Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Interim Phase

CHARACTERISTICS & COEFFICIENTS

MLSS =	3000	mg/l at normal operating level
Volatile Suspended Solids =	70	% of Total Suspended Solids
Minimum DO during aeration =	2.0	mg/l

Kinetic Coefficients for heterotrophic bacteria

Y=	0.40	g VSS / g bCOD
k_d =	0.12	g VSS / g VSS*d
k_d =	1.04	unitless
$k_{d,\ 15°C}$ =	0.099	g / g*d
f_d =	0.15	unitless

Kinetic Coefficients for nitrification

Y_n =	0.12	g VSS / g NH4-N
K_o =	0.50	g / m^3
Kn =	0.74	g NH4-N / m^3
Kn =	1.053	unitless
$K_{n,\ 15°C}$ =	0.572	g / m^3
kdn =	0.080	g VSS / g VSS*d
kdn =	1.040	unitless
$k_{dn,\ 15°C}$ =	0.066	g / g*d
μ_{mn} =	0.75	g VSS / g VSS*d
μ_n =	1.07	unitless
$\mu_{m,15°C}$ =	0.535	g / g*d

a: Metcalf & Eddy, Wastewater Engineering Treatment & Reuse, 4th Ed., Tables 8-10 & 8-11, Pgs 704-705

LOADING

BOD5 Loading:

BOD5 Removed = $\dfrac{8.34 x Q(BOD_5\ \text{inf} - BOD_5 eff)}{10^6}$

BOD5 Removed = 7,089 lbs/day

TSS Loading:

TSS Removed = $\dfrac{8.34\ xQx\ (TSS\ \text{inf}\ -\ TSSeff\ )}{10^{\ 6}}$

TSS Removed = 5,942 lbs/day

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Interim Phase

FINE SCREEN

Bar Spacing:	0.25	in
Average Flow Rate:	2.5	MGD
Approximate Volume of Screenings:	13	cf/MG
Anticipated Volume of Screenings:	32.5	cf per day

COARSE SCREEN (BYPASS/OVERFLOW BAR SCREEN)

INFLUENT FLOW RATE:

Average Influent Flow Rate:	2.50	MGD	=	1736	gpm	=	3.868 cfs
Peak Influent Flow Rate:	7.50	MGD	=	5208	gpm	=	11.604 cfs

CHANNEL GEOMETRY:

Channel Width:	5.0	ft
Design Channel Flow Depth:	0.7	ft
Max. Channel Depth:	1.8	ft

BAR RACK GEOMETRY:

Bar Size:	0.375	in
Clear Space Between Bars:	0.500	in
Incline Angle:	60	degrees
No. of Bars in Rack:	68	
Clear Space:	2.875	sf per ft of channel depth

HEADLOSS THROUGH BAR SCREEN:

Channel Area (Avg):	3.5	sf
Channel Area (Max):	9.0	sf
Approach Velocity (Avg):	1.11	fps (using design channel depth)
Approach Velocity (Peak):	1.29	fps (using max. channel depth)
Bar Screen Area (Avg):	2.01	sf
Bar Screen Area (Max):	5.18	sf
Velocity Through Bars (Avg):	1.92	fps (using design channel depth)
Velocity Through Bars (Max):	2.24	fps (using max. channel depth)

$$HeadLoss = \frac{V^2 - v^2}{0.7 \times 2 \times g}$$

V= Velocity of flow through openings in rack
v= Approach velocity
g= Acceleration of gravity, 32.2

Assuming No Clogging:

Head Loss (Design):	0.0549	ft
Head Loss (Max):	0.075	ft

Assuming Clogging:

Clogging Factor:	0.500	
Head Loss (Design):	0.219	ft
Head Loss (Max):	0.299	ft

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Interim Phase

INITIAL SBR BASIN DESIGN

Number of Basins =	2	
Number of Cycles per Day =	4	per Basin
Total Cycle Time =	6.00	hrs / cycle
Volume per Cycle =	312,500	gal / cycle
Side Water Depth (SWD) =	28.0	ft

Fill

Time to Fill = 24 hrs/day / Total No. of Cycles per day

Time to Fill (T_f)= 3.00 hrs / cycle

Average Flow Rate = Volume per Cycle / Time to Fill

Average Flow Rate = 1,736.1 gpm

React

Minimum Required Aeration Volume:

Maximum Organic Loading: 25 lbs BOD5/day/1000 cf

(TCEQ Chap. 217.154, Conventional Activated Sludge with Nitrification, with temperatures between 13°C and 15°C)

BOD_5 Loading: 7,089 lbs/day

Minimum Required Aeration Volume (V_a): 283,560.0 cf

Initial Assumption:

