"Healthy environment, healthy people"

Montana Department of
ENVIRONMENTAL QUALITY

Steve Bullock, Governor
Tracy Stone-Manning, Director

P. O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • Website: www.deq.mt.gov

March 13, 2013

Gregory Doyon, City Manager
City of Great Falls
P.O. Box 5021
Great Falls, MT 59403

RE: Wastewater Improvements
C301297
Great Falls, Montana

Dear Mr. Doyon:

Enclosed is a copy of the Finding of No Significant Impact (FONSI) and Environmental Assessment (EA) for the Great Falls Wastewater Improvements Project. **Please print the FONSI letter in one publication of your local paper under legal advertising and return the Proof of Advertising.** You do not have to print the EA, just have it available for public review should there be interest. We recommend you advertise this as soon as possible to allow for a 30-day comment period. **The FONSI and EA will be placed on our website for public review at http://www.deq.mt.gov/ea.mcpx.**

If you have any questions, please do not hesitate to contact me at (406) 444-6776.

Sincerely,

Mike Abrahamson, P.E.
Environmental Engineer
Technical & Financial Assistance bureau

Enclosures

Cc: Craig Caprara, P.E., HDR Engineering, Inc. (via e-mail)
Jeff Ashley, P.E., Morrison-Maierle, Inc. (via e-mail)
Mike Kynett, P.E., City Engineer, Great Falls (via e-mail)

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March 13, 2013

FINDING OF NO SIGNIFICANT IMPACT

TO ALL INTERESTED GOVERNMENTAL AGENCIES AND PUBLIC GROUPS

As required by state and federal rules for determining whether an Environmental Impact Statement is necessary, an environmental review has been performed on the proposed action below:

Project	Great Falls Wastewater Treatment System Improvements
Location	Great Falls, Montana
Project Number	WPCSRF Project # C301297
Total Cost	$23,993,000

The City of Great Falls' wastewater discharge permit was renewed in 2010. Based on several changes in their permit, the city has determined the need to make several improvements to the treatment facility in order to maintain compliance. Specifically, the new permit contains more stringent discharge limitations for bacteria, allowable chlorine residual, and ammonia. In addition, piping modifications are needed to prevent the bypass of the primary clarifiers and the secondary treatment process at peak flow rates. Finally, the new permit also requires the city to evaluate their flow monitoring capabilities, procedures and devices, and to make any necessary upgrades.

To meet these new requirements the city proposes to replace the existing gas chlorination disinfection system with an ultra-violet disinfection system, convert the existing secondary treatment process from complete-mix activated sludge to a Modified Ludzack-Ettinger (MLE) process for ammonia removal, make piping modifications that allow the primary clarifiers and secondary treatment process to remain operational and fully functional at the expected design peak hourly flow rate of 36 million gallons per day and install new flow monitoring devices for influent, effluent, and side stream flows.

Federal and State grant/loan programs will fund the project. Environmentally sensitive characteristics such as wetlands, floodplains, historical sites, and threatened or endangered species are not expected to be adversely impacted as a result of the proposed project. No significant long-term environmental impacts were identified. An environmental assessment (EA), which describes the project and analyzes the impacts in more detail, is available for public scrutiny on the DEQ web site (**http://www.deq.mt.gov/ea.mcpx**) and at the following locations:

Mike Abrahamson, P.E.
Department of Environmental Quality
1520 East Sixth Avenue
P.O. Box 200901
Helena, MT 59620-09011
mabrahamson@mt.gov

Gregory Doyon, City Manager
City of Great Falls
P.O. Box 5021
Great Falls, MT 59403

Comments on the EA may be submitted to the Department of Environmental Quality at the above address. After evaluating substantive comments received, the department will revise the environmental assessment or determine if an environmental impact statement is necessary. If no substantive comments are received during the comment period, or if substantive comments are received and evaluated and the environmental impacts are still determined to be non-significant, the agency will make a final decision. No administrative action will be taken on the project for at least 30 calendar days after release of the Finding of No Significant Impact.

Sincerely,

Todd Teegarden

Todd Teegarden, Bureau Chief
Technical and Financial Assistance Bureau

GREAT FALLS WASTEWATER TREATMENT SYSTEM IMPROVEMENTS

ENVIRONMENTAL ASSESSMENT

I. COVER SHEET

A. PROJECT IDENTIFICATION

Applicant: City of Great Falls

Address: 2 Park Drive South
Great Falls, MT 59401

Project Number: SRF Project # C301297

B. CONTACT PERSON

Name: Gregory Doyon, City Manager

Address: PO Box 5021
Great Falls, MT 59403

Telephone: (406) 455-8450

C. ABSTRACT

The City of Great Falls currently utilizes a complete-mix activated sludge process with chlorine disinfection to provide wastewater treatment. Treated effluent is discharged to the Missouri River. The city's wastewater discharge permit was renewed in 2010. Based on several changes in the new permit, the city has determined the need to make several improvements to the treatment facility in order to maintain compliance. Specifically, the new permit contains more stringent discharge limitations for: bacteria; allowable chlorine residual; and ammonia. In addition, piping modifications are needed to prevent the bypass of the primary clarifiers and the secondary treatment process at peak flow rates. Finally, the new permit also requires the city to evaluate their flow monitoring capabilities, procedures and devices, and make any necessary upgrades.

To meet these new requirements the city proposes to replace the existing gas chlorination disinfection system with an ultra-violet disinfection system, convert the existing secondary treatment process from a complete-mix activated sludge to a Modified Ludzack-Ettinger (MLE) process for ammonia removal, make piping modifications that allow the primary clarifiers and secondary treatment process to remain operational and fully functional at the expected design peak hourly flow rate of 36 million gallons per day, and install new flow monitoring devices for influent, effluent, and side stream flows.

The improvements, including administration, engineering, and construction are estimated to cost approximately $23,993,000. It is anticipated that the project will

be funded through a low interest loan (3.00%) obtained from the State Revolving Fund (SRF) loan program and local funds.

Environmentally sensitive characteristics such as wetlands, floodplains, threatened or endangered species and historical sites are not expected to be adversely impacted as a result of the proposed project. Additional environmental impacts related to land use, water quality, air quality, public health, energy, noise, growth, and sludge disposal were also assessed. No significant long-term environmental impacts were identified.

Under Montana law, (75-6-112, MCA), no person may construct, extend, or use a public sewage system until the DEQ has reviewed and approved the plans and specifications for the project. Under the Montana Water Pollution Control State Revolving Fund Act, the DEQ may loan money to municipalities for construction of public sewage systems.

The DEQ, Technical and Financial Assistance Bureau, has prepared this Environmental Assessment to satisfy the requirements of the Montana Environmental Policy Act (MEPA) and the National Environmental Policy Act (NEPA).

D. COMMENT PERIOD

Thirty (30) calendar days

II. PURPOSE OF AND NEED FOR ACTION

The City of Great Falls' (city) existing wastewater treatment facility is a conventional activated sludge treatment system with chlorine disinfection and anaerobic sludge digestion. It was built in 1974 to serve 120,000 people with an average daily flow of 21 million gallons per day (MGD). The city's wastewater treatment facility (WWTF) is a well-run and well-maintained facility that consistently meets its Montana Pollutant Discharge Elimination System (MPDES) discharge permit limits. However, the city's new discharge permit, issued in 2010, contains several new requirements that the current WWTF will not be able to meet. The maximum *E. coli* limit in the discharge permit has been reduced from 11,590 colony forming units/100 mL to 126 colony forming units/100 mL, and the limit has changed from seasonal (April 1st to October 31st) to year round. The effluent chlorine residual limit was also reduced from 0.5 mg/L to 0.026 mg/L. The combination of these regulations will require the city to construct a de-chlorination facility or change to an alternate form of disinfection. The new permit includes an effluent ammonia limit of 2.18 mg/L (effective December 1, 2014) which the plant, as currently operated, will not be able to meet. While the existing activated sludge process achieves some ammonia removal, the ammonia effluent concentration (ranging from 6.2 to 24.3 mg/L) would still exceed the new limit. The existing secondary treatment process will require modifications to achieve, and consistently meet the new ammonia effluent limitations. In the past, the permit allowed the city to bypass the primary treatment process at flows over 26 MGD, and the secondary process at flows over 40 MGD. The new permit prohibits the bypassing of any treatment process and therefore piping modifications are needed to prevent the bypasses. Lastly, the new permit requires the city to evaluate their flow

monitoring capabilities, procedures and devices, and make any necessary upgrades. Influent flows were previously monitored with magnetic flow meters, which eventually failed and were not replaced due to the difficulty of bypassing the metering locations. Instead, transit time and later Doppler (strap on) meters were installed, but these meters have had issues with accuracy. In addition, more accurate metering is needed to monitor intermediate and side stream flows to assist with plant operations and reporting.

