CITY OF LEWISTON

WASTEWATER MASTER PLAN UPDATE

July 13, 2018

GROWING POSSIBILITIES ▶

KELLER ASSOCIATES

JULY 2018

CITY OF
LEWISTON, IDAHO

Wastewater System Master Plan

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EXECUTIVE SUMMARY

ES.1 INTRODUCTION

This planning study has been prepared to summarize the current condition of the City of Lewiston wastewater facilities, and to determine alternatives to provide adequate transport and treatment of wastewater for current and future conditions.

ES.2 BASIS OF PLANNING

The projected population, assuming a 0.75% annual growth rate (reflecting current trends), is shown in Table ES.1.

TABLE ES.1 – LEWISTON DEMOGRAPHIC PROJECTIONS

Year	Design Year	Population (0.75% growth)
2020	5-year	34,368
2025	10-year	35,677
2035	20-year	38,445
2055	40-year/ buildout	44,641

Lewiston's wastewater flows come from domestic (residential and commercial) and industrial users. In addition to new domestic users from population growth, the City has been looking into the possibility of serving a number of residents who are currently on individual septic systems. For planning purposes, about 550 existing homes currently on septic were assumed to be added by 2025, utilizing available downstream conveyance capacity.

There are several industries that generate wastewater, including three significant industrial users (CCI Ammunition, Blue Ribbon Linen, and Vista Outdoor Southport Facility) whose combined flows constitute approximately 12% of the total flow to the treatment plant. For the planning period, two additional industries similar in size to Blue Ribbon Linen were assumed to be added, one in year 2025 and the other in year 2035. Beyond 2035, industrial flows were assumed to grow at the same annual growth rate as the domestic population (0.75%).

For Lewiston, infiltration is approximately 30% of the total flow into the treatment plant. While storm water inflow likely has an impact on plant influent, historical peak flows at the plant have not corresponded to storm events.

Table ES.2 summarizes the flow projections for the Lewiston wastewater treatment plant (WWTP).

TABLE ES.2 – FLOW PROJECTIONS

Flow, MGD	2015	2020	2025	2035	2055
Annual Average	3.77	4.07	4.47	4.98	5.76
Max Month	4.23	4.57	5.02	5.59	6.46
Max Day	4.94	5.34	5.86	6.52	7.55
Peak Hour	8.10	8.75	9.62	10.70	12.38

EPA issued a new NPDES permit for the City of Lewiston on December 9, 2015. The permit has essentially the same effluent limits as the old permit along with some additional monitoring requirements.

The planning criteria for the WWTP are summarized in Table ES.3. Though the new permit did not include an ammonia limit, additional ammonia monitoring was required, and potential future ammonia limits were considered in the evaluation.

TABLE ES.3 – 20-YEAR (2035) PLANNING CRITERIA FOR THE LEWISTON WWTP

Parameter	Units	Influent	NPDES Effluent Permit Requirements		
			Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit
Average Day Flow	MGD	4.98			
Maximum Month Flow	MGD	5.59			
Peak Day Flow	MGD	6.52			
BOD_5	mg/L lb/day % removal	229 9,500 -	30 1,430 85	45 2,145 -	- - -
TSS	mg/L lb/day % removal	228 9,460 -	30 1,430 85	45 2,145 -	- - -
E. coli Bacteria	#/100 mL		126/100	-	406/100
Ammonia[1]	mg/L	27.4	--	7.4	21.8
pH	SU		Daily min. and max. between 6.5 and 9.0		

1 - Potential, based on limits for Clarkston WWTP (water quality based).

Other planning criteria for the wastewater system are related to the reliability of unit processes, which generally involves providing redundant equipment. For the highest level of reliability, at least two units are required for screens, pumps, primary and secondary clarifiers, aeration basins, blowers, pumps, disinfection, and digesters. Firm capacity (capacity with the largest unit out of service) should be sufficient for:

- Screens – peak instantaneous flow
- Primary clarifiers – 50% of design flow
- Secondary clarifiers – 75% of design flow
- Blowers – design oxygen transfer
- Pumps – peak flow

A gravity pipeline is generally assumed to have insufficient capacity if surcharging occurs during a peak hour flow condition.

ES.3 COLLECTION SYSTEM ASSESSMENT

The City of Lewiston owns approximately 81.8 miles of gravity pipelines, ranging in size from 6 inches to 48 inches in diameter. About 12.1% of the total length is 6-inch diameter gravity pipe, which does not meet the DEQ's minimum standard (8-inch) for new gravity sewer pipe. The majority of the pipes are concrete (40.2%), plastic (34.4%), or clay (24.0%). Concrete pipe is more susceptible to hydrogen sulfide corrosion than plastic; clay pipe material usually indicates the oldest pipe in the system.

The City maintains 11 wastewater lift stations - four owned by the City, six owned by the Lewiston Orchards Sewer District, and one owned by the Nez Perce Tribe. Nine of the pump stations include duplex, constant speed submersible pumps; two use duplex, vacuum primed

suction lift pumps. All of the lift stations have relatively new supervisory control and data acquisition (SCADA) systems.

ES.4 COLLECTION SYSTEM IMPROVEMENTS

The following summarizes the improvement projects to the City's collection system:

ES.4.1 1A – PIPELINE RECONSTRUCTION ALONG 11TH AVE AND PROSPECT TO 10TH AVE

The existing line is undersized and the liner is failing. Additionally, the City needs to reconnect service to an existing home that lost service due to the condition of the pipeline.

ES.4.2 1B – LIFT STATION UPGRADES

This project groups together all of the lift station upgrades described in Chapter 2.

ES.4.3 1C– ENGINEERING INVESTIGATION OF ACCESS OPTIONS

Chapter 2 lists the access issues and this project is a study to determine viable options for improved access.

ES.4.4 2A – 24TH STREET NORTH PIPELINE REPLACEMENT – 3RD AVE N TO 1ST AVE N

This project will increase the capacity of the sewer main in North Lewiston to accommodate future industrial growth. About 800 feet of 12-inch sewer main will be installed as a part of this project.

ES.4.5 2B – PIPELINE REPLACEMENT – 11TH AVE TO 16TH AVE BETWEEN 21ST ST AND 23RD ST

Nearly 2,300 feet of 8-inch pipeline will be replaced with this project. The existing sewer main does not follow a roadway and the City should consider re-routing the sewer line into a road to make access easier. The City should monitor flow in the pipeline reach. Provided growth continues as expected, it is likely this project will need to be completed in the next 5-10 years.

ES.4.6 2C/3E – EAST ORCHARDS SEWER EXPANSION PHASE 2 AND 3

This project will expand on the trunk lines constructed as a part of Priority 1a and make sewer service available to the remaining homes on septic east of Lewiston and help reduce nitrate concerns in the area. In total, the sewer mains needed for this phase total over 29,000 feet. Also included in this project is a small lift station. The City should explore grant funding to help cover the cost of the expansion.

ES.4.7 2D – DESIGN AND CONSTRUCTION OF ACCESS IMPROVEMENTS

After completion of Priority 1c, design and construction will proceed with providing access where practical. This project assumes a total of approximately 13,000 feet of roadway will be constructed/improved along with improvements to about 45 manholes.

ES.4.8 3A – PIPELINE REPLACEMENT NEAR LEWISTON COUNTRY CLUB

The existing pipeline has several segments without much slope. These areas act as bottlenecks that limit the overall capacity of the line. In total, the project includes about 2,200 feet of 12-inch sewer main and 100 feet of 8-inch sewer main.

ES.4.9 3B – MAIN STREET PIPELINE REPLACEMENT – 9TH ST TO 6TH ST

The existing pipeline in this area is installed at less than minimum slope. Although not currently an issue, this project will reconstruct pipelines to achieve desired pipeline capacities.

ES.4.10 3C – G STREET PIPELINE REPLACEMENT – 15TH ST TO 16TH ST

The existing pipeline in this area is installed at less than minimum slope. Although not currently an issue, this project will reconstruct pipelines to achieve desired pipeline capacities.

ES.4.11 3D– PIPELINE RECONSTRUCTION DOWNSTREAM OF COSD WARNER DISCHARGE POINT

The existing pipeline in this area is installed at less than minimum slope. Although not currently an issue, this project will reconstruct pipelines to achieve desired pipeline capacities.

In addition to the collection system projects listed here, the City has also begun an Infiltration and Inflow (I/I) evaluation that will be completed in Fall 2018. This evaluation will be used to inform the City's closed-circuit television (CCTV) inspection program for the next few years as they work to pinpoint and reduce I/I in the collection system.

ES.5 TREATMENT PLANT ASSESSMENT

The City owns and operates a Class IV wastewater treatment plant (WWTP), which provides wastewater treatment service for the City of Lewiston, the Lewiston Orchards and Central Orchards sewer districts, and the Nez Perce Tribe. The wastewater treatment process consists of screening and grit removal, primary clarification, activated sludge treatment, secondary clarification, and ultraviolet (UV) disinfection. Treated wastewater is pumped and discharged into the Clearwater Arm of Lower Granite Dam Pool. Biosolids generated in the treatment process are thickened, anaerobically digested, and dewatered before being hauled to an offsite contractor for further treatment via composting.

The condition of the WWTP equipment, capacity, redundancy, hydraulics, and treatment performance were evaluated to determine deficiencies. The majority of the plant facilities are over 30 years old, with the following ages as of 2018:

- Primary plant (primary clarifiers, digesters #1 & #2): 60 years old
- Secondary plant (aeration basins, blowers, secondary clarifier No. 1, recycle activated sludge (RAS) pumps, solids building, gravity thickener, sludge mixing tank): 44 years old
- South Shore Pump Station: 44 years old (structure; pumps have been replaced or rebuilt)
- Effluent Pump Station: 44 years old (structure; pumps have been replaced or rebuilt)
- Screens, diffusers, secondary clarifier No. 2, dissolved air floatation (DAF) thickener, sludge holding tank: 35 years old

The condition of some of the units is such that rehabilitation or replacement in the next few years is recommended to insure reliable ongoing service. A summary of major treatment plant components and their condition is presented in Table ES.4.

TABLE ES.4 – UNIT PROCESS DEFICIENCY SUMMARY

Equipment	Backup Rating	Criticality Rating	Condition Rating	Issues to be addressed
South Shore Pump Station	2	S/H, EQ, PF, CC	M (New pumps 2015)	Air release
North Shore Pump Station	2	S/H, EQ, PF, CC	W/R	Ragging, concrete spalling, flow measurement, pipe corrosion
Standby Power/Main Switchgear	1	S/H, EQ, PF, CC	N (2017)	
Septage Receiving	5	PF	W/R	Grinder, maintenance, efficiency
Screening	5[1]	EQ, PF	M	Single washer-compactor, poor screen cleaning, bldg. corrosion
Grit Removal	1	PF	M	Freezing, grit accumulation in piping
Primary Clarifiers	5	EQ, PF	W/R	Redundancy, sludge scraper/scum skimmer corrosion, concrete spalling
Primary Sludge Pumps	1	PF	N (2014)	
Aeration Basin	5	EQ, PF	W	Concrete spalling, uneven distribution, capacity, slide gates
Blowers	5	EQ, PF, CC	R	Age, lack of redundancy, efficiency
Secondary Clarifiers	5	EQ, PF	W	Redundancy, drive vibration, coating deterioration, scum accumulation
RAS Pumps	5	EQ, PF	R	Lack of redundancy, efficiency
WAS Pumps	1	PF	N (2013)	
Gravity Thickener	5	EQ, PF	W	Deteriorated drive mechanism & scum baffle, missing skimmer arm, redundancy
DAF Thickener	5	EQ, PF	M	Efficiency, maintenance, spilling/spraying
Sludge Blending	4	PF	W/R	Mixer, odors
Anaerobic Digestion	2	EQ, PF	M	Struvite formation
Sludge Holding	4	PF	W/R	Mixing, corrosion (Tank #1)
Belt Press Dewatering	5[2]	PF, CC	W/R	Maintenance, redundancy
UV Disinfection	5	EQ, S/H	W	Redundancy, efficiency, maintenance, age
Utility Water Pumps	1	PF	M	Head loss in distribution
Effluent Pumps	1	S/H, EQ, PF, CC	R	Age (reliability)

Notes:

1. While there are 2 screens, there is only one washer-compactor resulting in the backup rating of 5.
2. With the Andritz dewatering unit out of service, there is no dewatering redundancy.

Backup Rating

- **1** **One Level of "In Kind" Redundancy** (Identical piece of equipment is available to replace primary unit)
- **2** **Two or More Levels of "In Kind" Redundancy** (More than one piece of equipment is available for replacement)
- **3** **Equipment Alternative** (An alternative piece of equipment is provided)
- **4** **Procedural Alternative** (An alternative operating procedure is required to provide redundancy)
- **5** **No Backup** (Failure of equipment will shut entire process down)

Criticality Rating

- **S/H** **Safety and Health Risk** (Loss would create risk to safety and health of plant personnel and others)
- **EQ** **Effluent Quality Risk** (Loss would create risk to WWTP effluent quality and could result in NPDES permit violations)
- **PF** **Process Functionality Risk** (Loss would affect the function and/or efficiency of the affected processes)
- **CC** **Cost Critical** (Loss would have a significant cost impact in short term or long term)

Equipment Condition Rating

- **N** **New** (Equipment is new, or replaced in last 12 months)
- **LN** **Like New** (Equipment is operated very little or recently overhauled to a condition like new)
- **M** **Used but Maintained** (Equipment showing expected wear, but is adequately maintained and functions well)
- **W** **Heavily Worn** (Equipment is close to end of useful life, needs overhaul, difficulty in performing intended functions
- **R** **Needs Replacement** (Equipment does not acceptably perform, beyond cost-effective repair)

To identify potential bottlenecks in the treatment process, each plant component was evaluated based on both the process performance and the hydraulic limitations. The capacities are summarized in Table ES.5.

TABLE ES.5 – PLANT CAPACITY RESULTS

Component	Firm Cap'y (MGD)[1]	2015 Cap'y Needed (MGD)	2035 Cap'y Needed (MGD)	Limiting Factor
South Shore Pump Station	15.12	8.09 (PHF)	10.12 (PHF)	Redundancy: 3 pumps in service
North Shore Pump Station	2.97	0.67[2] (PHF)	1.13[2] (PHF)	Redundancy: 2 pumps in service
Headworks Screens	9.36[3]	8.47[2] (PHF)	11.07[2] (PHF)	Redundancy: 1 unit in service
Headworks Grit Chambers	14.0	8.47[2] (PHF)	11.07[2] (PHF)	Performance
Parshall Flume Flow Meter	10.6	10.9[2] (PIF)	14.3[2] (PIF)	Hydraulic
Primary Clarification	8.55	8.47[2] (PHF)	11.07[2] (PHF)	Redundancy & Performance
Aeration Basin (Incl. Blowers)	3.7	4.2 (MM)	5.6 (MM)	Redundancy & Performance
Secondary Clarification	7.3	8.1 (PHF)	10.7 (PHF)	Redundancy & Performance
UV System	7.88	8.1 (PHF)	10.7 (PHF)	Redundancy & Performance
Effluent Pump Station	25.1	8.1 (PHF)	10.7 (PHF)	Redundancy: 2 pumps in service

Notes:
[1] MGD – million gallons per day, PHF – Peak Hour Flow, PIF – Peak Instantaneous Flow, MM – Max Month Flow
[2] Assuming plant recycle flow rate of 0.37 MGD
[3] Assuming clean water is used to clean screens

A hydraulic evaluation of the liquid process was conducted to determine the facility's ability to handle the peak flows that each unit is expected to experience through the year 2035. The Parshall flume downstream of the screening channel is a limiting hydraulic component. At peak *instantaneous* flows including recycle, flows would potentially overtop the grit structure and Parshall flume. This situation is typically avoided by bypassing the grit units and primary clarifiers.

The plant has performed adequately to meet the current effluent limits for BOD, TSS, fecal coliform, E. coli bacteria, and pH. While the Lewiston WWTP does not currently have a permit limit that requires nitrification, the plant is operated to achieve nitrification for process settleability reasons. For example, in the winter of 2017-2018 the WWTP dropped out of nitrification and secondary clarification was significantly impacted. The sludge rose in the secondary clarifiers several feet with little to no response to RAS/WAS rate adjustments. Additional aeration basins and blowers will be necessary in order to consistently meet nitrification and settleability requirements in the future.

ES.6 TREATMENT PLANT IMPROVEMENTS

The following improvements are recommended to address the identified deficiencies (summarized in Tables ES.4 and ES.5, and as noted by staff for support facilities).

- **South Shore Pump Station:** Replace the air release structure. This is being done through the City's operations budget.
- **North Shore Pump Station:** Add a new concrete wet well with fall protection grate, three new screw centrifugal submersible pumps (two duty and one standby), discharge piping, a valve vault, and new electrical and controls. These modifications will allow the wet well to be drawn down and address the failing concrete. The

proposed improvements will, also increase size of flume that measures the sewage flow from North Lewiston from 6" to 15".

- **Septage Receiving:** Provide basin modifications, improved screening system, and better grinding.

- **Headworks:** Change screen spray water from primary effluent to disinfected plant effluent water. Upgrade the screens to provide the necessary future hydraulic capacity for 2035 flows. Provide second Washer-Compactor to provide redundancy (at a minimum, provide a spare motor).

  Add doors to enclose the structure, cover the water surfaces, and add an HVAC system adequate to control the building humidity and maintain negative pressure below the covers. Clean and repaint building interior. Review the electrical system to ensure compliance with NFPA 820.

  Install additional heat tape and insulation on the grit piping. To address issues with grit accumulation in the pump suction lines, consider increasing the pipe suction line size, reducing the number of fittings in the pipe (if possible), and eliminating dead spots in the piping.

- **Primary Clarifiers:** Construct a third 55 ft. diameter primary clarifier, along with a new clarifier influent flow splitter. Replace the clarifier mechanisms in the existing clarifiers. Add new fiberglass weirs and scum baffles, and refinish and seal the existing concrete structures.

- **Aeration Basins:** Add a new splitter box to the aeration basins for primary clarifier effluent and RAS, to evenly distribute the mixed liquor and primary effluent flow to the aeration basins.

  Repair and recoat the damaged concrete walls in the aeration basins. Remove the slide gates into the aeration basins. Construct new internal basin walls to create a smaller selector volume and a better flow pattern to decrease filamentous bacteria growth. Provide mixing of the selector.

  While the Lewiston WWTP does not currently have a permit limit that requires nitrification, the plant is operated to achieve nitrification for process settleability reasons. Carbonaceous operation (lower solids retention time (SRT)/lower mixed liquor concentrations) was recently attempted, but was found to not be feasible. Since longer SRTs are required, nitrification will be unavoidable and additional aeration and aeration basins will be required. Upgrade the aeration basin equipment by changing to fine bubble diffusers and high efficiency blowers with VFDs to vary blower speed to match oxygen demand. Provide electric air valves and flow meters to control the air delivered to each cell in the aeration basins based on dissolved oxygen measurements. Construct one new aeration basin to provide the necessary volume for consistent nitrification.

  Replace the existing basin drain valves and piping to allow easier basin draining. Replace the existing air piping with new air piping including electrically actuated air valves and air flow meters for automatic air flow control. The existing air piping does not allow for a good balance of air flow.

  Correct the effluent flow split from the aeration basins to the secondary clarifiers by adding a new mixed liquor flow splitter box. The splitter box will include scum removal pumping, so scum is not trapped in the aeration basins.

  It is also recommended that a pre-treatment survey be conducted to identify industries that may be discharging inhibitory substances to the WWTP, and that the City require additional monitoring and pretreatment by the identified industries to protect the WWTP.

- **Secondary Clarifiers:** Add a third secondary clarifier and upgrade the existing RAS/WAS pump station. The RAS/WAS pump station upgrade will address pump redundancy, RAS pump age, and lack of isolation from the secondary clarifiers. The upgraded facility will include four new RAS pumps, two existing WAS pumps, and isolation from each existing clarifier as well as a new secondary clarifier. The piping, valves, and flow metering inside the existing pump station will be replaced. Knife gate valves will be used for isolation rather than plug valves due to the smaller foot print required.

  Investigate the existing secondary clarifier mechanisms and address the mechanical vibration issues. Evaluate conversion of Clarifier 1 to a center feed clarifier to address its performance issues.

- **UV Disinfection:** New UV disinfection system to replace the old UV system and address the redundancy inadequacy. Provide newer technology that includes dose pacing of the lamps to save energy, an automatic wiping system for cleaning the lamps and more efficient lamp technology.

  The new UV system should be able to handle the 2035 peak hour design flow with one bank in each channel out of service. This redundancy would allow the UV system to maintain peak hour capacity while removing lamps for replacement or system maintenance.

  The existing isolation gates do not seal properly and should be replaced as part of this project. The walls in the channels should have surface treatment to repair and protect the channel walls from future surface erosion due to carbonation.

- **Effluent Pumps:** Begin replacement with brand-new pumps (one pump at a time or all at once). The pump replacement may be done through the City's operations budget.

- **Hypochlorite Backup System and 3W Water System:** The current hypochlorite system is not functional. Provide a functioning chlorination system (chlorine gas or sodium hypochlorite) for use as backup for the UV system, and also for chlorinating RAS when needed to control filaments and improve settling.

  The 3W water system has insufficient capacity to handle the plant needs, plus the line sizes are too small to deliver the required flow to all areas of the plant. Increase the 3W pump capacity, and loop the piping system to better deliver 3W to all areas of the plant. Place strainers where necessary in the 3W line to avoid plugging in the equipment. Add new lines to the influent screens for cleaning, and to the aeration basins for scum/foam suppression.

- **Solids Thickening**: Remove the gravity thickener from operation and replace the existing primary sludge pumps with new pumps that will pump at a lower flow rate and be able to be turned on and off. This will allow solids thickening in the primary clarifiers rather than in the gravity thickener. In addition to new primary sludge pumps, some of the smaller piping will be replaced. Removing the gravity thickener and replacing it with a new primary sludge pump station should decrease the amount of plant recycle water and also eliminate a source of odor.

  Provide spare motors for the DAF thickener to add redundancy for the WAS thickening. In order to avoid spraying in the DAF, recommended measures include: operating at a different water level, changing the skimmer speed, changing the polymer dose, or changing the timer control logic. Also provide new pipelines and valves to direct WAS into the dewatering, primary clarifiers, and/or blended sludge tank to provide operational flexibility and redundancy.

- **Sludge Blending / Holding Tanks:** Repair/replace mixer in the Sludge Blending Tank and design a mixing system for the Sludge Holding Tanks. Recoat interior of the

tanks. It is also recommended that a new odor control system be designed and constructed for the Sludge Blending Tank.

- **Solids Processing:** Replace the existing Andritz belt filter press and conveyor, located on the second floor of the Solids Building, with new dewatering equipment and a new conveyor. Keep the existing BDP belt filter press in place on the first floor of the Solids Building. Add two new dewatering feed pumps to replace the existing near the anaerobic digesters.

  An understanding of the industrial toxins and long-chain fatty acids identified in the influent to the WWTP is also needed. These contaminants have a detrimental effect on the sludge dewatering and should be controlled or eliminated.

- **Potable Water System:** Replace potable water system lines where corroded, and install reduced pressure backflow prevention devices where the potable water system is direct tapped. Extend potable water line to complete a loop near the sludge containment bay.

- **Plant Buildings and Security:** Install a new roof on the Digester Control Building to correct damage and drainage issues, and route drainage from the new roof drain to the North Shore Pump Station.

  Construct a new storage facility on the southeast corner of the WWTP to provide sufficient storage space and room for fabrication.

  Improve security to allow haulers, vendors, and City employees controlled access to the plant.

  Add to the Administration Building for locker rooms, showers, offices, conference space, and mud room by expanding the building upward to create a new section of 2nd floor space.

- **Vehicles:** It is recommended that a policy be implemented that provides a budget for vehicle and mobile equipment expenditures.

ES.7 CAPITAL IMPROVEMENT PLAN

Table ES.6 summarizes recommended capital improvement costs for the WWTP and collection system. Priority 1 improvements are required now, Priority 2 improvements from 2021 to 2025, and beyond 2025 are Priority 3 improvements. The City should recognize that changes in permit requirements may require new projects to be considered. These costs are planning level estimates and should be reviewed and updated through the pre-design and design phases of each project.

TABLE ES.6 – WWTP AND COLLECTION SYSTEM PRIORITY IMPROVEMENTS (CONT.)

ID	Item	Primary Purpose	Capital Improvement Plan (2017 Dollars)
Priority 1 Improvements			
Wastewater Treatment Plant			
1A	UV System	Capacity/Redundancy	$ 1,225,000
1B	Aeration Basins, Blowers, and Flow Splitting	Operations/Capacity	$ 7,501,000
1C	Primary Clarifier Rehabilitation	Operations/Replacement	$ 1,046,000
1D	New RAS/WAS Pumping	Redundancy	$ 1,164,000
1E	Dewatering	Replacement/Redundancy	$ 1,523,000
1F	Solids Thickening	Replacement/Redundancy	$ 993,000
1G	New Aeration Basin	Capacity/Redundancy	$ 4,973,000
1H	North Shore Pump Station	Operation/Capacity	$ 1,275,000
1I	Screen Washer/Compactor	Redundancy	$ 28,000
1J	Investigate Dissolved Air Floatation (DAF)	Operations/Redundancy	$ 81,000
1K	Sludge Blending and Sludge Holding Tanks	Operations/Replacement	$ 1,050,000
1L	Plant Security	Operations	$ 105,000
1M	New Primary Clarifier; Flow Splitting and Piping	Capacity/Redundancy	$ 1,469,000
1N	New Secondary Clarifier	Capacity/Redundancy	$ 3,673,000
		Wastewater Treatment Plant Subtotal	**$ 26,106,000**
Wastewater Collection System			
1a	Pipeline Reconstruction along 11th Ave and Prospect Ave to 10th Ave	Capacity	$ 199,000
1b	Lift Station Upgrades	Capacity/Redundancy	$ 314,000
1c	Engineering Investigation of Access Options	Operations	$ 150,000
		Wastewater Collection System Subtotal[1]	**$ 663,000**
		Total Priority 1	**$ 26,769,000**
Priority 2 Improvements (2021 - 2025)			
Wastewater Collection System			
2a	24th Street North Pipeline Replacement - 3rd Ave N to 1st Ave N	Replacement	$ 223,000
2b	Pipeline Replacement - 11th Ave to 16th Ave between 21st and 23rd St	Replacement	$ 584,000
2c	East Orchards Sewer Expansion Phase 2	Nitrate Reduction	$ 2,000,000
2d	Design and Construction of Access Improvements	Operations	$ 1,395,000
		Wastewater Collection System Subtotal	**$ 4,202,000**
		Total Priority 2	**$ 4,202,000**
Priority 3 Improvements (Beyond 2025)			
Wastewater Treatment Plant			
3.1	Administration Building	Operations	$ 735,000
3.2A	Hypochlorite System	Replacement	$ 452,000
3.2B	3W System (Plant Water; Non-potable, disinfected plant effluent)	Replacement	$ 368,000
3.2C	Potable Water	Replacement	$ 97,000
3.3	Digester Control Building	Operations	$ 231,000
3.4	Headworks Building	Operations	$ 1,784,000
3.5	Screen Washer/Compactor	Redundancy	$ 1,574,000
3.6	Influent Screens	Capacity/Redundancy	$ 1,155,000
3.7	Grit Chambers	Operations/Capacity	$ 58,000
3.8	Septage Receiving	Operations	$ 1,050,000
3.9	Shop Facility	Operations	$ 326,000
		Wastewater Treatment Plant Subtotal	**$ 7,830,000**
Wastewater Collection System			
3a	Pipeline Replacement near Lewiston Country Club	Replacement	$ 720,000
3b	Main Street Pipeline Reconstruction - 9th St to 6th St	Replacement	$ 304,000
3c	G Street Pipeline Reconstruction 15th St to 16th St	Replacement	$ 202,000
3d	Pipeline Reconstruction downstream of COSD Warner Discharge Point	Replacement	$ 68,000
3e	East Orchards Sewer Expansion Phase 3	Nitrate Reduction	$ 3,879,000
		Wastewater Collection System Subtotal	**$ 5,173,000**
		Total Priority 3	**$ 13,003,000**

Note:
1. City plans to fund the Priority 1 Collection System projects through its operations budget.

TABLE ES.7 – FY 2019 - FY 2021 CAPITAL IMPROVEMENT PLAN

ID#	Project Description	Cost (2017 dollars)	Capital Improvement Costs (inflated dollars)[1] FY 2019	FY 2020	FY 2021
Wastewater Treatment					
1A	UV System	$ 1,225,000	$293,100	$702,000	$305,000
1B	Aeration Basins, Blowers, and Flow Splitting	$ 7,501,000	$1,794,900	$4,298,500	$1,867,400
1C	Primary Clarifier Rehabilitation	$ 1,046,000	$250,300	$599,400	$260,400
1D	New RAS/WAS Pumping	$ 1,164,000	$278,500	$667,000	$289,800
1E	Dewatering	$ 1,523,000	$364,400	$872,800	$379,200
1F	Solids Thickening	$ 993,000	$237,600	$569,000	$247,200
1G	New Aeration Basin	$ 4,973,000	$1,190,000	$2,849,800	$1,238,100
1H	North Shore Pump Station	$ 1,275,000	$305,100	$730,600	$317,400
1I	Screen Washer/Compactor	$ 28,000	-	$29,700	-
1J	Investigate Dissolved Air Floatation (DAF)	$ 81,000	$26,000	$59,400	-
1K	Sludge Blending and Sludge Holding Tanks	$ 1,050,000	$251,300	$601,700	$261,400
1L	Plant Security	$ 105,000	$25,100	$60,200	$26,100
1M	New Primary Clarifier; Flow Splitting and Piping	$ 1,469,000	$351,500	$841,800	$365,700
1N	New Secondary Clarifier	$ 3,673,000	$920,500	$2,104,800	$229,200
	Subtotal	**$ 26,106,000**	**$ 6,288,300**	**$ 14,986,700**	**$ 5,786,900**
Wastewater Collection[2]					
1a	Pipeline - 11th Ave and Prospect Ave to 10th Ave	$ 199,000	$26,900	$172,100	-
1b	Lift Station Upgrades	$ 314,000	$42,500	$271,500	-
1c	Engineering Investigation of Access Options	$ 150,000	$156,100	-	-
	Subtotal	**$ 663,000**	**$ 225,500**	**$443,600**	**$ -**
Annual Replacement Budget					
	WWTP short-lived assets	$700,000	$728,300	$742,800	$757,700
	Pipeline replacement	$1,000,000	$1,040,400	$1,061,200	$1,082,400
	Vehicle replacement	$170,000	$176,900	$180,400	$184,000
	Subtotal	**$1,870,000**	**$ 1,945,600**	**$1,984,400**	**$ 2,024,100**
	TOTAL	**$28,639,000**	**$8,459,400**	**$17,414,700**	**$7,811,000**

1. Annual inflation assumed for establishing future capital costs = 2%
2. City plans to fund Priority 1 Collection System projects through operations budget.

A user rate model was developed to reflect the anticipated revenues and expenses and to approximate anticipated rate increases needed to fund improvements. For the purpose of this study, user rates were assumed to increase across all City accounts uniformly. Should the City desire to reevaluate the proportion of costs allocated to the base rate versus usage or to various types of users, a more detailed cost of service study should be completed. Table ES.8 summarizes recommended annual user rate increases.

TABLE ES.8 – USER RATE FORECAST

Fiscal Year	FY 2016	FY 2019	FY 2020	FY 2021	FY 2022
User Rate % Annual Increase		40%	2%	2%	2%
Typical Residential User Rate	$30.00	$46.30	$47.22	$48.17	$49.13

CHAPTER 1.0 – INTRODUCTION AND BASIS OF PLANNING

1.1 BACKGROUND

The City of Lewiston, Idaho is located in the Lewis Clark Valley in north central Idaho, at the confluence of the Clearwater and Snake Rivers. It is the goal of the City to maintain a high-performing sustainable utility infrastructure, provide continued protection of the health of City residents and the environment, and plan for future growth.

As part of the utility infrastructure, the City owns and operates a Class IV wastewater treatment plant (WWTP), which provides wastewater treatment service for the City of Lewiston and some surrounding areas. The City also maintains a gravity collection system and receives flow from two sewer districts – the Lewiston Orchards Sewer District (LOSD) and the Central Orchards Sewer District (COSD) – as well as the Nez Perce Tribe.

The City-owned portion of the collection system is comprised of approximately 81.8 miles of gravity pipelines and four lift stations. An additional two lift stations directly feed the City's wastewater treatment plant. The City also maintains five other lift stations owned by LOSD and one lift station owned by the Nez Perce Tribe.

The wastewater treatment process consists of screening and grit removal, primary clarification, activated sludge treatment, secondary clarification, and ultraviolet (UV) disinfection. Treated effluent is discharged into the Clearwater River less than a mile upstream of the Snake River. The discharge is regulated under a National Pollution Discharge Elimination System (NPDES) permit.

Biosolids generated in the treatment process are thickened, anaerobically digested, and dewatered before being hauled offsite for further treatment via composting.

1.2 RELATED STUDIES

This planning study is intended to be an update to the Wastewater System Master Plan prepared by Keller Associates (June 2016). Related studies used in the preparation of this document include the following:

- 2005 Wastewater Facilities Plan (May 2005)
- 2007 Flow Monitoring Report by CH2MHill (Sept 2007)
- 2008 Comprehensive Plan
- Water Master Plan prepared by CH2MHill (December 2010)
- Tammany Creek Area Sewer Feasibility Study prepared by Keller Associates (August 2011)
- Lewiston Wastewater Treatment Plant, Lewiston, Idaho, Background Research Paper prepared by Argonne National Laboratory (November 10, 2011)
- Preliminary Engineering Reports for the Equalization Basin Addition and the South Shore Pump Station by Keller Associates (April 2012)
- Technical Memorandum titled "Review of City of Lewiston's SCADA System Security" prepared by CH2MHill (June 16, 2012)
- Technical Memorandum titled "Lewiston Digester Gas CHP Feasibility Evaluation by JUB Engineers (March 1, 2013)
- Public Works Memorandum showing Notes from 7/15/2013 Task Force Meeting
- Laboratory Report by Andritz (January 3, 2014)
- Microbiological Assessment letter report by Callan Brooks Inc. (January 31, 2014)
- Industrial Wastewater Pretreatment Policy Manual (revised February 2014)

- Technical Memorandum titled "City of Lewiston WWTP – North Shore Pump Station Evaluation" prepared by Keller Associates (November 2017)
- Technical Memorandum titled "City of Lewiston WWTP – Dewatering System Evaluation" prepared by Keller Associates (November 2017)

The following is a list of the main components that have changed since the June 2016 Wastewater System Master Plan was completed:

- The WWTP Electrical Feed has been upgraded.
- The South Shore Pump Station (SSPS) switch gear was upgraded.
- The SSPS air release and the WWTP effluent pumps are being replaced under the maintenance budget and have been removed from the Capital Improvement Plan.
- Dewatering has been moved to a Priority 1 Improvement as the main belt filter press (Andritz unit) has been down for extended maintenance and the backup belt filter press (BDP unit) is not a long-term solution for the City's sludge dewatering.
- The North Shore Pump Station has been moved to a Priority 1 Improvement as the wet well has experienced significant concrete corrosion.
- Some collection system projects have been removed since the inverse grades on the drawings have been surveyed and the drawings found to be incorrect.
- The Priority 2 WWTP Improvements have been moved up to Priority 1 since these improvements will be needed by the time a construction project is completed.

1.3 SCOPE OF WORK

The following list highlights the major tasks included in this study:

- Development of planning criteria
- Data collection
- Assessment of existing wastewater treatment plant
- Development of recommended treatment plant improvement alternatives
- Collection system conditions assessment
- Evaluation of collection system performance and improvement alternatives
- Development of a capital improvement plan
- Evaluation of financial impacts on user rates

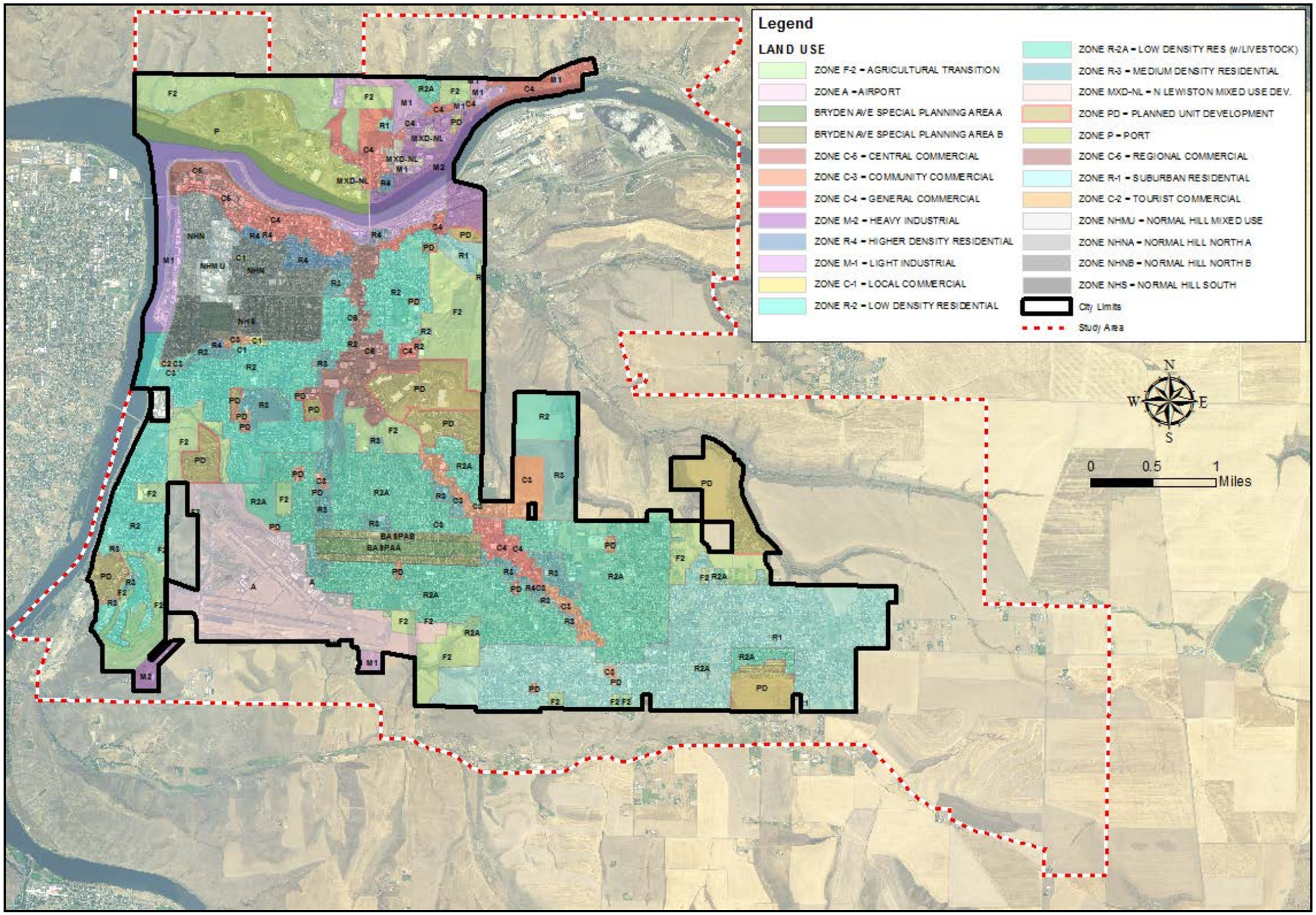
1.4 AUTHORIZATION

In May of 2018 the City of Lewiston, Idaho contracted with Keller Associates, Inc. to complete the wastewater treatment plant facility planning study. Funding for the study came from the City of Lewiston.

1.5 STUDY AREA AND LAND USE

Current land use and study area (also the impact boundary) were provided by the City and are illustrated in Figure 1.1 (See Appendix A for full-size figure).

FIGURE 1.1 – STUDY AREA AND LAND USE



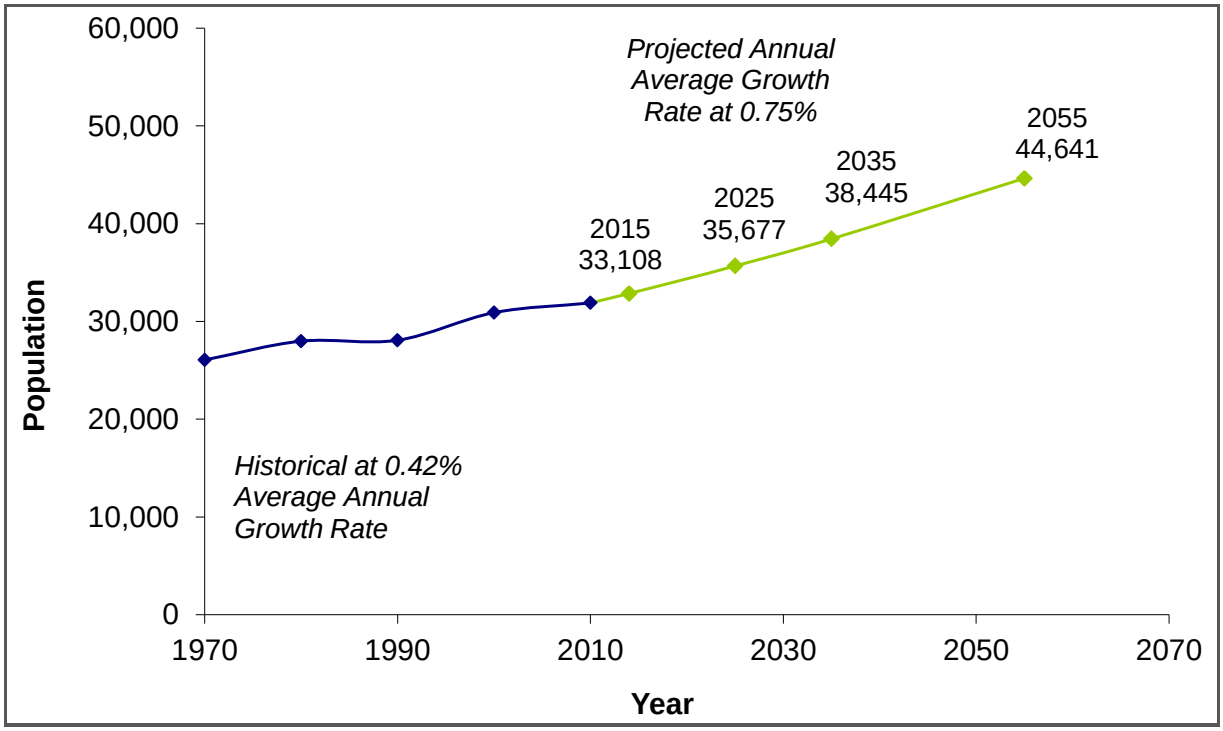
1.6 POPULATION PROJECTIONS

Demographic projections were developed with consideration of the 2008 Comprehensive Plan, 2010 Water Master Plan, 2011 Tammany Creek Area Sewer Feasibility Study, historical census populations, and discussions with City staff. Population projections were made for the 5-year, 10-year, 20-year, 40-year, and build-out time periods for the study area. Table 1.1 and Chart 1.1 illustrate the projected population assuming a 0.75% annual growth rate. While this growth rate is higher than the historical growth rate, it reflects current trends and provides a level of conservatism in the planning document. Population projections, as well as other planning assumptions should be reevaluated as part of future planning efforts.

TABLE 1.1 – LEWISTON DEMOGRAPHIC PROJECTIONS

Year	Design Year	Population (0.75% growth)
2010	Census	31,894
2015	Current	33,108
2020	5-year	34,368
2025	10-year	35,677
2035	20-year	38,445
2055	40-year/ buildout	44,641

CHART 1.1 – LEWISTON HISTORICAL POPULATION AND PROJECTED GROWTH



1.7 HISTORICAL FLOWS AND LOADING ANALYSIS

1.7.1 WASTEWATER TREATMENT PLANT INFLUENT FLOW SUMMARY

Table 1.2 summarizes the historical wastewater flows for 2005-2014. During this period, the annual average flows decreased from 3.89 million gallons per day (MGD) to 3.61 MGD. This decrease is primarily a result of City efforts to remove sources of infiltration and inflow and the ongoing transition to more efficient water fixtures. The highest daily flow to the plant was observed in 2011 at 4.94 MGD. The 2014 design values for this study are shown in Table 1.2. For evaluating maximum flow conditions, the highest recorded data for monthly and peak day flows were used rather than the 10-year average. This provides better assurance to the City that the collection system and treatment facility will remain in compliance.

TABLE 1.2 – LEWISTON INFLUENT FLOW SUMMARY (MGD)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005-2014 Avg	Design
Annual Average Day	3.89	3.86	3.94	3.74	3.84	3.74	3.78	3.72	3.61	3.61	3.77	**3.77**
Max Month	**4.23** **May 3 - June 2**	3.98 April 3 - May 3	4.21 Nov. 24 - Dec. 24	4.05 Dec. 28 - Jan. 27	4.06 Mar. 23 - Apr. 22	4.02 Feb. 26 - Mar. 28	4.07 Feb. 21 - Mar. 23	3.82 Oct. 14 - Nov. 13	3.74 Aug. 20 - Sept. 19	3.68 Apr. 24 - May 24	3.98	**4.23** **(5/2005)**
Peak Day	4.80 May 10th	4.62 June 4th	4.51 Nov. 18th	4.42 May 9th	4.63 Dec. 1st	4.87 June 2nd	**4.94** **March 3rd**	4.32 Jan. 19th	4.36 July 21st	4.22 Mar. 28th	4.57	**4.94** **(3/3/2011)**

Note:
1. 2014 data includes January through June.

1.7.2 INDUSTRIAL FLOWS

Lewiston's flows have been divided into two classifications – industrial and domestic (residential and commercial). Lewiston has several industries that contribute flow to Lewiston's collection system. The City provided daily discharge information for the three largest dischargers – CCI Ammunition, Blue Ribbon Linen, and Vista Outdoor, formerly ATK, Southport Facility (SPT). Chart 1.2 compares the total plant influent to the combined daily discharges of these three significant industrial user (SIU) flows for 2011-2013. Overall, the SIU's flows constitute approximately 12% of the total flow to the treatment plant. A breakdown by year and industry is provided in Table 1.3.

CHART 1.2 – TOTAL DAILY WWTP FLOW VS SIU FLOW (gpd)

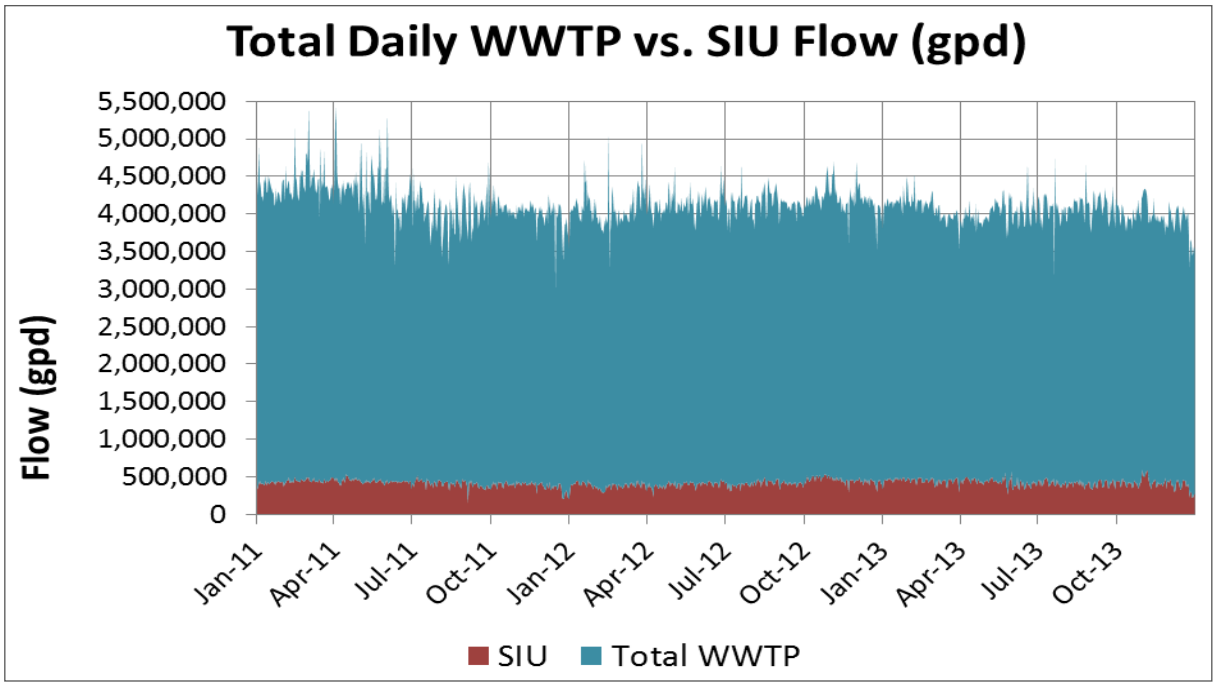


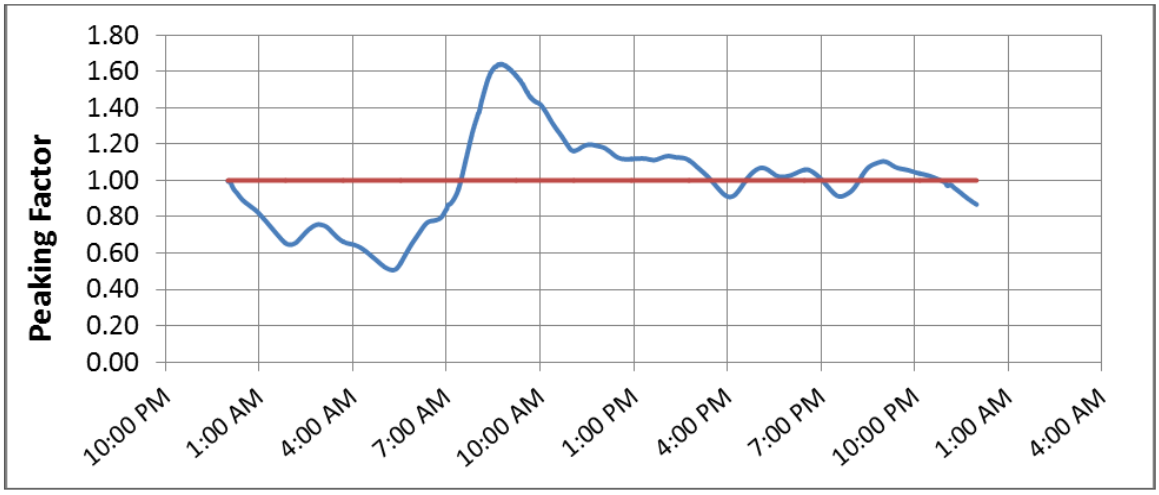
TABLE 1.3 – 2011-2013 SUMMARY OF SIGNIFICANT INDUSTRIAL USERS (SIU)

	2011				2012				2013			
	Average		Peak		Average		Peak		Average		Peak	
	(gpd)	(gpm)	(gpd)	(gpm)	(gpd)	(gpm)	(gpd)	(gpm)	(gpd)	(gpm)	(gpd)	(gpm)
CCI	389,888	271	528,327	367	367,822	255	487,507	339	374,285	260	526,770	366
Blue Ribbon Linen	41,821	29	52,430	36	43,079	30	64,570	45	52,256	36	178,794	124
SPT	11,119	8	18,823	13	10,082	7	21,300	15	13,638	9	23,466	16
TOTAL Average Industrial Inflow	442,829	308			420,983	292			440,179	306		
TOTAL Average WWTP Flow	3,777,250	2,623			3,725,462	2,587			3,612,550	2,509		
% Industry	12%				11%				12%			

1.7.3 PEAK HOUR FLOWS

The City provided a full year of continuous influent flow data exported from the City's SCADA system. Keller Associates used this data to develop a diurnal demand curve. A flow pattern was developed using data for August 19, 2014, which provided a representative pattern for a high flow day. Based on the analysis, the peak hour was estimated to be approximately 1.63 times the average daily flow (see Chart 1.3). This peak flow was observed around 9:00 AM. The minimum flow for the day was observed around 5:00 AM and was approximately 0.45 times (or 45%) of the average daily flow. The peaking factor was used to estimate existing and future peak hourly flows.

CHART 1.3 – UNIT CURVE



It should be noted that the flow curve was developed using a 1-hour moving average for influent flows. A review of the available SCADA data showed that the peak instantaneous (1-minute) flow was approximately 30% higher than the peak hourly flow.

1.7.4 INFILTRATION AND INFLOW

Infiltration and inflow refers to the groundwater and storm water that enters the wastewater system. Most cities strive to keep infiltration and inflow to a minimum amount. For Lewiston, infiltration is approximately 30% of the total inflow into the treatment plant. Inflow into the treatment plant was estimated by comparing the actual flows to the winter water consumption data and metered discharges from significant industrial users (CCI Ammunition and Southport). In estimating the infiltration for the Lewiston collection system, Keller Associates also accounted for metered flow data for COSD, LOSD, and the Casino Lift Station. Most of the infiltration and inflow likely occurs in the downtown area and in the drainage between Lindsey Creek and Warner Avenue where the depth to groundwater is reportedly shallower. Wastewater treatment influent data suggests that the infiltration does not change much seasonally. As the system ages, the potential for additional I/I sites increases and the City will need to be proactive to minimize this effect. For planning purposes, Keller Associates assumed that the City continued a rehabilitation program that maintained the current level of infiltration and inflow.

Chart 1.4 illustrates the average monthly flows, precipitation, and maximum and minimum daily flows, for the period of 2005 to 2014. There is no clear pattern of high rainfall months producing higher influent flows or seasonal variations in flows. Chart 1.5 shows the relationship between flows and peak precipitation days for the same time period. Even with rain events of greater than 1 inch in depth, influent flow rates appear to be relatively unaffected. A similar evaluation of the City's continuous SCADA data shows little or no increase in flows observed at the treatment plant following storm events (see Appendix C). Even with the low variation, there is still a sizable portion of the flow (30%) that appears to be associated with I/I. Infiltration and inflow is believed to be largely a result of the condition of pipelines and the groundwater levels in the area. The City is working on an I/I evaluation currently to better characterize the location and quantity of I/I into the system. The results of the study are anticipated to be available in Fall 2018.

CHART 1.4 – WWTP INFLUENT AND PRECIPITATION (2005-2014)

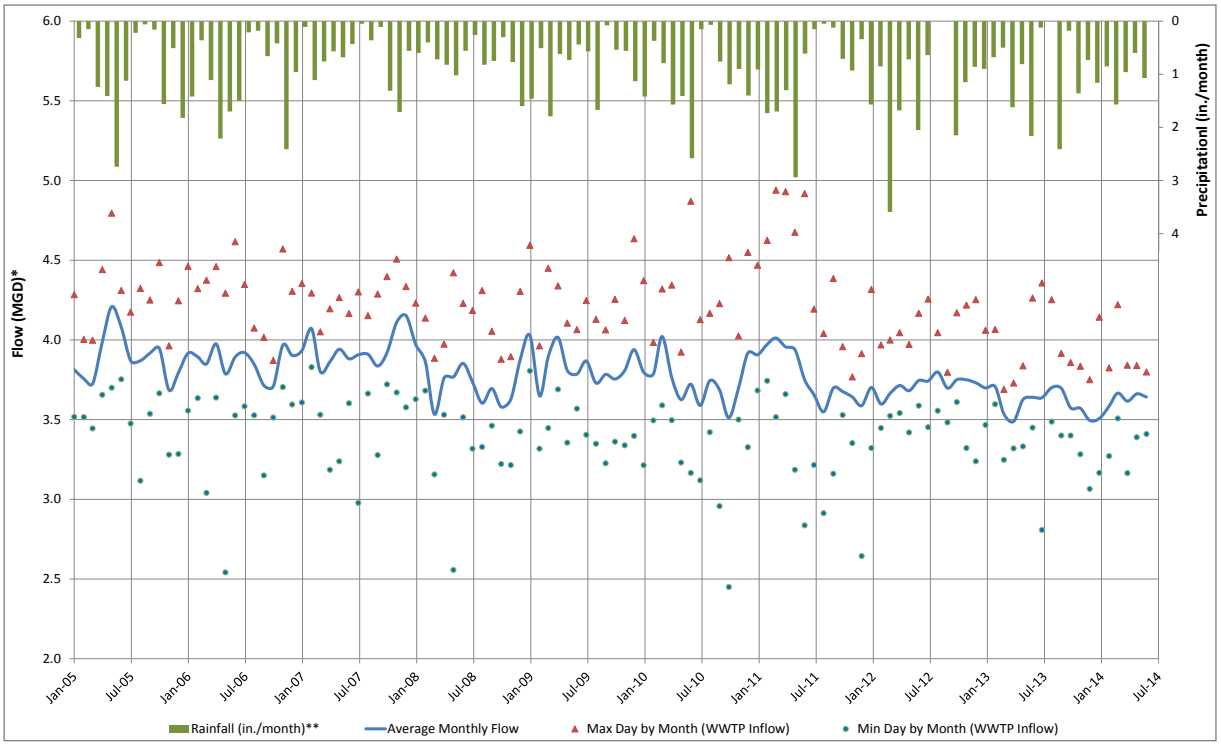
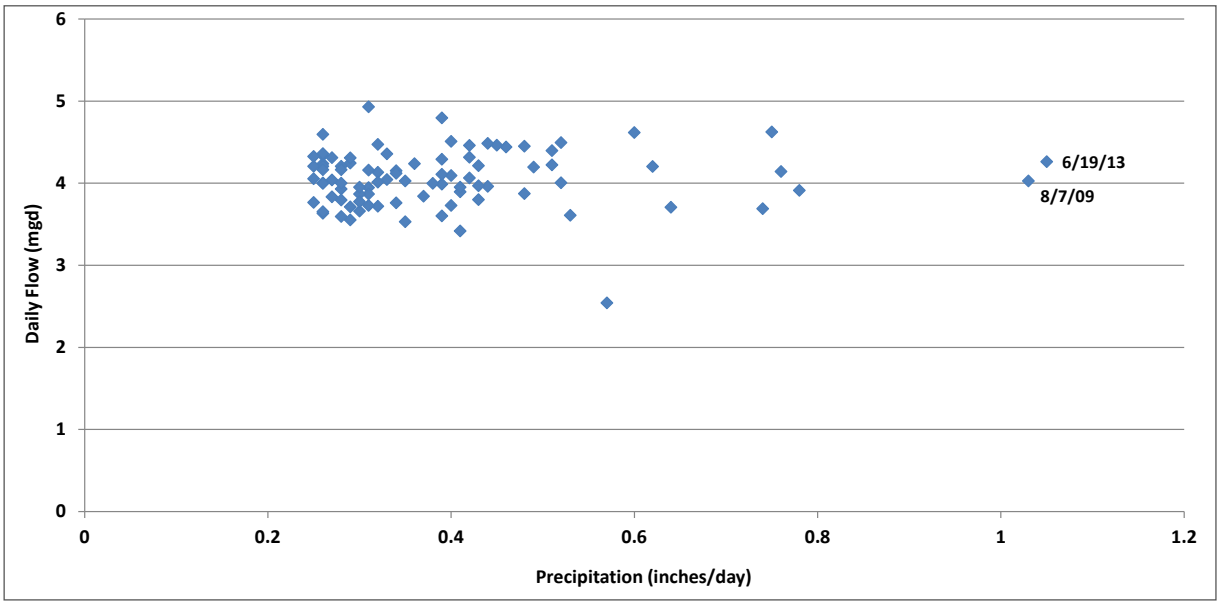


CHART 1.5 – DAILY WWTP FLOW VS. PRECIPITATION (2005-2014)



1.7.5 ALLOCATION OF EXISTING FLOWS

The domestic flows are allocated by joining individual meter-read data to their geospatially referenced shapefile location. Approximately 99% of the meter data was linked to the GIS, producing an excellent distribution of base flows. Special attention is given to the top users to ensure that their flows are allocated. In the case of CCI Ammunition, which has its own water supply source, metered discharges were used to allocate flows. For flows in the sewer districts, metered discharges into the City's system were spread out spatially throughout the service area. Flows from the Nez Perce Tribe were estimated from flow meter data and flows from the Water Treatment Plant were estimated using pump run time data.

1.7.6 BOD LOADING

The daily influent BOD concentrations and loads into the WWTP from January 2005 through June 2014 are provided in Charts 1.6 and 1.7. The influent BOD concentrations generally range from 100 to 300 mg/L, which are within the range of typical wastewater values. These concentrations equate to BOD loadings from 5,000 to 10,000 lbs/day. The BOD concentrations are fairly constant, especially during the past two years, and does not vary significantly based on the season. Again, this demonstrates that infiltration and inflow (I/I) flows are not a significant contribution to the collection system.

CHART 1.6 – WWTP INFLUENT BOD CONCENTRATIONS

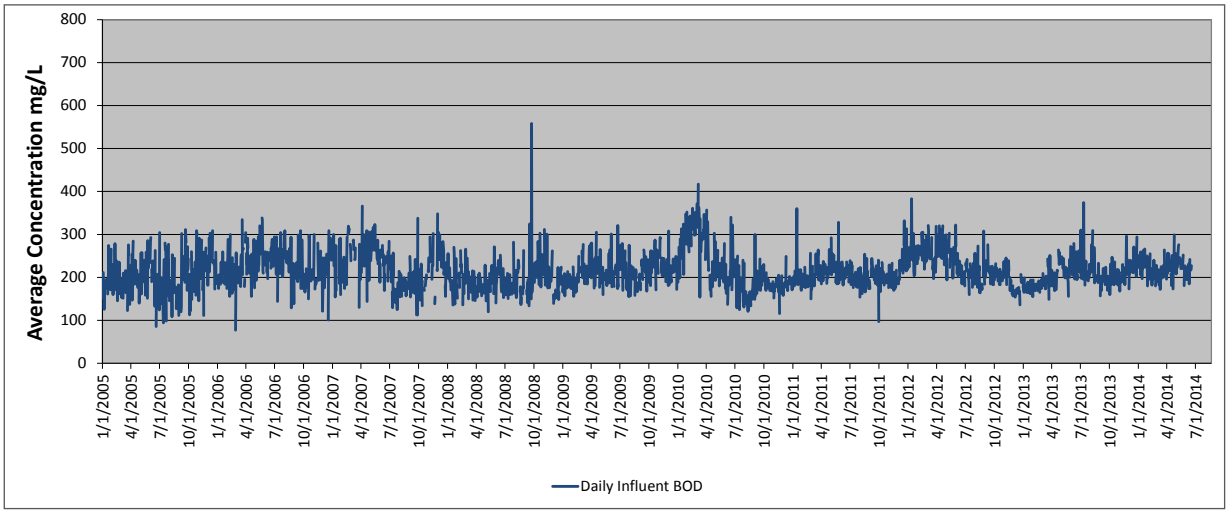
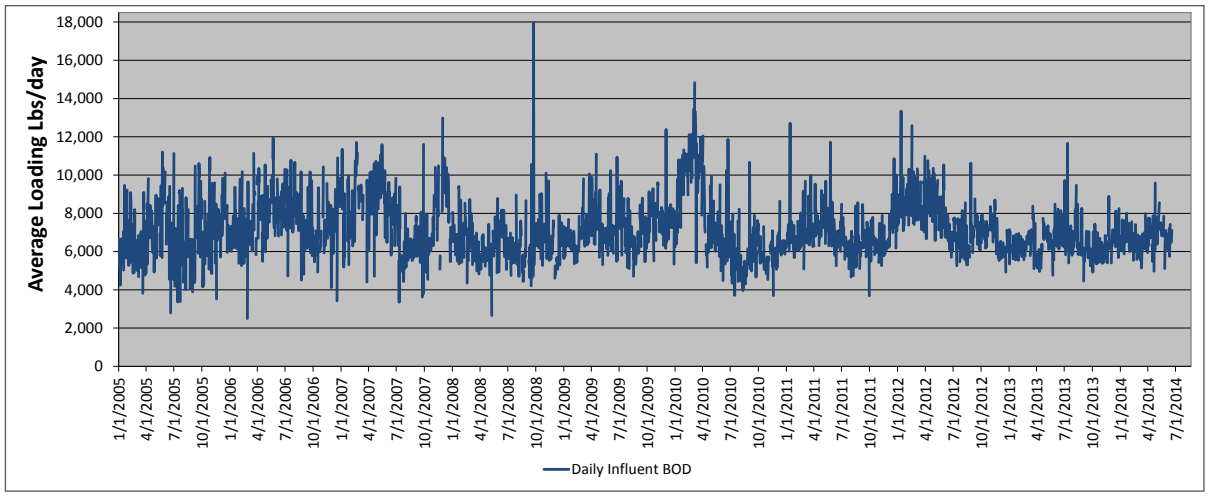


CHART 1.7 – WWTP INFLUENT BOD LOADING



The per person BOD loading rates are shown in Table 1.4. The units are in BOD pounds per capita per day (ppcd). The BOD ppcd loading rates have remained fairly constant over the years even perhaps decreasing slightly during the last 2 years. The typical range for BOD is shown in the table footnote.

The ppcd design values for this study are also shown in Table 1.4. Since the loading rates have remained fairly constant and perhaps are decreasing slightly, the 10-year average was used in determining the design values. Two data points were removed from the average - the maximum month values from 2010 and 2012. These two values were removed because the maximum month BOD values do not correspond to the maximum monthly TSS values, so these values appear to be outliers. The other monthly BOD values corresponded well with the monthly TSS values.

