Fourth Revised
Process Controls Program

Submitted to EPA on December 31, 2013

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Debbie G. Ailey

12-31-13

Date

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A 10-year Program to Improve Our Waterways

Contents

Figures

Tables

Section I – Introduction

Section VII.D.2.(b) of the Consent Decree (CD) requires development of a Process Controls Program (PCP) for the Kuwahee, Fourth Creek, and Loves Creek wastewater treatment plants (WWTPs). The PCP consists of standard procedures for wet-weather flow operating conditions, along with supporting documentation to optimize treatment of wastewater with existing facilities in order to achieve NPDES permit compliance. The standard procedures consist of checklists and flow charts and have been developed to base operational decision-making on parameters including plant flow, mixed liquor suspended solids (MLSS), clarifier sludge blanket levels, and other operational conditions including, but not limited to, status of on-site storage basins. Specifically, the procedures address when to initiate and conclude Diversions. This section describes original PCP development. Section II provides a Rationale for PCP revisions. Sections III, IV and V provide updated information on each plant and the Appendices provide updated Checklists and Flow Charts to guide operations.

A. Peak Wet-Weather Flow Issues

A key issue addressed in this PCP is Diversion of flows during peak wet-weather flow conditions. All three WWTPs have been designed and permitted for Diversion of flows that exceed the capacity of the secondary treatment system. However, diverted flows received disinfection after being combined with effluent from the secondary treatment system. The CD required compliance with the 1994 NPDES permit Diversion provisions until new permits became effective, but the original PCP development was based on the following information.

Diversion language from the 1994 permits is provided below:

> **"Diversion**
>
> a. 'Diversion' is the intentional rerouting of wastewater within a treatment facility away from a biological portion of the treatment facility.
>
> b. A diversion is permissible only when necessary to protect the active biomass from a wash-out due to peak flow events and when this action does not cause effluent limitations to be exceeded."

The definition of "Washout" in the permits was as follows:

> "For domestic wastewater plants only, a 'washout' shall be defined as loss of Mixed Liquor Suspended Solids (MLSS) of 30% or more. This refers to the MLSS in the aeration basin(s) only. This does not include MLSS decrease due to solids wasting to the sludge disposal system. A washout can be caused by improper operation or from peak flows due to infiltration and inflow.
>
> A washout is prohibited. If a washout occurs, the permittee must report the incident to the appropriate field office within 24 hours by telephone. A written submission must be

provided within five days. The washout must be noted on the Discharge Monitoring Report (DMR). Each day of a washout is a separate violation."

In addition to Diversion, Bypasses are also an issue during peak wet-weather flow conditions. Bypass language from the 1994 permits is provided below:

> "a. *'Bypass'* means the discharge of wastes from any portion of the collection or treatment system other than through permitted outfalls. 'Severe property damage' means substantial physical damage to property, damage to the treatment facilities which would cause 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.
>
> b. Bypass is prohibited unless the following three (3) conditions are met:
>
> i. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage;
>
> ii. There are not feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment down-time. 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 which occurred during normal periods of equipment down-time or preventative maintenance;
>
> iii. The permittee submits notice of an unanticipated bypass to the appropriate field office of the Division of Water Pollution Control within 24 hours of becoming aware of the bypass (if this information is provided orally, a written submission must be provided within five days). When the need for the bypass is foreseeable, prior notification shall be submitted to the Director, if possible, at least ten (10) days before the date of the bypass.
>
> c. The permittee shall operate the collection system so as to avoid bypassing. The permittee shall actively pursue the goal of eliminating bypasses through its Collection System Inspection and Rehabilitation Program as outlined in Exhibit A."

The CD contains new terms for "Bypasses" from the wastewater collection and transmission system (WCTS) and at the WWTPs as defined below:

> "'Sanitary Sewer Overflow' or 'SSO' shall mean an overflow, spill, or release of wastewater from the WCTS, including: (a) all Unpermitted Discharges; (b) overflows, spills, or releases of wastewater that may not have reached waters of the United States or the State; and (c) all Building Backups."
>
> "'Unpermitted Discharge' shall mean a discharge of pollutants from any location within the Treatment Works which reaches waters of the United States or the State, and which

is not authorized by an NPDES Permit, including but not limited to any SSO which reaches waters of the United States or the State."

"Bypass" is also defined under the CD to have "the meaning set forth at 40 C.F.R. § 122.41(m). Under 40 C.F.R. 122.41(m)(l)(i), a "bypass" means the intentional diversion of waste streams from any portion of a treatment facility. A bypass is prohibited unless:

(A) Bypass was *unavoidable to prevent* loss of life, personal injury or *severe property damage* ("severe property damage" is defined under 40 C.F.R. § 122.41(m)(l)(ii) as "substantial physical damage to property, *damage to 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");

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

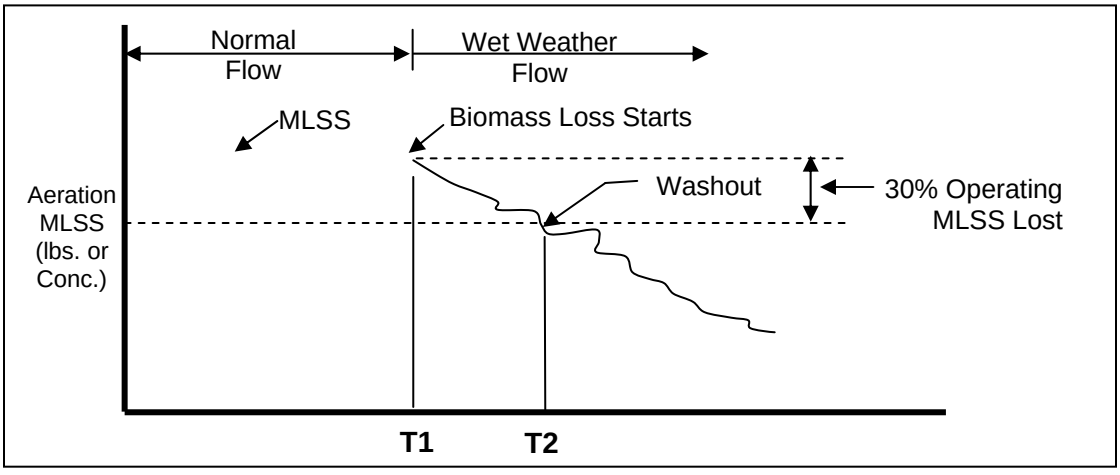
(C) The permittee submitted notices as required under paragraph (m)(3) of this section (Permittee must comply with the 24-hour reporting requirements of 122.41(1)(6).)"

Operation of the WWTPs during peak wet-weather flows can result in Unpermitted Discharges and/or Bypasses. The PCP has been developed to minimize the possibility of these occurrences.

Since the PCP has been developed as a requirement of the CD, the Bypass definition in the CD applies.

Diversions under the 1994 permit provisions could only be made when necessary to prevent washout (and effluent limits must not be violated), which is specifically defined to mean the specific result of an increased rate of solids transfer from the aeration basins to the final clarifiers (loss of 30 percent or more of MLSS in aeration basins, exclusive of wasted solids), as illustrated in **Figure I-1**.

Figure I-1: Aeration MLSS and Washout Illustration



The effluent limits imposed by the 1994 NPDES permits for the WWTPs are shown in **Table I-1**.

Parameter	Value for Fourth Creek	Value for Kuwahee	Value for Loves Creek
Flow used for maximum monthly mass loadings (mgd)	10.8	40	10.3
BOD (mg/L)			
Monthly	30		
Weekly	40		
Daily	45		
CBOD (mg/L)			
Monthly		25	25
Weekly		35	35
Daily		40	40
Minimum BOD removal (%)			
Daily	40%	40%	40%
Monthly	85%	85%	85%
Suspended solids (mg/L)			
Monthly	30	30	30
Weekly	40	40	40
Daily	45	45	45
Minimum suspended-solids removal (%)	40%	40%	40%
Daily	85%	85%	85%
Monthly			
Ammonia nitrogen—May through October (mg/L)			
Monthly		5	15
Weekly	NA	7.5	20
Daily		10	25
Ammonia nitrogen—November through April (mg/L)			
Monthly		15	
Weekly	NA	20	NA
Daily		25	
Settleable solids (ml/L)			
Daily	1	1	1
Dissolved oxygen (mg/L)			
Daily minimum	1.0		
Instantaneous minimum		1.0	1.0
Fecal coliform (number/100 ml)			
Monthly (geometric mean)	200	200	200
Daily	1,000	1,000	1,000
pH			
Daily minimum	6	6	6
Daily maximum	9	9	9

Table I-1 – 1994 NPDES Permit Limits for Fourth Creek, Kuwahee, and Loves Creek Wastewater Treatment Plants

Table I-1 shows that effluent standards for the Kuwahee and Loves Creek WWTPs are more stringent than standards for the Fourth Creek WWTP. The permits for Kuwahee and Loves Creek WWTPs require nitrification, but the permit for Fourth Creek WWTP does not.

B. Related Consent Decree Programs

This PCP is consistent with other programs that are being developed to comply with the CD, specifically the Comprehensive Performance Evaluation (CPE) and the Composite Correction Plan (CCP). These programs are described below:

Comprehensive Performance Evaluation (CPE) - For each of the three WWTPs, KUB completed a comprehensive performance evaluation using flow modeling and other appropriate evaluation techniques to determine capacity and ability to meet permits. To the extent applicable, the CPE was developed consistent with EPA publications "Improving POTW Performance Using the Composite Correction Approach" - EPA CERI, October 1984 and "Retrofitting POTW's" - EPA CERI, July 1989. The CPE is a thorough, structured review of a WWTP's process performance capabilities and associated administrative, operational, and maintenance practices. The objectives were to identify potential improvements in process performance that can be achieved without significant capital improvements, and to identify process components that would require capital improvements to achieve permit compliance. [Ref. CD Section VII.D.1.(a).(iv)]

Composite Correction Program (CCP) - The CCP is the performance improvement phase that follows the CPE. It is a systematic approach to implementing administrative, operation, and maintenance improvements as well as rehabilitation and/or upgrades to the WWTPs to address the problems identified in the CPE. The CCP is also consistent with the EPA publications "Improving POTW Performance Using the Composite Correction Approach" - EPA CERI, October 1984 and "Retrofitting POTWs" - EPA CERI, July 1989; and the "Tennessee Design Criteria", to the extent applicable. The CCP will: (A) address all factors which limit or which could limit the WWTP's operating efficiency or the ability to achieve NPDES Permit compliance; (B) address the peak flow handling procedures and peak flow capacity of the WWTP; and (C) identify specific actions and schedules to correct each limiting factor, including capital improvements to the existing WWTP where appropriate. The CCP will evaluate all appropriate alternatives and provide schedules for achieving permit compliance. [Ref. CD Section VII.D.1.(a).(v)]

It was anticipated that the checklists included in the original PCP would be modified as the CCP is implemented.

C. Process Controls Program Development

The original PCP was developed using available information including existing operation and maintenance manuals, previous studies, interviews with plant operations staff, and review of operations records. Specifically, this information was used to establish the peak secondary treatment capacity of each WWTP and to determine action levels for operational process decision-making. These capacities and the capacities of all other unit processes, and action levels were confirmed or revised upon completion of the CPE. Appendices A, B and C contain detailed updated checklists and flow charts to guide operational decision-making.

Section II – Rationale for PCP Revisions

A. Introduction

The PCP consists of standard procedures for wet-weather flow operating conditions, along with supporting documentation to optimize treatment of wastewater with existing facilities in order to achieve NPDES permit compliance at the Kuwahee WWTP, Fourth Creek WWTP and Loves Creek WWTP. The standard procedures consist of checklists and flow charts that have been developed to base operational decision-making on parameters including plant flow, mixed liquor suspended solids (MLSS), clarifier sludge blanket levels, and other operational conditions (including, but not limited to, status of on-site storage basins at KWWTP). Specifically, the procedures address when to initiate and conclude Diversions in accordance with the requirements of the CD and NPDES permits applicable at the time of PCP development.

This fourth revision of the PCP incorporates facility descriptions and operational guidelines for the Fourth Creek WWTP CCP Phase I Improvements, consisting of a parallel wet-weather treatment train in accordance with the approved CCP. Other miscellaneous modifications include minor clarifications and corrections as well as additional operations checklist items to facilitate consistency in wet-weather plant operations.

Previous revisions incorporated updates of some definitions and terms as a result of the new NPDES permits (2012 for KWWTP and FCWWTP, 2009 for LCWWTP) subsequent to the original PCP development and provided additional clarification on the use of storage and operational facilities constructed during the Kuwahee WWTP CCP Phase I projects. For purposes of the revised PCP, the storage tank at the west end of the Kuwahee WWTP and the tank offsite at Bernard Street (Second Creek) will be referred to as "CCP Storage". The purpose of these facilities is to prevent flows in excess of 120 mgd from reaching the Kuwahee WWTP under CCP design storm conditions. However, under some conditions they may be used to prevent or delay the start of a Diversion. Standard Operating Procedures (SOP) have been developed to guide operation of these facilities. These SOPs are referenced in the revised PCP Wet-Weather Checklists. Other miscellaneous modifications include clarifying the procedures and responsibilities based on operational experience over the past four years.

