referred to as
Attachment 7

Preliminary Engineering Report for

City of Dripping Springs

Hays County, Texas

South Regional Wastewater System Expansion New TPDES Permit Application

Prepared for:

City of Dripping Springs
P.O. Box 384
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STATE OF TEXAS
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CMA No: 1695-001

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South Regional Wastewater Treatment Plant
Technical Memorandum No. 1
Conceptual Design Services
By Carollo Engineers, Inc.

CITY OF DRIPPING SPRINGS
SOUTH REGIONAL WASTEWATER SYSTEM
HAYS COUNTY, TEXAS
WASTEWATER SYSTEM EXPNASION
PRELIMINARY ENGINEERING REPORT
NEW PERMIT APPLICATION

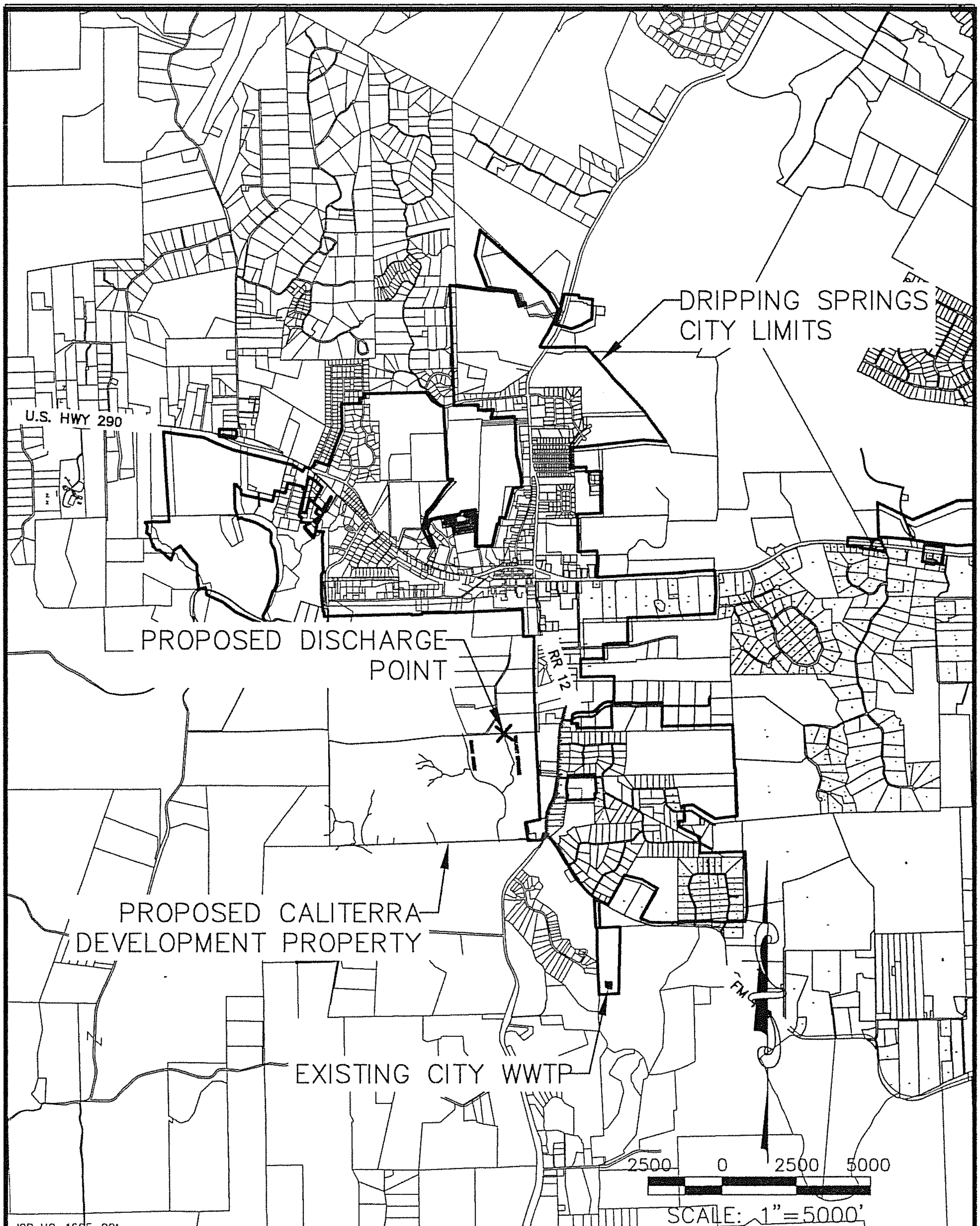
1.0 INTRODUCTION

The City of Dripping Springs (City) is pursuing a new Texas Pollutant Discharge Elimination System (TPDES) Permit Amendment for the expansion of it South Regional Wastewater System. The purpose of the new permit is to increase capacity of the City's South Regional Wastewater System and change its method of effluent disposal to accommodate growth in the Dripping Springs area. It's existing permitted capacity is 162,500 GPD via subsurface land application permit (TCEQ Permit Number WQ0014488001), and has an amendment pending to increase capacity via surface irrigation to 348,500 GPD. The City proposes to construct a new WWTP and increase the capacity of its existing WWTP, abandon the subsurface drip irrigation requirement from their existing permit, and convert the surface irrigation areas in the permit pending at the TCEQ to 30 TAC, Chapter 210 reuse, and discharge treated effluent to Walnut Springs, a tributary to Onion Creek.