TABLE 1.4 – SUMMARY OF INFLUENT BOD DATA

	2005	2006	2007	2008	2009	2010	2011	2012	2013	Jan.-Jun. 2014	Design
Population	31,399	31,498	31,597	31,696	31,795	31,894	31,983	32,051	32,291	32,534	-
Average (mg/L)	205	227	225	196	215	220	208	226	207	222	-
Max Month (mg/L)	236	257	263	225	232	317	238	276	232	233	-
Average (PPD)	6,990	7,680	7,750	6,450	6,560	7,230	6,930	7,580	6,470	6,710	-
Max Month (PPD)	8,090	8,600	9,110	7,030	8,110	10,750	7,800	9,020	7,060	7,180	-
Average (ppcd)	0.222	0.244	0.245	0.203	0.206	0.227	0.217	0.236	0.200	0.206	0.221
Max Month (ppcd)	0.258	0.273	0.288	0.222	0.255	0.337	0.244	0.281	0.218	0.221	0.247

Note:
1. Industry typical values (Metcalf & Eddy):
BOD: 0.130 - 0.260 ppcd

1.7.7 TSS LOADING

Daily influent TSS concentrations from January 2005 through June 2014 are provided in Charts 1.8 and 1.9. The TSS concentrations generally range between 150 and 250 mg/L, which are within the range of typical wastewater values. These concentrations equate to TSS loadings between 5,000 and 9,000 lbs/day. As with BOD, the TSS concentrations are fairly constant and do not vary significantly based on the season.

CHART 1.8 – WWTP INFLUENT TSS CONCENTRATIONS

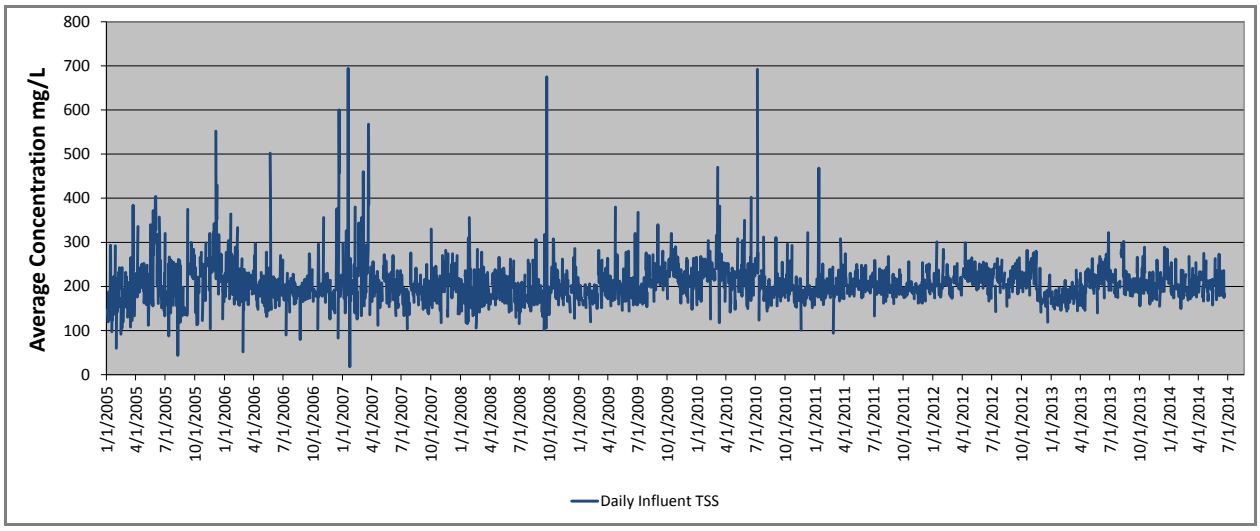


CHART 1.9 – WWTP INFLUENT TSS LOADING

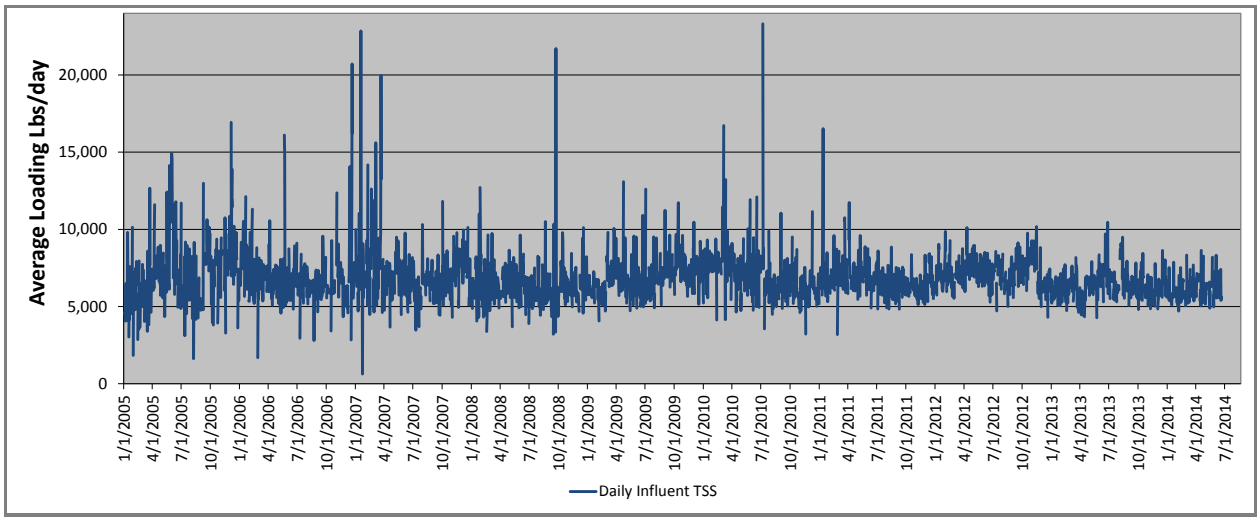


Table 1.5 shows the TSS ppcd summary. The TSS ppcd have remained fairly constant and perhaps decreased slightly during the previous two years. The typical range for TSS is shown in the table footnote. The ppcd design values for this study are also shown in Table 1.5. Since the loading rates have remained fairly constant and perhaps are decreasing slightly, the 10-year average was used in determining the design values.

TABLE 1.5 – SUMMARY OF INFLUENT TSS DATA

	2005	2006	2007	2008	2009	2010	2011	2012	2013	Jan.-Jun. 2014	Design
Population	31,399	31,498	31,597	31,696	31,795	31,894	31,983	32,051	32,291	32,534	-
Average (mg/L)	212	204	208	195	208	214	203	215	205	204	-
Max Month (mg/L)	266	235	252	213	252	250	211	240	240	211	-
Average (PPD)	7,220	6,910	7,180	6,430	7,050	7,040	6,780	7,200	6,400	6,170	-
Max Month (PPD)	8,720	8,110	8,460	6,860	8,370	8,810	7,390	7,840	7,390	6,370	-
Average (ppcd)	0.230	0.219	0.227	0.203	0.222	0.221	0.212	0.225	0.198	0.190	0.215
Max Month (ppcd)	0.278	0.257	0.268	0.216	0.263	0.276	0.231	0.245	0.229	0.196	0.246

Note:
1. Industry typical values (Metcalf & Eddy):
TSS: 0.130 - 0.330 ppcd

1.8 FUTURE FLOWS AND LOADING ANALYSIS

1.8.1 DOMESTIC FLOW PROJECTIONS

The future projections are based on actual and estimated data provided by the City, which includes 2005-2014 data for WWTP flows. Because ample significant industrial user data was available, domestic and industrial average flow projections were developed and then summed to provide a total system projection.

Domestic projections include residential and commercial discharges and any other unaccounted for flows. Current (2015) domestic flows (commercial and residential only) were calculated by subtracting historical industry flow data from historical WWTP data. The resulting values were then divided by population to arrive at historical gallons per capita per day values (gpcd). The gpcd values were multiplied by the projected populations to determine the future domestic flows.

Table 1.6 shows the domestic gpcd design values for Lewiston which reflects the current residential and commercial demands. The average domestic value is 101 gpcd, which is comparable with published typical flow rates (97 gpcd, Metcalf & Eddy).

TABLE 1.6 – DOMESTIC GPCD DESIGN VALUES

Parameter	gpcd*
Average	101
Max Month	114
Max Day	133
Max Hour	218

Note:
1. Includes commercial and residential

In addition to the new domestic users, the City has been looking into the possibility of serving many residents who are currently on individual septic systems. There are about 350 existing homes currently on septic that could be served with a main line extension to the area east of the existing Central Orchards Sewer District service area. For planning purposes, this area was assumed to be connected by 2020. An additional 200 existing homes currently on septic could be served with a new lift station; this area was assumed to be added by 2025. These 550 potential additions to the existing system are analyzed as part of this study and accounted for in the flow projections.

1.8.2 INDUSTRIAL FLOW PROJECTIONS

Industrial flow projections are summarized in Table 1.7. For existing users, projected growth was provided by the City, with input from the respective industries. Two additional future industries were assumed to be added, one in year 2025 and the other in year 2035. The size of these industries was assumed to be similar to Blue Ribbon Linen. Beyond 2035, industrial flows were assumed to grow at the same rate as the domestic population (0.75%). Maximum daily flows and peak hour flows were estimated using the same peaking factors observed for the combined total flow (domestic plus industry) observed at the WWTP.

TABLE 1.7 – CURRENT AND FUTURE INDUSTRIAL AVERAGE FLOW (gpd)

	2015 (Current)	2020	2025	2030	2035	2055
CCI Ammunition[a]	380,000	419,551	463,218	511,430	564,660	564,660
Southport[b]	280	25,340	50,400	50,400	50,400	50,400
Blue Ribbon Linen[c]	53,000	86,500	120,000	120,000	120,000	120,000
SPT[d]	12,000	16,000	20,000	24,000	24,000	24,000
Casino[e]	11,870	12,322	12,791	13,278	13,783	16,005
Future Industry 1[f]	-	-	120,000	120,000	120,000	120,000
Future Industry 2[f]	-	-	-	-	120,000	120,000
Future[g]	-	-	-	-	-	161,033
Total	445,280	547,391	773,618	825,830	999,060	1,160,093
Change in Flow		102,111	226,227	52,212	173,230	161,033
% of System Flow	12%	13%	17%	18%	20%	20%

Notes:
*Future growth was determined based on conversations with the City and business owners.
[a] Projected yearly growth of 2% for the 20-year planning period.
[b] Projected to reach 30 gpm (43,200 gpd) by 2025.
[c] Projected to reach permit limit of 120,000 gpd by 2025.
[d] Projected to double current output by 2025.
[e] Projected yearly growth of 0.75%.
[f] Future industry flows are expected to be similar to Blue Ribbon Linen and occur 2025 and 2035.
[g] After 2035, industrial growth is projected to be consistent with the residential & commercial 0.75% growth rate.
[h] Pending buildout population year determination.

1.8.3 ALLOCATION OF PROJECTED FLOWS

Future domestic flows were allocated based on input from the City of Lewiston and are generally consistent with the build-out forecast for the transportation analysis zones (TAZs). City planning staff provided direction for the 20-year and 40-year distribution of future growth.

Industrial growth is expected to occur within existing industrial areas via expansion of current operations and development of new industries. As far as new industries are concerned, the City estimated that one new industry will be added to the system by 2025 and one by 2035. The first industry was added adjacent to the WWTP. The second industry was added along 4th Avenue N, just west of 28th Street N.

For the 2055 collection system evaluation, a third future industry was added near Southport Avenue with an average day flow of 120,000 gallons per day. The future industry located near 4th Avenue N and 28th Street N was assumed to expand to an average day flow of 163,000 gallons per day.

1.8.4 SUMMARY OF PROJECTED FLOWS

Table 1.8 summarizes the flow projections for the Lewiston WWTP. This table separates industrial and domestic flow into the WWTP. The total future flows are calculated by summing industrial and domestic flows for a given year.

TABLE 1.8 – DOMESTIC AND INDUSTRIAL FLOW PROJECTIONS

		Domestic				Industrial				Total			
Year	Pop.[a]	Peak Hour (MGD)[b]	Max Day (MGD)[c]	Max Month (MGD)[c]	Avg. (MGD)[c]	Peak Hour (MGD)	Max Day (MGD)	Max Month (MGD)	Avg. (MGD)	Peak Hour (MGD)	Max Day (MGD)	Max Month (MGD)	Avg. (MGD)
2015	33,108	7.13	4.35	3.72	3.32	0.97	0.59	0.51	0.45	8.10	4.94	4.23	3.77
2020[d]	34,368	7.57	4.62	3.95	3.52	1.18	0.72	0.61	0.55	8.75	5.34	4.57	4.07
2025[e]	35,677	7.95	4.85	4.15	3.70	1.66	1.01	0.87	0.77	9.62	5.86	5.02	4.47
2035	38,445	8.55	5.21	4.46	3.98	2.15	1.31	1.12	1.00	10.70	6.52	5.59	4.98
2055	44,641	9.88	6.03	5.16	4.60	2.49	1.52	1.30	1.16	12.38	7.55	6.46	5.76

Notes:
[a] Assumes 0.75% population growth rate
[b] Based on daily SCADA data during 2013-2014
[c] Residential flows are based on averages from 2005-2014
[d] Assumes 350 additional COSD septic connections added by 2020
[e] Assumes 200 additional COSD septic connections added by 2025

1.8.5 LOADING PROJECTIONS

Design per capita loadings and projected loads for both BOD and TSS for 2015, 2020, 2025 and 2035 are listed in Table 1.9. Per capita loading rates reflect the observed data for the Lewiston wastewater system. Projected loads were calculated by applying the per capita loads to the estimated service population. Using a per capita rate (vs. a concentration) results in loading projections that are independent of flow and will not need to be updated if flow projections change (e.g. due to I/I reduction).

TABLE 1.9 – DOMESTIC INFLUENT LOADING PROJECTIONS

	Planning Criteria	2015	2020	2025	2035
Est. Pop.		33,108	34,368	35,677	38,445
Constituent	ppcd*	PPD	PPD	PPD	PPD
BOD Average	0.221	7,320	7,600	7,890	8,500
Max Month	0.247	8,180	8,490	8,820	9,500
TSS Average	0.215	7,120	7,390	7,670	8,270
Max Month	0.246	8,150	8,460	8,780	9,460

1.9 REGULATORY REQUIREMENTS

Since Lewiston's discharge is just upstream of the Idaho/Washington border, it has the potential to impact water quality in both states. Therefore, water quality standards from both the Idaho Department of Environmental Quality (DEQ) and Washington Department of Ecology (DOE) are considered in this section. The City of Lewiston discharges treated effluent into the Clearwater Arm of Lower Granite Dam Pool, about 0.65 miles upstream of the confluence with the Snake River.

Idaho water quality standards have been developed to protect beneficial uses of specific surface waters. The Lower Granite Dam pool has designated beneficial uses that include:

- Aquatic life uses – viable aquatic life community for cold water species
- Recreational uses – primary contact recreation
- Water supply uses – domestic, agricultural, industrial, and stock watering
- Other uses – wildlife habitat and aesthetics

Washington water quality standards similarly designate beneficial uses for the Snake River, including:

- Aquatic life uses – spawning/rearing
- Recreational uses – primary contact recreation
- Water supply uses – domestic, agricultural, industrial, and stock watering
- Miscellaneous uses – wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics

The Clearwater Arm of the Lower Granite Dam pool is categorized in Idaho's 2012 Integrated Report as a Category 2 water, which is defined as fully supporting assessed beneficial uses (this reflects 303(d) delisting relative to total dissolved gas). Therefore, no Total Maximum Daily Load (TMDL) allocations are required.

Though two TMDL allocations have been approved by the Environmental Protection Agency (EPA) for the main stem of the Snake River, it should be noted that neither include waste load allocations that have been included in the current NPDES permit:

- *Total Maximum Daily Loading (TMDL) to Limit Discharges of 2,3,7,8-TCDD (Dioxin) to the Columbia River Basin*, February 1991, U.S. EPA.
- *Total Maximum Daily Load for Lower Snake River Total Dissolved Gas (TDG)*, August 2003 (03-03-020). The TMDL does not include waste load allocations for TDG because impairment to TDG is caused by releases from the dams, not by NPDES permitted sources.

The City of Lewiston discharges treated effluent through a multi-port diffuser under NPDES permit ID0022055 (see Appendix B). The City's new permit went into effect on February 1, 2016, with an expiration date of January 31, 2021. According to the EPA fact sheet issued for Lewiston's current permit, the significant river current that exists at the point of discharge results in complete mixing as the effluent leaves the diffuser. Existing effluent limits are summarized in Table 1.10.

TABLE 1.10 – EXISTING NPDES PERMIT LIMITS*

Parameter	Average Monthly	Average Weekly
Biochemical Oxygen Demand (BOD_5)	30 mg/L 1,430 ppd[1] 85% removal	45 mg/L 2,145 ppd[1]
TSS	30 mg/L 1,430 ppd[1] 85% removal	45 mg/L 2,145 ppd[1]
pH	Daily minimum and maximum between 6.5 and 9.0	
E. coli Bacteria	126/100 mL	406/100 mL[2]

Notes:
* Residual chlorine limits not shown since effluent chlorination is no longer used
1. ppd = pounds per day
2. Instantaneous maximum limit

Keller Associates has communicated with EPA regarding future permit conditions beyond the new permit. Though EPA is unable to provide specifics at this time, there are a few wastewater constituents that may be included in future NPDES permits that are worthy of mention based on this preliminary conversation with EPA. Nutrients (ammonia, nitrogen, and phosphorus) were mentioned as constituents being considered. Low dissolved oxygen levels - primarily caused by dams along the river - may also impact future temperature, phosphorus, and other contaminant load limits. Ongoing work on toxic substances, including heavy metals, polychlorinated biphenyls (PCBs), mercury, and DDT, could also have future effects on wastewater treatment plants along the Snake River. EPA performs a "reasonable potential analysis" for toxic substances to determine which pollutants in the discharge have a reasonable potential to violate water quality standards.

In addition to the discharge requirements outlined above, wastewater systems need to function in compliance with the Idaho Administrative Code (IDAPA 58.01.16).

1.10 SUMMARY OF PLANNING CRITERIA

The planning criteria are summarized in Table 1.11 for the WWTP. These criteria were developed based on plant data, future growth and wastewater flow projections, current discharge limits, and expected discharge limits. An assumed limit for ammonia, based on limits at a nearby treatment plant (Clarkston, WA), is also included (note that a reasonable potential analysis is needed to determine if limits are necessary). An influent ammonia concentration based on the maximum month of data from February through May 2014 is also shown. These planning criteria are the basis for evaluating treatment system components in following chapters.

TABLE 1.11 – 20-YEAR (2035) PLANNING CRITERIA FOR THE LEWISTON WWTP

Parameter	Units	Influent	NPDES Effluent Permit Requirements		
			Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit
Average Day Flow	MGD	4.98			
Maximum Month Flow	MGD	5.59			
Peak Day Flow	MGD	6.52			
BOD_5	mg/L lb/day % removal	229 9,500 -	30 1,430 85 (minimum)	45 2,145 -	- - -
TSS	mg/L lb/day % removal	228 9,460 -	30 1,430 85 (minimum)	45 2,145 -	- - -
E. coli Bacteria	#/100 mL		126/100	-	406/100 (instant.)
Ammonia[1]	mg/L	27.4	--	7.4	21.8
pH	SU		Daily min. and max. between 6.5 and 9.0		

Notes:

1. Potential, based on limits for Clarkston WWTP (water quality based).

Other criteria for the wastewater treatment plant planning are related to the reliability of unit processes, which generally relates to providing redundant equipment. For the highest level of reliability (Reliability Class I per EPA guidance, EPA 430-99-74-001), at least two units are required for screens, pumps, primary and secondary clarifiers, aeration basins, blowers, pumps, disinfection, and digesters. The EPA criteria also require that the capacity with the largest unit out of service be sufficient to provide for:

- Primary clarifiers – 50% of design flow
- Secondary clarifiers – 75% of design flow
- Blowers – design oxygen transfer
- Pumps – peak flow

Ten States Standards (referenced in the Idaho Wastewater Rules) also recommends that screening facilities have the capacity to treat peak instantaneous flows with one unit out of service, and that UV disinfection facilities be able to provide full treatment with one bank out of service.

The collection system capacity is assessed by determining the available capacity in pipelines and lift stations. Based on the available capacity and expected growth in an area, improvements are suggested to increase the capacity as required to meet future infrastructure needs.

A lift station is assumed to have sufficient capacity if it can convey peak hour flows with the largest pump out of service. Additionally, it is the municipality's responsibility to ensure that sanitary sewer overflows (SSOs) do not occur. Extended power outages may lead to wastewater backing up into homes and onto the streets. Mobile generators or portable trash pumps may be acceptable for lift stations, depending on the risk of overflow, available storage in the wet well and pipelines, alarms, and response time.

A gravity pipeline is generally assumed to have insufficient capacity if surcharging occurs during a peak hour flow condition. Surcharging refers to a condition when the flow in the pipe backs up into manholes and begins flowing under pressure. This condition

presents an increased risk of wastewater backing up into people's homes, overflows, and the increased potential for exfiltration (escape of raw wastewater into the groundwater). Based on discussions with City staff, only the deep interceptor trunkline that runs along the north side of the river was assumed to be able to accommodate periodic surcharging.

There is a wide range of standards used to determine when a pipe is considered too full or overcapacity. For the purposes of this plan, two triggers were considered in prioritizing improvements:

- Areas that will likely experience growth - The need for capital improvements should be triggered when the pipe is at 75% of flow capacity, with the goal to have new facilities in place by the time the existing pipelines reach 90% of capacity.
- Areas with limited growth capacity - As long as interceptor pipeline flows are less than 90% capacity and no historical problems have been observed, then no improvements would be recommended. However, increased monitoring may be warranted.

Ongoing infiltration and inflow (I/I) reduction efforts, along with installation of check valves in service lines that feed basements, are additional measures the City could take to reduce the risk of pipe surcharging and sanitary sewer overflows.

In addition to capacity problems, other conditions may affect the effectiveness of the collection system. Providing minimum slopes that allow for scouring velocities is important to keeping pipelines free from debris. Additionally, the condition of the pipe may affect pipeline capacity. Root intrusions, broken sections of pipeline, accumulation of fats, oil, and grease (FOG), and excessive debris can all affect the capacity of the pipelines. For purposes of computer modeling, it was assumed that operation, maintenance, and repair activities would keep pipelines clean and free of obstructions.

CHAPTER 2.0 – EXISTING COLLECTION SYSTEM CONDITION ASSESSMENT

Lewiston owns and operates its own wastewater collection system. The City also operates the Lewiston Orchards Sewer District's (LOSD) wastewater collection system. The current contract between the City and LOSD states that the District agrees to pay the City for its services, which include operation and maintenance of the wastewater system. The Central Orchards Sewer District (COSD) wastewater collection system is owned, operated, and maintained by COSD, which also does its own billing. This chapter provides an overview of the wastewater collection system conditions for the City's system. Chapter 3 of this report presents the hydraulic capacities of the City's system and addresses the hydraulic impacts of satellite collection systems (i.e. Lewiston Orchards, Central Orchards Sewer Districts, and Nez Perce Tribe) that contribute flow.

2.1 OVERVIEW

2.1.1 PIPELINES AND MANHOLES

The City of Lewiston owns approximately 81.8 miles of gravity pipelines. Pipe sizes range from 6 inches to 48 inches in diameter. Figure 2.1 illustrates the existing collection system and pipeline diameters, and Figure 2.2 illustrates the pipe material types in the City's collection system (See Appendix A for full-size figures). Pipe data is also summarized in Table 2.1.

TABLE 2.1 – COLLECTION SYSTEM PIPE SIZE AND MATERIAL SUMMARY

Pipe Diameter [in]	Pipe Material Lengths [ft]					Total by Diameter [ft]	% of Total
	Unknown	Clay	Concrete	Other	Plastic		
6"	282	26,174	17,716	496	7,702	52,370	12.1%
8"	715	62,788	79,878	417	111,457	255,255	59.1%
10"	856	3,653	13,612	0	7,288	25,409	5.9%
12"	314	8,013	9,904	0	4,974	23,205	5.4%
14"	0	846	0	0	0	846	0.2%
15"	0	1,587	8,464	0	1,934	11,985	2.8%
16"	306	217	0	0	0	523	0.1%
18"	0	0	22,895	0	5,624	28,519	6.6%
21"	0	0	51	0	2,145	2,196	0.5%
24"	0	0	5,583	0	7,382	12,965	3.0%
30"	0	0	7,268	0	0	7,268	1.7%
36"	0	306	7,834	0	0	8,140	1.9%
42"	0	8	0	0	0	8	0.0%
48"	0	0	447	0	0	447	0.1%
Unknown	2,734	0	0	0	0	2,734	0.6%
Total by Material [ft]	5,208	103,591	173,651	913	148,505	431,869	100%
% of Total	1.2%	24.0%	40.2%	0.2%	34.4%	81.8	Miles

About 12.1% of the total length is 6-inch diameter gravity pipe, which does not meet the DEQ's minimum standard of 8-inch diameter for new gravity sewer pipe. As these pipelines approach the end of their useful life, they should be replaced with pipelines that are at least 8 inches in diameter.

FIGURE 2.1 – EXISTING SYSTEM PIPE SIZE

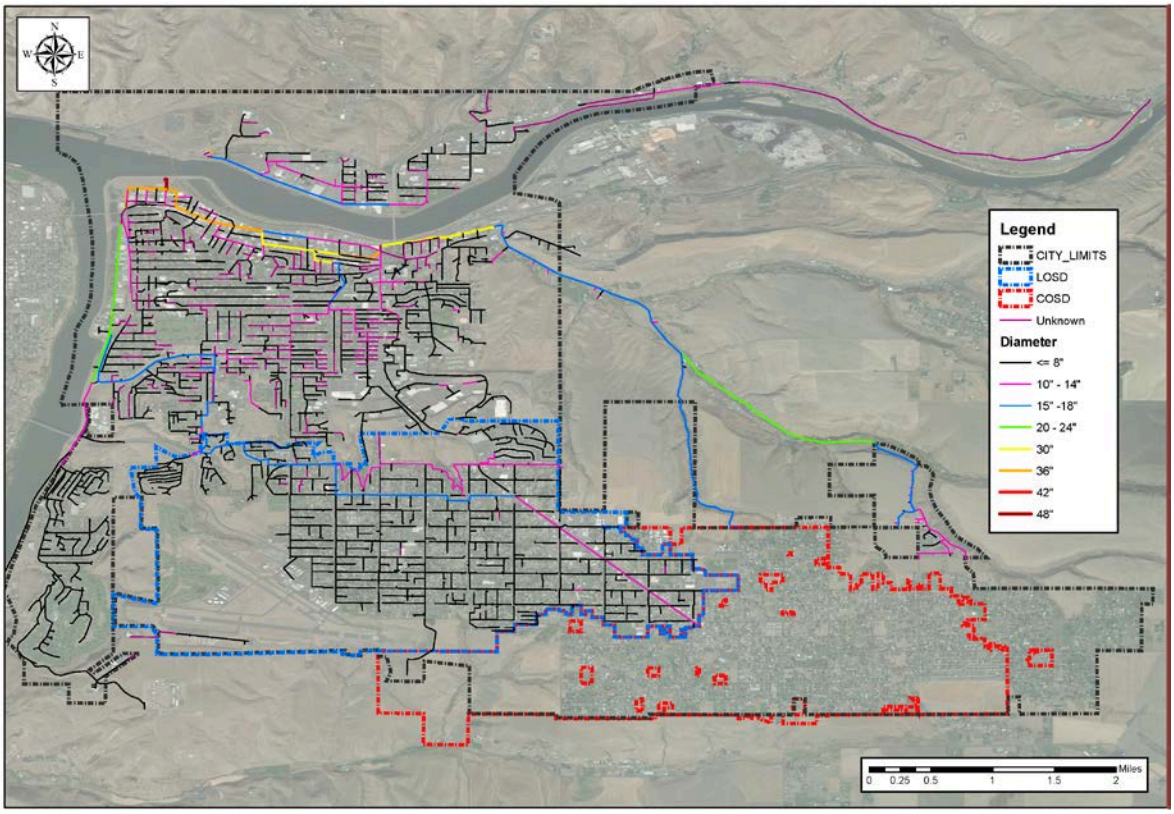
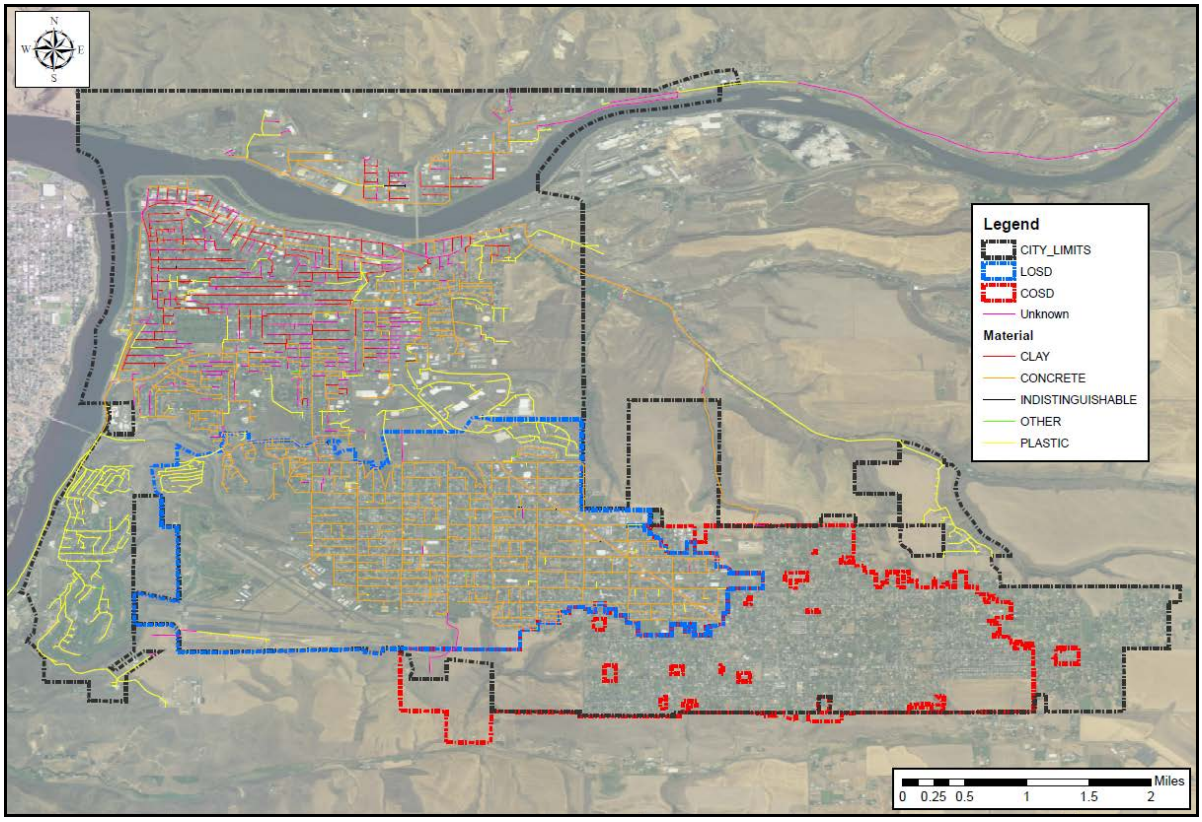


FIGURE 2.2 – EXISTING SYSTEM PIPE MATERIAL



Approximately 0.6% (about 0.5 miles) of the pipe material in the City of Lewiston system is unknown. Pipe material records are important in defining future pipeline replacement and rehabilitation needs. If the unknown pipe material were to be older materials such as clay or concrete, problems such as root cracking, structural failure, infiltration, and exfiltration could persist because of the materials' higher vulnerability to deterioration. As additional field work and pipeline inspections are completed in the future, the City should identify missing pipe material information and update the City's GIS accordingly.

A majority (40.2%) of pipe in the collection system is concrete, which is more susceptible to hydrogen sulfide corrosion than plastic pipe. Clay pipe material usually indicates the oldest pipe in the system, and comprises approximately 24.0% of Lewiston's total system. Keller Associates recommends that future pipeline improvements be PVC, HDPE, or other corrosion-resistant material to maximize the life of the asset.

2.2 LIFT STATIONS

The City maintains eleven lift stations that are owned by the City, LOSD, and the Nez Perce Tribe. The locations of the lift stations are illustrated in Figure 2.3 (full-size figure provided in Appendix A). All of the lift stations evaluated have relatively new supervisory control and data acquisition (SCADA) systems. Nine pump stations include duplex, constant speed submersible pumps. Two pump stations use vacuum-primed suction lift pumps. A summary of lift station features is presented in Table 2.2.

This section provides a general description, identifies deficiencies, and documents the results of pump tests on the four City-owned lift stations and the Casino Lift Station (owned by the Nez Perce Tribe). Findings from the LOSD lift station evaluations are

documented in a separate report. The South Shore and North Shore Lift Stations are evaluated as part of the treatment plant analysis in Chapter 5.

FIGURE 2.3 – EXISTING LIFT STATIONS

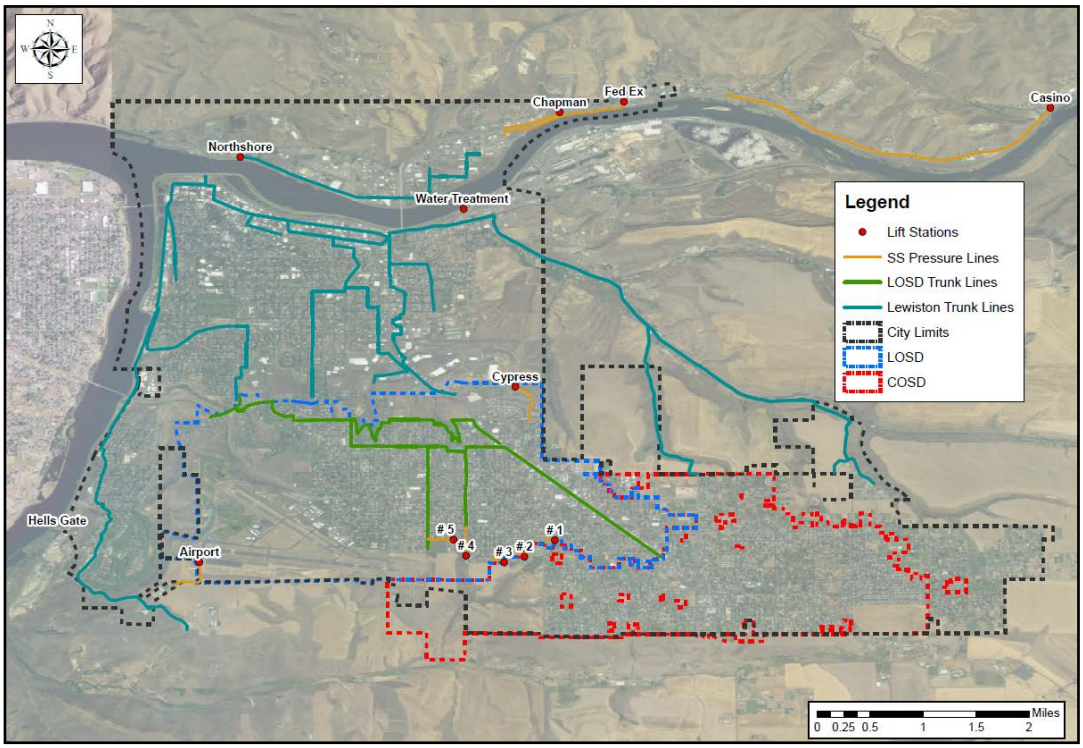


TABLE 2.2 – LIFT STATION SUMMARY

	Airport	Casino	Chapman	Cypress	Fedex	Water Plant	#1	#2	#3	#4	#5
Pump Station											
Owner	City	Nez Perce Tribe	City	LOSD	City	City	LOSD	LOSD	LOSD	LOSD	LOSD
Type	Duplex, Submersible	Duplex, Submersible	Duplex, Submersible	Duplex, Submersible Grinder	Duplex, Submersible	Duplex, Submersible	Duplex, Vacuum Primed	Duplex, Submersible	Duplex, Submersible	Duplex, Dry Pit	Duplex, Vacuum Primed
Pump Type	Constant speed, non-clog	Constant speed, non-clog	Constant speed, non-clog	Constant speed, non-clog	Constant speed, non-clog	Constant speed, non-clog	Constant speed, non-clog	Constant speed, non-clog	Constant speed, non-clog	Constant speed, non-clog	Constant speed, non-clog
Capacity, gpm	120 gpm each pump	220 gpm each pump	110 gpm each pump	100 gpm each pump	280 gpm each pump	Pump 1 - 290 gpm Pump 2 - 210 gpm	60 gpm each pump	Pump 1 - 80 gpm Pump 2 - 50 gpm	130 gpm each pump	390 gpm each pump	140 gpm each pump
Pump, hp	10	32	7.5	5	10	7.5 and 10	3	3	3	20	5
Level Control Type	Pressure Transducer	Pressure Transducer	Pressure Transducer	Pressure Transducer	Pressure Transducer	Pressure Transducer	Pressure Transducer	Pressure Transducer	Pressure Transducer	Pressure Transducer	Pressure Transducer
Flow meter (Y/N)	N	Y	N	N	N	N	N	N	N	N	N
Auxiliary Power Type	Portable generator	On-site diesel generator (private)	Portable generator	Portable generator	Portable generator	None	Portable generator	Portable generator	Portable generator	Portable generator	Portable generator
Transfer Switch	Manual	Automatic	Manual	Manual	Manual	None	Manual	Manual	Manual	Manual	Manual
Bypass Piping	Y	Y	Y	Y	Y	N	N	N	N	N	N
Alarm Telemetry Type	SCADA	SCADA	SCADA	SCADA	SCADA	SCADA	SCADA	SCADA	SCADA	SCADA	SCADA
Year Constructed	2011	2001	2001	2000	2001	Around late 60's - early 70's	1971	1980	1980	1970	1976
Wet Well Dimensions (Length, Width, Depth), ft	6.0'Diam X 87.8'D*	6.0'Diam X 20.5'D	6.0'Diam X 18.5'D	6.0'Diam (OD) X 17'D*	6.0'Diam X 21'D	Hexagonal, 3'Equ.Diam.X 18'D	6.0'Diam X 8.2'D	4.0'Diam X 10.4'D	4.0'Diam X 10.1'D	4.0'Diam X 79.1'D*	4.0'Diam X 71.8'D*
Force Main											
Diameter, Length	1,940 ft, 4" **	13,215 ft, 4.5" (ID)	2,100 ft, 3.5" (ID)	1,960 ft, 4" **	4,800 ft, 5" (ID)	2,270 ft, 6"	400 ft, 4" **	870 ft, 3" **	570 ft, 3" **	1,455 ft, 6" **	890 ft, 4" **
Material Type	HDPE	HDPE	HDPE	PVC **	HDPE	Steel	Steel	PVC	PVC	AC	AC
Profile, Continuously Ascending (Y/N)	Y ***	N	N	Y ***	N	Not Defined	Y ***	Y ***	Y ***	Y ***	Y ***
Sulfide Control System	N	N	N	N	N	N	N	N	N	N	N
Other		8 Air Releases on Force Main	2 Air Releases on Force Main		4 Air Releases on Force Main	No Air Release					

* Depth reflects depth to pressure transducer

** From ArcGIS data

*** From Google Earth elevations

2.2.1 AIRPORT LIFT STATION

The Airport Lift Station is located on the east side of O'Conner Road, north of Southport. Wastewater is pumped from the wet well into a 4-inch HDPE pressure main, approximately 1,940 feet long.

During testing, it was noted that the pumps had over-temperature lights on. In addition, the hatches are not traffic-rated, so Eco-Blocks have been placed around the wet well and valve vault to keep traffic away. It appears that the lids are not supported adequately around the opening. The lift station was constructed in 2011.

Pump Test Results:

A pump test was completed on September 16, 2014. Average pumping rates for the two pumps are 120-135 gpm. There was no pump curve provided for analysis.

At flows of 120 gpm, the velocity in the pressure main is approximately 3.1 fps, which should be adequate to provide scouring of sediment in the pipeline.

Recommended improvements:

- Priority 1 Improvements:
  - Provide padlock on valve vault.
  - Check if over-temperature lights are working correctly, and if so, investigate cause.
  - Modify lid to improve support around opening and prevent safety hazards.
  - If practical, provide security fencing.
  - Provide fall protection for wet well.

2.2.2 CASINO LIFT STATION

The Casino Lift Station is located near the Clearwater River Casino. Wastewater is pumped from the wet well into a 4.5-inch HDPE pressure main, approximately 13,215 feet long. The lift station, wet well, and dry pit housing the discharge mechanical piping all appear to be in relatively good condition. The wet well cover is beginning to show signs of hydrogen sulfide corrosion. A nearby generator, owned and maintained by others, provides back-up power to the lift station.

City staff report that hydrogen sulfide has resulted in severe corrosion on the lid and rim of the fiberglass discharge manhole and has also compromised the integrity of downstream manholes. Grease build-up in the wet well is also reported, requiring cleaning every few months.

One of the unique features of the lift station's discharge pressure main is that the last 1,980 feet of pipe is sloped downward. This allows the pipe to

partially drain after the pumps turn off. The concurrent and competing activities of flow moving downstream and air moving upstream can sometimes be problematic. However, City staff have not reported any issues.

Pump Test Results:

Pump tests were completed on August 28, 2014 and repeated on September 16, 2014. The Casino Lift Station was unique in that initial pumping rates would begin at approximately 260 gpm, and over the course of a couple minutes, reduce to about 200 gpm. Because the wet well draws down relatively fast, the average pumping rate during normal operations is estimated to be about 220 gpm, which is relatively close to the 211 gpm reported as the design flow for the pump station.

The variation in pump rates could come from a number of factors. Given the long discharge pipe length and profile, it is possible that segments of the pipeline empty between pump runs. This is especially true for the final 1,980 feet of pipe that runs downward into a gravity sewer line.

It should be noted that the pump curve for the lift station did not indicate which pump impeller size was provided. Based on the discharge head and flow as well as the amp readings for the pump station, it appears that the pump impeller would be between 185 and 191 mm.

At flows of 220 gpm, the velocity in the pressure main is approximately 4.4 fps, which should be more than adequate to achieve good scour conditions in the pipeline.

Recommended improvements:

- Maintenance Improvements:
  - Clean air release valves every six months. This frequency could be modified based on field observations but should not be longer than every 12 months. Keeping the valves clean will ensure better operation.
  - Add provisions for hydrogen sulfide control.
  - Work with upstream restaurant(s) to install a grease interceptor.
- Priority 1 Improvements:
  - If practical, provide security fencing. At a minimum, provide padlocks on all electrical panels, wet well, and vault.
  - If the grease cannot be eliminated at the source, consider installing a grease aerator that will allow the grease to be suspended in the wastewater.
  - Provide fall protection for wet well.
  - The manholes downstream of the pressure main should be rehabilitated or replaced with manholes equipped with a protective liner or constructed of a hydrogen sulfide-resistant material.
- Future Improvements:
  - Given the age of the pumps, the City should plan on replacing the pumps within the next 5-10 years.
  - As flow conditions change over time, continue to monitor the discharge pressure main. At some future date, the City may wish to replace the last 1,980 feet of discharge pressure main with a gravity sewer pipeline.
  - Within the next 5-10 years, replace the wet well cover and access door with protective coatings.

2.2.3 CHAPMAN LIFT STATION

The Chapman Lift Station is located on Highway 95, near 36th Street North. Wastewater is pumped from the wet well to a 3.5-inch HDPE pressure main, approximately 2,100 feet long. The lift station, wet well, and submersible pumps all appear to be in relatively good condition. A portable generator provides back-up power to the lift station.

City staff report that there are no issues or concerns with this lift station. It was constructed in 2001 and does not currently have any hydrogen sulfide controls. Only one office building currently discharges to the pump station. Because of this low inflow, the station only runs a few times a month.

Pump Test Results:

Pump tests were completed on August 28, 2014. The average pumping rate during normal operations is estimated to be about 105-110 gpm, which is close to the 120 gpm reported as the design flow for the pump station. However, the observed operation point appears to be well below the pump curve. Based on the flow testing, it appears that the pump impellers may be worn, the pressure gage was reporting inaccurate (low) readings, or the wrong pump curve is on file. At flows of 110 gpm, the velocity in the pressure main is approximately 3.7 fps, which should be adequate to achieve proper scour.

Recommended Improvements:

- Maintenance Improvements:
  - Clean air release valves every six months. This frequency could be increased/decreased based on field observations but should not be longer than every 12 months.
  - Monitor hydrogen sulfide levels and condition of downstream manholes. Consider future rehabilitation of downstream manholes or implementation of hydrogen sulfide control as required.
- Priority 1 Improvements:
  - If practical, provide security fencing. At a minimum, provide padlocks on all electrical panels and vaults.
  - Provide fall protection for wet well.
- Future Improvements:
  - Given the age of the pumps, the City should plan on replacing the pumps within the planning period. Because the pumps rarely run, they may be adequate for an additional 10+ years.

2.2.4 FEDEX LIFT STATION

The FedEx Lift Station is located on Highway 95, near 41st Street North. Wastewater is pumped from the wet well to a 5-inch HDPE pressure main, approximately 4,800 feet long. The lift station, wet well, and dry pit housing the discharge mechanical piping all appear to be in relatively good condition. City staff report that hydrogen sulfide has resulted in corrosion in the discharge manhole.

The lift station was constructed with a buried biofilter for odor control. City staff indicate that the media has never been replaced since original installation, and that there are no odor complaints.

The pressure main profile shows a number of high spots. All but one of these high spots has an air release valve.

Pump Test Results:

A pump test was completed on August 28, 2014. Average pumping rates for the two pumps were 270-290 gpm. At flows of 280 gpm, the velocity in the pressure main is approximately 4.6 fps, which should be more than adequate to achieve good scour conditions in the pipeline.

Recommended improvements:

- Maintenance Improvements:
  - Clean air release valves every six months. This frequency could be modified based on field observations but should not be longer than every 12 months. Keeping the valves cleaned will ensure better operation.
  - Add provisions for hydrogen sulfide control.
- Priority 1 Improvements:
  - Provide padlocks to all panels, wet well, and vault.
  - Replace corroded cable hanger in wet well with stainless steel.
  - Replace cover with a new cover, coated for corrosion resistance. Also, provide fall protection for wet well.
  - The manholes downstream of the pressure main should be rehabilitated or replaced as needed.
  - Install an air release valve at the high spot within the existing valve vault.
- Future Improvements:
  - Given the age of the pumps, the City should plan on replacing the pumps within the next 5-10 years.

2.2.5 WATER PLANT LIFT STATION

The Water Plant Lift Station is located near the Lewiston Water Treatment Plant. Wastewater is pumped from the hexagonal-shaped wet well to a 6-inch steel pressure main, approximately 2,270 feet long. The lift station electrical was upgraded in 2013. The wet well appears to be relatively old and in fair condition. The pumps are 30+ years old.

This lift station does not currently have a backup power supply. City staff report that if the pumps fail, the lift station floods a basement in the water treatment plant.

Pump Test Results:

A pump test was completed on August 28, 2014. Average pumping rates for the two pumps were 210 and 290 gpm, suggesting that one pump may be smaller or less efficient than the other. No pump curves are available to compare to the pump performance.

A review of the SCADA data shows a steady inflow of water and more than 100 pump cycles per day. The pump "on" setting is above the pipe inlet invert, resulting in water routinely backing up in the pipeline. City staff believe the flows to be excessive and a potential indicator of groundwater infiltration. The clear and steady nature of the observed inflow would also indicate groundwater infiltration as a potential source.

At flows of 210 gpm, the velocity in the pressure main is approximately 2.4 fps. Given the clear nature of the fluids observed at the time of the visit and IDAPA requirements for force main velocity, this is likely adequate to achieve scour velocities.

Recommended improvements:

- Maintenance Improvements:
  - Steel pipelines can be highly susceptible to corrosion. The City should investigate the integrity of this discharge pipeline. If the steel pipe corrosion rate is above 100 microns per year and more than 60 percent of the base metal remains, add cathodic protection to the pipeline. If the pipe does not meet these requirements, plan on future replacement.
- Priority 1 Improvements:
  - Complete a groundwater infiltration investigation. Remove sources of infiltration. This may require pipeline replacement/rehabilitation.
  - Install backwater valve or check valve in water treatment plant's plumbing to prevent flooding in future.
  - Given the age of the pumps, the City should plan on replacing the pumps within the next 5 years.
  - The wet well volume is inadequate for the existing pumps. Rather than providing a new larger wet well, we recommend that the new pumps be equipped with variable frequency drives.
  - Extend backup power from the water treatment plant to the lift station.
  - Provide fall protection for wet well.

2.3 PIPELINE CONDITIONS

In the past, the City has documented pipeline conditions using their own logging format and rating system. In 2015, the City decided to adopt the National Association of Sewer Service Companies' (NASSCO) Pipeline Assessment and Certification Program (PACP). This program provides the City with the ability to accurately assess their infrastructure using tools that are recognized as an industry standard. A member of the City's wastewater division recently became a member of NASSCO and was trained and certified in the three areas of certification: PACP, Manhole Certification and Assessment Program (MACP), and Lateral Certification and Assessment Program (LACP). This study included the inspection and rating score of the major interceptor pipelines according to the PACP.

Figure 2.4 (Appendix A) illustrates the pipelines CCTV inspected as part of this effort. These lines represent approximately 20% of the total system. Closed-circuit television (CCTV) records were provided to Keller Associates by the City. These records, including NASSCO pipe ratings, were analyzed and linked to the City's GIS data.

Figure 2.5 (Appendix A) shows an overall pipe rating condition developed by Keller Associates utilizing the NASSCO information. The conditions assessment was

developed by weighting 75% of the total NASSCO structural score and 25% of the NASSCO O&M score. The scores were then normalized by dividing the total score by the length of the pipeline and grouped into a 10-point scale. Higher numbers generally indicate a higher risk of pipeline failure. Keller Associates recommends that initial efforts for pipeline replacement be focused on pipeline segments with scores of 8 to 10.

For some pipe segments, there may have been relatively few, but severe, pipe defects. In these cases, localized spot repairs rather than pipeline replacement may be warranted. Figure 2.6 (Appendix A) identifies the highest rated defect recorded for each pipe during CCTV inspection. Those segments with a relatively low overall pipe score and a 4 or 5 as the highest rated defect may be good candidates for spot repairs.

2.4 LIMITED ACCESS AREAS

The City has identified several areas where they have limited access to the collection system. A brief discussion of each of these areas follows.

Warner and Lindsey Creek Area

The City maintains approximately 8,300 feet of pipe between Lindsey Creek Road and Warner Ave. Currently, there are only three access points to this line, one at the top of the line, one at the bottom, and one close to the middle. This line runs from manhole 6614 to manhole 5317 and connects the COSD to the City's trunk lines.

Southport Area

The final 3,500 feet of pipe connecting to ATK's Southport facility has limited seasonal access. The portion of the line with difficulties runs from manhole 9066 to manhole 9054. The City has stated a desire to upgrade the road near this pipeline to improve access.

In the spring of 2018 the City preformed TV inspection of the majority of the pipe segments from Warner Ave to Lindsay Creek Road. An Envirosight Quickview manhole camera which can zoom approximately 30-60 ft from each manhole was used. Other equipment usage is limited to what the crew could carry on backpacks and by hand given the extremely limited access. During the inspection four (4) manholes were found to be underwater and were not unbolted and opened for inspection. Generally, the condition of the pipe that could be observed was good and consistent with the known age and materials of the pipe. Due to the lack of access, there is no record of this pipeline being jetted or cleaned since initial installation in the late 1970's. Cobwebs along the top of the pipe often severely limited visibility as the manhole camera zoomed further down pipes. Several areas of root intrusion into or adjacent to manholes were identified. A large point source of infiltration was discovered in Manhole #4030 where the canyon line intersects Lindsay Creek Road. This was due to poor coring or grouting of the more recent 24" PVC wastewater line built southeast along Lindsay Creek Road. The City is replacing the manhole in the summer of 2018. It is recommended that all manholes that are under water be raised in a watertight fashion to allow for maintenance and inspection. It is also recommended that jetting and regular maintenance be established as soon as a sufficient access road is constructed. This cost to replace this line is expected to be unusually high, so any maintenance that prolongs the useful life is desirable, especially considering the potential in this area for groundwater infiltration.

8th Street and 25th Avenue

The City only has two access points to 1,200 feet of pipe west of 8th Street and north of 25th Avenue. The stretch of pipe runs from manhole 8101 to manhole 8097. These two manholes provide the only access points to this section of pipe.

Manhole 8225

Manhole 8225 is located near 2039 1st Street. The City does not currently have a signed access easement for this manhole.

Manhole 8203.1

Manhole 8203.1 is located near 1933 Carol Drive. The City does not currently have a signed access easement for this manhole.

Keller Associates recommends investigation how access to these pipelines and manholes could be improved and provide improved access where practical.

2.5 UNSEWERED HIGH NITRATE PRIORITY AREAS

The City has expressed a desire to incorporate approximately 250 existing homes, currently on septic systems, into their collection system. The homes are located within the City limits, but outside the bounds of the existing sewer to the east of the COSD. The homes are also located within the drainage areas of Lindsey and Tammany Creek Drainages that have established TMDLs. Keller Associates recommends that the City extend a trunk line to this area capable of conveying existing flows as well as future development in the area.

2.6 REPLACEMENT BUDGET

Three approaches to establishing an annual replacement budget were evaluated for the collection system. These included: 1) assuming a 100-year life for all pipelines (which would correspond to 1% system replacement per year), 2) replacing all non-PVC pipelines over the next 40 years, and 3) replacement of pipelines based on available CCTV pipe conditions rating. Supporting information for the replacement costs for each of these options is presented in Appendix D.

2.6.1 APPROACH 1

By assuming a 100-year life for all pipes, the City would replace about 4,300 feet of pipe per year with sizes varying from 8 to 48-inch. All existing 6-inch pipe would be replaced with 8-inch pipe. The estimated total annual cost for this approach would be approximately $920,000.

2.6.2 APPROACH 2

The second approach considered assumes all non-PVC pipelines are replaced over the next 40 years. For the next 40 years, this would involve replacing about 7,100 feet of pipe per year with an estimated annual cost of $1,540,000.

2.6.3 APPROACH 3

The third approach used to quantify pipeline rehabilitation/replacement needs was to review the pipeline conditions recorded by City staff. For this approach, Keller Associates assumed that all pipeline segments with a conditions rating of 6 or higher would need to be replaced over the next 20 years. Additionally, spot repairs were assumed in establishing the budget for segments with an overall conditions score of 1-5 that had severe localized defects. Because only the major pipeline interceptors were inspected as part of this effort, results from observed conditions were used to estimate conditions for pipelines of similar pipe materials in other locations in the collection system.

Based on the criteria established, approximately 21% of the collection system pipelines should be replaced over the next 20 years. This includes about 4,500 feet of pipe per year as well as multiple spot repairs. The estimated annual cost of this replacement program is approximately $1.0 million.

2.6.4 RECOMMENDATION

Keller Associates recommends the City expand their existing infrastructure repair and replacement program (IRRP) with an initial budget of approximately $1.0 million per year. For those pipeline segments with conditions scores of 8 to 10, further

prioritization of rehabilitation activities should be completed in a subsequent pre-design phase as each of these CCTV records are reviewed in more detail and the appropriate rehabilitation techniques are identified. Because risks can be dependent on a number of factors not captured by the NASSCO rating system, the City should retain flexibility to adjust priority based on observed conditions, and other factors such as service area, and potential environmental/social damages that would result from a pipe failure.

Additionally, this prioritization of improvements should be continually updated as additional CCTV records are gathered for the other portions of the system. As the City continues to complete additional CCTV inspections, the actual system-wide rehabilitation needs will become better identified and prioritized.

2.7 OPERATION AND MAINTENANCE RECOMMENDATIONS

In conjunction with this planning effort, the City of Lewiston completed pipeline cleaning and CCTV inspection of many of the major sewer interceptors. City staff have also been trained and have begun to use a national pipeline conditions rating system. Keller Associates recommends that the City continue with their pipeline cleaning and CCTV inspection efforts for the balance of the City's collection system. Linking this system to the City's GIS further allows the City to graphically review pipeline conditions over time.

Keller Associates also recommends that the City continue to clean, CCTV monitor, and update the pipeline conditions database as part of an ongoing pipeline preservation/rehabilitation program. Initially, this program should follow typical industry standards of line cleaning every 3 years (unless more frequent cleaning is needed depending on pipe material, size, and slope) and CCTV inspection every 5-10 years. These time periods are general guidelines and should be updated for sections of pipe as more information is available. For PVC pipelines with good scour conditions serving residential areas, periods between line cleaning and CCTV monitoring could be extended. Similarly, for locations with known grease problems, poor pipe conditions, or flatter pipe slopes, the frequency for cleaning and/or CCTV work may need to be increased. Monitoring conditions over time will allow the City staff to optimize the appropriate frequencies for the City of Lewiston.

CHAPTER 3.0 – EVALUATION OF COLLECTION SYSTEM'S EXISTING AND FUTURE PERFORMANCE

This chapter highlights the results of a capacity evaluation of the major interceptor pipelines in Lewiston's collection system under existing and anticipated future flow conditions. This chapter also includes a description of the computer model development and calibration process used for the analysis. For an evaluation of improvement alternatives and recommended capital improvements to correct capacity deficiencies in the collection system, refer to Chapter 4.

3.1 MODEL DEVELOPMENT AND CALIBRATION

InfoSewer Pro Suite 7.6 by Innovyze was used to model the City's sewer interceptor pipelines. Sewer pipeline records from the City's Geographic Information System (GIS), including sewer pipe sizes plus manhole invert and rim elevations, were used to populate the model. Several quality control checks were performed on the City-provided data to ensure that model accurately represented the City's collection system. This was an iterative process that involved City staff members resurveying several manholes.

Once the model framework had been built using the City's GIS information, the next step in the model development was to allocate the model loads within the collection system. Model loads refer to the wastewater flows that enter the sewer collection system. These loads are comprised of wastewater collected from individual services (base flows), plus groundwater infiltration and storm water inflows (I/I). The Lewiston model was loaded using water meter usage data, estimated sewage flows from other significant users (CCI Ammunition (CCI) and Southport Industrial Park), and metered flows from the Lewiston Orchards Sewer District (LOSD) and the Central Orchards Sewer District (COSD). Additional loads for infiltration and inflow were estimated using metered data. Loads for the model were developed and calibrated in several stages as described below.

3.1.1 MODEL LOADS

Winter water meter usage data were used to develop the initial flows (dry weather loads) for the majority of the City. During the winter, water usage is a close approximation of sewer flows because irrigation water use and infiltration and inflow into the collection system are minimized. Water meter data from November 2013 through March 2014 were analyzed to establish an average winter usage for each water user. These data were loaded into the model and assigned as a load to a modeled manhole.

In those portions of the City's system that receive wastewater from areas that do not have available water meter data, other sources of data were used to develop the initial loads for the model. The outflow from the LOSD and COSD sewer districts is monitored and recorded each month. The past five years of monthly totalized flow were reviewed for each location and loaded into the model. For COSD, the total load was split between its outflows at 14th and Warner and at the 1800 block of Warner. The split was based on the recorded data that were analyzed. Some of the sewer mains in LOSD were modeled; therefore, the loads were distributed throughout the sewer district according to service area. The loads for each parcel were then applied to the modeled manholes within the district.

The final step in loading the model was to ensure that flows from significant users and additional outside dischargers were properly accounted for. This is especially important since some of these users have their own water source. The other users added to the model included CCI, Southport, the Casino Lift Station, and the Water Treatment Facility Lift Station.

CCI's and Southport's contributions to the collection system were estimated from the metered discharge on their industrial lines as well as an estimation of daily employee usage. The casino's usage was based on recorded meter data for the past 18 months. The contribution of the Water Treatment Facility was based on an analysis of pump run time for the facility's lift station. All of the estimated flow values were loaded onto the model at the appropriate discharge location.

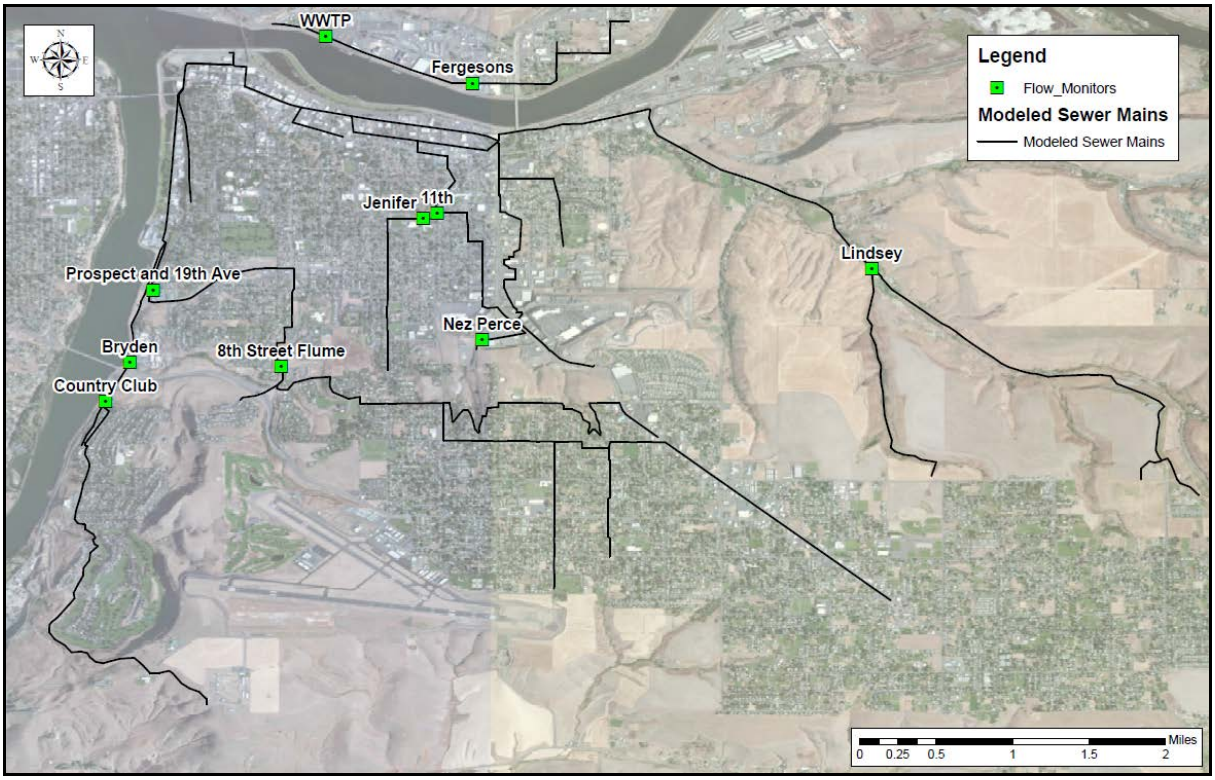
3.1.2 FLOW MONITORING

Flow monitoring data was provided by the City for ten locations throughout the collection network, as shown in Figure 3.1 (See Appendix A for full-size figure). Nine of these ten locations are in the City's main interceptor pipelines. The collected data was analyzed to establish average flows and typical 24-hour patterns at each site. A typical day was selected for each site, which was utilized in the model for loading and calibration efforts. These typical patterns were assigned to all existing flows in the manholes located upstream of the monitoring site. Appendix C contains a summary of the raw flow monitoring data used for modeling purposes.

All flow monitoring data was checked for consistency, anomalies, and other indicators to provide a reasonable assurance that the data was accurate. This data check revealed a couple of problems with some of the datasets, which were subsequently corrected or addressed as noted below:

- The reported flow data at Bryden, Country Club, 8th Street, and Lindsey was adjusted to reflect actual pipe diameters rather than the incorrect pipe sizes reported in the flow monitoring data.
- Since the Nez Perce flow monitoring location has small intermittent flows that the monitoring equipment has difficulty accurately recording, this location was not used in calibration.
- A comparison of data from the portable flow monitoring device near the 8th Street flume to the nearby recorded flow from the District's flume as well as water meter data from the Lewiston Orchards Irrigation District revealed that the flume data provided more realistic and conservative sewer flows. Therefore, the flume data were used for calibration.
- Though the Country Club and Bryden flow monitoring locations are very close to each other, with minimal flow contributions between them, a large discrepancy in reported flows was noted. Based on the upstream water usage, it was determined that the Bryden flow metering data provided the more accurate readings and so was used for calibration.
- The WWTP monitoring site was an old monitoring location that recorded lower flows than were observed at the more recent Fergesons monitoring location. Therefore, data from the Fergesons monitoring location were used for calibration north of the Snake River.

FIGURE 3.1 – FLOW MONITORING SITES



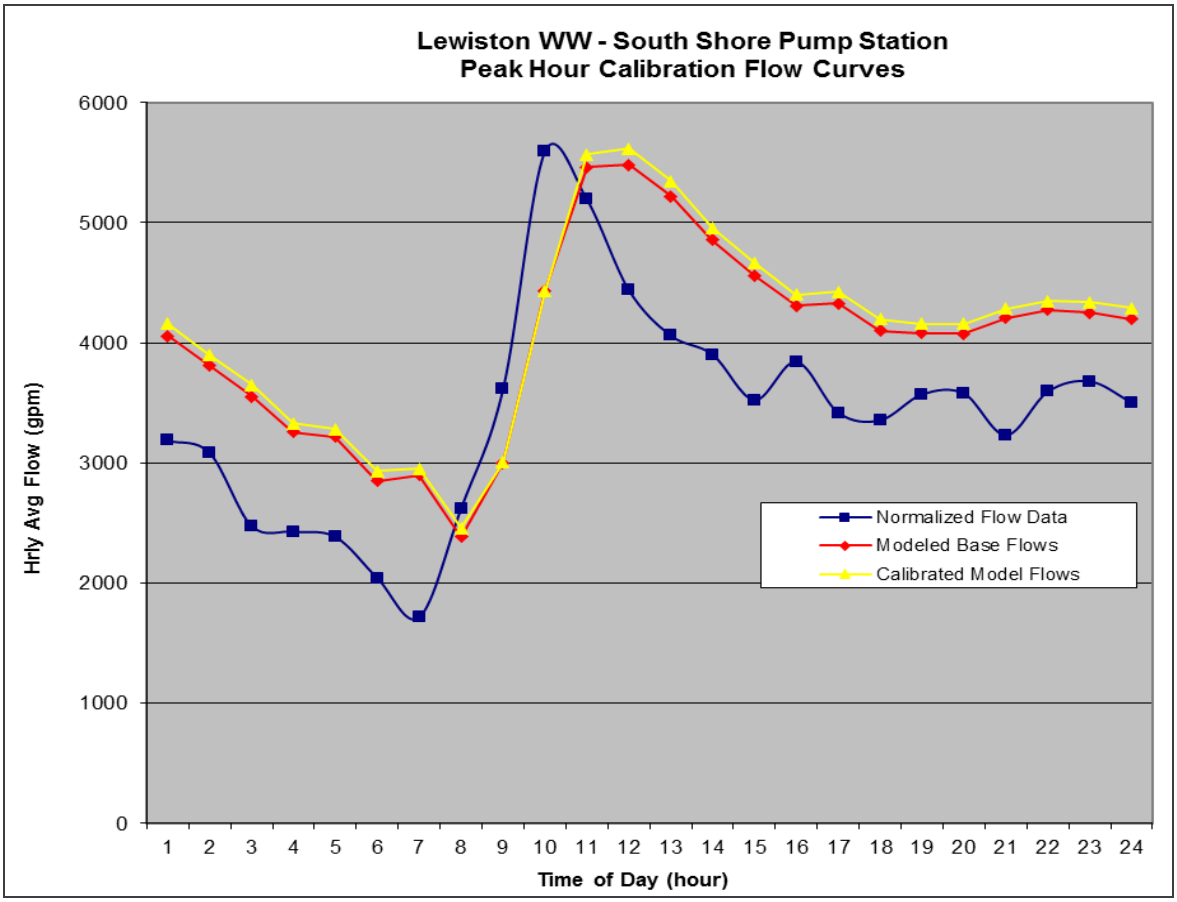
3.1.3 CALIBRATION

With the initial model loads allocated to the model, the resulting modeled flows were compared to the selected typical day flow at each of the flow monitoring sites. Loads in each sewer basin were factored up or down in the model until modeled flows matched relatively close to observed flows.