Aerated Portion of Fill:	0%	
Aerated Portion of React:	100%	
React Portion of Total Cycle:	34%	
React Cycle Time (T_r):	2.04	hrs
Aerated React Cycle Time (T_{ra}):	2.04	hrs

Minimum Total Volume Required (V_t) = V_a / Ta

V_t = 834,000 cf = 6,238,737 gal

Minimum Total Volume Required per Basin =	417,000.0	cf =	3,119,368.5	gal		
Minimum Surface Area Required per Basin =	14,892.9	sf				
Proposed Basin Size =	94.0	ft x	160.0	ft x	28.0	ft SWD
Round Basin Size =	137.7	ft diameter				
Proposed Volume per Basin =	421,120.0	cf				

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Interim Phase

Settle

Maximum Overflow Rate @ 2-Hr Peak Flow =	1200	gal/day/sf	(TCEQ Chap. 217.154, Conventional Activated Sludge with Nitrification, with temperatures between 13°C and 15°C)
Min. Surface Area Required (Proposed Surface Area per basin) =	15,040.0	sf	
Maximum Overflow Rate =	12,533.3	gpm	
Volume per Cycle =	312,500	gal	
Minimum Settle Time (T_S) =	24.93	min	
Use Ts =	25.00	min = 0.42 hrs	

Decant

Assumed Flow Rate of Decanter =	6,950.0	gpm	
Decanters per Basin =	2		
Total Decant Flow Rate per Basin =	13,900.0	gpm	
Volume per Decant =	312,500	gal	
Decant Time (T_d) =	22.48	min =	0.37 hrs

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Interim Phase

SBR DESIGN

Number of Basins =	2				
Number of Cycles per Day =	4				
Volume per Cycle =	312,500	gal			
Side Water Depth (SWD) =	28	ft			
Minimum Total Volume Needed =	834,000	cf			
Minimum Volume per Basin =	417,000.0	cf			
Minimum Surface Area Required per Basin =	15,040.0	sf			
Proposed Basin Size =	94.0	ft x	160.0 ft x	28.0 ft SWD	
Proposed Surface Area =	138.4	ft diameter			
Volume Proposed Per basin	421,120	cf			
Volume Proposed Total	842,240	cf			
Total Cycle Time =	6.00	hrs			
Max. Fill Time (T_f):	3.00	hrs (at design flow)			
Anoxic Fill Time ($T_{f,an}$):	*3.00*	*hrs*			
Aerated Fill Time ($T_{f,aer}$):	*0.00*	*hrs*			
React Time (T_r):	2.04	hrs			
Settle Time (T_s):	0.42	hrs			
Decant Time (T_d):	0.37	hrs			
Idle Time (T_i):	0.17	hrs			

Hydraulic Retention Time

$$\tau = V / Q$$

Hydraulic Retention Time = 2.52 days

F/M

$$F/M = \frac{Q \times BOD_{5,\text{inf}}}{MLSS \times V}$$

F/M = 0.046 gBOD/gMLSS-d

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Interim Phase

Wastewater Characteristics

bCOD = 1.6(BOD) =	560	mg/l (Biodegradable COD)
nbCOD = COD - bCOD =	140	mg/l (non-biodegradable COD)

iTSS = TSS - VSS

TSS =	300	mg/l
VSS =	210	mg/l
iTSS =	90	mg/l

$$\frac{bpCOD}{pCOD} = \frac{(bCOD/BOD)(BOD - sBOD)}{COD - sCOD}$$

sBOD: soluble BOD
sCOD: soluble COD
bpCOD: Biodegradable particulate COD
pCOD: Particulate COD

Assume: sCOD =	33%	of COD =	231	mg/l
Assume: sBOD =	33%	of BOD =	116	mg/l

bpCOD/pCOD = 0.80

$$nbVSS = \left[1 - \left(\frac{bpCOD}{pCOD}\right)\right] BOD$$

nbVSS = 70.0 mg/l (non-biodegradable VSS)

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Interim Phase

Sludge Retention Time

$$(P_{X,TSS})SRT = \frac{QY(S_O - S)SRT}{[1+(k_d)SRT](0.85)} + Q(nbVSS)SRT + \frac{QY_n(NO_x)SRT}{[1+(k_{dn})SRT](0.85)} + \frac{(f_d)(k_d)Q(Y)(S_O - S)SRT^2}{[1+(k_d)SRT](0.85)} + Q(TSS_O - VSS_O)SRT$$