To address these issues and to provide capacity for future anticipated flows and loads, the city will need to make improvements to the disinfection system, secondary treatment process, peak flow handling, and flow metering capabilities of the wastewater treatment facility.

III. ALTERNATIVES INCLUDING THE PROPOSED ACTION

To determine if the ammonia design criteria value of 1.6 mg/L could be met, each of the secondary treatment alternatives considered below were evaluated (modeled) at the 2030 design flows, and at a temperature of 10^{o} C (to ensure year-round nitrification). This will ensure the WWTP would be able to consistently meet the 30-day average effluent requirement of 2.18 mg/L, and the maximum day effluent requirement of 3.25 mg/L. In addition, all alternatives discussed below will include the following improvements as well:

- Piping modifications that will allow the primary clarifiers and secondary treatment process to remain operational and fully functional at the expected design peak hourly flow rate of 36 MGD.

- Two new pumps will be installed in the West Pump Station. Each new pump will be sized to accommodate flows from 3,000 gpm to 7,500 gpm (4.32 MGD to 10.80 MGD), and will be equipped with variable frequency drives (VFDs) to provide efficient turndown over the flow range. The existing pump station includes provision for adding the new pumps, with existing piping already in place. The two existing pumps, which are still in operating condition, but just not as efficient at pumping current flow rates, will be retained for redundancy during high flow situations. The new pumps, in conjunction with the existing pumps (20.10 MGD capacity each), will result in a firm pumping capacity of 41.76 MGD for the West Pump Station.

- Improvements to the facility's flow metering capabilities, including the installation of a new weir structure that will house two Cipolletti weirs with ultrasonic flow measurement devices, transmitters, and staff gauges to measure the influent flow; the installation of a Parshall flume with ultrasonic flow measurement, transmitter and staff gauge to measure effluent flow; and the installation of magnetic flow meters on the process water feed to the centrifuges, and the combined gravity thickener / dissolved air floatation thickener (DAFT) overflow.

- In the event that adequate funding is available, equipment to make the existing fourth secondary clarifier operational will be included as a bid alternative with the proposed project.

A. Six secondary treatment alternatives were considered for ammonia removal to meet the new permit limits. The alternatives evaluated included:

T-0 No Action
T-1 Aeration System Upgrade
T-2 Aeration System Upgrade with Additional Bioreactor Capacity
T-3 Denitrification with Plug-Flow Conversion
T-4 On-Site Treatment at Malteurop Malt Facility
T-5 Retrofit Existing Aeration Basins with a Commercial System

T-0 NO ACTION - The no-action alternative would result in the continued use of the city's complete-mix activated sludge process. Oxygen is provided to each bioreactor basin by four two-speed surface aerators. The WWTF was designed to achieve secondary treatment standards for BOD and TSS, but was not designed for ammonia removal. Ammonia can be removed from wastewater through nitrification, which is a biological process where ammonia is converted to nitrate in the presence of oxygen. While the existing activated sludge process achieves some ammonia removal, monitoring has shown that the effluent ammonia concentration ranges from 6.2 to 24.3 mg/L. This will result in permit violations when the average day ammonia limit of 2.18 mg/L is imposed in the discharge permit on December 1, 2014. Based on the inability of the existing facility to meet future discharge permit limits, even at current flows, the no-action alternative was not considered to be a viable option.

T-1 AERATION SYSTEM UPGRADE – This alternative was evaluated to determine if the city could meet the new permit limits with minimal new construction by replacing the existing surface aerators with a fine bubble diffuser system in all four bioreactor basins, to improve the nitrification process. Fine bubble diffusers have a much higher oxygen transfer rate than the current aeration system and are more cost efficient than upgrading the existing surface aerators. The only modifications that would take place would be those necessary to convert the current aeration system (surface aerators) to fine bubble diffusers, and would include: new air header system with basin air laterals; fine-bubble diffusers; new air blowers; new building to house the blowers; and electrical system modifications to accommodate the high power draw from the air blowers. However, performance modeling indicated that the existing treatment plant configuration with a fine-bubble diffusion system is not sufficient to meet the recommended design criteria (<1.6 mg/L ammonia), and therefore is not a viable solution to meet the new permit requirements.

T-2 AERATION SYSTEM UPGRADE WITH ADDITIONAL BIOREACTOR CAPACITY - This alternative consists of converting the four existing bioreactors to a fine-bubble diffusion system as described above, along with the construction of a new fifth bioreactor. All basins would remain complete-mix. Proposed modifications would include: new air header system with basin air laterals; fine-bubble diffusers; new air blowers; new building to house the blowers; electrical system modifications to

accommodate the high power draw from the air blowers; and construction of an additional 900,000 gallon bioreactor. Performance modeling indicated that converting the existing basins to a fine bubble diffusion system and construction of an additional 900,000 gallon bioreactor would result in a treatment system that meet all the recommended design criteria. In particular, the risk of violating the ammonia limit during a peak day scenario would be very low. This alternative was determined to be a viable solution and will be given further consideration.

T-3 DENITRIFICATION WITH PLUG-FLOW CONVERSION – This alternative consists of incorporating both the nitrification process (as discussed above) and a denitrification process into the treatment system. Denitrification is a biological process where the nitrate produced from nitrification is converted to nitrogen gas under anoxic conditions (the absence of free oxygen) and is released to the atmosphere. While adding denitrification will increase capital costs, it will lower operational costs by decreasing that amount of oxygen needed to treat the wastewater. A further benefit is that it will remove total nitrogen (organic, ammonia, and oxidized) from the wastewater, should this become necessary in future permits. There are several processes available for nitrification/denitrification, but the modified Ludzack-Ettinger (MLE) process was chosen because it would involve relatively minor modifications to the existing bioreactors. Furthermore, the MLE process is easily adapted to the existing activated sludge processes, is highly effective in removing ammonia, and easily upgraded for biological nutrient removal should future regulations require it. The MLE treatment process would contain an anoxic zone in series with an aeration zone for BOD and nitrogen removal. Nitrates produced in the aeration zone are recycled back to the anoxic basin to enhance the denitrification rates. Further treatment is then provided through secondary clarification and disinfection. Proposed modifications would include: new air header system with basin air laterals; fine-bubble diffusers; new air blowers; new building to house the blowers; electrical system modifications to accommodate the high power draw from the air blowers; reconfiguration the four existing complete-mix bioreactors into two plug-flow bioreactors; and construction of an additional 1.8 million gallon plug-flow bioreactor. The three plug-flow bioreactors will be operated in parallel. Performance modeling indicated that the proposed system will meet all recommended design criteria and anticipated discharge limits. This alternative was determined to be a viable solution and will be given further consideration.

T-4 ON SITE TREATMENT AT MALTEUROP MALT FACILITY – This alternative consists of building a conventional activated sludge plant at the Malteurop malting facility located north of Great Falls. The Malteurop barley malting plant is the largest industrial discharger by volume (1.3 MGD) to the City of Great Falls wastewater treatment plant. This may allow the city to meet new permit requirements without any additional improvements at the WWTF. Proposed improvements at the malting facility would include: construction of a 500,000 gallon bioreactor;

construction of a 200,000 gallon secondary clarifier; air header system with basin air laterals; fine-bubble diffusers; air blowers; building to house the blowers; and pumps. Performance modeling indicated that this alternative while slightly less conservative than typically recommended, was within the accepted range of design criteria and was determined to be a viable solution and will be given further consideration.

