The complete report (205 pages) is
on file in the City Clerk's Office

Environmental Information Document

Norman Water Reclamation Facility

Norman Utilities Authority

Norman, Oklahoma

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December 2013

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TECHNICAL MEMORANDUM

December 23, 2013

Project: Norman Water Reclamation Facility Phase 2 Improvements
Norman Utilities Authority

RE: Amendment to the Engineering Report for the Environmental Information Document

Purpose

The Norman Utilities Authority owns and operates the Water Reclamation Facility (WRF) which treats wastewater generated by the City of Norman. An Engineering Report (ER) dated March 2013 documented the proposed improvements to the plant; this report was submitted to and approved by the Oklahoma Department of Environmental Quality (ODEQ) and served as the basis by which to begin design.

To properly address discharge requirements lined out in the newest discharge permit, address operations and maintenance concerns, as well as meet ultimate master planning goals of the plant, modifications from the design proposed in the ER were necessary to complete final design documents. Therefore, the purpose of this Technical Memorandum is to document those updates from the proposed plan that were outlined in the ER to the actual final project submitted for construction. Those updates noted herein are not in conflict with the approval granted by ODEQ of the Engineering Report. Furthermore, the final design drawings and specifications have been approved by ODEQ for construction in the form of a Permit to Construct dated November 27, 2013.

Final Design Modifications

Influent Flow Monitoring and Splitting

The ER proposes a 72" parshall flume to measure influent flow. It was determined that sufficient area was not available to accommodate the structure. Therefore, a total of two 30-in magnetic flow meters, one on each line to the two sets of primary clarifiers, are located downstream of the flow splitter box to measure incoming flow. In addition, a 24-in bypass line and meter have been designed to measure diverted flows during wet weather.

Aeration Basin Expansion

The volume and dimension of the new aeration basin proposed by the ER allows for the same surface area of the existing aeration basin, but deeper. During design it was determined to have operational and equipment advantages to match water levels of the existing and new basins.

The final design includes two new turbo blowers, where the ER anticipated no new blowers being required. Turbo blowers are a more efficient blower at high air volumes then the existing centrifugal blowers. The more efficient blowers over a long period of time will result in electrical savings.

RAS/WAS Pump Station
The ER proposes to convert the existing RAS/WAS pump station to a RAS pump station with upsized pumps and then build a new WAS pump station. The final design modifies this approach to include a completely new RAS/WAS pump station. There are operational advantages to having the RAS and WAS pumping facilities. Further, this allows the existing RAS/WAS pump station to be taken offline and be available for emergency or when maintenance is necessary on the new RAS/WAS or secondary clarifiers.

UV Disinfection and Post Aeration
The UV Disinfection system in the ER proposes three channels that can each accommodate 12 mgd. The final design allows for two channels that can handle 22 mgd each, which will accommodate peak hourly flows, provide a more efficient use of the UV lamps/racks, and also addresses master planning concerns. In addition, the final design includes a building to enclose the UV facility, instead of an open-air facility as proposed in the ER.

Outfall Pipeline
The ER proposed a 36-in outfall line that would serve as a relief line to the 54-in existing outfall. The final design has upsized this line to a 66-in outfall line as the existing 54-in line has operational concerns. Additionally, a new 66-in line will accommodate master planning for the future.

Odor Control
A central odor control facility proposed by the ER has been replaced in final design with several odor control facilities specific to the following facilities: Headworks, sludge bay, centrifuges, WAS storage, and the Westside lift station. Dedicated odor control facilities will be address source odors and each location; it was further determined that several facilities would have reduced operational costs.

Miscellaneous
Additional improvements to the site that were not identified in the ER include the rehabilitation of a retaining wall on the east side of the property, site grading and lighting to provide access to new structures, various electrical improvements, and modifications to the existing WAS storage basin and the retrofit of the non-potable water pump station to be used to pump centrate off the centrifuges back to the headworks.

Conclusion

As indicated above, as the project transitioned from preliminary engineering in the ER to detailed design, the proposed improvements for the project became better defined. Additionally, more information was revealed in the completion of site surveys, progress meetings, and conferences. For the purposes of the Environmental Information Document, the intention of this memo is to summarize these changes where inconsistencies might be noticed between the Engineering Report and the final design documents.

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1.0 Project Information

The City of Norman, Oklahoma is a growing community located south of Oklahoma City, Oklahoma in Cleveland County. The Norman Utilities Authority (NUA) owns and operates a water reclamation facility (WRF) that treats wastewater generated by the City of Norman before discharging to the Canadian River in Cleveland County, Oklahoma.

Several issues have been the drivers for Norman WRF Improvements project including population growth, aging equipment, new permit regulations, and the desire to implement wastewater reuse capabilities. All proposed improvements are to occur on the existing WRF site, which is city-owned property. A new outfall line from the facility will be upsized to accommodate the additional flows; however, this line will be built within the existing right-of-ways on site and the discharge point on the Canadian River will be maintained.