This calibration process was repeated throughout the model, sewer basin by sewer basin, to produce a calibrated existing average day model. Total system flows into the South Shore lift station were likewise compared to the design values developed using a typical treatment plant influent flow curve taken from August 20, 2009 data.

Comparative graphs of observed and calibrated flows are illustrated in Figure 3-2 for the South Shore Pump Station (SSPS). The normalized flow data line represents flow recorded by the monitoring device adjusted slightly to reflect anticipated annual average conditions rather than just the average conditions during the monitoring period. The figure shows that modeled flows follow a pattern similar to observed flows, and accurately represent the peak observed flow. In this case, very little adjustment needed to be made to get from modeled base flows to calibrated model flows. Similar figures for all of the monitoring sites can be found in Appendix C.

FIGURE 3.2 – MODELED VS. OBSERVED FLOWS – SSPS



3.2 EXISTING CONDITIONS CAPACITY ASSESSMENT

With the calibrated computer model, the collection system capacity could be assessed and the remaining available capacity in pipelines and lift stations could be estimated. Based on the available capacity and expected growth in an area, improvements can also be evaluated to correct existing deficiencies and meet future capacity needs.

A gravity pipeline is generally assumed to have insufficient capacity if surcharging occurs during a peak hour event. Surcharging refers to a condition when the flow in the pipe backs up into manholes and services and begins flowing under pressure. This condition presents an increased risk of wastewater backing up into homes, overflows, and exfiltration (escape of raw wastewater into the groundwater).

Because peak events may vary from basin to basin and there are always factors that cannot be anticipated, there are generally accepted industry standards used to identify when a pipe is considered too full or overcapacity. For the purposes of this plan, two triggers were considered in prioritizing improvements:

- For areas that are likely to experience growth, the need for capital improvements should be triggered when the pipe reaches 85% of flow capacity during a peak hour event, with the goal to have new facilities in place by the time the existing pipelines reach 90% of capacity.

- For areas with limited growth capacity, as long as peak hour flows within the interceptor pipeline are less than 90% capacity and no historical problems have been observed, no improvements would be recommended. However, increased monitoring may be warranted.

A lift station is assumed to have insufficient capacity if it cannot convey peak hour flows with the largest pump out of service. Additionally, it is the municipality's responsibility to ensure that sanitary sewer overflows (SSOs) do not occur. Extended power outages may lead to wastewater backing up into homes and onto the streets. Mobile generators or portable trash pumps may be acceptable for lift stations, depending on the risk of overflow, available storage in the wet well and pipelines, alarms, and response time.

Ongoing infiltration and inflow reduction efforts, along with installation of check valves in service lines that serve basements, are additional measures the City could take to reduce the risk of pipe surcharging and sanitary sewer overflows.

Other conditions may affect the effectiveness of the collection system. Providing minimum slopes that allow for scouring velocities is important for keeping pipelines free from debris. Root intrusions, broken sections of pipeline, accumulation of grease, and excessive debris can all affect the capacity of the pipelines. For purposes of computer modeling, it was assumed that operation, maintenance, and repair activities would keep pipelines clean and free of obstructions.

3.2.1 PEAKING FACTORS, PER CAPITA FLOWS, AND EXISTING DESIGN FLOWS

Peak hour flows are the basis for evaluating collection system capacity. For this study, actual flow monitoring data were used to estimate peak flows. Peak hour factors varied by flow monitoring site according to the site-specific flow patterns. Table 3.1 lists the flow characteristics of the existing system, based on influent flow measurements at the WWTP.

Typically, peaking factors in smaller basins are higher than those observed for the entire collection system. This is because over larger areas, peak flows from smaller basins will occur at different times and attenuate in larger interceptor lines. This was observed at the portable flow monitoring sites, where peak hour factors ranged from 1.5 to 2.53 times the peak day flow. In the calibration process, Keller Associates attempted to match observed upstream peak hours.

TABLE 3.1 – EXISTING WWTP INFLUENT FLOW DATA (2005-2014)

Flow Statistic	MGD	gpcd *	Peaking Factor
Average Day	3.77	114	—
Peak Month	4.23	128	1.12
Peak Day	4.94	149	1.31
Peak Hour	8.05	243	1.63

Note:
1. gpcd = gallons per capita per day

3.2.2 EXISTING CONDITIONS SEWER MAINS CAPACITY ANALYSIS

The calibrated model was exercised to determine the remaining existing capacity by evaluating a 2014 maximum day flow / peak hour event. Figure 3-1 in Appendix A illustrates the available capacity of the existing system. The figure is color-coded to show a gradation of pipes based on flow depth (red where the depth is 90 – 100% of diameter, orange for depths of 80 – 90% of diameter, and yellow for flows of 70 – 80% of diameter). Figure 3-2 in Appendix A highlights just the downtown area where the capacity issues exist.

Initial data showed two sections of pipe with large inverse slopes: the first was upstream of the WWTP along the north shore of the Clearwater River, and the second was near Locomotive Park. In the model, two sections of pipe experienced surcharging due to inverse manhole inverts: one was near the Blue Bridge, and the other was near Lewis-Clark State College. Only one of the modeled manholes surcharged due to limited remaining capacity. Additional surveys were conducted as these modeled results were not consistent with the actual conditions observed. The surveys showed that the initial data was incorrect and no inverse slopes were present in these areas.

Most of the system has more than adequate capacity for existing flow conditions. Limited surcharging was predicted by the model near 21st Street from 11th Ave to 16th Ave.

In addition to the peak hour analysis, average day flow conditions were evaluated to determine if scouring velocities are achieved at least once each day throughout the system. Figure 3-3 in Appendix A shows the average day velocity for each trunk line in the City. The figure is color-coded to show a gradation of pipes based on velocity (red for average velocity of less than 1 feet per second (fps), orange for average velocities of 1 – 2 fps, and green for velocities of 2 – 10 fps). Keller Associates recommends that the City monitor deposition issues for all areas that do not routinely experience velocities of greater than 2 fps. Should deposits be observed in these areas, an increased cleaning frequency may be required.

3.2.3 EXISTING CONDITIONS LIFT STATION CAPACITY ANALYSIS

Most of the existing lift stations serve relatively small areas. Only the South Shore Pump Station is located on the sewer mains that were modeled. (A complete hydraulic analysis of the South Shore Pump Station is included in Chapter 6.)

A review of the lift station run time data provided for 2011-2015 revealed that, on average, all lift stations pump for less than 4 hours per day (see Table 3.2). Keller Associates suggests using SCADA to monitor pump run times and alert the operator whenever both the duty and standby pumps have to operate to keep up with system flows.

TABLE 3.2 – AVERAGE AND PEAK DAY LIFT STATION PUMP RUN TIMES

Lift Station Name	Average Pump Run Time	Peak Day Pump Run Time
Casino	0.6	2.0
Chapman	0.0	0.4
Fed Ex	0.0	1.2
Water Plant	2.3	3.7

Currently, only the Casino Lift Station has dedicated standby power. The rest of the lift stations require the use of portable generators in the event of a prolonged power outage. The City has one portable generator mounted on a trailer that is used to power lift stations during a power outage. The City also has a second generator they intend to mount on another trailer.

Table 3.3 summarizes the number of times per day each lift station would have to be pumped during a power outage, for both average and peak day flows.

TABLE 3.3 – LIFT STATION POWER OUTAGE EVALUATION

Lift Station Name	Available Storage Volume (gal)[1]	Average Flow Rate (gpd)	Times Pumped per Average Day	Pump Station Max Day Flow (gpd)	Times Pumped per Max Day
Casino	1,163	8,715	8	26,503	23
Chapman	1,375	101	1	2,307	2
Fed Ex	1,057	101	1	19,274	19
Water Plant	397	39,844	101	47,541	120

Notes:
1. Calculated based on volume between the high and low alarm levels in the wet well.
2. Storage volume includes on site emergency storage and wet well filling to spill level.

In order for the City to meet their operational obligations to the Lewiston Orchard Sewer District, Keller Associates recommends that the City secure a second generator mounted on a trailer to increase the City's ability to keep up with sewer flows during power outages. We also recommend that the City encourage Lewiston Orchard Sewer District to provide dedicated standby power for Lift Station #2 and Lift Station #4.

Rather than providing increased storage or standby power to the water plant lift station, we suggest the City first investigate the possibility of removing what appears to be a large source of infiltration entering the lift station. The City may also wish to investigate putting the water treatment plant lift station on the standby power system for the water plant. Finally, we suggest that the City simulate an extended power outage to refine their emergency response plan and ensure that operations can be maintained with the available standby power units.

3.3 FUTURE CONDITIONS CAPACITY ASSESSMENT

Future flows, due to population growth and system expansion, were estimated for domestic (residential and commercial) and industrial users as discussed below. Keller Associates worked closely with City personnel who assisted in identifying the type and distribution of future growth.

3.3.1 RESIDENTIAL AND COMMERCIAL FLOWS

Residential and commercial flow projections were presented in Table 1.8 of Chapter 1. Based on the wintertime water consumption data, approximately 73% of these domestic flows comes from residential users with the balance of 27% coming from commercial users. Keller Associates worked with the City of Lewiston to quantify and distribute the new growth in two phases, corresponding to years 2035 and 2055.

Included in the residential growth projections are a few already established neighborhoods to be connected to the collection system in the future. For planning purposes, we assumed that an existing 350-home subdivision east of the Central Orchards Sewer District boundary will be connected to the collection system. Additionally, we assumed another 200 homes will be connected to the system by 2025 by a future lift station. These areas are illustrated in Figure 3-4 (Appendix A).

3.3.2 INDUSTRIAL FLOWS

Future industrial loads, summarized in Chapter 1, include both expansion of existing industries and development of new industries. For the 2035 collection system evaluation, two future industries were added (one by 2025 and one by 2035) with average day flows of 120,000 gallons per day. The first industry was added adjacent to the WWTP. The second industry was added along 4th Avenue N, just west of 28th Street N.

For the 2055 collection system evaluation, a third future industry was added near Southport Avenue with an average day flow of 120,000 gallons per day. The future industry located near 4th Avenue N and 28th Street N was assumed to expand to an average day flow of 163,000 gallons per day.

3.3.3 FUTURE CONDITIONS SEWER MAINS CAPACITY ANALYSIS

The model was exercised to simulate two future scenarios, years 2035 and 2055. Available capacity was analyzed by looking at the peak hour flow event. Figures showing the results of future model runs are included in Appendix C.

The 2035 model simulation showed adequate capacity in most of the model. The system begins to approach capacity near the Blue Ribbon Linen discharge location, along Snake River Avenue, and along Southway Avenue. Figure 3-5 in Appendix A illustrates the capacity of each pipe for the 2035 simulation. Chapter 4 presents recommendations to correct pipeline capacity deficiencies.

In the 2055 growth scenario, the problems previously identified become worse. Additional trunk line segments reach capacity along the western portion of the City near the Lewiston Country Club area. Figure 3-6 in Appendix A illustrates the system capacity for the 2055 pipe simulation.

3.3.4 FUTURE CONDITIONS LIFT STATION CAPACITY ANALYSIS

Only the South Shore Pump Station was included as a part of the modeled collection system (see Chapter 6 for a complete hydraulic analysis of the South Shore Pump Station). It is recommended that the flows into and out of the remaining lift stations be monitored into the future to identify when they are reaching capacity.

CHAPTER 4.0 – COLLECTION SYSTEM IMPROVEMENT ALTERNATIVES

This chapter discusses project alternatives to correct the existing collection system deficiencies discussed in Chapter 3, and to prepare the system for future sewer loads.

4.1 CAPACITY ALTERNATIVES

As pipelines approach their capacity, action must be taken to ensure that manhole surcharging and sanitary sewer overflows do not occur. The City can choose to restrict development on pipelines that are approaching capacity so that they do not exceed their capacity, replace pipelines with larger ones to increase capacity, or construct a parallel pipeline beside the existing line. A brief description of each alternative is discussed below.

4.1.1 CAPACITY ALTERNATIVE NO. 1: RESTRICT DEVELOPMENT

By restricting the amount of new development that can be added to existing sewer lines, the City will be able to control the amount of flow that is allowed to enter into specific mains throughout the collection system. This would reduce the risk of surcharging and sanitary sewer overflows, but would restrict the development of the City, potentially leading to undesired moratorium conditions for certain areas and lost economic development opportunities. If the City wanted to be able to continue expanding its service area, it would need to construct new sewer mains that would connect to areas with additional capacity available.

4.1.2 CAPACITY ALTERNATIVE NO. 2: INCREASE CAPACITY WITH A LARGER PIPE

Another alternative the City could pursue would be to increase the system's capacity by installing larger pipes. The City could reconstruct pipelines that are approaching capacity with larger ones, or use trenchless technology such as pipe bursting existing pipelines with larger pipelines (typically limited to upsizing by one nominal pipe diameter) to increase capacity. By increasing the system's capacity, the City would not need to limit development. This would allow the City to expand its service area and mitigate risks of manhole surcharging and sanitary sewer overflows. The drawback to this alternative is the upfront capital cost associated with pipe upsizing.

4.1.3 CAPACITY ALTERNATIVE NO. 3: INSTALL PARALLEL LINES

Finally, the City could choose to run parallel lines in areas with limited remaining capacity. This alternative would increase the system's capacity, but is generally less costly than increasing pipe diameters because smaller diameter pipe is needed. In this scenario, existing pipes would be left in service and a second pipe would be installed between existing manholes. The downside of this alternative is the increase in maintenance costs associated with parallel lines, and the potential higher life-cycle costs associated with the eventual replacement or rehabilitation of the original pipeline.

4.2 CONDITION ALTERNATIVES

As pipelines approach the end of their useful life, the City will need to look into replacement and repair options to keep the collection system operating smoothly. As pipes begin to degrade, there is an increased chance of failure and sanitary sewer overflows, and the amount of infiltration and inflow (I/I) into the system generally increases. Increases in I/I can also lead to manhole surcharging and sanitary sewer overflows. The City has two main options to address pipeline condition issues: reconstruct the pipes through a traditional open cut construction approach or utilize trenchless pipe repair technologies.

4.2.1 CONDITION ALTERNATIVE NO. 1: NO ACTION

This alternative is not viable because the system will need to continue operating even as pipelines fail. If pipelines are not replaced or repaired as they fail, the City would not be able to continue providing service to the wastewater users.

4.2.2 CONDITION ALTERNATIVE NO. 2: REPLACE PIPE WITH TRADITIONAL OPEN CUT TECHNOLOGY

As pipelines approach the end of their useful life, they could be replaced with a new pipeline using traditional open cut installation. This alternative would extend the useful life of the pipeline by the life span of a new pipe. The City could also choose to increase pipe size as they replace the pipelines. Depending on site constraints (pipe depth, surface restoration, sewer bypass requirements, services, groundwater, soil conditions, existing pipe size and grade, etc.), this alternative may be a preferred approach.

4.2.3 CONDITION ALTERNATIVE NO. 3: UTILIZE TRENCHLESS TECHNOLOGY FOR REPAIR

Alternatively, the City could utilize trenchless repair technology such as pipe bursting, cured-in-place piping, or slip lining. Under the right circumstances, this approach can be less costly than the open cut construction approach. Keller Associates recommends that each pipeline segment be evaluated to determine the optimum replacement strategy. This evaluation includes a careful review of CCTV conditions and other site constraints, and should be completed as part of the pre-design phase of pipeline rehabilitation/ replacement projects.

4.3 PRELIMINARY COST ESTIMATES

No costs were prepared for the No Action or Do-Nothing alternatives as these were not felt to be viable long-term solutions. All pipeline deficiencies identified in Chapter 3 were assumed to be corrected using traditional open-cut technology. In areas where existing pipelines were constructed of PVC, parallel pipelines were evaluated to utilize the longer remaining life in PVC as opposed to concrete or clay pipes. During the pre-design phase of each project, an evaluation should be performed to analyze the potential cost savings associated with using trenchless technologies. Cost estimates for each selected alternative are summarized in Chapter 8 Capital Improvement Plan.

4.4 RECOMMENDED IMPROVEMENTS

This section summarizes the needed improvements to the City's collection system. A summary of the estimated costs for each recommended improvement is provided in Chapter 8. Detailed project sheets are included in Appendix D and show a breakdown of costs, project location maps, and a list of potential construction issues. A brief explanation of each project follows.

4.4.1 1A – PIPELINE RECONSTRUCTION ALONG 11TH AVE AND PROSPECT TO 10TH AVE

The existing line that provides service to homes in this area has previously been slip-lined and is undersized. The current liner is failing and the City needs to reconnect service to an existing home that lost service due to the condition of the pipeline.

4.4.2 1B – LIFT STATION UPGRADES

This project groups together all of the lift station upgrades discussed in Chapter 2.

4.4.3 1C – ENGINEERING INVESTIGATION OF ACCESS OPTIONS

This project groups together the access issues listed in Chapter 2 into a study to determine viable options for improved access.

4.4.4 2A – 24TH STREET NORTH PIPELINE REPLACEMENT – 3RD AVE N TO 1ST AVE N

This project will increase the capacity of the sewer main in North Lewiston to accommodate future industrial growth. About 800 feet of 12-inch sewer main will be installed as a part of this project.

4.4.5 2B – PIPELINE REPLACEMENT – 11TH AVE TO 16TH AVE BETWEEN 21ST ST AND 23RD ST

Nearly 2,300 feet of 8-inch pipeline will be replaced with this project. The existing sewer main does not follow a roadway and the City should consider re-routing the sewer line into a road to make access easier. Pipe bursting should be considered during the pre-design phase of this project. The City should monitor flow in the pipeline reach. Provided growth continues as expected, it is likely this project will need to be completed in the next 5-10 years.

4.4.6 2C/3E – EAST ORCHARDS SEWER EXPANSION PHASE 2 AND 3

This project will expand on the trunk lines constructed as a part of Priority 1a and make sewer service available to the remaining homes on septic east of Lewiston and help reduce nitrate concerns in the area. In total, the sewer mains needed for this phase total over 29,000 feet. Also included in this project is a small lift station. The City should explore grant funding to help cover the cost of the expansion.

4.4.7 2D – DESIGN AND CONSTRUCTION OF ACCESS IMPROVEMENTS

After completion of the engineering study of Priority 1f, design and construction will proceed with gravel access roads where practical. Manhole rim elevations will be raised and supported to reduce the risk of storm flow entering the top of manholes. This project assumes a total of approximately 13,000 feet of roadway will be constructed/improved along with improvements to about 45 manholes.

4.4.8 3A – PIPELINE REPLACEMENT NEAR LEWISTON COUNTRY CLUB

The existing pipeline that provides service to the Lewiston Country Club area has several pipeline segments with slopes much lower than the rest. These areas act as bottlenecks that limit the overall capacity of the line. This project aims to increase the capacity of these lines by adjusting slopes where possible and increasing pipe diameter where needed. In total, the project includes about 100 feet of 8-inch sewer main and 2,200 feet of 12-inch sewer main.

4.4.9 3B – MAIN STREET PIPELINE REPLACEMENT – 9TH ST TO 6TH ST

The existing pipeline in this area is installed at less than minimum slope. Currently, this does not result in capacity problems within the system provided the pipelines are well maintained and free of debris. However, as future development increases flows throughout the system the potential for manhole surcharging increases. This project will reconstruct pipelines at desired slopes to achieve desired pipeline capacities.

4.4.10 3C – G STREET PIPELINE REPLACEMENT – 15TH ST TO 16TH ST

The existing pipeline in this area is installed at less than minimum slope. Currently, this does not result in capacity problems within the system provided the pipelines are well maintained and free of debris. However, as future development increases flows throughout the system the potential for manhole surcharging increases. This project will reconstruct pipelines at desired slopes to achieve desired pipeline capacities.

4.4.11 3D – PIPELINE RECONSTRUCTION DOWNSTREAM OF COSD WARNER DISCHARGE POINT

The existing pipeline in this area is installed at less than minimum slope. Currently, this does not result in capacity problems within the system provided the pipelines are well maintained and free of debris. However, as future development increases flows throughout the system the potential for manhole surcharging increases. This project will reconstruct pipelines at desired slopes to achieve desired pipeline capacities.

In addition to the projects listed above, the City has begun an I/I evaluation to better ascertain areas within the City that see higher flows from these sources. The evaluation is anticipated to be completed in Fall 2018 and will be used to guide the City's CCTV inspection program for 2019 and 2020. CCTV inspections will be used to identify pipelines for replacement through the City's annual replacement budget.

CHAPTER 5.0 – EXISTING WASTEWATER TREATMENT PLANT ASSESSMENT

5.1 DESCRIPTION / OVERVIEW

The City of Lewiston's wastewater treatment plant (WWTP) is located on the north side of the Clearwater River in the northwest corner of the City of Lewiston. Wastewater is pumped to the plant from the South Shore and North Shore Pump Stations; the North Shore Pump Station also receives septage from an on-site receiving station.

The Lewiston WWTP was constructed in 1958 as a primary treatment plant with a design capacity of 2.5 MGD. Subsequent upgrades have increased the design capacity of the WWTP to 5.71 MGD, and also raised the treatment level to secondary treatment. Figure 5.1 (see Appendix A for full-size figure) shows the plant layout.

The influent wastewater flows by gravity from the headworks through the rest of the treatment plant. Following the headworks (screening and grit removal), the wastewater undergoes primary clarification, activated sludge treatment, secondary clarification, and UV disinfection. Treated wastewater is pumped and discharged into the Clearwater Arm of Lower Granite Dam Pool.

Waste solids from the primary and secondary clarifiers are thickened, blended, and then digested in anaerobic digesters. The digested solids are transferred to sludge storage tanks to await dewatering via belt press. The dewatered solids are hauled offsite to Clearwater Composting. A process schematic of the City's WWTP is provided in Figure 5.2 (see Appendix A for full-size figure).

This chapter discusses the condition of the WWTP equipment. Capacity, redundancy, hydraulics, and treatment performance are addressed in Chapter 6.

The existing treatment facilities have been evaluated and also discussed with plant staff to determine facility conditions and deficiencies that might exist. Each process of the treatment plant is discussed in following sections.

FIGURE 5.1 – WWTP LAYOUT

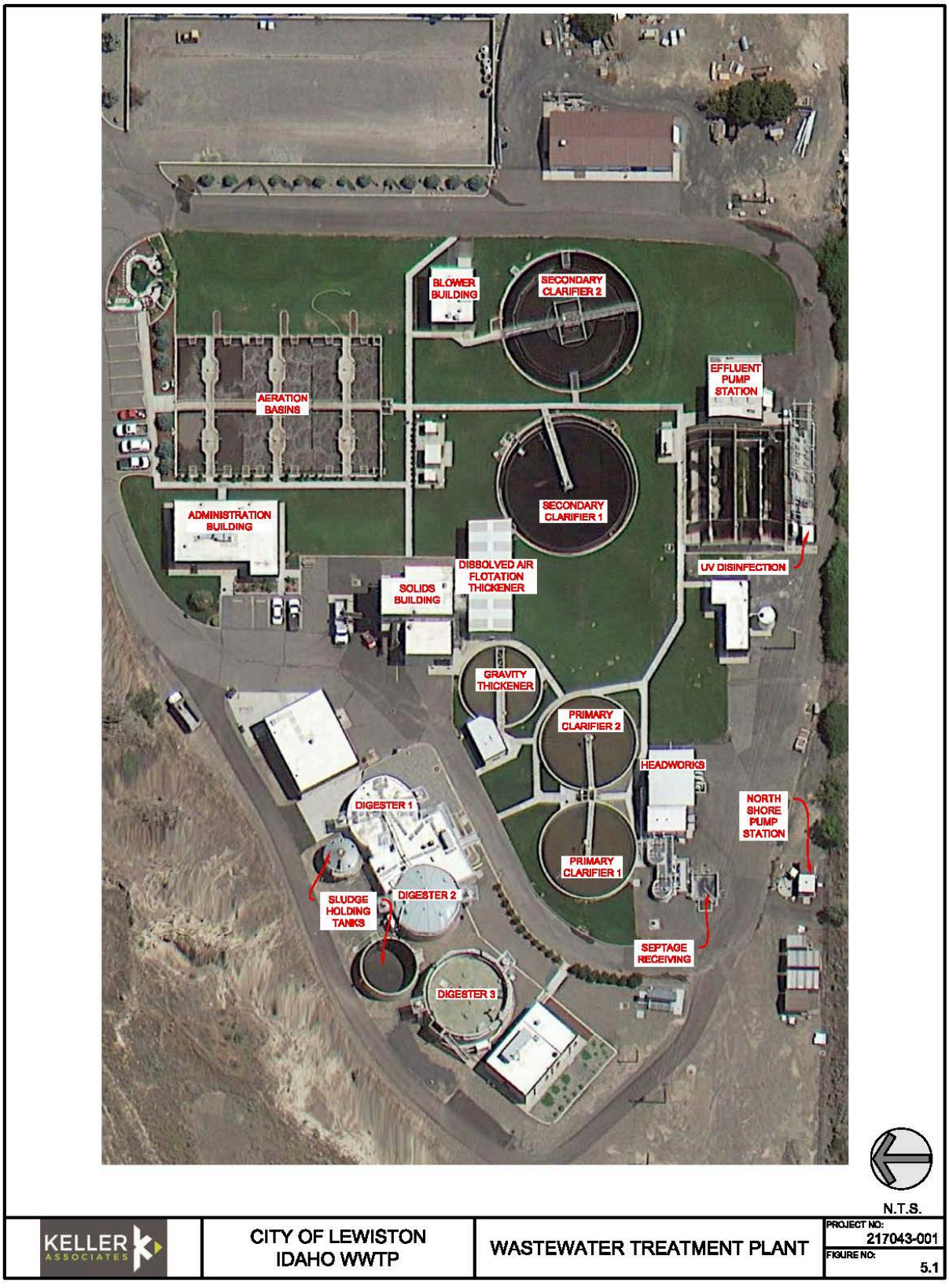
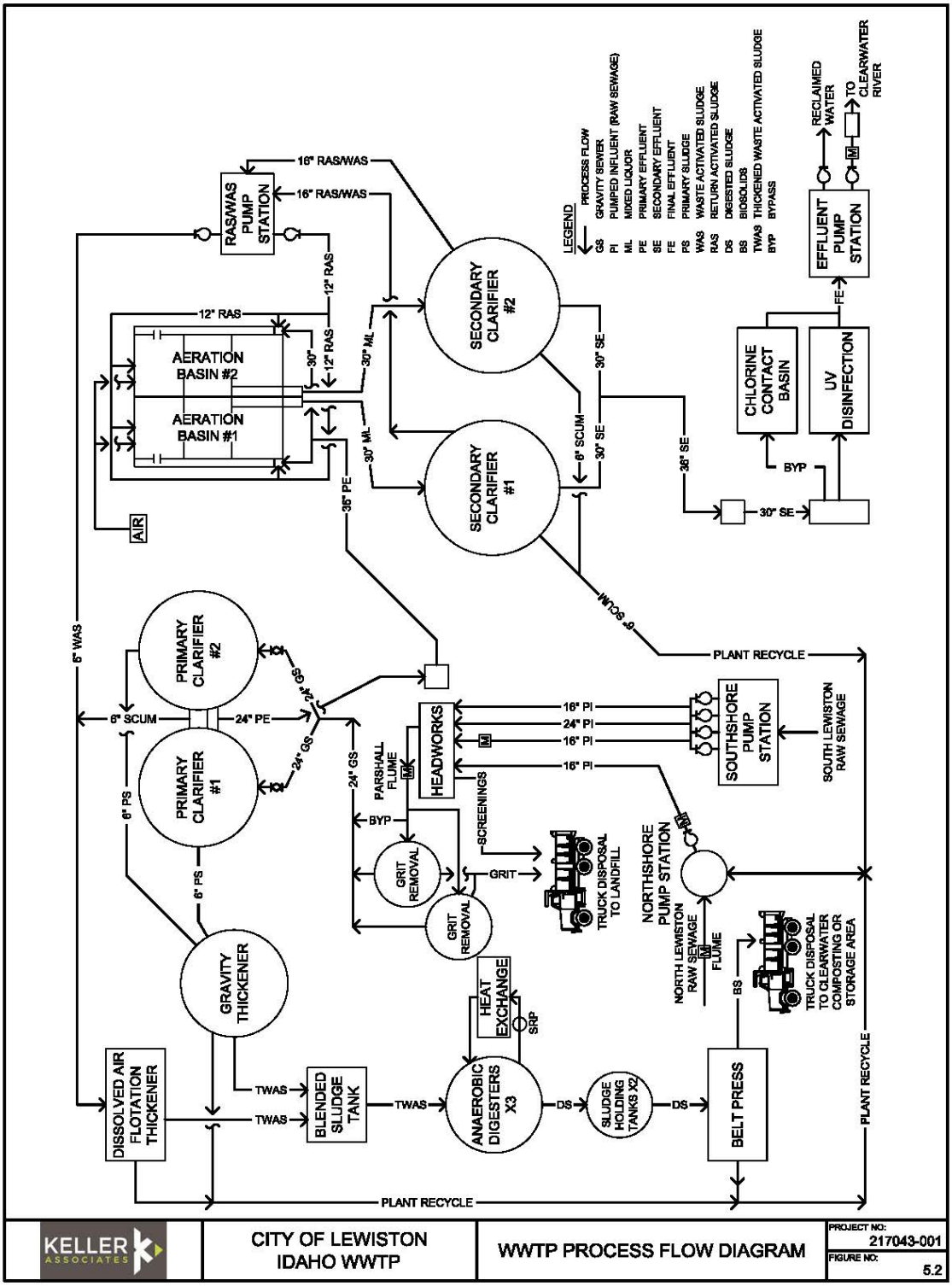


FIGURE 5.2 – WWTP FLOW DIAGRAM



5.2 CONDITION ASSESSMENT – LIQUID PROCESSES

5.2.1 SOUTH SHORE PUMP STATION

The South Shore Pump Station is a masonry building located in the downtown area, near the intersection of 5th Street and the US12 Bypass Route in the Normal Hill neighborhood. The South Shore Pump Station, constructed in 1974, collects all wastewater south of the Clearwater River and pumps it across the river to the headworks of the treatment plant. Three force mains (one 24-inch and two 16-inch) run from the South Shore Pump Station to an air release structure at the top of the West Lewiston levee, then under the river to a manhole (air break structure) at the top of the North Lewiston levee. Wastewater flows by gravity from this structure to the treatment plan headworks. Currently only one 16-inch force main is used; flow is measured through a magnetic flowmeter at the treatment plant.

The South Shore Pump Station is a wet well/dry well configuration, with four pumps in the dry well pulling from an adjacent rectangular wet well. The pumps are located in the basement of the pump station building. A stairway provides access to the basement, and the pumps can be removed using a monorail crane. A separate stairway provides access to the wet well. The building also houses an emergency generator on the main floor, to run the station in the event of a power outage.


South Shore Pump Station

The operators reported that rags and scum accumulate in the wet well, forming mats that required frequent manual removal. To address this situation, the City purchased four 3500 gpm screw centrifugal pumps to replace the existing vertical frame-mounted centrifugal pumps. All the pumps were installed, tested, and placed in operation by the end of January 2015.

Since the pumps are in a basement about 25-feet below grade, they were provided with motors designed to run either in air or submerged (in case of flooding). The pumps are also provided with VFDs and a control system to vary the pump rate based on flow.

Concerns and Deficiencies:

- The air release structure concrete (particularly the lid) is showing signs of its age, and the valves and manhole steps inside are highly corroded.
- The force mains under the river have not been inspected in many years (planned for this coming year).

5.2.2 NORTH SHORE PUMP STATION

The North Shore Pump Station (NSPS) was constructed in 1999 and is located on the southwest end of the WWTP. This pump station collects wastewater from residents and businesses on the north side of the Clearwater River; septage from the septage receiving station located about 35 feet to the north; recycle flows from the plant solids thickening and dewatering processes; and drain lines from various basins, including the chlorine contact basin, secondary clarifiers, and aeration basins.


North Shore Pump


Wet Well

The NSPS includes a 10-foot-diameter concrete wet well with three submersible HOMA non-clog sewage pumps, a shelter building that houses the discharge piping and valves, and a covered variable frequency drive (VFD) control and electrical area. All three pumps were tested in 2014 and recorded an average flow rate of 1,030 gpm per pump. Electrical, control, and VFD panels are all located adjacent to the wet well and are protected from the weather by an overhead shelter. Fall protection was recently added at the lift station wet well. The electrical and controls for the lift station appear to be satisfactory.

Concerns and Deficiencies:

- The concrete on the wet well demonstrates severe spalling. The underlying concrete is exposed.
- Rags and scum accumulate in the NSPS wet well, forming mats that require manual removal.
- There appears to be significant groundwater infiltration into the wet well at the pipe penetrations, adding considerable flow over time. Severity varies seasonally.
- Discharge piping demonstrates corrosion.
- The existing flume does not have sufficient flow measurement capacity.

5.2.3 SEPTAGE RECEIVING STATION

The septage receiving station consists of a 15-foot x 15-foot x 5.5-foot concrete basin with a trash rack and rock trap at the outlet. Adjacent to the basin is a vault containing a B-100R Disposable Waste Systems septage grinder. The outlet pipe from the basin transports the septage through the grinder to the NSPS. The trash rack upstream of the outlet captures large solids, which accumulate in a rock trap located upstream of the screen. The rock trap bucket can be removed (with an adjacent hoist) for dumping accumulated material.

Concerns and Deficiencies:

- The septage receiving process is labor-intensive, requiring washdown of the basin and manual removal of material accumulated in the rock trap bucket.
- Rags often require manual removal, as they do not reach the grinder at the elevation where it is currently mounted.
- The grinder is worn and needs to be replaced.

5.2.4 HEADWORKS

The headworks are located east of the NSPS and include the primary diversion structure, screening, and grit removal. Screening equipment includes two mechanically cleaned screens and one washer-compactor. Grit removal equipment includes two vortex grit units, two grit pumps, and two grit cyclones/classifiers.

The grit units, grit pumps and majority of the grit piping are located outdoors, while the screens, washer-compactor, and grit cyclone/classifiers are housed in an adjacent uninsulated metal building. The washer-compactor and the classifiers discharge to a common area inside the building where a truck that is parked to collect the screenings and grit. Heat tracing and insulation have been installed on both inside and outside piping to reduce freezing problems.

Screening is provided by two stainless steel Brackett Green CF100 band screens installed in the primary diversion structure. Wastewater enters through the center of the screen, and flows outward through a moving band of polymer mesh panels to the outside of the screen chamber. The screenings retained on the inside of the screen panels are discharged by low pressure water jets during a cleaning cycle. A 4-foot long metal chute from each screen carries the screenings that are flushed from the screens to a single washer-compactor that sits on top of the screen channels.

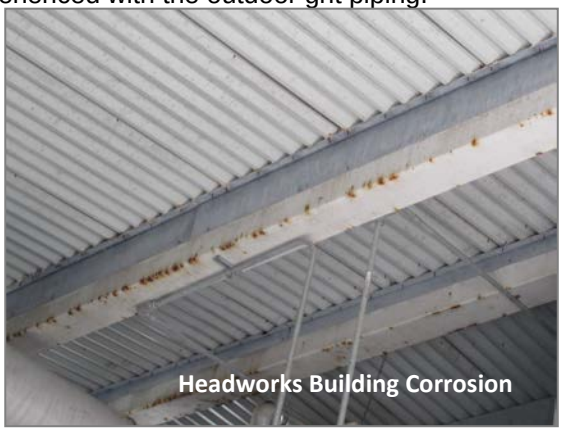
Screened influent exits the primary diversion structure and flows west through a Parshall flume to the Eimco JGT100 vortex grit units. Slide gates in the grit unit influent and effluent channels allow the flow to be directed to either one of the two 10-foot diameter grit units. The flow from the influent channel enters the vortex grit chamber and circles around the grit chamber, creating a vortex flow. Grit is trapped in the low flow portion of the vortex and settles to the bottom of the grit chamber. Two grit pumps (located south of the grit units about 7-feet below grade) periodically pump grit from the vortex units to two grit cyclones/classifiers.


Grit Unit


Grit Pumps

Concerns and Deficiencies:

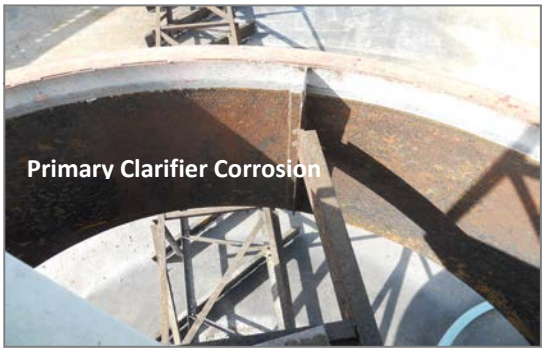
- Primary effluent currently used for screen wash water does not provide effective screen cleaning.
- A single washer-compactor provides no redundancy.
- There are some freezing issues experienced with the outdoor grit piping.
- Grit accumulates in the grit pump suction piping, possibly due to the suction pipe length (<10-feet typically recommended) and fittings (e.g. the tee connecting the two pump suction lines creates a dead spot).
- Some corrosion is evident on the screens and building beams.
- There is no ventilation in the Headworks Building.
- Flow can potentially back up in grit chambers.


Headworks Building Corrosion

5.2.5 PRIMARY CLARIFICATION

From the headworks, wastewater flows through a 24-inch pipe which tees to split the flow to the primary clarifiers. Valves on either side of the tee allow isolation of each clarifier. Primary clarification is provided by two 55-foot diameter primary clarifiers consisting of a scraper and skimmer mechanism in a circular concrete tank.


Primary Clarifier


Primary Clarifier Corrosion

he clarifiers were constructed in 1958 and are in poor condition, but still operational. An on-site structural evaluation of the west clarifier (No. 1) was performed by Keller Associates in April 2012 (west clarifier) and June 2017 (east clarifier) with the following observations and recommendations:

Concerns and Deficiencies:

- Based on current flow rates, the primary clarifiers do not provide adequate redundancy.
- Spalling and minor cracking were observed, mostly in the upper part of the clarifiers, launder, and launder wall.
- The submerged part of the clarifier has heavy corrosion on all the parts and structural members, deep enough to require major rust removal to prepare the surface for any coating. The entire mechanism has limited service life remaining, and is recommended for continued observation.
- Bolts used to attach the sludge scraper blades to the rake arms were heavily rusted on the exterior, and were recommended to be replaced at the next scheduled dewatering maintenance.
- The scum skimmer has extensive wear in addition to being corroded, and should be repaired or replaced.
- The scum collection box appears to have been recently replaced with a stainless steel fabrication and is good condition.
- The center well, overflow weir, baffle, and bridge structure are in satisfactory condition, and no repairs were recommended.
- The grout on the floor of the clarifiers appears to be in good condition.

5.2.6 ACTIVATED SLUDGE

Activated sludge treatment was added as part of the 1974 wastewater treatment plant expansion. This included two common wall concrete aeration basins (divided into two unequal cells) operated in parallel, with submerged turbine aerators supplied by four Hoffman centrifugal blowers in the Blower Building. Two return sludge pumps and two waste sludge pumps were also installed in the basement of the Blower Building in the 1974 wastewater treatment plant expansion.

As part of the 1982 modifications, the mechanical aerators in the basins were replaced with coarse bubble diffusers. Concrete masonry unit (CMU) walls were added to divide each of the aeration basins into three equally sized cells; and (by raising the walls with CMU) the influent launders were converted to channels and the northern 2/3 of the effluent launders were taken out of service. Weirs and shear gates

were added to the splitter box at the south end of the aeration basins.

Aeration Basins

The effluent from the primary clarifiers is piped to the south end of the basins into influent channels on the outer wall running the full length of each basin. Each influent channel has two 2-foot openings in each cell with slide gates; under current operation, primary effluent is being routed only to the north cell in each basin. RAS from the secondary clarifiers is piped separately into the south end of the influent channels and to the north end of each basin. The mixed liquor flows from north to south over a 10-foot wide broad-crested weir in the wall between each cell.

An aerated effluent launder on the inner wall of each basin collects the aeration basin overflow (mixed liquor), and carries it to a splitter box on the south end of the basins for distribution to the secondary clarifiers. The center wall of the splitter box has a gated opening that allows the flow from each of the aeration basins to intermingle. Both sides of the splitter box include a weir and one or more shear gates for flow splitting. The west weir is 6-inches higher than the east weir, and is currently not in use; three different sized shear gates at different elevations are used to adjust the flow to the west clarifier.

There is a dissolved oxygen (DO) sensor in each aeration basin cell to provide the DO concentration in each cell to an indicator in the Blower Building.

Blowers

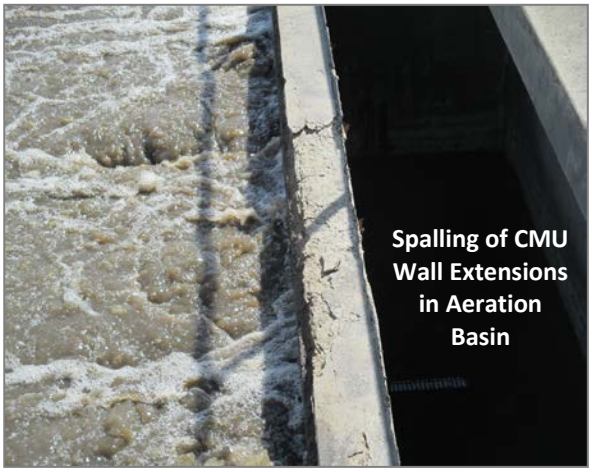
Aeration to the activated sludge basins is provided by the four centrifugal blowers (two with 125 hp motors and two with 75 hp motors) installed when the activated sludge basins were constructed. The blowers are located on the main floor of the Blower Building, south of the aeration basins. Each blower has its own inlet piping that draws air through an inlet filter located on the roof of the building, and manual inlet butterfly valves for flow control.


Centrifugal Blowers

All the blowers discharge to a common air header, which supplies six 8-inch air distribution lines that each furnish air to one of the aeration basin cells. Each air distribution line has an annubar averaging pitot tube to measure air flow. At the aeration basin, each air distribution line supplies air to the six diffuser headers in an aeration basin cell. There is a manual butterfly valve on each header drop pipe to control air flow to the diffusers on that header. The blowers are sequenced to achieve a targeted DO level.

Concerns and Deficiencies:

- The basins do not meet the requirements for consistent, year-round nitrification.
- The current basins reveal soft and deteriorated concrete.
- Interior masonry walls do not have necessary durability for years of additional service.
- Existing manual controls do not allow blower capacity to be adjusted to match varying plant loads, resulting in an inefficient use of electricity.
- Existing coarse bubble diffusers are not energy efficient.
- The slide gates into the aeration basins are difficult to operate and do not seal tightly.


Spalling of CMU Wall Extensions in Aeration Basin

- Flow splitting to the clarifiers is split based on similar pipe lengths to each basin, resulting in a trial-and-error process involving adjustment of several shear gates in the splitter box, with no flow meter on the mixed liquor pipelines to verify the results of the adjustments.
- Plugging in the splitter box occurs in the narrow space between the weirs and the wall.
- If all flow to the splitter box is routed through the shear gates, scum will accumulate upstream of the weirs.
- If the weirs in the splitter box are used, the drop over the weirs may cause damage to the floc and result in poor settling in the clarifiers.
- There is no equipment to mix anoxic cells.
- Existing blowers are energy inefficient.

5.2.7 SECONDARY CLARIFICATION

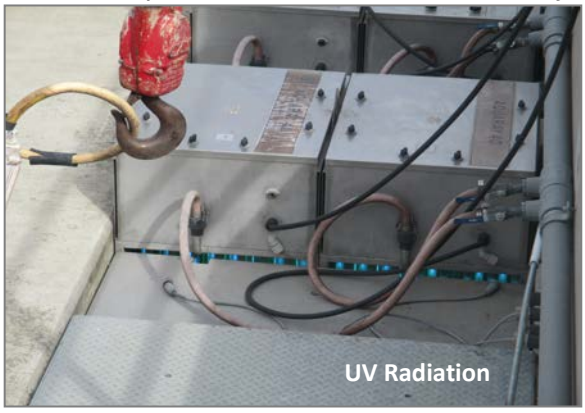
Secondary clarification is provided in two 85-feet diameter clarifiers consisting of a sludge removal and skimmer mechanism in a circular concrete tank. Clarifier 1 (the west unit) is a peripheral feed type clarifier, with both influent and effluent channels located on the perimeter of the clarifier. Clarifier 2 (the east unit) is a center feed clarifier, with an effluent trough several feet in from the perimeter of the clarifier. The influent and effluent channels for Clarifier 1 are concrete, while the effluent trough for Clarifier 2 is steel. The clarifier drives were recently replaced. The drive for Clarifier 2 was replaced in 2016 and the drive for Clarifier 1 was replaced last year.

Concerns and Deficiencies:

- Based on current flow rates, the secondary clarifiers do not provide adequate redundancy.
- The floor of Clarifier No. 1 has heaved and been repaired several times.
- Scum from the secondary clarifiers is returned to the NSPS rather than to the digesters, causing scum accumulation and continual recycling.
- Clarifier No. 1 has 20% less effective surface area than Clarifier No. 2 due to its influent/effluent configuration and underperforms Clarifier No. 2.
- Both clarifier drive mechanisms experience vibration.

5.2.8 UV DISINFECTION

Effluent from the secondary clarifiers is disinfected through an ultraviolet (UV) disinfection process. The UV radiation initiates a photochemical reaction that destroys the genetic information contained in the DNA of bacteria in the wastewater. The bacteria lose their reproductive capability and thus are inactivated.



The outlet piping from the secondary clarifiers is combined at a manhole north of the chlorine contact basin, which discharges to the basin inlet channel that feeds the UV disinfection channels. The two UV disinfection channels, which are immediately adjacent to the south wall of the chlorine contact basin, are operated in parallel. A rotating scum pipe upstream of the UV units allows for removal of any scum that may accumulate in the channels.


UV Disinfection Units

The existing UV disinfection system consists of a low-pressure, vertical-type, Aquaray 40 VLS system that was installed in 1998. The UV units are installed in concrete channels. Each channel contains six vertical UV lamp banks. The equipment furnished included a packaged blower system to provide air scour for the lamp modules, and a chemical tank for more thorough out-of-channel cleaning.

The disinfected wastewater exits the UV channels and flows to the effluent pump station, located immediately adjacent to the east wall of the chlorine contact basin.

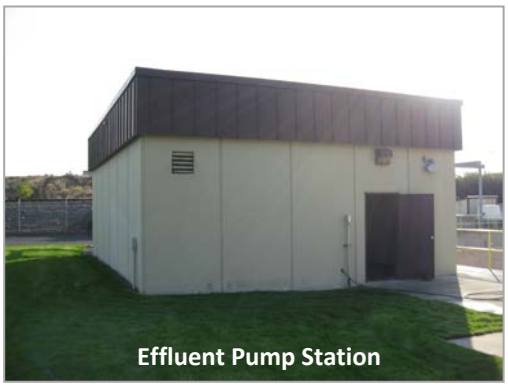
The City also constructed a sodium hypochlorite system to provide a backup disinfection process; however, the system is not functional.

Concerns and Deficiencies:

- The UV system does not meet redundancy requirements for the current peak flows.
- The UV monitoring system and application software is not functional.
- The UV disinfection system does not have a flow-pacing feature, which would save on energy costs.
- The large number of lamps (240 per channel) requiring periodic manual cleaning and/or replacement is a maintenance issue.
- There have been challenges with obtaining parts and service.

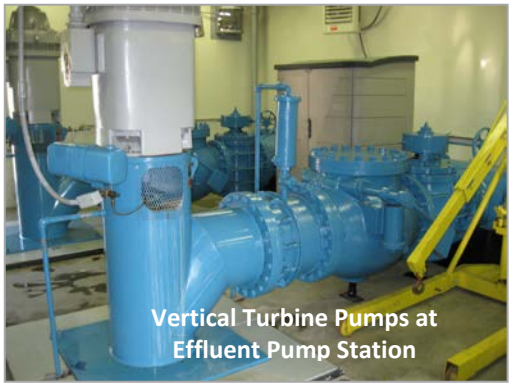
5.2.9 EFFLUENT PUMP STATION

The Effluent Pump Station includes three vertical turbine pumps. Each of the 100 hp pumps is rated for 8,700 gpm, and pumps into a manifold connected to the effluent pipe that carries the flow to an effluent diffuser in the river. Effluent flow is measured in a magnetic meter located outside the effluent pump station building on the east side of the building.


Effluent Pump Station

Pumped effluent is discharged to the river through an effluent diffuser; a bypass pipe provides for discharge to the river if the diffuser is out of service.


Outside Piping at Effluent Pump Station


Vertical Turbine Pumps at Effluent Pump Station

Concerns and Deficiencies:

- The effluent pumps, which are essential to removing the treated effluent from the plant, are nearing the end of their expected lifespan.

5.3 CONDITION ASSESSMENT – SOLIDS PROCESSES

Processing of waste solids from the clarifiers includes thickening (gravity thickener for primary sludge; dissolved air flotation thickener for secondary sludge), anaerobic digestion, sludge storage, and dewatering by a belt press.

5.3.1 SLUDGE THICKENING

Gravity Thickener


Gravity Thickener

Primary sludge is pumped from each of the primary clarifiers to a gravity thickener. The thickener is a 45-foot diameter circular concrete tank with a scraper and skimmer mechanism; however, the skimmer arm was damaged and has been removed. Thickened sludge is pumped from the thickener to the digesters, and the liquid from the thickener is returned to the NSPS.

Concerns and Deficiencies:

- The drive mechanism and scum baffle needs refurbishing.
- There is no scum removal, since the skimmer arm is missing.
- Single unit provides no redundancy.

Dissolved Air Flotation Thickener

Waste activated sludge is pumped from the secondary clarifiers to the dissolved air flotation (DAF) thickener. The DAF thickener consists of a tank with a skimmer, air compressor, pressurization tank, and recycle pump. The DAF tank is a rectangular steel tank, with the length about five times the width. The activated sludge comes in to and is thickened to 3.1-3.6% solids (two samples). This is within the typical range of 3-5% solids expected from a DAF thickener.


Dissolved Air Flotation Thickener

An on-site structural evaluation of the dissolved air flotation tank was performed by Keller Associates in 2012 (Evaluation Report for Dissolved Air Floatation Thickener, May 2012). The repairs recommended in that report to address observed corrosion and coating failures have been carried out; continued maintenance of the coating is recommended.

Concerns and Deficiencies:

- The equipment is prone to sludge spilling and spraying if the float layer is allowed to build, making it difficult to keep the area clean.
- Single DAF unit provides no redundancy.

5.3.2 SLUDGE BLENDING TANK

Thickened primary sludge from the gravity thickener and thickened secondary sludge from the DAF thickener is routed to the sludge blending tank before being pumped to the digesters. The sludge mixing tank, located at the south end of the Solids Building, is a baffled 6900-gallon rectangular concrete tank originally provided with a top entry mechanical mixer. The original mixer is no longer functional; mixing provided by the sludge pumps is insufficient.

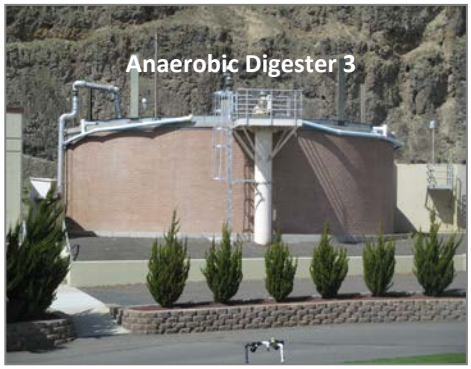
Concerns and Deficiencies:

- The mixer is in need of repair.
- The blending tank produces noticeable odors, and the hydrogen sulfide has contributed to corrosion and disabling of the mixer.
- There is a bulge in the side of the tank, which may need to be repaired.

5.3.3 ANAEROBIC DIGESTERS

Sludge is pumped from the sludge mixing tank to the anaerobic digesters for stabilization and pathogen reduction. The blended sludge pumps are three Penn Valley double disc diaphragm pumps, rated at 70 gpm each. The pumps operate intermittently based on level in the sludge mixing tank.

There are three digesters, numbered from east to west. The oldest digesters (Digesters 1 and 2) have a volume of 217,000 gallons each; Digester 3 (designed as a primary digester) has a volume of 366,000 gallons. Digesters 1 and 2 have fixed covers and Digester 3 has a floating cover. A constant level is maintained in the digesters, with the overflow equalized in the sludge holding tanks.



Problems with foaming, gas recirculation, and mixing in the digesters, as discussed in the 2005 Wastewater Facilities Plan, were recently addressed via a digester improvements project. The only additional issue with the digesters noted by the plant staff is struvite formation, resulting in plugging of the overflow piping as shown below.

5.3.4 SLUDGE HOLDING TANKS

There are two open circular tanks for storing the digested sludge before dewatering. Both tanks previously had covers, which have since been removed due to issues with corrosion. Sludge Holding Tank #1 is a 20-foot diameter steel tank, located north of Digester #1, with a working volume (volume to overflow) of about 39,560 gallons. Sludge Holding Tank #2, a 34-foot diameter concrete tank located north of Digester #2 and #3, has a working volume of 120,320 gallons. Thus, the total available sludge storage volume is 159,880 gallons. Tank #1 is connected to Digesters 1 and 2, while Tank #2 is tied to Digester 3.

Two 6-hp mechanical (ABS) mixers were recently moved from the anoxic basins and installed in each of the tanks to keep the tank contents mixed.

Concerns and Deficiencies:

- Sludge Holding Tank #1 has a significant amount of corrosion. Sludge Holding Tank #2 also requires new coating.
- Struvite buildup has been observed in the tanks.
- The mixers, masts, and hoists were not designed for this application. Given the size of the mixer and its location at the perimeter of the tank, the contents of Sludge Holding Tank #2 are not sufficiently mixed to prevent settling in the center of the tank.
- Since the sludge holding tanks are tied directly to specific digesters, taking a tank out of service also puts the associated digester(s) out of commission.

5.3.5 DEWATERING

The existing dewatering system consists of two digested sludge pumps, two belt filter presses (BFPs; one Andritz unit and one BDP unit), one polymer system, and two dewatered sludge conveyors (one for each dewatering unit). A 2-meter Andritz belt filter press (BFP) is located on the second floor of the solids building above the pump and polymer feed room. This unit was installed in 1983 with a hydraulic capacity of 250 gallons per minute (gpm) and a solids loading capacity of approximately 1,320 pound per hour (pph). In 2012, the City worked with Andritz to

refurbish the BFP, which included replacing bearings, seals, spray bars and a belt. In spite of this maintenance, the City has been experiencing increasingly frequent operational issues that have rendered the Andritz unit virtually inoperative. During a site visit, Keller personnel observed general wear and tear on the unit – including material build-up on the frame and degradation of the dewatering belt.

The City's second dewatering unit – a 1-meter BDP Model 3DP filter press – was installed on the first floor of the solids building in 2007. This unit has a design hydraulic capacity of 135 gpm and a solids loading capacity of 750 pph. The solids capture has ranged between 70-95% – averaging 81% for 2014-2016, with an average dewatered cake total solids (TS) of approximately 14%. This solids capture is low compared to a more typical 90-95%; the cake TS is slightly lower than the required 14-16%. Polymer usage during 2016 averaged 30 pounds per ton (ppt) of dry solids. With the existing digested sludge coming into the BFP at about 1.7% TS, the current BDP belt press would need to receive flow at about 88 gpm to maintain a solids loading of 750 pph. Thus, it would take approximately 7.5 hours per day (hpd) to dewater the 2035 average annual day sludge flow during a 5-day week, and 8.5 hpd for the maximum month sludge flow. The current BDP equipment is adequate to perform the role of a redundant press, but is not a long-term solution for the City's sludge dewatering.

Waste solids from the WWTP are currently hauled offsite to Clearwater Composting. The purpose of the dewatering equipment is to increase total solids in the plant sludge from the 1-2% TS present in the sludge from the digesters, to the 14-16% TS required by Clearwater Composting.


Andritz Belt Press


BDP Belt Press

Concerns and Deficiencies:

- Major maintenance issues with the Andritz press are increasingly frequent, and the location of the Andritz press makes maintenance and removal difficult.
- With the Andritz unit out of service there is no redundancy for the BDP press.
- Based on tests by Andritz, Lewiston's digested sludge is classified as "poorly dewaterable".

5.3.6 SLUDGE PUMPING

Sludge pumping includes pumping from the primary and secondary clarifiers (waste and return sludge), from the sludge mixing tank, from the thickeners, and from the digesters. Keller Associates evaluated the waste solids handling pumps (Preliminary Engineering Report for WWTP Primary and Secondary Thickening, May 2012), and made recommendations for replacement of some of the pumps. Three sets of pumps have since been replaced.

Primary Sludge (PS)

Sludge is pumped from the primary clarifiers to the gravity thickener, using three

Wemco Torque-Flow recessed impeller pumps located in the Solids Building. The pumps were designed to originally pump to a grit classifier on the second floor of the Solids Building, which was removed in 2008 when new grit removal facilities were constructed in the Headworks. These pumps were fitted with slurry seals in 2017 to eliminate the need for seal water in order to comply with plumbing code. The primary sludge is currently pumped at approximately 130 gpm with solids content of less than 0.5%. The pumps operate on a continuous basis since they are located above the clarifier water surface and lose prime when shut off. This results in a significant amount of water being recycled back to the headworks.

Thickened Primary Sludge (TPS)

The thickened primary sludge pump pulls thickened primary sludge from the sludge hopper at the bottom of the gravity thickener and pumps it to the sludge blending tank. A single diaphragm pump (Penn Valley) was provided for this function with no redundancy.

Return Activated Sludge (RAS)

Return activated sludge is pumped from the secondary clarifiers to the aeration basins, using two Fairbanks Morse pumps with VFDs located in the basement of the Blower Building. Each pump is rated at 2,200 gpm and is dedicated to a specific clarifier (no redundancy). The pumps are operated continuously, and typically run at less than half speed to provide the desired RAS flow.

Waste Activated Sludge (WAS)

Waste sludge is pumped from the secondary clarifiers to the DAF thickener, using two Borger rotary lobe pumps located in the basement of the Blower Building. These pumps are relatively new (2013) and are equipped with VFDs to allow the WAS flow to be varied from 20-110 gpm. Wasting is alternated between clarifiers at six-month intervals.

Thickened Waste Activated Sludge (TWAS)

Thickened waste activated sludge is pumped from the DAF thickener to the sludge blending tank, using two diaphragm pumps (the second added in 2014). These pumps are reportedly performing well.

Blended Sludge Transfer Pumps

Combined thickened primary and secondary sludge from the sludge blending tank is pumped to the anaerobic digesters, using three Penn Valley double disc pumps located in the Solids Building. Each of these pumps are rated at 87 gpm and are adequate for conveying sludge at 4-5% solids. The City expressed some concern with the maintenance costs for these pumps.

Belt Press Feed

Digested sludge is pumped from the sludge holding tanks to the belt press using Gorman Rupp self-priming pumps. Since it is not recommended that this pump convey greater than 2% solids, anticipated digested sludge concentrations need to be considered with any proposed plant changes.

Sludge Pump Concerns and Deficiencies:

- The TPS pump is currently not capable of pumping greater than 4% solids from the gravity thickener (5-6% is recommended for optimum thickener performance. The small diameter suction pipe (reducing from 6-inches to 4-inches about 15-feet from the pump) was identified as a possible cause.
- A single TPS pump provides no redundancy, and space for a second pump is limited.

- Continuous operation of the RAS pumps at less than half speeds is energy-inefficient.

5.4 CONDITION ASSESSMENT – INFRASTRUCTURE

5.4.1 WATER DISTRIBUTION

Utility Water System

Utility Water Pumps

The Effluent Pump Station also houses two vertical turbine pumps that provide utility water to the plant for purposes of plant operation and maintenance. The pumps pull water from the effluent wet well, and discharge into a 6-inch manifold that feeds over 300-feet of 6-inch distribution line plus the smaller 3W distribution lines throughout the plant. There is significant head loss in the 6-inch manifold and distribution line, particularly since the distribution system is not looped. This limits the capacity of the system.

Potable Water System

The potable water lines on the plant site are old galvanized pipe; corrosion is evident where the pipe enters the Solids Building and is likely also occurring elsewhere. Potable water lines at the plant are unmetered. Backflow devices consisting of a reduced pressure backflow preventer (RPBP) are installed at each building; however, water lines are direct tapped in some locations.

5.4.2 SITE SECURITY AND BUILDINGS

Site security around the plant can be improved. Additionally, storage space plant-wide is insufficient and several of the buildings have space limitations or other issues.

Administration Building

The administration building was constructed in 1983, for the plant staffing level needed at that time. The subsequent addition of more equipment and processes, plus increasing flows and stricter permit limits, in the ensuing 30+ years have necessitated increased staffing levels to maintain plant performance. The resulting overlapping of shifts has created crowding in the administration building, particularly in the locker room/shower area and conference room.

Maintenance Building

The maintenance building was also constructed in 1983. Shop facilities are insufficient for current needs.

Solids Building

Corrosion is evident at several locations in the solids building.

Control Building

Plant staff has identified several issues relative to the Control 1 building (constructed in 1958 when the first two digesters were built): 1) the roof appears to be sloped incorrectly to drain properly, and the roof liner is lifting; and 2) roof drainage, including

foam from digester overflows, drains onto the road via an upflow catch basin.

5.4.3 ELECTRICAL

An upgrade to the electrical feed system and standby power has been completed. Avista Corporation supplies power to the WWTP. The equipment is fed from the new motor control centers (MCCs). The plant electrical feed consists of two 3,000 amp switchgear line-ups: one for normal utility power, and the other for emergency standby power. Standby power is provided by two parallel gensets with provisions for a third generator and eight automatic transfer switches. Each automatic transfer switch feeds a separate building. Future provisions are available for the addition of two more automatic transfer switches.

The solids building has an old switchgear that remains and was not replaced in the recent electrical upgrade. This equipment is outdated and of questionable reliability and should be considered for replacement.

5.4.4 VEHICLES/MOBILE EQUIPMENT

The City does not currently have a vehicle and mobile equipment replacement interval policy, or a program to budget for necessary replacement expenditures.

5.5 DEFICIENCY SUMMARY

The average expected service life of most wastewater treatment structures and equipment is 30 years and 10-15 years, respectively. Table 5.1 lists the major units for the Lewiston WWTP, along with approximate dates for construction and upgrades.

The majority of the plant facilities are over 30 years old, with the following ages as of 2018:

- Primary plant (primary clarifiers, digesters #1 & #2): 60 years old
- Secondary plant (aeration basins, blowers, secondary clarifier No. 1, RAS pumps, solids building, gravity thickener, sludge mixing tank): 44 years old
- South Shore Pump Station: 44 years old (structure; pumps have been replaced or rebuilt)
- Effluent Pump Station: 44 years old (structure; pumps have been replaced or rebuilt)
- Diffusers, secondary clarifier No. 2, DAF thickener, sludge holding tank: 35 years old

With so many of the units operating well beyond their anticipated useful life, it is clear that the plant staff has played an important role in extending the life of the plant. Even so, the condition of some of the units is such that rehabilitation or replacement in the next few years is recommended to insure reliable ongoing service. A summary of major treatment plant components and their deficiencies is presented in Table 5.2.