B. Peak Wet-Weather Flow Issues

A key issue addressed in the PCP for the KWWTP is Diversion of a portion of primary effluent flows directly to chlorination during peak wet-weather flow conditions. With the completion of the FCWWTP CCP Phase I Improvements, flows that exceed secondary treatment capacity are diverted to a wet-weather process treatment train consisting of high-rate clarification (HRC), providing diverted flows with a level of treatment greater than primary treatment. At LCWWTP, primary treatment is not provided. However, flows that exceed secondary treatment capacity are diverted to the peak flow clarifiers for storage. If these fill and overflow to chlorination, a Diversion has occurred, however the diverted flows receive the equivalent of primary treatment. All three WWTPs have been designed and permitted in accordance with the PCP for Diversion of flows that exceed the capacity of the secondary treatment system until the CCP is completed. However, diverted flows receive disinfection after being combined with effluent from the secondary treatment system. The CD requires compliance with the 1994

NPDES permit Diversion provisions until new permits become effective. New NPDES permits became effective in 2009 and 2012, which do not specifically address Diversions. However, under terms of the CD and the approved CCP, diversions are an allowable bypass until completion of the Composite Correction Plan provided that they are in accordance with the PCP.

The most recent NPDES permits include the following definition for "Overflow" and "Bypass."

1. Overflow

"a. "Overflow" means any release of sewage from any portion of the collection, transmission, or treatment system other than through permitted outfalls.

b. Overflows are prohibited.

c. The permittee shall operate the collection system so as to avoid overflows. New or additional flows shall only be allowed in accordance with KUB's approved Capacity Assurance Plan (CAP)."

2. Bypass

"a. "Bypass" is the intentional Diversion of wastewater away from any portion of a treatment facility. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause 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.

b. Bypasses are prohibited unless all of the following three conditions are met:

i. The Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage;

ii. There are no feasible alternatives to Bypass, such as the construction and 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, which occurred during normal periods of equipment downtime or preventative maintenance; and

iii. The permittee submits notice of an unanticipated Bypass to the Division of Water Pollution Control in the appropriate Environmental Field Office within 24 hours of becoming aware of the Bypass (if this information is provided orally, a written submission must be provided within five days). When the need for the Bypass is

foreseeable, prior notification shall be submitted to the director, if possible, at least 10 days before the date of the Bypass.

c. Bypasses not exceeding permit limitations are allowed only if the Bypass is necessary for essential maintenance to assure efficient operation. All other Bypasses are prohibited. Allowable Bypasses not exceeding limitations are not subject to the reporting requirements of iii, above.

Any Bypass in compliance with the PCP is referred to as a "Diversion". All Bypasses not in compliance with the PCP shall be referred to as a "Bypass."

C. Summary

Under the most recent NPDES permits, operation of the WWTPs during peak wet-weather flows can result in Bypasses or Overflows and the purpose of the PCP is to minimize the possibility of these occurrences during wet-weather conditions. The PCP has been revised to provide additional guidance for plant operations staff and updated plant information related to the KWWTP and FCWWTP CCP Phase I Improvements. These changes do not impact the decision criteria or action levels of the PCP.

The PCP for the KWWTP and FCWWTP will be further revised upon completion of future CCP project phases at each plant to reflect the process upgrades and revised applicable permit language.

Section III – Kuwahee WWTP

A. Overview

The Kuwahee WWTP includes screening, influent pumping, grit removal, primary clarification, intermediate pumping, secondary treatment with nitrification using conventional activated sludge, disinfection (chlorination/dechlorination), and solids processing. The plant was originally designed as a two-stage activated sludge facility featuring high purity oxygen activated sludge for biochemical oxygen demand (BOD) removal, followed by an aerated activated sludge nitrification system. The high purity oxygen system is no longer used because of a significant reduction in industrial loadings, and the plant is operated as a conventional single stage activated sludge plant with a solids retention time (SRT) sufficient to achieve nitrification. The original clarifiers provided for the high purity oxygen system are used to store peak wet-weather flows.

B. Capacity

The 2012 NPDES permit is based on an average annual flow of 44 mgd (This is an increase from the previous 40 mgd basis, though the effluent concentration limits have not been changed.) The design peak hydraulic capacity is 120 mgd according to the "Kuwahee Operations & Maintenance Manual" (1980, Envirodyne Engineers). At flows that exceed 120 mgd, a Bypass or Unpermitted Discharge could occur upstream of the WWTP.

Capacity issues were most recently addressed in the "Kuwahee Wastewater Treatment Plant Rerating Study" (CDM Smith, 2000). This study concluded that the annual average capacity is 44 mgd, which is also interpreted to be the monthly average capacity. In addition, it was concluded that the secondary treatment system could be operated at flows up to 70 mgd. However, sustained high flows at this level can result in Washout and/or loss of biomass from the final clarifiers. These conclusions were confirmed in the CPE, and the CCP was subsequently developed.

The plant was originally designed to operate in a Diversion mode when flows exceed the 70 mgd maximum design capacity of the secondary treatment facilities. In the Diversion mode, primary treatment effluent flows of up to 50 mgd are diverted to the chlorine contact basin where they are combined with 70 mgd of secondary treatment effluent.

The original design featured an automated flow control system that enabled a maximum of 70 mgd to be routed to the primary clarifiers. Flows in excess of 70 mgd were routed around the primary clarifiers through the preaeration basin to the secondary treatment system (i.e., the high purity oxygen system), and an equal amount of primary effluent flow was automatically diverted to the first chlorine contact basin. This resulted in maintaining a maximum flow of 70 mgd to secondary treatment. This control system is no longer used, and all flow re-routing and operation of the Diversion gates are now manually controlled to minimize the frequency and volume of Diversions.

C. Kuwahee WWTP CCP Phase 1 Overview

The process and hydraulic upgrades to the Kuwahee WWTP included in the Phase 1 CCP are summarized below:

- A permanent chemically enhanced primary treatment (CEPT) upgrade enables enhanced primary clarification during peak wet-weather flows. The intent of this upgrade is to improve primary effluent quality (CBOD and TSS) in preparation for possible opening of the Diversion.

- A second gravity thickener is provided to manage increased primary treatment solids production that will result when CEPT is in use. In addition, this will provide capacity for increased solids production upon completion of the Phase 2 CCP.

- Enhancements to the storage facilities on the south side of Neyland Drive.

- Hydraulic improvements to enable up to 120 mgd to flow across Neyland Drive where it is pumped to secondary treatment (70 to 80 mgd), or temporarily stored for subsequent secondary treatment. These improvements include removing the old UNOX reactors from the flow path. The hydraulic improvements will ultimately allow secondary treatment for all influent flow up to 120 mgd once the Phase 2 CCP is complete.

None of the improvements listed above impact the previous PCP Flow Chart or Wet-Weather Checklist decision criteria or action levels.

In addition to the improvements described above, the Phase 1 CCP included provision of storage facilities upstream of the KWWTP to manage flows that exceed 120 mgd to avoid an Overflow. However, they may also be used to avoid opening the Diversion when flows exceed 70 to 80 mgd if influent flows greater than 120 mgd are not expected to occur. Use of these facilities to avoid Diversion of primary effluent will no longer be needed once the Phase 2 CCP Improvements are complete. Use of these facilities to avoid a Diversion requires caution as it could result in an Overflow if plant flows increase unexpectedly (as a result of unavailable CCP storage volume). The decision to use this storage to avoid a Diversion depends on various factors that plant operations staff must consider when using the facilities. These include, but are not limited to:

- Volume stored in the CCP storage tanks at the time,
- Expected rainfall and resulting flows,
- Volume stored in the plant basins (south of Neyland Drive),
- Volume stored in the UNOX basin, and
- Secondary treatment process performance.

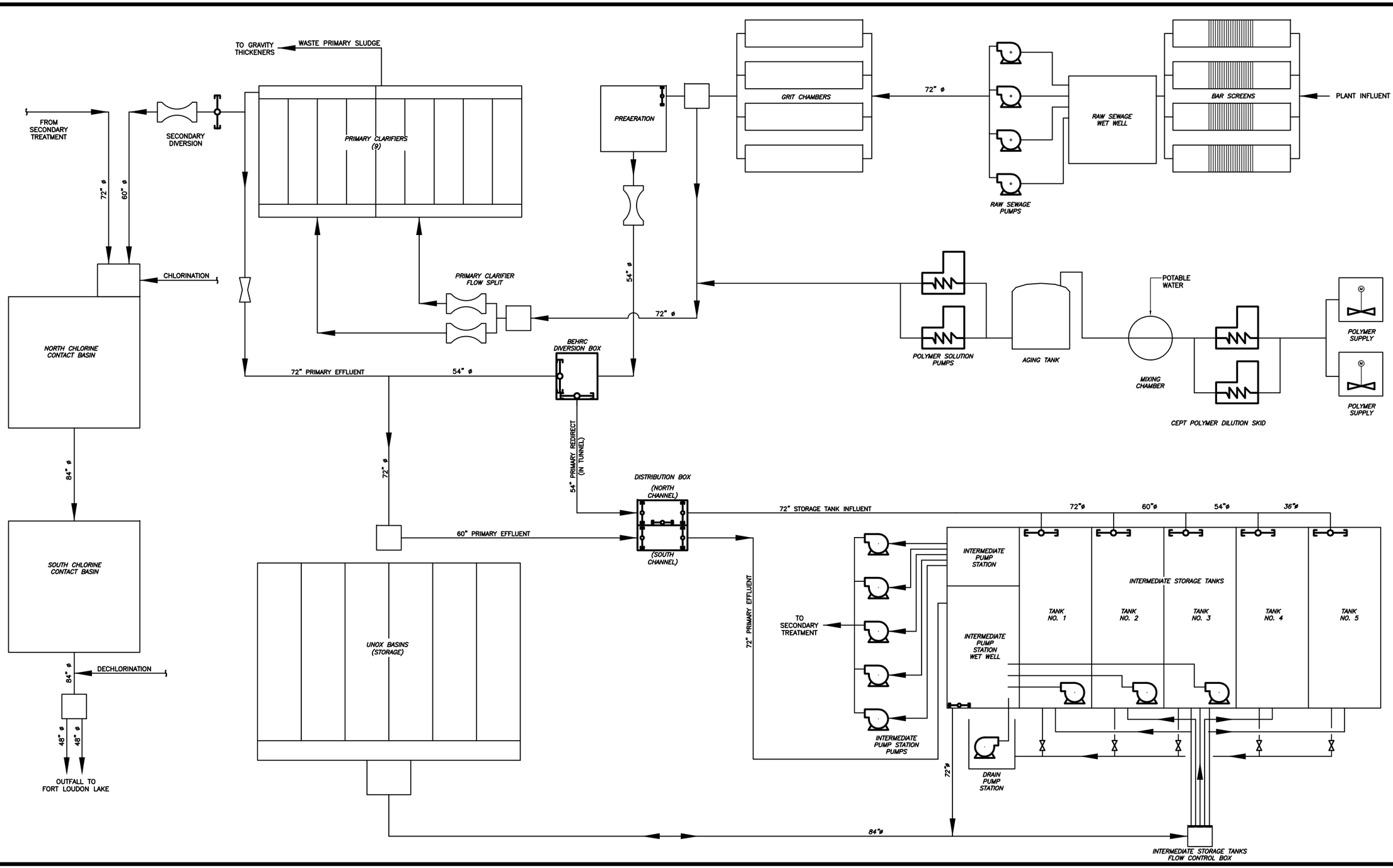
These CCP storage facilities do not impact the PCP Flow Chart or Wet-Weather Checklist decision criteria or action levels.

Another completed CCP project consisted of installing emergency generators capable of powering the entire KWWTP (including future CCP upgrades).

This upgrade does not impact the PCP Flow Chart or Wet-Weather Checklist decision criteria or action levels.