1.1 Project Need

There are four primary drivers for updating the Norman WRF capacity: regulatory driven improvements, operation and maintenance needs, a hydraulic capacity upgrade, and future water reuse opportunities. The latest Oklahoma Pollutant Discharge Elimination System (OPDES) permit renewal mandates that the NUA meet new fecal coliform discharge limitations, requiring disinfection of the wastewater prior to discharge. A UV disinfection upgrade has been proposed. For the operation and maintenance needs, outdated equipment needs to be replaced or repaired, since many of the major treatment components have reached the end of their service lives. Additionally, the facility is quickly reaching capacity. In 2010, an average daily flow of approximately 11 million gallons per day (mgd) was treated by the WRF, which is 92% of the plant's 12 mgd design capacity. By 2035, the plant will be undersized by approximately 4 mgd. Due to increased flows as a result of growth combined with anticipated changes to the discharge permit, the NUA has initiated plans for treatment and capacity upgrades to the WRF. As these upgrades are anticipated to produce a high quality effluent, the NUA proposes offsetting the City's increasing water demand with reuse of this effluent. The Engineering Report identified the improvements required to upgrade and expand the Norman WRF to treat 16 mgd, providing for a 20-year design life of the improvements to the year 2035.

1.2 Project Purpose

The purpose of this capital improvements project is part of the *Norman Wasterwater Master Plan* (*Master Plan*), adopted in 2001. In 2000, Phase 1 of the project upgraded the plant's biological process. Now, as part of the *Master Plan,* Phase 2 proposes to modify and refurbish existing WRF facilities as well as construct new facilities to meet the targeted capacity and treatment criteria, presented in Table 1-4. These improvements are designed to meet full build-out capacity and treatment goals identified in Plan B of the Engineering Report dated March 2013. Additionally, the proposed improvements will allow the Norman WRF to target regulatory requirements while addressing capacity deficiencies for the 20-year design horizon. As construction is expected to be complete in 2015, the improvements are anticipated to last until 2035.

1.3 Project Planning Area

1.3.1 Service Area

The City of Norman has been broken up into two sewer basins, the north basin and the south basin. Currently, the collection system throughout the City collects and conveys wastewater to the WRF, which is in the south basin. As the south basin grows and meets its sustainable capacity, it has been proposed by the Norman Utilities Authority that a second, smaller plant be built in the North basin where wastewater flows will be treated in a separate location. For the purposes of this report, it has been assumed that the North plant will be constructed before the existing plant exceeds its capacity. Additionally, the projected design flows for upgrading the existing WRF will not be impacted by the construction of a north plant. The design flows for the existing WRF have been estimated based upon growth in the south basin and land area available to sustain that growth. Refer to Section 1.3.2 for additional discussion.

The planning area for the project includes the existing Water Reclamation Facility (WRF) where improvements are proposed as well as a new discharge pipe which parallels the alignment of the existing discharge pipe from the facility down to the Canadian River. Located just south of Highway 9 and west of Jenkins Ave in Norman at 35°10'31"N and 97°26'39"W, the WRF has a legal address of S/2 SE/4, SE/4, Section 7 and the NE/4 of Section 18, Township 8 N, Range 2 W, I.M., Cleveland County, Oklahoma. The existing point of discharge in the Canadian River will be maintained in the NE/4 of section 18, Township 8 N, Range 2 W, I.M., Cleveland County, Oklahoma, at approximately 35°09'59.039"N and 97°26'40.308"W.

1.3.2 Historical Flows and Loadings

The existing average annual (AA) daily flow was calculated based on historical influent analysis from 2008 to 2011. Treatment systems are often evaluated on the basis of maximum month (MM) flows. MM flow rates are defined as the highest average flow over a consecutive 30-day period. The maximum month (MM), and maximum day (MD) flows were calculated with peaking factors identified in the Wastewater Master Plan following detailed hydraulic study of the system. The MM influent concentrations in Table 1-1 were based on historical influent analysis from 2008 to 2011. The historical max month BOD of 263 mg/L occurred in November 2009. The historical max month TSS of 230 mg/L occurred in April 2009. The historical max month ammonia concentration of 35 mg/L occurred in July 2009. The historic loadings are the result of the maximum month concentrations realized at the average annual flow of 10.5 mgd. All existing processes were evaluated with the criteria presented below.

Table 1-1: Historical Influent Flows

	Parameter	Design Criteria	Units
Historical Influent	AA/MM/MD Flow	10.5/13.5/19	mgd
	AA BOD Conc.	159	mg/L
	AA TSS Conc.	217	
	AA NH4 Conc.	26	
	MM BOD Conc.	263	
	MM TSS Conc.	230	
	MM NH4 Conc.	35	
	Existing BOD Load	23,031	ppd
	Existing TSS Load	20,141	
	Existing NH3 Load	3,065	

1.3.3 Growth

The plant capacity was last upgraded to 12 mgd in 2000 According to the *Master Plan*, the full build-out annual average daily flow (ADF) is 21.5 mgd for the City of Norman. The *Master Plan* recommends that the existing WRF be expanded to treat 17 mgd ADF and a new Northside WRF be constructed to treat the remaining 4.5 mgd ADF.