TABLE 5.1 – APPROXIMATE AGE OF FACILITIES

Equipment	Built	Upgrades
South Shore Pump Station	1974	2015 (replaced pumps, gates, and switch gear)
Pipelines, air release, air break	1974	
North Shore Pump Station	1999	2005 (replaced pumps)
Flow meter	2009	
Septage receiving station	1989	
Generators, primary power	2017	
Primary diversion structure	1974	1983
Grit removal (vortex)	2009	
Screens (mechanical)	1983	2009 (replaced with band screens)
Primary clarifiers	1958	1989 (replaced weir)
PS pumps	1958	2014
Aeration basins	1974	1983 (dividers, splitter box mods), 1991 (air lines)
Blowers (centrifugal)	1974	
Coarse bubble diffusers	1983	
Secondary clarifier No. 1	1974	~2017 (rehabbed drive)
WAS pumps	1974	1983, 2013
RAS pumps	1974	
Secondary clarifier No. 2	1983	~2016 (rehabbed drive)
UV disinfection	1999	scheduled for upgrade in 2015
Effluent pump station	1974	2004 (pump rebuild)
Effluent meter		2013
Plant water pumps	1974	1983, 2008, 2013
Solids Building	1974	1983, 1989 (additions)
Gravity thickener	1974	
TPS pumps		2014
DAF thickener	1983	
TWAS pumps	1983	2014
Sludge mixing tank	1974	
Blended sludge pumps		2003
Digester #1 (east)	1958	2013 (replaced cover, mixing, recirc, boiler)
Digester #2	1958	2013 (replaced mixing, recirc, boiler)
Digester #3	1989	2013 (replaced mixing, boiler)
Sludge holding tank #1	1983	
Sludge holding tank #2	1989	
Belt press (Andritz)	1983	2013 (rebuild)
Belt Press (BDP)	2007	

TABLE 5.2 – UNIT PROCESS DEFICIENCY SUMMARY

Equipment	Backup Rating	Criticality Rating	Condition Rating	Issues to be addressed
South Shore Pump Station	2	S/H, EQ, PF, CC	M (New pumps 2015)	Air release
North Shore Pump Station	2	S/H, EQ, PF, CC	W/R	Ragging, concrete spalling, flow measurement, pipe corrosion
Standby Power/Main Switchgear	1	S/H, EQ, PF, CC	N (2017)	
Septage Receiving	5	PF	W/R	Grinder, maintenance, efficiency
Screening	5[1]	EQ, PF	M	Single washer-compactor, poor screen cleaning, bldg. corrosion
Grit Removal	1	PF	M	Freezing, grit accumulation in piping
Primary Clarifiers	5	EQ, PF	W/R	Redundancy, sludge scraper/scum skimmer corrosion, concrete spalling
Primary Sludge Pumps	1	PF	N (2014)	
Aeration Basin	5	EQ, PF	W	Concrete spalling, uneven distribution, capacity, slide gates
Blowers	5	EQ, PF, CC	R	Age, lack of redundancy, efficiency
Secondary Clarifiers	5	EQ, PF	W	Redundancy, drive vibration, coating deterioration, scum accumulation
RAS Pumps	5	EQ, PF	R	Lack of redundancy, efficiency
WAS Pumps	1	PF	N (2013)	
Gravity Thickener	5	EQ, PF	W	Deteriorated drive mechanism & scum baffle, missing skimmer arm, redundancy
DAF Thickener	5	EQ, PF	M	Efficiency, maintenance, spilling/spraying
Sludge Blending	4	PF	W/R	Mixer, odors
Anaerobic Digestion	2	EQ, PF	M	Struvite formation
Sludge Holding	4	PF	W/R	Mixing, corrosion (Tank #1)
Belt Press Dewatering	5[2]	PF, CC	W/R	Maintenance, redundancy
UV Disinfection	5	EQ, S/H	W	Redundancy, efficiency, maintenance, age
Utility Water Pumps	1	PF	M	Head loss in distribution
Effluent Pumps	1	S/H, EQ, PF, CC	R	Age (reliability)

Notes:

1 - While there are 2 screens, there is only one washer-compactor resulting in the backup rating of 5.

2 - With the Andritz dewatering unit out of service, there is no dewatering redundancy.

Backup Rating

- **1** **One Level of "In Kind" Redundancy** (Identical piece of equipment is available to replace primary unit)
- **2** **Two or More Levels of "In Kind" Redundancy** (More than one piece of equipment is available for replacement)
- **3** **Equipment Alternative** (An alternative piece of equipment is provided)
- **4** **Procedural Alternative** (An alternative operating procedure is required to provide redundancy)
- **5** **No Backup** (Failure of equipment will shut entire process down)

Criticality Rating

- **S/H** **Safety and Health Risk** (Loss would create risk to safety and health of plant personnel and others)
- **EQ** **Effluent Quality Risk** (Loss would create risk to WWTP effluent quality and could result in NPDES permit violations)
- **PF** **Process Functionality Risk** (Loss would affect the function and/or efficiency of the affected processes)
- **CC** **Cost Critical** (Loss would have a significant cost impact in short term or long term)

Equipment Condition Rating

- **N** **New** (Equipment is new, or replaced in last 12 months)
- **LN** **Like New** (Equipment is operated very little or recently overhauled to a condition like new)
- **M** **Used but Maintained** (Equipment showing expected wear, but is adequately maintained and functions well)
- **W** **Heavily Worn** (Equipment is close to end of useful life, needs overhaul, difficulty in performing intended functions
- **R** **Needs Replacement** (Equipment does not acceptably perform, beyond cost-effective repair)

CHAPTER 6.0 – REDUNDANCY, CAPACITY, AND PERFORMANCE

6.1 REDUNDANCY ANALYSIS

As discussed in Chapter 1, the EPA (EPA 430-99-74-001) and Ten States Standards provide redundancy guidance as follows:

Redundancy Criterion 1:

At least two units are to be provided for screens, primary and secondary clarifiers, aeration basins, blowers, pumps, disinfection, and digesters. With the exception of the thickened primary sludge and the belt press feed pumps, Lewiston WWTP meets this criterion.

Redundancy Criterion 2:

Firm capacity (capacity with the largest unit out of service) is to be sufficient for:

- 50% of design flow for primary clarifiers
- 75% of design flow for secondary clarifiers
- 100% of design flow for blowers and UV disinfection
- Peak flow for pumps and fine screens

Capacities of the various units based on this criterion are discussed in Section 6.2.

6.2 PROCESS CAPACITY

To identify potential bottlenecks in the treatment process, each plant component was evaluated based on both the process performance and the hydraulic limitations. The capacities (described in following sections) are summarized in Table 6.1. The plant is currently over capacity in a few locations including the aeration basins (due to lack of blower redundancy).

TABLE 6.1 – PLANT CAPACITY RESULTS

Component	Firm Cap'y (MGD)[1]	2015 Cap'y Needed (MGD)	2035 Cap'y Needed (MGD)	Limiting Factor
South Shore Pump Station	15.12	8.09 (PHF)	10.12 (PHF)	Redundancy: 3 pumps in service
North Shore Pump Station	2.97	0.67[2] (PHF)	1.13[2] (PHF)	Redundancy: 2 pumps in service
Headworks Screens	9.36[3]	8.47[2] (PHF)	11.07[2] (PHF)	Redundancy: 1 unit in service
Headworks Grit Chambers	14.0	8.47[2] (PHF)	11.07[2] (PHF)	Performance
Parshall Flume Flow Meter	10.6	10.9[2] (PIF)	14.3[2] (PIF)	Hydraulic
Primary Clarification	8.55	8.47[2] (PHF)	11.07[2] (PHF)	Redundancy & Performance
Aeration Basin (Incl. Blowers)	3.7	4.2 (MM)	5.6 (MM)	Redundancy & Performance
Secondary Clarification	7.3	8.1 (PHF)	10.7 (PHF)	Redundancy & Performance
UV System	7.88	8.1 (PHF)	10.7 (PHF)	Redundancy & Performance
Effluent Pump Station	25.1	8.1 (PHF)	10.7 (PHF)	Redundancy: 2 pumps in service

Notes

[1] MGD – million gallons per day, PHF – Peak Hour Flow, PIF – Peak Instantaneous Flow, MM – Max Month Flow.

[2] Assuming plant recycle flow rate of 0.37 MGD.

[3] Assuming clean water is used to clean screens.

6.2.1 SOUTH SHORE PUMP STATION

The South Shore Pump Station includes four 3500 gpm screw centrifugal pumps and has the ability to pump into three force mains under the river (one 24-inch and two 16-inch pipelines). Three force mains (one 24-inch and two 16-inch) run from the South Shore Pump Station to an air release structure at the top of the West Lewiston levee, then under the river to a manhole (air break structure) at the top of the North Lewiston levee. Currently the City uses only one 16-inch force main to convey flow under the river. The current average sewage flow from the South Shore Pump Station is approximately 3.4 MGD.

6.2.2 NORTH SHORE PUMP STATION

The North Shore Pump Station includes three 1030 gpm submersible HOMA non-clog sewage pumps that pump into a 16-inch discharge manifold. The discharge from the North Shore Pump Station is metered through a 16-inch magnetic flow meter, capable of measuring 23.8 mgd. A 6-inch Palmer-Bowlus flume (capacity 0.2 mgd) with an ultrasonic sensor measures the sewage flow in the 18-inch RS line coming from north Lewiston. The current average sewage flow from north Lewiston is approximately 0.3 MGD.

6.2.3 HEADWORKS

The headworks building houses two Ovivo Brackett Green CF100 band screens with 5 mm screen openings. The capacity of each screen, as rated by the manufacturer, is 9.36 mgd. As the screen collects debris, the actual capacity is reduced until a cleaning cycle is initiated. The level control system will automatically increase cleaning during peak flow events. Thus, as the peak flows approach the rated capacity of the screens, more frequent cleaning will be required to maintain flow without excessive headloss. However, the primary effluent used as wash water does not provide effective screen cleaning.

Effluent from the screens discharges through a 12-inch Parshall flume to the grit removal portion of the headworks. The 12-inch flume is rated for a maximum free flow of 10.43 MGD, which corresponds to 2.5 feet of water depth.

The grit removal portion of the headworks is provided by two Eimco JGT100 vortex grit units with a diameter of 10-feet, each with an estimated capacity of 7 mgd. Each grit unit is connected to a separate grit pump that periodically pumps grit to a grit cyclone/classifier in the headworks building.

The screenings from both influent screens are sent to a single washer-compactor. No redundancy is provided for the screenings if the washer-compactor is being repaired.

6.2.4 PRIMARY CLARIFICATION

Primary clarification is provided by two 55-foot diameter primary clarifiers with 8-feet and 9-inches SWD. The capacity of the primary clarifiers, based on typical hydraulic loading rates in gallons per day per square foot (gpd/sf), are 800-1,200 gpd/sf for the average conditions (Metcalf & Eddy, Wastewater Engineering, 4th Edition), and 1,800 gpd/sf for the peak hour.

At current flows, primary clarifier overflow rates (with both clarifiers in service) would average 970 gpd/sf during maximum month flows, and 1790 gpd/sf during the peak hour – approaching the maximum loading. A third primary clarifier is needed.

The detention time in the primary clarifiers (both clarifiers in service) would be 1.8 hours at current maximum month flow. Based on typical performance data relative to detention time and influent concentrations, BOD_5 and TSS removals at the current maximum month flow would average about 30% and 60%, respectively.

6.2.5 ACTIVATED SLUDGE

Aeration Basins

The keys to a well-functioning aeration basin are the ability to maintain dissolved oxygen (DO), to provide adequate solids retention time (SRT), and to produce settleable solids. Each of the two aeration basins is approximately 125-feet x 41.5-feet x 15-feet SWD, with a volume of approximately 580,000 gallons divided into three equally sized cells. The SRT measures how long the mixed liquor remains in the basins, and it is also an indicator of the relative settleability of the mixed liquor and its ability to nitrify. In cold weather, an SRT near 12 days is normally necessary to consistently nitrify. The SRT at Lewiston varies from approximately 6 days during the summer to 11 days in the winter.

While the Lewiston WWTP does not currently have a permit limit that requires nitrification, the plant is operated to achieve nitrification for process settleability reasons. For example, in the winter of 2017-2018 the WWTP dropped out of nitrification and secondary clarification was significantly impacted. The sludge rose in the secondary clarifiers several feet with little to no response to RAS/WAS rate adjustments. Also, as discussed in Chapter 1, an ammonia limit may possibly be added in the future, requiring continuous nitrification. For these reasons, the ability of the Lewiston WWTP to continually achieve nitrification was evaluated. Nitrification requires a longer SRT and more aeration than is required for carbonaceous removal. Typically, the longer SRT leads to more settleable solids in the secondary clarifier and better effluent quality; however, a long SRT can also lead to filamentous bacteria growth (such as Microthrix parvicella), which can affect settling.

The existing plant was evaluated using the design flows and loads for the years 2015, 2020, 2025, and 2035 using BioWin® software. Septage flows can be significant sources of load to a plant. It was assumed in this evaluation that septage loads will be similar to those currently experienced at the plant and included in the load projections discussed in Chapter 1. The results of the BioWin® models indicate that:

- In order to more consistently meet nitrification requirements in the future, the MLSS concentrations in the aeration basins should be increased (especially during the winter). However, settleability issues and filamentous bacteria growth have occurred when the MLSS concentrations are increased in the existing basins. Additional aeration basins and blowers are needed to improve nitrification reliability.
- Plant effluent pH and alkalinity should be monitored, as nitrification can be inhibited by a low pH.

Diffusers

Aeration in the basins is provided by means of a 24-inches long broad band, coarse bubble diffusers (EDI MaxAir SS), with a rated capacity of 5-36 cfm each. Each of the three cells in each of the basins has 96 diffusers. The first cell in each aeration basin is currently not aerated, and functions as an anoxic cell to control the growth of filamentous microorganisms.

Blowers

The 75 and 125 hp blowers have manufacturer-rated capacities of 1,900 and 3,400 standard cubic feet per minute (scfm), respectively, at approximately 7 pounds per square inch gauge (psig). The total capacity with all blowers (two 75 hp and two 125 hp) in operation is 10,600 scfm; however, firm capacity (with one of the large blowers out of service) would be 7,200 scfm.

It is normally desirable to maintain 2.0 mg/l DO in the aeration basins to ensure adequate oxygen is available for metabolism of the influent organic matter (BOD) by

the microorganisms in the process. Using an alpha factor of 0.75 for the coarse bubble diffusers, it appears that the effective oxygen (O_2) transfer capacity of the existing aeration system is about 12,700 lbs. O_2/day. Assuming 1.5 lbs. O_2/lb. BOD_5, the existing aeration system has sufficient capacity to handle a maximum BOD_5 load of 8,400 lbs./day.

6.2.6 SECONDARY CLARIFICATION

Secondary clarification is provided in two 85-feet diameter clarifiers. Clarifier 1 (the west unit) is a peripheral feed type clarifier; mixed liquor from the aeration basins is distributed to the clarifier via a series of 3-inch holes in the bottom of an influent channel located on the perimeter of the clarifier. Clarified effluent flows over a weir into an effluent channel adjacent to the influent channel. With the influent channel and effluent launder located inside the tank, the actual diameter at the water surface is 76-feet and 4-inches; this reduces the effective surface area by about 20%.

Clarifier 2 (the east unit) is a center feed clarifier, with mixed liquor from the aeration basins distributed to the clarifier via a series of distribution ports on the center column. The effluent trough is located several feet in from the perimeter of the clarifier and clarified effluent flows into the trough over weirs on either side of the trough. (The 2-foot wide effluent trough inside the tank reduces the effective surface area by about 7.5%.) In addition to having a different influent/effluent configuration, Clarifier 2 is deeper than Clarifier 1 (16' SWD vs. 12' for Clarifier 1). Clarifier 2 reportedly typically outperforms Clarifier 1 in terms of both sludge settleability and effluent quality.

Overflow Rates

The capacities of the secondary clarifiers, based on overflow rates, are 400-700 gpd/sf for the average conditions (Metcalf & Eddy, Wastewater Engineering, 4th Edition) and 1,400 gpd/sf for the peak hour.

At current flows, secondary clarifier overflow rates would average 430 gpd/sf during the maximum month, and 825 gpd/sf during the peak hour – well within normal ranges. Flows routed to Clarifier 1 would need to be approximately 13% less than flows to Clarifier 2 to achieve equal overflow rates (additional flow adjustment may be necessary to achieve equal treatment results).

Considering surface overflow rates only, the maximum firm capacity of the secondary clarification facilities (based on Clarifier 1) is 3.2 mgd for average flows and 7.3 mgd for peak hour. This would meet redundancy criterion 2 (75% of design flow) for flows up to 4.27 mgd average and 9.76 mgd peak. Current maximum month flows are 4.27 mgd, and current peak hour flows are 8.14 mgd.

Solids Loading

The solids loading capacity of the clarifiers depends on the operation of the aeration basin with regard to MLSS, RAS concentration, flow, and wasting rate. The MLSS concentration needs to be higher for nitrification, so the capacity of the secondary clarifiers decreases with higher MLSS concentration. The capacities of the secondary clarifiers, based on the solids loading rates, are 19.2 - 28.8 lbs/sqft/day for the average conditions (Metcalf & Eddy, Wastewater Engineering, 4th edition) and 40.0 lbs/sqft/day for the peak hour.

At current flows and loads the maximum firm capacity of the secondary clarification facilities (based on clarifier 1) is 4.3 mgd for average flows and 6.0 mgd for peak hour flows. Current peak hour flows are 8.14 mgd, so the existing secondary clarification facilities do not meet the redundancy criterion 2. An additional secondary clarifier is needed to provide redundancy for the current flows and loads. In the future a second additional secondary clarifier (for a total of four) may need to be installed.

6.2.7 UV DISINFECTION

The concrete channels containing the UV units by IDI (Infilco Degremont Inc.) are 48' long and 5-feet and 9-inches deep. Each channel contains six vertical UV lamp banks, for a total of 12; each UV lamp bank consists of two lamp modules. According to the 2005 WWFP, the lamps were rated for flows up to 8.6 mgd (4.3 mgd per channel), but the plant needs to use both channels to comply with permit limits. With one of the 12 UV lamp banks out of service, the firm capacity is 7.88 mgd. Current peak hour flows are 8.14 mgd, so the UV system does not meet the redundancy criterion 2.

6.2.8 EFFLUENT PUMP STATION

The Effluent Pump Station includes three Peerless vertical turbine pumps. Each of the 100 hp pumps is rated for 8,700 gpm, and pumps into a manifold connected to the effluent diffuser. Effluent flow is measured through a 20" magnetic meter.

Pumped effluent then travels through 30" effluent pipe to a 5' square concrete structure at the top of the North Lewiston levee. A 36" buried pipe exits the structure to the effluent diffuser, which extends into the river about 200' from the edge of the water. The last 110' of the effluent diffuser includes 14 smaller (8") diffuser pipes (11 reportedly in initial use) that discharge flow near the bottom of the river. A 24" bypass pipe exiting near the top of the structure was provided to carry flow to the river if the diffuser is out of service.

Desirable port velocities for the diffuser are at least 2-3 fps at peak flow. At current conditions, the port velocities are estimated to be 3.3 fps at peak hour flows.

6.2.9 UTILITY 3W WATER SYSTEM

The Effluent Pump Station also houses two vertical turbine pumps that provide 3W (non-potable, disinfection plant effluent water) to the plant for purposes of plant operation and maintenance. The 3W water pumps are American Turbine pumps rated for 350 gpm; the pumps are controlled based on pressure in the utility water line. The pumps pull water from the effluent wet well, and discharge into a 6" manifold that feeds over 300' of 6" distribution line plus the smaller 3W distribution lines throughout the plant.

6.3 HYDRAULIC EVALUATION

A hydraulic evaluation of the liquid process was conducted to determine the facility's ability to handle the peak flows that each unit is expected to experience. This includes influent flows plus flows recycled from the solids processes. The headworks facility was evaluated for 2015 and 2035 flows using a one-minute instantaneous flow for the headworks, and a one-hour peak flow for the remainder of the plant. A return activated sludge flow of 2.7 MGD was also included in the total flow through the aeration basins and to the secondary clarifiers.

The results of the hydraulic evaluations are summarized in Table 6.2. The Parshall flume downstream of the screening channel is a limiting hydraulic component. For a 12-inch Parshall flume, "free flow" conditions only apply at submergences up to 70%. With submergence greater than 70%, the indicated discharge is greater than the actual discharge and a correction factor must be applied to determine the actual discharge. The flume is over 70% submerged at flows above 4.5 mgd.

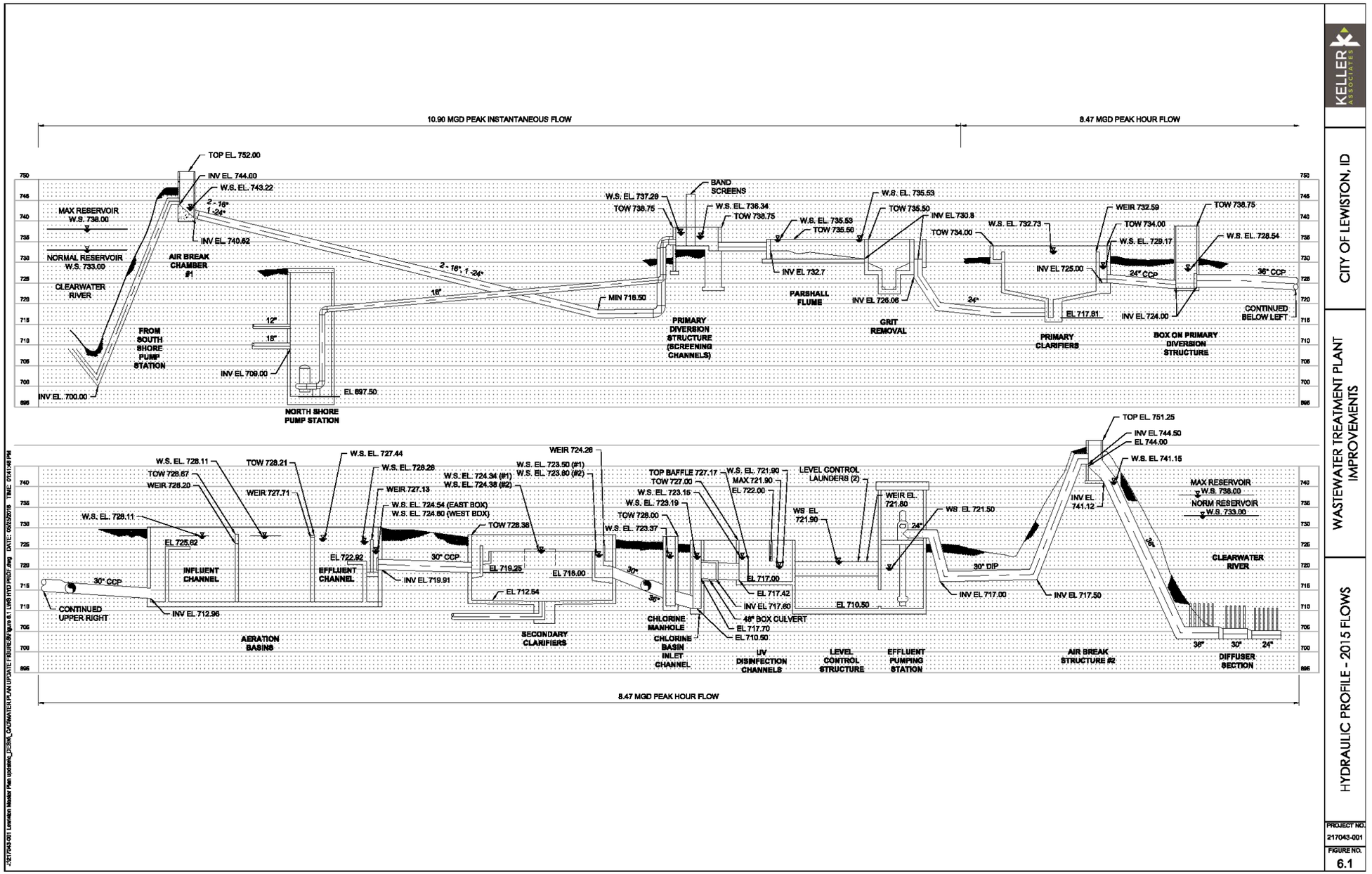
At peak *instantaneous* flows including recycle, flows would potentially overtop the grit structure and Parshall flume. This situation is typically avoided by bypassing the grit units and primary clarifiers. (Another option would be providing equalization to diminish the peaks.)

TABLE 6.2 – HYDRAULIC EVALUATION SUMMARY

Structure	2015 Flow, mgd	All units in service	2035 Flow, mgd	All units in service
Air Break Structure #1	10.9	No issues	14.3	No issues
Headworks Screening Channels	10.9	No issues	14.3	No issues
Parshall Flume	10.9	Potential overflow	14.3	Potential overflow
Grit Removal	10.9	Potential overflow	14.3	Potential overflow
Primary Clarifiers	8.47	No issues	11.07	No issues
Aeration Basins	8.47	No issues	11.07	No issues
Secondary Clarifiers	8.47	No issues	11.07	No issues
UV Disinfection	8.47	No issues	11.07	No issues
Effluent Pumping	8.47 & 10.9	No issues	11.07 & 14.3	No issues

Hydraulic profiles of the WWTP for 2015 and 2035 flows are shown in Figure 6.1 and 6.2, respectively. Full-size figures are provided in Appendix A.

FIGURE 6.1 – HYDRAULIC PROFILE - 2015 FLOWS



CITY OF LEWISTON, ID

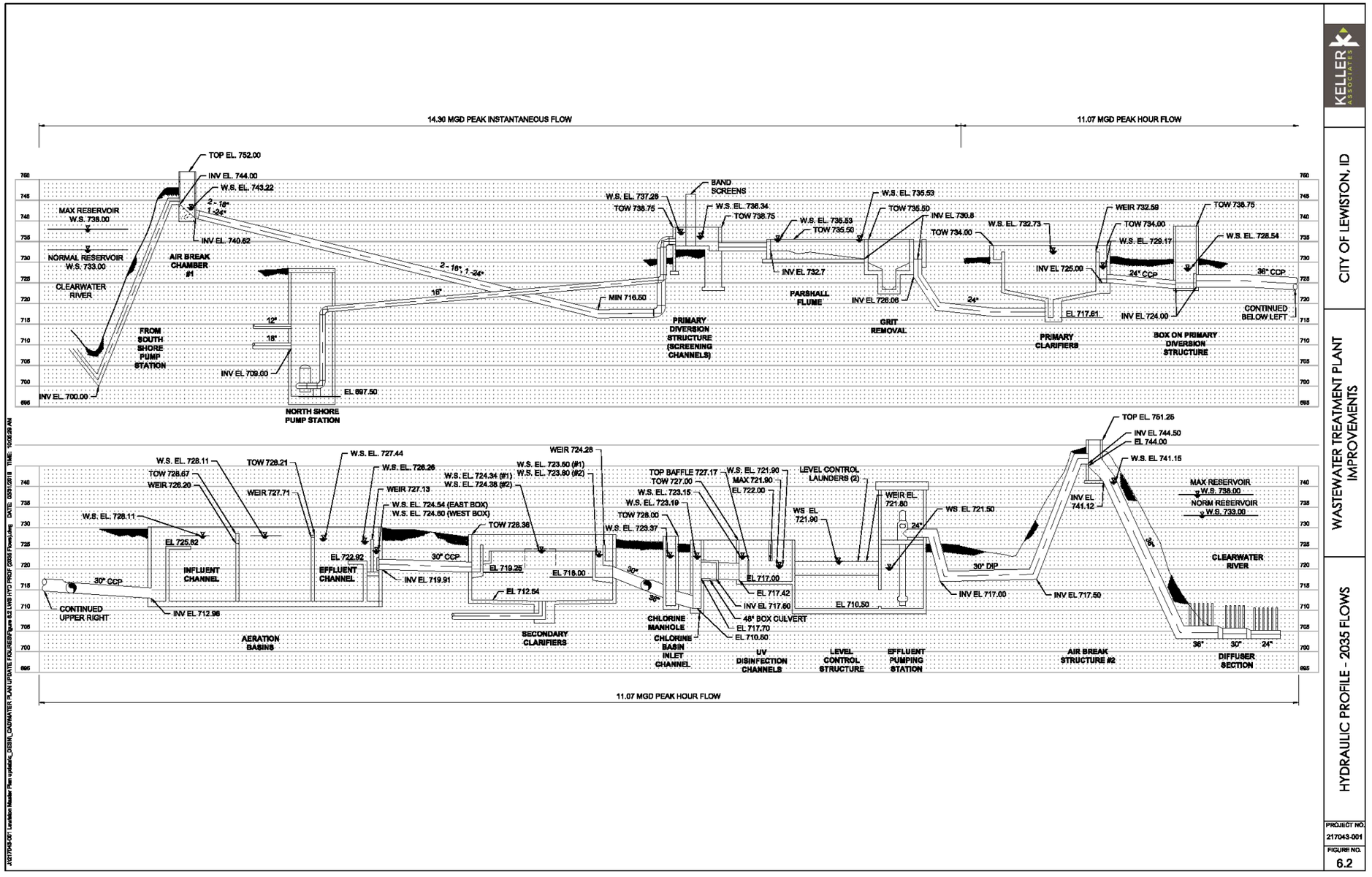
WASTEWATER TREATMENT PLANT IMPROVEMENTS

HYDRAULIC PROFILE - 2015 FLOWS

PROJECT NO. 217043-001

FIGURE NO. 6.1

FIGURE 6.2 – HYDRAULIC PROFILE - 2035 FLOWS



6.4 EFFLUENT PERFORMANCE

This section evaluates the effluent quality from the existing plant relative to current effluent limits for BOD_5, TSS, fecal coliform, E.coli bacteria and pH.

6.4.1 BOD_5

Monthly and weekly effluent BOD_5 data from January 2005 through June 2014 are shown in Charts 6.1 and 6.2, along with discharge limits per the current permit. No BOD_5 violations were noted during this period. In addition, the plant met the current 85% BOD_5 removal requirement for the entire period as shown in Chart 6.3. The effluent BOD_5 loads were also consistently lower than the permitted maximum average monthly and average weekly loads.

CHART 6.1 – WWTP EFFLUENT BOD_5 CONCENTRATIONS (MONTHLY)

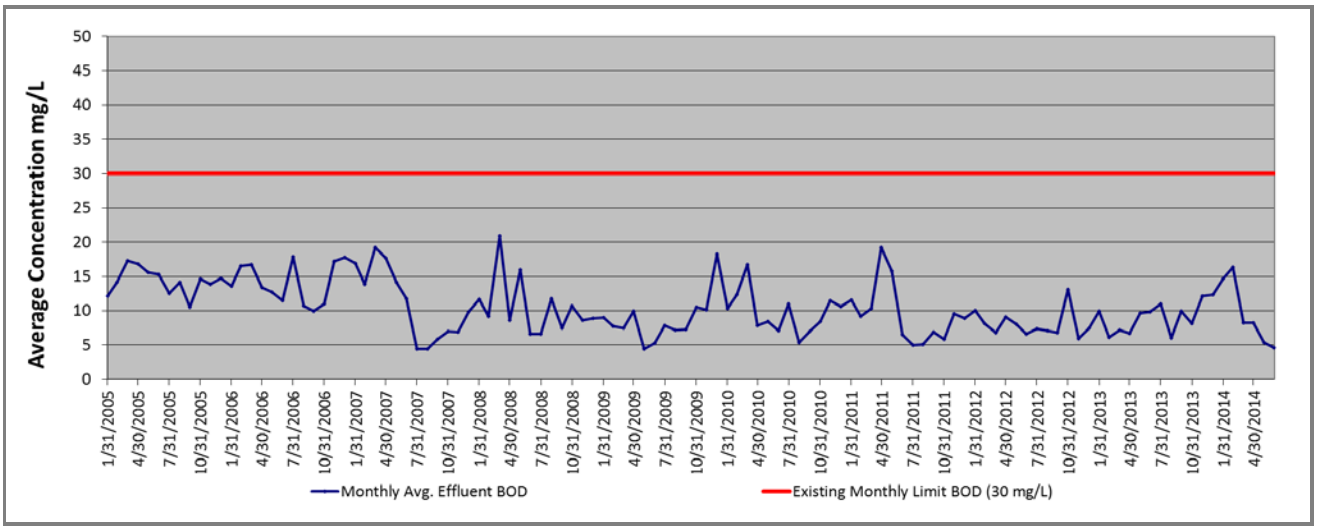


CHART 6.2 – WWTP EFFLUENT BOD_5 CONCENTRATIONS (WEEKLY)

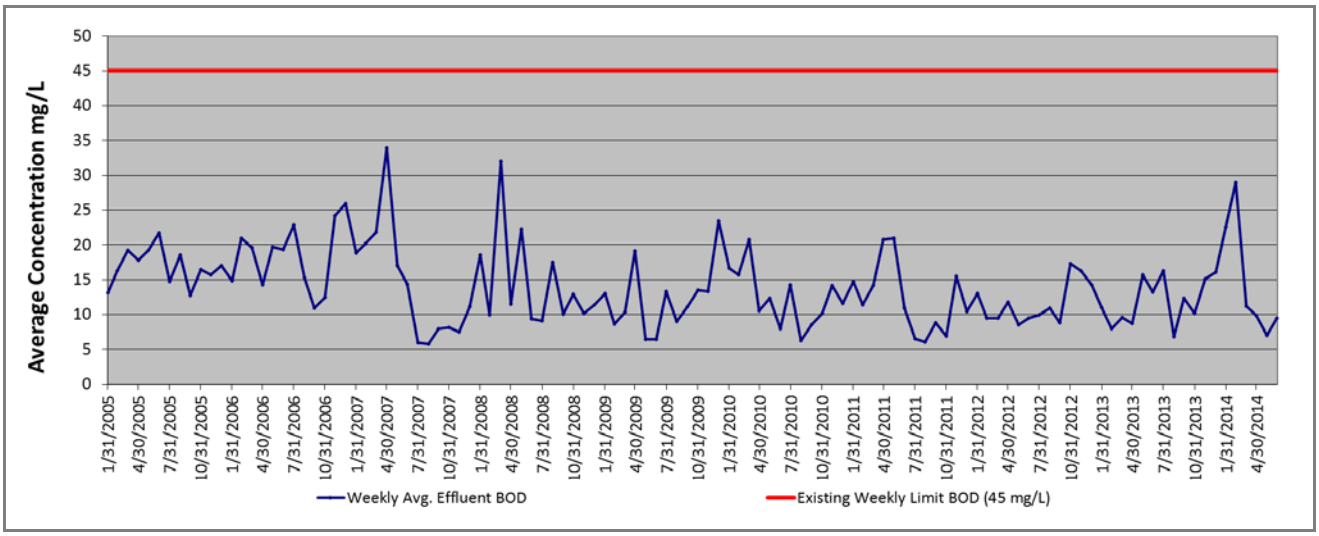
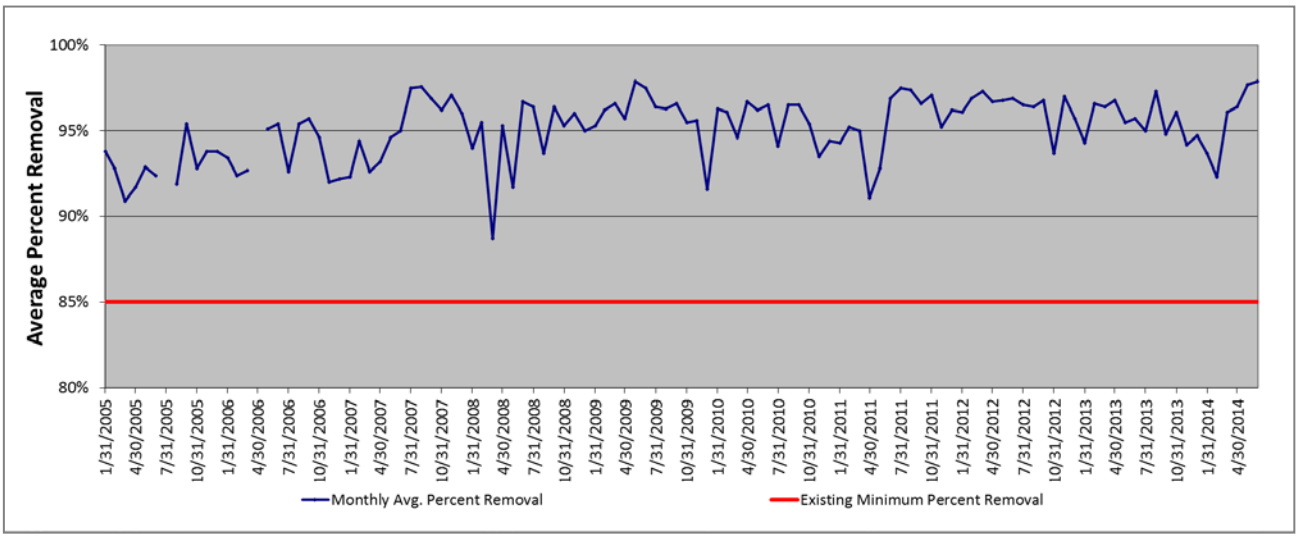


CHART 6.3 – WWTP BOD_5 PERCENT REMOVAL (MONTHLY)



6.4.2 TSS

Monthly and weekly effluent TSS data from January 2005 through June 2014 are shown in Charts 6.4 and 6.5 with discharge limits per the current permit. With only one exception in May 2005 for weekly concentration, the wastewater treatment plant has not experienced TSS permit violations. The May 2005 exception was due to an operational issue caused by filamentous bacteria. Similar to the BOD_5 results, TSS removals have consistently been above the anticipated permit requirement of 85% (Chart 6.6).

CHART 6.4 – WWTP EFFLUENT TSS CONCENTRATIONS (MONTHLY)

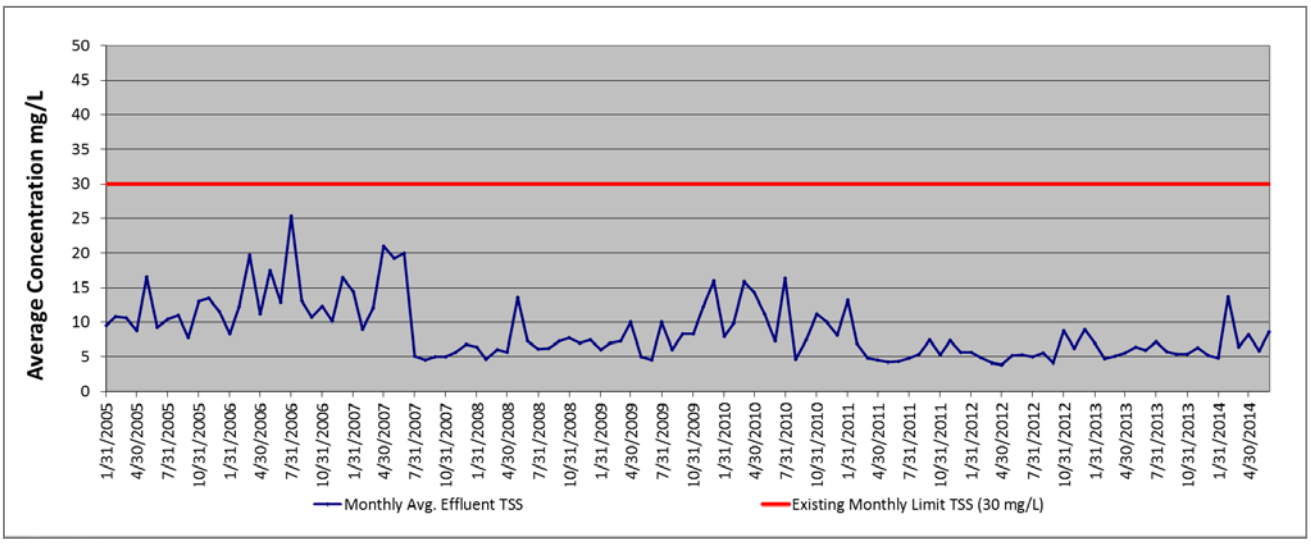


CHART 6.5 – WWTP EFFLUENT TSS CONCENTRATIONS (WEEKLY)

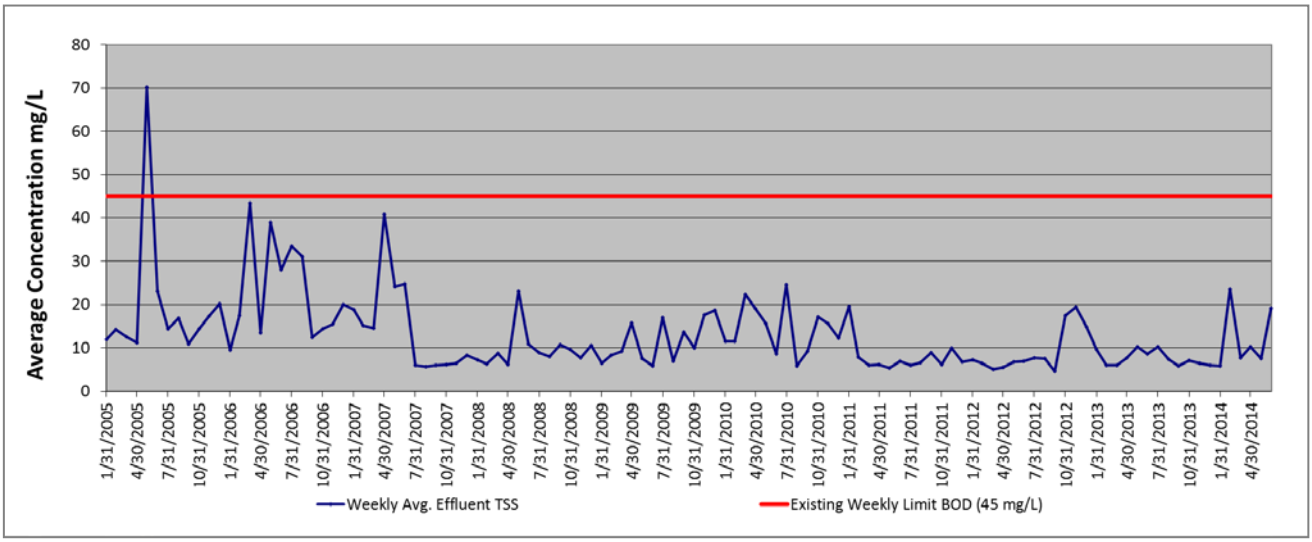
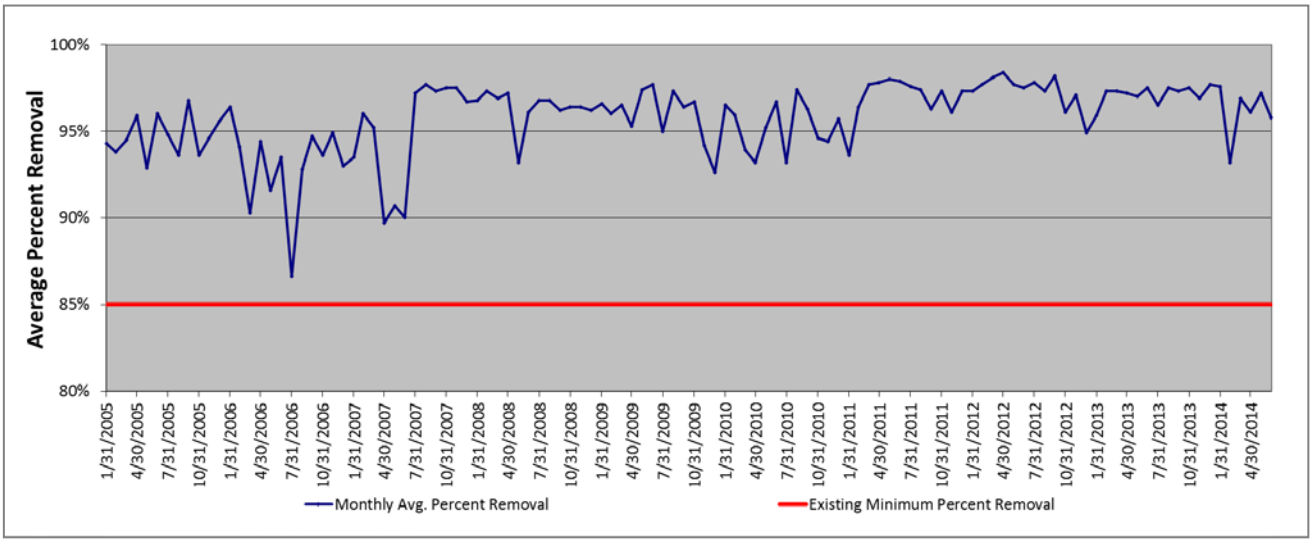


CHART 6.6 – WWTP TSS PERCENT REMOVAL (MONTHLY)



6.4.3 FECAL COLIFORM AND E. COLI BACTERIA

Fecal coliform and E. coli bacteria effluent data from January 2005 through June 2014 are shown in Charts 6.7 through 6.9. A few violations were noted during this period, primarily from 2005 through 2008. The March 2006 violation was due to UV maintenance and operational issues due to filamentous bacteria. The secondary process was changed in 2008 to include anoxic cells and nitrification in the aeration basins, which has improved the settling, reduced the filamentous bacteria, and denitrification occasionally identified in the secondary clarifiers.

CHART 6.7 – WWTP EFFLUENT FECAL COLIFORM (WEEKLY)

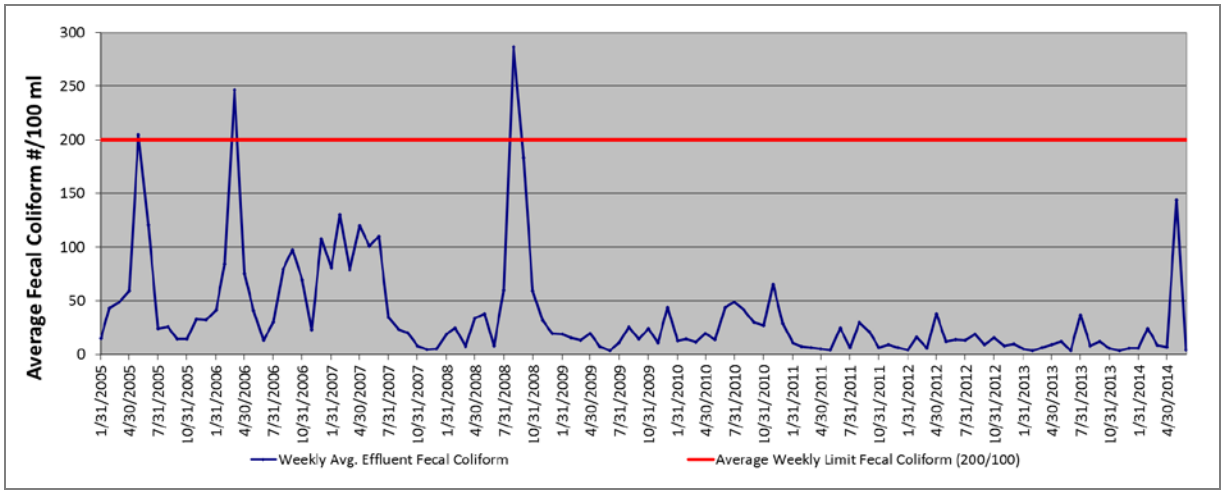


CHART 6.8 – WWTP EFFLUENT E.COLI BACTERIA (MONTHLY)

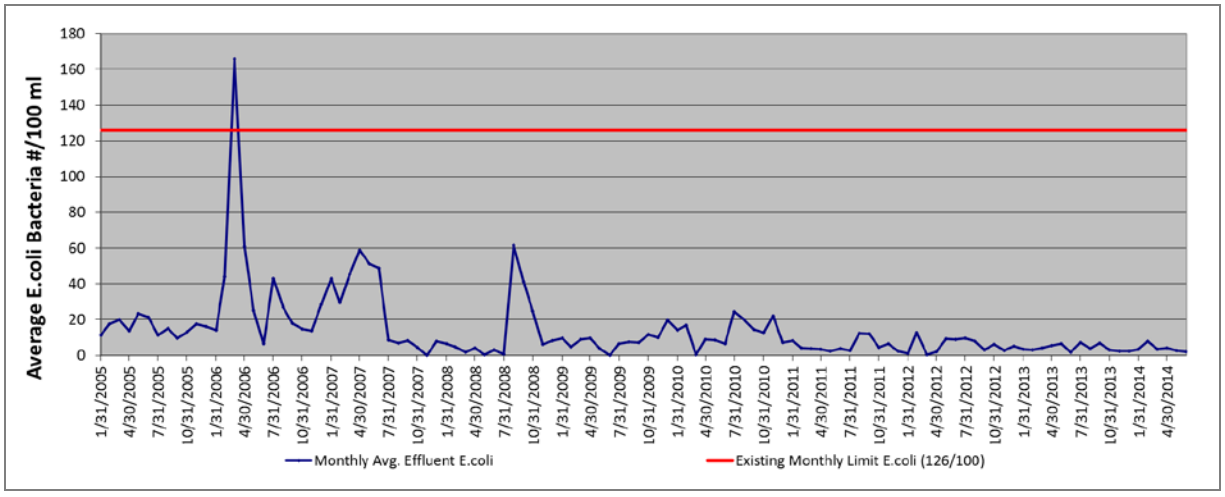
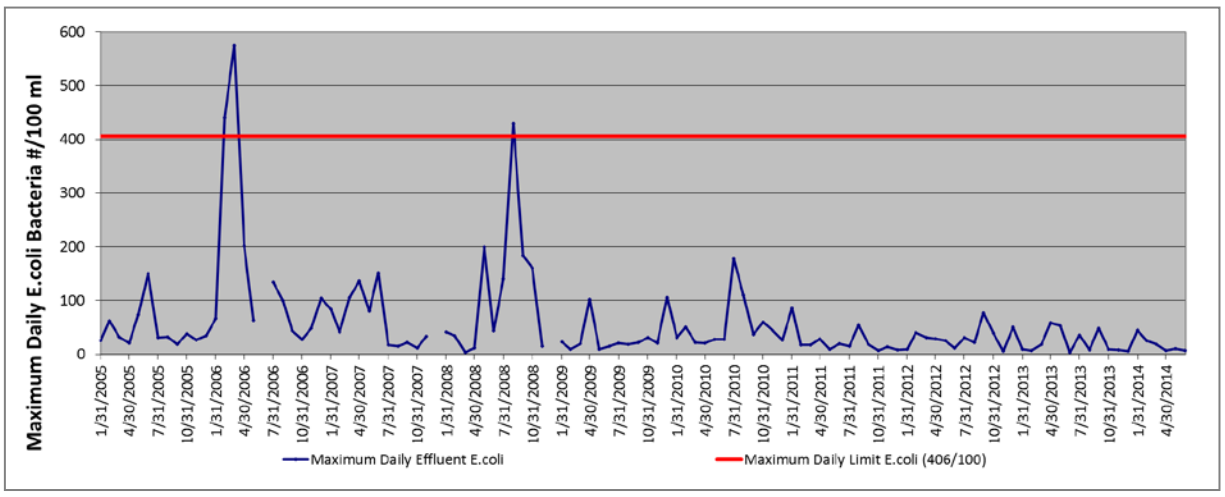


CHART 6.9 – WWTP EFFLUENT E.COLI BACTERIA (DAILY)



6.4.4 pH

The daily maximum and minimum pH effluent data from January 2005 through June 2014 are shown in Charts 6.10 and 6.11. A couple of violations of the minimum pH limit were noted during this period (November 2005, February 2006, and February 2014). The November 2005 and February 2006 readings were due to the pH probe not being calibrated; the February 2014 violation is attributed to a lab error.

CHART 6.10 – WWTP EFFLUENT pH (MAXIMUM DAILY)

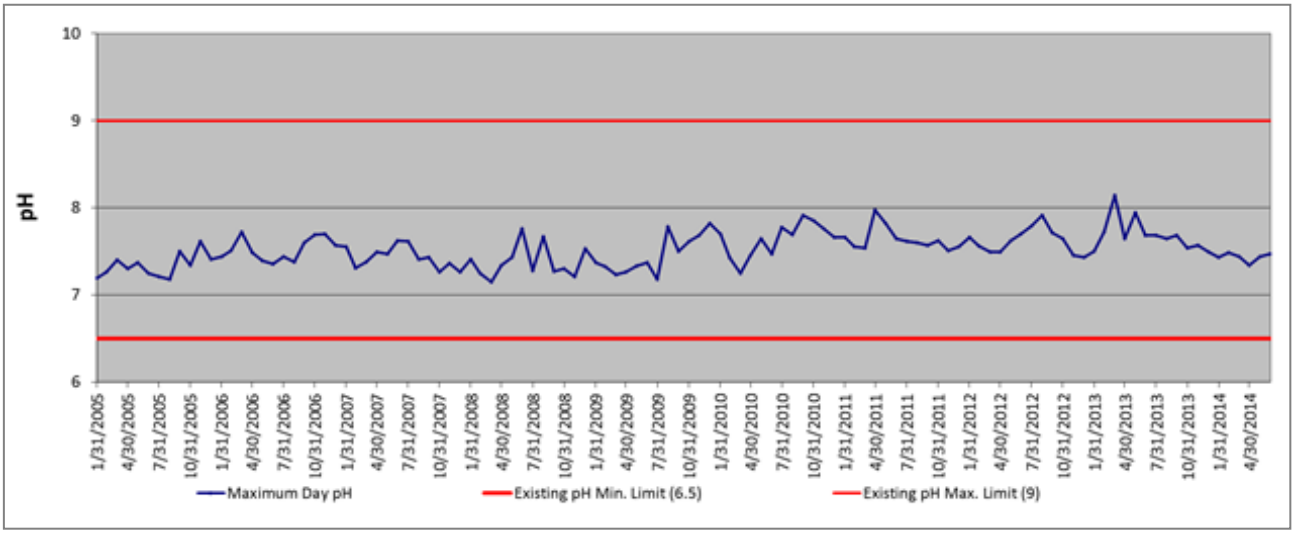
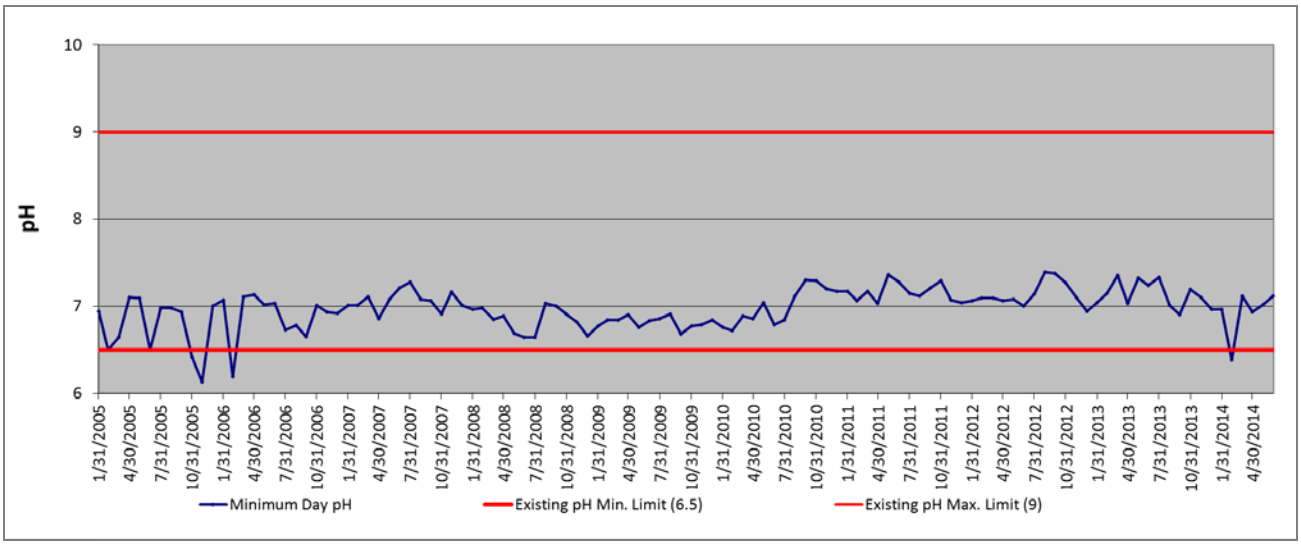


CHART 6.11 – WWTP EFFLUENT pH (MINIMUM DAILY)



CHAPTER 7.0 – WWTP IMPROVEMENTS

7.1 RECOMMENDED IMPROVEMENTS

This section summarizes the needed improvements to facilitate proper operation of the Lewiston WWTP. The information included in this chapter has been used in conjunction with the process sizing calculations to develop the overall project scope necessary to meet the long-term goals of the City of Lewiston.

A summary of the estimated costs for the recommended improvements is provided in Chapter 8.

7.1.1 SOUTH SHORE PUMP STATION

The air release structure associated with the South Shore Pump Station needs to be replaced. The South Shore Pump Station is responsible for pumping the vast majority of the sewage flow from Lewiston and this air release is critical to the proper function of the pump station.

7.1.2 NORTH SHORE PUMP STATION

The North Shore Pump Station collects sewage flow from North Lewiston, plus plant recycle flow, and septage received at the WWTP. The problems identified with the North Shore Pump Station include ragging (rags and scum accumulating in the wet well), infiltration, and concrete spalling. Ragging in the pump station requires manual removal and can decrease the capacity of the wet well resulting in more energy use from more frequent pump on/off cycles.

A new pump station is recommended. The new pump station will include pumps with drawdown capability to handle ragging and debris build-up. Improvements will include a new concrete wet well, three new pumps, discharge piping, a valve vault, and new electrical and controls in a dedicated building. Additionally, the flume upstream of the lift station will be upsized from 6-inches to 15-inches.

7.1.3 SEPTAGE RECEIVING

Septage receiving has required a lot of maintenance to manually remove rags. To reduce the amount of maintenance required and improve the septage receiving system, basin modifications, an improved screening system for removing rags and other larger items, and better grinding are recommended.

7.1.4 HEADWORKS

The headworks suffers from freezing and corrosion problems. It is recommended that doors be added to the headworks to enclose the structure, and an adequate HVAC system be installed to control the building humidity. The HVAC system needs to ensure the proper amount of air exchanges. A review of the electrical system should be a part of this upgrade to ensure compliance with the Standard for Fire Protection in Wastewater Treatment and Collection Facilities (NFPA 820). Water surfaces in the headworks should be covered to contain odors and moisture with sufficient ventilation provided below the covers to ensure that a negative pressure is maintained and foul air is not released into the headworks building. As a part of this upgrade, the interior of the building should also be cleaned and repainted.

It was noted that the influent screens, in the headworks, experience a build-up of biological solids, which decreases the screening capacity and leads to bypassing. This build-up of biological materials is attributed to the use of primary effluent for a spray water source. Rather than using primary effluent, it is recommended that the spray water be changed to 3W (non-potable, disinfected plant effluent water). Since

3W has undergone disinfection the biological material in 3W is much less than primary effluent.

For the future 2035 flows, when one unit is out of service the influent screen capacity will be insufficient. The influent screens will need to be upgraded to provide the necessary future hydraulic capacity.

An additional issue in the headworks area is a lack of redundancy for the washer/compactor. If the washer/compactor needs to be repaired, there is no means for the screenings to be washed or compacted. At a minimum, spare motors should be purchased for the washer/compactor; ideally, a second washer/compactor should be installed to provide redundancy.

The grit chamber area has also experienced some problems. Cold weather and grit accumulation in the pump suction lines have been the key issues with the grit removal system. To eliminate these issues, recommendations include adding more insulation and heat tape on the grit piping, increasing the pipe suction line size, reducing the number of fittings in the pipe (if possible), and eliminating dead spots in the piping.

Current peak instantaneous design flows are such that flow can back up into the grit chambers from the primary clarifiers and potentially overflow. This can be addressed either by raising the grit chamber walls, or by modifying the piping to reduce the head loss between the grit chambers and the primary clarifiers. Since the headworks was recently upgraded, it is recommended for now that the peak flows bypass the grit chambers. This will allow the grit chambers to function the majority of the time until piping and/or headworks modifications are made.

7.1.5 PRIMARY CLARIFIERS

Based on current flow rates, a third primary clarifier is needed in order to meet the EPA redundancy requirement. It is recommended that the third 55-feet diameter primary clarifier be located east of the two existing primary clarifiers. A new flow splitter is recommended to equally split the flow to the three primary clarifiers. An alternative to adding a new 55-feet diameter clarifier would be to repurpose the existing 45-foot diameter gravity thickener as a third primary clarifier. This would require modifications to the gravity thickener, which might not be feasible. Eliminating the gravity thickener would also require the existing primary clarifiers to be operated with different sludge pumping, as discussed in Section 7.1.11.

The clarifier mechanisms in the existing primary clarifiers are reaching the end of their expected life and based on recent observation should be replaced soon. In addition to the clarifier mechanisms the existing concrete should be refinished and sealed as part of the replacement.

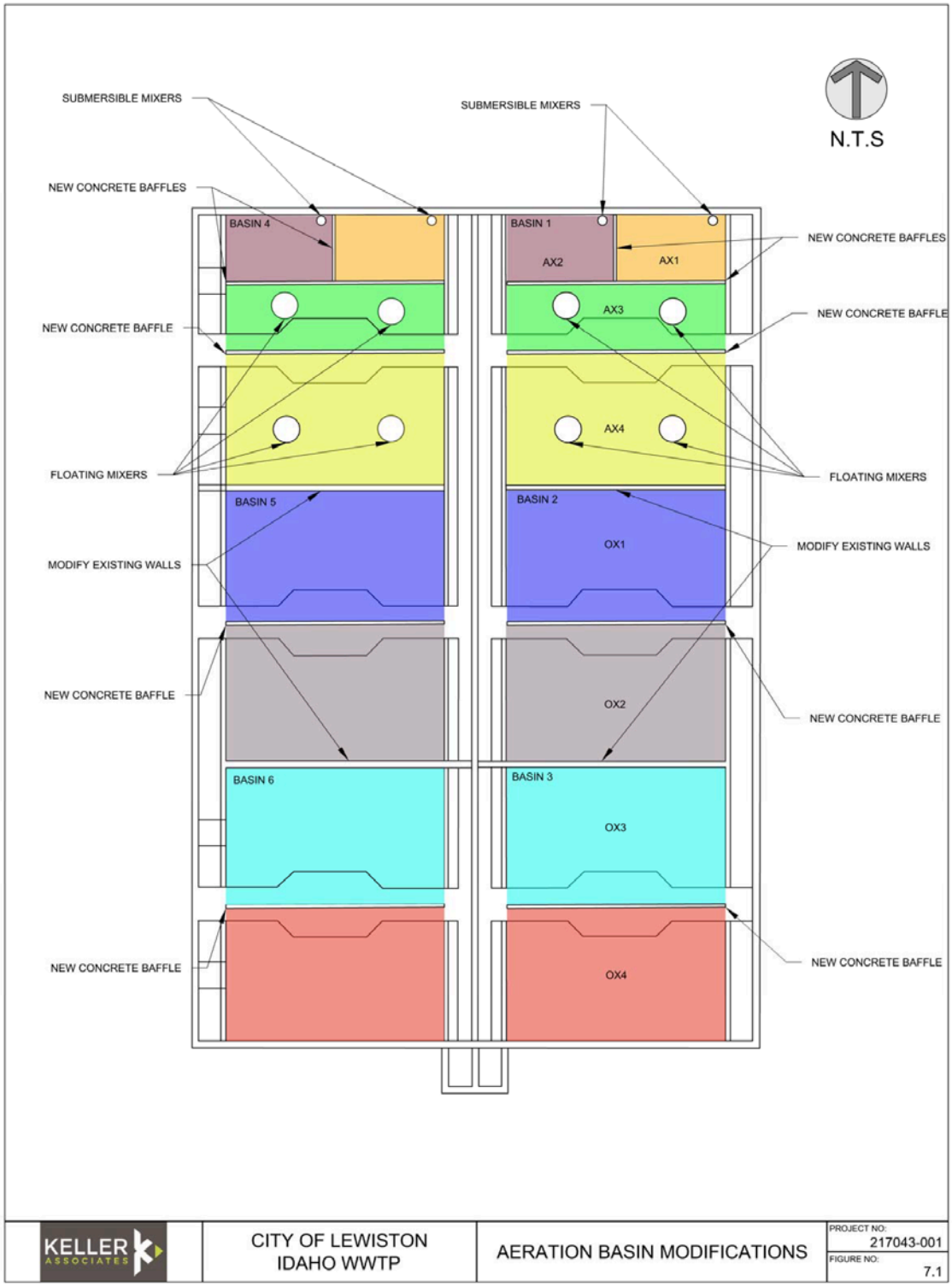
7.1.6 AERATION BASINS

A new primary clarifier effluent splitter is recommended near the aeration basins. The splitter should include the secondary clarifier RAS so that the mixed liquor and primary effluent flow can be distributed evenly to the aeration basins. Currently the mixed liquor and flow are not equally split, which has created process challenges in the aeration basins.

The issues with the aeration basins, as discussed in Chapters 5 and 6, include flow splitting, energy use, Microthrix accumulation, concrete spalling and the additional capacity required for future flows and loads.

It is recommended the damaged concrete walls in the aeration basins be repaired, the slide gates into the aeration basins be replaced, and that new internal basin walls be constructed. These internal basin walls create a smaller selector volume and also a better flow pattern through the aeration basins to decrease Microthrix growth. Mixing of the selector volume can be accomplished either by using submersible mixers or by utilizing a small amount of diffused aeration. Diffused aeration in the selector volume may also be effective at limiting biological phosphorus removal in the aeration basins. Limiting biological phosphorus removal would decrease the probability of struvite formation in the digesters. An example of the internal basin walls for the aeration basins is shown on Figure 7.1 (see Appendix A for full-size figure).

FIGURE 7.1 – AERATION BASIN MODIFICATIONS



Additional aeration is also required. Upgrading the aeration basin equipment is recommended to provide increased energy efficiency and to match the oxygen demand in the process. The recommended aeration upgrade includes changing the existing coarse bubble diffuser system to fine bubble diffusers, which will improve the oxygen transfer efficiency. To supply air to the new diffuser system, it is recommended to upgrade the existing centrifugal blowers to high efficiency blowers with VFDs to vary the blower speed to match oxygen demand. Electric air valves and flow meters are recommended to control the air delivered to each cell in the aeration basins based on D.O. measurements.

An internal recycle is recommended for each activated sludge train using submersible pumps in the final aeration cells (OX4 in Figure 7.1 – see Appendix A for full-size figure). This internal recycle provides the ability to achieve denitrification. The advantages of denitrification are the return of alkalinity and recovery of oxygen, which decreases the required energy for aeration. Denitrifying in the aeration basins also decreases the probability of denitrification occurring in the secondary clarifiers by removing nitrate in the anoxic cells of the aeration basins.

Another major concern is the inhibition of the activated sludge by toxins as noted by Dr. Clifford Lange from Auburn University in his February 4, 2014 report on tests of Lewiston's activated sludge. It is recommended that a pre-treatment survey be conducted to identify industries that may be discharging inhibitory substances to the WWTP. It is recommended that the City require additional monitoring and pretreatment by the identified industries to protect the WWTP.