The City is continuing to receive requests and inquiries for wastewater service within and outside of its existing service area. These include requests from developers of several large tracts located outside the existing service area that have obtained or are pursuing their own wastewater permits for onsite treatment and land application.

Additionally, the City will pursue Beneficial Reuse Authorization through 30 TAC, Chapter 210, which would allow the City to reuse treated effluent for irrigation on City-owned park lands and athletic fields, and potential irrigation of other privately owned areas (i.e., parks, greenbelts, pasture lands, etc.) to conserve treated surface water and/or groundwater resources. The City-owned park land and athletic fields, and other parks in the area currently utilize treated surface water from the West Travis County Public Utility Agency (WTCPUA) and groundwater from the Drippings Springs Water Supply Corporation (DSWSC) potable water systems. Other future reuses could be Direct Potable Reuse to supplement the existing treated surface water and/or groundwater supplies.

The City's existing South Regional Wastewater Treatment Plant is located along FM 150 approximately 0.55 miles east of Ranch Road 12 in Dripping Springs, Texas. The proposed discharge point is within the Caliterra Development located along the west side of Ranch Road 12 ("RR12") approximately 1.5 miles south of U.S. Highway 290, and immediately northwest of the Ranch Road 150 and Ranch Road 12 intersection in Dripping Springs, Texas (see Figure 1 for a Vicinity Map). The proposed WWTP would be located at the existing WWTP site.



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CITY OF DRIPPING SPRINGS

SOUTH REGIONAL WASTEWATER SYSTEM
VICINITY MAP

FIGURE
1

sray – Oct 19, 2015 – 12:28pm – File: M:\DWG\1695-DS TCEQ Permit 2\EXHIBITS\1695-VICINITY MAP.dwg

2.0 PROPOSED HYDRAULIC AND ORGANIC WASTEWATER LOADINGS

2.1 Estimated Flows and Permit Phases

Flow projections from the CMA Engineering, Inc. (CMA) July 2013 Preliminary Engineering Planning Report for South Regional Wastewater System Expansion Planning were updated and used to establish phasing for the permit amendment application. The City proposes to utilize new outfall (a tributary to Onion Creek) in the Caliterra Subdivision. The proposed permit will allow the City to provide wastewater service to the proposed Caliterra development and the Greater City of Dripping Springs Area.

A wastewater production rate of 175 GPD/LUE was used to establish capacity requirements for the City's wastewater treatment and disposal facilities. CMA Engineering, Inc. has found that the 175 GPD/LUE is typical of other residential subdivisions in the Dripping Springs area. Table 1 presents the summary of the estimated wastewater flow projections. Figure 2 is a Graph of the Wastewater Flow Projections.

The City is proposing three permit phases. The proposed Interim I Phase is 0.399 MGD and allows the City of operate the new WWTP in accordance with 30 TAC, Chapter 217.153(c) that requires that WWTPs over 0.400 MGD to have two aeration basins and two clarifiers for redundancy. This will allow the City to continue to grow while the existing WWTP is being retrofitted. The proposed Interim II Phase is 0.4975 MGD. If needed, it is hopeful that the TCEQ will grant the City a variance to 30 TAC, Chapter 217.153(c) during the retrofit of the existing WWTP allow the City to continue to keep growing. The proposed Final Phase is 0.995 MGD. Based on the conceptual design of the WWTP performed by Carollo Engineers (Carollo), the existing WWTP can be converted to a Biological Nutrient Removal (BNR) WWTP at the proposed permit phase capacities and meet the proposed effluent parameters. The Conceptual Design Engineering Report is included in Appendix A. The proposed permit phases are summarized below.

Interim I Phase:	0.399 MGD
Interim II Phase:	0.4975 MGD
Final Phase:	0.995 MGD

2.2 Peak Flow Rate

The peak flow to the WWTP is defined as the highest two-hour average flow rate expected to be delivered to the treatment units under any operational condition. It is proposed that influent flows will gravity flow to the WWTP influent lift stations, and then pumped from lift stations to the WWTP headworks. The peak factor used for the preliminary design of the WWTP is 4.0.