Since the *Master Plan* was adopted in 2001, more recent population projections for each sewer basin have been derived from house counts and full build-out of zoned plots. The population projection was adopted from the *Norman 2025 Land Demand Analysis*, which represents the most recent population projection adopted by the Norman City Council. As can be seen in Figure 1-1, the total projected population equivalent for the south sewer basin is 159,338 people.

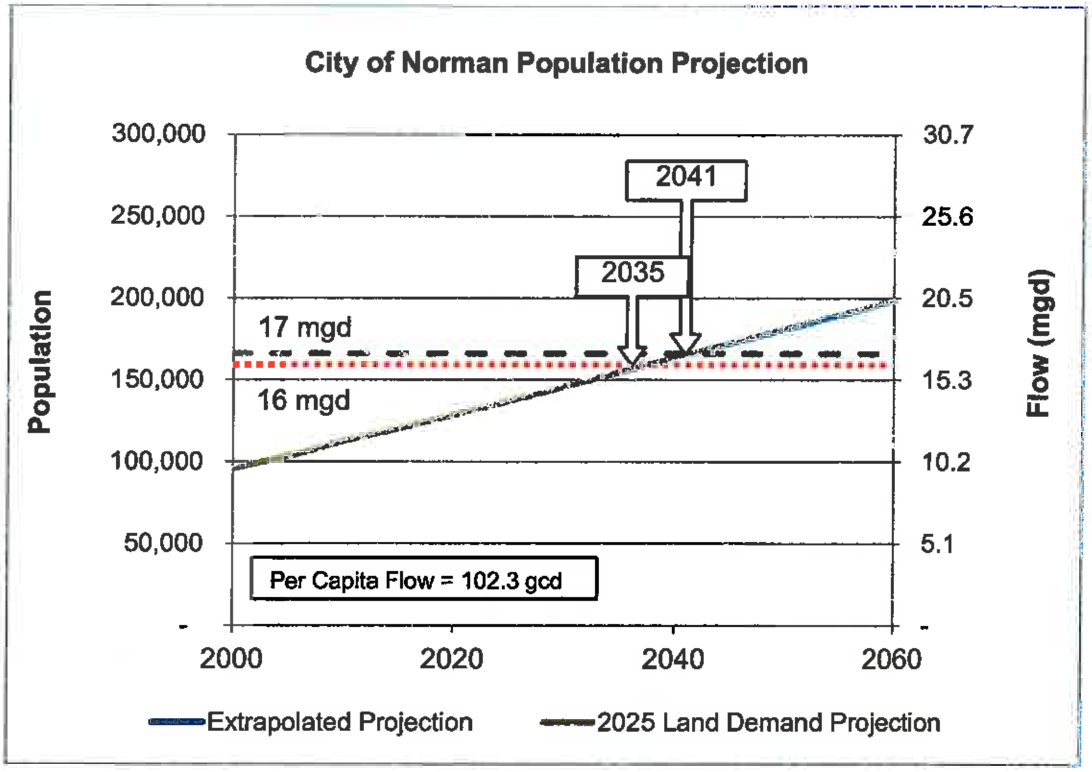


Figure 1-1: City of Norman population and flow projection

To determine a design horizon for the project, the anticipated growth was graphed to determine the year in which the population is estimated to reach 159,388 in the south basin. Figure 1-1 presents an illustration of population growth as a function of time. In 2010, the US Census Bureau determined that the population was 112,208. In 2041, it is estimated that the south basin will reach a population of 159,388 or 26 years from 2015. A 20-year design horizon, to the year 2035, results in a population of 154,633.

1.4 Existing Facilities

The existing WRF was initially constructed as a wastewater treatment plant (WWTP) in 1943. Significant upgrades were performed in 1957, 1963, 1972, 1986, 1990, 1999, 2004, 2008, and 2011. The WWTP became a water reclamation facility in 2009 to accommodate water reuse for the city of Norman and the University of Oklahoma (OU). The facility is designed to treat an average flow of 12 mgd. Refer to Figure 1-2 at the end of this section for an illustration of the existing plant.

Liquid Train

The liquid train for the WRF consists of preliminary treatment, primary treatment, and secondary treatment. The preliminary treatment includes the West Side Lift station, the headworks, and flow measurement. Primary treatment is the four primary clarifiers, and secondary treatment is the activated sludge process, a rotating biological contactor, four final clarifiers, and return activated sludge and waste activated sludge (RAS/WAS) pumping.