7.1.7 SECONDARY CLARIFIERS

The secondary clarifiers and RAS pumps are currently at the EPA redundancy requirement. A third secondary clarifier and upgraded RAS pump station with redundant RAS pumps are recommended to address these concerns. In the future, a fourth secondary clarifier and larger RAS pump station may be required.

Another issue with the secondary clarifiers is the splitting of the mixed liquor flow to the clarifiers. A new mixed liquor splitter box is recommended to provide improved flow splitting; the new splitter box should include a scum removal partition to capture scum and allow it to be wasted from the system to help control the growth of Microthrix. It is recommended that the scum from this partition and the scum from the secondary clarifiers be sent to the DAF, along with the WAS, rather than to the plant drain as is currently done.

Denitrification has also been observed to cause settling difficulties. Utilizing the internal recycle in the aeration basins will decrease the amount of denitrification that occurs in the secondary clarifiers.

In addition to the above changes, it is recommended that the secondary clarifier mechanisms be investigated and changes made to correct the mechanical vibration issues. It is also recommended that Clarifier 1 be evaluated for conversion into a center feed clarifier to address its performance issues.

7.1.8 UV DISINFECTION

The UV system does not meet redundancy requirements for the current peak flows. The UV system is critical to achieving the permit required disinfection. Also, there are newer UV systems that use less power and require less maintenance than the existing UV system. It is recommended that the UV system be expanded/upgraded to address the redundancy inadequacy.

7.1.9 EFFLUENT PUMPS

The effluent pumps are essential to removing the treated effluent from the plant. The pumps were rebuilt approximately 10 years ago but are nearing the end of their expected lifespan. It is recommended that, due to the critical importance of the effluent pumps, the City begin replacement with brand-new pumps (one pump at a time or all at once).

7.1.10 HYPOCHLORITE BACKUP SYSTEM AND 3W WATER SYSTEM

The current hypochlorite system is not functional. A functioning hypochlorite system is advantageous in that it can be used as backup for the UV system, and also for chlorinating RAS when needed to control filaments and improve settling. Providing a functioning chlorination system for these purposes is recommended; however, a study should first be conducted on which type of chlorine system to implement (chlorine gas or sodium hypochlorite).

The 3W water system has insufficient capacity to handle the plant needs, plus the line sizes are too small to deliver the required flow to all areas of the plant. It is recommended that the 3W pump capacity be increased. It is also recommended that the piping system be looped to better deliver 3W to all areas of the plant. New lines to the influent screens for cleaning and to the aeration basins for scum/foam suppression should be added. In order to avoid plugging in the equipment, it is recommended that strainers be placed where necessary in the 3W line.

7.1.11 SOLIDS THICKENING

The existing gravity thickener lacks redundancy, has pieces missing, and is nearing the end of its expected lifespan. There is only one existing thickened primary sludge pump.

It is recommended that sludge thickening be allowed to occur in the primary clarifiers so that the gravity thickener (which is in need of major upgrades) can be abandoned or repurposed for another use. Primary sludge would be pumped directly from the primary clarifiers to the sludge blending tank. This would require new positive displacement pumps to control the amount of sludge being pumped and enable the sludge to thicken in the primary clarifiers. An advantage to this alternative is the elimination of the gravity thickener, which is a source of odor. Also, the amount of recycled flow in the plant would be reduced.

The existing DAF lacks redundancy, and also has been experiencing operational problems with spray. It also requires a lot of space for the equipment. It is recommended that spare motors be on hand to address redundancy. In order to avoid spraying, recommended measures include: operating at a different water level, changing the skimmer speed, changing the polymer dose, or changing the timer control logic. Further evaluation of the DAF to address these concerns is recommended.

7.1.12 SLUDGE BLENDING / HOLDING TANKS

The sludge blending tank and sludge holding tanks have issues with mixing. The sludge blending tank also has an issue with odors. It is recommended that the mixer in the sludge blending tank be repaired or replaced, and that a mixing system be designed for the sludge holding tanks. Impeller and pump mixing are both possible options for mixing. It is also recommended that a new odor control system be designed and constructed for the sludge blending tank. The interior of the tanks should be recoated as part of the improvements.

7.1.13 SOLIDS PROCESSING

Sludge dewatering is one of the chief concerns at the Lewiston WWTP. The Andritz belt press has been a major issue due to the maintenance needed, plus its location in the building makes it difficult to repair. It is recommended that the Andritz belt press be replaced with new, more reliable dewatering equipment. Easier maintenance and access should also be a consideration for the dewatering equipment. The solids building has old switchgear that remains and was not replaced in the recent electrical upgrade. This switchgear will likely require modification to feed new sludge dewatering equipment.

An understanding of the industrial toxins and long-chain fatty acids identified in the influent to the WWTP is needed. These contaminants have a detrimental effect on the sludge dewatering and should be controlled or eliminated.

7.1.14 POTABLE WATER SYSTEM

The potable water system at the plant has corrosion issues, and there are locations where the water system is direct tapped without backflow prevention devices. It is recommended that the potable water system lines be replaced where corroded, and that the required backflow prevention devices (reduced pressure per Lewiston City Code section 36-56, subsection 4c) be installed. It is also recommended that a potable water line be extended to complete a loop near the sludge containment bay. The City intends to evaluate the water system in more detail in the future for fire flow and supply redundancy.

7.1.15 PLANT BUILDINGS AND SECURITY

The digester control building roof drain is connected to the road through an upflow catch basin. The roof has periodically received foam from the digesters; as the water drains from the roof, the foam is carried from the roof to the road and makes the road very slippery. Also, the digester control building roof liner is lifting and the roof slope is not contoured properly to allow for proper draining. It is recommended that a new roof be installed to correct these issues, and that the new roof drain be rerouted to the North Shore Pump Station.

The shop facilities at the WWTP provide inadequate storage space for plant needs. A new storage facility on the southeast corner of the WWTP is recommended to provide sufficient storage space and room for fabrication. Plant security should allow haulers, vendors, and City employees with controlled access into the plant.

The administration building currently does not offer any dedicated space for workers to get dressed or store their personal belongings. Also, there is an insufficient number of offices. It is recommended that offices, conference space, mud room, and a locker room with showers be added by expanding the administration building upward to create a new section of second floor space. Ideally, portions of the existing roof, electrical and HVAC ductwork will be able to remain. A review of these should be a part of the expansion.

7.1.16 ELECTRICAL

An upgrade to the electrical feed system and standby power has been completed. Avista Corporation supplies power to the WWTP. The equipment is fed from the new motor control centers (MCCs). The plant electrical feed consists of two 3,000 amp switchgear line-ups: one for normal utility power, and the other for emergency standby power. Standby power is provided by two parallel gensets with provisions for a third generator and eight automatic transfer switches. Each automatic transfer switch feeds a separate building. Future provisions are available for the addition of two more automatic transfer switches.

The electrical switchgear for the solids building was not replaced in the recent electrical upgrade and is nearing the end of its expected life.

7.1.17 VEHICLES

There is currently no policy to budget for replacement vehicles. It is recommended that a policy be implemented that provides a budget for vehicle and mobile equipment expenditures.

7.2 NITRIFICATION OPTIONS

The plant is currently operated to achieve nitrification for process settleability reasons. However, there are areas in the WWTP that require additional capacity and redundancy to reliably treat existing and future flows and loads for nitrification. Expansion of the existing activated sludge treatment process was one of three options explored to add the capacity needed to reliably achieve year-round nitrification. The following three options were preliminarily evaluated:

- Upgrade the existing activated sludge treatment processes and increase capacity with additional basins.
- Convert to an IFAS (integrated fixed film activated sludge) system.
- Convert to an MBR (membrane bioreactor) system.

7.2.1 OPTION 1 – UPGRADE EXISTING PROCESSES PLUS NEW BASINS

The general recommended improvements to the aeration basins (new diffusers, divider walls, mixers, splitter boxes, internal recycle, etc.) are listed in Section 7.1.6.

Nitrification operation requires longer SRTs to maintain the nitrifying organisms in the system, which can lead to filamentous growth. Since the current aeration basins are not able to accommodate a longer SRT, an additional aeration basin is required. Also, to handle the additional future flows, a fourth aeration basin may become necessary.

To help control Microthrix, it is recommended that scum in the aeration basins be mitigated, moved, and wasted from the system. To accomplish this, it is recommended that a baffle be installed to remove filamentous scum. The scum and waste activated sludge would then be wasted to the DAF for thickening prior to being pumped to the digesters.

In addition to the upgrades mentioned above, new secondary clarifiers are recommended to increase capacity and also provide redundancy. A third secondary clarifier is needed right away, as discussed in Section 7.1.7. A fourth secondary clarifier may be needed in the future to handle future flows and additional solids loading. Modifications to the existing clarifiers are also recommended to improve performance. Additionally, the existing RAS pumps should be upgraded as a part of this option and a standby RAS pump installed.

This option assumed two additional aeration basin trains and two new secondary clarifiers to meet nitrification capacity needs. Although the WWTP has sufficient space for these basins, future plant expansion beyond adding these units may be difficult.

7.2.2 OPTION 2 – CONVERT TO AN IFAS SYSTEM

Integrated fixed-film activated sludge (IFAS) incorporates fixed film treatment into the activated sludge system, and effectively increases the sludge age and nitrification capacity of the existing aeration basins. The additional capacity is created by providing additional biomass in the system, which is attached to the IFAS media. Another advantage of an IFAS process is that it provides improved process stability and the ability to handle fluctuations in BOD loading because of the biomass attached to the media. Therefore, the IFAS process combines the

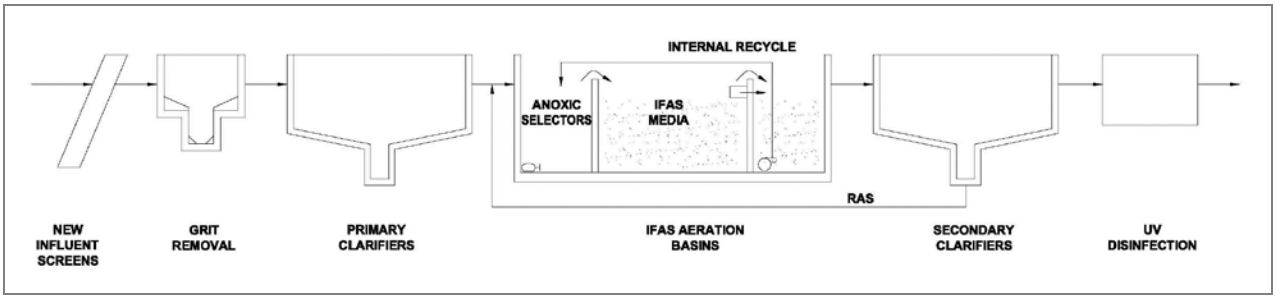
advantages of both fixed film and suspended growth into one treatment process.

An IFAS system is created by adding floating or fixed media into the existing aeration basins, and (for floating media) preventing the media from escaping the basins through the use of media retention screens. The media is retained in the aeration basin, and the activated sludge flows out of the basin to the secondary clarifier. The media provides the surface area for fixed film growth. Biological solids that slough off the fixed film are collected and returned with the RAS from the secondary clarifiers.

Aeration is provided by blowers, which deliver air to coarse or medium bubble diffusers, depending on the system. The existing blower capacity would likely need to be increased. Therefore, new more efficient blowers are required as part of this option, along with VFDs, electric air valves, D.O. probes, and flow meters to automatically adjust the air supply to conserve energy. There are several manufacturers producing IFAS systems, including Veolia, WesTech, Headworks, and Evoqua.

Similar to Option 1, the recommended improvements include internal concrete walls and mixers installed to create selector cells. An internal recycle should also be added to each train to provide denitrification using submersible pumps in the final aeration cells. The effluent mixed liquor splitter box should be replaced to improve the flow splitting and a baffle installed to remove scum. A new secondary clarifier is recommended to provide redundancy as discussed in 7.1.7. Modifications to the existing clarifiers are recommended to allow the existing clarifiers to maintain performance. The existing RAS pumps should also be upgraded and a standby RAS pump installed as a part of this option. Diagram 7.1 presents an example of the IFAS option.

DIAGRAM 7.1 – IFAS PROCESS FLOW DIAGRAM



The advantages of the IFAS System are that the fixed film provides a longer effective sludge age and improves the sludge settling characteristics. The additional biomass attached to the IFAS media would help address the limited capacity in the existing basins to provide reliable year-round nitrification. Also, the fixed film organisms are able to respond more quickly to a shock loads (e.g. from an industrial user, or during normal peak or diurnal fluctuations).

The IFAS System would require an upgrade to the influent screens in the Headworks, as the IFAS Systems requires a smaller screen opening to remove items that could accumulate in the IFAS media or plug the media retention screens.

7.2.3 OPTION 3 – CONVERT TO AN MBR SYSTEM

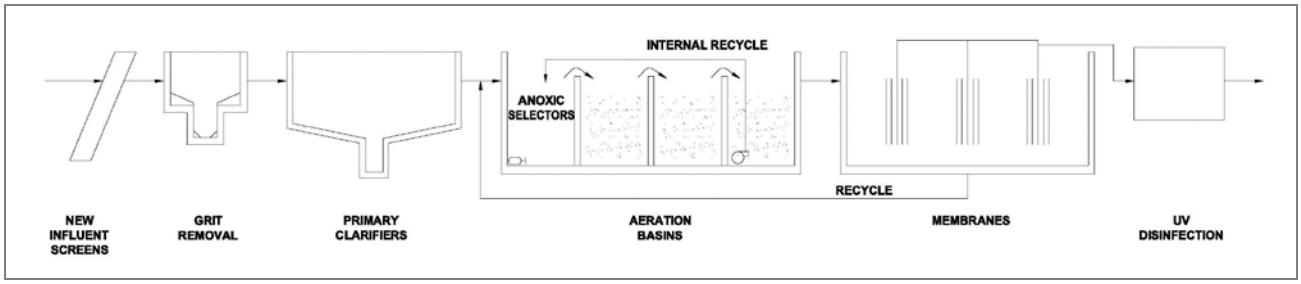
A Membrane Bioreactor (MBR) System is an activated sludge treatment process that utilizes membranes for solids removal rather than secondary clarifiers. The use of membranes eliminates the secondary clarifiers (along with the settleability problems of the secondary clarifiers) and allows the aeration basins to operate with a much higher mixed liquor solids concentration, which provides the necessary treatment capacity in a smaller footprint. The membranes are typically installed in

separate membrane tanks. Effluent from the aeration basins typically flows by gravity to the membrane tanks. The membranes filter the mixed liquor flow by passing the flow through the membranes. Following membrane filtration, the effluent would flow to the UV system for disinfection. Solids retained in the membrane tanks are recycled to the aeration basins. The recommended recycle flow rate is approximately 200-400% of the influent flow.

Aeration in the aeration basins would be provided by fine bubble diffusers and new increased capacity high efficiency blowers that are operated on VFDs. Electric air valves, D.O. probes, and flow meters would be provided to automatically adjust the air supply to conserve energy. Also aeration is provided under the membranes to remove solids from the membranes. This air scour process is typically provided by a separate blower system and coarse bubble diffusers. There are several manufacturers producing MBR systems, including Kubota, Ovivo, Evoqua, Veolia, and GE.

Similar to Option 1, internal concrete walls and mixers would be installed in the aeration basins to create selector cells. An internal recycle would also be added to each train to provide denitrification using submersible pumps in the final aeration cells. The effluent mixed liquor splitter box would be replaced to improve the flow splitting to the membrane tanks and a baffle would be installed to remove scum. The RAS pumps would be replaced with much higher capacity pumps. Diagram 7.2 presents an example of the MBR option.

DIAGRAM 7.2 – MBR PROCESS FLOW DIAGRAM



The advantages of the MBR System are the ability to remove solids down to low levels, which can increase the efficiency of the downstream UV disinfection. The other two options (activated sludge and IFAS) would need tertiary filtration, at a minimum, to achieve a similar level of solids removal. The membranes also eliminate the settleability concerns of the secondary clarifiers, which would no longer be needed and could be either repurposed or eliminated. The high mixed liquor suspended solids concentrations in an MBR System also allows for a smaller footprint than the other options, which provides more space for future expansion.

The disadvantages of the MBR System are the need to have a higher recycle mixed liquor flow rate (200-500% of the influent flow rate), chemicals for cleaning the membranes of foulants, and the additional training and operation/maintenance required to operate an MBR System. The influent screens would also need to be replaced to have much smaller openings, as small particles can damage the membranes. The influent channels for the aeration basins may also need to be modified to accommodate the higher recycle flow rates.

7.2.4 RECOMMENDED OPTION

Based on the plant staff's familiarity with the activated sludge technology, Option 1 is the recommended option. However, IFAS or MBR should be considered as options for future plant expansions.

CHAPTER 8.0 – CAPITAL IMPROVEMENT PLAN

This chapter summarizes the costs for the recommended improvements. For a more detailed description of the recommended improvements, refer to Chapters 4 and 7.

8.1 PRIORITY IMPROVEMENTS

Table 8.1 summarizes recommended capital improvement costs for the wastewater treatment plant (WWTP) and collection system. The need for each improvement varies, but includes compliance with the City's discharge permit, achieving capacity necessary to accommodate growth, and replacing worn/old equipment. Priority 1 improvements are required now, Priority 2 improvements from 2021 to 2025, and beyond 2025 are Priority 3 improvements. The City should recognize that changes in permit requirements may require new projects to be considered. These costs are planning level estimates and should be reviewed and updated through the pre-design and design phases of each project. Figure 8.1 in Appendix A shows the distribution of collection system improvements throughout the City. More detailed cost information for each project is included in Appendix D.

TABLE 8.1 – WWTP AND COLLECTION SYSTEM PRIORITY IMPROVEMENTS

ID	Item	Primary Purpose	Capital Improvement Plan (2017 Dollars)
Priority 1 Improvements			
Wastewater Treatment Plant			
1A	UV System	Capacity/Redundancy	$ 1,225,000
1B	Aeration Basins, Blowers, and Flow Splitting	Operations/Capacity	$ 7,501,000
1C	Primary Clarifier Rehabilitation	Operations/Replacement	$ 1,046,000
1D	New RAS/WAS Pumping	Redundancy	$ 1,164,000
1E	Dewatering	Replacement/Redundancy	$ 1,523,000
1F	Solids Thickening	Replacement/Redundancy	$ 993,000
1G	New Aeration Basin	Capacity/Redundancy	$ 4,973,000
1H	North Shore Pump Station	Operation/Capacity	$ 1,275,000
1I	Screen Washer/Compactor	Redundancy	$ 28,000
1J	Investigate Dissolved Air Floatation (DAF)	Operations/Redundancy	$ 81,000
1K	Sludge Blending and Sludge Holding Tanks	Operations/Replacement	$ 1,050,000
1L	Plant Security	Operations	$ 105,000
1M	New Primary Clarifier; Flow Splitting and Piping	Capacity/Redundancy	$ 1,469,000
1N	New Secondary Clarifier	Capacity/Redundancy	$ 3,673,000
		Wastewater Treatment Plant Subtotal	**$ 26,106,000**
Wastewater Collection System			
1a	Pipeline Reconstruction along 11th Ave and Prospect Ave to 10th Ave	Capacity	$ 199,000
1b	Lift Station Upgrades	Capacity/Redundancy	$ 314,000
1c	Engineering Investigation of Access Options	Operations	$ 150,000
		Wastewater Collection System Subtotal[1]	**$ 663,000**
		Total Priority 1	**$ 26,769,000**
Priority 2 Improvements (2021 - 2025)			
Wastewater Collection System			
2a	24th Street North Pipeline Replacement - 3rd Ave N to 1st Ave N	Replacement	$ 223,000
2b	Pipeline Replacement - 11th Ave to 16th Ave between 21st and 23rd St	Replacement	$ 584,000
2c	East Orchards Sewer Expansion Phase 2	Nitrate Reduction	$ 2,000,000
2d	Design and Construction of Access Improvements	Operations	$ 1,395,000
		Wastewater Collection System Subtotal	**$ 4,202,000**
		Total Priority 2	**$ 4,202,000**
Priority 3 Improvements (Beyond 2025)			
Wastewater Treatment Plant			
3.1	Administration Building	Operations	$ 735,000
3.2A	Hypochlorite System	Replacement	$ 452,000
3.2B	3W System (Plant Water; Non-potable, disinfected plant effluent)	Replacement	$ 368,000
3.2C	Potable Water	Replacement	$ 97,000
3.3	Digester Control Building	Operations	$ 231,000
3.4	Headworks Building	Operations	$ 1,784,000
3.5	Screen Washer/Compactor	Redundancy	$ 1,574,000
3.6	Influent Screens	Capacity/Redundancy	$ 1,155,000
3.7	Grit Chambers	Operations/Capacity	$ 58,000
3.8	Septage Receiving	Operations	$ 1,050,000
3.9	Shop Facility	Operations	$ 326,000
		Wastewater Treatment Plant Subtotal	**$ 7,830,000**
Wastewater Collection System			
3a	Pipeline Replacement near Lewiston Country Club	Replacement	$ 720,000
3b	Main Street Pipeline Reconstruction - 9th St to 6th St	Replacement	$ 304,000
3c	G Street Pipeline Reconstruction 15th St to 16th St	Replacement	$ 202,000
3d	Pipeline Reconstruction downstream of COSD Warner Discharge Point	Replacement	$ 68,000
3e	East Orchards Sewer Expansion Phase 3	Nitrate Reduction	$ 3,879,000
		Wastewater Collection System Subtotal	**$ 5,173,000**
		Total Priority 3	**$ 13,003,000**

Note:
1. City plans to fund the Priority 1 Collection System projects through its operations budget.

8.2 ANNUAL REPLACEMENT PROGRAM

In addition to the capital improvement projects identified in Table 8.1, the City should also budget each year for replacement of assets at the WWTP and collection system. Keller Associates has estimated annual replacement needs for the WWTP, collection system, and vehicle fleet.

Based on our work with other treatment plants, Keller Associates estimates that the annual replacement cost for short lived assets at the WWTP to be approximately 1.6% of the overall plant replacement costs. For the City of Lewiston, we estimated that the replacement value of the existing plant to be approximately $40-50 million. Applying 1.6% of the replacement value equates to approximately $700,000 per year that should be set aside for short lived asset replacements at the WWTP.

The collection system replacement budget is based on the analysis described in Chapter 2 and equates to approximately $1.0 million per year. This equates to replacing a little over 1% of the collection system each year. Historically, the collection system replacement account has been significantly underfunded. The City is also planning to address some priority collection system improvements in the near future in addition to the general replacement budget.

Vehicle maintenance replacement costs were estimated based on a list of vehicles, vehicle life, and replacement cost information provided by the City. The estimated annual replacement budget for vehicle replacement is approximately $170,000.

8.3 PRIORITY 1 IMPLEMENTATION SCHEDULE

Table 8.2 shows the proposed implementation schedule for the Priority 1 improvements. At the City's direction, an inflation of 2% per year was assumed.

TABLE 8.2 – FY 2019 - FY 2021 CAPITAL IMPROVEMENT PLAN

ID#	Project Description	Cost (2017 dollars)	Capital Improvement Costs (inflated dollars)[1] FY 2019	FY 2020	FY 2021
Wastewater Treatment					
1A	UV System	$ 1,225,000	$293,100	$702,000	$305,000
1B	Aeration Basins, Blowers, and Flow Splitting	$ 7,501,000	$1,794,900	$4,298,500	$1,867,400
1C	Primary Clarifier Rehabilitation	$ 1,046,000	$250,300	$599,400	$260,400
1D	New RAS/WAS Pumping	$ 1,164,000	$278,500	$667,000	$289,800
1E	Dewatering	$ 1,523,000	$364,400	$872,800	$379,200
1F	Solids Thickening	$ 993,000	$237,600	$569,000	$247,200
1G	New Aeration Basin	$ 4,973,000	$1,190,000	$2,849,800	$1,238,100
1H	North Shore Pump Station	$ 1,275,000	$305,100	$730,600	$317,400
1I	Screen Washer/Compactor	$ 28,000	-	$29,700	-
1J	Investigate Dissolved Air Floatation (DAF)	$ 81,000	$26,000	$59,400	-
1K	Sludge Blending and Sludge Holding Tanks	$ 1,050,000	$251,300	$601,700	$261,400
1L	Plant Security	$ 105,000	$25,100	$60,200	$26,100
1M	New Primary Clarifier; Flow Splitting and Piping	$ 1,469,000	$351,500	$841,800	$365,700
1N	New Secondary Clarifier	$ 3,673,000	$920,500	$2,104,800	$229,200
	Subtotal	**$ 26,106,000**	**$ 6,288,300**	**$ 14,986,700**	**$ 5,786,900**
Wastewater Collection[2]					
1a	Pipeline - 11th Ave and Prospect Ave to 10th Ave	$ 199,000	$26,900	$172,100	-
1b	Lift Station Upgrades	$ 314,000	$42,500	$271,500	-
1c	Engineering Investigation of Access Options	$ 150,000	$156,100	-	-
	Subtotal	**$ 663,000**	**$ 225,500**	**$443,600**	**$ -**
Annual Replacement Budget					
	WWTP short-lived assets	$700,000	$728,300	$742,800	$757,700
	Pipeline replacement	$1,000,000	$1,040,400	$1,061,200	$1,082,400
	Vehicle replacement	$170,000	$176,900	$180,400	$184,000
	Subtotal	**$1,870,000**	**$ 1,945,600**	**$1,984,400**	**$ 2,024,100**
	TOTAL	**$28,639,000**	**$8,459,400**	**$17,414,700**	**$7,811,000**

1. Annual inflation assumed for establishing future capital costs = 2%
2. City plans to fund Priority 1 Collection System projects through operations budget.

8.4 FORECAST OF EXPENSES

Table 8.3 shows the revenues and expenses for FY 2016 and FY 2017, and the anticipated revenue and expenses for FY 2018 through FY 2022. Keller Associates worked closely with City staff in reviewing historical revenues and expenses. Forecasted revenue increases are intended to cover debt obligations associated with Priority 1 improvements and to fully fund replacement budgets.

8.4.1 OPERATING EXPENDITURES

Operating Expenditures are forecasted to increase due to inflation and new materials and services costs.

Salaries and Benefits:

Salaries and benefits are forecasted by the City to increase at the rate of 2% per year due to inflation. No additional employees are anticipated within the next six years.

Materials & Services:

In projecting future expenses, the forecasted expenses are also assumed by the City to increase at 2% per year to reflect inflation.

Repairs and Maintenance:

Based on our analysis, additional funding is needed to cover ongoing pipeline and system replacement costs. The replacement costs are described in Section 8.2.

Debt Service:

Debt service is anticipated to increase as new bond(s) are issued or loans obtained to finance needed improvements. For the forecast, it was assumed that all of the Priority 1 wastewater treatment improvements would be financed by the City and the Lewiston Orchard Sewer District, Central Orchard Sewer District, and the Nez Perce Tribe would reimburse the City for their share of expenses. The City has assumed in their calculations they would cash finance $4.5 million of the project.

8.4.2 OPERATING REVENUES

Customer Receipts:

Operating revenues were assumed to increase based on projected rate increases. Equity buy-in (EBI) fees were assumed to increase 1.5% per year. The scope of this study did not reevaluate the EBI fees. Intragovernmental charges represent revenues from the Lewiston Orchard Sewer District, Central Orchard Sewer District, and the Nez Perce Tribe.

Cash Flows from Investing Activities:

The City invests idle cash in interest bearing accounts. These revenues from interest fluctuate with cash balances and the rate of return on the investments.

8.4.3 RESERVES

The City maintains a healthy reserve. For the rate analysis, a minimum fund balance of about $5 million was targeted. This reserve equates to about six months of operating expenses in FY 2022.

8.5 USER RATE IMPACTS

A user rate model was developed to reflect the anticipated revenues and expenses and to approximate anticipated rate increases needed to fund improvements. This model was updated by the City based on their current information and projections. Should the City desire to reevaluate the proportion of costs allocated to the base rate versus usage or to various types of users, a more detailed cost of service study should be completed. Keller Associates recommends that from time to time the City reevaluate how costs are allocated to the various Districts they serve to ensure that existing City customers are not subsidizing District patrons and that all pertinent costs, including associated staffing costs, are fully recovered. Table 8.3 summarizes the City's preferred annual user rate increases, projected revenues, and expenses. According to the City, a single larger rate increase in FY 2019 would be preferred rather than multiple smaller increases.

TABLE 8.3 – FORECAST OF USER RATES, REVENUES, AND EXPENSES

	Baseline	Actual	Forecast	Forecast	Forecast	Forecast	Forecast
	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
User Rate % Annual Increase		**5.00%**	**5.00%**	**40.0%**	**2.0%**	**2.0%**	**2.0%**
Typical User Rate	**$30.00**	**$31.50**	**$33.07**	**$46.30**	**$47.22**	**$48.17**	**$49.13**
Revenues							
Intragovernment Charges	$ 1,092,300	$ 1,379,176	$ 1,614,450	$ 2,049,860	$ 2,492,000	$ 2,535,000	$ 2,580,000
Customer Service Charges	$ 4,379,620	$ 4,521,890	$ 4,515,000	$ 6,321,000	$ 6,447,420	$ 6,576,368	$ 6,707,896
City EBI Fees [1]	$ 61,620	$ 87,810	$ 65,000	$ 95,000	$ 96,425	$ 97,871	$ 99,339
Reimbursements [2]	$ 171,670	$ 682,390	$ 76,900	$ 288,000	$ 205,200	$ 5,040	$ 9,140
Interest & Dividend Earnings	$ 22,290	$ 35,440	$ 6,000	$ 6,000	$ 35,440	$ 35,440	$ 35,440
Bond Revenue				$ 2,000,000	$ 15,000,000	$ 6,000,000	
Miscellaneous [3]	$ 348,360	$ 169,094	$ 921,000	$ 114,000	$ 88,896	$ 91,146	$ 92,260
Total Revenues (Less Depreciation)	**$ 6,075,860**	**$ 6,875,800**	**$ 7,198,350**	**$ 10,873,860**	**$ 24,365,381**	**$ 15,340,866**	**$ 9,524,075**
Total Operating Revenues	**$ 5,820,280**	**$ 6,070,160**	**$ 7,050,450**	**$ 10,484,860**	**$ 24,028,316**	**$ 15,202,515**	**$ 9,380,156**
Less EBI fees, reimbursements, interest							
Expenditures							
Operations (Less Depreciation) [4]	$ 3,692,060	$ 3,716,620	$ 4,026,950	$ 4,364,260	$ 4,451,545	$ 4,540,576	$ 4,631,388
Debt Payment				$ 397,183	$ 1,588,731	$ 1,588,731	$ 1,588,731
Capital Improvements - WWTP	$ 2,797,093	$ 426,247	$ 2,133,500	$ 6,500,000	$ 15,000,000	$ 6,000,000	
Replacements [5]	$ 583,222	$ 205,478	$ 1,608,050	$ 1,502,900	$ 2,125,100	$ 3,154,700	$ 3,184,076
Total Expenditures	**$ 7,072,375**	**$ 4,348,345**	**$ 7,768,500**	**$ 12,764,343**	**$ 23,165,376**	**$ 15,284,007**	**$ 9,404,195**
Net Change in Fund Balance	**$ (996,515)**	**$ 2,527,455**	**$ (570,150)**	**$ (1,890,483)**	**$ 1,200,005**	**$ 56,859**	**$ 119,880**
Initial Fund Balance [6]	$ 6,000,000						
Ending Fund Balance	**$ 5,003,485**	**$ 7,530,940**	**$ 6,960,790**	**$ 5,070,307**	**$ 6,270,312**	**$ 6,327,171**	**$ 6,447,051**

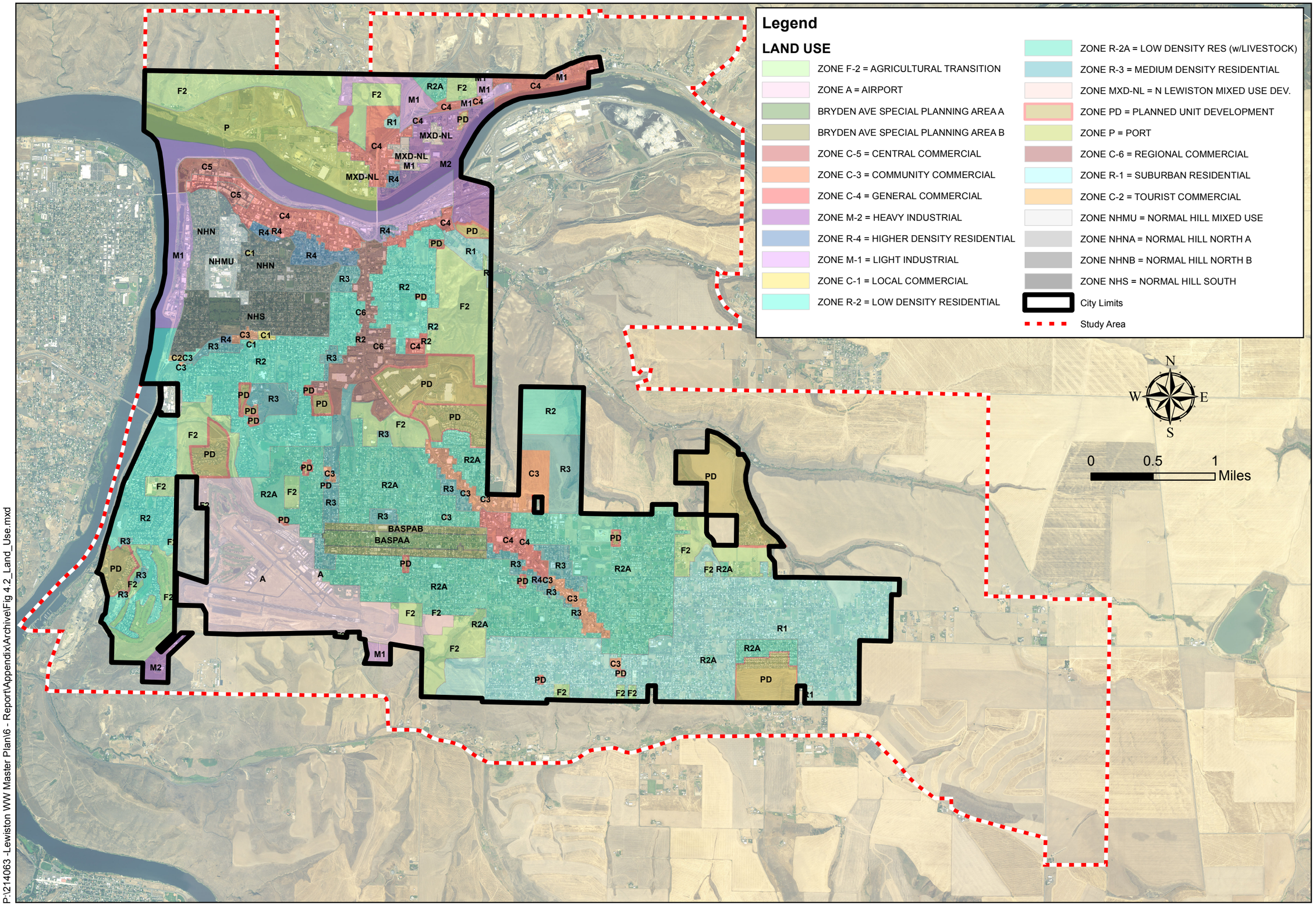
Notes:

1. EBI fees assumed to increase 1.5% per year.
2. LOSD's and NPT's portion of replacements/capital improvements.
3. Includes accounts: other, sale of assets, sale of scrap iron, printing, customer installations, real property rent, contributions, etc.
4. 2 % annual inflation in operations costs assumed.
5. Includes collection system priorities, short lived assets, vehicles, and pipeline replacement.
6. Includes EBI, operating, and capital.

APPENDIX A

Figures

KELLER ASSOCIATES



P:\214063 -Lewiston WW Master Plan\6 - Report\Appendix\Archive\Fig 4.2_Land_Use.mxd

KELLER ASSOCIATES

Prepared for: CITY OF LEWISTON 1861

Project: LEWISTON WASTEWATER SYSTEM MASTER PLAN

Title: EXISTING LAND USE

Figure: 1.1

N
W E
S

Legend

- CITY_LIMITS
- LOSD
- COSD
- Unknown

Diameter

- <= 8"
- 10" - 14"
- 15" -18"
- 20 - 24"
- 30"
- 36"
- 42"
- 48"

0 0.25 0.5 1 1.5 2 Miles

KELLER ASSOCIATES

CITY OF LEWISTON 1861

Project: LEWISTON WASTEWATER SYSTEM MASTER PLAN

Title: Pipe Diameters

Figure: 2.1

N
W E
S

Legend

- CITY_LIMITS
- LOSD
- COSD
- Unknown

Material

- CLAY
- CONCRETE
- INDISTINGUISHABLE
- OTHER
- PLASTIC

Miles
0 0.25 0.5 1 1.5 2

KELLER ASSOCIATES

CITY OF LEWISTON 1861

Project: LEWISTON WASTEWATER SYSTEM MASTER PLAN

Title: Pipe Materials

Figure: 2.2

N
W E
S

Chapman
Fed Ex
Casino
North Shore
South Shore
Water Treatment
Cypress
Hells Gate
Airport
5
4
3
2
1

Legend

- Lift Stations
- SS Pressure Lines
- LOSD Trunk Lines
- Lewiston Trunk Lines
- City Limits
- LOSD
- COSD

0 0.25 0.5 1 1.5 2 Miles

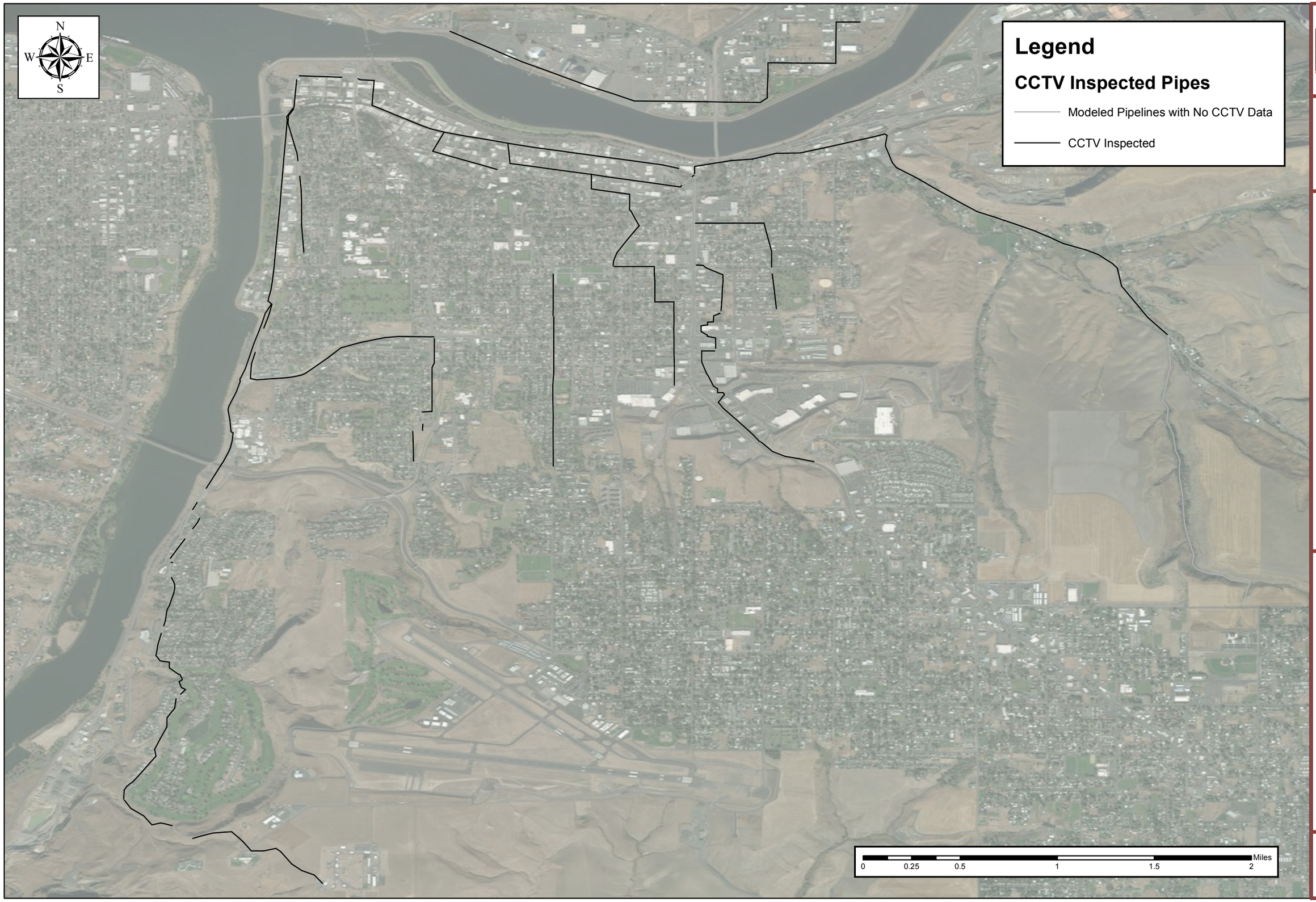
KELLER ASSOCIATES

CITY OF LEWISTON 1861

Project:
LEWISTON WASTEWATER SYSTEM MASTER PLAN

Title:
Lift Stations

Figure:
2.3



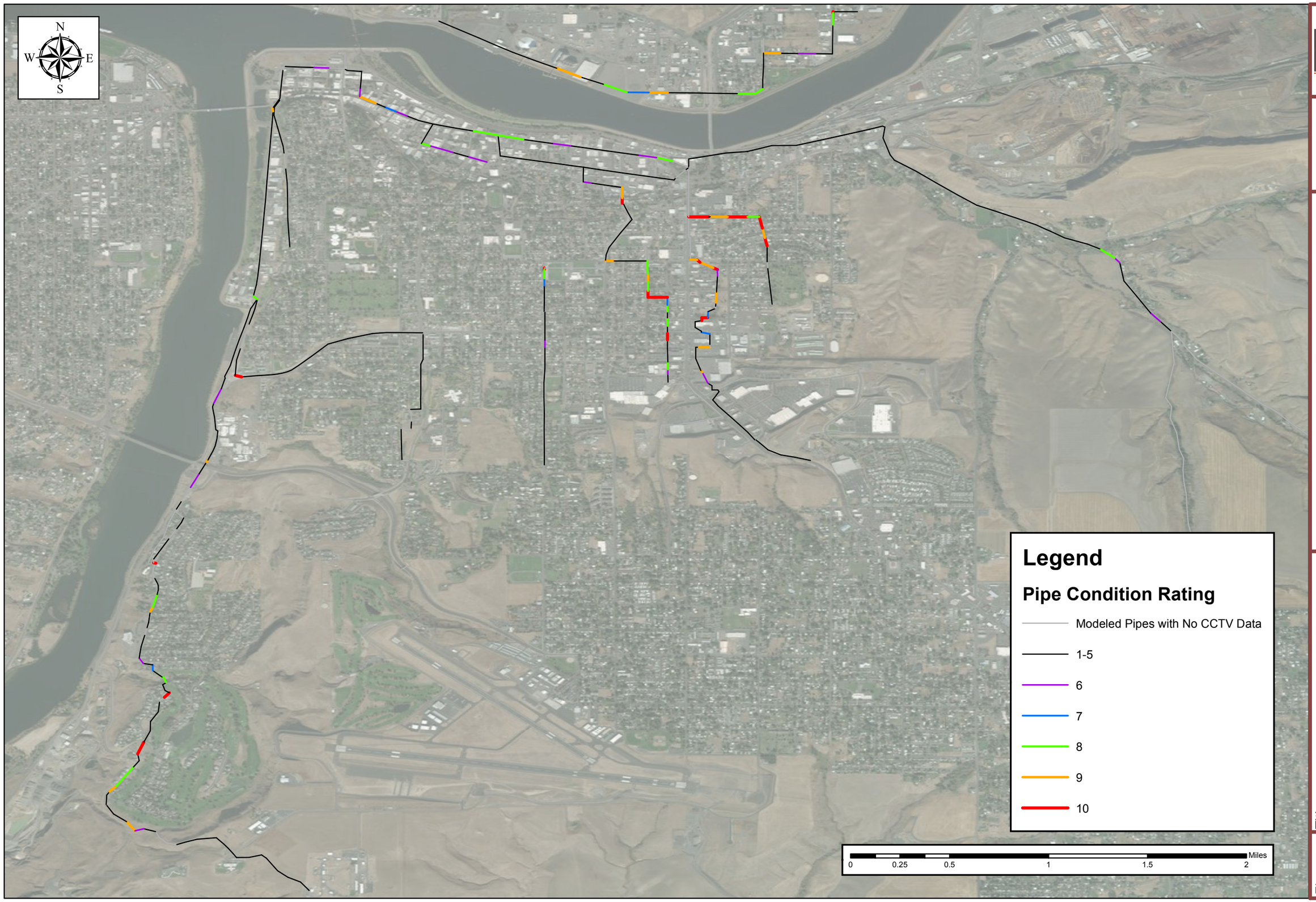
KELLER ASSOCIATES

CITY OF LEWISTON 1861

Project: LEWISTON WASTEWATER SYSTEM MASTER PLAN

Title: Pipelines CCTV Inspected

Figure: 2.4



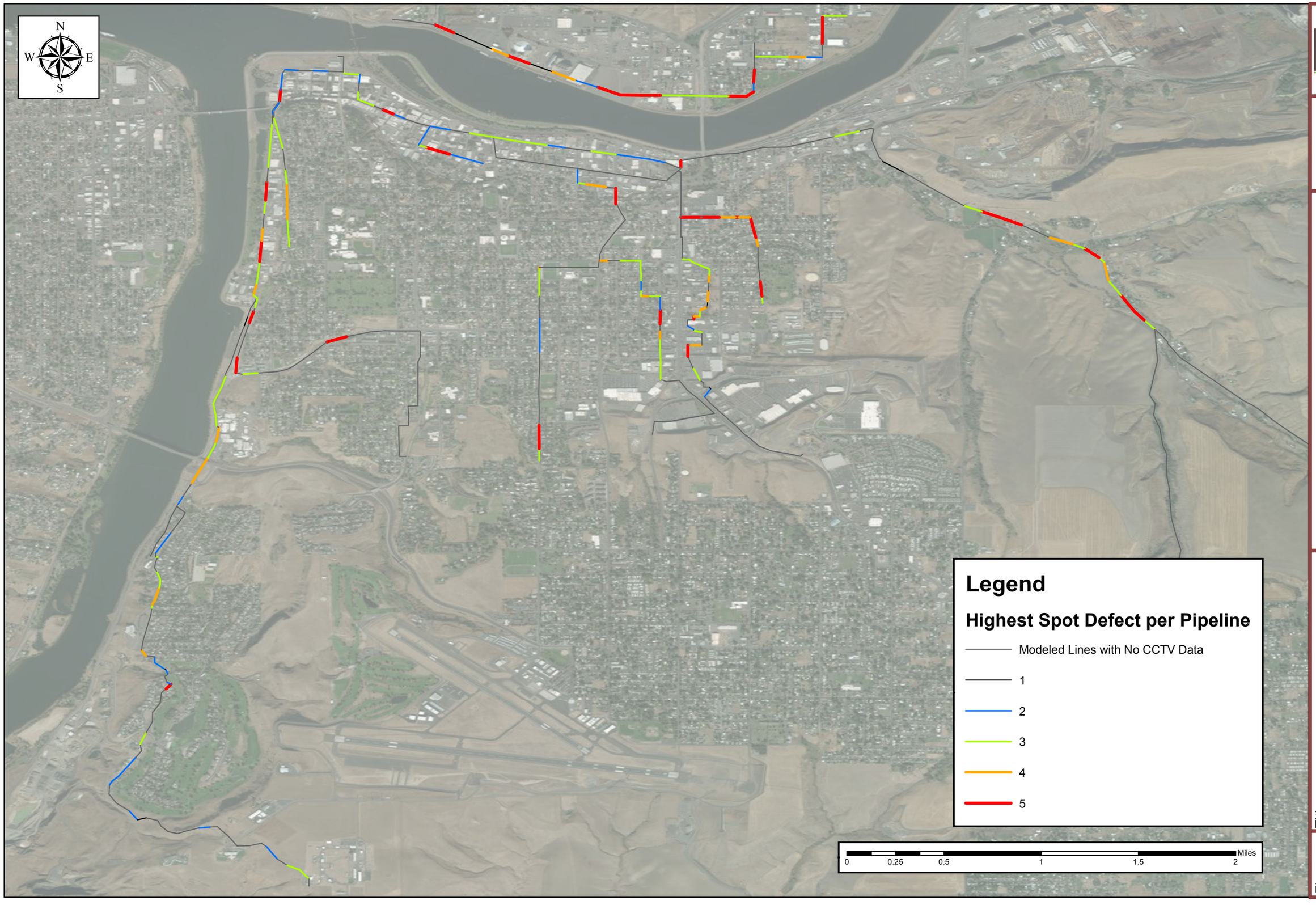
KELLER ASSOCIATES

CITY OF LEWISTON 1861

Project: LEWISTON WASTEWATER SYSTEM MASTER PLAN

Title: Pipe Condition Gradation

Figure: 2.5



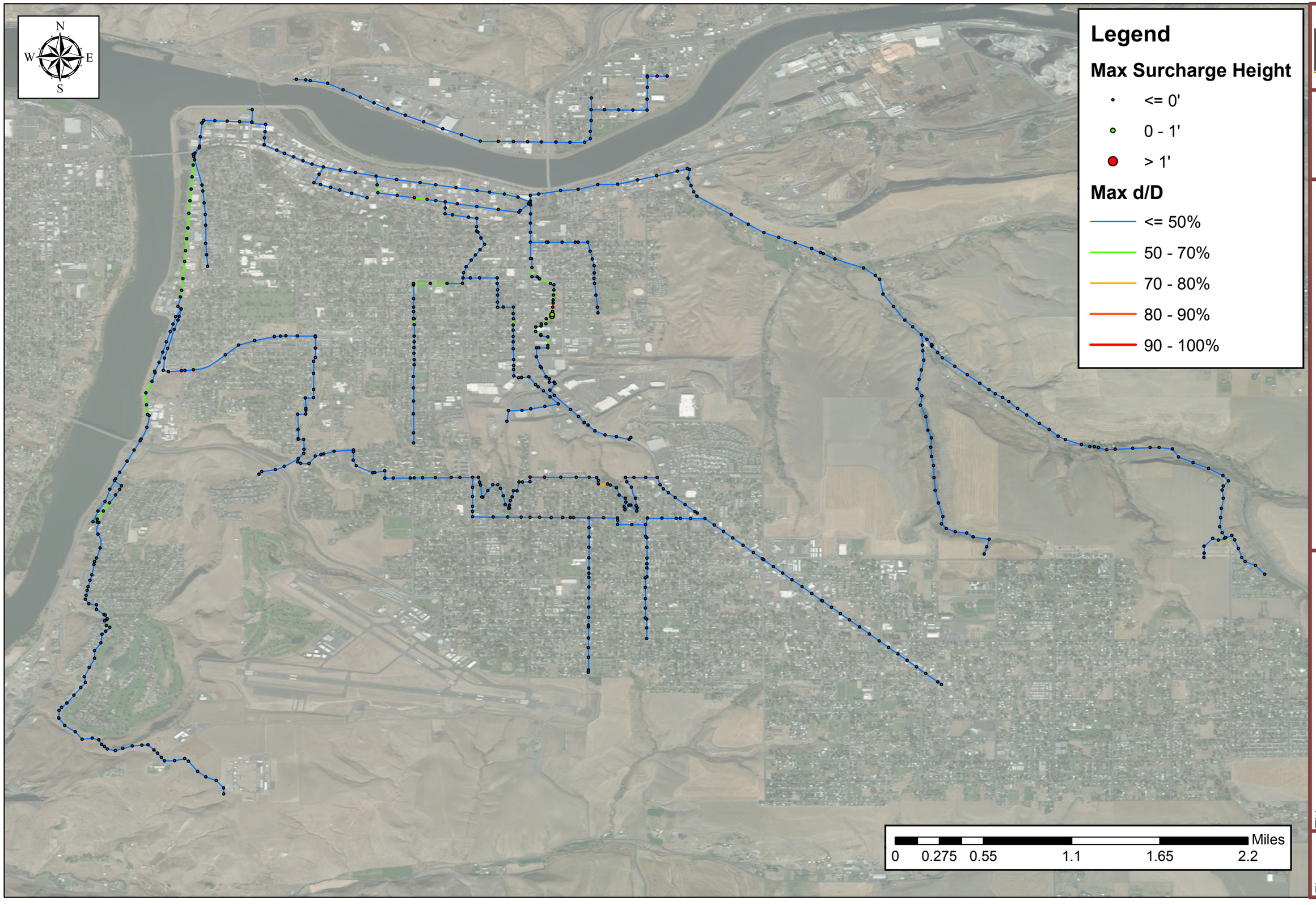
KELLER ASSOCIATES

CITY OF LEWISTON 1861

Project: LEWISTON WASTEWATER SYSTEM MASTER PLAN

Title: Spot Defects

Figure: 2.6



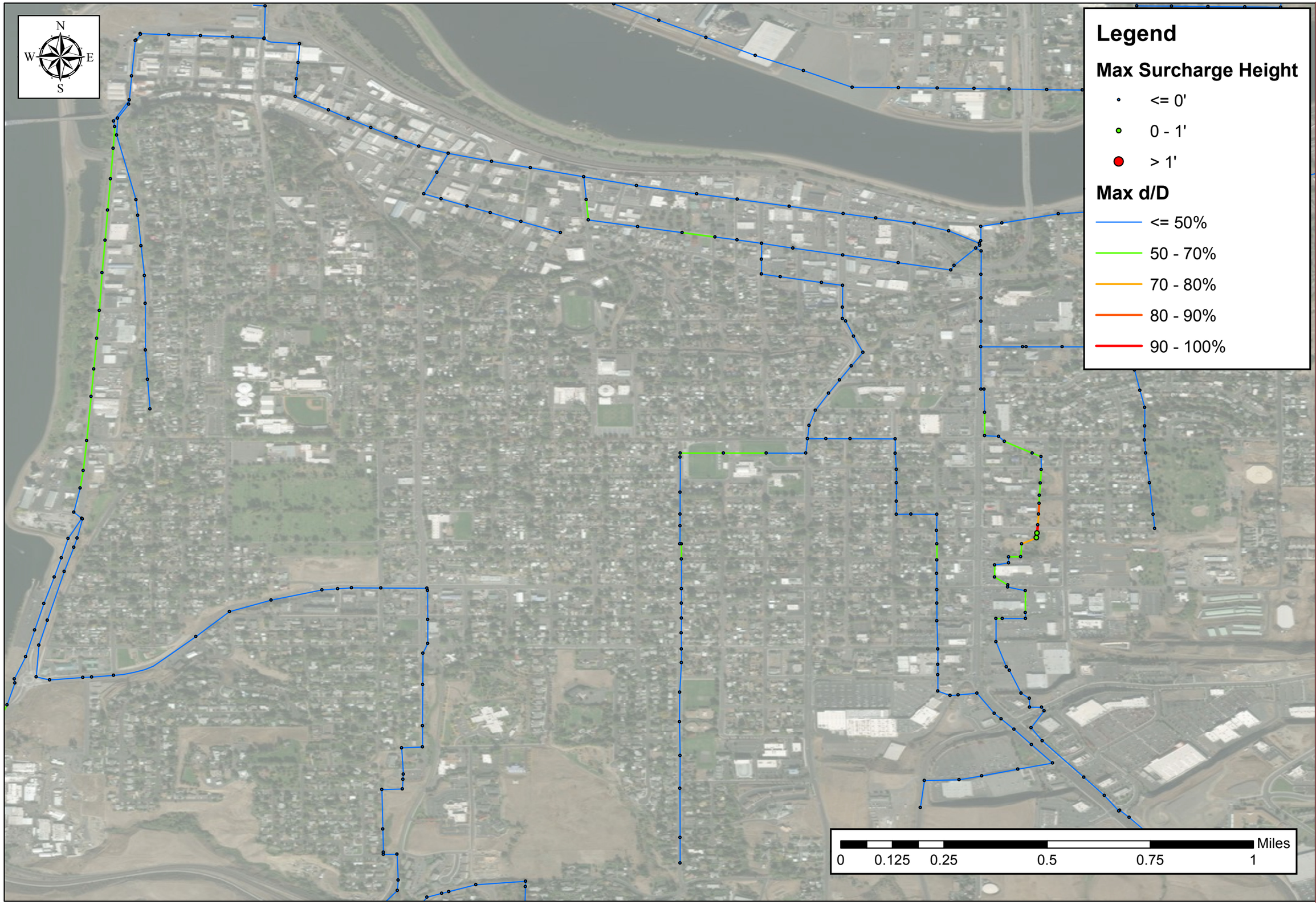
KELLER ASSOCIATES

CITY OF LEWISTON 1861

Project: LEWISTON WASTEWATER SYSTEM MASTER PLAN

Title: Existing Hydraulic Deficiencies

Figure: 3.1



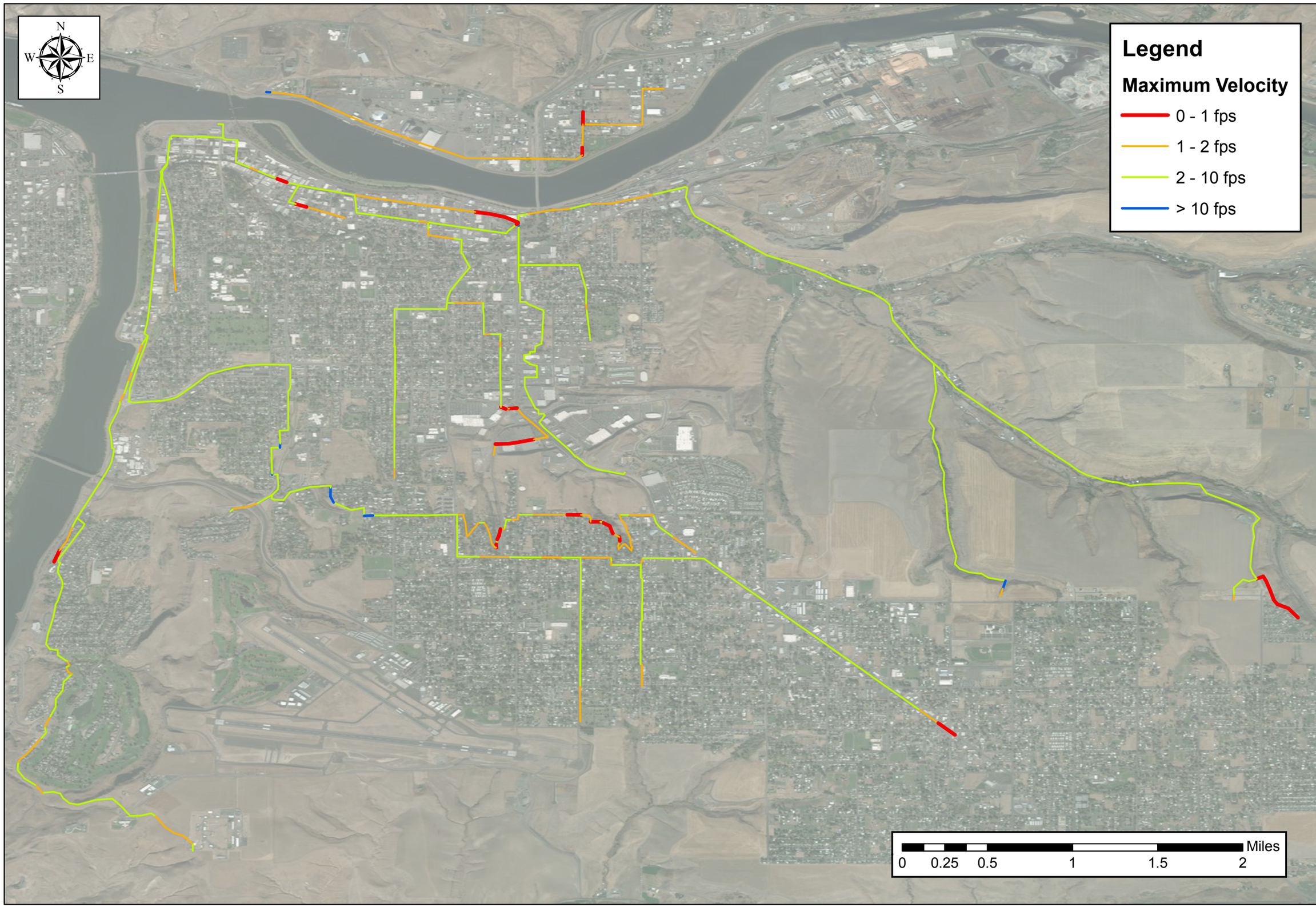
KELLER ASSOCIATES

CITY OF LEWISTON 1861

Project: LEWISTON WASTEWATER SYSTEM MASTER PLAN

Title: Existing Hydraulic Deficiencies (Zoomed)