Table 1
Wastewater Flow and Growth Projections
City of Dripping Springs

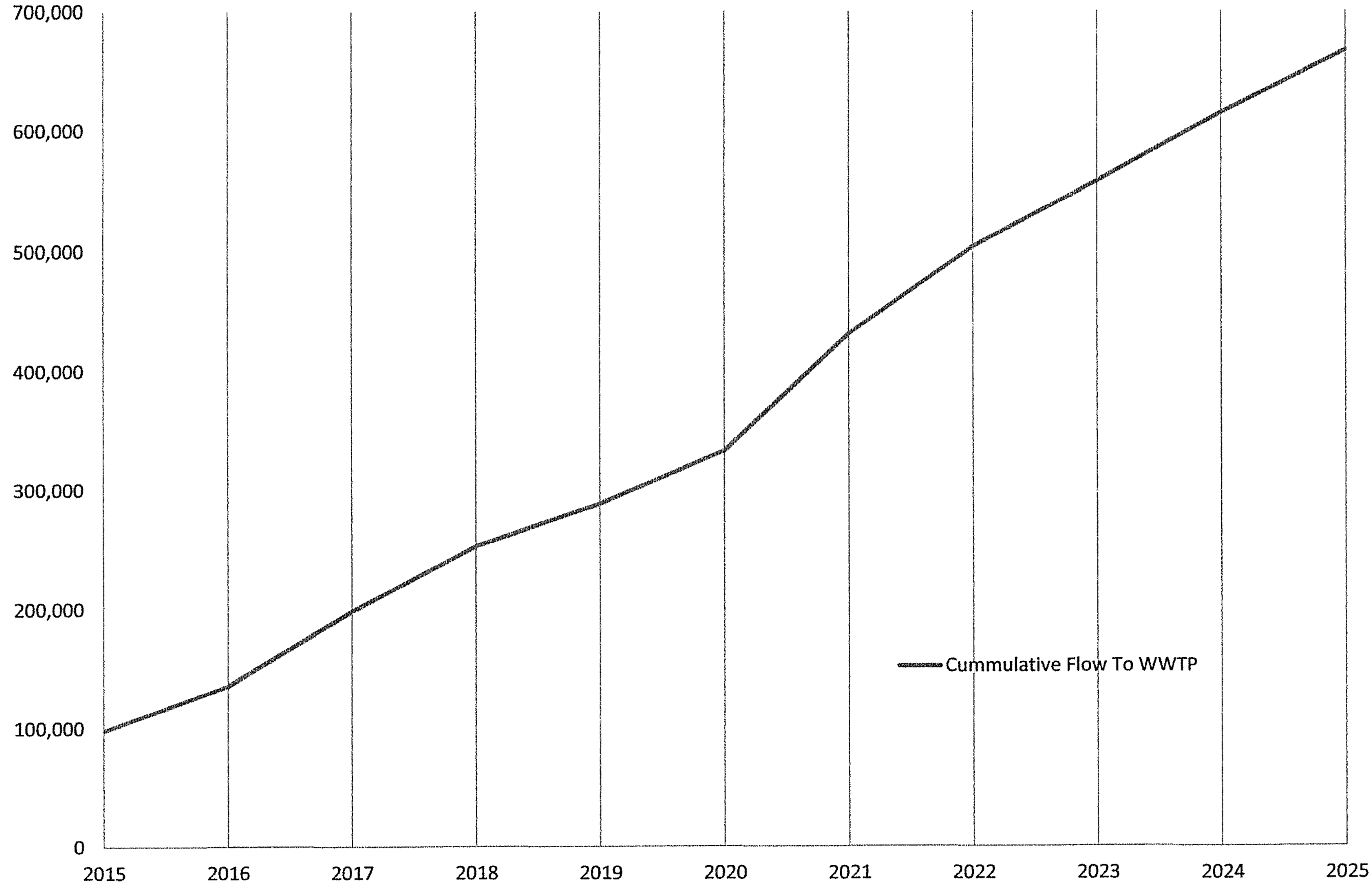
Revised October 19, 2015

GROWTH AREA	LUE PROJECTION - by Year											Area Total
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
Arrowhead Ranch							250	50	50	50	50	450
Barshop & Oles Tracts	3	3										6
Burrows MF/The Retreat @ DS	15	18	30	13								76
Calilterra	30	90	100	100	100	80	80	75	20			675
Cannon Tract								50	50	50	50	200
Carter Ranch			25	50	50	50	50	10				235
Creek Road							5	5	5	5	5	25
Downtown Area						5						5
DS Presbyterian	3											3
DSISD - MS								35				35
Garnett Tract							25	25	25	25	10	110
Harrision Tract								5	5			10
Haydon Tract							10	10	10	10		40
Hibberd Tracts							35	35	35	35	35	175
Hidden Springs MF								5	5			10
Holiday Inn Express		35										35
Howard Tract		20	20									40
HWY 290 - East						5	5	5	5	5	5	30
HWY 290 - Mid West						10	10	10	10	10	10	60
HWY 290 - W Central						5	2	2	2	2	2	15
Karhan Tract							7	8	8			23
Founder's Ridge/Linwood	70		70	65								205
McAllister/Meritage/Heritage	34	40	33	33								140
Merit Hill Country Senior Living			30									30
Polkinghorn		1										1
RR 12 - N							2	2	2	2	2	10
RR 12 - S							5	5	5	5	5	25
Slaughter Ranch										50	50	100
SPP/Heritage PID			50	50	50	100	75	75	75	75	75	625
Twisted X Tract	7	8										15
	162	215	358	311	200	255	561	412	312	324	299	
	162	377	735	1,046	1,246	1,501	2,062	2,474	2,786	3,110	3,409	
	98,350	135,975	198,625	253,050	288,050	332,675	430,850	502,950	557,550	614,250	666,575	
	127,500	127,500	189,500	313,500	313,500	399,000	497,500	995,000	995,000	995,000	995,000	

Current WWTP Flow	70,000
GPD/LUE	175

Total of LUEs Projected by End of 2025 **3409**

Figure 2
Wastewater Flow Projections Using LUE Projections



2.3 Proposed Organic Loadings

Carollo performed an influent loading analysis for the BOD_5, TKN, ammonia, and total phosphorus (TP) as part of the Conceptual Design Engineering Report (included in Appendix A). TSS data was not available, but Carollo estimated TSS influent concentrations were estimated to be about 10 % higher than the calculated BOD_5 influent concentrations. A summary of the influent organic and nutrient loadings for each phase are presented below:

Interim I Phase

- 510 pounds of BOD_5/day
- 560 pounds of TSS/day
- 120 pounds of TKN/day
- 87 pounds of ammonia/day
- 15.5 pounds of TP/day

Interim II Phase

- 600 pounds of BOD_5/day
- 660 pounds of TSS/day
- 140 pounds of TKN/day
- 100 pounds of ammonia/day
- 18.2 pounds of TP/day

Final Phase

- 1,200 pounds of BOD_5/day
- 1,320 pounds of TSS/day
- 280 pounds of TKN/day
- 200 pounds of ammonia/day
- 36.5 pounds of TP/day

2.4 Proposed Effluent Quality

The City is proposing to discharge treated effluent into Walnut Springs, a tributary to Onion Creek. The proposed effluent limits are as follows:

- 5 mg/L $CBOD_5$
- 5 mg/L TSS
- 2 mg/L Ammonia Nitrogen
- 0.5 mg/L Total Phosphorus
- E Coli Bacteria - 126 colonies per 100 ml
- 5 mg/L Dissolved Oxygen

- pH shall not be less than 6.0 standard units nor greater than 9.0 standard units
- The effluent shall contain a chlorine residual of at least 1.0 mg/L after a detention time of 20 minutes (based on peak flow)

In addition, the following requirements for Type I effluent will apply to Beneficial Reuse authorized under Chapter 210 of the TCEQ Rules:

- BOD_5 or $CBOD_5$- 5 mg/L
- Turbidity - 3 NTU
- Fecal Coliform - 20 CFU/100 ml (geometric mean)
- Fecal Coliform - 75 CFU/100 ml (single grab sample)
- Enterococci – 4 CFU/ml (30-day geometric mean)
- Enterococci – 9 CFU/ml (maximum grab sample)
- The effluent shall be re-chlorinated prior to reuse

2.5 Wastewater Treatment Plant Design

The City's existing WWTP is a field-erected steel activated sludge WWTP with a potential total treatment capacity of approximately 500,000 GPD. The concentric steel bulls-eye WWTP structure has an outer diameter of approximately 94 feet and an inner diameter of approximately 62 feet, and has 18.5 feet tall walls with stairways, walk ways and grating, and other equipment. However, the existing equipment at the WWTP currently in operation limits the plant capacity to 127,500 GPD. As such, there are several basins within the structure that are not being used at this time. The existing WWTP consists of one aeration basin, clarifier, chlorine contact chamber, and two digester basins. Based on the Conceptual Design Engineering Report developed by Carollo (included in Appendix A), the existing WWTP can be converted to a BNR WWTP with a capacity of 497,500 GPD. Please refer to Appendix A for preliminary design. It is planned that a new identical WWTP will be constructed in the interim I Phase, and that the existing WWTP be converted to a BNR WWTP after the new proposed WWTP is constructed and in operation.

The disinfection for each phase of the permit will include chlorination of the treated wastewater prior to discharge. The treated effluent will be chlorinated in a chlorine contact chamber to a chlorine residual of 1.0 mg/L with a minimum detention time of 20 minutes at peak flow. Effluent will also be re-chlorinated prior to reuse.

Digesters will be used to partially stabilize sludge prior to land fill disposal and/or transporting the sludge to another WWTP or sludge treatment facility for further processing and ultimate disposal. The City's existing WWTP utilizes auxiliary power at the WWTP site, and at lift stations that do not meet the requirements of a reliable power supply as described in 30 TAC, Chapter 217.

2.6 WWTP and Discharge Site

The existing WWTP site and proposed discharge location are within the Barton Springs Zone of the Onion Creek watershed. No portion of the project site is in the Edwards Aquifer Recharge Zone as mapped by the TCEQ. However, the project is located within the Barton Springs Contributing Zone of the Edwards Aquifer region.

The existing WWTP is outside of and protected from the 100 year flood plain as delineated by FEMA, and the 150 foot buffer zones around the existing WWTP are owned by the City. All WWTP siting requirements of 30 TAC, Chapter 309 are met.

3.0 DISCHARGE ROUTE

Treated effluent will be pumped from the WWTP site through a 12 inch PVC line to the proposed discharge point within the Caliterra Subdivision. At the discharge point, a concrete and rock structure/waterfall or other reaeration structure will be constructed so that effluent is re-aerated before entering the tributary. Treated effluent will flow through the reaeration structure, and be discharged to Walnut Springs, thence to Onion Creek in Segment 1427 of the Colorado River Basin.

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CITY OF DRIPPING SPRINGS
SOUTH REGIONAL WASTEWATER SYSTEM
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PRELIMINARY ENGINEERING REPORT
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Interim I Phase:	0.399 MGD
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Final Phase:	0.995 MGD

2.2 Peak Flow Rate

The peak flow to the WWTP is defined as the highest two-hour average flow rate expected to be delivered to the treatment units under any operational condition. It is proposed that influent flows will gravity flow to the WWTP influent lift stations, and then pumped from lift stations to the WWTP headworks. The peak factor used for the preliminary design of the WWTP is 4.0.

