



AGENDA SUMMARY REPORT

To: Honorable Mayor and Council Members

From: Tom Mannatt, City Engineer

Agenda Title: ACCEPT AND CERTIFY THE SHN CAPACITY DETERMINATION AS SET FORTH IN THE CERTIFICATION OF INCREMENTAL CAPACITY AND AUTHORIZE CITY ENGINEER TO PROVIDE NOTICE THEREOF TO BROOKTRAILS TOWNSHIP COMMUNITY SERVICES DISTRICT

Type: Presentation Consent Regular Agenda Public Hearing Urgent Time: N/A

Summary of Request: Paragraph 8 of the Fourth Amendment of the sewer agreement between the City and the Brooktrails Township requires that the City certify the amount of the incremental or additional capacity resulting from the improvements, if any, and the portion of such additional incremental capacity to which the District is entitled. At the City's request, SHN has prepared the attached memorandum which concludes that the Average Dry Weather Flow capacity following completion of the improvements at 1.18 mgd.

In 1981, following modifications to the aeration basins, the ADWF capacity was cited as 1.3 mgd in the National Pollution Discharge Elimination System (NPDES) Permit.

The attached SHN capacity memorandum states that,

- The 2010 upgrades improved treatment and reliability, and provide an ADWF capacity of 1.18 MGD based on design flows and loadings determined by permit requirements. The capacity of the current plant must be evaluated in terms of ability to comply with current NPDES requirements and appropriate redundancy and reliability criteria.*

The 2010 upgrades have significantly improved treatment, reliability and hydraulic capacity but, when evaluated in terms of current requirements, they cannot be said to provide an increase in absolute ADWF capacity.

Based upon the foregoing, it is my determination that there is there is no additional or incremental ADWF capacity resulting from completion of the plant improvements. It is my recommendation that the council accept and certify the SHN capacity determination as set forth in the attached memorandum and authorize me to provide notice thereof to the Brooktrails Township.

Recommended Action: Accept and certify the SHN Capacity Determination as set forth in the Certification of Incremental Capacity and authorize City Engineer to provide notice thereof to Brooktrails Township Community Services District.

Alternative(s): None recommended.

Fiscal Impact: Not applicable.

Personnel Impact: Not applicable.

Reviewed by: City Manager City Attorney Finance Director Human Resources Risk

Council Action: Approved Denied Other: _____

Records: Agreement Resolution # _____ Ordinance # _____ Other _____

February 22, 2013

Denise Rose
Brooktrails Township
Community Services District
2480 Birch Street
Willits, California 95490

RE: Certification of Incremental Capacity Available for Brooktrails Township Willits 2012-2013 Willits Wastewater Treatment Plant Stages 2&3 Secondary Treatment Plant Improvements & Enhancement Wetlands

Dear Ms. Rose:

Pursuant to the attached analysis of SHN, this will certify on behalf of the City of Willits, as required in paragraph 8 of the Fourth Amendment to Agreement by City of Willits for Disposal of Sewage from Brooktrails Township Community Services District, that there is no additional incremental capacity available upon completion of the above referenced Wastewater Facilities Improvement project. Furthermore, there is no portion of incremental capacity to which the District shall be entitled.

Respectfully,

Thomas M. Mannatt
City Engineer
City of Willits
Phone (707) 459-7136
Email: tmannatt@willitscity.com

Enclosure

cc: H. James Lance, City Attorney
Steven C. Mitchell, Attorney



Technical Memorandum

Reference: **412072**
Date: **February 21, 2013**
To: **Tom Herman, Project Manager**
From: **Susan Foreman, P.E.**

Subject: Willits Wastewater Treatment Plant Average Dry Weather Flow Capacity

Background

Secondary treatment at the Willits Wastewater Treatment Plant (WWTP) is based on an extended aeration activated sludge process. Improvements to this process were required to improve the reliability of this process and the ability to meet the higher effluent quality required by the permit approved in 2010. These improvements included:

- Replacing the mechanical aerators with diffused aeration
- Decreased loading –improved reliability of Biological Oxygen Demand (BOD) removal
- Increasing aeration capacity to provide nitrification of ammonia and total nitrogen removal
- Increased clarification capacity – needed to reduce suspended solids and turbidity required for disinfection with UV