T-5 RETROFIT EXISTING AERATION BASINS WITH A COMMERCIAL SYSTEM - This alternative consists of retrofitting the existing aeration basins with Siemens' Vertical Loop Reactor (VLR), Siemens' Integrated Fixed-Film Activated Sludge (IFAS) system, or Ovivo's Cleartec Integrated Fixed-Film Activated Sludge (IFAS) system. The VLR process is designed to achieve both nitrification and denitrification and utilizes both fine bubble and coarse bubble diffusers. IFAS systems, designed primarily for nitrification, are a hybrid process that combines the features of suspended and attached-growth activated sludge systems. With each of these systems, synthetic packing media can be attached, or freely suspended, in the aeration basin of an activated sludge system. Performance modeling was performed for each of these commercial systems. The results indicated that none of these systems were capable of meeting all of the recommended design criteria (<1.6 mg/L ammonia), and therefore were not viable solutions to meet the new permit requirements.

B. To determine the most desirable disinfection process for the Great Falls WWTP, six processes were considered and included:

D-1 No Action
D-2 Expand Existing Gaseous Chlorination System with De-Chlorination
D-3 Liquid Hypochlorite with De-Chlorination
D-4 Solid Chlorine
D-5 Ultra-Violet Light
D-6 Ozone

D-1 NO ACTION - The no-action alternative would result in the continued use of the WWTP's existing gas chlorine system. The gas is stored in 1-ton pressurized cylinders. Three cylinders are located within the chlorination building while up to six cylinders can be stored on the covered loading dock. The facility's new discharge permit reduces the allowable chlorine residual concentration in the effluent. This new limit cannot be met without utilization of a de-chlorination system, which the current facility does not have. Without improvements, the facility will be in constant violation of the chlorine residual limit. Furthermore, the existing chlorination equipment is old and replacement parts are difficult to obtain. The gas storage facility has limited capacity to accommodate future growth and the gas feed equipment, which requires 100 percent standby capacity, would also be undersized as the community grows and chlorine gas use increases. Lastly, there are public health and safety concerns associated with use of chlorine gas, which is toxic and requires the facility to maintain a Risk

Management Plan, which is a burden to the staff. Chlorine gas is extremely toxic and the potential for an accidental release remains as long as the gas is stored and handled on site. Based on these concerns, the no-action alternative was not considered to be a viable option.

D-2 EXPAND EXISTING GASEOUS CHLORINATION SYSTEM WITH DE-CHLORINATION – This alternative would consist of keeping and expanding the existing gaseous chlorination system and adding a de-chlorination facility to comply with the discharge permit requirement for total residual chlorine. When chlorine gas is utilized for disinfection, de-chlorination is typically achieved by using sulfur dioxide gas, which is also rated as a toxic gas and is subject to risk management, hazardous material handling, and fire code enforcement. To accommodate system expansion, a new building with adequate storage and containment facilities will need to be constructed. Additional gas feed equipment will need to be installed to meet redundancy requirements and gas scrubbers will be needed to satisfy code requirements. Utilizing chlorine gas and sulfur dioxide would result in an increased risk to public health and safety associated with transporting, handling, and using these toxic gases. Based on these concerns, this alternative was not considered to be a viable option.

D-3 LIQUID HYPOCHLORITE WITH DE-CHLORINATION – This alternative would consist of using sodium hypochlorite for disinfection, and sodium bisulfite to de-chlorinate the plant effluent. While sodium hypochlorite and sodium bisulfite are both classified as hazardous materials, switching from a gas chlorination system to a liquid hypochlorite/bisulfite system significantly reduces the safety concerns associated with the disinfection process as these materials are safer to transport, store, and handle than chlorine gas. Conversion from the existing gas chlorination system to a hypochlorite/bisulfite system will require substantial upgrades including the installation of bulk storage tanks with secondary containment structures and metering pumps. Since the hypochlorite/bisulfite feed equipment does not take a large footprint, a new chemical storage and feed facility could be constructed closer to the application point. The hypochlorite and bisulfite solutions will be delivered to the site by tanker truck. A concern with use of hypochlorite for disinfection is the possible generation of disinfection by-products such as trihalomethane (THMs) and haloacetic acid (HAA5) in the effluent. While these by-products are not currently regulated within the permit, the regulatory trend is that these by-products will be regulated in the future by USEPA for all surface water discharges nationwide. The use of hypochlorite/bisulfite has a long history of successful application for disinfection in wastewater treatment and personnel experienced with chlorine gas can easily adapt to a sodium hypochlorite system. This alternative was determined to be a viable solution and will be given further consideration.

D-4 SOLID CHLORINE - This alternative would consist of using calcium hypochlorite or chlorinated cyanurates in the form of granules, tablets, or

powder. As with any process that utilizes chlorine for disinfection, a de-chlorination system would be required as well. Due to the significantly higher costs of solid hypochlorite in comparison to liquid hypochlorite and the concern that large quantities of solid hypochlorite in storage have been known to spontaneously combust, and if not properly sealed, solid hypochlorite can absorb water out of the air and become rock hard, it was determined that use of solid hypochlorite for large scale chlorination was not a viable alternative for the Great Falls WWTP

D-5 ULTRA-VIOLET LIGHT - This alternative would consist of constructing a new ultra-violet (UV) light disinfection system. UV is an effective means for providing disinfection, especially when preceded by a treatment process that produces a high quality effluent. UV disinfection is a physical disinfection process involving electromagnetic wavelengths which penetrates the cell wall of bacteria, altering the genetic material, and destroying its ability to replicate. A UV disinfection system uses mercury arc lamps to provide the electromagnetic wavelength and does not require the addition of chemicals that must be subsequently removed from the effluent. In addition, UV disinfection does not produce any known hazardous by-products. With this alternative a portion of the facility's existing chlorine contact basin would be converted into two open channel UV reactors equipped with low pressure/high intensity UV lamps. To provide full redundancy, two parallel channels would be developed, allowing one channel to be taken out of service for maintenance (i.e., tube cleaning, lamp replacement, etc.). The UV equipment and control panel would be housed in a building to protect it from the weather. The UV system will be designed to treat 36 MGD and meet the bacterial limits established in the discharge permit. Expansion of the system beyond the 2030 design flows would be possible through a similar installation in the second existing chlorine contact basin. This alternative was determined to be a viable solution and will be given further consideration.

D-6 OZONE - This alternative would consist of utilizing ozone, which is a very strong oxidant to provide disinfection. Ozone is generated when oxygen molecules are disassociated into oxygen atoms through use of a high voltage current. These oxygen atoms then collide with other oxygen molecules to form ozone (O_3). The ozone is generated onsite as it is unstable and decomposes to elemental oxygen shortly after generation. Key components of an ozone system include; ozone generators, ozone transfer system, contact basin, and an ozone destruction system. Due to higher power and capital costs than UV disinfection system and the increased safety risks associated with pure oxygen generation type equipment, it was determined that ozone disinfection was not a viable alternative.

C. COST COMPARISON - PRESENT WORTH ANALYSIS

The present worth analysis is a means of comparing alternatives in present day dollars and can be used to determine the most cost-effective alternative(s). An

alternative with low initial capital cost may not be the most cost efficient project if high monthly operation and maintenance costs occur over the life of the alternative. Salvage values were determined to be inconsequential, and therefore not presented. An interest rate of 5.0% over the 20-year planning period (design year 2030) was used in the analysis. Table 1 provides a summary of the present worth analysis of the feasible alternatives considered.

TABLE 1 - ECONOMIC EVALUATION OF FEASIBLE ALTERNATIVES

Alternative Number (From Above)	**Alternative**	**Total Capital Cost**	**Annual O&M**	**Total Present Worth**
T-2	Aeration System Upgrade with Additional Bioreactor Capacity	$6,590,000	$344,000	$10,880,000
T-3	Denitrification with Plug-Flow Conversion	$10,180,000	$344,000	$14,470,000
T-4	On Site Treatment at Malteurop Malt Facility	$2,110,000	$90,000	$3,230,000
D-3	Liquid Hypochlorite with De-Chlorination	$1,079,000	$550,790	$7,940,000
D-5	Ultra-Violet Light	$3,400,000	$134,000	$5,070,000

C. BASIS OF SELECTION OF PREFERRED ALTERNATIVE

Selection of the preferred alternative was based upon several criteria, both monetary and non-monetary. The ranking criteria considered are shown in Table 2. Each alternative was assigned a ranking score of 1 to 5 for each category with 5 being the most favorable and 1 being the least favorable. The ranking factors were then multiplied by the relative weight of importance assigned to each evaluation criteria. The weighted rank scores were then summed, resulting in a weighted rank total score, the greatest score indicating the highest ranking. As shown in the ranking criteria matrix, Alternative T-3 (Denitrification with Plug-Flow Conversion) ranked the highest, primarily due to treatment reliability and facility flexibility. Even though it has the highest capital cost, based on the overall score, alternative T-3 was selected to provide advanced wastewater treatment for the City of Great Falls. In addition, the city selected the ultra-violet light system (Alternative D-5) to disinfect the effluent from the wastewater treatment facility. Alternative D-5 was selected due to its lower present worth cost, the absence of toxic by-products associated with its use, its ability to treat the 2030 design flows, and the ease with which it could be expanded to accommodate growth.