A new headworks facility was constructed in 2004, which directs the flow to the primary clarifiers. A bypass line can divert influent flow from the headworks to the storm holding ponds, which can hold a total of approximately 15.8 million gallons (MG). A manually operated gate valve allows water in the storm holding basins to flow to a lift station before returning to the WRF for treatment. Currently, the storm holding ponds are used to store excess waste activated sludge (WAS).

The flow from the headworks is split 60-40 between two sets of two primary clarifiers. Primary Clarifiers Nos. 1 and 2 are 70-feet in diameter, were originally constructed in 1957, and receive 60% of the flow. Primary Clarifiers Nos. 3 and 4 are both 60-feet in diameter, were originally constructed as part of the 1964 upgrades, and receive 40% of the flow.

Three parallel aeration basins treat suspended solids with a total volume of 2.6 MG. Four 350 HP blowers supply air to a grid of fine bubble diffusers. The aeration process is rated for 10.5 mgd of treatment capacity, with an average hydraulic residence time of six hours. It currently has an organic loading rate of 48 lb BOD_5/1000 ft^3-day, which is above the ODEQ requirement of 30-40 BOD_5/1000 ft^3-day.

Four circular final clarifiers treat effluent from the aeration basins before sending the flow to a splitter box to be discharged to the South Canadian River. Final Clarifiers Nos. 1 and 2 are each 126-feet in diameter with side water depths of 7.25-feet. Final Clarifiers Nos. 3 and 4 are each 125-feet in diameter with side water depths of 14.5-feet.

Refer to Figure 1-3 at the end of this chapter for a process flow diagram of the plant's processes. The rotating biological contactor and biotowers have been taken off-line and will be concurrent with the proposed upgrades.

The condition and age of each unit are provided in the table below.

Table 1-2: Liquid Train Components

Level	Process	Component	Year of Construction	Condition
Preliminary Treatment	West Side Lift Station	2- Mechanical Finescreen, 20 mgd/ea	2004	Good
		1 - Screenings Conveyor	2004	Good
		3 - Vertical Centrifugal Pumps, 4,700 gpm/ea	2004	Good
	Headworks	2- Mechanical Finescreen, 72 mgd/ea	2004	Good
		1 - Screenings Conveyor	2004	Poor
		1 - Vortex Grit Chambers, 30 mgd	2004	Good
		1 - Vortex Grit Chambers, 12 mgd	2004	Good
	Flow Measurement	1 - Parshall Flume, 18"	1964	Poor
		1 - Parshall Flume, 24"	1965	Poor
Primary Treatment	Primary Clarifiers	2 - 70-ft Primary Clarifiers, SWD - 10-ft	1957	Fair
		2 - 60-ft Primary Clarifiers, SWD - 9.5-ft	1964	Fair
		2 - Primary Clarifier Splitter Box	1957/1964	Fair
Secondary Treatment	Activated Sludge Process	3 - Aeration Basin, 184-ft x 40-ft x 16-ft SWD /ea	2000	Good
		4 - 350 HP Blowers, 6,550 scfm/ea	2000	Good
		4 - Blower VFDs, 350 HP	2011	Good
	Rotating Biological Contactor	1 - RBC Basin, 472,991 gallons	1992	Out of Service
	Secondary Clarifiers	2 - 126-ft Secondary Clarifiers, SWD - 7.25-ft	1988	Fair
		2 - 125-ft Secondary Clarifiers, SWD - 14.5-ft	2000	Good
	RAS/WAS Pumping	2 - 60 HP Vertical Turbine Pumps, 4,600 gpm/ea	2000	Poor

<u>Solids Train</u>

The solids train process includes primary sludge thickening, WAS storage, WAS thickening, anaerobic digestion, cogeneration, and sludge dewatering.

As part of the primary sludge thickening, settled primary sludge from the four primary clarifiers is sent to four circular gravity thickeners. Gravity thickeners Nos. 1 and 2 are 18-feet in diameter and were originally constructed in 1963, with the thickener mechanisms replaced in 1992. Gravity thickeners Nos. 3 and 4 were originally constructed in 1988. Thickened sludge from the gravity thickeners is conveyed by double disc pumps (installed in 2008 and 2009) to two primary digesters and two secondary digestors.

The existing RAS/WAS pumping station was constructed in 2000 and receives secondary sludge flows from Final Clarifiers Nos. 1, 2, 3, and 4. Two 60 HP vertical turbine solids handling pumps recycle sludge via a 24-inch force main to the aeration basin influent line to help with the suspended solids biological process. A four-inch line valved to the discharge side of the pumps allows plant staff to control the WAS flow; however, the current backlog of sludge stored at the WRF requires that the valve be completely open all the time. This prevents the WAS flow from being properly measured.