PER Treatment Units
p. 1

Table 1.5	Existing Unit Process Design Criteria City of Dripping Springs Conceptual BNR Design CMA Engineering, Inc.				
Criteria	**Units[1]**	**Texas Design Requirements**	**Interim I Phase**	**Interim II Phase**	**Final Phase**
Design Capacity					
ADMMF	mgd		0.399	0.4975	0.995
Peak 2-hr Flow	mgd		1.6	1.99	3.98
BOD Loading at ADMMF	ppd		800	1,000	2,000
Activated Sludge Process					
Number of Treatment Trains	-	> 0.4 mgd two trains	1		2
Number of Basins per Train	-			1	
Total Volume of all Aeration Basins	gal		327,340		654,680
	1000 cf		43.9		87.8
Organic BOD Loading	ppd BOD /1,000 cf	<50	18.2	22.8	
Hydraulic Detention Time at 2-hr Peak Flow	hr	>1.8	4.9	3.9	
Total Aerated Volume	gal		177,080 (54%)		354,160 (54%)
Total Unaerated Volume	gal		150,250 (46%)		300,500 (46%)
Outer diameter	ft			94	
Inner diameter	ft			62	
Side Water Depth (SWD)	ft	> 10 ft diffuser submergence		15.5	
Number of zones per Basin	-			4	
Zone 1 - Anoxic					
Arc	Degrees			41	
Volume per Train	gal			52,320	
Total Volume	gal		52,320		104,640

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Table 1.5 Existing Unit Process Design Criteria
City of Dripping Springs Conceptual BNR Design
CMA Engineering, Inc.

Criteria	Units[1]	Texas Design Requirements	Interim I Phase	Interim II Phase	Final Phase
Zone 1 - Anoxic (continued)					
Hydraulic Retention Time at ADMMF	hrs		3.1	2.5	
% of total Aeration Volume	%			16 %	
Type of Mixing	-			Mechanical	
Zone 2 - Aerobic					
Arc	Degrees			115	
Volume per Train	gal			147,570	
Total Volume	gal		147,570		295,140
Hydraulic Retention Time at ADMMF	hrs		8.9	7.1	
% of total Aeration Volume	%			45 %	
Zone 3 - Anoxic					
Arc	Degrees			77	
Volume per Train	gal			97,930	
Total Volume	gal		97,930		195,866
Hydraulic Retention Time at ADMMF	hrs		5.9	4.7	
% of total Aeration Volume	%			30 %	
Type of Mixing	-			Mechanical	
Zone 4 - Aerobic					
Arc	Degrees			23	
Volume per Train	gal			29,510	
Total Volume	gal		29,510		59,028
Hydraulic Retention Time at ADMMF	hrs		1.8	1.4	
% of total Aeration Volume	%			9 %	

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Table 1.5	Existing Unit Process Design Criteria City of Dripping Springs Conceptual BNR Design CMA Engineering, Inc.				
Criteria	**Units[1]**	**Texas Design Requirements**	**Interim I Phase**	**Interim II Phase**	**Final Phase**
Mixed Liquor Recycle					
Flow at ADMMF	mgd		0.8	1.0	2.0
% of ADMMF Influent	%			200%	
External Carbon Addition					
Methanol equivalents	gpd		9.6	12	2436
Operational Design Conditions					
Min. Wastewater Temperature	°C			18	
Minimum aerobic SRT, (aSRT)	days			6	
Mixed Liquor Suspended Solids (MLSS)	mg/L	2,000-5,000	3,010	3,770	

The effluent alkalinity could be low (insufficient influent alkalinity data available to reliably model), suggesting that the implementation of an alkalinity addition system might be required. Carollo recommends the routine monitoring of alkalinity to determine whether alkalinity addition will be required.

Figure 1.12 illustrates the new zone configuration in the Bullseye treatment reactor after the conversion to a 4-Stage Bardenpho treatment process. It may be beneficial to split aerated Zone 2 in half with an additional baffle wall to improve nitrification through enhanced plug flow.

PER
Treatment Units
p-4

Table 1.6	Conceptual BNR Design Criteria - Secondary Clarification City of Dripping Springs Conceptual BNR Design CMA Engineering, Inc.				
Criteria	Units[1]	Texas Design Require-ments	Interim I Phase	Interim II Phase	Final Phase
Design Capacity					
ADMMF	mgd		0.399	0.4975	0.995
Peak 2-hr Flow	mgd		1.6	1.99	3.98
Secondary Clarifiers					
Number of Units	-	> 0.4 mgd two trains	1		2
Volume	cf		45,286		90,572
	gal		338,740		677,480
Diameter	ft			62	
Surface area	sf		3,019		6,040
Side water depth	ft	>10		15.5	
Weir length	ft		185.4		370
Design Sludge Volume Index (SVI)	mL/g			150	
Clarifier Safety Factor (CSF)	-			2.7	
Weir Loading Rate @ Peak 2-hr Flow	gal/ft	<20,000	5,720	10,730	
Surface Overflow Rate @ Peak 2-hr Flow	gal/sf/day	<1,200	350	660	
Return Activated Sludge Pumps					
Type of Pumps	-			VFD Controlled	
Flow at 150 % of Permitted Influent	mgd		0.6	0.75	1.5
	gpm		420	490	980
Turndown (40% of ADMMF)	mgd		0.16	0.2	0.4
Waste Activated Sludge Pumps					
Type of pumps	-			VFD Controlled	
Number of pumps	-		2		4

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10.1.5 Chemical Addition

Chemical addition for phosphorus removal will be added upstream of tertiary filtration with the option to add chemicals also upstream of the secondary clarifiers. Adequate provisions must be included during preliminary and final design to allow for metered dosing and effective mixing, and coagulation to occur upstream of the filters to avoid unnecessary chemical consumption. Design requirements in accordance with Subchapter K of the TAC must be followed. Table 1.7 summarizes the chemical feed design criteria.