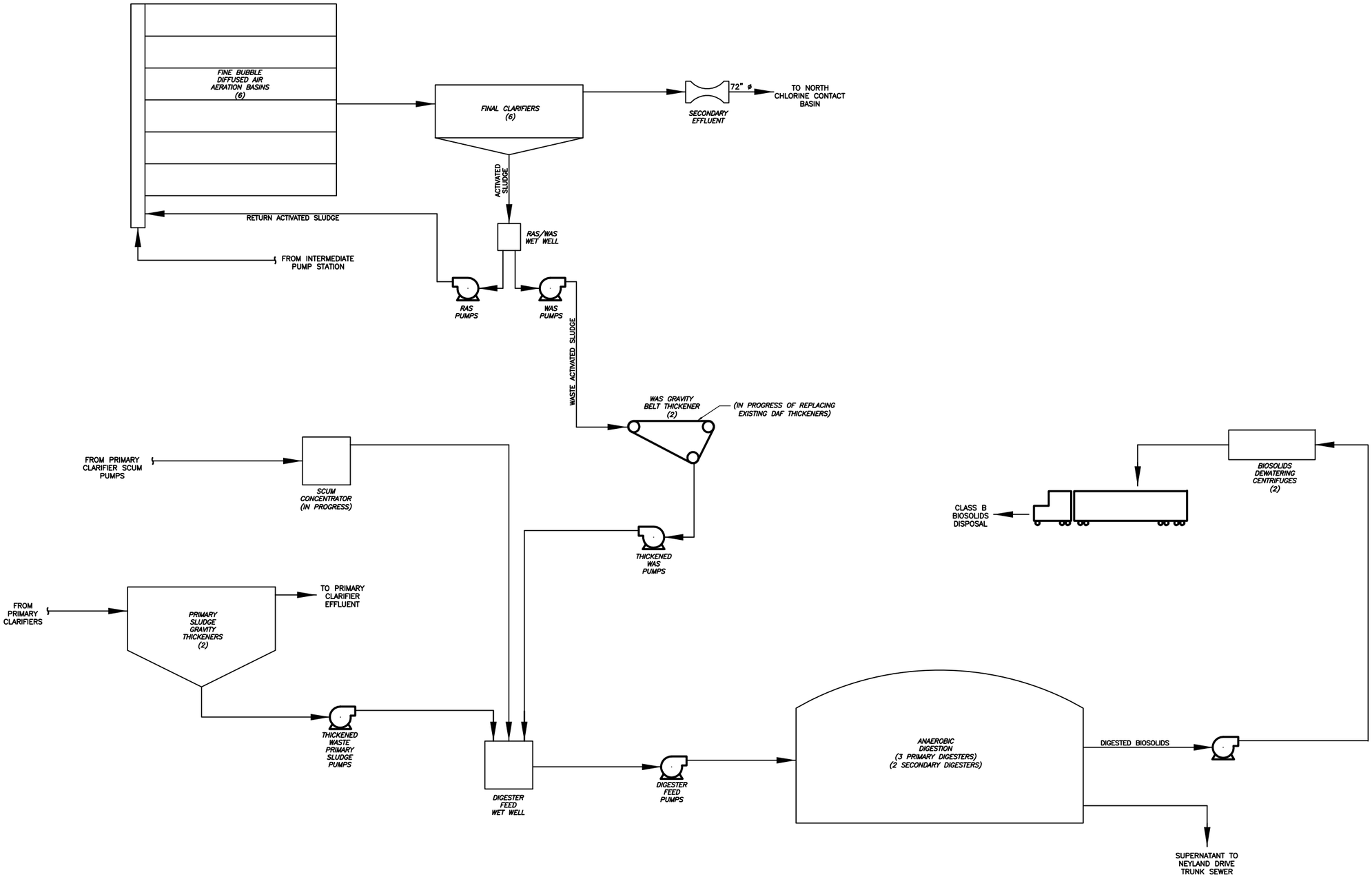
One other recent Kuwahee WWTP upgrade (not a CCP project) consisted of replacing all five Intermediate Pump Station Pumps. The 17 mgd pumps (firm capacity of 68 mgd) were replaced with 18.7 mgd pumps (firm capacity of 75 mgd). This upgrade does not impact the PCP Flow Chart or Wet-Weather Checklist decision criteria or action levels. However, it provides increased capacity to deliver flow to secondary treatment which has been found to operate satisfactorily at flows above 70 mgd for short periods of time.

An updated plant flow schematic is provided in **Figure III-1**.



CDM Smith

Figure III-1
Kuwahee WWTP
Process Flow Diagram
005646



CDM Smith

Figure III-1(Continued)
Kuwahee WWTP
Process Flow Diagram
005647

Critical capacity information is summarized in **Table III-1**:

Process	*Features*	*Comments*
Screens	4 mechanical screens	Approximately 60 mgd per screen
Influent Pumps	4 pumps	Approximately 40 mgd per pump
Grit Removal	4 aerated channels	120 mgd capacity
Primary Clarifiers	9 rectangular tanks	70 mgd capacity
Storage Tanks	5 rectangular tanks	Approximately 6 million gallons total
Intermediate Pumps	5 pumps	Approximately 18.7 mgd capacity per pump
Aeration Basins	6 basins	30 feet deep with fine bubble diffusers; 8.67 million gallons
Final Clarifiers	6 clarifiers, each 135 ft. diameter	815 gpd/ft^2 at 70 mgd
Disinfection	2 basins	15 minute detention at 120 mgd

Table III-1 – Kuwahee WWTP Capacity Summary

D. Operational Issues

At flows up to 70 mgd, all but 1 to 2 mgd receive primary treatment, prior to secondary treatment. The plant features a preaeration basin that receives 1 to 2 mgd which is routed around primary treatment, but receives full secondary treatment.

As influent flow increases above 70 mgd, flow to the preaeration basin is increased to maintain 70 mgd through primary clarification. Flows above 70 mgd through the primary clarifiers cause flooding of the effluent launders.

Prior to Diversion, primary effluent (up to 70 mgd) and pre-aeration effluent (up to 50 mgd) flow across Neyland Drive through two large pipes and enter the intermediate pump station for pumping to secondary treatment or for storage and future secondary treatment. The original intermediate clarifiers provide up to approximately 6 million gallons of storage for flows that exceed the capacity of the intermediate pump station, which is 70 mgd or more with four of the five pumps in service. Use of the intermediate clarifiers for storage results in operation of the intermediate pump station with a wet well level that is up to 5 feet higher than normal.

Although the original design provided for Diversion to automatically occur whenever plant flows exceeded 70 mgd, KUB has found that the use of the intermediate clarifiers for storage and performance monitoring of the secondary treatment system results in minimizing Diversion volume and sometimes eliminates the need for Diversion.

The secondary treatment system consists of six plug flow aeration basins with fine bubble ceramic diffusers that are also designed to be operated in the complete mix mode. Effluent is distributed to the six final clarifiers through a channel with weirs to control flow to each clarifier. Sludge in each clarifier is collected by a rotating hydraulic removal system which discharges through an adjustable telescopic valve. All of the sludge flows by gravity to the sludge pump station where it is returned to the aeration basin influent stream, or wasted. An on-line total suspended solids meter in the aeration basin effluent channel continuously measures mixed liquor suspended solids (MLSS).

Process control of the secondary treatment system is influenced by the hydraulics of the secondary clarifiers feed channel which make it difficult to achieve uniform flow and solids loadings to each clarifier. As a result, the telescopic valves must be set at different levels to maintain similar sludge blanket levels in each clarifier. This aspect of the system makes it difficult to adjust sludge removal rates as flows change, even though sludge blanket levels are checked frequently during high flow conditions, and the telescopic valves are adjusted to maintain uniform low blanket levels. The difficulty in increasing the return sludge rate can result in a washout under sustained high flow conditions. This issue was evaluated as part of the CPE.

The on-line total suspended solids (TSS) meter installed at the aeration basin effluent channel is used to monitor for a Washout condition. **Figure III-2** provides an overview of the process used to monitor for Washout conditions and implement the Diversion.

With plug flow aeration basins, use of effluent MLSS to monitor for washout conditions is not entirely accurate because of the variability of MLSS concentration from influent to effluent end of the basin. Conversion to complete mix reactors and other alternatives were evaluated as part of the CPE.

The procedure for completing preparation activities prior to a Diversion is presented in Figure III-2 and is summarized as follows:

1. Establish pre-event MLSS concentration – this is the MLSS concentration that will be used to calculate the percentage of biomass lost from aeration.

2. The pre-Diversion approval threshold is the MLSS concentration at which supervisory approval is obtained for a possible Diversion. It is set at 10 percent of the pre-event MLSS value. (There is also a pre-Diversion approval threshold for storage tank level as described below).

3. The Diversion threshold is the MLSS concentration at which the Diversion gate is opened to avoid a washout condition. The Diversion threshhold is set at 15 percent of the pre-event MLSS value.

The pre-event MLSS concentration is the average concentration determined by TSS meter readings for the 12 hours preceding the time the second influent pump comes on. The pre-Diversion approval and Diversion thresholds described above are used as guidelines to take the indicated actions. Due to the typically rapid changes in flows and process performance characteristic of wet-weather operations and the manual operation required to adjust gates, these actions may be taken when TSS measurements are within 2 percent of the action levels.

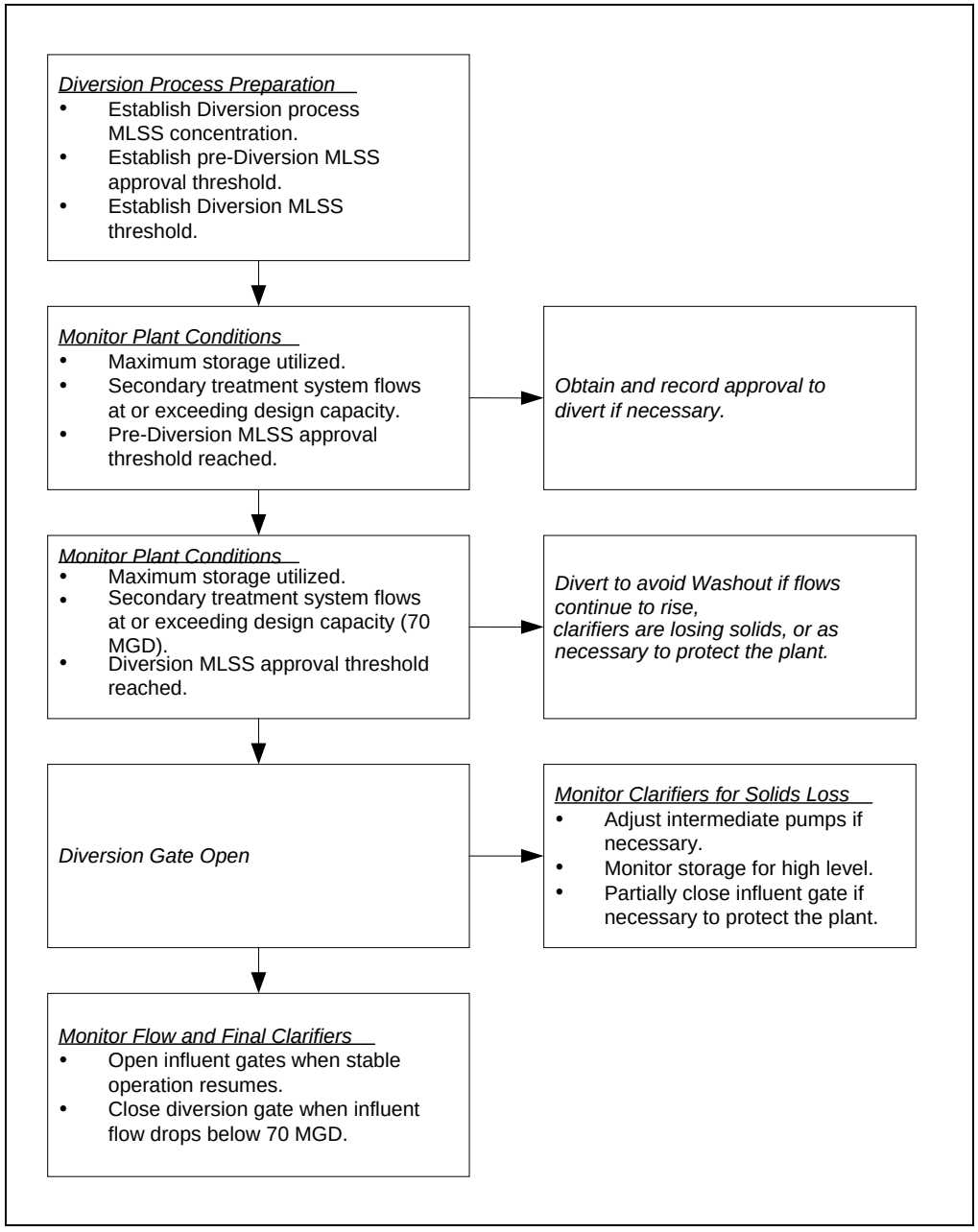


Figure III-2: Kuwahee WWTP Diversion Process

Note that it is up to the discretion of the operator to open the Diversion gate once Diversion approval is obtained and the Diversion threshold is reached. If plant flows are decreasing and/or final clarifier performance is satisfactory (sludge blanket levels are controlled in all clarifiers and excessive solids are not being lost), the operator may decide not to open the Diversion gate. In fact, even if a Washout has occurred, the operator may exercise discretion and not open the Diversion gate based on the conditions described above.

In addition to monitoring MLSS for Washout conditions, the operator must concurrently monitor the storage basin level to ensure maximum use of available plant storage while not exceeding the capacity of the junction box. When flows to the intermediate pump station exceed the secondary treatment capacity of 70 mgd, the storage basins begin to fill. Once the storage

basins are full and plant flows are at or exceeding secondary treatment system capacity, the maximum dry-weather flow through the plant has been achieved and the Diversion gate must be opened if the additional wet-weather design capacity of the plant is to be utilized. The pre-Diversion notification level for the storage tanks is approximately 823.00, and the Diversion threshold is approximately 824.00. If the Diversion gate is open as a result of reaching the MLSS threshold, the operator must continue to monitor the storage basin level. If the level reaches approximately 823.00, it is necessary to adjust the influent gates. Refer to SOP for utilization of UNOX basin for additional storage.

E. Wet-Weather Operating Procedures

Appendix A contains a flow chart and checklist to guide operations decisions when flows increase due to wet-weather conditions. If a Diversion occurs, the checklist must be fully completed and maintained as part of the plant operations records.

IV. Fourth Creek WWTP

A. Overview

The Fourth Creek WWTP includes screening, grit removal, pumping, primary clarification, secondary treatment with conventional activated sludge secondary treatment, disinfection (chlorination/dechlorination), and effluent pumping. Primary sludge and waste activated sludge are thickened and then sent to the Kuwahee WWTP through the trunk sewer system.

The plant is designed to divert influent flows in excess of the secondary treatment capacity directly to a high-rate clarification (HRC) wet-weather treatment process prior to discharge to the chlorine contact basin for disinfection along with secondary treatment effluent. The effluent pump station is used when the level in Fort Loudon Lake is above a threshold level. A plant flow schematic is provided in **Figure IV-1.**

Recommended improvements to this plant are being implemented as part of the CCP and this PCP will be updated upon completion of each phase.