Design Capacity

To comply with funding agency guidelines the recently completed plant upgrades were designed based on a twenty year planning period ending in 2025. The design Average Dry Weather Flow (ADWF) is 1.18 Million Gallons per Day (MGD), BOD loading 2,037 lbs/day and Total Suspended Solids (TSS) loading 2683 lbs/day.¹

SHN has been asked to compare the capacity of the 2010-02 upgrade with estimated capacity before the upgrade. Following modifications to the aeration basins made in 1981, the ADWF capacity was cited as 1.3 MGD in the 1990 National Pollution Discharge Elimination System (NPDES) Permit and in the Wastewater Treatment Plant Evaluation prepared by Harris Consultants Inc. Oct. 1991. The basis for this estimate of capacity was not given.

We have no official documentation of how the ADWF capacity of the 1981 upgrade was arrived at. We can provide a comparison of capacity for the 1981 and 2010 upgrades based on similar design criteria but only in the context of the effluent water quality that each could provide.

¹ These design flows were published in Pre-Design Report Tech Memorandum 01 August 16,2007

Permit Requirements

The NPDES permits in 1990 and 2010 are very different. Differences in effluent requirements for BOD, TSS, and Total Nitrogen (TN), are summarized in Table 1.

Table 1		
NPDES Permit CA0023060		
Effluent Requirements 1990 and 2010		
30-Day Average		
	1990 Order# 90-92	2010 Order # R1-2010-0017
BOD	30 mg/l ¹	10 mg/l
	325 ppd ²	334 ppd
TSS	30 mg/l	10 mg/l
	325 lb/day	334 lb/day
TN	No limit	10 mg/l (DP ³ -002)
		6 mg/l (DP-003)
1. mg/l: milligrams per liter 2. ppd: pounds per day (ppd) 3. DP: /discharge Point		

Note: the mass discharge limit of 334 ppd in the 2010 permit is based on flows up to a maximum monthly flow of 4.0 MGD. The 1990 permit limit is based on the ADWF of 1.3 MGD. In other words, the 1990 mass discharge limit of 325 ppd is based on higher concentrations and lower total volume.

Design Criteria

Relevant design criteria for estimating the ADWF capacity of the plant before and after the recent upgrades are summarized in Table 2. To a large extent ADWF capacity is based on the ability to treat the loadings, BOD, TSS, and TN, associated with the design flows. For design element where hydraulic capacities were the main consideration, those flows and design criteria have been noted.

Table 2		
Design Comparison		
1981 and 2009 Upgrades		
	1981 Upgrade	2010 Upgrade
ADWF Flows	1.3 MGD	1.18 MGD
Wet Weather Flow	PWWF ¹ Capacity 3.0 MGD	AWWF ² 2.44 MGD MMDWF ³ 2.24 MGD MMWWF ⁴ 4.62 MGD PWWF Capacity: 7.0 MGD
BOD Loading	2,244 ppd ⁵	2,037 ppd
Aeration Volume	1.38 MG ⁶ (185,000 CF ⁷)	2.44 MG (326,000 CF)
Detention Time		
	24 hours at ADWF	50 hours
	11 Hours at PWWF	24 hours at AWWF