Table 1.7 Conceptual BNR Design Criteria - Chemical Alum Feed
City of Dripping Springs Conceptual BNR Design
CMA Engineering, Inc.

Criteria	Units[1]	Texas Design Requirements	Interim I Phase	Interim II Phase	Final Phase
Design Capacity					
ADMMF	mgd		0.399	0.4975	0.995
Chemical Addition					
Type of Chemical	-			Alum	
Dose	gpd		5.5	7.0	14.0
Chemical Strength	mg Al/L			150,000	

10.1.6 Tertiary Filtration

Post-secondary treatment chemical alum addition, flocculation and tertiary filtration will be provided to remove particulate phosphorus (§217.190(a)). As previously explained in section 9.1.2, for planning purposes it was assumed that a conventional down-flow media filter will be used. Preliminary and final design should evaluate whether cloth filters are a suitable cost-effective alternative for effluent polishing. Design criteria for the tertiary filters are summarized in Table 1.8. A minimum of two filter units must be provided for a facility using filtration to provide tertiary treatment for a permit requirement.

The down-flow media filters were sized per TAC by calculating the required filter surface area based on the peak flow through the filters with the largest filter unit out of service using a conservative hydraulic loading rate of 3 gpm per square foot of media surface for a single media filter (Table 1.8). Filtered water will be used for backwash water and will be returned from the filters to the head of the facility for processing. Surface air and/or water will be used for filter scouring.

PER Treatment Units p. 5

Table 1.8	Conceptual BNR Design Criteria - Media Filtration City of Dripping Springs Conceptual BNR Design CMA Engineering, Inc.				
Criteria	Units[1]	Texas Design Requirements	Interim I Phase	Interim II Phase	Final Phase
Design Capacity					
PDF	gpd		611,800	762,840	1,525,600
Tertiary Filters					
Type of Filter	-		Single or Dual Media, down-flow		
Hydraulic Loading Rate	gpm/sf	<3	3.0	1.8	2.7
Number of Units	-	>2	2	3	4
Filter Size, each	sf			140	
Filter Size, total	sf		280	420	560

10.1.7 Disinfection

It is planned to use chlorine for final disinfection. Final disinfection needs to occur downstream of the tertiary P removal filters and therefore, a new chlorine dosing system and chlorine contact tank must be built on-site upstream of the effluent storage tank. The capacity of the chlorination system will need to be upgraded to safely treat the projected design flows for all Permit Phases (Figure 1.9).

Per Chapter 30 TAC 217.281 (b) (1), the Chlorine Contact Basin must be sized to provide a minimum Cl_2 contact time of 20 minutes at the peak flow, meaning the peak 2-hour flow. The dosage requirements are based on the effluent type (Chapter 30 TAC 217.272 (b), Table K.1). For secondary effluent, the dose required is 8 mg/L, for tertiary or nitrified, it is 6 mg/L. Per discharge permit, a 1 mg/L chlorine residual must be maintained after a CT of 20 min.

PER Treatment Units P.6

Table 1.9	Conceptual BNR Design Criteria - Final Disinfection City of Dripping Springs Conceptual BNR Design CMA Engineering, Inc.				
Criteria	Units[1]	Texas Design Requirements	Interim I Phase	Interim II Phase	Final Phase
Design Capacity					
Peak 2-hr Flow	mgd		1.6	1.99	3.98
Disinfection					
Oxidant	-			Gaseous chlorine	
Dosage	mg/L	>6 mg/L		> 6 mg/L	
Residual	mg/L	>1 mg/L		> 1 mg/L	
Chlorine Contact Basin					
Size	gal		30,000		60,000
HRT @ 2-hr PDF	min	>20	27	22	22

10.1.8 Process Monitoring and Control

BNR treatment for ultra-low nutrient limits requires a robust process monitoring and control support for reliable treatment and cost-effective process operation and chemical applications. During preliminary and detailed design the benefits of online instrumentation need to be further evaluated to reliably control e.g., DO concentrations in the aerated zones, effluent ammonia and nitrate, sludge blanket levels in the SCs, tertiary effluent phosphorous and turbidity. Effective and reliable process operation is also facilitated through automated electronic recording of such relevant data series. Per TAC, at minimum WAS and RAS flows need to be metered and controllable for enhanced BNR operation. The monitoring frequency of influent, effluent, and individual process operations will need to be increased to assure adequate BNR performance and chemical dosing. Specifically, aeration control and solids inventory management will need to be tightly controlled from day-to-day operation so ammonia and nitrate removal is adequately balanced.

10.1.9 Aerobic Digestion, Storage, and Sludge Hauling

Table 1.9 summarizes the WAS flow projections under ADMMF conditions in the Interim I and Interim II Phases at an aSRT of 6 days. The temperature in the sludge holding tanks is close to 18 °C in winter months.