B. Capacity

The 2012 NPDES permit is based on an average annual flow of 10.8 mgd. The peak hydraulic capacity of the secondary treatment process units is 18 mgd, and the maximum day dry-weather flow capacity is 14.4 mgd according to the "Fourth Creek Wastewater Treatment Facility Operations & Maintenance Manual" (1988, Barge, Waggoner, Sumner & Cannon). The hydraulic and process treatment capacities of the HRC wet-weather process train is 17 mgd. The combined hydraulic and treatment peak hour flow capacity of the secondary treatment process train and the HRC wet-weather process train is 34 mgd.

The plant features an activated sludge aeration system consisting of two tanks totaling 1.30 million gallons. Mechanical surface aerators are used for aeration and mixing. The secondary treatment process typically operates satisfactorily at peak hour flows up to 15-17 mgd. The actual peak flow capacity was evaluated as part of the CPE, and the CCP subsequently developed.

C. Fourth Creek WWTP CCP Phase 1 Overview

The process and hydraulic upgrades to the Fourth Creek WWTP included in the Phase I CCP are summarized below:

- A permanent chemically enhanced primary treatment (CEPT) upgrade enables enhanced primary clarification during peak wet-weather flows. The intent of this upgrade is to improve primary effluent quality (CBOD and TSS) in preparation for possible opening of the Diversion.

- A wet-weather screening structure enables screening and flow routing of excess peak flow to the wet-weather treatment train. The structure includes a horizontal channel screen that provides mechanical screening of the wet-weather process flow, leaving screenings in the influent flow to be removed in the existing headworks structure. The wet-weather screenings structure also includes a bending weir and modulating gates to

control the routing of influent flow to the existing headworks and influent pump station and to the wet-weather influent pump station.

- A wet-weather influent pump station transfers all flow routed to the wet-weather treatment process from the wet-weather screening structure. The pump station consists of four submersible pumps with variable frequency drives.

- A high-rate clarification (HRC) process provides advanced physical-chemical treatment to the wet-weather process flow. The process utilizes a combination of coagulant, polymer, and micro-sand to create dense floc particles capable of rapid settling. Plate settlers provide increased surface area for high-rate settling. Two HRC process trains provide treatment over a range of 3 to 17 mgd of FCWWTP wet-weather influent flow. In the future the HRC process will be upgraded to Biologically Enhanced High-Rate Clarification (BEHRC) through the incorporation of return activated sludge into the process. Conversion of the process to BEHRC is included in the future FCWWTP CCP Phase 2 Improvements.

- A third chlorine contact tank has been added to provide acceptable, minimum contact time for the increased FCWWTP peak hydraulic capacity of 34 mgd.

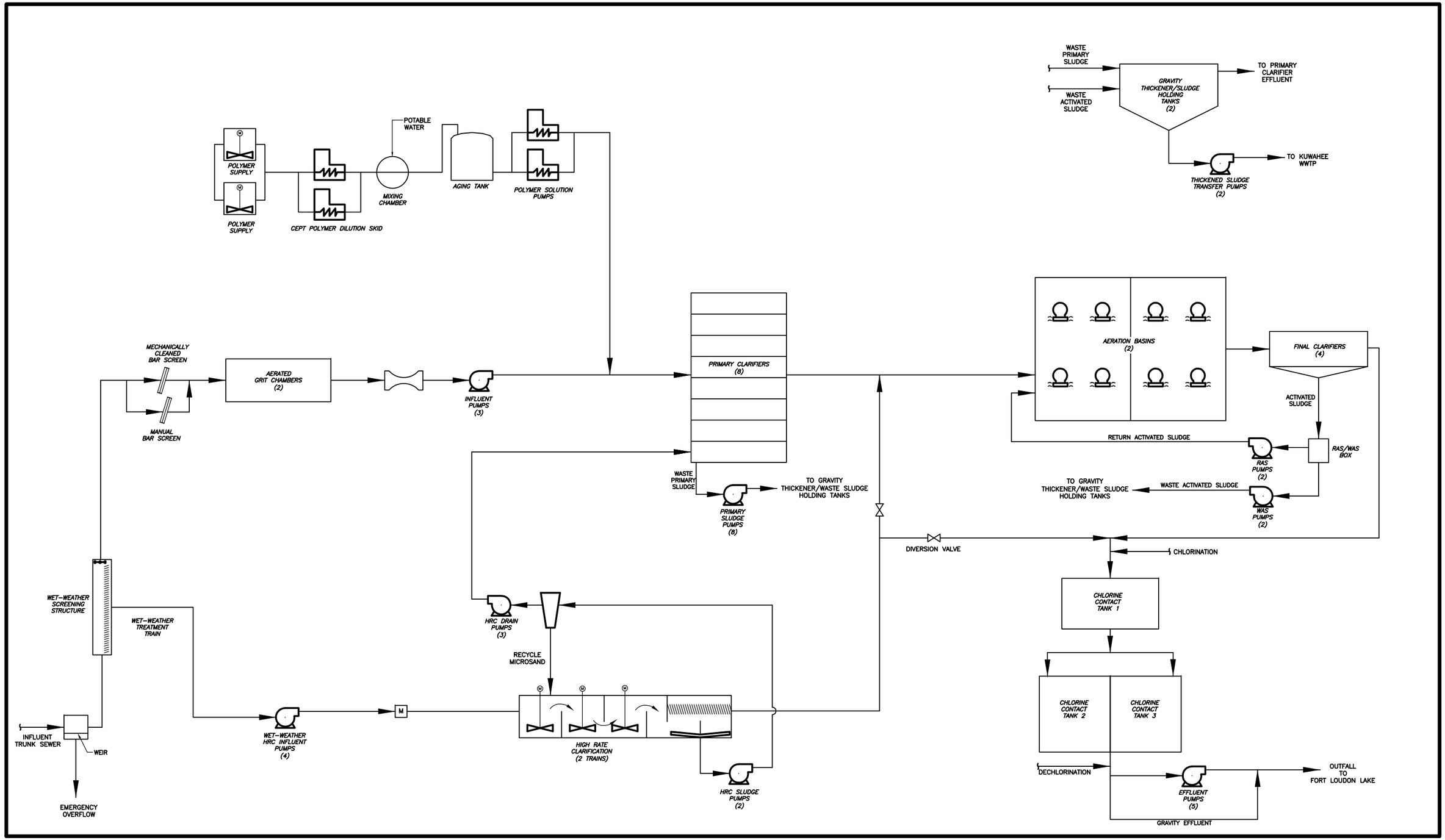
- A supplemental effluent pump station provides additional and more efficient pumping to match the increased FCWWTP peak hydraulic capacity of 34 mgd.

- Hydraulic improvements enable peak wet-weather flow management for flows up to 34 mgd (17 mgd through the secondary treatment train and 17 mgd through the HRC wet-weather treatment train).

Critical capacity information is summarized in **Table IV-1**:

Process	***Features***	***Comments***
Screens	1 mechanical, 1 manual	Approximately 18 mgd per screen
Grit Removal	2 channels	18 mgd capacity
Influent Pumps	3 pumps	22 mgd maximum firm capacity
Primary Clarifiers	8 rectangular tanks	18 mgd capacity
Aeration Basins	2 basins	12 feet deep with mechanical aerators; 1.3 million gallons.
Final Clarifiers	4 clarifiers, each 76 feet diameter	826 gpd/ft^2 at 15 mgd
Wet-Weather Screen	1 channel screen	20 mgd capacity
Wet-Weather Influent Pumps	4 pumps	18 mgd maximum firm capacity
HRC	2 process trains (coagulation, micro-sand injection, maturation, clarification)	19 mgd maximum capacity (18 mgd influent plus 1 mgd future RAS)
Disinfection	3 chlorine contact tanks	15 minute detention at 34 mgd
Effluent Pumps	5 pumps	36 mgd maximum firm capacity

Table IV-1 – Fourth Creek WWTP Capacity Summary



CDM Smith

Figure IV-1
Fourth Creek WWTP
Process Flow Diagram
005654

D. Operational Issues

Flows up to 11 mgd receive full primary and secondary treatment, along with disinfection. As flow increases above 11 mgd, the empty primary clarifiers (typically 3 or 4 of the 8 clarifiers are in service during dry-weather conditions) are put into service initially for storage, then as primary clarifiers when full. At this point, an on-line TSS meter in the aeration basin effluent is monitored to detect loss of solids, though this doesn't typically occur until flows through the secondary treatment process exceed 15 mgd.

When plant influent flows reach 15 mgd, the HRC wet-weather treatment train is brought on-line with a minimum wet-weather process flow of 3 mgd, the minimum recommended flow for effective treatment by one HRC process train. HRC process effluent is initially discharged to the aeration basin influent for secondary treatment. Once the conditions for Diversion approval are met, as detailed below, the HRC Effluent Diversion Valve to the chlorine contact tanks is opened and the HRC Effluent to Aeration Valve to the secondary treatment system is closed.

The procedure for completing Diversion process preparation activities indicated in **Figure IV-2** is described as follows:

1. Establish pre-event MLSS concentration – this is the MLSS concentration that will be used to calculate the percentage of biomass lost from aeration.

2. The pre-Diversion approval threshold is the MLSS concentration at which supervisory approval is obtained for a possible Diversion. It is set at 10 percent of the pre-event MLSS value.

3. The Diversion threshold is the MLSS concentration at which the HRC Effluent Diversion Valve is opened to avoid a washout condition. It is set at 15 percent of the pre-event MLSS value.

The pre-event MLSS concentration is the average concentration as determined by TSS meter readings for the 12 hours preceding the time when influent flow reaches 8 mgd. The pre-Diversion approval and Diversion thresholds described above are used as guidelines to take the indicated actions. Due to the typically rapid changes in flows and process performance characteristic of wet-weather operations, and coordination of two treatment process trains, these actions may be taken when TSS measurements are within 2 percent of the action levels.

Note that it is up to the discretion of the operator to open the HRC Effluent Diversion Valve once the Diversion threshold is reached. If plant flows are decreasing and/or final clarifier performance is satisfactory (sludge blanket levels are controlled in all clarifiers and excessive solids are not being lost), the operator may decide not to open the HRC Effluent Diversion Valve. In fact, even if a Washout has occurred, the operator may exercise discretion and not open the HRC Effluent Diversion Valve based on the conditions described above.

Under a Diversion event, the operational goal is to maintain a minimum of 15 mgd through the secondary treatment process, after the minimum flow criteria of the HRC process is met. During a Diversion all flows up to 34 mgd receive secondary treatment or HRC treatment and chlorine disinfection and dechlorination prior to discharge to Fort Loudon Lake.

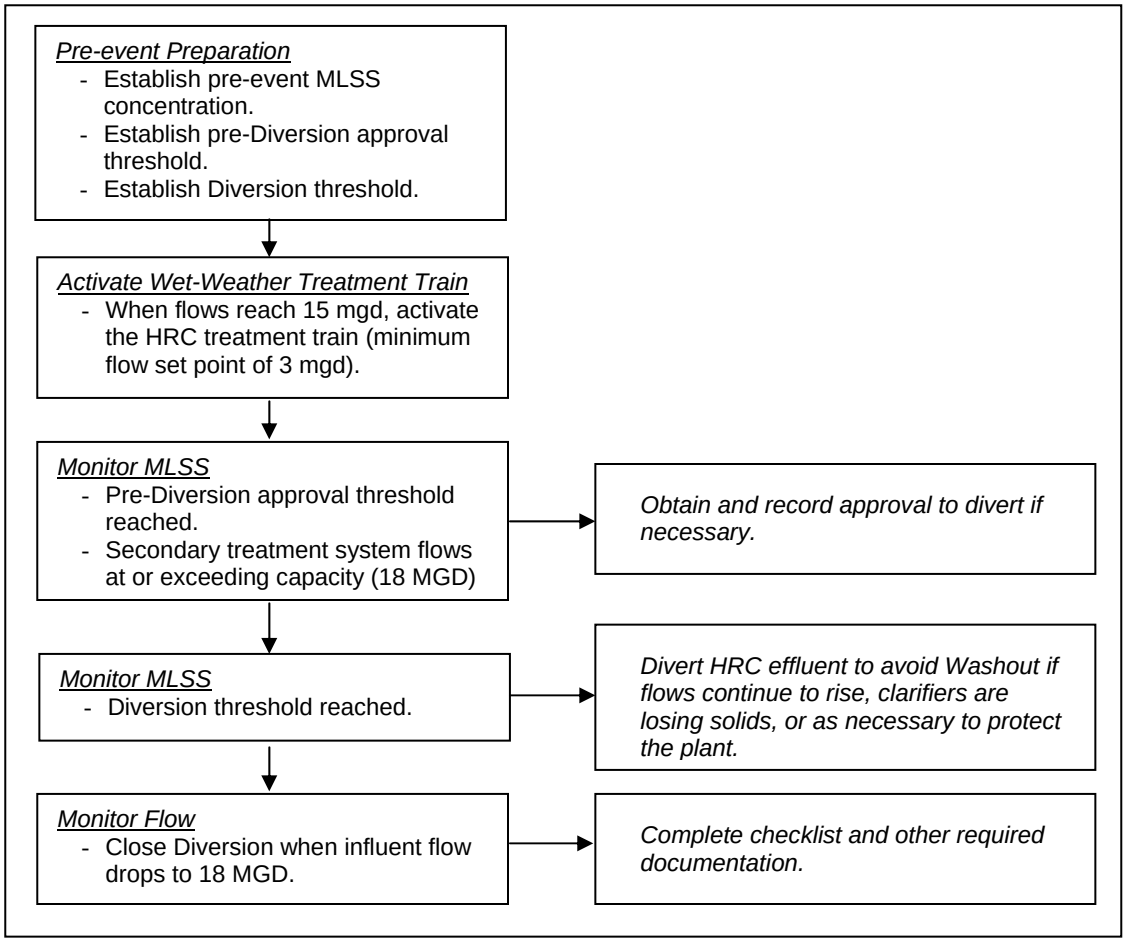


Figure IV-2: Fourth Creek WWTP Diversion Process

E. Wet-Weather Operating Procedures

Appendix B contains a flow chart and checklist to guide operations decisions when flows increase due to wet-weather conditions. If a Diversion occurs, the checklist must be fully completed and maintained as part of the plant operations records.