Due to equipment variations that impact design layouts, as well as establish a maximum price for key process equipment, a competitive pre-selection process was undertaken for the UV equipment and aeration blowers. The city evaluated the equipment based not only on capital costs, but also considered system reliability, operation and maintenance costs, technical service and support, and warranty and performance guidelines. As a result of this process the Ozonia UV disinfection system and APG-Neuros turbo blowers were selected. Of the UV

systems considered, Ozonia had the lowest capital and operational costs, it met all the requirements in the request for proposals (RFP), and best fit the space requirements allotted by the footprint of the existing chlorine contact channel that will house the disinfection facility. Furthermore, the ability to easily add lamps to the UV system to account for uncertainties in UV transmissivity and higher flows is an added benefit to the Ozonia system. The use of turbo blowers for this project was due primarily to air flow requirements, turndown capability, pressure rise, and life cycle costs. APG-Neuros blowers were selected primarily due to their smaller footprint than blowers of similar design flows, enabling a smaller blower building to be constructed.

TABLE 2
RANKING CRITERIA FOR TREATMENT ALTERNATIVES

Criteria	**Weighting Factor**	**Alt T-2: Aeration System Upgrade w/ Additional Capacity**		**Alt T-3: Denitrification with Plug-Flow Conversion**		**Alt T-4: On Site Treatment at Malteurop Plant**	
		Score	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**
Cost Effectiveness	6	3	18	2	12	5	30
Treatment Reliability	7	4	28	5	35	2	14
Facility Flexibility	4	2	8	4	16	1	4
Operational Ease	3	4	12	4	12	5	15
Weighted Total			**66**		**75**		**63**

The estimated administration, engineering, and construction cost for the recommended alternatives (Alternative T-3 and D-5) is $23,993,000. The city will fund the project through a $22,300,018 low interest loan (3.00%; 20-year term) obtained from the Water Pollution Control State Revolving Fund (WPCSRF) loan program, and will provide $1,692,982 in local funds.

A 10% increase in sewer rates went into effect on May 1, 2012, and a second 10% increase in sewer rates will be imposed in 2013 to help pay for the proposed project. The financial impact of this project on the system users is shown in Table 3. After the rate increases are imposed, residential user rates will increase from $18.94/month to approximately $22.90/month. Based on the EPA guidance for project affordability, the proposed project will result in a monthly cost per household that is less than 1% of the monthly median household income, and therefore, is not expected to impose a substantial economic hardship on household income.

Table 3 PROJECT AFFORDABILITY	
Monthly user cost[1]	$22.90
Monthly median household income (mMHI)[2]	$2,703.00
User rate as a percentage of mMHI	0.85 %

[1] Monthly sewer rates based on winter water usage. User cost listed in Table 3 is for an average 1-inch residential meter using 650 cubic feet of water.
[2] Based on 2000 census data

IV. AFFECTED ENVIRONMENT

A. PLANNING AREA AND MAPS

The City of Great Falls is located in Cascade County in north-central Montana along the Missouri River at the Interstate 15 and Highway 87/89 junction (See Figure 1). The planning area encompasses the City of Great Falls (including Black Eagle and Malmstrom Air Force Base) as well as adjacent areas that may be developed in the near future. The city boundary and planning area are shown in Figure 2. The proposed project involves construction of a biological nutrient removal treatment plant (utilizing the Modified Ludzack-Ettinger (MLE) process for nitrogen removal), with UV disinfection to provide advanced wastewater treatment. The overall site plan, showing the location of all improvements can be seen in Figure 3. A schematic showing a more detailed layout of the proposed improvements can be seen in figure 4. The project will take approximately eighteen months to construct. Construction is scheduled to begin in spring 2013.

B. FLOW PROJECTIONS

The most recent census data shows that the City of Great Falls has seen an annual growth rate of 0.3% annually over the last ten years. For planning purposes, a conservative growth rate of 0.5% for the 20 year planning period was assumed. Using this growth rate, the population served by the Great Falls wastewater treatment plant is estimated to be 70,265 in the year 2030. The current average day flow to the wastewater treatment facility is approximately 10.5 million gallons per day (MGD). Of this, 8.6 MGD can be attributed to residential wastewater flows and 1.9 MGD to industrial sources. The proposed improvements will result in an average day design flow rate of 13.32 MGD.

The projected design population and design flows are shown in Table 4.

Table 4 PROJECTED POPULATION AND WASTEWATER FLOWS				
Year	**Population**	**Average Daily Flow**	**Peak Day Flow**	**Peak Hour Flow**
		(MGD)	**(MGD)**	**(MGD**
2010	62,881	10.5	18.90	28.35
2030	70,265	13.32	23.98	35.96

C. NATURAL FEATURES

The City of Great Falls is located within the northern Great Plains approximately 70 miles east of the Rocky Mountain front and approximately 30 miles north of the Little Belt Mountains. The Missouri River flows through the city from the southwest to the northeast. The Sun River flows into the Missouri River in the western part of the city. The topography in the region is a combination of valleys and plateaus. Topography is variable throughout the city, but in general slopes gently towards the Missouri River. Elevations range from 3,500 feet above sea level to 3,300 feet near the river. Soils in the area are well-drained and consist primarily of clays, loams, sands, and silts. During continental glaciation, the valley became the temporary site of Glacial Lake Great Falls wherein relatively thick deposits of lakebed sediment were deposited. As the ice receded, and the lake drained, the soft clay consolidated and was variably eroded and covered by alluvial deposition associated with river re-establishment. The predominant geological feature of the study area is the Sweetgrass Arch, a broad low uplift in the marine basin that covered the region during the Middle Jurassic Period. The surficial geology at the project site consists of topsoil overlying alluvial sands and clays, which in turn overlay variably weathered shale bedrock at greater depths. While the area can be classified as semi-arid, the climate is very favorable for dry land farming. Much of the better land in the area has been cultivated for grain production and is very productive, while the remaining areas with native grass are considered to be excellent forage.

Groundwater quality is generally good in alluvial aquifers near major streams and rivers, and in deeper bedrock aquifers near the mountains. Six soil borings were drilled on-site in early June 2012 to depths between 20 and 33 feet below the existing grade. Two of these borings showed groundwater present at depths of 8.3 to 8.8 below the existing ground level. The field investigation did not fully reflect seasonal or long-term groundwater conditions, which likely fluctuate based on precipitation or other hydrologic impacts originating off-site (e.g., river elevations).

The Missouri River at Great Falls is classified as a B-2 waterbody by the State of Montana. Waters classified B-2 are suitable for drinking, culinary, and food processing purposes after conventional treatment. It is also considered suitable for bathing, swimming and recreation; growth and marginal propagation of salmonoid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply. Flow rates in the Missouri River at Great Falls are determined largely by dam releases at Holter Dam, and the Dearborn and Sun Rivers, the latter of which is also reservoir controlled. The Missouri River at the Great Falls WWTP outfall is not a free-flowing river. It is dammed approximately 1.7 miles downstream by the Black Eagle Dam, which results in a relatively consistent water surface elevation regardless of flow.

Great Falls' temperature can range from an average high of 85^{o} F in July to an average low of 14^{o} F in January. Wintertime temperatures can fluctuate rapidly due to warm "chinook" winds out of the southwest, or the movement of cold arctic fronts out of the north. The average annual precipitation rate is approximately 15

inches per year, the majority of which falls during May and June. Snow is common from November to March, and averages about 60 inches per year. The prevailing wind direction is out of the southwest and the average wind speed is relatively high at 13 mph.