Per 30 TAC 217, the volatile solids (VS) loading rate for aerobic digestion must be designed to be at least 100 lb but not more than 200 lb of VS per 1,000 cf per day. The DO concentration maintained in the liquid must be at least 0.5 mg/L. Energy input for mixing

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must be at least 20 scfm per 1,000 cf of aeration tank if diffused air mixing is used. The minimum HRT for staged aerobic digestion at 20 degrees is 28 days and for non-staged aerobic digestion 40 days. As the volume in the tanks does not meet the aerobic digester requirements, the tanks are serving as sludge holding tanks (see Table 1.10).

Table 1.10 Conceptual BNR Design Criteria - Sludge Holding Tanks City of Dripping Springs Conceptual BNR Design CMA Engineering, Inc.

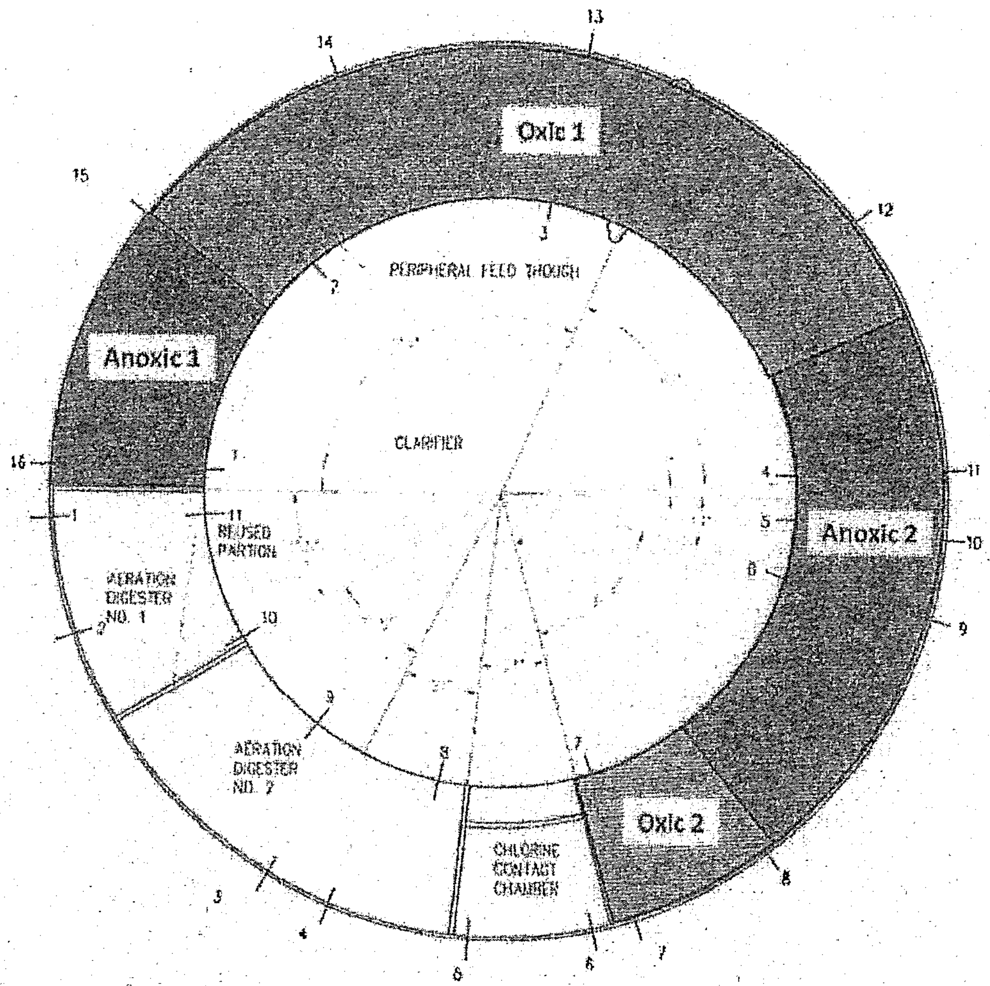
Criteria	Units	Texas Design Require-ments	Interim I Phase	Interim II Phase	Final Phase
Waste Activated Sludge					
Flow at ADMMF in winter (100%)	gpd		10,000	11,000	22,000
Proportionally Scaled:					
75%	*gpd*		*7,500*	*8,250*	*16,500*
50%	*gpd*		*5,000*	*5,500*	*11,000*
25%	*gpd*		*2,500*	*2,750*	*5,500*
TSS concentration	%			1.0	
VSS Load	ppd		526	655	1,310
Sludge Holding Tanks					
Number of Basins (existing)	-		3		6
Total Volume[1)]	gal		135,150		270,300
	1,000 cf		18.1		36.1
HRT at ADMMF	days	2)	13.5	12.3	12.3
VSS Loading Rate	ppd/	100 - 200 lb per 1,000 cf per day	29.1	36.2	

Notes:

1. The total shown here includes the volume currently being used for chlorine contact in the existing treatment train and assumes that new chlorine contact basins will be constructed.
2. The minimum HRT for staged aerobic digestion at 20 degrees is 28 days and for non-staged aerobic digestion 40 days. As the volume does not meet the aerobic digester requirements, the tanks are serving as sludge holding tanks.