V. Loves Creek WWTP

A. Overview

The Loves Creek WWTP includes influent pumping, screening, grit removal, secondary treatment with nitrification using activated sludge, and disinfection (chlorination/dechlorination). Waste sludge is sent to the Kuwahee WWTP through the trunk sewer system.

Two peak flow clarifiers are used when pumped influent exceeds capacity of the secondary treatment system. Excess volumes pass over a fixed weir in the grit basin and are sent to these basins which are normally empty. Once full, these basins operate as primary clarifiers and the overflow is directed to the disinfection system where it is combined with effluent from the secondary treatment system. A plant flow schematic is provided in **Figure V-1.**

No CCP upgrades are planned for this facility, as determined through the CPE.

B. Capacity

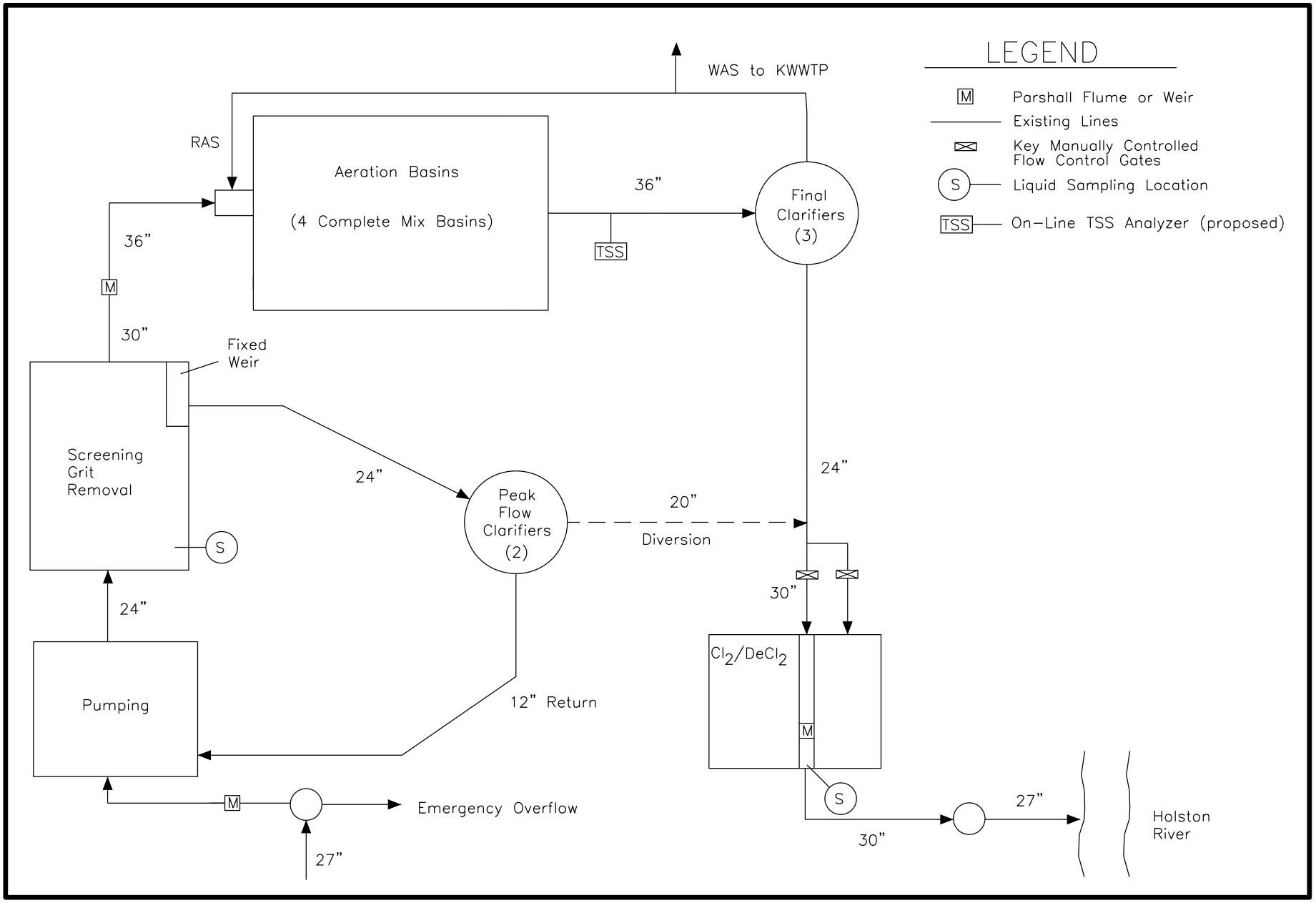
The 2009 NPDES permit is based on an annual average flow of 10 mgd. The peak hydraulic design capacity is 15 mgd according to the "Operation and Maintenance Manual for the Loves Creek Wastewater Treatment Plant" (1992-Burns & McDonnell). The firm capacity (capacity with largest pump out of service) of the influent pump station is also 15 mgd.

The cited reference above also indicates that the peak flow capacity of the secondary treatment system is 10 mgd. Flows that exceed 10-11 mgd are directed to the peak flow clarifiers for storage, and if necessary, Diversion. Influent flows greater than approximately 15 mgd are discharged through the emergency Diversion.

Critical capacity information is summarized in **Table V-1**.

Process	***Features***	***Comments***
Influent Pumps	4 pumps	Approximately 5 mgd per pump
Screens	2 mechanical screens	Approximately 15 mgd per screen
Grit Removal	2 aerated channels	15 mgd capacity
Aeration Basins	4 basins	14 feet deep with mechanical surface aerators; 3.78 million gallons
Final Clarifiers	3 clarifiers, each 75 feet diameter	754 gpd/ft^2 at 10 mgd
Disinfection	2 basins	22 minute detention at 15 mgd
Peak Flow Clarifiers	2 basins	650 gpd/ft^2 at 5 mgd; 0.52 million gallons of storage

Table V-1 – Loves Creek WWTP Capacity Summary



CDM Smith

Figure V-1
Loves Creek WWTP
Process Flow Diagram
005658

C. Operational Issues

Since average daily flows are typically less than 3.5 mgd, two aeration basins are kept off-line and empty. During wet-weather events, flows up to 10 mgd pass through the secondary treatment process and are disinfected prior to discharge. As flows exceed 11 mgd, excess flows are directed to the peak flow clarifiers which provide approximately 0.52 million gallons of storage prior to operating as primary clarifiers. A Diversion does not occur until the peak flow clarifiers overflow the weirs and operate as clarifiers. The drains on the peak flow clarifiers are left open resulting in recycling of some process flow and settled solids to the influent pump station.

Once the flows overflow the weir in the grit basin, approximately 11 mgd is being routed to the secondary treatment system. As flows increase above 11 mgd, some excess flow overflows to the peak flow clarifiers. The rest of the excess flow is sent to the out-of-service aeration basins for storage, so that a maximum of 11 mgd continues through full secondary treatment. The routing of flow to the out of service aeration basins is accomplished by manually controlled valves.

To summarize, a Diversion at the Loves Creek WWTP is not initiated by an operator decision, but by hydraulic conditions. The level of the Diversion weir was originally set to prevent peak flows from causing a Washout. The out-of-service aeration basins are used for storage to minimize flow to the peak flow clarifiers, which only results in a Diversion if they become full. The Diversion weir setting and the possibility of making it adjustable in response to secondary treatment performance were evaluated in the CPE.

At flows above about 11 mgd, the launders in the final clarifiers flood unless the second pipeline feeding the chlorine contact basin is used. It has been found that use of this second pipeline does not adversely impact the process.

D. Wet-Weather Operating Procedures

Appendix C contains a flow chart and checklist to guide operations decisions when flows increase due to wet-weather conditions. If a Diversion occurs, the checklist must be fully completed and maintained as part of the plant operations records.

Appendix A

Kuwahee WWTP Wet-Weather Checklist and Flow Chart

KUWAHEE WWTP
Wet-Weather Checklist (Refer to Wet-Weather Procedures Flow Chart)

Check and initial *each decision made prior to and upon opening the Diversion gate or when flows exceed 70 mgd and/or when influent flow is close to causing a possible Sanitary Sewer Overflow(SSO), Bypass and/or Unpermitted Discharge. Checklist is required during wet-weather events only.*

EVENT DATE(s):

OPERATOR(s): _____

_____

Initial and check

Pre-event communication

___ Advised Shift Lead or Tech 3 of pending event. Time: _____ *If not, explain:* _____

Pre-event setup

___ Refer to SOPs for CCP storage facilities readiness.

___ Are South Neyland storage tanks empty (water elevation at or below 809)? Yes/No *If no, explain:* _____

___ Are four influent pumps in Auto? Yes/No *If no, explain:* _____

___ Are five intermediate pumps in Auto? Yes/No *If no, explain:* _____

___ Number of primary clarifiers online. *(Please list):*_____

___ Check screenings box for level and coordinate disposal if necessary.

___ Check red box for level and coordinate disposal if necessary.

___ Confirm CEPT polymer system is operational and ready to start. *If no, explain:* _____

___ Confirm spare dump truck is available.

___ Record pre-event SSO meter reading at the Railroad Bridge _____.

___ Check composite samplers for proper operation every 4 hours.

Influent Flows increase above and maintains 50 mgd

___ Open all bar screen channels and place them in manual. Time: _____

___ Place grit system in manual.

___ Clean MLSS meter probe.

___ Record pre-event MLSS concentration. (Avg. MLSS of previous 12 hours) MLSS: _____mg/L

___ Record pre-Diversion approval threshold (loss of approximately 10% of biomass). MLSS: _____mg/L

Example Calculation: Pre-event MLSS 3000 mg/L – (3000 mg/L x 0.10) = 2700 mg/L Pre-Diversion threshold.

___ Record Diversion activation threshold (loss of approximately 15% of biomass). MLSS: _____mg/L

Example Calculation: Pre-event MLSS 3000 mg/L – (3000 mg/L x 0.15) = 2550 mg/L Diversion threshold.

___ Start final clarifier polymer feed.

___ Start CEPT polymer system.

___ Shut-off both gravity thickener dilution water pumps.

Influent flows increase above 70 mgd

___ Determine if additional personnel are required for the event and call-in as required.

___ Disallow digester supernatant process.

___ Turn off primary scum pumps.

___ Monitor status of CCP storage facilities. If extended large wet-weather event is not expected, consider filling South Neyland and UNOX storage tanks to capacity and use of CCP storage to reduce plant influent and avoid Diversion. Refer to SOP.

___ Adjust primary redirect gate to redirect flows from primary clarifiers. Maintain max flow to primary clarifiers with additional flow routed to pre-aeration tank. Time: _____

NOTE: *Each tank can handle 8 mgd and there are 9 tanks. If all are online, the primaries can take 70 to 72 mgd of flow. If there are 5 primaries online, for example, then only 40 mgd can be sent through the primaries.*

List information upon initial adjustment of pre-aeration gate.

___ Record primary redirect gate percent opened:_____ % Time: _____

___ Record: Final clarifier blankets (#1____ 2____ 3____ 4____ 5____ 6____ feet) Time: _____

___ Record:

Flow Meters:		TSS Meters:	
Influent:	_____ mgd	Primary effluent:	_____mg/L
Primary redirect:	_____ mgd	MLSS:	_____mg/L
Primary Inf.:	_____ mgd	Final clarifier junction box:	_____mg/L
Final clarifier tertiary Eff.:	_____ mgd	Effluent (#2 contact tank):	_____mg/L
Total Effluent:	_____mgd		

Time: _____

___ Are South Neyland Storage tanks are filling? Yes / No

___ Are four intermediate pumps running? Yes/No *(If no, explain):*_____

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KUWAHEE WWTP, cont.
Wet-Weather Checklist (Refer to Wet-Weather Procedures Flow Chart)

EVENT DATE(s):

Monitor for Pre-Diversion Approval Conditions:	
Monitor for Pre-Diversion Washout Conditions (loss of 10% of biomass) Current MLSS: _____mg/L; Time:_____	*Monitor South Neyland Storage Tank Level* Current tank level:_____ ; Time:_____
Monitor Secondary Treatment System Flow On line capacity (# Inter. Pumps times 18.7 mgd):_____; Current flow:_____; Time:_____	*If South Neyland storage tank level reaches 823.0, proceed to "Emergency Diversion Procedures" below. Refer to SOP for use of UNOX basin for additional storage.*

If Pre-Diversion Condition is met, Receive Approval for Diversion:	
Approval requested by: _____	Time: _____
Approval given by: _____	Time: _____
Approval must be given by Manager or VP	

Monitor for Diversion Activation Conditions:	
Monitor for Pre-Diversion Washout Conditions (loss of 15% of biomass) Current MLSS: _____mg/L; Time:_____	*Monitor South Neyland Storage Tank Level* Current tank level:_____ ; Time:_____
Monitor Secondary Treatment System Flow On line capacity (# Inter. Pumps times 18.7 mgd):_____; Current flow:_____; Time:_____	*If South Neyland storage tank level reaches 823.0, proceed to "Emergency Diversion Procedures" below. Refer to SOP for use of UNOX basin for additional storage.*

Was authorized Diversion implemented? Yes/No	*If no, explain:* _____
	If yes, proceed to "Diversion Authorized and Activated" below.