WAS storage consists of a 387,000 gallon tank that was initially constructed in 1972. When needed, the tank also doubles as a make-shift gravity thickener by turning off the air supply and allowing the contents to settle for several hours. Two feed pumps, installed in 2010, convey WAS to a thickening centrifuge. The horizontal solid-bowl thickening centrifuge was constructed in 2010 and is rated to treat a maximum solids loading rate of 790 pounds per hour (pph). At the expected WAS sludge concentration of 0.7%, this equates to approximately 220 gpm (0.32 mgd). The thickened WAS (TWAS) from the centrifuge has an expected solids concentration of 4.5-6%.The TWAS pump receives thickened sludge from the centrifuge discharge conveyor, which is discharged to either Primary Digester No. 2 or No. 4.

The anaerobic digestion portion of the solids train includes two primary anaerobic digesters, two secondary anaerobic digesters, two primary mixing pumps, and four sludge heating systems. The four anaerobic digesters each have 70-foot diameters, side water depths of 22-feet, and 700,500 gallon operating volumes. Digester No. 1 (secondary) and Digester No. 2 (primary) were constructed in 1963, and Digester No. 3 (secondary) and Digester No.4 (primary) were constructed in 1988. The primary digesters are operated under mesophilic conditions with a minimum sludge detention time of 15 days. To reach mesophilic conditions, sludge heaters are installed for the primary digesters. The sludge heaters for Digester No. 4 were installed in 1988, and the sludge heaters for Digester No. 2 were installed in 2012. Secondary digesters No. 1 and 3 essentially operate as holding tanks for digested sludge before being conveyed to the dewatering centrifuge or to tankers for liquid sludge application.

The 450 kW cogenerator was installed in 1991 near the digesters, which is a very corrosive environment. The cogenerator is tied to the power system grid to help power the WRF. However, the unit is much deteriorated and no longer functions.

The final step in sludge treatment is sludge dewatering. Digested sludge from the anaerobic digesters is dewatered in a dewatering centrifuge constructed in 2010. The resulting sludge cake is then trucked to agricultural land application sites. As an alternative to dewatering when the dewatering centrifuge is out of service or during dry weather, liquid sludge can be transported in a tanker truck to land application sites.

The age and condition of each unit are presented in the table below.

Table 1-3: Solids Train Components

Level	Process	Component	Year of Construction	Condition
Solids Handling	Primary Sludge Thickening	4 - 18-ft Gravity Thickeners, SWD - 10-ft	1963	Fair
		4 - Primary Sludge Pumps, 200 gpm/ea	1988	Good
	WAS Storage	1 - WAS Storage Tank, 77-ft x 48-ft x 14-ft	1972	Fair
		1 – Diffused Air Supply System	1972	Fair
		2 - WAS Feed Pumps, 220 gpm/ea	2010	Good
	WAS Thickening	1 - Thickening Centrifuge, 790 pph	2010	Good
		1 - TWAS Pump, 34 gpm	2010	Good
	Anaerobic Digestion	2 - 70-ft Primary Digesters, SWD - 22-ft	1963/1988	Fair
		2 - Primary Fixed Covers	2010	Good
		2 - 70-ft Secondary Digesters, SWD - 22-ft	1963/1988	Fair
		2 - Secondary Floating Covers	1963/1988	Poor/Fair
		2 - Primary Mixing Pumps, 2,300 gpm/ea	2010	Good
		2 – Sludge Heating System, 750,000 Btu/hr/ea	2011	Good
		2 – Sludge Heating System, 500,000 Btu/hr/ea	1988	Fair
	Cogeneration	1 – Cogenerator, 450 kW	1991	Poor
	Sludge Dewatering	1 - Dewatering Centrifuge, 1,800 pph	2010	Good
		2 - Digested Sludge Feed Pumps, 200 gpm/ea	2010	Fair
		1 - Cake Conveyor	2010	Good

1.5 Existing Problems

The facility was originally designed to handle an average flow rate of 12 mgd. As of 2010, the average daily flow was 10.5 mgd. Additionally, the 2010 OPDES permit renewal required the NUA meet new fecal coliform discharge limits that require disinfection of wastewater effluent before discharging. Together, these two factors make it necessary to upgrade and expand the existing facility.

Additionally, it is anticipated that the effluent dissolved oxygen (DO) requirement is likely to increase from 5 mg/L to 6 mg/L as a result of an ongoing Total Maximum Daily Load study of the Canadian River. The study has not been completed yet, but the NUA is proactively planning for the increase.

There are a number of system deficiencies that will be addressed by this project; the concerns impacting operation of the facility are briefly discussed below. This report addresses only the treatment system and does not evaluate the collection system.

For a schematic of the existing plant, please refer to Figure 1-2 at the end of this chapter.

Headworks Improvements

At the headworks, two screens capture floatables, debris, and rags from the influent and remove them from the raw wastewater. The common screw conveyor limits the redundancy of the headworks screens and is undersized to handle peak screenings flow. Furthermore, the current configuration requires a crane to raise the screenings dumpster to grade for disposal. New screenings conveyors are required to operate the screening system efficiently and reliably.