Table 2 (cont'd) Design Comparison 1981 and 2009 Upgrades		
Loading Rates		
	12.0 lbs BOD / 1,000 CF	6.2 lbs BOD / 1,000 CF
Aeration		
	Mixer	Diffused Air
	(4) 20 Horse Power (HP)	(2) 75 HP Blowers (1) 50 HP
BOD removed	1,919 ppd	1,938 ppd
NH4 removed	108 ppd	305 ppd
Oxygen Required		
Actual Oxygen Required (AOR) ⁸	3,375 ppd	4,310 ppd
Standard Oxygen Required (SOR) ⁹	216 lbs/hr DO 2.0 mg/l	382 lbs/ hr 2.0 mg/l (Nitrification)
	181 lbs/hr DO 0.5 mg/l	250 lbs /hr 2.0 mg/l (Wave-Ox)
Standard Oxygen Supplied ¹²	154 lbs/hour (2.0 mg/l)	468 lbs. /hr (2,500 scfm ¹⁰)
	183 lbs/hour (0.5 mg/l)	1 blower off line
Mixing requirements	104 HP	50 HP (800- 1200 scfm)
Clarification		
Overflow rate	@1.3 MGD, 662 gpd/SF ¹¹	@1.18 MGD, 307 gpd/SF 1 Clarifier O/L
	@3.0 MGD, 1,500 gpd/SF	@7 MGD, 1,000 gpd/SF
<ol style="list-style-type: none"> 1. PWWF: Peak Wet Weather Flow 2. AWWF: Average Wet Weather Flow 3. MMDWF: Maximum Month Dry Weather Flow 4. MMWWF: Maximum Month Wet Weather Flow 5. ppd: pounds per day. The influent loading assumes that average influent concentration is 207 mg/l same as that used to estimate current loadings. 6. MG:Million Gallons. 7. CF: cubic feet 8. Actual Oxygen Required (AOR) based on 2.5 lbs. O₂ per lb. Of BOD removed and 4.6 lbs. O₂ per lb. of nitrogen removed. 9. Standard Oxygen Required (SOR) AOR is converted to SOR taking into account factors such as temperature oxygen transfer efficiency and dissolved oxygen (DO) level in the basin 10. scfm: standard cubic feet per minute 11. SF: square feet 12. Oxygen supplied: 1981 Upgrade; "Aerator Oxygen Transfer", <u>Engineering Predesign Report</u>, Barret Harris Assoc July. 1981, 2007/2009 Upgrade; " Biolac Aeration Design Parkson 2008. 		

The following conclusions can be drawn regarding the ADWF capacity before and after the recent upgrades:

- The aeration basins in the 2010 upgrade were designed with longer detention times and lower BOD loading rates to provide BOD removal to the low levels required by the 2010 NPDES Permit.

- Oxygen requirements for the 2010 upgrade increased because of the need to remove nitrogen.
- Before the 2010 upgrade there was insufficient aeration to maintain dissolved oxygen (DO) levels of 2.0 mg/l, or to provide adequate mixing even without nutrient removal.
- The 2010 upgrades provided needed redundancy for aeration, and clarification

Note: Biosolids treatment was not included in the previous table but has consistently been listed as a plant deficiency since 1981. The 2010 upgrade increased the capacity and reliability of biosolids treatment system.

Conclusion

The recently completed Willits WWTP plant upgrade was required to bring the facility into compliance with a Cease and Desist Order (CDO) under which it had been operating. The CDO was instituted originally to address disposal concerns regarding the inability of the facility to meet required dilution rates during the spring and fall while discharging to Outlet Creek. Approval of the variance request allowing a reduction in required dilution rates was predicated on improved effluent quality as defined in the 2010 NPDES Permit.

The 2010 upgrades improved treatment and reliability, and provide an ADWF capacity of 1.18 MGD based on design flows and loadings determined by permit requirements. The capacity of the current plant must be evaluated in terms of ability to comply with current NPDES requirements and appropriate redundancy and reliability criteria.

The 2010 upgrades have significantly improved treatment, reliability and hydraulic capacity but, when evaluated in terms of current requirements, they cannot be said to provide an increase in absolute ADWF capacity. Neither is it correct to say that there has been a reduction in ADWF capacity. In 1981 the facility was operating under a very different regulatory regime than currently, and the ADWF capacity of 1.3 MGD was based on a 30/30 permit and no nutrient removal. Without the 2010 upgrades the facility would not be able to treat current or projected flows to the levels as defined in the 2010 NPDE permit.

The 2010 upgrades include the capacity for future growth in the City and Brooktrails. The design flows and loadings are based on data analyzed as part of the 2002 Preliminary Engineering Report projected to 2025 at an assumed annual rate of growth of 1.7% for each entity.

The ADWF capacity of 1.18 MGD is based on the capacity of the secondary treatment system to remove the BOD, TSS and TN associated with that flow. The ADWF capacity can be increased by increasing the aeration system capacity. The aeration system installed as part of the 2010 upgrades has excess aeration capacity built into the system. Each suspended diffuser assembly has three diffuser tubes with space for two more. If future loadings exceed the design capacity on a regular basis, additional diffuser tubes can be added to increase airflow and the smaller 50 HP Blower would be upsized to 75 HP.



CITY OF WILLITS

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February 22, 2013

BROOKTRAILS TOWNSHIP CSD

APR 25 2013

RECEIVED

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No Attachment
Provided

Hand Delivered