___ Shut off WAS cycle if 15% MLSS lost is achieved.

Influent flow between 90 and 120 mgd

Four intermediate pumps are running.

___ Monitor status of CCP storage facilities. If extended large wet-weather event is not expected (influent flow not expected to exceed 120 mgd), consider use of CCP storage to reduce plant influent and avoid Diversion. If influent flow exceeds capacity of influent pumps (120 mgd±), use CCP storage to avoid a SSO at MH#1. Refer to SOP.

Prior to opening Diversion gate:

___ Record: Final clarifier blankets (#1____ 2____ 3____ 4____ 5____ 6____ feet) Time: _____

___ Record: Time: _____

Flow Meters:		TSS Meters:	
Influent:	_____ mgd	Primary effluent:	_____mg/L
Primary redirect:	_____ mgd	MLSS:	_____mg/L
Primary Inf.:	_____ mgd	Final clarifier junction box:	_____mg/L
Final clarifier tertiary Eff.:	_____ mgd	Effluent (#2 contact tank):	_____mg/L
Total Effluent:	_____mgd		

NOTE: If Pre-Diversion approval has already been received, continue to "Diversion Authorized and Activated" below; otherwise proceed as follows:

Monitor for Pre-Diversion Approval Conditions:	
Monitor for Pre-Diversion Washout Conditions (loss of 10% of biomass) Current MLSS: _____mg/L; Time:_____	*Monitor South Neyland Storage Tank Level* Current tank level:_____ ; Time:_____
Monitor Secondary Treatment System Flow On line capacity (# Inter. Pumps times 18.7 mgd):_____; Current flow:_____; Time:_____	*If South Neyland storage tank level reaches 823.0, proceed to "Emergency Diversion Procedures" below. Refer to SOP for use of UNOX basin for additional storage.*

KUWAHEE WWTP, cont.

Wet-Weather Checklist (Refer to Wet-Weather Procedures Flow Chart)

EVENT DATE(s):

If Pre-Diversion Condition is met, Receive Approval for Diversion:	
Approval requested by: _____	Time: _____
Approval given by: _____	Time: _____
Approval must be given by Manager or VP	

Monitor for Diversion Activation Conditions:	
Monitor MLSS for Diversion Washout Conditions (loss of 15% of biomass) Current MLSS: _____mg/L; Time:_____	*Monitor South Neyland Storage Tank Level* Current tank level:_____ ; Time:_____
Monitor Secondary Treatment System Flow On line capacity:_____; Current flow:_____; Time:_____	*If South Neyland storage tank level reaches 823.0, proceed to "Emergency Diversion Procedures" below. Refer to SOP for use of UNOX basin for additional storage.*

Was authorized Diversion implemented? Yes/No	*If no, explain:* _____
	If yes, send Supervisory page.

Emergency Diversion Procedures	
If South Neyland storage tank level reaches 823.0 and the level is expected to increase, notify Manager, or VP, of need for Emergency Diversion and open Diversion gate if level reaches 824.0 and flow continues to rise. Refer to SOP for use of UNOX basin for additional storage.	
Supervisor notified by: _____	Time: _____
Diversion Opened due to Emergency? Yes / No	*If no, explain:* _____ *If Yes: South Neyland Storage Tank Level:* _____ *Time:* _____ *If Yes, send Supervisory Page*

Diversion Authorized and Activated

Above Diversion Activation Condition confirmation should be made prior to opening Diversion gate.

___ Primary redirect gate adjusted to allow flows up to 50 mgd to be redirected around primaries to maintain primary clarifier performance.

NOTE: Based on increasing influent flows into the facility, the primary redirect gate will need to be continually adjusted to help manage flow fluctuations and help maximize South Neyland storage tank usage. ***Maintain 70 mgd through secondary treatment.***

___ Chlorine control is placed in manual with initial residual target of 2.5 mg/L.

Prior to Diversion gate operation:

___ Record: Final clarifier blankets (#1____ 2____ 3____ 4____ 5____ 6____ feet) Time: _____

___ Record: Time: _____

Flow Meters:		TSS Meters:	
Influent:	_____ mgd	Primary effluent:	_____mg/L
Primary redirect:	_____ mgd	MLSS:	_____mg/L
Primary Inf.:	_____ mgd	Final clarifier junction box:	_____mg/L
Final clarifier tertiary Eff.:	_____ mgd	Effluent (#2 contact tank):	_____mg/L
Total Effluent:	_____ mgd		

KUWAHEE WWTP, cont.

Wet-Weather Checklist (Refer to Wet-Weather Procedures Flow Chart)

EVENT DATE(s):

Open Diversion gate to 100% initially and back off to maximize and maintain 70 mgd through secondary treatment. Send Supervisory Page after opening Diversion gate. Once flows stabilize:

___ Record

Diversion gate % open:_____ Influent flow:_____ mgd	Diversion flow: _____ mgd Final clarifier tertiary flow:_____ mgd

Time: _____

NOTE: Observe for washout conditions and adjust the Diversion gate to maintain less than 30% solids loss from the aeration basins. Also, observe the final clarifiers for sludge blanket buildup and solids loss that may require adjustment of the 4th intermediate pump. Maintain 70 mgd to secondary treatment.

When 4th intermediate pump is shut off:

___ Record: Final clarifier blankets (#1____ 2____ 3____ 4____ 5____ 6____ feet) Time: _____

___ Record: Time: _____

Flow Meters:		TSS Meters:	
Influent:	_____ mgd	Primary effluent:	_____mg/L
Primary redirect:	_____ mgd	MLSS:	_____mg/L
Primary Inf.:	_____ mgd	Final clarifier junction box:	_____mg/L
Diversion:	_____ mgd	Effluent (#2 contact tank):	_____mg/L
Final clarifier tertiary Eff.:	_____ mgd	Diversion gate % open:	_____

WARNING: ***Monitor South Neyland storage tanks. If level reaches 824.0 and/or a SSO or Unpermitted Discharge is imminent, contact Manager or VP of need to adjust influent gates or use CCP storage to reduce flow into and protect the plant. After approval is obtained reduce % open as required to stop filling of the South Neyland storage tanks. Confirm Diversion flow rate of up to 50 mgd prior to adjusting influent gates. Send Supervisory Page after adjusting influent gates. Monitor for a SSO immediately upstream of the Kuwahee WWTP (refer to SSO procedure below). Refer to SOP for use of UNOX basin for additional storage.***

Manager or VP Notified by: _____ Time: _____

Manager or VP Notified: _____ Time: _____

Note: If influent gates have to be adjusted to prevent overfilling of South Neyland storage tanks, it is recommended that initially all four gates be throttled to 25% open. Once the flows have balanced from the gate adjustment, two conditions must be monitored. First, monitor South Neyland storage tanks to assure flows are stable and not increasing. Second, monitor the last lead influent pump speed. If pump speed of the last lag reduces drastically then #1 and #2 gates should be re- opened no more than 2% increment. Leave #3 and #4 gates at 25% until #1 and #2 gates are both at 35% open. At this point the plant will be taking all the influent flow again.

Diversion gate is open and flow is decreasing

As the influent flow decreases, adjust the Diversion gate to maximize flow to maintain 70 mgd through secondary treatment if possible and prevent level in South Neyland storage tanks from increasing.

___ Record: Final clarifier blankets (#1____ 2____ 3____ 4____ 5____ 6____ feet) Time: _____

___ Record: Time: _____

Flow Meters:		TSS Meters:	
Influent:	_____ mgd	Primary effluent:	_____mg/L
Primary redirect:	_____ mgd	MLSS:	_____mg/L
Primary Inf.:	_____ mgd	Final clarifier junction box:	_____mg/L
Diversion:	_____ mgd	Effluent (#2 contact tank):	_____mg/L
Final clarifier tertiary Eff.:	_____ mgd	Diversion gate % open:	_____

___ When the MLSS TSS meter trend is stable or rising or when the intermediate wet well level is at 821.0 or falling, or when secondary treatment system can sustain all flow, close the Diversion gate.

Time gate closed: _____

KUWAHEE WWTP, cont.
Wet-Weather Checklist (Refer to Wet-Weather Procedures Flow Chart)

EVENT DATE(s):

___ Record the data from the event.

Dates the event occurred: _____

Total time (hrs) the Diversion gate was open: _____

Total Diverted flow (MG): _____

Diversion gate is closed and flow is decreasing

___ Turn on dilution water pumps.
___ Return initial chlorine residual to 2.0 mg/L
___ Resume secondary digester supernatant flow if required.
___ Turn primary scum pumps in auto.
___ Turn off final clarifier polymer feed.
___ Reduce % open for the primary redirect gate to permit correct flow into primary clarifiers.

Note: If Diversion gate is closed and flows exceed 50 mgd, complete the checklist without the next section being completed. Include comments on plant conditions at the time of checklist completion.

Influent flow decreases to 40 mgd

___ Shut off two bar screens and close channel gates. Time: _____
___ Place two bar screens in Auto when there is only one influent pump running.
___ Place grit collection system in Off mode when there is only one influent pump running.
___ Turn off CEPT.
___ Begin draining CCP storage tanks if they have been used.
___ Begin draining UNOX storage tanks after CCP storage tanks have been drained.

Post wet-weather event

___ Complete "Diversion Report Form".
___ Check progress of South Neyland storage tanks pump out.
___ Record post-event SSO meter reading _____ and total gallons _____ (subtract pre-event reading from post-event reading).

Example Calculation:
Total SSO gallons = (Post-event SSO Meter Reading – Pre-event SSO Meter Reading) x 10,000.

If an SSO or Bypass occurs during the wet weather event, refer below:

Comments:

Sanitary Sewer Overflow (SSO)

WARNING: *If at any time a reportable Sanitary Sewer Overflow occurs as defined by any release of sewage from any portion of the collection, transmission or treatment system, other than through permitted outfalls) that is caused by a problem in the KUB wastewater collection / treatment plants system; or where any significant overflow of any of the plant process tanks, diversion boxes, flumes or manholes where wastewater is discharged to the outside grounds that can not be contained:*

- ***Review and execute Sanitary Sewer Overflow Response Plan (SORP) procedures****.*
- ***Notify a Supervisor immediately and proceed with notification process by informing KUB Systems Operations Dispatch (Ext. 2600) of the initial onset of the overflow****.*

KUWAHEE WWTP, cont.
Wet-Weather Checklist (Refer to Wet-Weather Procedures Flow Chart)

EVENT DATE(s):

Bypass

WARNING: *"Bypass" means the intentional diversion of wastewater away from any portion of the treatment facility. Bypass is prohibited unless three conditions are met:*

- *The Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage.*
- *There are not feasible alternatives to Bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment down-time.*
- *Permittee submits notice of an unanticipated Bypass to the appropriate field office of the Division of Water Pollution Control within 24 hours of becoming aware of the Bypass.*

*In the event of a Bypass, **notify a Supervisor immediately** and proceed with notification process by informing KUB Systems Operations Dispatch (Ext. 2600) of the initial onset of the Bypass and initiate a Supervisory Page. Any Bypass in compliance with the Process Controls Program is referred to as a "Diversion". All Bypasses not in compliance with the Process Controls Program shall be referred to as a "Bypass."*

Post-event approval

Prior to filing this checklist, it should be approved by KUB Manager or VP.

Pre-Diversion and Diversion Approvals were Provided by: _____ Date: _____
(signature)

KUWAHEE WWTP WET-WEATHER PROCEDURES FLOW CHART

Plant Design Flow Ranges:
Average Daily Flow is 44 mgd.
Maximum Secondary Treatment Flow is 70 mgd.
Peak Hydraulic Flow is 120 mgd.

NOTE: Plant Bypasses are prohibited without Manager or VP approval.

When rain is expected, prepare plant for high flows.
- South Neyland storage tanks should be pumped empty with sump pump in Auto.
- CCP storage tanks empty and ready for service.

High flows enter plant and flows increase above 50 mgd.

Place all four bar screens in service. Place the bar screens and the grit system in Manual control.

Open Primary redirect gate so that the primary clarifiers are not overloaded. Each tank can handle 8 mgd and there are 9 tanks. If all are online, the primaries can take 72 mgd of flow. For example, with 5 primaries at 8 mgd each only 40 mgd can be sent through the primaries. Adjust the Primary redirect gate to control primary clarifier flows. Redirected flow travels across Neyland Drive to the storage tanks.

Check primary sludge blanket levels and adjust timers as required. Increase pump times to minimize polymer sludge flotation.

Establish Diversion criteria:
- Determine pre-event MLSS concentration.
- Calculate pre-Diversion approval threshold MLSS concentration (10% MLSS loss).
- Calculate Diversion threshold MLSS concentration (15% MLSS loss).
- Monitor South Neyland storage tank levels and flow.

Determine if additional personnel are required for the event and call-in as required.