V. ENVIRONMENTAL IMPACTS OF PROPOSED PROJECT

A. DIRECT AND INDIRECT ENVIRONMENTAL IMPACTS

1. Land Use/Prime Farmland – All treatment improvements will occur on land within the boundaries of the existing wastewater treatment facility. The proposed project will not impact prime farmland or land use in general. Most of the upgrades will occur to existing facilities within the existing treatment plant complex. The new bioreactor basin will be constructed east of the existing facility on undeveloped land within existing plant boundaries.

2. Floodplains and Wetlands –The proposed project will not impact any wetlands. All portions of the completed project will be constructed above the documented floodplain elevation of 3295 feet and therefore out of the 100-year floodplain. Prior to construction, the City of Great Falls floodplain administrator will determine if a floodplain permit is required for this project. The Department of Natural Resources (floodplains) and Army Corps of Engineers (wetlands) have been notified of this project and asked to reply with any concerns. See *Section X Agencies Consulted* of this report for a summary of their comments.

3. Cultural Resources – No impacts to cultural resources are anticipated. The wastewater treatment plant improvements should not impact historic or cultural resources since all new facilities will be constructed within the existing plant boundary. The State Historic Preservation Office (SHPO) reviewed the proposed project. They conducted a cultural resource file search for the area and concluded that there is a low likelihood that cultural properties will be impacted by the proposed project, and that a cultural resource inventory is unwarranted at this time. However, if cultural materials are inadvertently discovered during this project, SHPO must be contacted and the site investigated. The State Historic Preservation Office (SHPO) has reviewed the proposed project. See *Section X Agencies Consulted* of this report for a summary of their comments.

4. Fish and Wildlife – Fish and animal life will not be significantly affected by the proposed project. Most of the upgrades will occur to existing facilities within the treatment plant complex. The new bioreactor basin will be constructed east of the existing facility on undeveloped land with sparse vegetation. This land is owned by the City of Great Falls and was set aside for future plant expansion. The land is located within an urban/industrial setting and therefore the project will not affect any critical wildlife habitats, nor will any known endangered species be affected. The proposed project has water quality benefits, including nitrogen and

pathogen reduction, that will protect and reduce the risk of harm to fisheries and other animals.

The Montana Department of Fish, Wildlife, and Parks and U.S. Fish and Wildlife Services have been notified of this project and asked to reply with any concerns. See *Section X Agencies Consulted* of this report for a summary of their comments.

5. Water Quality – The proposed wastewater treatment facility will produce a higher quality effluent than the current facility, and therefore will have a positive effect on the Missouri River.

The existing wastewater treatment facility is designed to serve a population of 120,000 with a design flow of 21 MGD. Those numbers were used to establish the facility's baseline allocated non-degradation load limits (BOD and TSS) in the MPDES discharge permit. Any increase above this baseline allotment is subject to the provisions of Montana's Non-Degradation Policy 75-5-303, MCA, and would require the facility to provide a higher level of treatment for compliance. Recent discharge data has shown that the existing facility is currently discharging approximately 15% of the allotted BOD load and 9% of the allotted TSS load and therefore well within their allotted load allocation for those parameters.

The Missouri River is listed on the State's 2012 303(d) list of impaired water bodies. The beneficial uses impacted are aquatic life and drinking water. The probable causes of these impacts have been identified as chromium, mercury, PCBs, sedimentation, selenium, solids, and turbidity. Contaminated sediments, industrial discharges, storm water discharges, and dam construction are listed as probable sources for these pollutants. The total maximum daily load (TMDL) for the Missouri River near the facility's outfall has not yet been completed by the MDEQ, and therefore specific limits, or loads, for pollutants have not been established. There are no numeric water quality standards for nutrients (i.e., nitrogen and phosphorus) that apply to the Missouri River in the area of the WWTP discharge. Therefore, no permit limits for these parameters are necessary at this time.

The facility's current discharge permit contains effluent limits for four metals (arsenic, copper, selenium, and thallium) that will go into effect on December 1, 2014. Extensive effluent monitoring indicates that the existing facility is unable to meet all of these limits on a consistent basis. It is uncertain what effect, if any, the upgraded facility will have on metal removal in the effluent. If it is determined that metal removal will be required to meet effluent limits, the city will need to address that in a separate future project. This issue will require careful consideration of all alternatives, including industrial pre-treatment, corrosion control in the water distribution system, tertiary treatment processes, etc.

The primary purpose of the proposed upgrades to the wastewater treatment facility is to further improve the quality of the effluent. The city's new discharge permit contains an average monthly ammonia limit of 2.18 mg/L and a maximum daily ammonia limit of 3.25 mg/L that will go into effect December 1, 2014. System performance modeling indicates that the new facility will be capable of meeting these limits, producing a peak day composite effluent ammonia concentration of 1.0 mg/L. Currently the Great Falls WWTP (at 10.5 MGD) discharges, on average, an ammonia concentration of 15.6 mg/L. Once the new facility is operational, the concentration of ammonia in the discharge will be reduced by 94% and will result in the in-stream water quality standards being met. The new facility will continue to produce an effluent that meets or exceeds the current low levels of BOD and TSS. While nutrient removal (i.e., total nitrogen and total phosphorus) are not required at this time, the proposed improvements are a major step towards meeting more stringent nutrient standards that may implemented in future permits.

6. Air Quality - Short-term negative impacts on air quality are expected to occur during construction from heavy equipment in the form of dust and exhaust fumes. Proper construction practices will minimize this problem. Project specifications will require dust control. The new bioreactors will be designed and operated in a manner that will minimize or eliminate the generation of any new odors from the treatment plant.

7. Public Health - Public health will not be negatively affected by the proposed project. The proposed treatment facility improvements will reduce nutrients to the Missouri River. Improvements will also replace the existing chlorine gas disinfection system with an ultra violet light (U.V) disinfection system. This will eliminate a serious potential public health and safety risk for the plant staff and surrounding public associated with chlorine gas use.

8. Energy – An increase in energy consumption will occur after the new treatment plant is constructed due to the operation of additional equipment. Energy consumption will be minimized as much as possible through the use of energy efficient equipment (pumps, blowers, lighting, etc.). To offset some of the plants operational costs the city utilizes a co-generation system to burn methane gas from the digesters which produces electricity, which is then metered back into the power grid and the City of Great Falls is credited. The consumption of energy resources directly associated with construction of the recommended improvements is unavoidable, but will be a short-term commitment.

9. Noise - Short-term impacts from excessive noise levels may occur during the construction activities. The construction period will be limited to normal daytime hours to avoid early morning or late evening construction disturbances. The new blowers will be housed within a building, and therefore no significant long-term impacts from noise will occur. The project is located in an industrial zone of the city that has no residential

neighborhoods in the immediate proximity

10. Sludge Disposal – The WWTP utilizes anaerobic digesters to treat and stabilize sludge. The existing digester and sludge dewatering equipment has adequate capacity to handle the additional sludge that will be produced as a result of system expansion. All sludge generated at this facility will continue to be disposed of in an approved Class II landfill in accordance with EPA's 258 Regulations *Criteria for Municipal Solid Waste Landfills.*

11. Environmental Justice – Environmental Justice Executive Order 12898: The proposed project will not result in disproportionately high or adverse human health or environmental effects on minority or low income populations. All base sewer rates were increased by 10%. The amount charged to users is dependent on the size of the water service to the respective property along with winter water usage. No disproportionate effects among any portion of the community would be expected.

12. Growth – The 20-year design population is based on a growth rate of approximately 0.5 percent per year. The proposed improvements should be capable of serving a population of 70,265. The anticipated increase in population and development in the service area will result in increased flows to the WWTP. Improvements to the WWTP will be a positive feature for the community and will allow the city to manage its growth in a proactive manner and promote urbanization within its service area.