Inaccurate Influent Flow Measurement

The existing influent Parshall flumes flood during peak flow conditions, preventing the staff from accurately recording influent flow during peak flows. Furthermore, the flumes do not provide the required entrance length for accurate readings during normal operation.

Inadequate Primary Clarifier Flow Split

The influent Parshall flumes split the flow between the two sets of primary clarifiers. There are no valves or gates to control this flow split, which is undesirable as there is no operational control to change the flow split at varying influent flow rates.

Insufficient Sludge Handling Facilities

The operations staff cannot properly process the WAS at the desired rate because of the absence of a dedicated WAS pump station. Furthermore, WAS cannot be thickened at the desired rate because of lack of redundant centrifuges, thickened WAS pumps, and support piping. As a result, WAS is often co-settled in primary clarifiers, which negatively impacts gravity thickening and the downstream biological processes as well as sludge digestion.

Shallow final clarifiers

Final Clarifiers Nos. 1 and 2 were originally constructed to treat fixed film effluent, and are only 7.5-ft deep. The Oklahoma Department of Environmental Quality (ODEQ) standards require final clarifiers be a minimum of 12-ft deep. Shallow clarifiers increase the risk of sludge blanket carry-over and result in a lower concentrations of return and waste activated sludge.

Fixed Film Replacement

The rotating biological contactors have not operated for some time and are to be removed as part of this project. In their place, additional aeration volume is required to meet the biological and hydraulic needs of the facility. New aeration basins are required to phase out the outdated fixed film treatment process.

Aged Equipment

Much of the treatment equipment has reached the end of its service life and requires replacement. The major equipment items needing replacement include primary clarifier mechanisms, aeration basin diffusers, return activated sludge (RAS) pumps, Digester No. 2 cover, and various other digester components. Many smaller components apart from the major equipment listed here also need repair or replacement.

Hydraulic shortcomings

To convey the current wet weather flow rates, the existing interconnecting piping between several facilities is undersized. During storm events, several hydraulic elements flood, including the influent flumes, primary clarifier weirs, aeration basin weirs, and final clarifier weirs. Flooding causes inefficient treatment of water by reducing time of treatment and ultimately lowering the final effluent quality. This in turn can cause potential harm to all environments to which the water might be exposed after discharge.

1.6 Proposed Improvements

The proposed improvements to the Norman WRF include the following:

- New redundant screening conveyors
- New influent flow measurement
- Replacement of primary clarifier mechanisms
- New aeration basins for activated sludge expansion
- Two (2) new final clarifiers
- Expanded RAS/WAS pumping

- New UV disinfection
- New post-aeration
- New centrifuge thickening
- New sludge blend tank
- Anaerobic digester improvements
- New odor control treatment
- New standby power system
- New 36-in discharge line (parallel to the existing 54-in line)

1.7 Project Permits and Information

1.7.1 Receiving Stream

The Norman WRF currently discharges to the South Canadian River, Water Body ID No. 520610010010_05, in Planning Segment No. 520610.

1.7.2 Oklahoma Water Quality Management Plan and OPDES Permit

Norman is included in the Oklahoma Water Quality Management Plan (208 Plan). The Department of Environmental Quality issued Oklahoma Pollutant Discharge Elimination System (OPDES) Permit No. OK0029190 to NUA on June 28, 2010 and is set to expire on June 30, 2015. The effluent limits for carbonaceous biochemical oxygen demand 5 day ($CBOD_5$), total suspended solids (TSS), ammonia (NH_3N), and dissolved oxygen (DO) are provided in the table below.

Table 1-4: OPDES Permit Effluent Limits

Pollutants		Discharge Limitations			
		Mass Loading (lb/day)	Concentrations (mg/l)		
		Monthly Avg.	Monthly Avg	Weekly Avg	Daily Max
$CBOD_5$	Apr-May	1301.0	13	19.5	--
	June-Oct	1301.0	13	19.5	--
	Nov-Mar	2502.0	25	37.5	--
TSS	Year round	3002.4	30	45	--
NH_3N	Year round	410.3	4.1	--	9.9
Dissolved Oxygen	Year round	--	Instantaneous Minimum: 5 mg/l		

The permit was issued with phased limits to allow the WRF to continue discharging while performing upgrades to reach the final effluent requirements. The current effluent limits are provided in the permit. Copies of the 208 Plan and the OPDES permit are in Appendix B.