Place four intermediate pumps in Auto. Confirm four influent pumps are in Auto. Monitor South Neyland storage tank levels and flow. Follow Wet-Weather Checklist for communication protocols.

Start CEPT polymer system and put on line prior to opening Diversion gate. Start final clarifier polymer feed.

Monitor and prepare to divert flow:
- Monitor pre-Diversion conditions of biomass Washout (10% of MLSS), storage and flow.
- Once condition is met, seek approval to divert as per Wet-Weather Checklist.
- Once authorization is given, monitor for Diversion conditions of biomass Washout (15% of MLSS). Monitor South Neyland storage tank levels.

Once the Diversion Activation Conditions on the Wet-Weather Checklist are met and the Diversion is authorized, open the Diversion gate 100% initially and then back off to maintain 70 mgd through secondary treatment. Must maintain 70 mgd if Diversion gate is open.

Alarm will indicate when fourth intermediate pump comes on. Check final clarifier sludge blankets numerous times. Adjust fifth intermediate pump as needed to maintain final clarifier performance at 70 mgd. Follow Wet-Weather Checklist for communication protocols.

WARNING: Monitor levels of the storage tanks across Neyland Drive. Under no circumstance does an operation allow storage tanks to overflow at junction box. Take proactive planning and steps to prevent that from occurring. If storage tanks reach full condition (823.0) and level is expected to continue to rise, notify Supervisor and receive permission to adjust influent gates in accordance with PCP. Refer to SOP for use of UNOX basin for additional storage. Confirm Diversion flow rate of up to 50 mgd prior to adjusting influent gates.

Check composite samplers every 4 hours.

Check final clarifier blankets, TSS meters, and flow meters often to monitor solids Washout conditions, final clarifier performance, and South Neyland storage tank levels.

Turn dilution water pumps off, prior to opening Diversion gate.

Do not supernate.

Increase chlorine feed and keep residual set point at 2.5.

WARNING: If influent wet well continues to rise or South Neyland storage tanks are full and high flow continues, initiate Supervisory Page to discuss further action.

Adjust influent gates as necessary to protect the plant (i.e. prevent overflow of storage tanks at junction box and/or flooding of screen room) in accordance with PCP.

As flow begins to decrease

As flows reduce to 70 mgd, there are no Washout conditions, and the primary clarifiers are capable of taking more flow, reduce percent open on the Diversion gate. Fully close the Diversion gate when the primary clarifiers can handle all the influent flow and intermediate wetwell is no longer backing up (wetwell level at 821), and flows through secondary are dropping below 70 mgd.

Turn dilution water pumps on when Diversion is closed.

Return chlorine residual set point to 2.0.

Turn off final clarifier and CEPT polymer systems as flows decrease below 50 mgd and drain system unless more wet weather is expected.

Shut off two bar screens and place two in Auto when flows decrease below 50 mgd.

Turn grit collection system in Auto when flows decrease below 50 mgd.

Secondary digester supernatant can resume when Diversion gate is closed and flow is decreasing.

Close primary redirect gate to allow correct flows into the primaries. Each tank can handle 8 mgd and there are 9 tanks. Adjust the Primary redirect gate to control primary clarifier flows. Normal gate position is such that 1-2 mgd flow is routed to intermediate pump station through the pre-aeration basin.

Post-Event Procedures

If a Diversion occurred, complete "DIVERSION REPORT FORM" and package.

If an SSO or Bypass occurred, initiate reporting process.

Check that the storage tank drain sump pumps are running in Auto and that the South Neyland storage tanks are emptying.

Drain CCP storage tanks.

Drain UNOX storage tanks.

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Appendix B

Fourth Creek WWTP Wet-Weather Checklist and Flow Chart

FOURTH CREEK WWTP

Wet-Weather Checklist (Refer to Wet-Weather Procedures Flow Chart)

Check and initial each decision made prior to and upon startup of the HRC wet-weather treatment train and opening the HRC Diversion Valve. Checklist is required during wet-weather events only.

EVENT DATE(s): | | |
|---|---|
| | |
| | |

OPERATOR(s):_____

Initial and check

Pre-event communication

___ Advise Kuwahee of pending event. Time: _____ *If not, explain:* _____

Pre-event setup

___ Check and empty the grit red box and screenings compactor.

___ Check availability of standby primaries. Number of standby primaries: _____

___ Are standby primaries drain valves closed? *If not, explain:* _____

___ Are standby primaries sludge valves in auto? *If not, explain*: _____

___ Are standby primaries empty and ready for high flow? *If not, explain*: _____

___ Clean MLSS meter probe.

___ Are three influent pumps in Auto? *If not, explain:* _____

___ If the plant is discharging by gravity place the effluent pumps in Auto and close the effluent gate. Time: _____

___ Confirm CEPT and final clarifier Polymer system is operational and ready to start.
If no, explain: _____

___ Is the HRC Effluent to Aeration Valve to secondary treatment open? *If no, explain:* _____

___ Is the HRC Effluent Diversion Valve to chlorine contact tanks closed? *If no, explain:* _____

___ Record pre-event SSO meter reading _____.

___ Check composite samplers for proper operation every 4 hours.

Flow exceeds 10 mgd

___ Record pre-event MLSS concentration. (Avg. MLSS of previous 12 hours) MLSS: _____mg/L

___ Record Pre-Diversion approval threshold (loss of approximately 10% of biomass). MLSS: _____mg/L

Example Calculation: Pre-event MLSS 3000 mg/L – (3000 mg/L x 0.10) = 2700 mg/L Pre-Diversion threshold.

___ Record Diversion threshold (loss of approximately 15% of biomass). MLSS: _____mg/L

Example Calculation: Pre-event MLSS 3000 mg/L – (3000 mg/L x 0.15) = 2550 mg/L Diversion threshold.

Flow exceeds 11 mgd

___ Call in additional personnel after normal operating hours (if needed). Time: _____

___ Place additional empty standby primary tanks in service.

___ Shut off primary scum pumps

___ Place chlorine system in manual to maintain initial minimum residual of 2.5 mg/L.

___ Start second grit blower

___ Prepare small batch of HRC dry polymer for aging.

___ Clean HRC TSS and pH probes.

Flow exceeds 15 mgd

___ Place influent gate in Manual. Date: _____ Time: _____

___ Place HRC wet-weather treatment train in operation with minimum flow set point of 3 mgd. Set the secondary treatment train minimum flow set point to 15-17 mgd (applicable for total influent flows above 18 mgd so that the minimum HRC flow requirement is met).

___ Start CEPT and final clarifier Polymer system at 15 mgd.

FOURTH CREEK WWTP, cont.

Wet-Weather Checklist (Refer to Wet-Weather Procedures Flow Chart)

EVENT DATE(s):

Influent flow increases above 18 mgd

Monitor for Solids Pre-Diversion Approval Conditions:
Monitor MLSS for Pre-Diversion Washout Conditions (loss of 10% of biomass per above)
Current MLSS: _____mg/L; Time:_____

If Pre-Diversion Condition is met, Receive Approval for Diversion:	
Approval requested by: _____	Time: _____
Approval given by: _____	Time: _____
Approval must be given by Manager or VP	

Monitor for Solids Diversion Activation Conditions:
Monitor MLSS for Diversion Washout Conditions (loss of 15% of biomass per above)
Current MLSS: _____mg/L; Time:_____

Was Diversion authorized but not implemented? Yes/No	*If no, explain:* _____

___ Notify Kuwahee and send "Supervisory Page" of Diversion gate opening.
___ Open the HRC Effluent Diversion Valve and close the HRC Effluent to Aeration Valve to secondary treatment. Time: _____
___ Record the HRC effluent TSS. HRC Effluent TSS: _____ Time: _____
___ Check initial chlorine residual and maintain a minimum of 2.5 mg/L.
___ Decrease automatic plant water strainer flush timer setting to 1 hour (normal flush cycle is 6 hours) Time: _____
___ Check and clean chlorine residual analyzers if residuals vary from DR 890.
___ Shut off WAS cycles if 15% MLSS loss is achieved.

Monitor diverted flow and minimum secondary treatment system flow set point (between 15-17 mgd) based on secondary treatment system performance.

___ Record:
___ Record:

Final clarifier blankets (#1____ 2____ 3____ 4____ feet)	
Flow Meters:	TSS Meters:
Influent: _____ mgd	Effluent: _____mg/L
Diversion: _____ mgd	MLSS: _____mg/L
RAS: _____ mgd	HRC Effluent: _____mg/L
WAS: _____ mgd	

Time: _____
Time: _____

WARNING: During flows exceeding 34 mgd when the effluent wet well reaches high wet well alarm condition or other conditions in plant warrant an action, it may be necessary to adjust influent gates in accordance with the PCP. Contact Manager or VP of the need. Send Supervisory Page after adjusting influent gates. Monitor for SSO immediately upstream of the Fourth Creek WWTP. (refer to SSO procedure below)	
Manager or VP notified by: _____	Time: _____
Manager or VP notified: _____	Time: _____

FOURTH CREEK WWTP, cont.

Wet-Weather Checklist (Refer to Wet-Weather Procedures Flow Chart)

EVENT DATE(s):

Diversion is open and flows are decreasing

When flows steadily decrease and reach 18 mgd:

___ Place influent gate in Auto. Date: _____ Time: _____

___ Return influent pump arrangement to pre-event configuration. Time: _____

___ Record: Final clarifier blankets (#1____ 2____ 3____ 4____ feet) Time: _____

___ Record: Time: _____

Flow Meters:		TSS Meters:	
Influent:	_____ mgd	Effluent:	_____mg/L
Diversion:	_____ mgd	MLSS:	_____mg/L
RAS:	_____ mgd	HRC Effluent:	_____mg/L
WAS:	_____ mgd		

___ Open the HRC Effluent to Aeration Valve to secondary treatment and close the HRC Effluent Diversion Valve to disinfection and record total diverted flow: _____ mg Time: _____

___ Record: Final clarifier blankets (#1____ 2____ 3____ 4____ feet) Time: _____

___ Adjust chlorine system to maintain 2.0 mg/L initial residual in Auto.

___ Stop CEPT and final clarifier polymer systems at15 mgd or below.

Influent flow decreases below 15 mgd

___Shut down HRC treatment train. Time: _____

Influent flow decreases below 12 mgd

___Place primary scum pumps back in Auto. Time: _____

___Increase automatic plant water strainer flush timer setting to normal setting of 6 hours Time: _____

___Turn off second grit blower.

___Put WAS cycles back on line.

Note: If HRC Effluent Diversion Valve is closed and flows exceed 12 mgd, complete the checklist without this section being completed. Include comments on plant conditions at the time of checklist completion.

Influent flow decreases to normal (less than 10 mgd)

___ Complete "Diversion Report Form".

___ Complete wet-weather treatment train washdown and drain cycle.

___ Remove the standby primary tanks from service, drain and/or pump contents.

___ Record post-event SSO meter reading _____ and total gallons _____ (subtract pre-event reading from post-event reading).

Example Calculation:
Total SSO gallons = (Post-event SSO Meter Reading – Pre-event SSO Meter Reading) x 1,000.

Comments:

FOURTH CREEK WWTP, cont.

Wet-Weather Checklist (Refer to Wet-Weather Procedures Flow Chart)

EVENT DATE(s):

If a SSO or Bypass occurs during the wet weather event, refer below:

Sanitary Sewer Overflow (SSO)

WARNING: *If at any time a reportable Sanitary Sewer Overflow occurs as defined by any release of sewage from any portion of the collection, transmission or treatment system, other than through permitted outfalls) that is caused by a problem in the KUB wastewater collection / treatment plants system; or where any significant overflow of any of the plant process tanks, diversion boxes, flumes or manholes where wastewater is discharged to the outside grounds that can not be contained:*

- ***Review and execute the Sanitary Sewer Overflow Response (SORP) procedures.***
- ***Notify a Supervisor immediately and proceed with notification process by informing KUB Systems Operations Dispatch (Ext. 2600) of the initial onset of the overflow.***

Bypass

WARNING: *"Bypass" means the intentional diversion of wastewater away from any portion of the treatment facility. Bypass is prohibited unless three conditions are met:*

- *The Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage.*
- *There are not feasible alternatives to Bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment down-time.*
- *Permittee submits notice of an unanticipated Bypass to the appropriate field office of the Division of Water Pollution Control within 24 hours of becoming aware of the Bypass.*

*In the event of a Bypass**, notify a Supervisor immediately** and proceed with notification process by informing KUB Systems Operations Dispatch (Ext. 2600) of the initial onset of the Bypass and initiate a Supervisory Page. Any Bypass in compliance with the Process Controls Program is referred to as a "Diversion". All Bypasses not in compliance with the Process Controls Program shall be referred to as a "Bypass."*

Post-event approval

Prior to filing this checklist, it should be approved by KUB Manager or VP
Pre-Diversion and Diversion Approvals were Provided by: _____ Date: _____
(signature)

FOURTH CREEK WWTP WET-WEATHER PROCEDURES FLOW CHART

Plant Design Flow Ranges:
- Average Daily Flow is 10.8 mgd.
- Maximum Secondary Treatment Flow is 17-20 mgd.
- Maximum HRC Flow is 17.0 mgd.
- Peak Hydraulic Flow is 34.0 mgd.

NOTE: Plant Bypasses are prohibited without Manager or VP approval.

When rain is expected, prepare plant for high flows.

At least four primary clarifiers should be empty and ready to accept high flows.

Influent flows begin increasing. As flows reach 10-11 mgd and rain is continuing, call in additional personnel.