As an alternative to meeting minimum criteria for aerobic digestion, the existing permit allows for alternative options for disposal of solids that are not dewatered, and it is assumed that these options will remain available in the future. Under the current hauling procedure

PER Treatment Units



Background image provided by CMA Engineering, Inc.

PROPOSED AERATION BASIN CONFIGURATION (PLAN VIEW)

FIGURE 1.12

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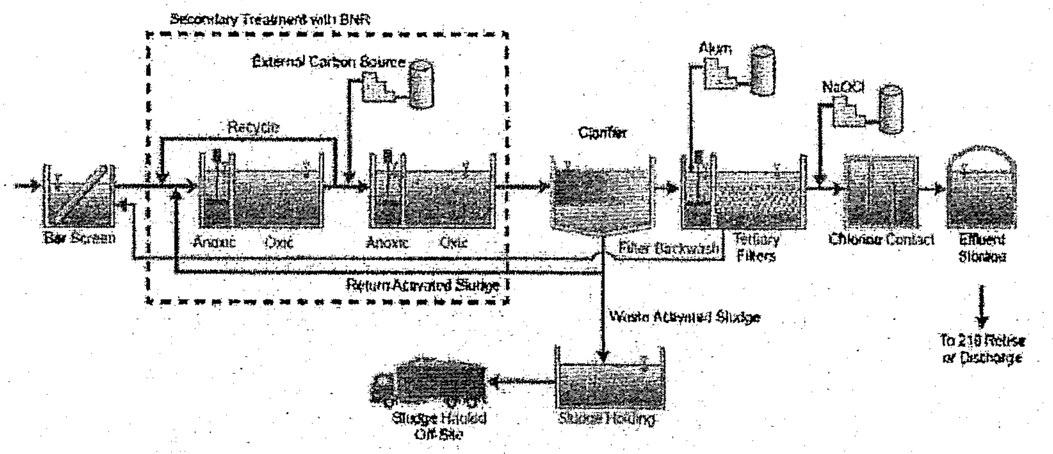
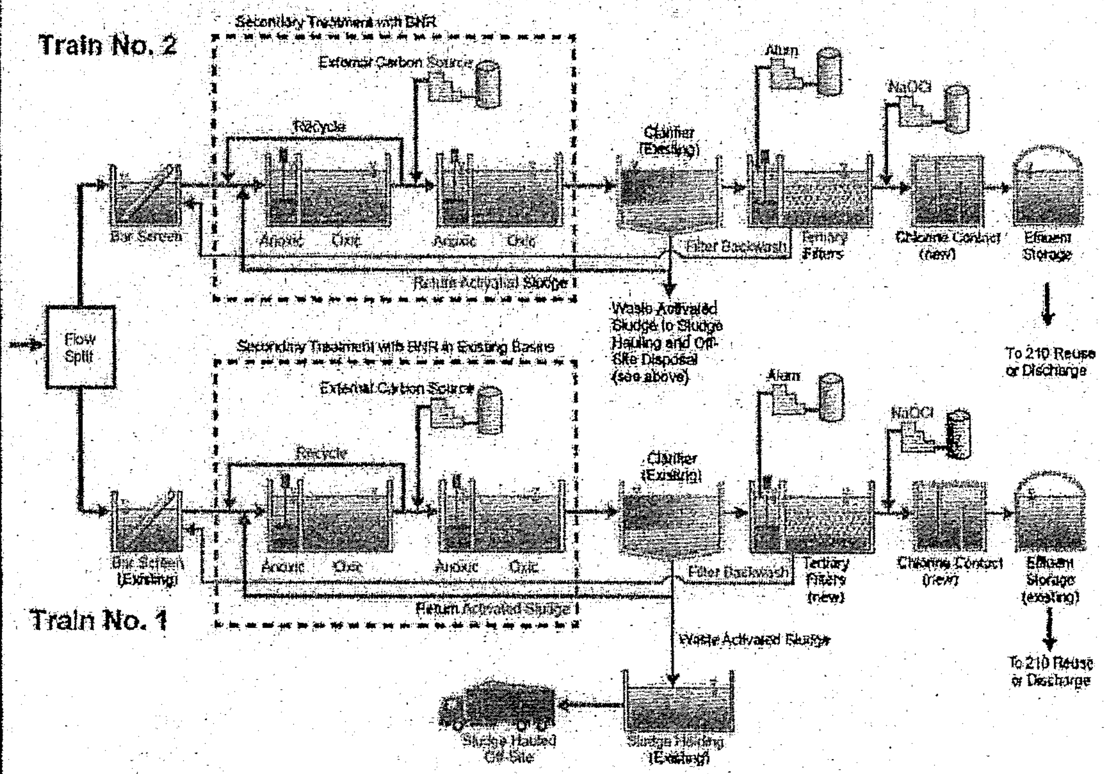
CITY OF DRIPPING SPRINGS CONCEPTUAL BNR DESIGN

Train No. 2 Constructed for Interim Phase I and Interim Phase II:



Existing Train No. 1 Retrofitted to Complete Final Phase:



REVISED PROCESS FLOW DIAGRAM FOR SOUTH REGIONAL WASTEWATER TREATMENT PLANT WITH BNR UPGRADES

Revised FIGURE 1.11

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CONCEPTUAL BNR DESIGN