Figure: 3.2



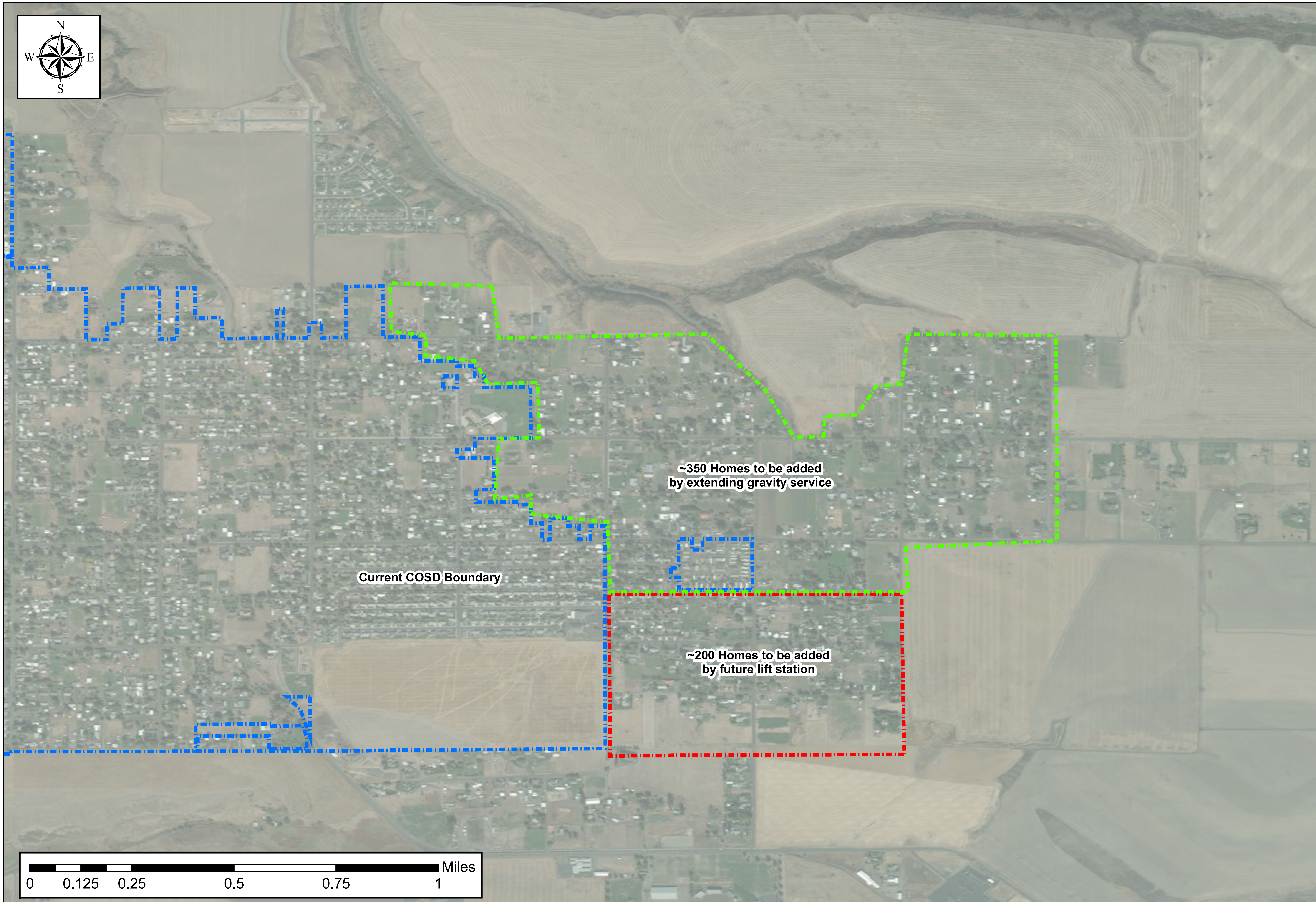
KELLER ASSOCIATES

CITY OF LEWISTON 1861

Project: LEWISTON WASTEWATER SYSTEM MASTER PLAN

Title: Existing Average Daily Maximum Velocities

Figure: 3.3



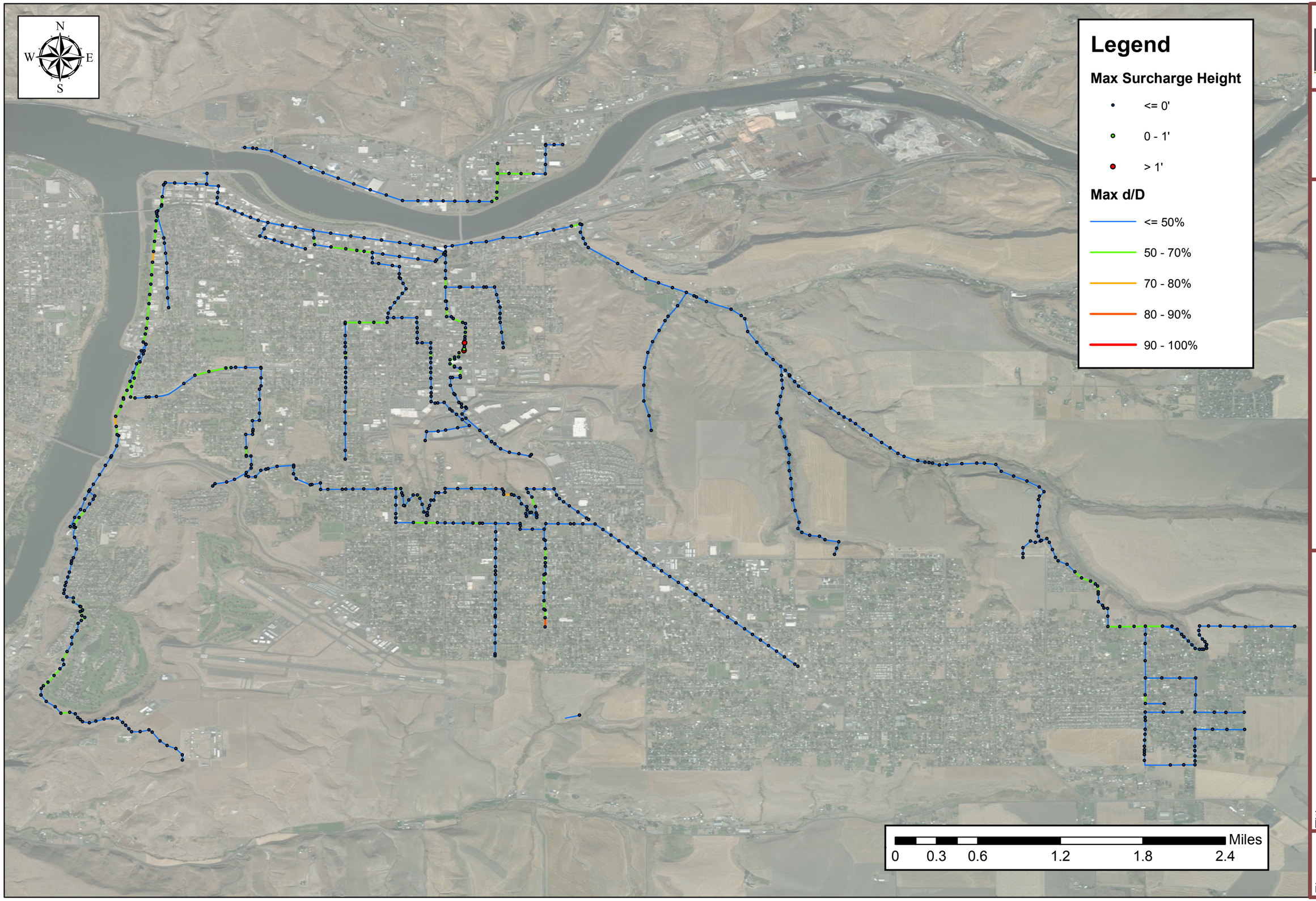
KELLER ASSOCIATES

CITY OF LEWISTON 1861

Project: LEWISTON WASTEWATER SYSTEMMASTER PLAN

Title: Existing Homes not on City Sewer

Figure: 3.4



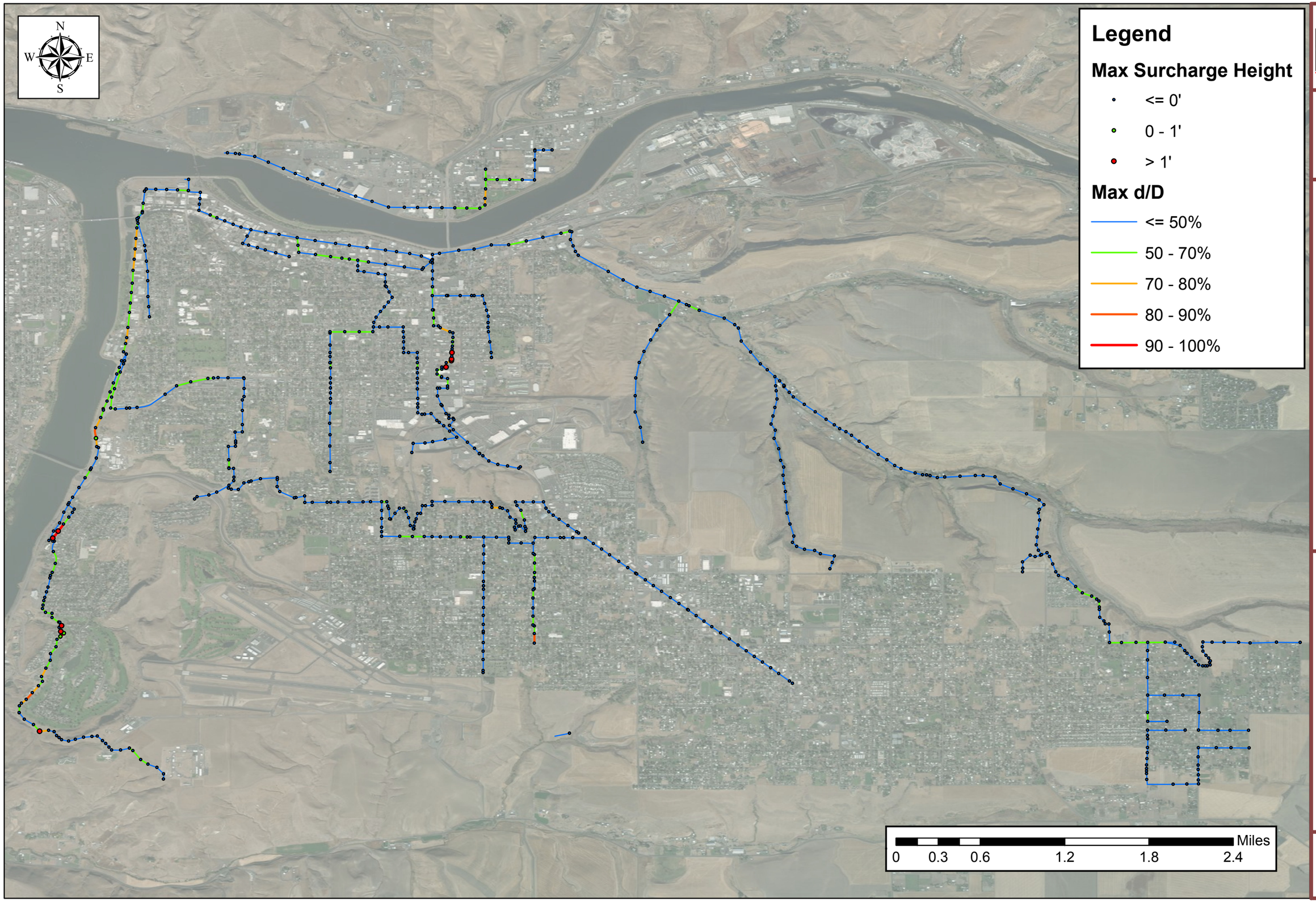
KELLER ASSOCIATES

CITY OF LEWISTON 1861

Project: LEWISTON WASTEWATER SYSTEM MASTER PLAN

Title: 2035 Hydraulic Deficiencies

Figure: 3.5



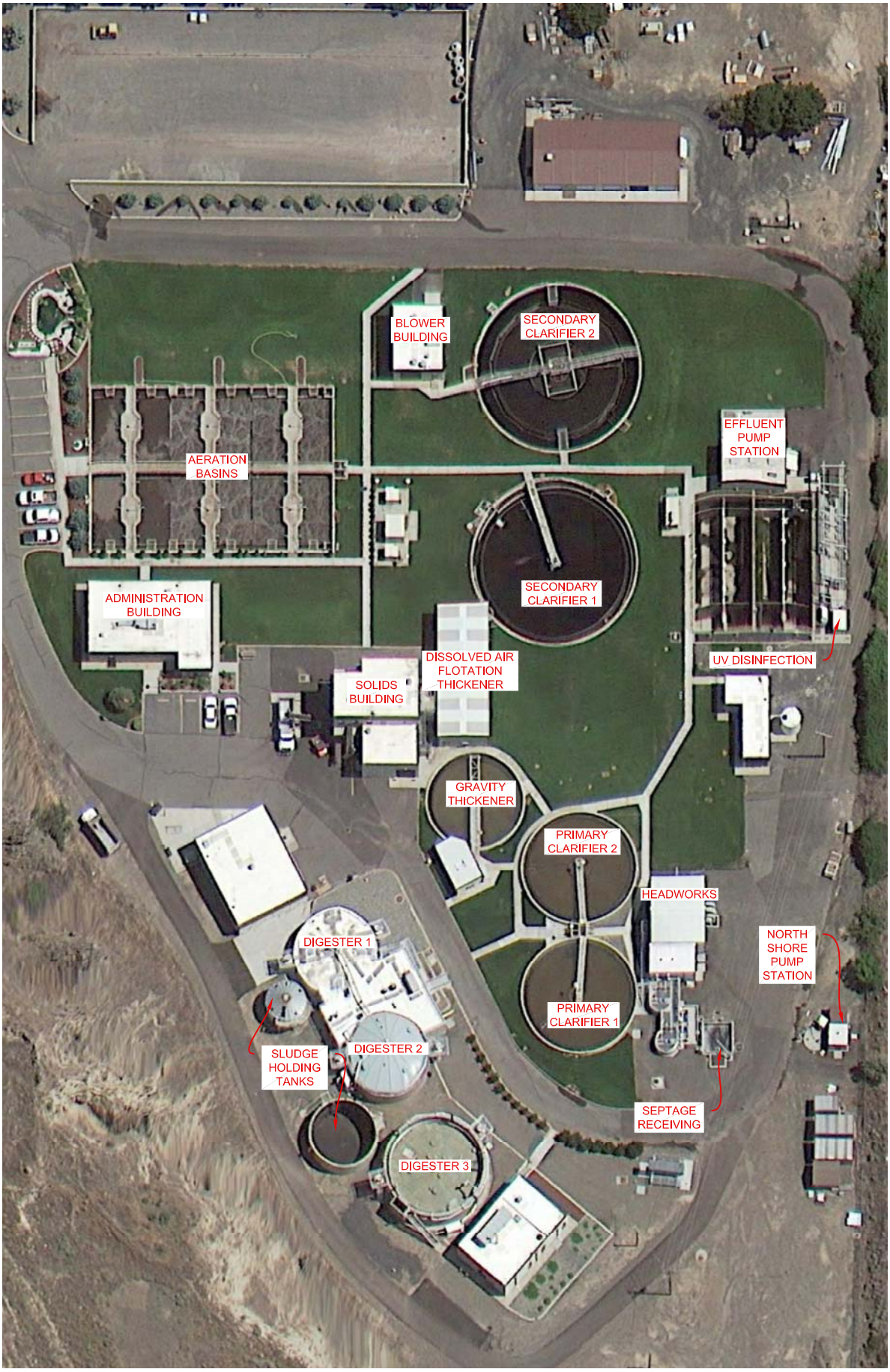
KELLER ASSOCIATES

CITY OF LEWISTON 1861

Project: LEWISTON WASTEWATER SYSTEM MASTER PLAN

Title: 2055 Hydraulic Deficiencies

Figure: 3.6



N.T.S.

KELLER ASSOCIATES	CITY OF LEWISTON IDAHO WWTP	WASTEWATER TREATMENT PLANT	PROJECT NO: 217043-001 FIGURE NO: 5.1

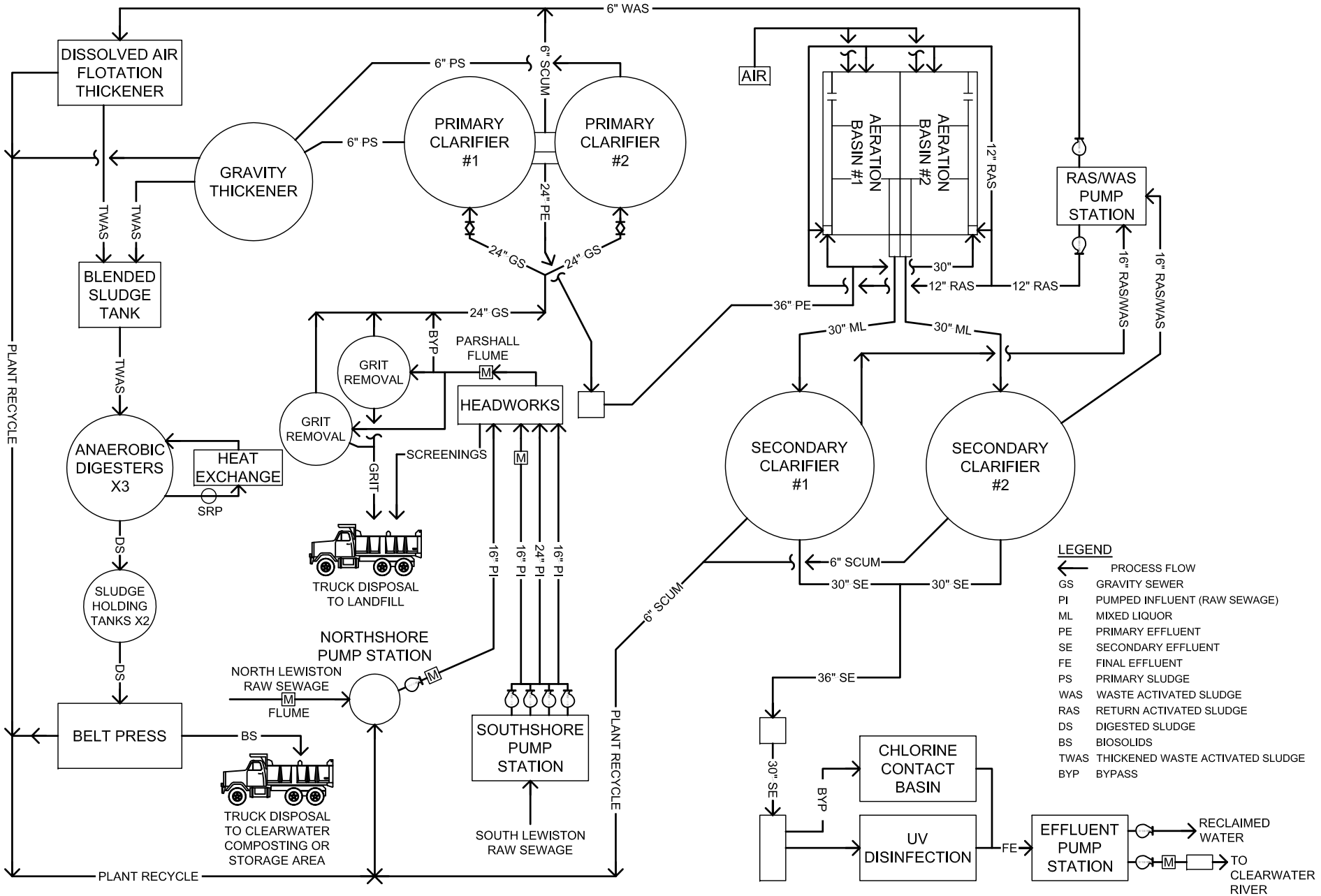
KELLER ASSOCIATES

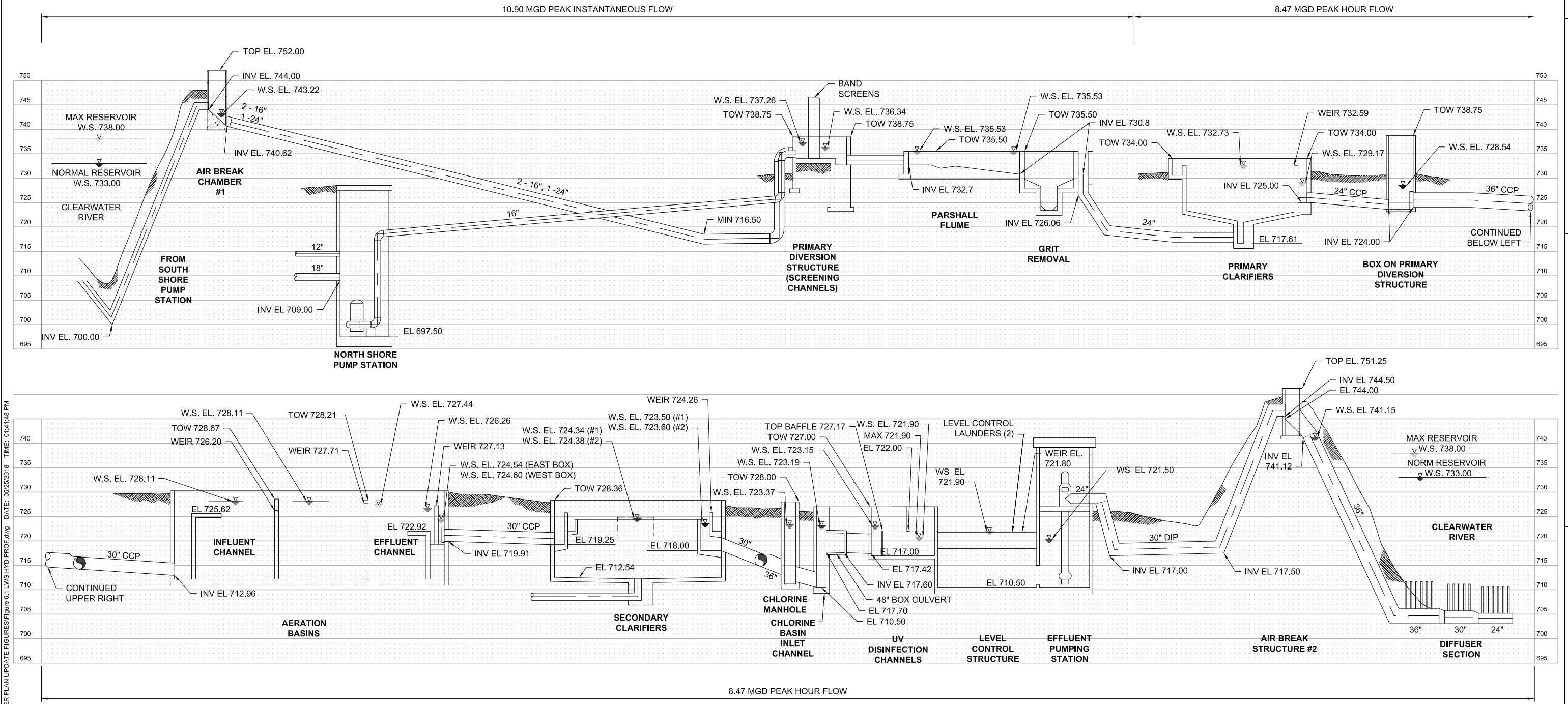
CITY OF LEWISTON
IDAHO WWTP

WWTP PROCESS FLOW DIAGRAM

PROJECT NO: 217043-001

FIGURE NO: 5.2





KELLER ASSOCIATES

CITY OF LEWISTON, ID

WASTEWATER TREATMENT PLANT IMPROVEMENTS

HYDRAULIC PROFILE - 2015 FLOWS

PROJECT NO.
217043-001

FIGURE NO.
6.1

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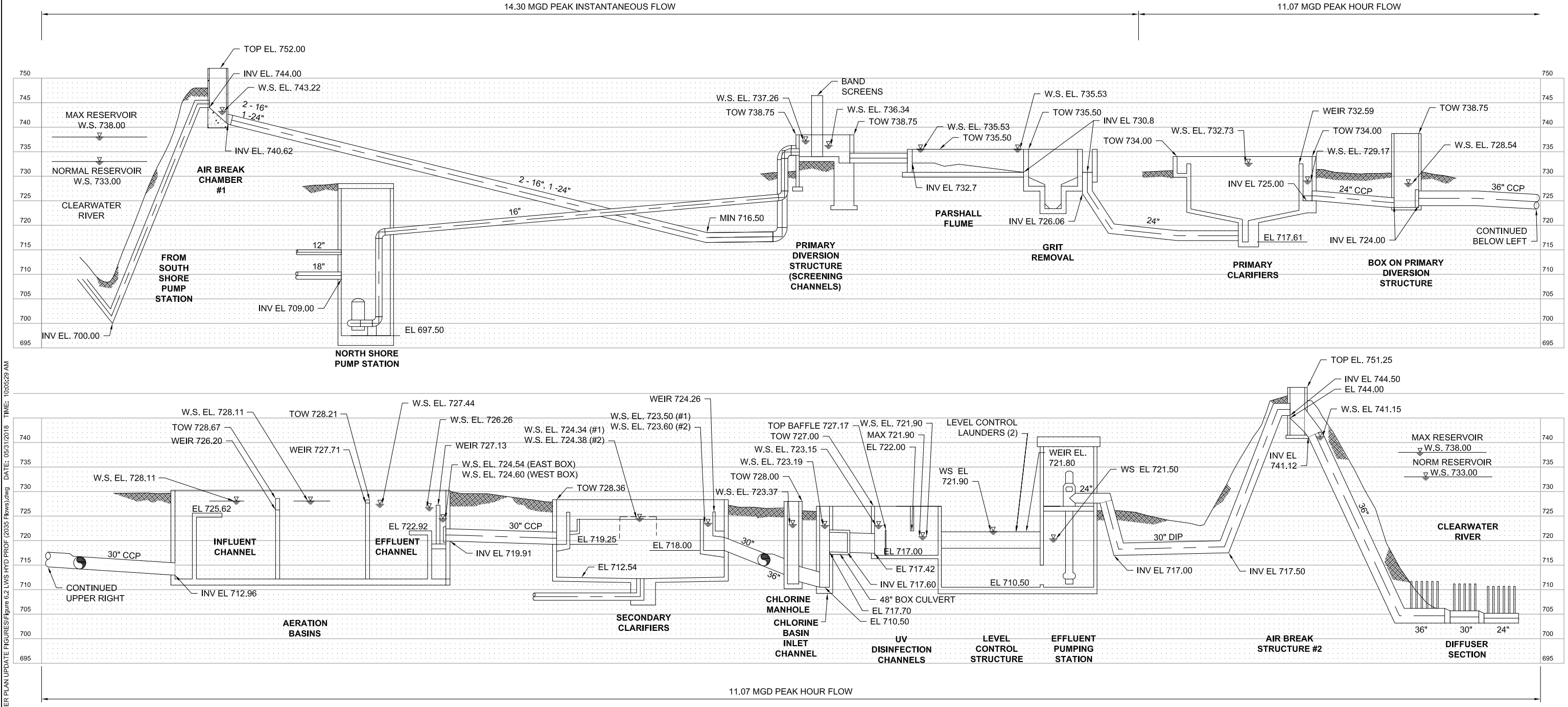

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KELLER ASSOCIATES

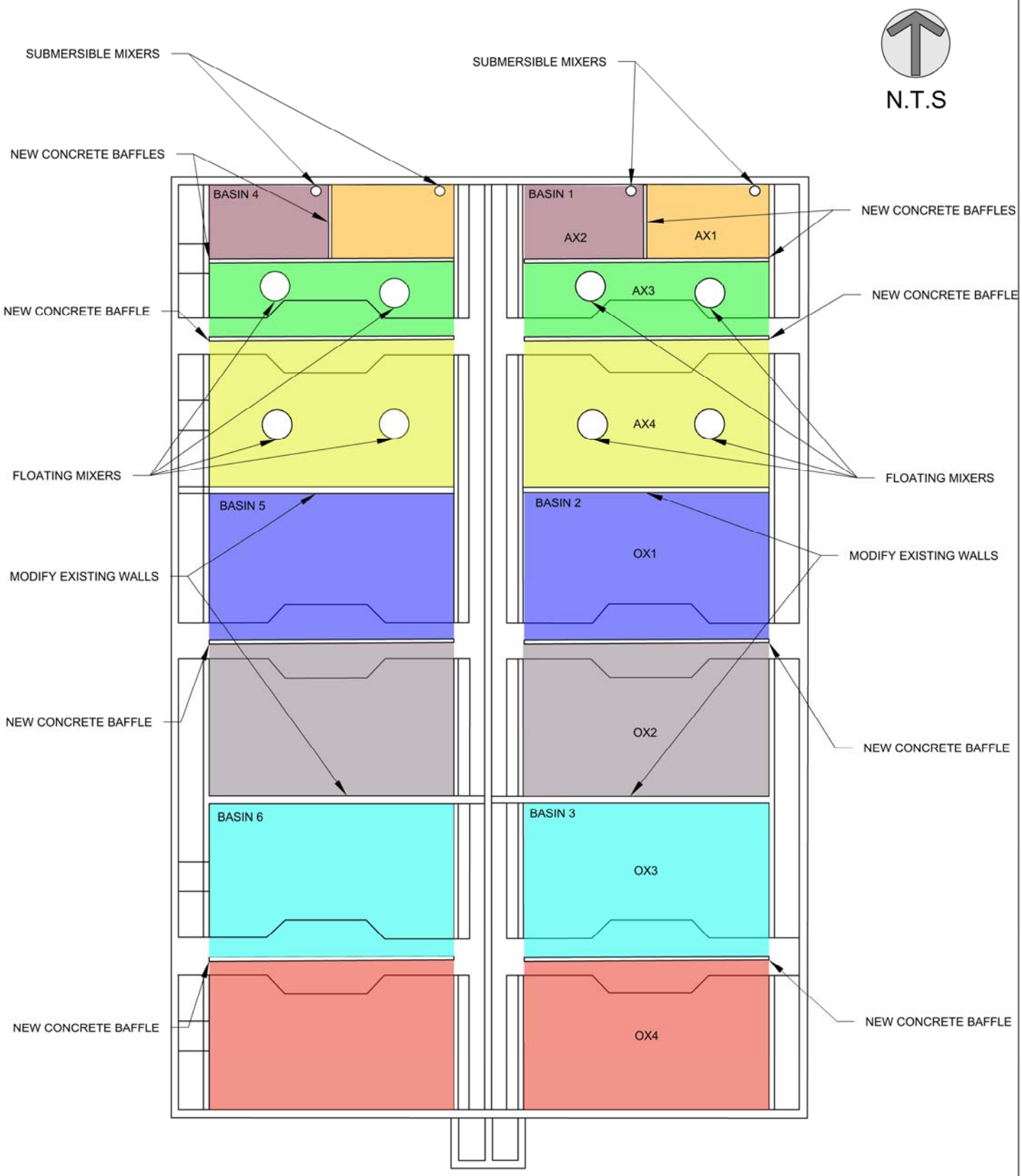
CITY OF LEWISTON, ID

WASTEWATER TREATMENT PLANT IMPROVEMENTS

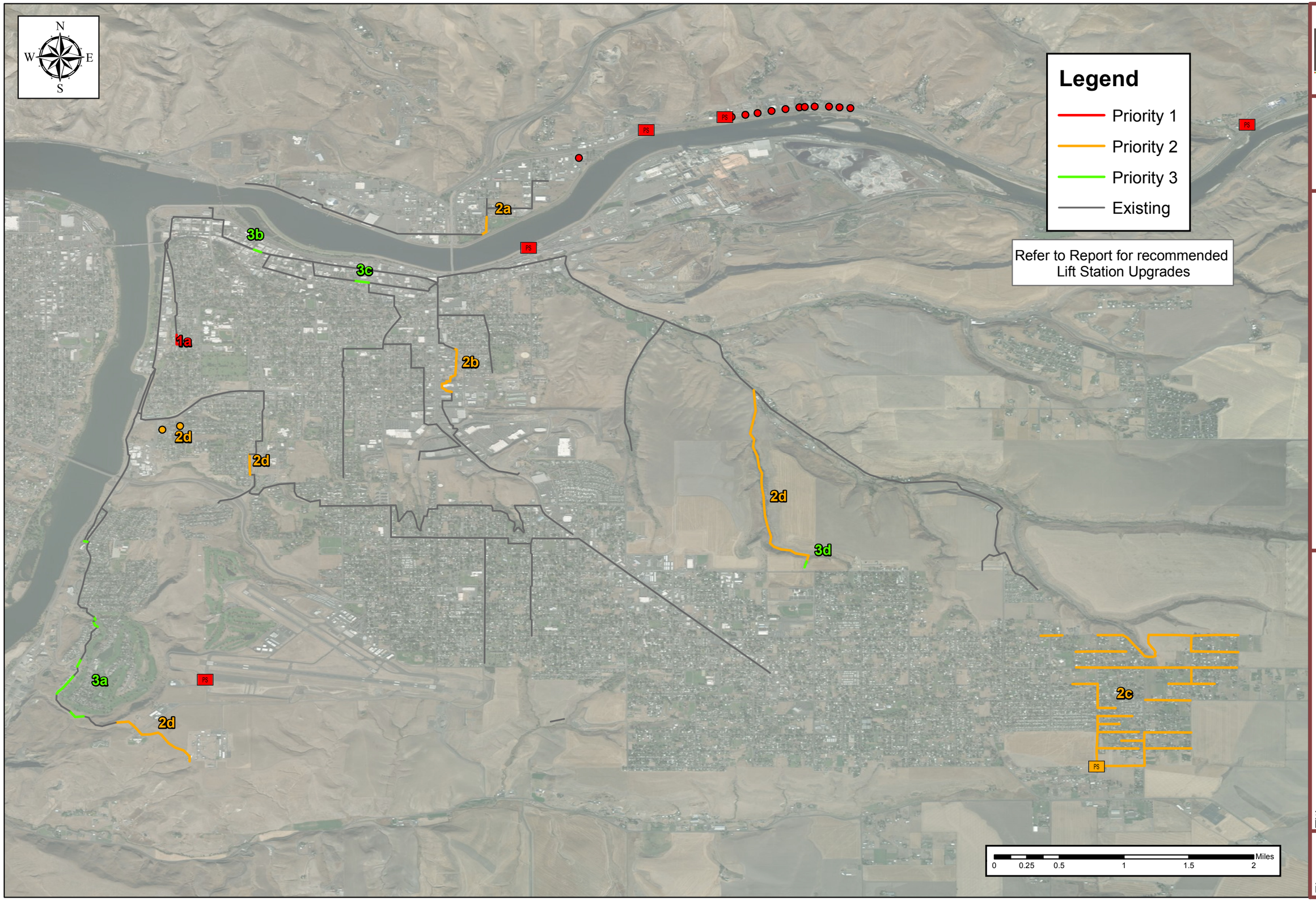
HYDRAULIC PROFILE - 2035 FLOWS

PROJECT NO.
217043-001

FIGURE NO.
6.2



KELLER ASSOCIATES	CITY OF LEWISTON IDAHO WWTP	AERATION BASIN MODIFICATIONS	PROJECT NO: 217043-001 FIGURE NO: 7.1



KELLER ASSOCIATES

CITY OF LEWISTON 1861

Project: LEWISTON WASTERWATER SYSTEM MASTER PLAN

Title: Collection System Master Plan

Figure: 8.1

APPENDIX B

NPDES Permit

KELLER ASSOCIATES

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue Suite 900
Seattle, Washington 98101-3140

Authorization to Discharge Under the National Pollutant Discharge Elimination System

In compliance with the provisions of the Clean Water Act, 33 USC §1251 *et seq.*, as amended by the Water Quality Act of 1987, P.L. 100-4, the "Act",

City of Lewiston Wastewater Facility
P.O. Box 617
Lewiston, Idaho 83501

is authorized to discharge from the City of Lewiston Wastewater facility located in Lewiston, Idaho, at the following location(s):

Outfall	**Receiving Water**	**Latitude**	**Longitude**
001	Clearwater Arm of Lower Granite Dam Pool, Clearwater River	46° 25' 38" N	117° 01' 16" W

in accordance with discharge point(s), effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective February 1, 2016.

This permit and the authorization to discharge shall expire at midnight, January 31, 2021.

The permittee shall reapply for a permit reissuance on or before August 4, 2020, 180 days before the expiration of this permit if the permittee intends to continue operations and discharges at the facility beyond the term of this permit.

Signed this 9th day of December, 2015

//Signed//
Daniel D. Opalski, Director
Office of Water and Watersheds

Schedule of Submissions

Item	Due Date
Discharge Monitoring Reports (DMR)	DMRs are due monthly and must be postmarked on or before the 20th of the month following the monitoring month. Beginning from the November 2016 DMR (due December 20, 2016) and thereafter, the permittee must submit monitoring data and other reports electronically using NetDMR.
Quality Assurance Plan (QAP)	The permittee must provide EPA and IDEQ with written notification that the Plan has been developed and implemented within 180 days after the effective date of the final permit (see Part II.B of this permit). The Plan must be kept on site and made available to EPA and IDEQ upon request.
Operation and Maintenance (O&M) Plan	The permittee must provide EPA and IDEQ with written notification that the Plan has been developed and implemented within 180 days after the effective date of the final permit (see Part II.A of this permit). The Plan must be kept on site and made available to EPA and IDEQ upon request.
Whole Effluent Toxicity Testing (WET) Report	The permittee must submit the results of the toxicity testing with the discharge monitoring reports (DMRs). Toxicity tests taken from October 1 through June 30 must be reported on the August DMR. Toxicity tests taken from July 1 through September 30 must be reported on the November DMR. In addition, all WET test results must be resubmitted with the next permit application.
TRE Initial Evaluation	Within 6 months of the effective date of this permit, the permittee shall submit to EPA a copy of the permittee's initial investigation TRE workplan.
Local Limits Evaluation	Within twenty four months of the effective date of this permit, the permittee must submit to EPA a complete local limits evaluation pursuant to 40 CFR 403.5(c)(1).
NPDES Application Renewal	The application must be submitted at least 180 days before the expiration date of the permit (see Part V.B of this permit).
Surface Water Monitoring Report	Surface water monitoring results must be reported on the monthly DMR. In addition, the permittee must submit all surface water monitoring results for the previous calendar year for all parameters in an annual report to EPA and IDEQ by January 31st of the following year and with the application (see Part V.B of this permit, *Duty to Reapply*).
Twenty-Four Hour Notice of Noncompliance Reporting	The permittee must report certain occurrences of noncompliance by telephone within 24 hours from the time the permittee becomes aware of the circumstances (see Part III.G and Paragraph I.B.3 of this permit).

Emergency Response and Public Notification Plan	The permittee must develop and implement an overflow emergency response and public notification plan. The permittee must submit written notice to EPA and IDEQ that the plan has been developed and implemented within 24 months after the effective date of this permit. (See Part II.D of this permit)
Annual Pretreatment Report	The permittee must submit an annual report pursuant to 40 CFR 403.12(i) that describes the permittee's program activities over the previous 12-month. This report must be submitted to EPA no later than January 31st of each year (See Part II.C.9 of this permit.)

Table of Contents

List of Tables

I. Limitations and Monitoring Requirements

A. Discharge Authorization

During the effective period of this permit, the permittee is authorized to discharge pollutants from the outfalls specified herein to the Clearwater Arm of Lower Granite Dam Pool of the Clearwater River, within the limits and subject to the conditions set forth herein. This permit authorizes the discharge of only those pollutants resulting from facility processes, waste streams, and operations that have been clearly identified in the permit application process.

B. Effluent Limitations and Monitoring

1. The permittee must limit and monitor discharges from outfall 001 as specified in *Table 1. Effluent Limitations and Monitoring Requirements*, below. All figures represent maximum effluent limits unless otherwise indicated. The permittee must comply with the effluent limits in the tables at all times unless otherwise indicated, regardless of the frequency of monitoring or reporting required by other provisions of this permit.

Table 1. Effluent Limitations and Monitoring Requirements

Parameter	Units	Effluent Limitations			Monitoring Requirements		
		Average Monthly	Average Weekly	Maximum Daily	Sample Location	Sample Frequency	Sample Type
Parameters With Effluent Limits							
Biochemical Oxygen Demand (BOD_5)	mg/l	30	45	--	Influent and Effluent	5/week	24-hour composite
	lbs/day	1430	2145	--			Calculation[1]
BOD_5 Percent Removal	%	85 (minimum)	--	--	--	1/month	Calculation[2]
Total Suspended Solids (TSS)	mg/l	30	45	--	Influent and Effluent	5/week	24-hour composite
	lbs/day	1430	2145	--			Calculation[1]
TSS Percent Removal	%	85 (minimum)	--	--	--	1/month	Calculation[2]
E. coli [3]	CFU/ 100 ml	126	--	406 (instant. max) [4]	Effluent	5/month	Grab
Total Residual Chlorine[5] (monitoring when chlorine is used for disinfection)	µg/l	340	--	700[4]	Effluent	1/day	Grab
	lbs/day	14.29	--	33.33			Calculation[1]
pH	std units	Between 6.5 – 9.0			Effluent	5/week[6]	Grab
Floating, Suspended, or Submerged Matter	See Paragraph I.B.4. of this permit				Effluent	1/month	Visual Observation
Report Parameters							
Dissolved Oxygen	mg/l	Report Minimum and Average			Effluent	1/week	Grab
Total Ammonia (as N)	mg/l	Report	---	Report	Effluent	1/month	24-hour composite
	lbs/day	Report	---	Report			Calculation[1]
Total Phosphorus (as P)	mg/l	Report	---	Report	Effluent	1/month	24-hour composite
	lbs/day	Report	---	Report			Calculation[1]
Total Kjeldahl Nitrogen	mg/l	Report	--	Report	Effluent	1/month	24-hour composite
Nitrate + Nitrite	mg/l	Report	--	Report	Effluent	1/month	24-hour composite
Flow	mgd	Report	--	Report	Effluent	continuous	Meter
Temperature	ºC	--	Report	Report	Effluent	1/week	Grab

Parameter	Units	Effluent Limitations			Monitoring Requirements		
		Average Monthly	Average Weekly	Maximum Daily	Sample Location	Sample Frequency	Sample Type
Whole Effluent Toxicity (WET)[7,8]	See Part I.C of this permit				Effluent	2/year[7,8]	24-hour composite
Copper, total recoverable[9]	µg/l	--			Effluent	2/year	24-hour composite
Cyanide, weak acid dissociable[9]	µg/l	--			Effluent	2/year	24-hour composite
Lead, total recoverable[9]	µg/l	--			Effluent	2/year	24-hour composite
Mercury, total recoverable[9]	µg/l	--			Effluent	2/year	24-hour composite
Arsenic[9]	µg/l	--			Effluent	2/year	24-hour composite
Chromium (III) & (VI) [9]	µg/l	--			Effluent	2/year	24-hour composite
Selenium, total recoverable[9]	µg/l	--			Effluent	2/year	24-hour composite
Silver, total recoverable[9]	µg/l	--			Effluent	2/year	24-hour composite
Zinc, total recoverable[9]	µg/l	--			Effluent	2/year	24-hour composite
Nickel, total recoverable[9]	µg/l	--			Effluent	2/year	24-hour composite
Dissolved Organic Carbon[9]	µg/l	--			Effluent	2/year	24-hour composite
Hardness[9]	mg/L as $CaCO_3$	--			Effluent	2/year	24-hour composite
Conductivity[9]	µmhos /cm	--			Effluent	2/year	24-hour composite
Effluent Testing for Permit Renewal							
Permit Application Effluent Testing Data[10]	--				Effluent	1/year	--
Permit Application Expanded Effluent Testing[11]	--				Effluent	1/year	--

Parameter	Units	Effluent Limitations			Monitoring Requirements		
		Average Monthly	Average Weekly	Maximum Daily	Sample Location	Sample Frequency	Sample Type

Notes

1. Loading (in lbs/day) is calculated by multiplying the concentration (in mg/L) by the corresponding flow (in mgd) for the day of sampling and a conversion factor of 8.34. For more information on calculating, averaging, and reporting loads and concentrations see the *NPDES Self-Monitoring System User Guide* (EPA 833-B-85-100, March 1985).
2. Percent Removal. The monthly average percent removal must be calculated from the arithmetic mean of the influent values and the arithmetic mean of the effluent values for that month using the following equation: (average monthly influent concentration – average monthly effluent concentration) ÷ average monthly influent concentration x 100. Influent and effluent samples must be taken over approximately the same time period.
3. The average monthly *E. coli* bacteria counts must not exceed a geometric mean of 126/100 ml based on a minimum of five samples taken every 3 - 7 days within a calendar month. See Part VI of this permit for a definition of geometric mean.
4. Reporting is required within 24 hours of a maximum daily limit or instantaneous maximum limit violation. See Paragraph I.B.3 and Part III.G of this permit.
5. Effluent limits for Total Residual Chlorine applies at all times; however, monitoring is only required when chlorine is used for disinfection.
6. Samples must be taken on different days.
7. See monitoring described in Paragraph I.C. of this permit.
8. Toxicity Testing Data – See NPDES Permit Application Form 2A, Part E. Chronic WET testing must be conducted at least twice per year, once during the period from October 1 through June 30, and once during the period from July 1 through September 30.
9. Sampling must occur on the same day as whole effluent toxicity testing.
10. Effluent Testing Data - See NPDES Permit Application Form 2A, Part B.6 for the list of pollutants to be included in this testing. Testing must be conducted at least once per year. The effluent testing must occur on the same day as whole effluent toxicity testing. The Permittee must use sufficiently sensitive analytical methods in accordance with Part I.B.6 of this permit.
11. Expanded Effluent Testing - See NPDES Permit Application Form 2A, Part D for the list of pollutants to be included in this testing. The expanded effluent testing must be conducted at least once per year and occur on the same day as whole effluent toxicity testing. The Permittee must use sufficiently sensitive analytical methods in accordance with Part I.B.6 of this permit.
12. All parameters, including Effluent Testing, Expanded Effluent Testing, and Toxicity Testing, must continue for the duration of the permit, including during a potential period when the permit is administratively extended.

2. Narrative limitations for floating suspended or submerged matter:

   The permittee must not discharge floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions or that may impair designated beneficial uses.

3. The permittee must report within 24 hours any violation of the maximum daily limits for the following pollutants: *E. coli* and Total Residual Chlorine. Violations of all other effluent limits are to be reported at the time that discharge monitoring reports are submitted (See Parts III.B. *Reporting of Monitoring Results* and III.H. *Twenty-four Hour Notice of Noncompliance Reporting* of this permit).

4. The permittee must conduct a monthly visual inspection of the effluent at the location where the effluent enters the surface water to confirm the effluent meets the narrative limitations for floating, suspended or submerged matter. A written log of the monthly inspection which includes the date, time, observer, and observation must be retained and made available to EPA and to IDEQ upon request.

5. The permittee must collect effluent samples from the effluent stream after the last treatment unit prior to discharge into the receiving waters.

6. For all effluent monitoring, the permittee must use sufficiently sensitive analytical methods which meet the following:

   a) Parameters with an effluent limit. The method must achieve a minimum level (ML) less than the effluent limitation unless otherwise specified in *Table 1 Effluent Limitations and Monitoring Requirements*.

   b) Parameters that do not have effluent limitations.

      (i) The permittee must use a method that detects and quantifies the level of the pollutant, or

      (ii) The permittee must use a method that can achieve a maximum ML less than or equal to those specified in *Appendix A. Minimum Levels;*

   c) For parameters that do not have an effluent limit, the permittee may request different MLs. The request must be in writing and must be approved by EPA.

   d) See also Part III.C *Monitoring Procedures*

7. For purposes of reporting on the DMR for a single sample, if a value is less than the MDL, the permittee must report “less than {numeric value of the MDL}” and if a value is less than the ML, the permittee must report “less than {numeric value of the ML}.”

8. For purposes of calculating monthly averages, zero may be assigned for values less than the MDL, and the {numeric value of the MDL} may be assigned for values between the MDL and the ML. If the average value is less than the MDL,

the permittee must report "less than {numeric value of the MDL}" and if the average value is less than the ML, the permittee must report "less than {numeric value of the ML}." If a value is equal to or greater than the ML, the permittee must report and use the actual value. The resulting average value must be compared to the compliance level, the ML, in assessing compliance.

C. Whole Effluent Toxicity Testing Requirements

The permittee must conduct chronic WET tests on effluent samples from outfall 001. Testing must be conducted in accordance with Paragraphs 1 through 4, below.

1. Toxicity testing must be conducted on 24-hour composite samples of effluent. In addition, a split of each sample collected must be analyzed for the chemical and physical parameters required in Part I.B of this permit, *Effluent Limitations and Monitoring*, with a required sampling frequency of monthly or more frequently, using the same sample type required in Part I.B. When the timing of sample collection coincides with that of the sampling required in Part I.B, analysis of the split sample will fulfill the requirements of Part I.B as well. For parameters for which grab samples are required in Part I.B, grab samples must be taken during the same 24-hour period as the 24-hour composite sample used for the toxicity tests. A split of the first discrete effluent sample collected for the 24-hour composite sample for the toxicity test cannot be used to satisfy the required grab sample in Part I.B.
2. Chronic Test Species and Methods
    a) For Outfall 001, chronic WET testing must be conducted at least twice per year, once during the period from October 1 through June 30, and once during the period from July 1 through September 30.
    b) The permittee must conduct the following two chronic WET tests on each sample, using the species and protocols in
    c) Table 2*: Toxicity Test Species and* Protocols.

Table 2: Toxicity Test Species and Protocols

Freshwater Chronic Toxicity Tests	Species	Method
Fathead minnow larval survival and growth test (method 1000.0)	*Pimephales promelas*	EPA-821-R-02-013
Daphnid survival and reproduction test (method 1002.0)	*Ceriodaphnia dubia*	EPA-821-R-02-013

    d) The presence of chronic toxicity must be determined as specified in Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving

Waters to Freshwater Organisms, Fourth Edition, EPA/821-R-02-013, October 2002.

e) Results must be reported in TU_C (chronic toxic units), which is defined as follows:

(i) For survival endpoints, $TU_C = 100/NOEC$.

(ii) For all other test endpoints, $TU_C = 100/IC25$

(iii) IC25 means "25% inhibition concentration." The IC25 is a point estimate of the toxicant concentration, expressed in percent effluent, that causes a 25% reduction in a non-quantal biological measurement (e.g., reproduction or growth) calculated from a continuous model (e.g., Interpolation Method).

(iv) NOEC means "no observed effect concentration." The NOEC is the highest concentration of toxicant, expressed in percent effluent, to which organisms are exposed in a chronic toxicity test [full life-cycle or partial life-cycle (short term) test], that causes no observable adverse effects on the test organisms (i.e., the highest concentration of effluent in which the values for the observed responses are not statistically significantly different from the controls).

3. Quality Assurance

a) The toxicity testing on each organism must include a series of six test dilutions and a control. The dilution series must include 50, 25, 12.5, 6.25, the receiving water concentration (RWC), which is 2.3% effluent, and 1.15% effluent.

b) All quality assurance criteria and statistical analyses used for chronic tests and reference toxicant tests must be in accordance with Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition, EPA/821-R-02-013, October 2002, and individual test protocols.

c) In addition to those quality assurance measures specified in the methodology, the following quality assurance procedures must be followed:

(i) If organisms are not cultured in-house, concurrent testing with reference toxicants must be conducted. If organisms are cultured in-house, monthly reference toxicant testing is sufficient. Reference toxicant tests must be conducted using the same test conditions as the effluent toxicity tests.

(ii) If either of the reference toxicant tests or the effluent tests do not meet all test acceptability criteria as specified in the test methods manual,

the permittee must re-sample and re-test within 14 days of receipt of the test results.

(iii) Control and dilution water must be receiving water or lab water, as appropriate, as described in the manual. If the dilution water used is different from the culture water, a second control, using culture water must also be used. Receiving water may be used as control and dilution water upon notification of EPA and IDEQ. In no case shall water that has not met test acceptability criteria be used for either dilution or control.

4. Reporting

   a) The permittee must submit the results of the toxicity testing with the discharge monitoring reports (DMRs). Toxicity tests taken from October 1 through June 30 must be reported on the August DMR. Toxicity tests taken from July 1 through September 30 must be reported on the November DMR. In addition, all WET test results must be resubmitted with the next permit application.

   b) The report of toxicity test results must include all relevant information outlined in Section 10, Report Preparation, of Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition, EPA/821-R-02-013, October 2002. In addition to toxicity test results, the permittee must report: dates of sample collection and initiation of each test; effluent flow rate at the time of sample collection; and the results of the monitoring required in Part I.B of this permit, for parameters with a required monitoring frequency of once per month or more frequently.

5. Preparation of initial investigation toxicity reduction evaluation (TRE) plan: Within 6 months of the effective date of this permit, the permittee shall submit to EPA a copy of the permittee's initial investigation TRE workplan. This plan shall describe the steps the permittee intends to follow in the event chronic toxicity is detected at levels greater than the triggers in Part I.E.6, and should include at a minimum:

   a) A description of the investigation and evaluation techniques that would be used to identify potential causes/sources of toxicity, effluent variability, treatment system efficiency;

   b) A description of the facility's method of maximizing in-house treatment efficiency, good housekeeping practices, and a list of all chemicals used in operation of the facility; and

   c) If a toxicity identification evaluation (TIE) is necessary, who will conduct it (i.e., in-house or other).

6. Accelerated Testing

   a) The chronic toxicity trigger is any test result >43 TU_C

   b) If chronic toxicity is detected above the trigger in Part I.E.6.a, above, the permittee must implement the initial investigation TRE workplan. If implementation of the initial investigation TRE workplan indicates the source of toxicity (for instance, a temporary plant upset), then only one additional test is necessary.

   c) If chronic toxicity is detected above the trigger in Part I.E.6.a in the test required under Part I.E.6.b, above, then the permittee shall conduct six more tests, bi-weekly (every two weeks), over a twelve-week period. Testing shall commence within two weeks of receipt of the sample results of the exceedance.

7. Toxicity Reduction Evaluation (TRE)

   a) If chronic toxicity is detected above the triggers in Part I.E.6.a in any of the six additional tests required under Part I.E.6.c, then, in accordance with the permittee's initial investigation TRE workplan and EPA manual EPA 833B-99-002 (*Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants*), the permittee shall initiate a TRE within fifteen (15) days of receipt of the sample results of the exceedance. The permittee will develop as expeditiously as possible a more detailed TRE workplan, which includes:

      (i) Further actions to investigate and identify the cause of toxicity;

      (ii) Actions the permittee will take to mitigate the impact of the discharge and to prevent the recurrence of toxicity; and

      (iii) A schedule for these actions.

   b) The permittee may initiate a TIE as part of the overall TRE process described in the EPA acute and chronic TIE manuals EPA/600/6-91/005F (Phase I), EPA/600/R-92/080 (Phase II), and EPA-600/R-92/081 (Phase III).

   c) If none of the six tests required under Part I.E.6.c above indicated toxicity, then the permittee may return to the normal testing frequency.

   d) If a TIE is initiated prior to completion of the accelerated testing, the accelerated testing schedule may be terminated or used as necessary in performing the TIE.

D. Surface Water Monitoring

The permittee must conduct surface water monitoring. Surface water monitoring must start within 90 days after the effective date of the permit and continue for the duration of the permit. The program must meet the following requirements:

1. The monitoring station must be established in the Clearwater River above the influence of the facility's discharge.
2. The permittee must seek approval of the surface water monitoring stations from IDEQ.
3. A failure to obtain IDEQ approval of surface water monitoring stations does not relieve the permittee of the surface water monitoring requirements of this permit.
4. To the extent practicable, surface water sample collection must occur on the same day as effluent sample collection.
5. Samples must be analyzed for the parameters listed in *Table 3. Surface Water Monitoring Requirements.*
6. For all surface water monitoring, the permittee must use sufficiently sensitive analytical methods which meet the following:
   a) The method must detect and quantify the level of the pollutant, or
   b) The permittee must use a method that can achieve MLs less than or equal to those specified in *Appendix A. Minimum Levels.* The permittee may request different MLs. The request must be in writing and must be approved by EPA.

Table 3. Surface Water Monitoring Requirements

Parameter	Units	Sample Location	Sample Frequency	Sample Type
Temperature	°C	Upstream of the point of discharge and location as approved by IDEQ	1/Quarter	Grab
pH	standard units		1/Quarter	Grab
Hardness as $CaCO_3$	mg/L		1/Quarter	Grab
Alkalinity	mg/L		1/Quarter	Grab
Dissolved Oxygen	mg/L		1/Quarter	Grab
Total Ammonia as N	mg/L		1/Quarter	Grab
Nitrate + Nitrite Nitrogen	mg/L		1/Quarter	Grab
Total Kjeldahl Nitrogen	mg/L		1/Quarter	Grab
Total Phosphorus	mg/L		1/Quarter	Grab
Orthophosphate	mg/L		1/Quarter	Grab
Notes: 1. For quarterly monitoring frequency, quarters are defined as: January 1 to March 31; April 1 to June 30; July 1 to September 30; and, October 1 to December 31.				

7. Quality assurance/quality control (QA/QC) plans for all the monitoring must be documented in the Quality Assurance Plan required under Part II.B.
8. Submission of SW Monitoring
   a) Surface water monitoring results must be reported on the monthly DMR.

b) In addition, the permittee must submit all surface water monitoring results for the previous calendar year for all parameters in an annual report to EPA and IDEQ by January 31st of the following year and with the application (see Part V.B of this permit, *Duty to Reapply*). The file must be in the format of one analytical result per row and include the following information: name and contact information of laboratory, sample identification number, sample location in latitude and longitude (decimal degrees format), method of location determination (i.e., GPS, survey etc.), date and time of sample collection, water quality parameter (or characteristic being measured), analysis result, result units, detection limit and definition (i.e., MDL etc.), analytical method, date completed, and any applicable notes.

II. Special Conditions

A. Operation and Maintenance Plan

In addition to the requirements specified in Part IV.E, *Proper Operation and Maintenance*, by 180 days of the effective date of this permit, the permittee must submit written notice to EPA and IDEQ that an operations and maintenance plan for the current wastewater treatment facility has been developed and implemented. The plan must be retained on site and made available to EPA and/or IDEQ upon request. Any changes occurring in the operation of the plant must be reflected within the Operation and Maintenance plan.

B. Quality Assurance Plan (QAP)

The permittee must develop a quality assurance plan (QAP) for all monitoring required by this permit. Within 180 days of the effective date of this permit, the permittee must submit written notice to EPA and IDEQ that the Plan has been developed and implemented. Any existing QAPs may be modified for compliance with this section.

1. The QAP must be designed to assist in planning for the collection and analysis of effluent and receiving water samples in support of the permit and in explaining data anomalies when they occur.

2. Throughout all sample collection and analysis activities, the permittee must use the EPA-approved QA/QC and chain-of-custody procedures described in *EPA Requirements for Quality Assurance Project Plans* (EPA/QA/R-5) and *Guidance for Quality Assurance Project Plans* (EPA/QA/G-5). The QAP must be prepared in the format that is specified in these documents.

3. At a minimum, the QAP must include the following:

   a) Details on the number of samples, type of sample containers, preservation of samples, holding times, analytical methods, analytical detection and quantitation limits for each target compound, type and number of quality

assurance field samples, precision and accuracy requirements, sample preparation requirements, sample shipping methods, and laboratory data delivery requirements.

b) Map(s) indicating the location of each sampling point.

c) Qualification and training of personnel.

d) Name(s), address(es) and telephone number(s) of the laboratories used by or proposed to be used by the permittee.

4. The permittee must amend the QAP whenever there is a modification in sample collection, sample analysis, or other procedure addressed by the QAP.

5. Copies of the QAP must be retained on site and made available to EPA and/or IDEQ upon request.

C. Pretreatment Requirements

1. Implementation. The permittee must implement its pretreatment program in accordance with the legal authorities, policies, procedures, staffing levels and financial provisions described in its original approved pretreatment program submission *Industrial Pretreatment Study, Volume V of Wastewater Management Program for the City of Lewiston (May, 1981)*, which was approved by EPA Region 10 on July 1, 1982, any program amendments submitted thereafter and approved by EPA, and the general pretreatment regulations (40 CFR 403) and any amendments thereof. At a minimum, the permittee must carry out the following activities:

a) Enforce prohibitive discharge standards as set forth in 40 CFR 403.5(a) and (b), categorical pretreatment standards promulgated pursuant to Section 307(b) and (c) of the Act (where applicable), and local limitations and Best Management Practices developed by the permittee in accordance with 40 CFR 403.5(c), whichever are more stringent and are applicable to non-domestic users discharging wastewater into the permittee's collection system. Locally derived limitations must be defined as pretreatment standards under Section 307(d) of the Act.

b) Implement and enforce the requirements of the most recent and EPA-approved portions of local law and regulations (e.g. municipal code, sewer use ordinance) addressing the regulation of non-domestic users.

c) Update its inventory of non-domestic users at a frequency and diligence adequate to ensure proper identification of non-domestic users subject to pretreatment standards, but no less than once per year. The permittee must notify these users of applicable pretreatment standards in accordance with 40 CFR 403.8(f)(2)(iii).

d) Issue, reissue, and modify, in a timely manner, industrial wastewater discharge permits to at least all Significant Industrial Users (SIUs) and categorical industrial users (CIUs). These documents must contain, at a minimum, conditions identified in 40 CFR 403.8(f)(1)(iii), including Best Management Practices, if applicable. The permittee must follow the methods described in its implementation procedures for issuance of individual permits.

e) Develop and maintain a data management system designed to track the status of the permittee's non-domestic user inventory, non-domestic user discharge characteristics, and their compliance with applicable pretreatment standards and requirements. The permittee must retain all records relating to its pretreatment program activities for a minimum of three years, as required by 40 CFR 403.12(o), and must make such records available to EPA upon request. The permittee must also provide public access to information considered effluent data under 40 CFR Part 2.

f) Establish, where necessary, legally binding agreements with contributing jurisdictions to ensure compliance with applicable pretreatment requirements in 40 CFR Part 403 by industrial users within these jurisdictions. These legally binding agreements must identify the agency responsible for the various pretreatment implementation and enforcement activities in the contributing jurisdiction and outline the specific roles, responsibilities and pretreatment activities of each jurisdiction.

g) Carry out inspections, surveillance, and monitoring of non-domestic users to determine compliance with applicable pretreatment standards and requirements. A complete inspection of all SIUs and sampling of all SIUs' effluent must be conducted at least annually.

h) Require SIUs to conduct wastewater sampling as specified in 40 CFR 403.12(e) or (h). Frequency of wastewater sampling by the SIUs must be appropriate for the character and volume of the wastewater but no less than twice per year. Sample collection and analysis must be performed in accordance with 40 CFR 403.12(b)(5)(ii) through (v) and 40 CFR 136. In cases where the Pretreatment Standard requires compliance with a Best Management Practice or pollution prevention alternative, the permittee must require the User to submit documentation to determine compliance with the Standard. If the permittee elects to conduct all non-domestic user monitoring for any SIU instead of requiring self-monitoring, the permittee must conduct sampling in accordance with the requirements of this paragraph, and the requirements of 40 CFR 403.12(g)(2).

i) Enforce and obtain remedies for any industrial user noncompliance with applicable pretreatment standards and requirements. This must include timely and appropriate reviews of industrial reports to identify all violations of the user's permit, the local ordinance, and federal pretreatment standards and

requirements. Once violations have been uncovered, the permittee must take timely and appropriate action to address the noncompliance. The permittee's enforcement actions must follow its EPA-approved enforcement response procedures.

j) Publish, at least annually, in a newspaper or newspapers of general circulation that provides meaningful public notice within the jurisdiction(s) served by the POTW, a list of all non-domestic users which, at any time in the previous 12 months, were in significant noncompliance as defined in 40 CFR 403.8 (f)(2)(viii).

k) Maintain adequate staff, funds and equipment to implement its pretreatment program.

l) Conduct an analysis annually to determine whether influent pollutant loadings are approaching the maximum allowable headworks loadings calculated in the permittee's most recent local limits calculations. Any local limits found to be inadequate by this analysis must be revised. The permittee may be required to revise existing local limits or develop new limits if deemed necessary by EPA.

2. Spill Prevention and Slug Discharges. The permittee must implement an accidental spill prevention program to reduce and prevent spills and slug discharges of pollutants from non-domestic users.

   a) Control mechanisms for SIUs must contain requirements to control slug discharges if determined by the POTW to be necessary [40 CFR 403.8(f)(1)(iii)(B)(6)].

   b) SIUs must be evaluated for the need for a plan or other action to control slug discharges within 1 year of being designated an SIU. For IUs designated as significant prior to November 14, 2005, this evaluation must be conducted by October 14, 2006 [40 CFR 403.8(f)(2)(vi)].

   c) SIUs must notify the POTW immediately of any changes at their facilities affecting the potential for a slug discharge [40 CFR 403.8(f)(2(vi)].

3. Enforcement Requirement. Whenever EPA finds, on the basis of any available information, that the owner or operator of any source is introducing a pollutant into the POTW in violation of national pretreatment standards, including prohibited discharges, local limits, or categorical standards, or has caused interference or pass through, EPA may notify the owner or operator of the POTW of such violation. If, within 30 days after such notification has been sent by EPA to the POTW, the POTW fails to commence appropriate enforcement action to correct the violation, EPA may take appropriate enforcement action under the authority provided in section 309(f) of the Act.

4. Modification of the Pretreatment Program. If the permittee elects to modify any components of its pretreatment program, it must comply with the requirements of

40 CFR 403.18. No substantial program modification, as defined in 40 CFR 403.18(b), may be implemented prior to receiving written authorization from EPA.

5. Local Limits Evaluation. Within twenty-four months of the effective date of this permit, the permittee must submit to EPA a complete local limits evaluation pursuant to 40 CFR 403.5(c)(1). The study must take into account water quality in the receiving stream, inhibition levels for biological processes in the treatment plant, and sludge quality goals. The study must address at least the following pollutants: arsenic, 5-day biochemical oxygen demand, cadmium, chromium, copper, cyanide, lead, mercury, molybdenum, nickel, selenium, silver, total suspended solids, and zinc and any other pollutants of concern. The permittee must address total ammonia as N if the POTW accepts indirect discharges of ammonia. Submitted results of the study must include proposed local limits, maximum allowable headworks loadings, all supporting calculations, and all assumptions.

6. Control of Undesirable Pollutants. The permittee must not allow introduction of the following pollutants into the POTW:

   a) Pollutants which will create a fire or explosion hazard in the POTW, including, but not limited to, wastestreams with a closed cup flashpoint of less than 140 ºF or 60 ºC using the test methods specified in 40 CFR 261.21;

   b) Pollutants which will cause corrosive structural damage to the POTW, but in no case, indirect discharges with a pH lower than 5.0, unless the treatment facilities are designed to accommodate such indirect discharges;

   c) Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW (including the collection system) resulting in interference;

   d) Any pollutant, including oxygen demanding pollutants (*e.g.* BOD), released in an indirect discharge at a flow rate and/or pollutant concentration which will cause interference with the POTW;

   e) Heat in amounts which inhibit biological activity in the POTW resulting in interference, but in no case heat in such quantities that the temperature at the POTW treatment plant exceeds 40 ºC (104 ºF) unless the Regional Administrator, upon request of the POTW, approves alternate temperature limits;

   f) Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;

   g) Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems; and

h) Any trucked or hauled pollutants, except at discharge points designated by the POTW.

7. Requirements for Industrial users. The permittee must require any industrial user of its treatment works to comply with any applicable requirements in 40 CFR 403 through 471.

8. Sampling Requirements

a) Parameters: The permittee must sample influent and effluent from the POTW for arsenic, cadmium, chromium, copper, cyanide, lead, mercury, molybdenum, nickel, selenium, silver, and zinc. Metals must be analyzed and reported as total metals. If the POTW accepts ammonia from industrial sources, the permittee must also sample the POTW influent and effluent for ammonia. The permittee must sample sludge for arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, percent solids, selenium and zinc.

b) Frequency: Sampling must be conducted twice per year: once between January and June, and once between July and December, the two sampling events must be approximately 6 months apart.

c) Sampling Locations and Sample Type: The permittee must sample as described in Table 4. To the extent that the timing of effluent sampling coincides with sampling required for whole effluent toxicity testing under paragraph I.C, these results will satisfy the requirements of that paragraph.

Table 4. Pretreatment Monitoring - Sample Types and Frequency

Wastestream	Sample Type	Frequency
Influent	24-hour composite[1]	3 days within a week (Mon – Fri)
Effluent	24-hour composite[1]	3 days within a week (Mon – Fri)
Sludge	Grab	Once, during the same time period that influent and effluent samples are being taken.

Notes:
1. Influent and effluent samples for cyanide must be collected and analyzed as required in paragraph 8.(h) of this Part.

d) Analytical Methods: For influent and effluent pretreatment sampling of Arsenic, Cadmium, Chromium, Copper, Cyanide, Lead, Mercury, Nickle, Silver and Zinc, the permittee must use EPA-approved analytical methods that achieve the minimum level (ML) in Appendix A.

e) Sludge Sampling: Sludge samples must be taken as the sludge leaves the dewatering device or digesters.

f) Sludge Reporting: Metals concentrations in sludge must be reported in mg/kg, dry weight.

g) Reporting Results: Analytical results for each day's samples must be reported separately. Sample results must be submitted with the pretreatment annual report required in paragraph 9, below.

h) Cyanide sampling: Influent and effluent sampling for cyanide must be conducted as follows. Eight discrete grab samples must be collected over a 24-hour day. Each grab sample must be at least 100 ml. Each sample must be checked for the presence of chlorine and/or sulfides prior to preserving and compositing (refer to Standard Methods, 4500-CN B). If chlorine and/or sulfides are detected, the sample must be treated to remove any trace of these parameters. After testing and treating for the interference compounds, the pH of each sample must be adjusted, using sodium hydroxide, to 12.0 standard units. Each sample can then be composited into a larger container which has been chilled to 4 degrees Celsius, to allow for one analysis for the day.

i) Toxic organics sampling: The permittee must perform chemical analyses of its influent, effluent, and sludge for all specific toxic organic pollutants listed in Table II of Appendix D of 40 CFR 122.

   (i) Sample Type: The influent and effluent samples must be 24-hour composites, except when sampling volatiles.

   (ii) Volatile Organics Sampling: eight discrete samples must be collected over the 24 hour day using 40 ml VOC vials with teflon septa. During sampling, the flow from the discharge will be controlled to produce smooth laminar flow to prevent agitation and aeration of the sample. The VOC vials will be filled to the top such that there is a meniscus present. There must be no visible air space or air bubbles in the VOC vials when capped. A single analysis for volatile pollutants may be run for each monitoring day by compositing equal volumes of the individual discrete VOC vials (at the analytical laboratory using extreme care not to introduce air/air bubbles) directly into the GC purge and trap apparatus, with no less than 1 ml of each grab included in the composite. The composite sample must be analyzed immediately.

   (iii) GC/MS Analysis: In addition to analyzing for pollutants specified in the previous paragraph, the permittee must make a reasonable attempt using GC/MS analytical techniques to identify and quantify the ten most abundant constituents of each effluent extract (excluding toxic organic pollutants and unsubstituted aliphatic compounds) shown to be present by peaks on the total ion plots (reconstructed gas chromatograms). Identification must be attempted through the use of the USEPA/NIH computerized library of mass spectra, with visual

confirmation by an experienced analyst. Quantification may be an order-of-magnitude estimate based upon comparison with an internal standard.