13. Cumulative Effects - The increased treatment capacity at the wastewater treatment plant may result in secondary and/or cumulative impacts due to growth of the community and expansion of the service area. Secondary impacts associated with housing, commercial development, solid waste, transportation, utilities, air quality, water utilization, and possible loss of agricultural and rural lands may occur. These secondary impacts are uncertain at this time, and therefore, cannot be directly addressed in the EA. However, these impacts will need to be managed and minimized as much as possible through proper community planning. There are several existing city, county and state regulations already in place (i.e., zoning regulations, comprehensive planning, subdivision laws, etc.) that control the density and development of property with regards to water supply, sewage disposal, solid waste disposal, transportation, and storm drainage system.

B. UNAVOIDABLE ADVERSE IMPACTS

Short-term construction related impacts (i.e., noise, dust, traffic disruption, etc.) will occur, but should be minimized through proper construction management. Energy consumption during construction cannot be avoided.

VI. PUBLIC PARTICIPATION

Public participation for this project included a Commission Work Session/Meeting held on March 6, 2012, a Utility Rate Presentation held on April 10, 2012, a Commission Meeting/Public Hearing held on April 17, 2012, and a Commission Work Session held on August 21, 2012. At the various meetings the need for the project, recommended alternatives, and major equipment pre-selection results were discussed. Cost estimates for engineering, project construction, and proposed sewer rates were presented as well. Comments included the impacts of the Malt Plant on the wastewater treatment facility, and how the improvements would be funded.

VII. AGENCY ACTION, APPLICABLE REGULATIONS AND PERMITTING AUTHORITIES

All proposed improvements will be designed to meet state standards in accordance with Circular DEQ-2, and will be constructed using standard construction methods. Best management practices will be implemented to minimize or eliminate pollutants during construction. No additional permits will be required from the State Revolving Fund (SRF) section of the DEQ for this project after the review and approval of the submitted plans and specifications. However, coverage under the storm water general discharge permit and groundwater dewatering discharge permit, are required from the DEQ Water Protection Bureau prior to the beginning of construction. A 124 Permit from the Department of Fish, Wildlife and Parks, a 404 Permit from the U.S. Corps of Engineers, and a 318 Authorization from the Department of Environment Quality will be required for any work that occurs in a streambed or wetland, and will be obtained if necessary.

VIII. RECOMMENDATION FOR FURTHER ENVIRONMENTAL ANALYSIS

[ ] EIS [ ] More Detailed EA [X] No Further Analysis

Rationale for Recommendation: Through this EA, the DEQ has verified that none of the adverse impacts of the proposed City of Great Falls wastewater treatment project are significant. Therefore, an environmental impact statement is not required. The environmental review was conducted in accordance with the Administrative Rules of Montana (ARM) 17.4.607, 17.4.608, 17.4.609, and 17.4.610. The EA is the appropriate level of analysis because none of the adverse effects of the impacts are significant.

IX. REFERENCE DOCUMENTS

The following documents have been utilized in the environmental review of this project and are considered to be part of the project file:

1. City of Great Falls Wastewater Treatment Plant Permit Required Upgrades Summary Report, November 2012, prepared by HDR and Morrison Maierle, Inc.
2. Clean Water Act Information Center (a TMDL database search), December 2012 Montana Department of Environmental Quality TMDL database search.
3. Facility Plan City of Great Falls Wastewater Treatment and Collection System. 1998 prepared by Neil Consultants, Inc. in association with Montgomery Watson.
4. City of Great Falls Water Master Plan. 2006, prepared by TD&H, Black and Veatch, and Red Oak Consulting.

5. Department of Environmental Quality Permitting and Compliance Division Montana Pollutant Discharge Elimination System Fact Sheet (Permit No. MT0021920), August 2010.

6. Uniform Application Form for Montana Public Facility Projects, May 2012, prepared by City of Great Falls.

7. Uniform Application Form for Montana Public Facility Projects, February 2013, prepared by City of Great Falls.

X. AGENCIES CONSULTED

The following agencies have been contacted in regard to the proposed construction of this project:

1. The U.S. Fish and Wildlife Service reviewed the proposed project and indicated that "since most of the project-related construction will involve upgrades and conversions to existing facilities, and all of the work is proposed to occur within an urban/industrial setting, there are unlikely to be any significant adverse effects to fish, wildlife, and habitat resources under the purview of the U.S. Fish and Wildlife Service".

2. The Montana Department of Natural Resources and Conservation (DNRC) indicated that it appears that portions of the planning area may be located within a designated 100-year floodplain and that a floodplain permit may or may not be required. They recommended that the City of Great Falls Floodplain Administrator be contacted for additional input.

3. The Montana Historical Society's State Historic Preservation Office (SHPO) reviewed the proposed project. According to their records, there have been a few previously recorded sites and a few cultural resource inventories done within the designated search locales. It is SHPO's position that any structure over fifty years of age is considered historic, and is potentially eligible for listing on the National Register of Historic Places. If any structures over fifty years old are to be altered, SHPO recommends that they be recorded and a determination of their eligibility be made. They stated that as long as there will be no disturbance or alteration to structures over fifty years of age, that there is a low likelihood that cultural properties would be impacted and, as such, felt a cultural resource inventory is unwarranted at this time. However, should structures need to be altered or cultural materials be inadvertently discovered during the project, SHPO must be contacted and the site investigated.

4. The U.S. Department of the Army Corps of Engineers (USCOE) reviewed the proposed project. They indicated that if any work is proposed within the Missouri River (or below the ordinary high water mark) that a Section 10 and Section 404 permit would apply and authorization from USCOE would be needed. They stated that the proposed project site location does not contain jurisdictional waters of the United States, including wetlands, and that no Department of Army permit is required for this project. However, if the project deviates from the reviewed

information that the project could require authorization from their office.

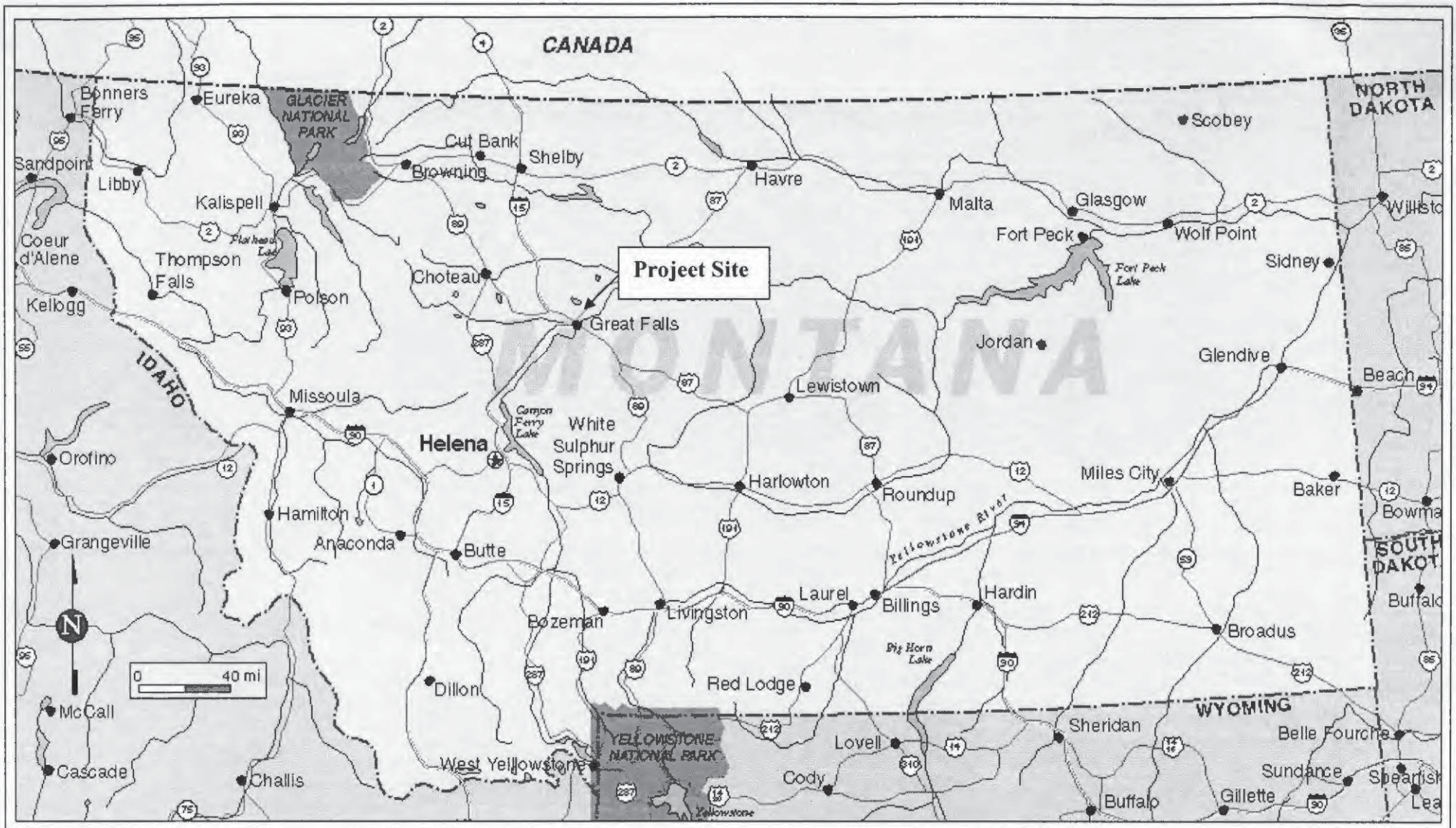
5. The Montana Department of Fish, Wildlife and Parks indicated that they did not have any comments regarding the proposed improvements to the City of Great Falls wastewater treatment facility.