Establish Diversion criteria:
- Determine pre-event MLSS concentration.
- Calculate pre-Diversion approval threshold MLSS concentration (10% MLSS loss).
- Calculate Diversion threshold MLSS concentration (15% MLSS loss).

Redirect high flows into the four empty primary clarifiers one at a time by partially opening the primary clarifier slide gates. As the tanks begin to fill, turn sludge collectors on and set the sludge withdrawal valve to 300 seconds open.

Complete Diversion setup:
- Shut off primary scum pumps.
- Start second grit blower.
- Confirm HRC Effluent to Aeration Valve to the secondary treatment system is open.
- Confirm HRC Effluent Diversion Valve to disinfection is closed.
- Prepare small bath of HRC dry polymer for aging.
- Clean HRC system TSS and pH probes.

Bar screen and grit systems will automatically run in continuous mode when flow exceeds 10 mgd.

Operate chlorine system in Manual mode and maintain an initial residual of at least 2.5 mg/L. If unable to maintain a 2.5 mg/L residual, a second chlorinator may be placed into service.

As flows begin to exceed 15 mgd.

Place HRC wet-weather treatment train in operation with minimum flow setpoint of 3 mgd. HRC effluent to discharge to the secondary treatment system upon startup.

Start the CEPT system and the final clarifier polymer feed into MLSS wetwell to reduce floc carry out in final clarifiers. This MLSS chemical addition is optional and may not be needed during every event.

As flows begin to exceed 18 mgd.

Based on process conditions, allow up to 18 mgd to flow through the secondary treatment portion of the plant. As influent flows surpass 18 mgd. Monitor and prepare to divert flow:
- Monitor pre-Diversion conditions of biomass Washout (10% of MLSS).
- Once condition is met, seek approval to divert.

Once authorization is given, monitor for Diversion conditions of biomass Washout (15% of MLSS).

Check composite samplers every 4 hours.

Set the influent gate to Manual mode. Once Diversion is authorized and Washout condition is met, open the HRC Effluent Diversion Valve to allow HRC effluent to be diverted to the chlorine contact tanks and close the HRC Effluent to Aeration Valve to the secondary treatment system. For example, if the influent flow is 20 mgd, allow 15 mgd to flow into the aeration tanks and 5 mgd through HRC treatment and Diversion valve. The secondary treatment and HRC process flows can be operated and monitored from the operations computer. During flows exceeding 34 mgd when the effluent wetwell (or influent wetwell) reaches high wetwell alarm condition or if no influent pumps are running, the influent gate will close automatically. It will continue to oscillate open and closed. This is why it is better to set the control gate in Manual if operator attended.

When the HRC Effluent Diversion Valve is open
- Decrease timer on plant water automatic flush to 1 hour.
- Clean chlorine analyzers frequently.
- Target 15 mgd minimum flow through secondary, after the 3 mgd HRC minimum flow criteria is met.

As flows begin to decrease to 18 mgd.

As the influent flows reach 18 mgd and continues to drop, place influent gate in Auto.

Prepare for conversion from wet-weather mode operations to normal operations:
- Operate chlorine system in Auto and maintain an initial residual of 2.0 mg/L.
- Return influent and effluent pumps to normal operations, if adjusted.
- Return WAS cycle back to normal (if adjusted).

Open the HRC Effluent to Aeration Valve to the secondary treatment system and close the HRC Effluent Diversion Valve to allow HRC effluent to be routed back to the aeration basin.

As flows begin to decrease less than 15 mgd.

Shut down the HRC wet-weather treatment train.

As flows begin to decrease less than 12 mgd.

Place primary scum pumps back in Auto and turn off the second grit blower. Decrease timer on plant water automatic flush to 1 hour. Turn off CEPT and MLSS wetwell polymer feed.

Post-Event Procedures

If a Diversion occurred, complete "DIVERSION REPORT FORM."

If an SSO or Bypass occurred, initiate reporting process.

Remove from service, the four primary clarifiers used for storage. Begin setting up equipment to pump down or drain those tanks to prepare for the next wet-weather event. Complete wet-weather treatment train washdown and drain cycle.

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Appendix C

Loves Creek WWTP Wet-Weather Checklist and Flow Chart

LOVES CREEK WWTP
Wet-Weather Checklist (Refer to Wet-Weather Procedures Flow Chart)

Check and initial each decision made leading to Diversion of flow away from the extended aeration basins and/or overflow of the peak clarifier. Checklist is required during wet-weather events only.

EVENT DATE(s): ***OPERATOR(s):_____***

Initial and check

Pre-event communication

___Advise Kuwahee of pending event. Time: _____ *If not, explain:* _____

Pre-event setup

___ How many off-line aeration basins are empty: _____ *If none, explain:*_____
___ Check that four influent pumps are in Auto. *If not, explain:* _____
___ Check composite samplers for proper operation every 4 hours.

Influent flow increasing to 9 mgd, rain in area

___Check that all bar screens are in Auto. *If not, explain:* _____
___Check that grit system is in Auto. *If not, explain:* _____
___Call in additional personnel after normal operating hours
___To prevent flows from backing up in the final clarifiers, open the valve located between #1 final clarifier and the vault in front of the chlorine contact tanks. Cap is painted yellow for easy identification. *Note: This will redirect some of the flow around the chlorine mixer vault; the chlorine feed will need to be increased to maintain a 1.0 mg/L post-residual.*

Influent flow increasing above 11 mgd

___Put final clarifier polymer feed system on-line.
___Crack open one gate to an off-line aeration basin. Select basin with sump pump for the first basin to bring on line.
NOTE: Flow to on-line aeration basins and rest of plant is maintained up to 11 mgd through secondary treatment.
___Increase return sludge pump speed to 62% - 64% (1550 gpm) through VFD or computer
___Confirm that one chlorinator is in Auto position, second chlorinator is in Manual and set at 50 lbs/day

Influent flow above 11 mgd, filling off-line aeration basins

___When the first off-line aeration basin is full, start aerator and fully open inlet gate
___Crack open gate to second off-line aeration basin, maintain flow through secondary treatment up to 11 mgd. When full, start aerator and fully open inlet gate.
NOTE: Increase chlorine feed as needed to meet demand. Rake the hoppers at influent trash rack, classifiers and bar screens.

If Pre-Diversion Condition is met, Receive Approval for Diversion:	
Approval requested by: _____	Time: _____
Approval given by: _____	Time: _____
Approval must be given by Manager or VP	

Influent flow above 11 mgd, all aeration basins full and on line

Note: When both off-line aeration basins are full and effluent flows are above 11 mgd, begin closing down on the inlet valve to aeration located in the driveway off the end of the grit chamber. The cap is painted yellow for easy identification. This will direct excess flows above 11 mgd to the peak flow clarifiers, prevent flooding of the final clarifier center wells, and prevent solids Washout. Monitor peak clarifiers regularly and note below when they begin to overflow (start of Diversion).

Record time when grit chamber effluent valve is throttled closed. *Time:* _____

___Check that three RAS pumps are running. *If not, explain:* _____
___ Record: Final clarifier blankets (#1____ 2____ 3____ feet) Time: _____
___ Record: Flow Meters: TSS Meters: Time: _____
Influent: _____ mgd Effluent: _____mg/L
Effluent: _____ mgd MLSS: _____mg/L
RAS: _____ gpm

LOVES CREEK WWTP, cont.

Wet-Weather Checklist (Refer to Wet-Weather Procedures Flow Chart)

EVENT DATE(s):

Peak flow clarifiers are filling

CAUTION: If the flow continues to rise and backs up into the grit chamber, flow will overflow a weir that leads to the peak flow clarifiers.

WARNING: When the peak flow clarifiers overflow, a Diversion has occurred.

___ Note time the peak clarifier weirs overflowed; continue monitoring and record when overflow stops. Time of Diversion: _____ Time: _____

___ Notify Kuwahee WWTP and send Supervisory Page of event.

___ Record: Final clarifier blankets (#1____ 2____ 3____ feet) Time: _____

___ Record:

Flow Meters:	TSS Meters:
Influent: _____ mgd	Effluent: _____mg/L
Effluent: _____ mgd	MLSS: _____mg/L
RAS: _____ gpm	

Time: _____

Influent flow decreasing below 8 mgd, all aeration basins full and on line

___Adjust sludge return rate to pre-event settings. Time: _____

___Close the valve located between # 1 final clarifier and the vault in front of the chlorine tanks Time: _____

___Turn off second chlorinator and leave the lead chlorinator in Auto.

___ Turn off final clarifier polymer system.

___ Open aeration basin inlet valve located in driveway off the end of the grit chamber to 100%. Valve cap is painted yellow.

___ Record total diverted flow Total Flow: _____mg

Influent flow decreases to normal (2~3 mgd), all aeration basins full and on line

___Close inlet gate to aeration basin that contains the sump pump and pump to active aeration basins.

___Relocate sump pump to next aeration basin, close inlet gate to basin and pump to active aeration basins.

NOTE: If a Diversion occurred, complete "Diversion Report Form"

If an SSO or Bypass occurs during the wet weather event, refer below:

Sanitary Sewer Overflow (SSO)

WARNING: *If at any time a reportable Sanitary Sewer Overflow occurs as defined by any release of sewage from any portion of the collection, transmission or treatment system, other than through permitted outfalls) that is caused by a problem in the KUB wastewater collection / treatment plants system; or where any significant overflow of any of the plant process tanks, diversion boxes, flumes or manholes where wastewater is discharged to the outside grounds that can not be contained:*

- ***Review and execute the Sanitary Sewer Overflow Response Plan (SORP) procedures.***
- ***Notify a Supervisor immediately and proceed with notification process by informing KUB Systems Operations Dispatch (Ext. 2600) of the initial onset of the overflow.***

Bypass

WARNING: *"Bypass" means the intentional diversion of wastewater away from any portion of the treatment facility. Bypass is prohibited unless three conditions are met:*

- *The Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage.*
- *There are not feasible alternatives to Bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment down-time.*
- *Permittee submits notice of an unanticipated Bypass to the appropriate field office of the Division of Water Pollution Control within 24 hours of becoming aware of the Bypass.*

In the event of a Bypass, ***notify a Supervisor immediately*** *and proceed with notification process by informing KUB Systems Operations Dispatch (Ext. 2600) of the initial onset of the Bypass and request Kuwahee to initiate a Supervisory Page. Any Bypass in compliance with the Process Controls Program is referred to as a "Diversion". All Bypasses not in compliance with the Process Controls Program shall be referred to as a "Bypass."*

Post-event approval

Prior to filing this checklist, it should be approved by KUB Manager or VP.

Pre-Diversion and Diversion Approvals were Provided by:_____ Date: _____

(signature)

LOVES CREEK WWTP WET-WEATHER PROCEDURES FLOW CHART

Plant Design Flow Ranges:
- Average Daily Flow is 5.0 mgd.
- Maximum Secondary Treatment Flow is 11.0 mgd
- Peak Hydraulic Flow is 15 mgd.

NOTE: Plant Bypasses are prohibited without Manager or VP approval.

When rain is expected, prepare plant for high flows. NOTE: 1-2 off-line aeration basins should be empty and ready to accept high flows.

Influent flows begin increasing. As flows reach 11 mgd and rain is continuing, additional personnel need to be called in after normal hours.

All influent pumps are in Auto.

Bar Screen and Grit systems are in Auto. Run in continuous mode when flow exceeds 11 mgd.

Adjust RAS pumps to 62-64% speed.

Operate chlorine system with one chlorinator in Auto and the second chlorinator in manual feeding 50 lbs/day. Open the chlorine feed interconnection valve to increase chlorine feed capacity. Adjust chlorine feed as needed.

Allow high flows to fill the first empty aeration basins. This can be accomplished by cracking open the basin inlet gate. Use basin with sump pump in it first.

Allow high flows to flow into the second empty aeration basins. This can be accomplished by cracking open the basin inlet gate. Fully open the gate on the first aeration basin and start the aerator.

After filling both off-line aeration basins, throttle the grit effluent valve to maintain 11 mgd through aeration.

As flow increases above 11 mgd, open the valve between # 1 final clarifier and the vault in front of chlorine contact tank. Increase chlorine feed after opening the valve. Start final clarifier polymer feed.

When the water level in the grit chamber exceeds the inner baffle weir, the excess flow will flow over the weir into the peak flow clarifiers.

Based on process conditions, allow up to 11 mgd to flow through the secondary treatment process.

Monitor peak flow clarifiers for overflow and record start and stop times.

Check composite samplers every 4 hours.

As flow begin to decrease below 11 mgd.

Fully open the grit effluent valve to allow all flow to the aeration basins.

As flow begin to decrease below 8 mgd.

Adjust the return (RAS) rates to 30%.

Close valve between # 1 final clarifier and the vault in front of the chlorine tanks.

Turn off second chlorinator, leave lead chlorinator in Auto. Close chlorine feed interconnection valve.

Turn off final clarifier polymer feed.

Hose out peak flow clarifier if high flow entered the clarifier.

After plant flow returns to normal, around 2~3 mgd.

Close inlet gate and start pumping out aeration basin with the sump pump in it. Pump contents in to on-line aeration basin. Turn off aerator before liquid level exposes aerator. Hose out basin.

Move sump pump to second aeration basin, close inlet gate and pump contents into online aeration basin. Turn off aerator before liquid level exposes aerator. Hose out basin.

Post-event Procedures

If a diversion occurred, complete "DIVERSION REPORT FORM".

If a SSO or Bypass occurred, initiate reporting process.

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