1.7.3 Sludge Management Plan

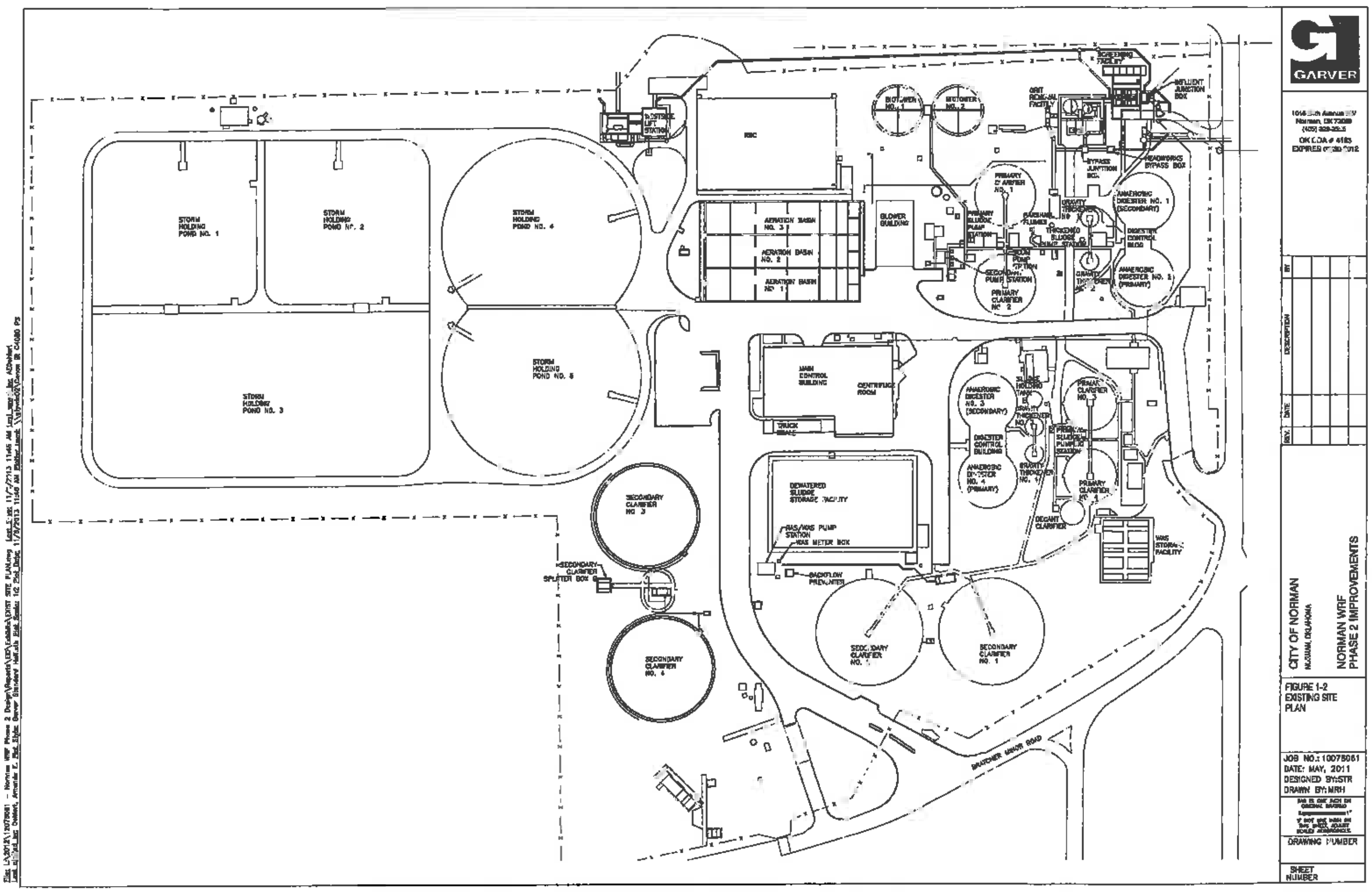
Norman has an existing Sludge Management Plan, permit number 3514006. It allows for land application of sludge on nearby farmland. The permit approval is located in Appendix B.