EA Prepared by:

Mike Abrahamson, P.E. — Date: 3/13/13

EA Reviewed by:

Jerry Paddock, P.E. — Date: 3/13/13



Montana Department of
ENVIRONMENTAL QUALITY

Figure 1. Site Location Map – Great Falls, MT

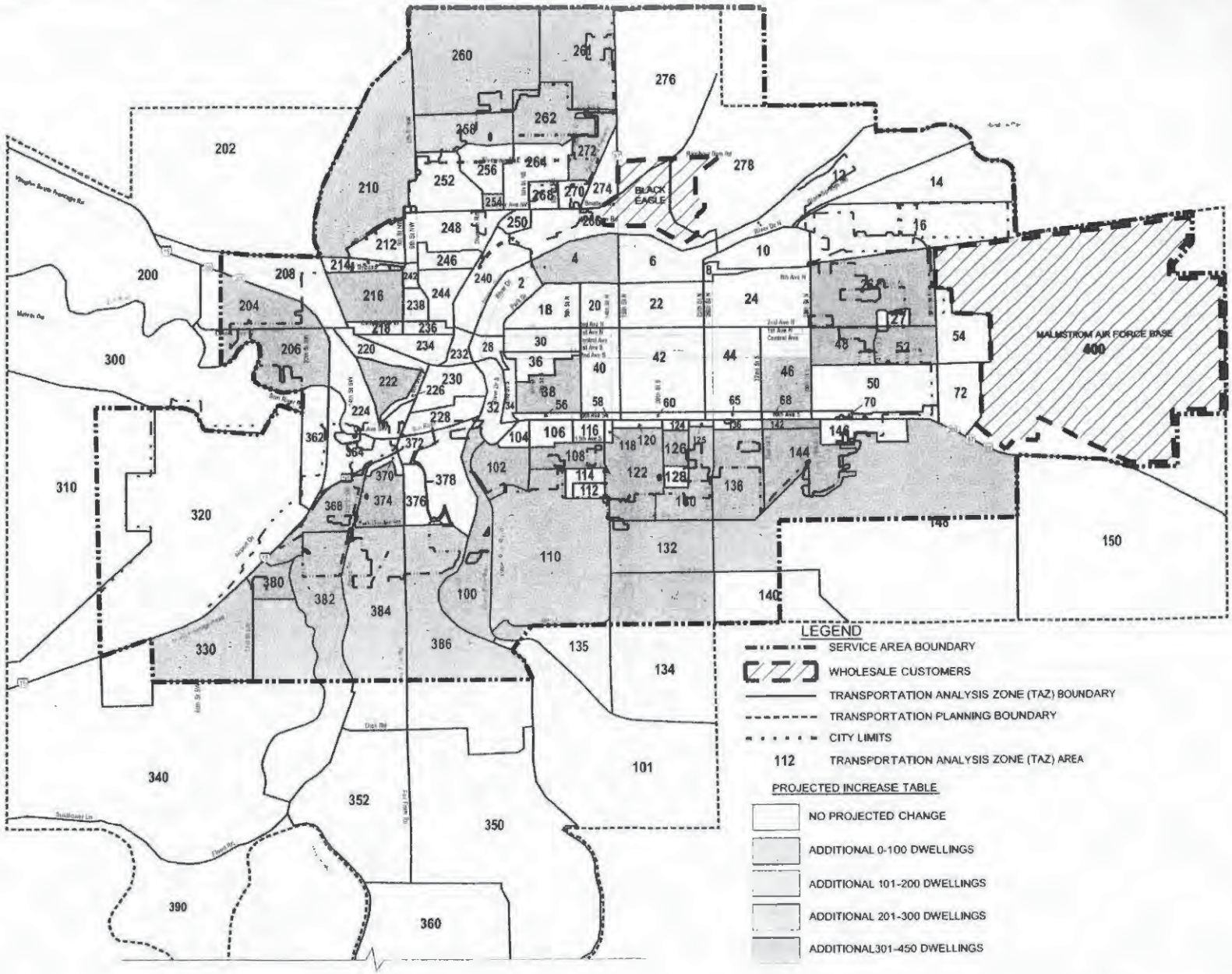
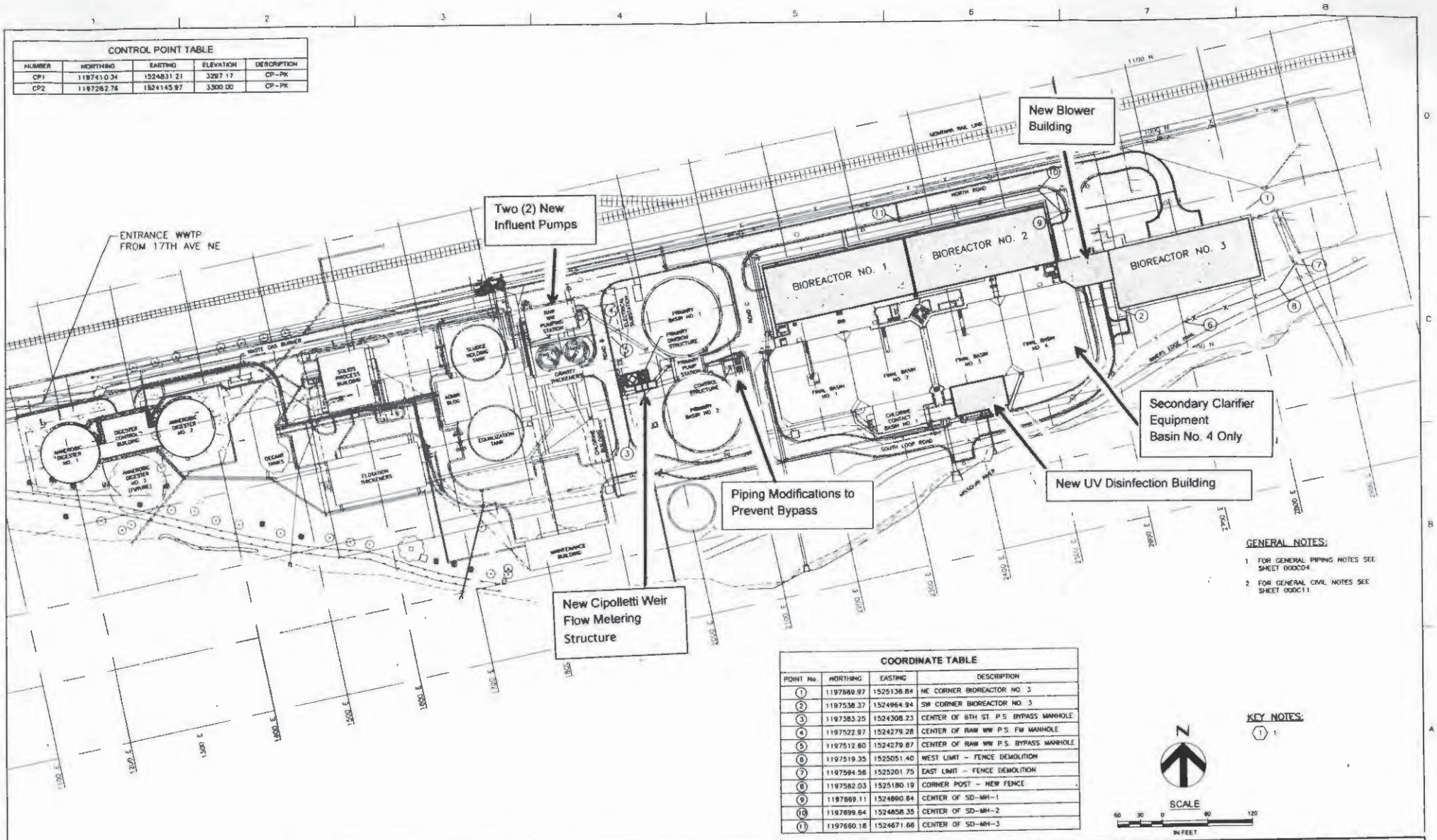