(iv) Sample Handling: All samples must be prepared, preserved, shipped, and analyzed in accordance with Appendix A.

9. Annual Pretreatment Report

a) The permittee must submit an annual report pursuant to 40 CFR 403.12(i) that describes the permittee's program activities over the previous 12-month. This report must be submitted to the following address no later than January 31st of each year:

Pretreatment Coordinator
U.S. Environmental Protection Agency
Region 10, OWW-191
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

b) The pretreatment report must be compiled following the Region 10 Annual Report Guidance. At a minimum, the report must include:

(i) An updated non-domestic user inventory, including those facilities that are no longer discharging (with explanation), and new dischargers, appropriately categorized and characterized. Categorical industrial users should have the applicable category noted as well as cases where more stringent local limits apply instead of the categorical standard.

(ii) Results of wastewater and sludge sampling at the POTW as specified in Part II.A.8 (above).

(iii) Calculations of removal rates for each pollutant for each day of sampling.

(iv) An analysis and discussion of whether the existing local limitations in the permittee's sewer use ordinance continue to be appropriate to prevent treatment plant interference and pass through of pollutants that could affect water quality or sludge quality. This should include a comparison between influent loadings and the most recent relevant maximum allowable headworks loadings calculated for the treatment plant.

(v) Status of program implementation, including:

(a) Any planned modifications to the pretreatment program that have been approved by EPA, including staffing and funding updates.

(b) A description of any interference, pass through, upset, or NPDES permit violations experienced at the POTW which were directly or indirectly attributable to non-domestic users, including:

(i) Date & time of the incident

(ii) Description of the effect on the POTW's operation

(iii) Effects on the POTW's effluent and biosolids quality

(iv) Identification of suspected or known sources of the discharge causing the upset

(v) Steps taken to remedy the situation and to prevent recurrence

(c) Listing of non-domestic users inspected and/or monitored during the report year with dates and an indication compliance status.

(d) Listing of non-domestic users planned for inspection and/or monitoring for the coming year along with associated frequencies.

(e) Listing of non-domestic users whose permits have been issued, reissued, or modified during the report year along with current permit expiration dates.

(f) Listing of non-domestic users notified of promulgated pretreatment standards and/or local standards during the report year as required in 40 CFR 403.8(f)(2)(iii).

(g) Listing of non-domestic users notified of promulgated pretreatment standards or applicable local standards who are on compliance schedules. The listing must include the final date of compliance for each facility.

(vi) Status of enforcement activities including:

(a) Listing of non-domestic users who failed to comply with applicable pretreatment standards and requirements, including:

(i) Summary of the violation(s).

(ii) Enforcement action taken or planned by the permittee.

(iii) Present compliance status as of the date of preparation of the pretreatment report.

(b) Listing of those users in significant noncompliance during the report year as defined in 40 CFR 403.8(f)(2)(viii) and a copy of the newspaper publication of those users' names.

(c) EPA may require more frequent reporting on those users who are determined to be in significant noncompliance.

D. Emergency Response and Public Notification Plan

1. The permittee must develop and implement an overflow emergency response and public notification plan that identifies measures to protect public health from overflows that may endanger health and unanticipated bypasses or upsets that exceed any effluent limitation in the permit. At a minimum the plan must include mechanisms to:

   a) Ensure that the permittee is aware (to the greatest extent possible) of all overflows from portions of the collection system over which the permittee has ownership or operational control and unanticipated bypass or upset that exceed any effluent limitation in the permit;

   b) Ensure appropriate responses including assurance that reports of an overflow or of an unanticipated bypass or upset that exceed any effluent limitation in the permit are immediately dispatched to appropriate personnel for investigation and response;

   c) Ensure immediate notification to the public, health agencies, and other affected public entities (including public water systems). The overflow response plan must identify the public health and other officials who will receive immediate notification;

   d) Ensure that appropriate personnel are aware of and follow the plan and are appropriately trained; and

   e) Provide emergency operations.

2. The permittee must submit written notice to EPA and IDEQ that the plan has been developed and implemented within 24 months after the effective date of this permit. Any existing emergency response and public notification plan may be modified for compliance with this section.

III. Monitoring, Recording and Reporting Requirements

A. Representative Sampling (Routine and Non-Routine Discharges)

Samples and measurements must be representative of the volume and nature of the monitored discharge.

To ensure that routine sampling does not overlook possible exceedances of permit limits and requirements, the permittee must collect additional samples at the appropriate outfall whenever any discharge occurs that may reasonably be expected

to cause or contribute to a violation that is unlikely to be detected by a routine sample.

The permittee must analyze the additional samples for those parameters limited in Part I.B of this permit that are likely to be affected by the discharge.

The permittee must collect such additional samples as soon as the spill, discharge, or bypassed effluent reaches the outfall. The samples must be analyzed in accordance with Part III.C of this permit, *Monitoring Procedures*. The permittee must report all additional monitoring in accordance with Part III.D of this permit, *Additional Monitoring by Permittee*.

B. Reporting of Monitoring Results

During the period between the effective date of the permit and the submission of the October 2016 DMR, the permittee must either submit monitoring data and other reports in paper form, or must report electronically using NetDMR, a web-based tool that allows permittees to electronically submit DMRs and other required reports via a secure internet connection.

Beginning with the submission of the November 2016 DMR (due December 20, 2016) and thereafter, the permittee must submit monitoring data and other reports electronically using NetDMR.

Specific requirements regarding submittal of data and reports in paper form and submittal using NetDMR are described below.

1. Paper Copy Submissions. Monitoring data must be submitted using the DMR form (EPA No. 3320-1) or equivalent and must be postmarked by the 20th day of the month following the completed reporting period. The permittee must sign and certify all DMRs, and all other reports, in accordance with the requirements of Part V.E, of this permit *Signatory Requirements.* The permittee must submit the legible originals of these documents to the Director, Office of Compliance and Enforcement, with copies to IDEQ at the following addresses:

   US EPA Region 10
   Attn: ICIS Data Entry Team
   1200 Sixth Avenue, Suite 900
   OCE-101
   Seattle, Washington 98101-3140

   Idaho Department of Environmental Quality
   Lewiston Regional Office
   1118 “F” Street
   Lewiston, Idaho 83501

2. Electronic Copy Submissions

a) Monitoring data must be submitted electronically to EPA no later than the 20th of the month following the completed reporting period. All reports required under this permit must be submitted to EPA as a legible electronic attachment to the DMR. The permittee must sign and certify all DMRs, and all other reports, in accordance with the requirements of Part V.E, of this permit *Signatory Requirements*. Once a permittee begins submitting reports using NetDMR, it will no longer be required to submit paper copies of DMRs or other reports to EPA and IDEQ.

b) The permittee may use NetDMR after requesting and receiving permission from US EPA Region 10. NetDMR is accessed from https://netdmr.epa.gov/netdmr/public/home.htm .

C. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR 136, unless another method is required under 40 CFR subchapters N or O, or other test procedures have been specified in this permit or approved by EPA as an alternate test procedure under 40 CFR 136.5.

D. Additional Monitoring by Permittee

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136 or as specified in this permit, the permittee must include the results of this monitoring in the calculation and reporting of the data submitted in the DMR.

Upon request by EPA, the permittee must submit results of any other sampling, regardless of the test method used.

E. Records Contents

Records of monitoring information must include:

1. the date, exact place, and time of sampling or measurements;
2. the name(s) of the individual(s) who performed the sampling or measurements;
3. the date(s) analyses were performed;
4. the names of the individual(s) who performed the analyses;
5. the analytical techniques or methods used; and
6. the results of such analyses.

F. Retention of Records

The permittee must retain records of all monitoring information, including, all calibration and maintenance records and all original strip chart recordings for

continuous monitoring instrumentation, copies of all reports required by this permit, copies of DMRs, a copy of the NPDES permit, and records of all data used to complete the application for this permit, for a period of at least five years from the date of the sample, measurement, report or application. This period may be extended by request of EPA or IDEQ at any time.

G. Twenty-four Hour Notice of Noncompliance Reporting

1. The permittee must report the following occurrences of noncompliance by telephone within 24 hours from the time the permittee becomes aware of the circumstances:

   a) any noncompliance that may endanger health or the environment;

   b) any unanticipated bypass that exceeds any effluent limitation in the permit (See Part IV.F of this permit, *Bypass of Treatment Facilities*);

   c) any upset that exceeds any effluent limitation in the permit (See Part IV.G of this permit, *Upset Conditions*); or

   d) any violation of a maximum daily discharge limitation for applicable pollutants identified by footnote 4 of Table 1 of Part I.B.

   e) any overflow prior to the treatment works over which the permittee has ownership or has operational control. An overflow is any spill, release or diversion of municipal sewage including:

      (i) an overflow that results in a discharge to waters of the United States; and

      (ii) an overflow of wastewater, including a wastewater backup into a building (other than a backup caused solely by a blockage or other malfunction in a privately owned sewer or building lateral) that does not reach waters of the United States.

2. The permittee must also provide a written submission within five days of the time that the permittee becomes aware of any event required to be reported under Paragraph 1 above. The written submission must contain:

   a) a description of the noncompliance and its cause;

   b) the period of noncompliance, including exact dates and times;

   c) the estimated time noncompliance is expected to continue if it has not been corrected; and

   d) steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

   e) if the noncompliance involves an overflow, the written submission must contain:

(i) The location of the overflow;

(ii) The receiving water (if there is one);

(iii) An estimate of the volume of the overflow;

(iv) A description of the sewer system component from which the release occurred (e.g., manhole, constructed overflow pipe, crack in pipe);

(v) The estimated date and time when the overflow began and stopped or will be stopped;

(vi) The cause or suspected cause of the overflow;

(vii) Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the overflow and a schedule of major milestones for those steps;

(viii) An estimate of the number of persons who came into contact with wastewater from the overflow; and

(ix) Steps taken or planned to mitigate the impact(s) of the overflow and a schedule of major milestones for those steps.

3. The Director of the Office of Compliance and Enforcement may waive the written report on a case-by-case basis if the oral report has been received within 24 hours by the NPDES Compliance Hotline in Seattle, Washington, by telephone, (206) 553-1846.

4. Reports must be submitted in paper form. The permittee must sign and certify the report in accordance with the requirements of Part V.E, of this permit *Signatory Requirements.* The permittee must submit the legible originals of these documents to the Director, Office of Compliance and Enforcement, with copies to IDEQ at the following addresses:

US EPA Region 10
Attn: ICIS Data Entry Team
1200 Sixth Avenue, Suite 900
OCE-101
Seattle, Washington 98101-3140

Idaho Department of Environmental Quality
Lewiston Regional Office
1118 “F” Street
Lewiston, Idaho 83501

H. Other Noncompliance Reporting

The permittee must report all instances of noncompliance, not required to be reported within 24 hours, at the time that monitoring reports for Part III.B of this permit,

Reporting of Monitoring Results are submitted. The reports must contain the information listed in Paragraph G.2 of this permit.

I. Public Notification

The permittee must immediately notify the public, health agencies and other affected entities (e.g., public water systems) of any overflow which the permittee owns or has operational control; or any unanticipated bypass or upset that exceeds any effluent limitation in the permit in accordance with the notification procedures developed in accordance with Part II.D of this permit.

J. Notice of New Introduction of Toxic Pollutants

The permittee must notify the Director of the Office of Water and Watersheds and IDEQ in writing of:

1. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to Sections 301 or 306 of the Act if it were directly discharging those pollutants; and
2. Any substantial change in the volume or character of pollutants being introduced into the POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
3. For the purposes of this section, adequate notice must include information on:
   a) The quality and quantity of effluent to be introduced into the POTW, and
   b) Any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.
4. The permittee must notify the Director of the Office of Water and Watersheds at the following address:

   US EPA Region 10
   Attn: NPDES Permits Unit Manager
   1200 6th Avenue
   Suite 900 OWW-191
   Seattle, WA 98101-3140

K. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date.

IV. Compliance Responsibilities

A. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification, or for denial of a permit renewal application.

B. Penalties for Violations of Permit Conditions

1. Civil and Administrative Penalties. Pursuant to 40 CFR Part 19 and the Act, any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed the maximum amounts authorized by Section 309(d) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 USC § 2461 note) as amended by the Debt Collection Improvement Act (31 USC § 3701 note) (currently $37,500 per day for each violation).

2. Administrative Penalties. Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Pursuant to 40 CFR Part 19 and the Act, administrative penalties for Class I violations are not to exceed the maximum amounts authorized by Section 309(g)(2)(A) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 USC § 2461 note) as amended by the Debt Collection Improvement Act (31 USC § 3701 note) (currently $16,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $37,500). Pursuant to 40 CFR Part 19 and the Act, penalties for Class II violations are not to exceed the maximum amounts authorized by Section 309(g)(2)(B) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 USC § 2461 note) as amended by the Debt Collection Improvement Act (31 USC § 3701 note) (currently $16,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $177,500).

3. Criminal Penalties:

   a) Negligent Violations. The Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or

subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both.

b) Knowing Violations. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both.

c) Knowing Endangerment. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the Act, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

d) False Statements. The Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both. The Act further provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

C. Need To Halt or Reduce Activity not a Defense

It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with this permit.

D. Duty to Mitigate

The permittee must take all reasonable steps to minimize or prevent any discharge in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance

The permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by the permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

F. Bypass of Treatment Facilities

1. Bypass not exceeding limitations. The permittee may allow any bypass to occur that does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Paragraphs 2 and 3 of this Part.

2. Notice.

   a) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it must submit prior written notice, if possible at least 10 days before the date of the bypass.

   b) Unanticipated bypass. The permittee must submit notice of an unanticipated bypass as required under Part III.G of this permit, *Twenty-four Hour Notice of Noncompliance Reporting*.

3. Prohibition of bypass.

   a) Bypass is prohibited, and the Director of the Office of Compliance and Enforcement may take enforcement action against the permittee for a bypass, unless:

      (i) The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

      (ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance; and

(iii) The permittee submitted notices as required under Paragraph 2 of this Part.

b) The Director of the Office of Compliance and Enforcement may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in Paragraph 3.a. of this Part.

G. Upset Conditions

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the permittee meets the requirements of Paragraph 2 of this Part. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.
2. Conditions necessary for a demonstration of upset. To establish the affirmative defense of upset, the permittee must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
   a) An upset occurred and that the permittee can identify the cause(s) of the upset;
   b) The permitted facility was at the time being properly operated;
   c) The permittee submitted notice of the upset as required under Part III.G of this permit, *Twenty-four Hour Notice of Noncompliance Reporting* and
   d) The permittee complied with any remedial measures required under Part IV.D of this permit, *Duty to Mitigate*.
3. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

H. Toxic Pollutants

The permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

I. Planned Changes

The permittee must give written notice to the Director of the Office of Water and Watersheds as specified in Paragraph III.J.4 of this permit, and IDEQ as soon as possible of any planned physical alterations or additions to the permitted facility whenever:

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source as determined in 40 CFR 122.29(b); or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this permit.

3. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application site.

J. Anticipated Noncompliance

The permittee must give written advance notice to the Director of the Office of Compliance and Enforcement and IDEQ of any planned changes in the permitted facility or activity that may result in noncompliance with this permit.

K. Reopener

This permit may be reopened to include any applicable standard for sewage sludge use or disposal promulgated under section 405(d) of the Act. The Director may modify or revoke and reissue the permit if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or controls a pollutant or practice not limited in the permit.

V. General Provisions

A. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause as specified in 40 CFR 122.62, 122.64, or 124.5. The filing of a request by the permittee for a permit modification, revocation and reissuance, termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

B. Duty to Reapply

If the permittee intends to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. In accordance with 40 CFR 122.21(d), and unless permission for the application to be submitted at a later date has been granted by the Regional Administrator, the permittee must submit a new application at least 180 days before the expiration date of this permit.

C. Duty to Provide Information

The permittee must furnish to EPA and IDEQ, within the time specified in the request, any information that EPA or IDEQ may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to

determine compliance with this permit. The permittee must also furnish to EPA or IDEQ, upon request, copies of records required to be kept by this permit.

D. Other Information

When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or that it submitted incorrect information in a permit application or any report to EPA or IDEQ, it must promptly submit the omitted facts or corrected information in writing.

E. Signatory Requirements

All applications, reports or information submitted to EPA and IDEQ must be signed and certified as follows.

1. All permit applications must be signed as follows:
   a) For a corporation: by a responsible corporate officer.
   b) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively.
   c) For a municipality, state, federal, Indian tribe, or other public agency: by either a principal executive officer or ranking elected official.
2. All reports required by the permit and other information requested by EPA or IDEQ must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
   a) The authorization is made in writing by a person described above;
   b) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company; and
   c) The written authorization is submitted to the Director of the Office of Compliance and Enforcement and IDEQ.
3. Changes to authorization. If an authorization under Paragraph 2 of this Part is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Paragraph 2 of this Part must be submitted to the Director of the Office of Compliance and Enforcement and IDEQ prior to or together with any reports, information, or applications to be signed by an authorized representative.
4. Certification. Any person signing a document under this Part must make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

F. Availability of Reports

In accordance with 40 CFR Part 2, information submitted to EPA pursuant to this permit may be claimed as confidential by the permittee. In accordance with the Act, permit applications, permits and effluent data are not considered confidential. Any confidentiality claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice to the permittee. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR Part 2, Subpart B (Public Information) and 41 Fed. Reg. 36902 through 36924 (September 1, 1976), as amended.

G. Inspection and Entry

The permittee must allow the Director of the Office of Compliance and Enforcement, EPA Region 10; IDEQ; or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
4. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the Act, any substances or parameters at any location.

H. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to persons or property or invasion of other private rights, nor any infringement of federal, tribal, state or local laws or regulations.

I. Transfers

This permit is not transferable to any person except after written notice to the Director of the Office of Water and Watersheds as specified in Part III.J.4. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Act. (*See* 40 CFR 122.61; in some cases, modification or revocation and reissuance is mandatory).

J. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 510 of the Act.

VI. Definitions

1. "Act" means the Clean Water Act.
2. "Acute Toxic Unit" ("TUa") is a measure of acute toxicity. TUa is the reciprocal of the effluent concentration that causes 50 percent of the organisms to die by the end on the acute exposure period (i.e., 100/"LC50").
3. "Administrator" means the Administrator of the EPA, or an authorized representative.
4. "Average monthly discharge limitation" means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.
5. "Average weekly discharge limitation" means the highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.
6. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.
7. "Chronic toxic unit" ("TUc") is a measure of chronic toxicity. TUc is the reciprocal of the effluent concentration that causes no observable effect on the test organisms by the end of the chronic exposure period (i.e., 100/"NOEC").

8. "Composite" - see "24-hour composite".
9. "Daily discharge" means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day.
10. "Director of the Office of Compliance and Enforcement" means the Director of the Office of Compliance and Enforcement, EPA Region 10, or an authorized representative.
11. "Director of the Office of Water and Watersheds" means the Director of the Office of Water and Watersheds, EPA Region 10, or an authorized representative.
12. "DMR" means discharge monitoring report.
13. "EPA" means the United States Environmental Protection Agency.
14. "Geometric Mean" means the n^{th} root of a product of n factors, or the antilogarithm of the arithmetic mean of the logarithms of the individual sample values.
15. "Grab" sample is an individual sample collected over a period of time not exceeding 15 minutes.
16. "IDEQ" means the Idaho Department of Environmental Quality.
17. "Inhibition concentration", IC, is a point estimate of the toxicant concentration that causes a given percent reduction (p) in a non-quantal biological measurement (e.g., reproduction or growth) calculated from a continuous model (e.g., Interpolation Method).
18. "Indirect Discharge" means the introduction of pollutants into a POTW from any non-domestic source regulated under section 307(b), (c) or (d) of the Act.
19. "Interference" means a Discharge which, alone or in conjunction with a discharge or discharges from other sources, both: 1) Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and 2) Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to

subtitle D of the SWDA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

20. "Interim Minimum Level (IML)" is used when a method-specific "Minimum Level (ML)" has not been published by EPA. The IML is equal to 3.18 times the method-specified "Method Detection Limit (MDL)". The IML for non-metals is rounded to the nearest multiple of 2, 5, 10, 20, 50.
21. "LC50" means the concentration of toxicant (e.g., effluent) which is lethal to 50 percent of the test organisms exposed in the time period prescribed by the test.
22. "Maximum daily discharge limitation" means the highest allowable "daily discharge."
23. "Method Detection Limit (MDL)" means the minimum concentration of a substance (analyte) that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.
24. "Minimum Level (ML)" means the concentration at which the entire analytical system must give a recognizable signal and an acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method-specified sample weights, volumes and processing steps have been followed.
25. "NOEC" means no observed effect concentration. The NOEC is the highest concentration of toxicant (e.g., effluent) to which organisms are exposed in a chronic toxicity test [full life-cycle or partial life-cycle (short term) test], that causes no observable adverse effects on the test organisms (i.e., the highest concentration of effluent in which the values for the observed responses are not statistically significantly different from the controls).
26. "NPDES" means National Pollutant Discharge Elimination System, the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits . . . under sections 307, 402, 318, and 405 of the Act.
27. "Pass Through" means a Discharge which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).
28. Receiving Water Concentration (RWC) is the concentration of a toxicant or effluent in the receiving water after mixing. The RWC is the inverse of the dilution factor. It is sometimes referred to as the instream waste concentration (IWC).
29. "QA/QC" means quality assurance/quality control.

30. “Regional Administrator” means the Regional Administrator of Region 10 of the EPA, or the authorized representative of the Regional Administrator.

31. “Severe property damage” means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

32. “Upset” means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

33. “24-hour composite” sample means a combination of at least 8 discrete sample aliquots of at least 100 milliliters, collected over periodic intervals from the same location, during the operating hours of a facility over a 24 hour period. The composite must be flow proportional. The sample aliquots must be collected and stored in accordance with procedures prescribed in the most recent edition of Standard Methods for the Examination of Water and Wastewater.

Appendix A. Minimum Levels

Minimum Levels

The Table below lists the maximum Minimum Level (ML) for pollutants that may have monitoring requirements in the permit. The permittee may request different MLs. The request must be in writing and must be approved by EPA.

CONVENTIONAL PARAMETERS

Pollutant & CAS No. (if available)	Minimum Level (ML) µg/L unless specified
Biochemical Oxygen Demand	2 mg/L
Soluble Biochemical Oxygen Demand	2 mg/L
Chemical Oxygen Demand	10 mg/L
Total Organic Carbon	1 mg/L
Total Suspended Solids	5 mg/L
Total Ammonia (as N)	50
Dissolved oxygen	0.2 mg/L
Temperature (max. 7-day avg.)	0.2º C
pH	N/A

NONCONVENTIONAL PARAMETERS

Pollutant & CAS No. (if available)	Minimum Level (ML) µg/L unless specified
Total Alkalinity	5 mg/L as CaCO3
Chlorine, Total Residual	50.0
Color	10 color units
Fluoride (16984-48-8)	100
Nitrate + Nitrite Nitrogen (as N)	100
Nitrogen, Total Kjeldahl (as N)	300
Soluble Reactive Phosphorus (as P)	10
Phosphorus, Total (as P)	10
Oil and Grease (HEM) (Hexane Extractable Material)	5,000
Salinity	3 practical salinity units or scale (PSU or PSS)
Settleable Solids	500 (or 0.1 mL/L)
Sulfate (as mg/L SO4)	0.2 mg/L
Sulfide (as mg/L S)	0.2 mg/L

Pollutant & CAS No. (if available)	Minimum Level (ML) µg/L unless specified
Sulfite (as mg/L SO3)	2 mg/L
Total dissolved solids	20 mg/L
Total Hardness	200 as CaCO3
Aluminum, Total (7429-90-5)	10
Barium Total (7440-39-3)	2.0
BTEX (benzene +toluene + ethylbenzene + m,o,p xylenes)	2
Boron Total (7440-42-8)	10.0
Cobalt, Total (7440-48-4)	0.25
Iron, Total (7439-89-6)	50
Magnesium, Total (7439-95-4)	50
Molybdenum, Total (7439-98-7)	0.5
Manganese, Total (7439-96-5)	0.5
Tin, Total (7440-31-5)	1.5
Titanium, Total (7440-32-6)	2.5

PRIORITY POLLUTANTS

Pollutant & CAS No. (if available)	Minimum Level (ML) µg/L unless specified
METALS, CYANIDE & TOTAL PHENOLS	
Antimony, Total (7440-36-0)	1.0
Arsenic, Total (7440-38-2)	0.5
Beryllium, Total (7440-41-7)	0.5
Cadmium, Total (7440-43-9)	0.1
Chromium (hex) dissolved (18540-29-9)	1.2
Chromium, Total (7440-47-3)	1.0
Copper, Total (7440-50-8)	2.0
Lead, Total (7439-92-1)	0.16
Mercury, Total (7439-97-6)	0.0005
Nickel, Total (7440-02-0)	0.5
Selenium, Total (7782-49-2)	1.0
Silver, Total (7440-22-4)	0.2
Thallium, Total (7440-28-0)	0.36
Zinc, Total (7440-66-6)	2.5
Cyanide, Total (57-12-5)	10

Pollutant & CAS No. (if available)	Minimum Level (ML) µg/L unless specified
Cyanide, Weak Acid Dissociable	10
Cyanide, Free Amenable to Chlorination (Available Cyanide)	10
Phenols, Total	50
2-Chlorophenol (95-57-8)	2.0
2,4-Dichlorophenol (120-83-2)	1.0
2,4-Dimethylphenol (105-67-9)	1.0
4,6-dinitro-o-cresol (534-52-1) (2-methyl-4,6,-dinitrophenol)	2.0
2,4 dinitrophenol (51-28-5)	2.0
2-Nitrophenol (88-75-5)	1.0
4-nitrophenol (100-02-7)	1.0
Parachlorometa cresol (59-50-7) (4-chloro-3-methylphenol)	2.0
Pentachlorophenol (87-86-5)	1.0
Phenol (108-95-2)	4.0
2,4,6-Trichlorophenol (88-06-2)	4.0
VOLATILE COMPOUNDS	
Acrolein (107-02-8)	10
Acrylonitrile (107-13-1)	2.0
Benzene (71-43-2)	2.0
Bromoform (75-25-2)	2.0
Carbon tetrachloride (56-23-5)	2.0
Chlorobenzene (108-90-7)	2.0
Chloroethane (75-00-3)	2.0
2-Chloroethylvinyl Ether (110-75-8)	2.0
Chloroform (67-66-3)	2.0
Dibromochloromethane (124-48-1)	2.0
1,2-Dichlorobenzene (95-50-1)	7.6
1,3-Dichlorobenzene (541-73-1)	7.6
1,4-Dichlorobenzene (106-46-7)	17.6
Dichlorobromomethane (75-27-4)	2.0
1,1-Dichloroethane (75-34-3)	2.0

Pollutant & CAS No. (if available)	Minimum Level (ML) µg/L unless specified
1,2-Dichloroethane (107-06-2)	2.0
1,1-Dichloroethylene (75-35-4)	2.0
1,2-Dichloropropane (78-87-5)	2.0
1,3-dichloropropene (mixed isomers) (1,2-dichloropropylene) (542-75-6) 6	2.0
Ethylbenzene (100-41-4)	2.0
Methyl bromide (74-83-9) (Bromomethane)	10.0
Methyl chloride (74-87-3) (Chloromethane)	2.0
Methylene chloride (75-09-2)	10.0
1,1,2,2-Tetrachloroethane (79-34-5)	2.0
Tetrachloroethylene (127-18-4)	2.0
Toluene (108-88-3)	2.0
1,2-Trans-Dichloroethylene (156-60-5) (Ethylene dichloride)	2.0
1,1,1-Trichloroethane (71-55-6)	2.0
1,1,2-Trichloroethane (79-00-5)	2.0
Trichloroethylene (79-01-6)	2.0
Vinyl chloride (75-01-4)	2.0
BASE/NEUTRAL COMPOUNDS	
Acenaphthene (83-32-9)	0.4
Acenaphthylene (208-96-8)	0.6
Anthracene (120-12-7)	0.6
Benzidine (92-87-5)	24
Benzyl butyl phthalate (85-68-7)	0.6
Benzo(a)anthracene (56-55-3)	0.6
Benzo(b)fluoranthene (3,4-benzofluoranthene) (205-99-2) 7	1.6
Benzo(j)fluoranthene (205-82-3) 7	1.0
Benzo(k)fluoranthene (11,12-benzofluoranthene) (207-08-9) 7	1.6
Benzo(r,s,t)pentaphene (189-55-9)	1.0
Benzo(a)pyrene (50-32-8)	1.0
Benzo(ghi)Perylene (191-24-2)	1.0

Pollutant & CAS No. (if available)	Minimum Level (ML) µg/L unless specified
Bis(2-chloroethoxy)methane (111-91-1)	21.2
Bis(2-chloroethyl)ether (111-44-4)	1.0
Bis(2-chloroisopropyl)ether (39638-32-9)	0.6
Bis(2-ethylhexyl)phthalate (117-81-7)	0.5
4-Bromophenyl phenyl ether (101-55-3)	0.4
2-Chloronaphthalene (91-58-7)	0.6
4-Chlorophenyl phenyl ether (7005-72-3)	0.5
Chrysene (218-01-9)	0.6
Dibenzo (a,h)acridine (226-36-8)	10.0
Dibenzo (a,j)acridine (224-42-0)	10.0
Dibenzo(a-h)anthracene (53-70-3)(1,2,5,6-dibenzanthracene)	1.6
Dibenzo(a,e)pyrene (192-65-4)	10.0
Dibenzo(a,h)pyrene (189-64-0)	10.0
3,3-Dichlorobenzidine (91-94-1)	1.0
Diethyl phthalate (84-66-2)	7.6
Dimethyl phthalate (131-11-3)	6.4
Di-n-butyl phthalate (84-74-2)	1.0
2,4-dinitrotoluene (121-14-2)	0.4
2,6-dinitrotoluene (606-20-2)	0.4
Di-n-octyl phthalate (117-84-0)	0.6
1,2-Diphenylhydrazine (as Azobenzene) (122-66-7)	20
Fluoranthene (206-44-0)	0.6
Fluorene (86-73-7)	0.6
Hexachlorobenzene (118-74-1)	0.6
Hexachlorobutadiene (87-68-3)	1.0
Hexachlorocyclopentadiene (77-47-4)	1.0
Hexachloroethane (67-72-1)	1.0
Indeno(1,2,3-cd)Pyrene (193-39-5)	1.0
Isophorone (78-59-1)	1.0
3-Methyl cholanthrene (56-49-5)	8.0

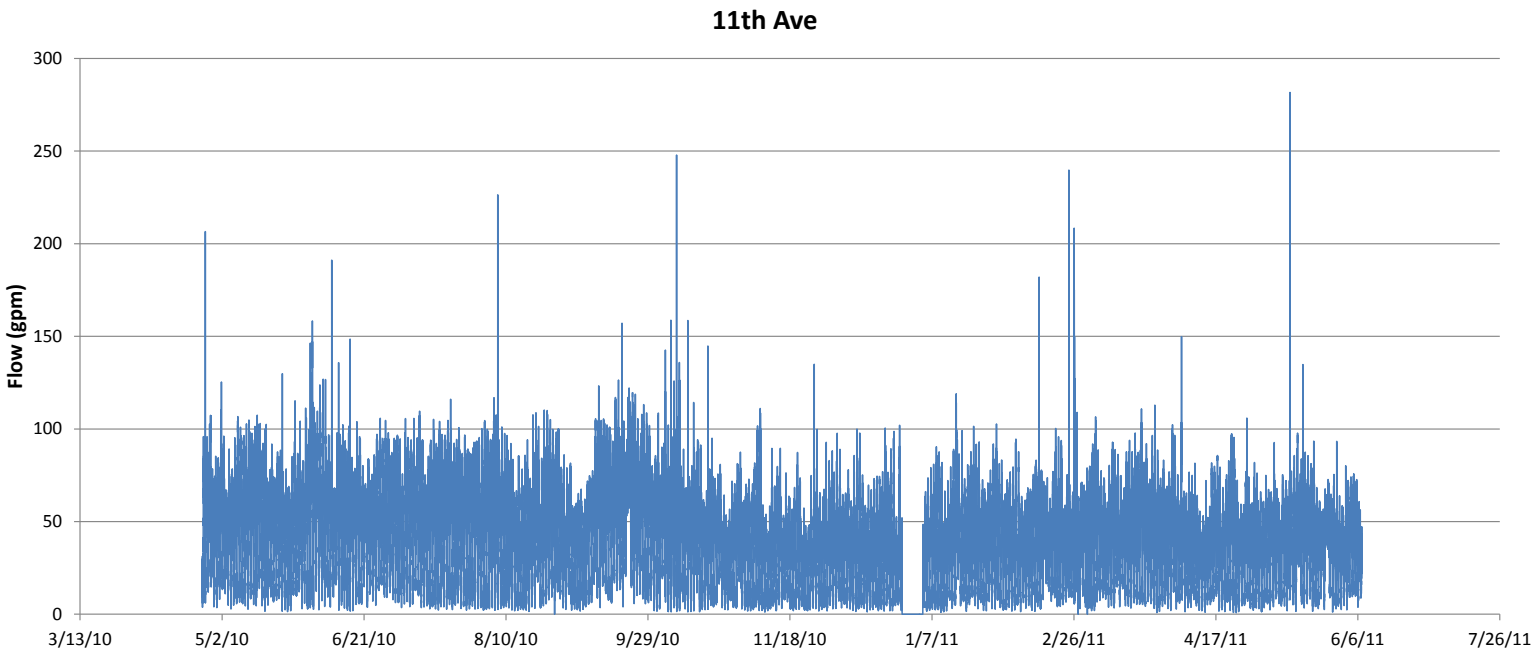
Pollutant & CAS No. (if available)	Minimum Level (ML) µg/L unless specified
Naphthalene (91-20-3)	0.6
Nitrobenzene (98-95-3)	1.0
N-Nitrosodimethylamine (62-75-9)	4.0
N-Nitrosodi-n-propylamine (621-64-7)	1.0
N-Nitrosodiphenylamine (86-30-6)	1.0
Perylene (198-55-0)	7.6
Phenanthrene (85-01-8)	0.6
Pyrene (129-00-0)	0.6
1,2,4-Trichlorobenzene (120-82-1)	0.6
DIOXIN	
2,3,7,8-Tetra-Chlorodibenzo-P-Dioxin (176-40-16) (2,3,7,8 TCDD)	5 pg/L
PESTICIDES/PCBs	
Aldrin (309-00-2)	0.05
alpha-BHC (319-84-6)	0.05
beta-BHC (319-85-7)	0.05
gamma-BHC (58-89-9)	0.05
delta-BHC (319-86-8)	0.05
Chlordane (57-74-9)	0.05
4,4'-DDT (50-29-3)	0.05
4,4'-DDE (72-55-9)	0.05
4,4' DDD (72-54-8)	0.05
Dieldrin (60-57-1)	0.05
alpha-Endosulfan (959-98-8)	0.05
beta-Endosulfan (33213-65-9)	0.05
Endosulfan Sulfate (1031-07-8)	0.05
Endrin (72-20-8)	0.05
Endrin Aldehyde (7421-93-4)	0.05
Heptachlor (76-44-8)	0.05
Heptachlor Epoxide (1024-57-3)	0.05
PCB-1242 (53469-21-9)	0.5
PCB-1254 (11097-69-1)	0.5
PCB-1221 (11104-28-2)	0.5

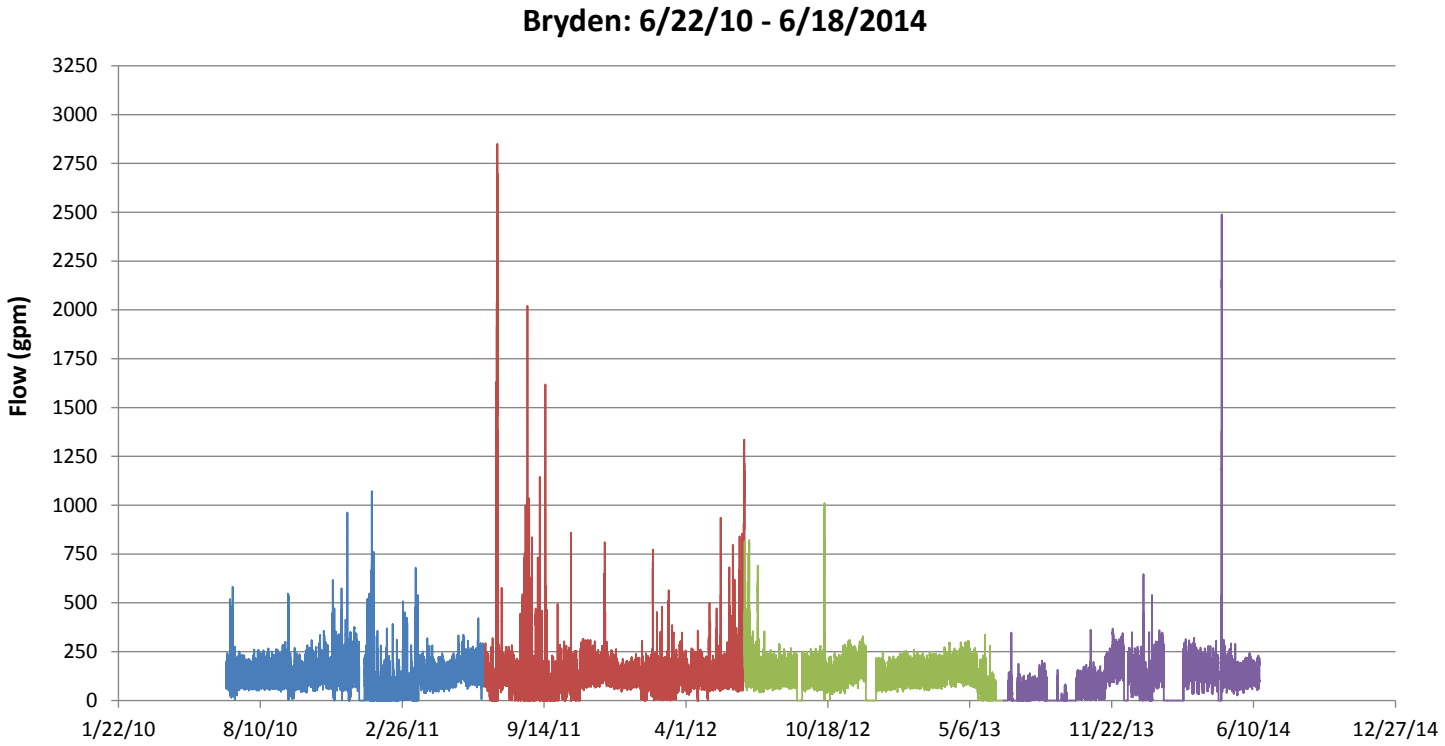
Pollutant & CAS No. (if available)	Minimum Level (ML) µg/L unless specified
PCB-1232 (11141-16-5)	0.5
PCB-1248 (12672-29-6)	0.5
PCB-1260 (11096-82-5)	0.5
PCB-1016 (12674-11-2)	0.5
Toxaphene (8001-35-2)	0.5

APPENDIX C

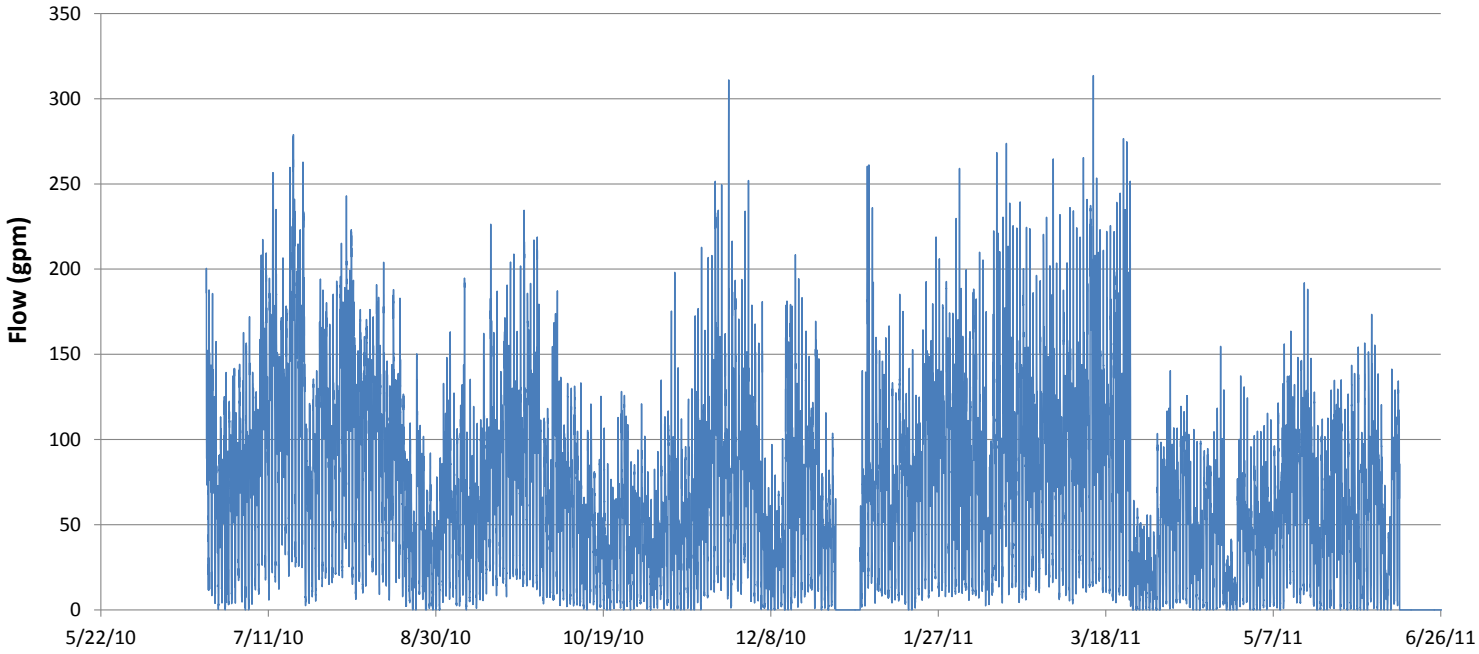
Model Data

KELLER ASSOCIATES

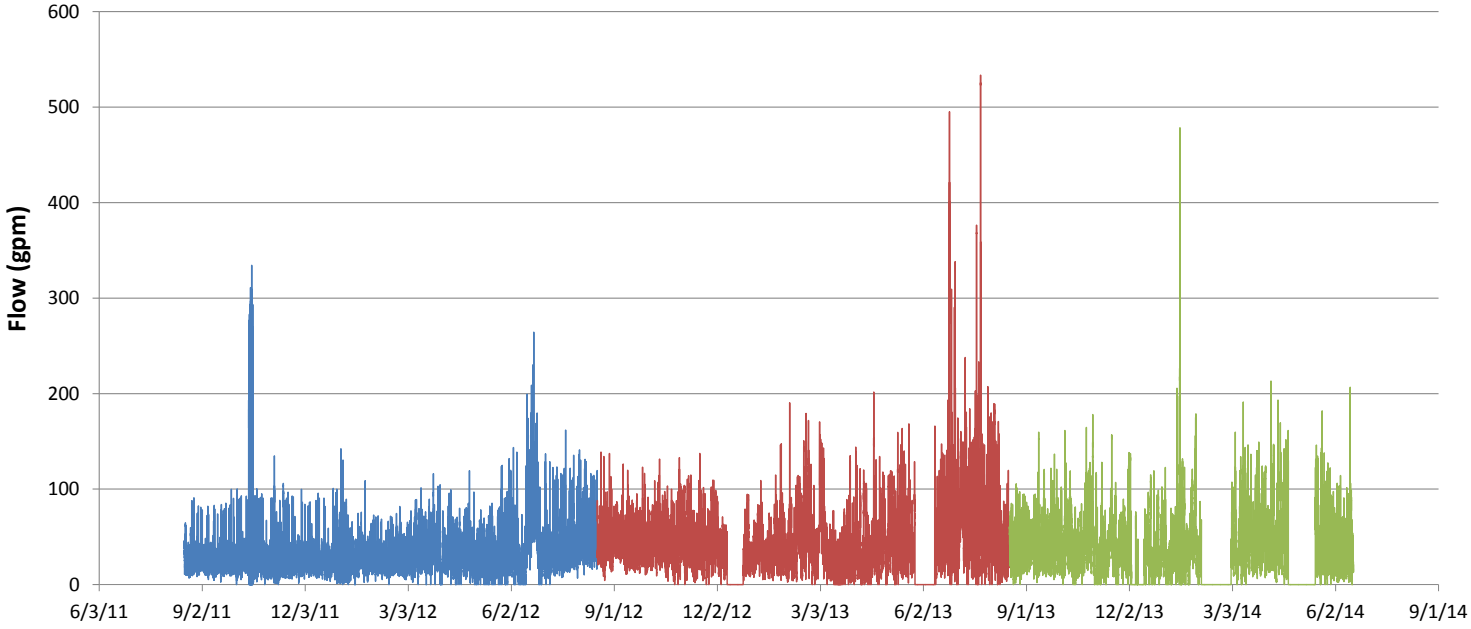

11th Ave
Flow (gpm)
300
250
200
150
100
50
0
3/13/10
5/2/10
6/21/10
8/10/10
9/29/10
11/18/10
1/7/11
2/26/11
4/17/11
6/6/11
7/26/11


Bryden: 6/22/10 - 6/18/2014
Flow (gpm)
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
1/22/10
8/10/10
2/26/11
9/14/11
4/1/12
10/18/12
5/6/13
11/22/13
6/10/14
12/27/14

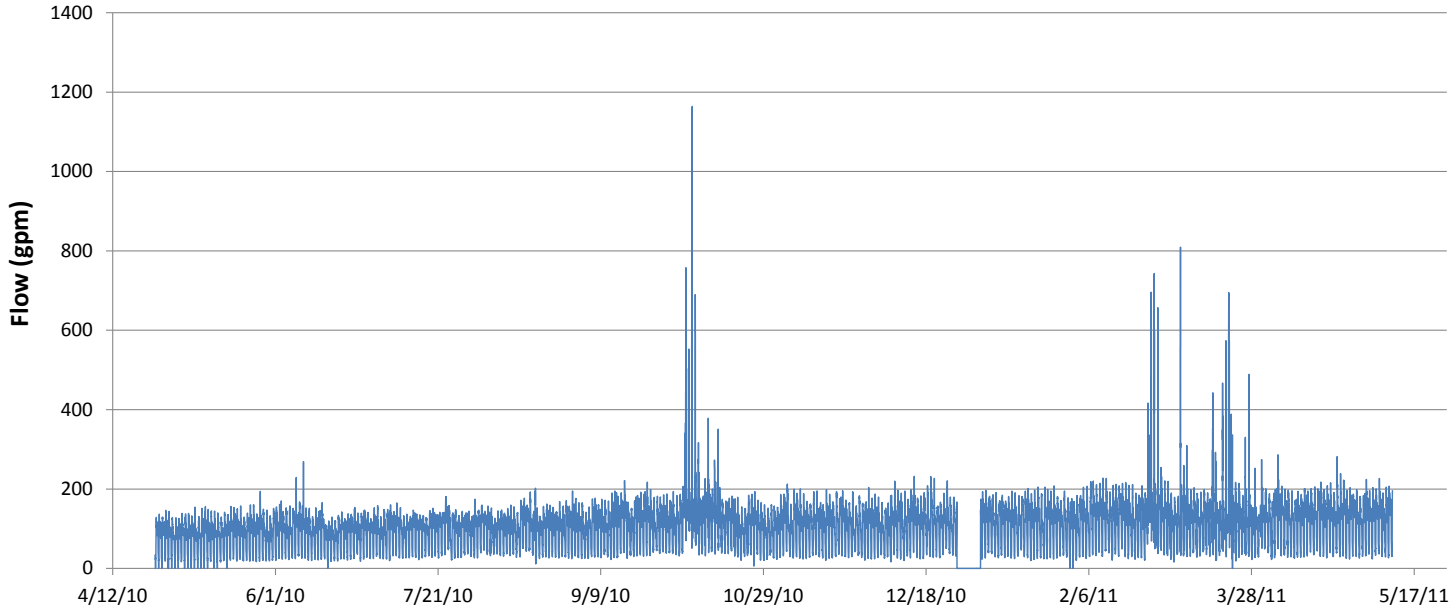
Country Club #14



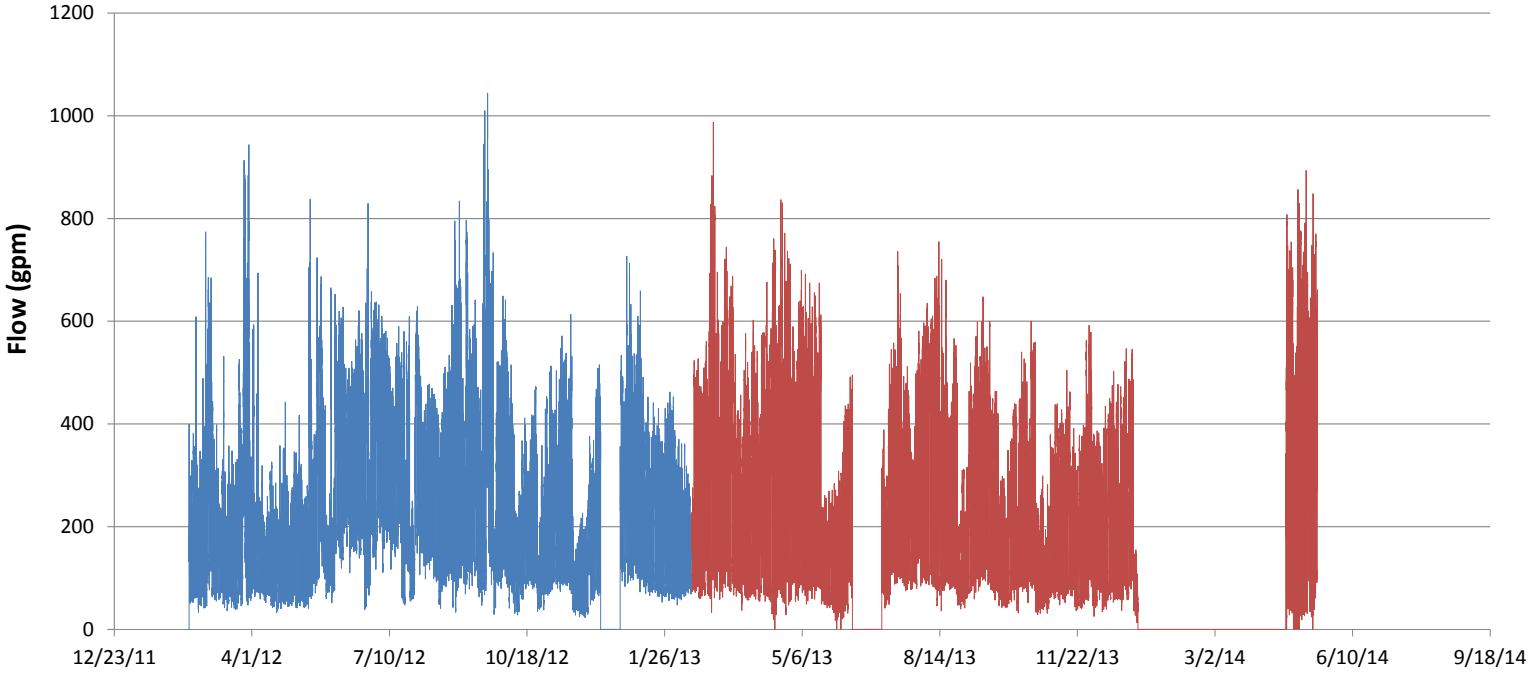
Fergesons 1st Ave North 20th St

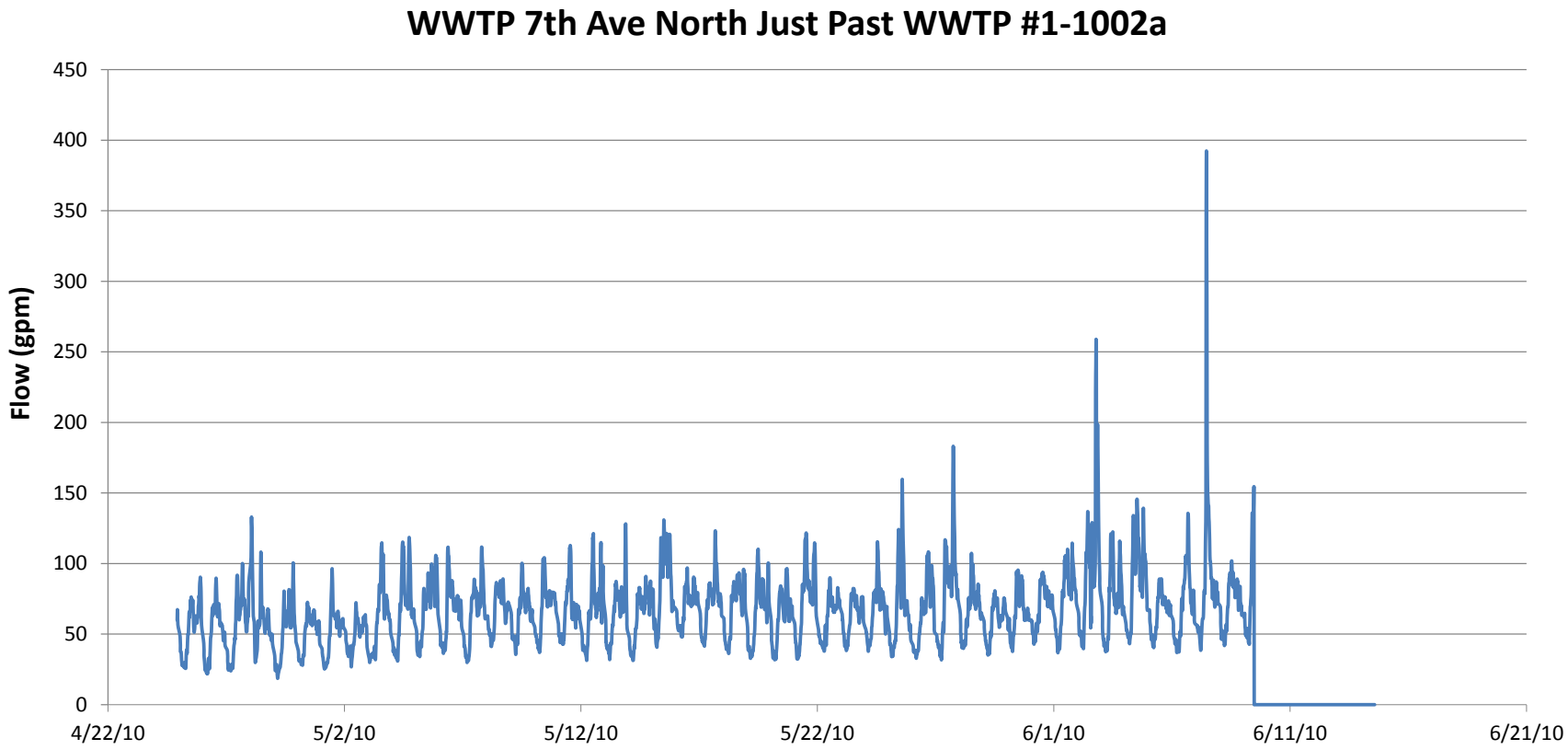


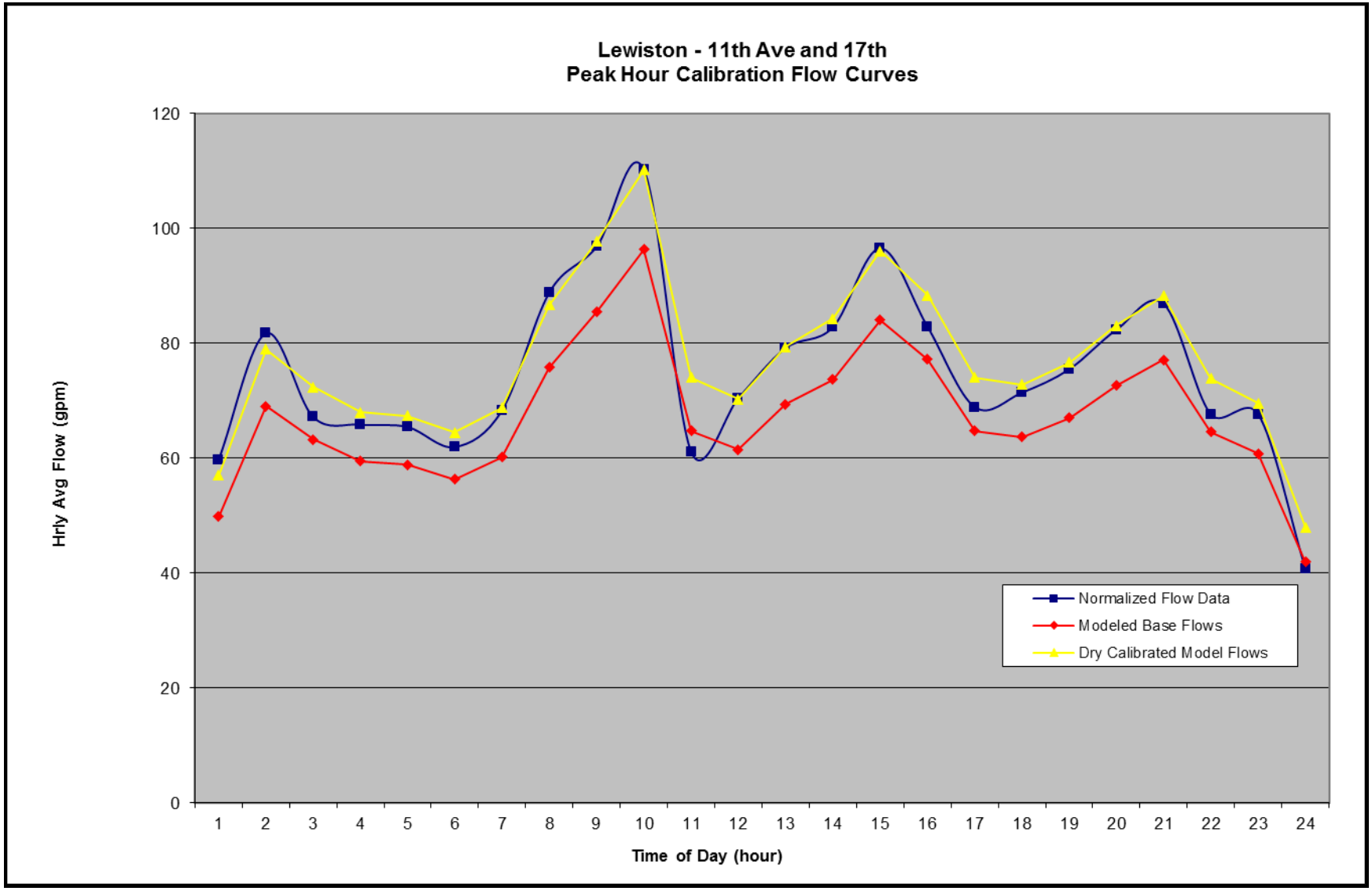
Jennifer 7-6018

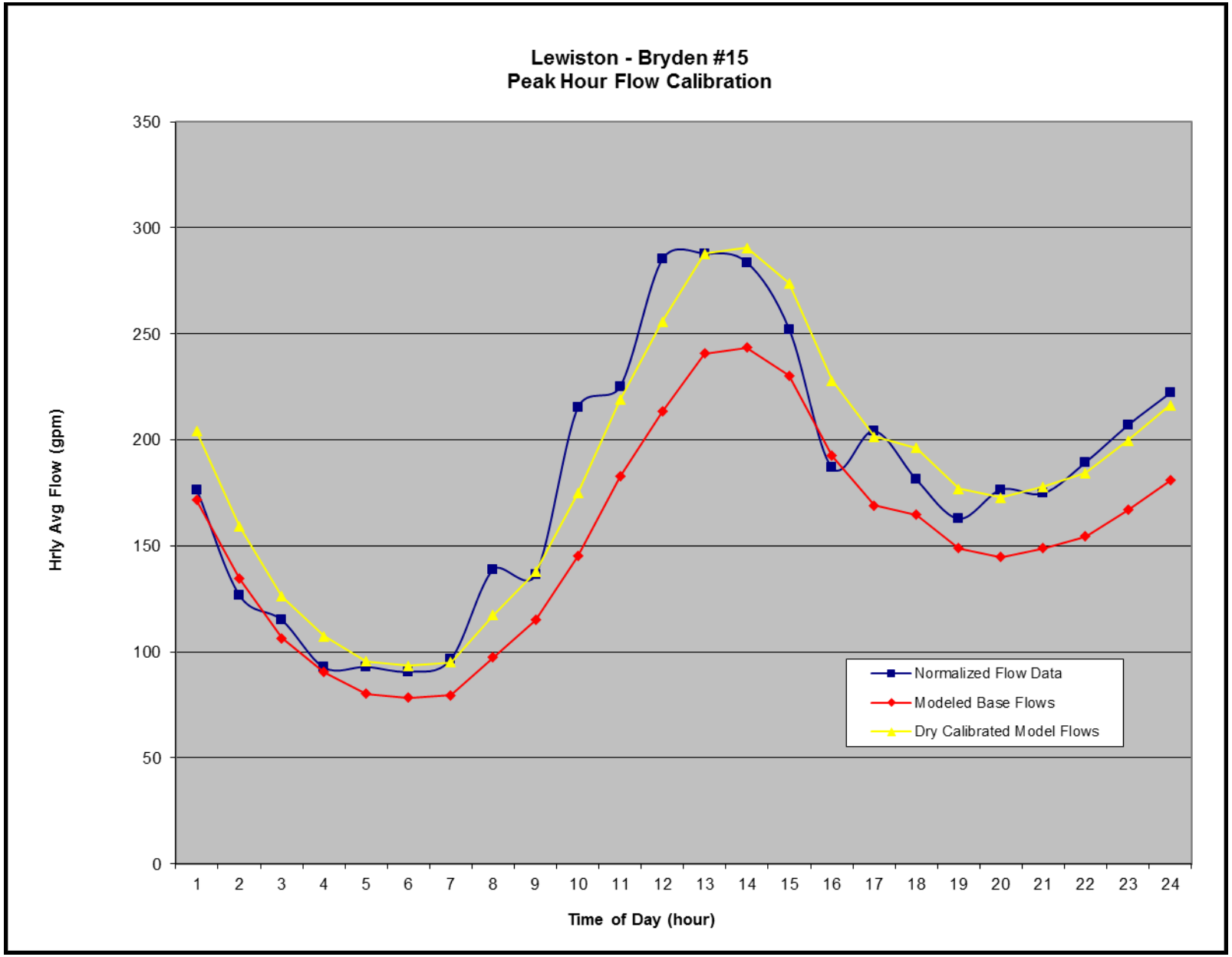


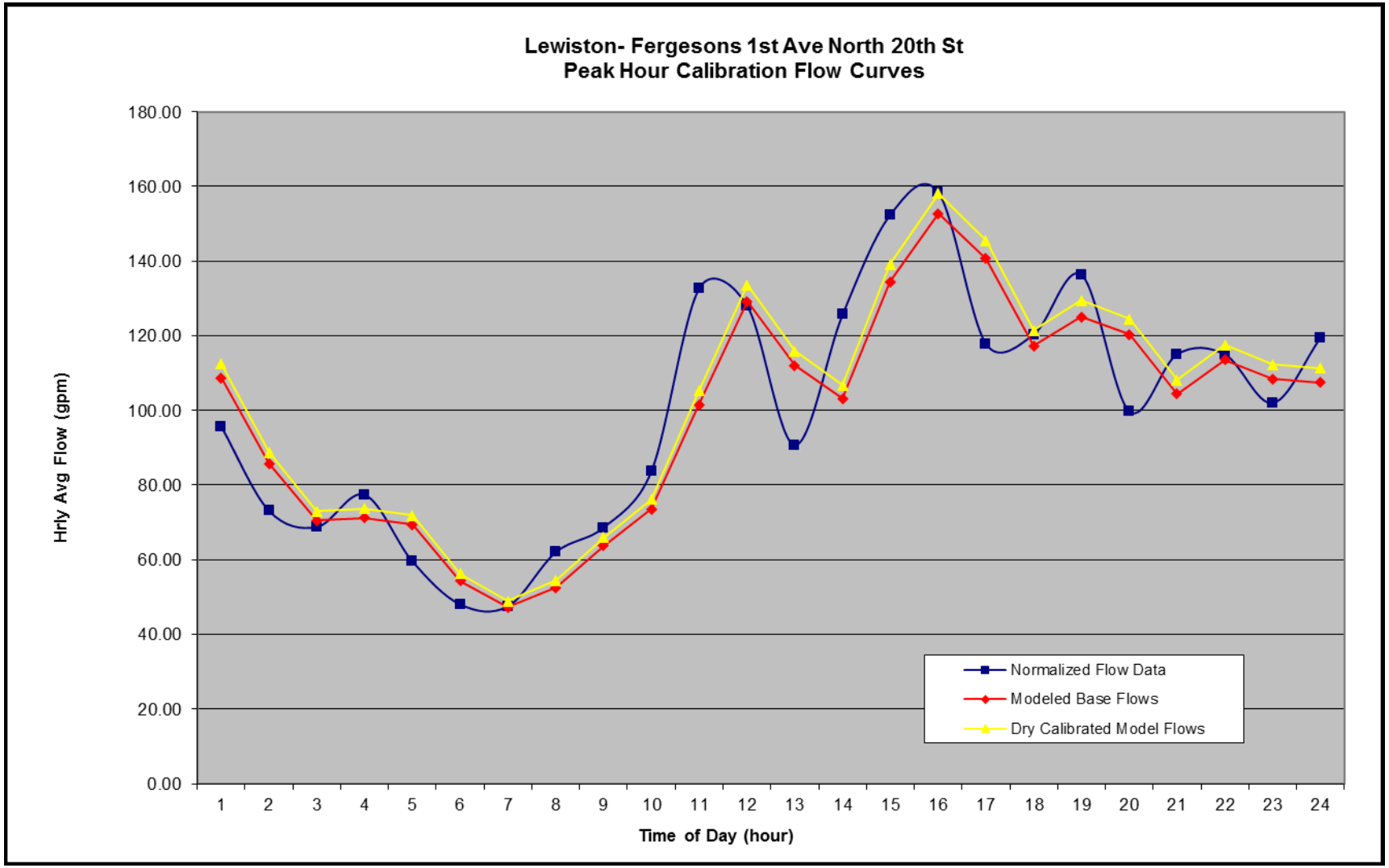
Lindsey #18

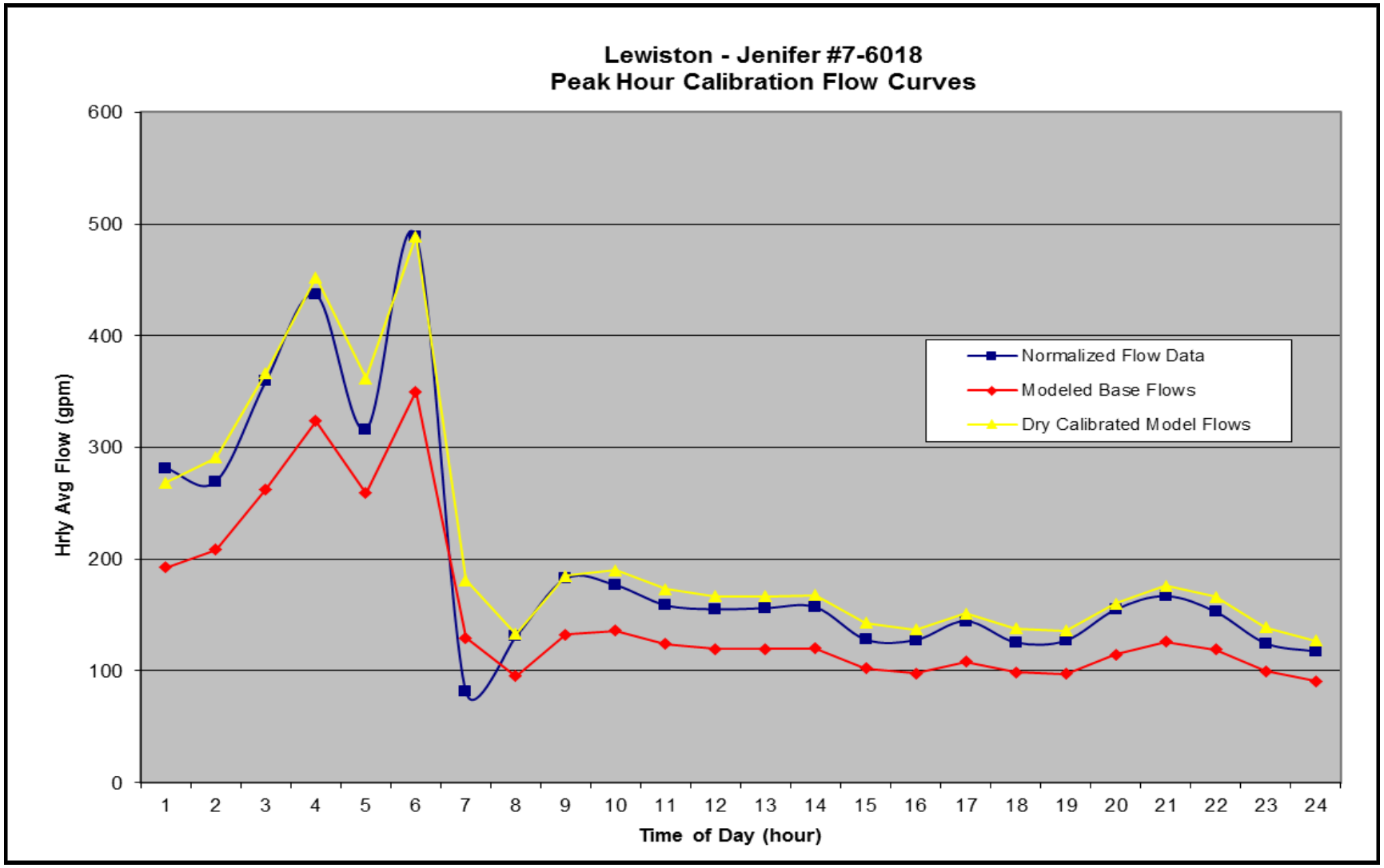


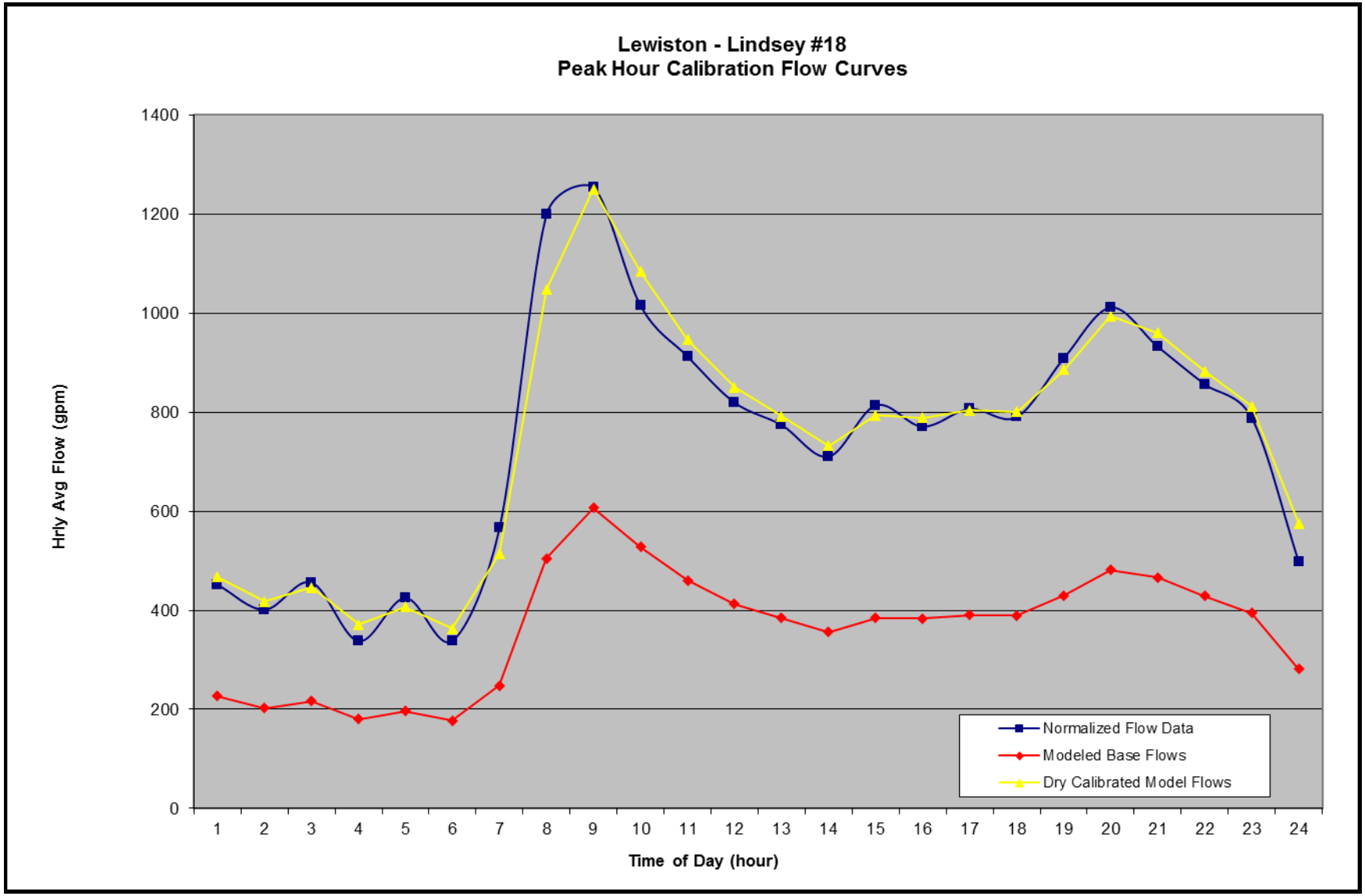

WWTP 7th Ave North Just Past WWTP #1-1002a
Flow (gpm)
450
400
350
300
250
200
150
100
50
0
4/22/10
5/2/10
5/12/10
5/22/10
6/1/10
6/11/10
6/21/10