1.7.4 Floodplain Permit

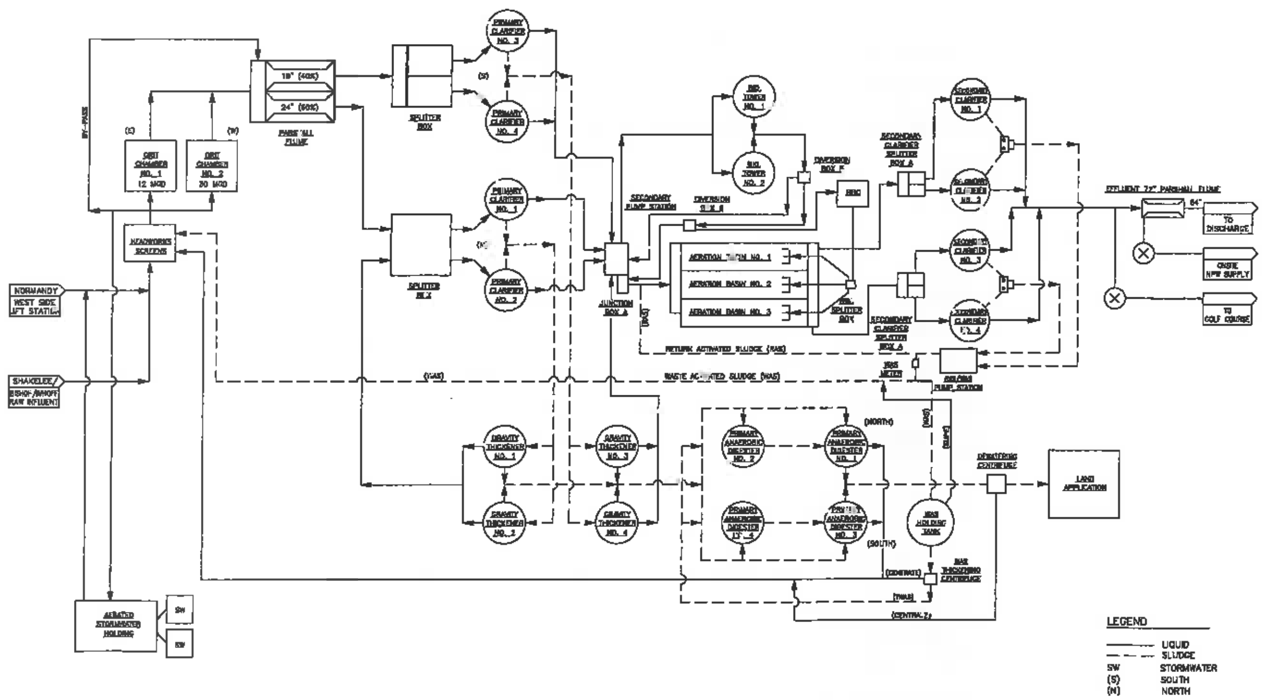
The City of Norman issued Floodplain Permit No. 532 for the discharge line for this project. It is provided in Appendix B.

1.8 User Rates

Currently, sanitary sewer user rates are based on water consumption with a $3.90 base rate and a $5.00 maintenance fee. Residential sanitary sewer rates are re-evaluated yearly based on average water usage rates for December, January, and February at $1.10 per 1000 gallons of water. Commercial sanitary sewer rates are re-evaluated monthly at the same price of $1.10 per 1000 gallons of water. In March 2014, the base fee will increase to $5.00 and the price per 1,000 gallons water used will increase to $2.70.



STORM HOLDING POND NO. 1
STORM HOLDING POND NO. 2
STORM HOLDING POND NO. 3
STORM HOLDING POND NO. 4
STORM HOLDING POND NO. 5
RBC
AERATION BASIN NO. 3
AERATION BASIN NO. 2
AERATION BASIN NO. 1
BLOWER BUILDING
SCREENING FACILITY
INFLUENT JUNCTION BOX
GRIT REMOVAL FACILITY
BYPASS JUNCTION BOX
HEADWORKS BYPASS BOX
PRIMARY CLARIFIER NO. 1
PRIMARY CLARIFIER NO. 2
SECONDARY PUMP STATION
ANAEROBIC DIGESTER NO. 1 (SECONDARY)
DIGESTER CONTROL BLDG
ANAEROBIC DIGESTER NO. 2 (PRIMARY)
MAIN CONTROL BUILDING
CENTRIFUGE ROOM
TRUCK SCALE
ANAEROBIC DIGESTER NO. 3 (SECONDARY)
DIGESTER CONTROL BUILDING
ANAEROBIC DIGESTER NO. 4 (PRIMARY)
DEWATERED SLUDGE STORAGE FACILITY
RAS/WAS PUMP STATION
WAS METER BOX
BACKFLOW PREVENTER
DECANT CLARIFIER
WAS STORAGE FACILITY
SECONDARY CLARIFIER NO. 3
SECONDARY CLARIFIER NO. 4
SECONDARY CLARIFIER SPLITTER BOX
SECONDARY CLARIFIER NO. 1
GARVER
1016 24th Avenue NW
Norman, OK 73069
OK C.O.A # 4165
EXPIRES 06/30/2012
BY
DESCRIPTION
DATE
REV.
CITY OF NORMAN
NORMAN, OKLAHOMA
NORMAN WRF
PHASE 2 IMPROVEMENTS
FIGURE 1-2
EXISTING SITE PLAN
JOB NO.: 10075061
DATE: MAY, 2011
DESIGNED BY: STR
DRAWN BY: MRH
DRAWING NUMBER
SHEET NUMBER



GARVER

1010 24th Avenue NW
Norman, OK 73069
OK COA # 4183

CITY OF NORMAN
NORMAN, OKLAHOMA

NORMAN WRF
PHASE 2 IMPROVEMENTS

FIGURE 1-3
EXISTING PROCESS FLOW DIAGRAM

JOB NO.. 10076051
DATE: MAY, 2011
DESIGNED BY: STR
DRAWN BY: MRH

DRAWING NUMBER

SHEET NUMBER