Figure 2

City of Great Falls, Montana
2025 RESIDENTIAL GROWTH PROJECTION AREAS

BLACK & VEATCH

TD&H Engineering Consultants



CONTROL POINT TABLE				
NUMBER	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP1	1197410.34	1524831.21	3297.17	CP-PK
CP2	1197262.76	1524145.97	3300.00	CP-PK

COORDINATE TABLE			
POINT No.	NORTHING	EASTING	DESCRIPTION
1	1197589.97	1525136.84	NE CORNER BIOREACTOR NO. 3
2	1197538.37	1524964.94	SW CORNER BIOREACTOR NO. 3
3	1197383.25	1524308.23	CENTER OF 6TH ST. P.S. BYPASS MANHOLE
4	1197522.97	1524279.28	CENTER OF RAW WW P.S. FM MANHOLE
5	1197512.60	1524279.67	CENTER OF RAW WW P.S. BYPASS MANHOLE
6	1197519.35	1525051.40	WEST LIMIT - FENCE DEMOLITION
7	1197594.56	1525201.75	EAST LIMIT - FENCE DEMOLITION
8	1197582.03	1525180.19	CORNER POST - NEW FENCE
9	1197669.11	1524890.84	CENTER OF SD-MH-1
10	1197699.64	1524858.35	CENTER OF SD-MH-2
11	1197660.18	1524671.66	CENTER OF SD-MH-3

GENERAL NOTES:

1. FOR GENERAL PIPING NOTES SEE SHEET 000C04
2. FOR GENERAL CIVIL NOTES SEE SHEET 000C11

KEY NOTES:

(1) 1

N

SCALE

60 30 0 60 120

IN FEET

MORRISON MAIERLE, INC.

HDR

ISSUE	DATE	DESCRIPTION
-	12/2012	ISSUED FOR 90% QC REVIEW

PROJECT MANAGER	C. CAPRARA
DESIGNER 1	S. WONACOTT
DESIGNER 2	
DRAWN BY	M. HANKEL
CHECKED BY	
PROJECT NUMBER	0000000001A2039

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

CITY OF GREAT FALLS MONTANA

Great Falls, Montana

City of Great Falls
Waste Water Treatment Plant

Disinfection and Ammonia Removal Improvements

2012

MASTER SITE PLAN AND SITE PLAN KEY

FILENAME	000C01.dwg
SCALE	1"=60'

Figure 3

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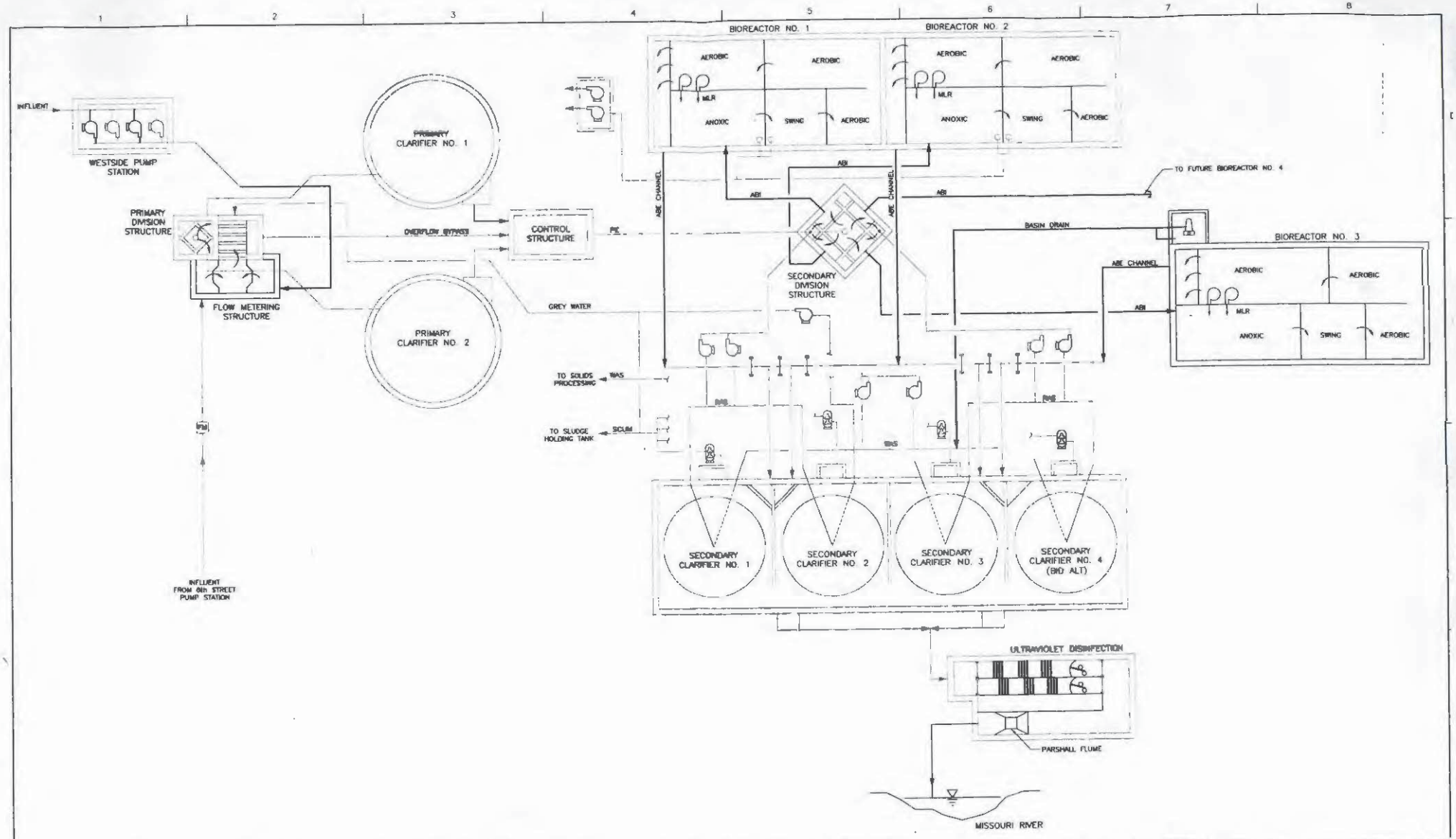

MORRISON MAIERLE, INC.

HDR

ISSUE	DATE	DESCRIPTION
	12/2012	ISSUED FOR 90% QC REVIEW

PROJECT MANAGER	C. CAPRARA
DESIGNER 1:	C. REVIS
DESIGNER 2:	
DRAWN BY:	H. FANCHER
CHECKED BY:	
PROJECT NUMBER	0000000001820.39

PRELIMINARY
NOT FOR
CONSTRUCTION
OR
RECORDING

CITY OF GREAT FALLS MONTANA

Great Falls, Montana

City of Great Falls
Waste Water Treatment Plant

Disinfection and
Ammonia Removal
Improvements

2012

GENERAL
LIQUID PROCESS FLOW DIAGRAM

FILENAME	D00G11.dwg
SCALE	NONE

Figure 4

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