Lewiston - 11th Ave and 17th
Peak Hour Calibration Flow Curves
Hrly Avg Flow (gpm)
120
100
80
60
40
20
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Time of Day (hour)
Normalized Flow Data
Modeled Base Flows
Dry Calibrated Model Flows


Lewiston - Bryden #15
Peak Hour Flow Calibration
Hrly Avg Flow (gpm)
350
300
250
200
150
100
50
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Time of Day (hour)
Normalized Flow Data
Modeled Base Flows
Dry Calibrated Model Flows


Lewiston- Fergesons 1st Ave North 20th St
Peak Hour Calibration Flow Curves
Hrly Avg Flow (gpm)
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Time of Day (hour)
Normalized Flow Data
Modeled Base Flows
Dry Calibrated Model Flows


Lewiston - Jenifer #7-6018
Peak Hour Calibration Flow Curves
Hrly Avg Flow (gpm)
600
500
400
300
200
100
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Time of Day (hour)
Normalized Flow Data
Modeled Base Flows
Dry Calibrated Model Flows


Lewiston - Lindsey #18
Peak Hour Calibration Flow Curves
Hrly Avg Flow (gpm)
1400
1200
1000
800
600
400
200
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Time of Day (hour)
Normalized Flow Data
Modeled Base Flows
Dry Calibrated Model Flows

City of Lewiston
Flow Meter Calibration

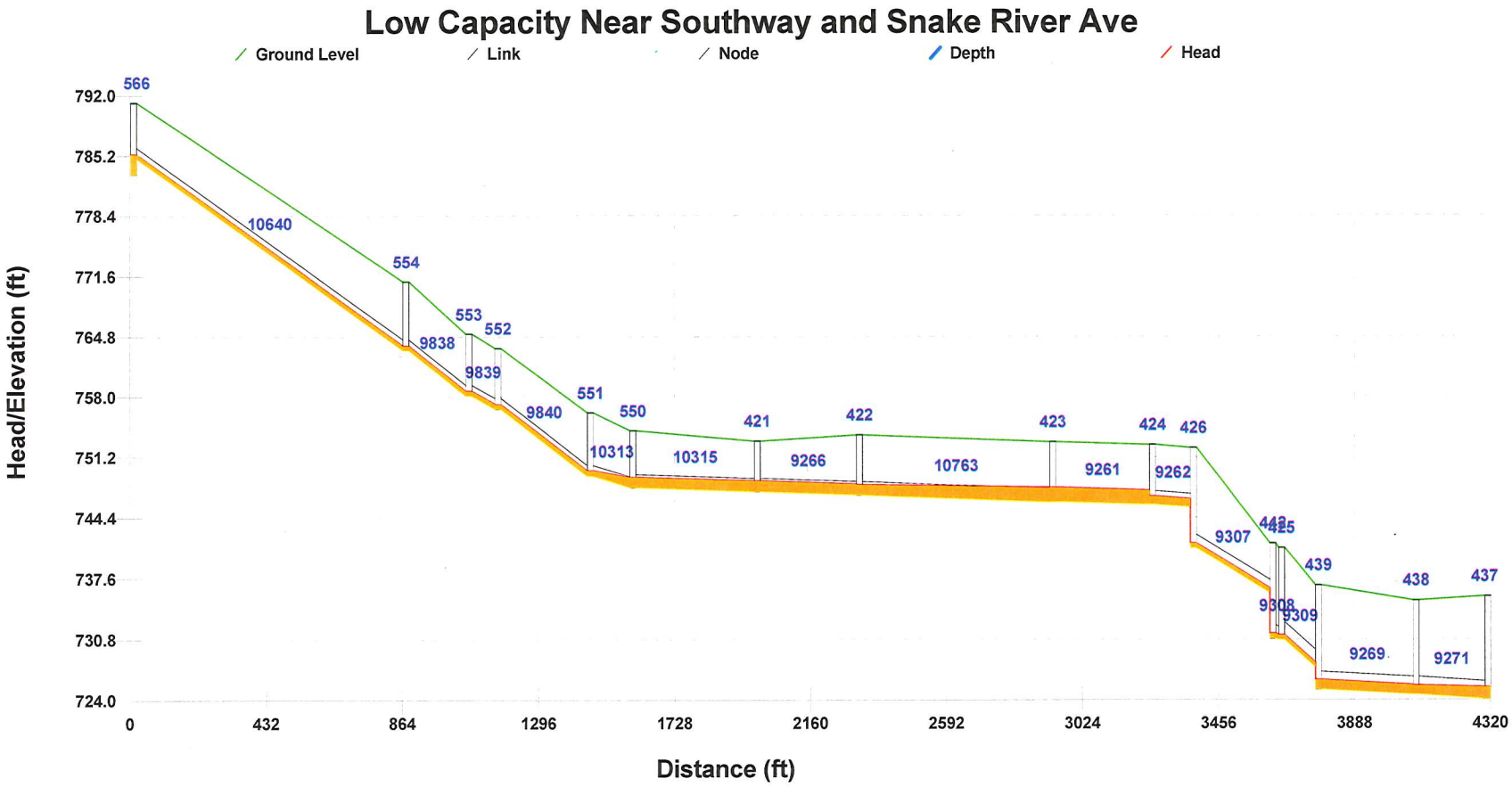
Flow Measuring Location	Average Day (gpm)[1]			Peak Hour (gpm)		
	Original Modeled Flows less Upstream Flow[4]	Observed Flow less Upstream Flow[4]	Calibration Factor	Original Modeled Flows less Upstream Flow[4]	Observed Flow less Upstream Flow[4]	Calibration Factor
Fergesons	48	49	1.02	154	158	1.03
WTTP, 7th Ave	9	19	2.00	N/A	N/A	N/A
Jenifer	113	108	0.95	350	489	1.40
11th Ave and 17th St	59	50	0.83	96	110	1.14
Bryden	99	108	1.09	243	288	1.18
8th Street Flume[2]	489	456	0.93	959	1037	1.08
Lindsey Creek[3]	181	314	1.73	607	1254	2.07
South Shore Pump Station	932	1583	1.70	2299	2414	1.05

[1] Data shifted to simulate average day flows

[2] Peak Hour flow estimated from Treatment Plant Factors

[3] Calibration from adding I/I flow (gpm)

[4] Flows reported reflect contributions from the contributing sub-basin only and do not include upstream sub-basin flows (if applicable). Flows were calculated by taking the total flow less any upstream monitored flows entering the sub-basin.


Low Capacity Near Southway and Snake River Ave
Ground Level
Link
Node
Depth
Head
Head/Elevation (ft)
792.0
785.2
778.4
771.6
764.8
758.0
751.2
744.4
737.6
730.8
724.0
0
432
864
1296
1728
2160
2592
3024
3456
3888
4320
Distance (ft)
566
10640
554
553
552
9838
9839
9840
551
550
10313
10315
421
9266
422
10763
423
9261
424
426
9262
9307
439
438
437
9269
9271

APPENDIX D

Financial Information

KELLER ASSOCIATES

Project:	Lewiston WW Master Plan	Date:	6/7/2018
Project #:	217043-001	By:	SK
Location:	Lewiston, Idaho	Reviewed:	ER

WWTP Capital Improvement Plan
Cost Summary

ID#	Item	Estimated Cost (2017)
WWTP Priority 1 Improvements		
1A	UV System	$ 1,225,000
1B	Aeration Basins, Blowers, and Flow Splitting	$ 7,501,000
1C	Primary Clarifier Rehabilitation	$ 1,046,000
1D	New RAS/WAS Pumping	$ 1,164,000
1E	Dewatering	$ 1,523,000
1F	Solids Thickening	$ 993,000
1G	New Aeration Basin	$ 4,973,000
1H	North Shore Pump Station	$ 1,275,000
1I	Screen Washer/Compactor	$ 28,000
1J	Investigate Dissolved Air Floatation (DAF)	$ 81,000
1K	Sludge Blending and Sludge Holding Tanks	$ 1,050,000
1L	Plant Security	$ 105,000
1M	New Primary Clarifier; Flow Splitting and Piping	$ 1,469,000
1N	New Secondary Clarifier	$ 3,673,000
	WWTP Priority 1 Improvements	**$ 26,106,000**
WWTP Priority 3 Improvements		
3.1	Administration Building	$ 735,000
3.2A	Hypochlorite System	$ 452,000
3.2B	3W System (Plant Water; Non-potable, disinfected plant effluent)	$ 368,000
3.2C	Potable Water	$ 97,000
3.3	Digester Control Building	$ 231,000
3.4	Headworks Building	$ 1,784,000
3.5	Screen Washer/Compactor	$ 1,574,000
3.6	Influent Screens	$ 1,155,000
3.7	Grit Chambers	$ 58,000
3.8	Septage Receiving	$ 1,050,000
3.9	Shop Facility	$ 326,000
	WWTP Priority 3 Improvements	**$ 7,830,000**

The opinion of most probable cost herein is based on our perception of current conditions at the project location. This estimate reflects our opinion of probable costs at this time and is subject to change as the project design matures. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented herein.

Project:	**Lewiston WW Master Plan**	**Date:**	**6/7/2018**
Project #:	**217043-001**	**By:**	**SK**
Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**1**	**ID#**	**1A**

UV System

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
UV System				
Sitework	LS	1	$ 20,000	$ 20,000
UV Equipment	EA	1	$ 588,000	$ 588,000
Concrete Fill and Walls	CY	180	$ 130	$ 22,000
Electrical/Controls	LS	1	$ 59,000	$ 59,000
Subtotal				**$ 689,000**
General Conditions		10%		$ 69,000
Subtotal				**$ 758,000**
Contingencies		20%		$ 152,000
Subtotal				**$ 910,000**
Contractor OH&P		15%		$ 137,000
Subtotal				**$ 1,047,000**
Soft Costs (Engineering & CMS)		17%		$ 178,000
Total Estimated Cost				**$ 1,225,000**

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Project:	**Lewiston WW Master Plan**	**Date:**	**6/7/2018**
Project #:	**217043-001**	**By:**	**SK**
Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**1**	**ID#**	**1B**

Aeration Basins, Blowers, and Flow Splitting

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Aeration Basins, Blowers, and Flow Splitting				
Demolition	LS	1	$ 222,000	$ 222,000
Mixing Equipment	LS	1	$ 325,000	$ 325,000
Diffusers	LS	1	$ 376,000	$ 376,000
Blowers	LS	1	$ 645,000	$ 645,000
Recycle Pumps	LS	1	$ 87,000	$ 87,000
Piping and Valves	LS	1	$ 590,000	$ 590,000
Concrete Wall Rehab	LS	1	$ 86,000	$ 86,000
Interior Concrete Walls	LS	1	$ 68,000	$ 68,000
Coatings/Painting	LS	1	$ 732,000	$ 732,000
Misc. Metals	LS	1	$ 31,000	$ 31,000
Aeration Basin Flow Splitter	LS	1	$ 233,000	$ 233,000
Mixed Liquor Flow Splitter	LS	1	$ 234,000	$ 234,000
Scum Pumping	LS	1	$ 44,000	$ 44,000
Electrical/Controls	LS	1	$ 551,000	$ 551,000
Subtotal				**$ 4,224,000**
General Conditions		10%		$ 422,000
Subtotal				**$ 4,646,000**
Contingencies		20%		$ 929,000
Subtotal				**$ 5,575,000**
Contractor OH&P		15%		$ 836,000
Subtotal				**$ 6,411,000**
Soft Costs (Engineering & CMS)		17%		$ 1,090,000
Total Estimated Cost				**$ 7,501,000**

The opinion of most probable cost herein is based on our perception of current conditions at the project location. This estimate reflects our opinion of probable costs at this time and is subject to change as the project design matures. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented herein.

Project:	**Lewiston WW Master Plan**	**Date:**	**6/7/2018**
Project #:	**217043-001**	**By:**	**SK**
Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**1**	**ID#**	**1C**

Primary Clarifier Rehabilitation

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Primary Clarifier Rehabilitation				
Demolition in Existing Structures	SF	4,749	$ 6.32	$ 30,000
Concrete Prep and Coatings	LS	1	$ 150,000	$ 150,000
Clarifier Mechanisms	LS	1	$ 353,000	$ 353,000
Weir and Scum Baffles	LS	1	$ 30,000	$ 30,000
6" Pipe DIMJ epoxy lined	LF	117	$ 42.74	$ 5,000
Electrical	LS	1	$ 20,000	$ 20,000
Subtotal				**$ 588,000**
General Conditions		10%		$ 59,000
Subtotal				**$ 647,000**
Contingencies		20%		$ 130,000
Subtotal				**$ 777,000**
Contractor OH&P		15%		$ 117,000
Subtotal				**$ 894,000**
Soft Costs (Engineering & CMS)		17%		$ 152,000
Total Estimated Cost				**$ 1,046,000**

The opinion of most probable cost herein is based on our perception of current conditions at the project location. This estimate reflects our opinion of probable costs at this time and is subject to change as the project design matures. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented herein.

Project:	**Lewiston WW Master Plan**	**Date:**	**6/7/2018**
Project #:	**217043-001**	**By:**	**SK**
Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**1**	**ID#**	**1D**

New RAS/WAS Pumping

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
New RAS/WAS Pumping				
Demolition	LS	1	$ 20,000	$ 20,000
RAS Pumps	EA	4	$ 42,025	$ 170,000
Piping and Valves	LS	1	$ 310,000	$ 310,000
Electrical/Controls	LS	1	$ 150,000	$ 150,000
Subtotal				**$ 650,000**
General Conditions		10%		$ 70,000
Subtotal				**$ 720,000**
Contingencies		20%		$ 144,000
Subtotal				**$ 864,000**
Contractor OH&P		15%		$ 130,000
Subtotal				**$ 994,000**
Soft Costs (Engineering & CMS)		17%		$ 170,000
Total Estimated Cost				**$ 1,164,000**

The opinion of most probable cost herein is based on our perception of current conditions at the project location. This estimate reflects our opinion of probable costs at this time and is subject to change as the project design matures. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented herein.

Project:	**Lewiston WW Master Plan**	**Date:**	**6/7/2018**
Project #:	**217043-001**	**By:**	**SK**
Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**1**	**ID#**	**1E**

Dewatering

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Dewatering				
Structural	LS	1	$ 65,000	$ 65,000
Screw Press	EA	1	$ 580,000	$ 580,000
Feed Pumps	EA	2	$ 67,500	$ 135,000
HVAC	LS	1	$ 7,000	$ 7,000
Electrical/Controls	LS	1	$ 70,000	$ 70,000
Subtotal				**$ 857,000**
General Conditions		10%		$ 86,000
Subtotal				**$ 943,000**
Contingencies		20%		$ 189,000
Subtotal				**$ 1,132,000**
Contractor OH&P		15%		$ 170,000
Subtotal				**$ 1,302,000**
Soft Costs (Engineering & CMS)		17%		$ 221,000
Total Estimated Cost				**$ 1,523,000**

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Project:	Lewiston WW Master Plan	Date:	6/7/2018
Project #:	217043-001	By:	SK
Location:	Lewiston, Idaho	Reviewed:	ER
Priority:	1	ID#	1F

Solids Thickening

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Primary Sludge Pump Station				
Sitework	LS	1	$ 14,000.00	$ 14,000
Concrete Roof	CY	79	$ 1,250	$ 99,000
Concrete Floor	CY	29	$ 650	$ 20,000
Equipment Bases	CY	2	$ 850	$ 2,000
Stairs	LS	1	$ 35,000	$ 35,000
Access Hatches (4' x 4' alum)	EA	3	$ 2,500	$ 8,000
Coatings	LS	1	$ 10,000	$ 10,000
Primary Sludge Pumps and Grinders	LS	1	$ 122,000	$ 122,000
Piping	LS	1	$ 98,000	$ 98,000
HVAC	LS	1	$ 50,000	$ 50,000
Electrical	LS	1	$ 100,000	$ 100,000
Subtotal				**$ 558,000**
General Conditions		10%		$ 56,000
Subtotal				**$ 614,000**
Contingencies		20%		$ 123,000
Subtotal				**$ 737,000**
Contractor OH&P		15%		$ 111,000
Subtotal				**$ 848,000**
Soft Costs (Engineering & CMS)		17%		$ 145,000
Total Estimated Cost				**$ 993,000**

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Project:	**Lewiston WW Master Plan**	**Date:**	**6/7/2018**
Project #:	**217043-001**	**By:**	**SK**
Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**1**	**ID#**	**1G**

New Aeration Basin

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
New Aeration Basin				
Site Work	LS	1	$ 378,000	$ 378,000
Mixing Equipment	LS	1	$ 170,000	$ 170,000
Diffusers	LS	1	$ 198,000	$ 198,000
Blowers	LS	1	$ 215,000	$ 215,000
Recycle Pumps	LS	1	$ 46,000	$ 46,000
Piping and Valves	LS	1	$ 312,000	$ 312,000
Concrete Basins	LS	1	$ 639,000	$ 639,000
Interior Concrete Walls	LS	1	$ 161,000	$ 161,000
Coatings/Painting	LS	1	$ 339,000	$ 339,000
Misc. Metals	LS	1	$ 51,000	$ 51,000
Electrical/Controls	LS	1	$ 291,000	$ 291,000
Subtotal				**$ 2,800,000**
General Conditions		10%		$ 280,000
Subtotal				**$ 3,080,000**
Contingencies		20%		$ 616,000
Subtotal				**$ 3,696,000**
Contractor OH&P		15%		$ 554,000
Subtotal				**$ 4,250,000**
Soft Costs (Engineering & CMS)		17%		$ 723,000
Total Estimated Cost				**$ 4,973,000**

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Project:	**Lewiston WW Master Plan**	**Date:**	**6/7/2018**
Project #:	**217043-001**	**By:**	**SK**
Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**1**	**ID#**	**1H**

North Shore Pump Station

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
North Shore Pump Station				
Excavation	LS	1	$ 38,000	$ 38,000
Demolition of Existing Structures	LS	1	$ 19,000	$ 19,000
Bypass Pumping	LS	1	$ 5,000	$ 5,000
Structure Backfill	LS	1	$ 37,000	$ 37,000
Dewatering	LS	1	$ 91,000	$ 91,000
Wet Well	LS	1	$ 75,000	$ 75,000
Valve Vault	LS	1	$ 14,000	$ 14,000
Painting Wet Well	LS	1	$ 45,000	$ 45,000
Submersible Pumps	LS	1	$ 170,000	$ 170,000
Flume	LS	1	$ 40,000	$ 40,000
Wet Well Piping	LS	1	$ 42,000	$ 42,000
Valves	LS	1	$ 38,000	$ 38,000
Electrical/Controls	LS	1	$ 100,000	$ 100,000
Subtotal				**$ 714,000**
General Conditions		10%		$ 71,000
Subtotal				**$ 785,000**
Contingencies		20%		$ 162,000
Subtotal				**$ 947,000**
Contractor OH&P		15%		$ 142,000
Subtotal				**$ 1,089,000**
Soft Costs (Engineering & CMS)		17%		$ 186,000
Total Estimated Cost				**$ 1,275,000**

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Project:	**Lewiston WW Master Plan**	**Date:**	**6/7/2018**
Project #:	**217043-001**	**By:**	**SK**
Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**1**	**ID#**	**1I**

Screen Washer/Compactor

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Screen Washer/Compactor				
Spare Motor	EA	1	$ 21,000	$ 21,000
Subtotal				**$ 21,000**
Contingencies		30%		$ 7,000
Total Estimated Cost				**$ 28,000**

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Project:	**Lewiston WW Master Plan**	**Date:**	**6/7/2018**
Project #:	**217043-001**	**By:**	**SK**
Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**1**	**ID#**	**1J**

Investigate Dissolved Air Floatation (DAF)

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Dissolved Air Floatation (DAF)				
Spare Motors	EA	2	$ 21,000	$ 42,000
Subtotal				**$ 42,000**
Contingencies		30%		$ 14,000
Subtotal				**$ 56,000**
DAF Study	LS	1	$ 25,000	$ 25,000
Total Estimated Cost				**$ 81,000**

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Project:	**Lewiston WW Master Plan**	**Date:**	**6/7/2018**
Project #:	**217043-001**	**By:**	**SK**
Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**1**	**ID#**	**1K**

Sludge Blending and Sludge Holding Tanks

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Sludge Blending/Holding Tanks				
Tank Sand Blast/Recoating	EA	3	$ 11,000	$ 33,000
Mixing Systems	EA	3	$ 43,000	$ 129,000
Cover	EA	1	$ 128,000	$ 128,000
Odor System	LS	1	$ 161,000	$ 161,000
Electrical/Controls	LS	1	$ 43,000	$ 43,000
Installation	LS	1	$ 86,000	$ 86,000
Subtotal				**$ 580,000**
Contingencies		30%		$ 180,000
Subtotal				**$ 760,000**
Contractor OH&P		15%		$ 110,000
Subtotal				**$ 870,000**
Soft Costs (Engineering & CMS)		20%		$ 180,000
Total Estimated Cost				**$ 1,050,000**

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Project:	**Lewiston WW Master Plan**	**Date:**	**6/7/2018**
Project #:	**217043-001**	**By:**	**SK**
Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**1**	**ID#**	**1L**

Plant Security

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Plant Security				
Plant Fencing	LF	500	$ 54	$ 27,000
Gate Security System	LS	1	$ 32,000	$ 32,000
Subtotal				**$ 59,000**
Contingencies		30%		$ 17,000
Subtotal				**$ 76,000**
Contractor OH&P		15%		$ 11,000
Subtotal				**$ 87,000**
Soft Costs (Engineering & CMS)		20%		$ 18,000
Total Estimated Cost				**$ 105,000**

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Project:	**Lewiston WW Master Plan**	**Date:**	**6/7/2018**
Project #:	**217043-001**	**By:**	**SK**
Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**1**	**ID#**	**1M**

New Primary Clarifier; Flow Splitting and Piping

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
New Primary Clarifier				
New Clarifier	LS	1	$ 150,000	$ 150,000
Clarifier Installation	LS	1	$ 43,000	$ 43,000
Site Work	LS	1	$ 77,000	$ 77,000
Clarifier Concrete	CY	1,200	$ 190	$ 228,000
Concrete Installation	LS	1	$ 107,000	$ 107,000
Misc. Metals (guardrail, grating)	LS	1	$ 16,000	$ 16,000
Piping	LF	300	$ 210	$ 63,000
Electrical/Controls	LS	1	$ 32,000	$ 32,000
Flow Splitting				
Flow Splitter	LS	1	$ 61,000	$ 61,000
Install Flow Splitter	LS	1	$ 30,000	$ 30,000
Subtotal				**$ 810,000**
Contingencies		30%		$ 249,000
Subtotal				**$ 1,059,000**
Contractor OH&P		15%		$ 160,000
Subtotal				**$ 1,219,000**
Soft Costs (Engineering & CMS)		20%		$ 250,000
Total Estimated Cost				**$ 1,469,000**

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Project:	**Lewiston WW Master Plan**	**Date:**	**6/7/2018**
Project #:	**217043-001**	**By:**	**SK**
Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**1**	**ID#**	**1N**

New Secondary Clarifier

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
New Secondary Clarifier				
New Clarifier	LS	1	$ 352,000	$ 352,000
Clarifier Installation	LS	1	$ 114,000	$ 114,000
Site Work	LS	1	$ 207,000	$ 207,000
Clarifier Concrete	CY	3,600	$ 190	$ 684,000
Concrete Installation	LS	1	$ 290,000	$ 290,000
Misc. Metals (guardrail, grating)	LS	1	$ 44,000	$ 44,000
Piping	LF	1,000	$ 210	$ 210,000
Electrical/Controls	LS	1	$ 124,000	$ 124,000
Subtotal				**$ 2,025,000**
Contingencies		30%		$ 608,000
Subtotal				**$ 2,633,000**
Contractor OH&P		15%		$ 395,000
Subtotal				**$ 3,028,000**
Soft Costs (Engineering & CMS)		20%		$ 605,000
Mechanical Vibration Investigation	LS	1	$ 20,000	$ 20,000
Center Feed Evaluation	LS	1	$ 20,000	$ 20,000
Total Estimated Cost				**$ 3,673,000**

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Project:	**Lewiston WW Master Plan**	**Date:**	**6/7/2018**
Project #:	**217043-001**	**By:**	**SK**
Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**3**	**ID#**	**3.1**

Administration Building

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Administration Building				
Demolition	LS	1	$ 32,000	$ 32,000
Flooring	SF	2,400	$ 21	$ 50,000
Roofing	SF	2,400	$ 13	$ 31,000
Ceiling	SF	2,400	$ 6	$ 15,000
Walls	SF	2,500	$ 32	$ 80,000
Doors/Windows/Interior Finishes	LS	1	$ 39,000	$ 39,000
Plumbing/Electrical/HVAC	LS	1	$ 86,000	$ 86,000
Stairs	LS	1	$ 6,000	$ 6,000
Installation	LS	1	$ 64,000	$ 64,000
Subtotal				**$ 403,000**
Contingencies		30%		$ 121,000
Subtotal				**$ 524,000**
Contractor OH&P		15%		$ 81,000
Subtotal				**$ 605,000**
Soft Costs (Engineering & CMS)		20%		$ 130,000
Total Estimated Cost				**$ 735,000**

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Project:	**Lewiston WW Master Plan**	**Date:**	**6/7/2018**
Project #:	**217043-001**	**By:**	**SK**
Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**3**	**ID#**	**3.2A**

Hypochlorite System

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Hypochlorite System				
Demolition	LS	1	$ 5,400	$ 5,400
Hypochlorite System	LS	1	$ 161,000	$ 161,000
System Installation	LS	1	$ 16,000	$ 16,000
Electrical/Controls	LS	1	$ 32,000	$ 32,000
Piping	LF	500	$ 54	$ 27,000
Subtotal				**$ 242,000**
Contingencies		30%		$ 73,000
Subtotal				**$ 315,000**
Contractor OH&P		15%		$ 47,000
Subtotal				**$ 362,000**
Soft Costs (Engineering & CMS)		20%		$ 80,000
Chlorine System Study	LS	1	$ 10,000	$ 10,000
Total Estimated Cost				**$ 452,000**

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Project:	Lewiston WW Master Plan	Date:	6/7/2018
Project #:	217043-001	By:	SK
Location:	Lewiston, Idaho	Reviewed:	ER
Priority:	3	ID#	3.2B

3W System (Plant Water; Non-potable, disinfected plant effluent)

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
3W Water System				
Demolition	LS	1	$ 10,700	$ 10,700
Pumps	EA	2	$ 32,000	$ 64,000
New Piping	LF	1000	$ 110	$ 110,000
Piping Installation	LS	1	$ 21,000	$ 21,000
Subtotal				**$ 206,000**
Contingencies		30%		$ 60,000
Subtotal				**$ 266,000**
Contractor OH&P		15%		$ 40,000
Subtotal				**$ 306,000**
Soft Costs (Engineering & CMS)		20%		$ 62,000
Total Estimated Cost				**$ 368,000**

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Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**3**	**ID#**	**3.2C**

Potable Water

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Potable Water				
Replace Piping	LF	100	$ 107	$ 10,700
Add New Piping	LF	300	$ 107	$ 32,100
Installation	LS	1	$ 10,700	$ 10,700
Subtotal				**$ 54,000**
Contingencies		30%		$ 16,000
Subtotal				**$ 70,000**
Contractor OH&P		15%		$ 11,000
Subtotal				**$ 81,000**
Soft Costs (Engineering & CMS)		20%		$ 16,000
Total Estimated Cost				**$ 97,000**

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Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**3**	**ID#**	**3.3**

Digester Control Building

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Digester Control Building				
Demolition	LS	1	$ 21,000	$ 21,000
New Roof	SF	2,500	$ 21	$ 53,000
New Piping	LF	150	$ 130	$ 20,000
Installation	LS	1	$ 32,000	$ 32,000
Subtotal				**$ 126,000**
Contingencies		30%		$ 40,000
Subtotal				**$ 166,000**
Contractor OH&P		15%		$ 25,000
Subtotal				**$ 191,000**
Soft Costs (Engineering & CMS)		20%		$ 40,000
Total Estimated Cost				**$ 231,000**

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Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**3**	**ID#**	**3.4**

Headworks Building

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Headworks Building				
Demolition	LS	1	$ 80,000	$ 80,000
HVAC System	LS	1	$ 120,000	$ 120,000
Odor Control	LS	1	$ 380,000	$ 380,000
Cleaning/Repainting	LS	1	$ 70,000	$ 70,000
Electrical Upgrade	LS	1	$ 330,000	$ 330,000
Subtotal				**$ 980,000**
Contingencies		30%		$ 304,000
Subtotal				**$ 1,284,000**
Contractor OH&P		15%		$ 200,000
Subtotal				**$ 1,484,000**
Soft Costs (Engineering & CMS)		20%		$ 300,000
Total Estimated Cost				**$ 1,784,000**

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Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**3**	**ID#**	**3.5**

Screen Washer/Compactor

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Screen Washer/Compactor				
Demolition	LS	1	$ 75,000	$ 75,000
Washer/Compactor	EA	1	$ 471,000	$ 471,000
Washer/Compactor Installation	LS	1	$ 54,000	$ 54,000
Misc. Metals (guardrail, grating)	LS	1	$ 43,000	$ 43,000
Electrical/Controls	LS	1	$ 86,000	$ 86,000
Headworks Rearrangement	LS	1	$ 161,000	$ 161,000
Subtotal				**$ 890,000**
Contingencies		30%		$ 260,000
Subtotal				**$ 1,150,000**
Contractor OH&P		15%		$ 162,000
Subtotal				**$ 1,312,000**
Soft Costs (Engineering & CMS)		20%		$ 262,000
Total Estimated Cost				**$ 1,574,000**

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Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**3**	**ID#**	**3.6**

Influent Screens

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Influent Screens				
Demolition	LS	1	$ 54,000	$ 54,000
Upgrade Screens	EA	2	$ 264,000	$ 528,000
Concrete Work	LS	1	$ 54,000	$ 54,000
Subtotal				**$ 636,000**
Contingencies		30%		$ 189,000
Subtotal				**$ 825,000**
Contractor OH&P		15%		$ 130,000
Subtotal				**$ 955,000**
Soft Costs (Engineering & CMS)		20%		$ 200,000
Total Estimated Cost				**$ 1,155,000**

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Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**3**	**ID#**	**3.7**

Grit Chambers

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Grit Chambers				
Demolition	LS	1	$ 5,400	$ 5,400
Heat Tape/Insulation	LS	1	$ 21,000	$ 21,000
Pipe Changes	LF	25	$ 210	$ 5,300
Subtotal				**$ 32,000**
Contingencies		30%		$ 9,600
Subtotal				**$ 41,600**
Contractor OH&P		15%		$ 6,300
Subtotal				**$ 47,900**
Soft Costs (Engineering & CMS)		20%		$ 9,600
Total Estimated Cost				**$ 58,000**

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Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**3**	**ID#**	**3.8**

Septage Receiving

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Septage Receiving				
Demolition / Basin Modifications	LS	1	$ 54,000	$ 54,000
Screen	EA	1	$ 215,000	$ 215,000
New Grinder	EA	1	$ 65,000	$ 65,000
Wet Well	LS	1	$ 33,000	$ 33,000
Transfer Pumps	EA	2	$ 33,000	$ 65,000
Flow Meters	EA	2	$ 5,400	$ 10,800
Piping	LF	120	$ 170	$ 30,000
Electrical/Controls	LS	1	$ 97,000	$ 97,000
Subtotal				**$ 570,000**
Contingencies		30%		$ 180,000
Subtotal				**$ 750,000**
Contractor OH&P		15%		$ 120,000
Subtotal				**$ 870,000**
Soft Costs (Engineering & CMS)		20%		$ 180,000
Total Estimated Cost				**$ 1,050,000**

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Location:	**Lewiston, Idaho**	**Reviewed:**	**ER**
Priority:	**3**	**ID#**	**3.9**

Shop Facility

Item	Unit	Quantity	Unit Price	Estimated Cost (2017)
Shop Facility				
Storage Building	SF	1000	$ 130	$ 130,000
Site Work	LS	1	$ 21,000	$ 21,000
Installation	LS	1	$ 32,000	$ 32,000
Subtotal				**$ 183,000**
Contingencies		30%		$ 53,000
Subtotal				**$ 236,000**
Contractor OH&P		15%		$ 36,000
Subtotal				**$ 272,000**
Soft Costs (Engineering & CMS)		20%		$ 54,000
Total Estimated Cost				**$ 326,000**

The opinion of most probable cost herein is based on our perception of current conditions at the project location. This estimate reflects our opinion of probable costs at this time and is subject to change as the project design matures. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented herein.

Collection System Capital Improvement Plan
Cost Summary

ID#	Item	Estimated Cost (2017)
Collection System Priority 1 Improvements		
1a	8-inch Pipeline Reconstruction along 11th Ave and Prospect Ave to 10th Ave	$ 199,000
1b	Lift Station Upgrades	$ 314,000
1c	Engineering Investigation of Access Options	$ 150,000
	Collection System Priority 1 Improvements	**$ 663,000**
Collection System Priority 2 Improvements		
2a	24th Street North Pipeline Replacement - 3rd Ave N to 1st Ave N	$ 223,000
2b	Pipeline Replacement - 11th Ave to 16th Ave between 21st and 23rd St	$ 584,000
2c	East Orchards Sewer Expansion Phase 2	$ 2,000,000
2d	Design and Construction of Access Improvements	$ 1,395,000
	Collection System Priority 2 Improvements	**$ 4,202,000**
Collection System Priority 3 Improvements		
3a	Pipeline Replacement near Lewiston Country Club	$ 720,000
3b	Main Street Pipeline Reconstruction - 9th St to 6th St	$ 304,000
3c	G Street Pipeline Reconstruction 15th St to 16th St	$ 202,000
3d	Pipeline Reconstruction downstream of COSD Warner Discharge Point	$ 68,000
3e	East Orchards Sewer Expansion Phase 3	$ 3,879,000
	Collection System Priority 3 Improvements	**$ 5,173,000**

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our opinion of probable costs at this time and is subject to change as the project design matures. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids, or actual construction costs will not vary from the cost presented herein.

Wastewater Capital Improvements Project
Pipeline Reconstruction along 11th Ave and Prospect Ave to 10th Ave

Project Identifier: 1a

Objectives: Replace undersized, problematic line running through alley and under structures.

Potential Issues:
- Maintaining services during construction.

Project Location:
Corner of 11th Avenue and Propsect Avenue

Items	Unit	Unit Price	Estimated Quantity	Estimated Cost (2017)
8-inch Pipe - Excavation, Backfill	LF	$ 62	530	$ 32,860
Manholes - 48"	EA	$ 3,000	5	$ 15,000
Existing Utility Protection	LF	$ 4	530	$ 2,120
Half Lane Pavement Repair	LF	$ 25	530	$ 13,250
Reconnect Services	EA	$ 3,500	12	$ 42,000
Pipe Boring	LF	$ 650	0	$ -
Traffic Control - With Flagging	LS	$ 2,500	0	$ -
Traffic Control - Without Flagging	LF	$ 4	530	$ 2,120
Subtotal				**$ 107,350**
Mobilization - Percent of Item Cost Sum	%	10%		$ 10,735
Contingency - % of construction costs	%	35%		$ 37,573
Total Construction Costs				**$ 155,658**
Geotechnical Investigation		$ 4,000		$ 4,000
Engineering and CMS - % of construction costs	%	25%		$ 38,914
Total Estimated Cost (rounded)	**$199,000**			

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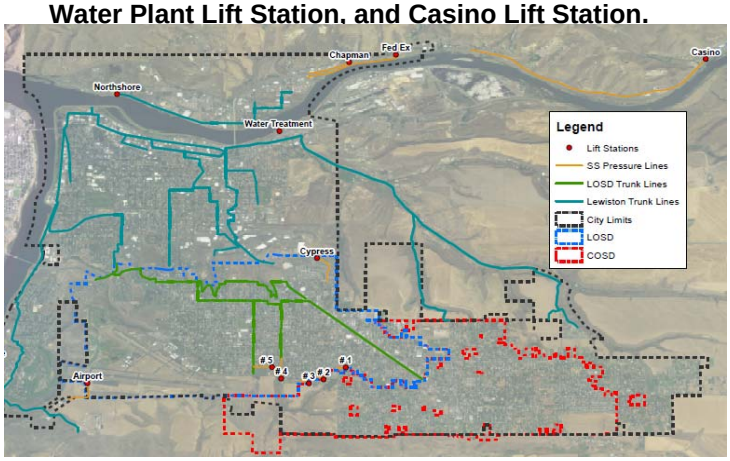
Wastewater Capital Improvements Project
Lift Station Upgrades

Project Identifier: 1b

Objective: Correct existing deficiencies identified at each lift station during site visits in September 2014.

Potential Issues:
- Maintaining Operation during construction activities.
- Potential high groundwater

Project Location:
Airport Lift Station, Chapman Lift Station, Fed Ex Lift Station, Water Plant Lift Station, and Casino Lift Station.



Items	Unit	Unit Price	Estimated Quantity	Estimated Cost (2017)
Airport Lift Station Upgrades (New Lid, Security Fencing, Fall Protection)	LS	$ 10,600	1	$ 10,600
Chapman Lift Station Upgrades (Security Fencing, Fall Protection)	LS	$ 6,400	1	$ 6,400
Fed Ex Lift Station Upgrades				
Replace Corroded Cable Hanger in Wet Well with Stainless Steel	LS	$ 1,100	1	$ 1,100
Replace Wet Well Cover	LS	$ 3,200	1	$ 3,200
Provide Fall Protection in Wet Well	LS	$ 2,100	1	$ 2,100
Rehabilitate/Replace Down Stream Manholes (assumes 10)	EA	$ 2,100	10	$ 21,000
Install an Air Release Valve within Existing Valve Vault	LS	$ 3,700	1	$ 3,700
Water Plant Lift Station Upgrades				
Install Backwater/Check Valve	LS	$ 10,600	1	$ 10,600
New Pumps with VFDs	EA	$ 26,500	2	$ 53,000
Extend Backup Power to Lift Station	LS	$ 12,700	1	$ 12,700
Provide Fall Protection in Wet Well	LS	$ 2,100	1	$ 2,100
Casino Lift Station Upgrades				
Install Security Fencing and Fall Protection	LS	$ 6,400	1	$ 6,400
Install a Grease Aerator	LS	$ 15,900	1	$ 15,900
Rehabilitate/Replace Down Stream Manholes (assumes 10)	EA	$ 2,100	10	$ 21,000
Subtotal				**$ 169,800**
Mobilization - Percent of Item Cost Sum	%	10%		$ 16,980
Contingency - % of construction costs	%	35%		$ 59,430
Total Construction Costs				**$ 246,210**
Engineering and CMS - % of construction costs	%	25%		$ 61,553
Groundwater Infilitration Investigation	LS	$ 6,000	1	$ 6,000
Total Estimated Cost (rounded)				**$314,000**

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Wastewater Capital Improvements Project
Engineering Investigation of Access Points

Project Identifier: 1c

Objective: Investigate access points

Project Location:
Various throughout City

Items	Unit	Unit Price	Estimated Quantity	Estimated Cost (2017)
Investigation of Access Points	LS	$ 150,000	1	$ 150,000
Total Estimated Cost (rounded)	**$150,000**			

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Wastewater Capital Improvements Project
24th Street North Pipeline Upgrade, 3rd Ave N to 1st Ave N

Project Identifier: 2a

Objective: Increase pipeline capacity to accomodate future growth.

Potential Issues:
- Maintaining services during construction.
- Consider evaluating pipe bursting during pre-design

Project Location:
Along 24th Street from 1st Avenue to 3rd Avenue

Items	Unit	Unit Price	Estimated Quantity	Estimated Cost (2017)
12-inch Pipe - Excavation, Backfill	LF	$ 95	780	$ 74,100
Manholes - 48"	EA	$ 3,000	4	$ 12,000
Existing Utility Protection	LF	$ 4	780	$ 3,120
Traffic Control - Without Flagging	LF	$ 4	780	$ 3,120
Half Lane Pavement Repair	LF	$ 25	780	$ 19,500
Reconnect Services	LF	$ 14	780	$ 10,920
Subtotal				**$ 122,760**
Mobilization - Percent of Item Cost Sum	%	10%		$ 12,276
Contingency - % of construction costs	%	35%		$ 42,966
Total Construction Costs				**$ 178,002**
Engineering and CMS - % of construction costs	%	25%		$ 44,501
Total Estimated Cost (rounded)	**$223,000**			

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Wastewater Capital Improvements Project
Pipeline Upgrades from 11th to 16th Avenue between 21st St and 23rd St

Project Identifier: 2b

Objective: Increase pipe capacity to accomodate future growth.

Potential Issues:
- Maintaining services during construction.
- Consider evaluating rerouting pipelines during pre-design
- Consider evaluating pipe bursting during pre-design

Project Location:
From 11th Avenue to 16th Avenue between 21st Street and 23rd Street

Items	Unit	Unit Price	Estimated Quantity	Estimated Cost (2017)
10-inch Pipe - Excavation, Backfill	LF	$ 75	630	$ 47,250
12-inch Pipe - Excavation, Backfill	LF	$ 95	1,630	$ 154,850
Manholes - 48"	EA	$ 3,000	20	$ 60,000
Existing Utility Protection	LF	$ 4	2,260	$ 9,040
Traffic Control - Without Flagging	LF	$ 4	880	$ 3,520
Half Lane Pavement Repair	LF	$ 25	880	$ 22,000
Miscellaneous Surface Repair	LF	$ 5	1,380	$ 6,900
Reconnect Services	LF	$ 14	2,260	$ 31,640
Subtotal				**$ 335,200**
Mobilization - Percent of Item Cost Sum	%	10%		$ 33,520
Contingency - % of construction costs	%	35%		$ 117,320
Total Construction Costs				**$ 486,040**
Engineering and CMS - % of construction costs	%	20%		$ 97,208
Total Estimated Cost (rounded)	**$584,000**			

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Wastewater Capital Improvements Project
East Orchards Sewer Extension Phase 2 and 3

Project Identifier: 2c and 3e

Objective: To address high nitrate concerns and eliminate septic systems.

Potential Issues:
- Extending services to approximately 550 local home owners (for planning purposes included only cost to stub for ROW -- property owner to extend to home)
-Potential grant funding assistance should be explored
-Project could be implemented in phases.
-Final alignments to be determined during desing phase

Project Location:
East end of Lewiston south of Lindsay Creek Rd

Items	Unit	Unit Price	Estimated Quantity	Estimated Cost (2017)
8-inch Pipe - Excavation, Backfill	LF	$ 62	29,939	$ 1,856,218
Manholes - 48"	EA	$ 3,000	86	$ 256,800
Existing Utility Protection	LF	$ 4	7,120	$ 28,480
Half Lane Pavement Repair	LF	$ 25	7,120	$ 178,000
Miscellaneous Surface Repair	LF	$ 5	22,819	$ 114,095
Traffic Control - Without Flagging	LF	$ 4	7,120	$ 28,480
Service Stub to property line	EA	$ 1,000	550	$ 550,000
Smaller Lift Station	LS	$ 450,000	1	$ 450,000
Subtotal				**$ 3,462,073**
Mobilization - Percent of Item Cost Sum	%	10%		$ 346,207
Contingency - % of construction costs	%	30%		$ 1,038,622
Total Construction Costs				**$ 4,846,902**
Easement/Permitting Support	LS	$ 12,500		$ 12,500
Geotechnical Support	LS	$ 10,000		$ 10,000
Lift Station Site Purchase	LS	$ 40,000		$ 40,000
Engineering and CMS - % of construction costs	%	20%		$ 969,380
Total Estimated Cost (rounded)	**$5,879,000**			

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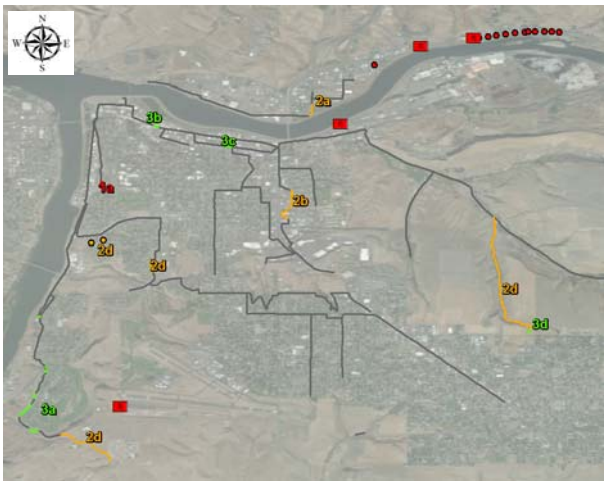
Wastewater Capital Improvements Project
Design and Construction of Access Roads

Project Identifier: 2d

Objective: Construct a road that will provide the City with access to existing sewer lines with limited access

Potential Issues:
- Constructing in wetlands
- Standing water along pipe path
- Limited access for construction

Project Location:
Various Locations



Items	Unit	Unit Price	Estimated Quantity	Estimated Cost (2017)
Gravel Road Construction (12' Wide)	LF	$ 50	13,000	$ 650,000
Raise Manholes and surrounding ground	EA	$ 4,000	45	$ 180,000
Subtotal				**$ 830,000**
Mobilization - Percent of Item Cost Sum	%	10%		$ 83,000
Contingency - % of construction costs	%	30%		$ 249,000
Total Construction Costs				**$ 1,162,000**
Engineering and CMS - % of construction costs	%	20%		$ 232,400
Total Estimated Cost (rounded)	**$1,395,000**			

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Wastewater Capital Improvements Project
Pipelines Upgrades near Lewiston Country Club

Project Identifier: 3a

Objective: Increase pipe capacity to accomodate future development

Potential Issues:
- Maintaining services during construction.
- Traffic control

Project Location:
Various Locations west of Lewiston Airport

Items	Unit	Unit Price	Estimated Quantity	Estimated Cost (2017)
8-inch Pipe - Excavation, Backfill	LF	$ 62	100	$ 6,200
12-inch Pipe - Excavation, Backfill	LF	$ 95	2160	$ 205,200
Manholes - 48"	EA	$ 3,000	17	$ 51,000
Existing Utility Protection	LF	$ 4	972	$ 3,887
Rock Removal	LF	$ 40	1130	$ 45,200
Traffic Control - With Flagging	LF	$ 8	972	$ 7,774
Half Lane Pavement Repair	LF	$ 25	972	$ 24,293
Reconnect Services	LF	$ 28	2260	$ 63,280
Miscellaneous Surface Repair	LF	$ 5	1288	$ 6,441
Subtotal				**$ 413,275**
Mobilization - Percent of Item Cost Sum	%	10%		$ 41,328
Contingency - % of construction costs	%	35%		$ 144,646
Total Construction Costs				**$ 599,249**
Engineering and CMS - % of construction costs	LF	20%		$ 119,850
Total Estimated Cost (rounded)	**$720,000**			

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Wastewater Capital Improvements Project
Main Street Pipeline Reconstruction, 9th St to 6th St

Project Identifier: 3b

Objective: Increase pipe slope to increase capacity.

Potential Issues:
- Maintaining services during construction.
- Construction in downtown area.

Project Location:
Along Main Street Between New Sixth Street and 9th Street

Items	Unit	Unit Price	Estimated Quantity	Estimated Cost (2017)
36-inch Pipe - Excavation, Backfill	LF	$ 210	490	$ 102,900
Manholes - 72"	EA	$ 5,000	3	$ 15,000
Existing Utility Protection	LF	$ 4	490	$ 1,960
HWY Repair	LF	$ 65	490	$ 31,850
Traffic Control - Without Flagging	LF	$ 4	490	$ 1,960
Reconnect Services	LF	$ 28	490	$ 13,720
Subtotal				**$ 167,390**
Mobilization - Percent of Item Cost Sum	%	10%		$ 16,739
Contingency - % of construction costs	%	35%		$ 58,587
Total Construction Costs				**$ 242,716**
Engineering and CMS - % of construction costs	LF	25%		$ 60,679
Total Estimated Cost (rounded)	**$304,000**			

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Wastewater Capital Improvements Project
G Street Pipeline Reconstruction, 15th St to 16th St

Project Identifier: 3c

Objective: Increase pipe slope to increase capacity.

Potential Issues:
- Maintaining services during construction.

Project Location:
Along G Street from 15th Street to 16th Street

Items	Unit	Unit Price	Estimated Quantity	Estimated Cost (2017)
30-inch Pipe - Excavation, Backfill	LF	$ 170	430	$ 73,100
Manholes - 60"	EA	$ 4,000	3	$ 12,000
Existing Utility Protection	LF	$ 4	430	$ 1,720
Traffic Control - Without Flagging	LF	$ 4	430	$ 1,720
Half Lane Pavement Repair	LF	$ 25	430	$ 10,750
Reconnect Services	LF	$ 28	430	$ 12,040
Subtotal				**$ 111,330**
Mobilization - Percent of Item Cost Sum	%	10%		$ 11,133
Contingency - % of construction costs	%	35%		$ 38,966
Total Construction Costs				**$ 161,429**
Engineering and CMS - % of construction costs	LS	25%		$ 40,357
Total Estimated Cost (rounded)	**$202,000**			

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Wastewater Capital Improvements Project
Pipeline Reconstruction downstream of COSD Warner discharge point

Project Identifier: 3d

Objective: Increase pipe slope to increase capacity.

Potential Issues:
- Maintaining services during construction.

Project Location:
North of Warner Avenue by 14th Street

Items	Unit	Unit Price	Estimated Quantity	Estimated Cost (2017)
18-inch Pipe - Excavation, Backfill	LF	$ 115	250	$ 28,750
Manholes - 48"	EA	$ 3,000	2	$ 6,000
Miscellaneous Surface Repair	LF	$ 5	250	$ 1,250
Subtotal				**$ 36,000**
Mobilization - Percent of Item Cost Sum	%	10%		$ 3,600
Contingency - % of construction costs	%	35%		$ 12,600
Total Construction Costs				**$ 52,200**
Engineering and CMS - % of construction costs	LS	30%		$ 15,660
Total Estimated Cost (rounded)	**$68,000**			

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City of Lewiston Wastewater Master Plan
Pipeline Replacement Unit Cost

ITEM	UNIT	UNIT PRICE*
PVC Pipe		
8-inch Pipe - Excavation, Backfill	LF	$190
10-inch Pipe - Excavation, Backfill	LF	$209
12-inch Pipe - Excavation, Backfill	LF	$239
15-inch Pipe - Excavation, Backfill	LF	$262
18-inch Pipe - Excavation, Backfill	LF	$269
21-inch Pipe - Excavation, Backfill	LF	$299
24-inch Pipe - Excavation, Backfill	LF	$322
30-inch Pipe - Excavation, Backfill	LF	$356
36-inch Pipe - Excavation, Backfill	LF	$419
42-inch Pipe - Excavation, Backfill	LF	$511
48-inch Pipe - Excavation, Backfill	LF	$639
Average Weighted Unit Cost	LF	$213

*Unit Price includes surface restoration, manholes, contingency, and engineering services.

City of Lewiston Wastewater Master Plan
Approach 1 - Replace 1% of the Entire Collection System per Year

Pipe Diameter [in]	Pipe Material Lengths [ft]					Total by Diameter [ft]	% of Total
	Unknown	Clay	Concrete	Other	Plastic		
6"	282	26,174	17,716	496	7,702	52,370	12.1%
8"	715	62,788	79,878	417	111,457	255,255	59.1%
10"	856	3,653	13,612	0	7,288	25,409	5.9%
12"	314	8,013	9,904	0	4,974	23,205	5.4%
14"	0	846	0	0	0	846	0.2%
15"	0	1,587	8,464	0	1,934	11,985	2.8%
16"	306	217	0	0	0	523	0.1%
18"	0	0	22,895	0	5,624	28,519	6.6%
21"	0	0	51	0	2,145	2,196	0.5%
24"	0	0	5,583	0	7,382	12,965	3.0%
30"	0	0	7,268	0	0	7,268	1.7%
36"	0	306	7,834	0	0	8,140	1.9%
42"	0	8	0	0	0	8	0.0%
48"	0	0	447	0	0	447	0.1%
Unknown	2,734	0	0	0	0	2,734	0.6%
Total [ft]	5,208	103,591	173,651	913	148,505	431,869	100%
% of Total	1.20%	24.00%	40.20%	0.20%	34.40%	81.8	Miles

Assumptions:

1. One percent of the pipe system will be replaced per year.
2. 6-inch pipe and unknown diameter pipe will be replaced with 8-inch pipe.
3. 14-inch pipe will be replaced with 15-inch pipe.
4. 16-inch pipe will be replaced with 18-inch pipe.

Pipe Size	Annual Feet of Pipe Replaced	Annual Replacement Cost
8"	3,104	$588,906
10"	254	$53,168
12"	232	$55,518
15"	128	$33,585
18"	290	$78,196
21"	22	$6,572
24"	130	$41,715
30"	73	$25,838
36"	81	$34,127
42"	0.1	$41
48"	4	$2,855
Total	**4,319**	**$921,000**

City of Lewiston Wastewater Master Plan
Approach 2 - Replace all Non-Plastic Pipe over 40 Years

Pipe Diameter [in]	Pipe Material Lengths [ft]					Total by Diameter [ft]	% of Total
	Unknown	Clay	Concrete	Other	Plastic		
6"	282	26,174	17,716	496	7,702	52,370	12.1%
8"	715	62,788	79,878	417	111,457	255,255	59.1%
10"	856	3,653	13,612	0	7,288	25,409	5.9%
12"	314	8,013	9,904	0	4,974	23,205	5.4%
14"	0	846	0	0	0	846	0.2%
15"	0	1,587	8,464	0	1,934	11,985	2.8%
16"	306	217	0	0	0	523	0.1%
18"	0	0	22,895	0	5,624	28,519	6.6%
21"	0	0	51	0	2,145	2,196	0.5%
24"	0	0	5,583	0	7,382	12,965	3.0%
30"	0	0	7,268	0	0	7,268	1.7%
36"	0	306	7,834	0	0	8,140	1.9%
42"	0	8	0	0	0	8	0.0%
48"	0	0	447	0	0	447	0.1%
Unknown	2,734	0	0	0	0	2,734	0.6%
Total [ft]	5,208	103,591	173,651	913	148,505	431,869	100%
% of Total	1.20%	24.00%	40.20%	0.20%	34.40%	81.8	Miles

Assumptions:

1. All installed plastic pipe will last longer than 40 years before failure.
2. All clay, concrete, unknown and other material pipe will be replaced over 40 years.
3. 6-inch pipe and unknown diameter pipe will be replaced with 8-inch pipe.
4. 14-inch pipe will be replaced with 15-inch pipe.
5. 16-inch pipe will be replaced with 18-inch pipe.

Pipe Size	Annual Feet of Pipe to be Replaced	Annual Replacement Cost
8"	4,780	$907,005
10"	453	$94,795
12"	456	$109,044
15"	272	$71,307
18"	585	$157,632
21"	1	$382
24"	140	$44,908
30"	182	$64,594
36"	204	$85,317
42"	0	$102
48"	11	$7,137
Total	**7,084**	**$1,543,000**

City of Lewiston Wastewater Master Plan

Approach 3 - Replace Pipes Rated 6 to 10 and Repair Spot Defects Rated 4 and 5 over 20 Years

Pipe Diameter [in]	Pipe Material Lengths [ft]					Total by Diameter [ft]	% of Total
	Unknown	Clay	Concrete	Other	Plastic		
6"	282	26,174	17,716	496	7,702	52,370	12.1%
8"	715	62,788	79,878	417	111,457	255,255	59.1%
10"	856	3,653	13,612	0	7,288	25,409	5.9%
12"	314	8,013	9,904	0	4,974	23,205	5.4%
14"	0	846	0	0	0	846	0.2%
15"	0	1,587	8,464	0	1,934	11,985	2.8%
16"	306	217	0	0	0	523	0.1%
18"	0	0	22,895	0	5,624	28,519	6.6%
21"	0	0	51	0	2,145	2,196	0.5%
30"	0	0	7,268	0	0	7,268	1.7%
36"	0	306	7,834	0	0	8,140	1.9%
42"	0	8	0	0	0	8	0.0%
48"	0	0	447	0	0	447	0.1%
Unknown	2,734	0	0	0	0	2,734	0.6%
Total [ft]	5,208	103,591	173,651	913	148,505	431,869	100%
% of Total	1.20%	24.00%	40.20%	0.20%	34.40%	81.8	Miles

Assumptions:

1. All pipes rated as a 6 or higher based on CCTV data will be replaced over the next 20 years.
2. Total of 3,647 shown in GIS data.
2. All spot defects rated as a 4 or higher will be repaired over the next 20 years.
3. Pipe replacement costs will be based on a weighted average replacement cost of $213/lf.
4. The total length of pipe CCTV inspected is 95,537 feet (482 pipes).
5. Spot defects will cost approximately $5,000 to repair.

Pipe Rating From CCTV	Feet of Pipe	Percent of CCTV Inspected Pipelines
1	43,710	46%
2	12,497	13%
3	7,734	8.1%
4	9,379	10%
5	2,402	2.5%
6	4,891	5.1%
7	1,553	1.6%
8	5,929	6.2%
9	4,422	4.6%
10	3,020	3.2%
% of Pipelines Rated 6+		**20.7%**

City of Lewiston Wastewater Master Plan

Approach 3 - Replace Pipes Rated 6 to 10 and Repair Spot Defects Rated 4 and 5 over 20 Years

tal feet of pipe to be replaced over 20 years (20.7% * 431,869 feet)	89,569	feet
Annual feet of pipe to be replaced	4,478	feet
Annual pipeline replacement cost	**$955,000**	
Number of identified spot defects	42	defects
Percent of Pipe CCTV inspected by length	22%	
Estimated number of spot defects to be replaced over 20 years	190	
Total repair budget for spot defects	$950,000	
Annual spot defect repair cost	**$48,000**	
Total Annual Replacement Cost	**$1,003,000**	