$$(P_{X,TSS})SRT = (V)(X_{MLSS})$$

XMLSS = 3000 g/m^3

V = 421,120.0 cf/basin = 11,924.78 m^3 / basin

Q (per Basin) = 1.25 MGD = 4,731.76 m^3 / day

(PX,TSS)SRT = 35,774,338 g

Assume So ≈ So -S

So = bCOD = 560 g/m^3

Assume Nox ≈ 80% of TKN = 40.0 g/m^3

SRT = 29.16 days

MLVSS

$$(P_{X,VSS})SRT = \frac{QY(S_O - S)SRT}{[1+(k_d)SRT]} + Q(nbVSS)SRT + \frac{QY_n(NO_x)SRT}{[1+(k_{dn})SRT]} + \frac{(f_d)(k_d)Q(Y)(S_O - S)SRT^2}{[1+(k_d)SRT]}$$

$$(P_{X,VSS})SRT = V_T(X_{MLVSS})$$

(Px,vss)SRT = 21,300,780 g

MLVSS = 1786 mg/l

Sludge Yield

$$P_{X,TSS} = \frac{(V)(MLSS)}{SRT}$$

PX,TSS = 5,409

$$Q_{Sludge} = \frac{P_{X,TSS}}{8.34 \times PercentSolids}$$

Assume Percent Solids = 1.5 %

Qsludge = 43,236 gal/day

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Interim Phase

NITRIFICATION / DENITRIFICATION

Nitrification

$$K_n \ln\frac{N_o}{N_t} + (N_o - N_t) = X_n\left(\frac{\mu_{mn}}{Y_n}\right)\left(\frac{DO}{k_o + DO}\right)t$$

N_t = NH_4-N concentration at time t (mg/L)
X_n = Nitrifying bacteria concentration (mg/L)
DO = Dissolved Oxygen concentration= 2.0 mg/L

$$NO_x = TKN_o - N_e - 0.12P_{x,bio}/Q$$

NOx = Nitrogen oxidized (mg/L)
TKN_o = Influent TKN (mg/L)
N_e = Effluent NH4-N (mg/L)
$P_{x,bio}$ = Nitrogen in cell tissue

$$P_{x,bio} = \frac{QY(S_o - S)}{1+(k_d)SRT} + \frac{QY_n(NO_x)}{1+(k_{dn})SRT} + \frac{(f_d)(k_d)QY(S_o - S)SRT}{1+(k_d)SRT}$$

Q =	1,250,000	gpd/basin =	4,731.8	m^3/day/basin
So - S =	560	g/m^3 (from SRT calculation)		
Nox =	40.0	g/m^3 (from SRT calculation)		
SRT =	29.16270079	days		
Px,bio =	399,188	g/day =	399.2	kg/day
NOx =	36.9	g/m^3		

NOx added per cycle = Fill Volume x NOx = 43,623 g per fill cycle
NH_4-N remaining before Fill Cycle = Settle Volume x N_e = 32,225.56 g
Total Oxidizable N at beginning of Cycle = 75,848 g

N_o = Total Oxidizable N at beginning of Cycle / Total Basin Volume = 6.36 g/m^3

$$X_n = \frac{Q(Y_n)(NO_x)SRT}{[1+(k_d)SRT]V}$$

X_n = 17.55 g/m^3

Time Needed: 0.06057 days = 1.454 hours
Aeration Time Proposed: 2.04 hours
Adequate Aeration time available for Nitrification

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Interim Phase

Denitrification

NO_x Added per Cycle:	43,623	g/fill cycle			
Vt:	11,924.8	m^3			
NO_3-N:	3.66	g/m^3 at end of aeration with tank full			
Vs:	10,741.8	m^3			
NO_3-N:	39,295	g after decant			

$$x_b = \frac{QY(S_o - S)SRT}{(1+(k_d)SRT)Vt}$$

xb= 668.7 g/m^3

Biomass in System:	7,974	kg		
BOD Feed Rate:	828	kg/day		
F/Mb:	0.104	g/g*day		
SDNRb:	0.07	g/g*day at 20°C		

From Metcalf & Eddy, Fig. 8-23, Pg 755, for rbCOD/bCOD of 0.10

$SDNR_{14}$:	0.062	g/g*day		

$NO_x = (SDNR_b)(x_b)(V_t)$ = NO_3-N removal capacity

NOx:	490,949	g/day		
Fill Time:	3.0	hrs		
NOr at	3.0	hrs =	61,369	g
NO3-N Available:	39,295	g		

All NO3-N can be removed during Fill 156.2%

Alkalinity

Alkanity Required for Nitrification:	263	mg/l		
Alkanity Recovered in Denitrification:	132	mg/l		
Net Alkanity Required:	132	mg/l		
Residual Alkalinity Needed to maintain pH:	80	mg/l		
Total Alkalinity Required in Influent:	212	mg/l		
Alkalinity Available in Influent:	200	mg/l		
Alkalinity Addition Needed:	**12**	**mg/l**		
Added as $CaCO_3$:	**110.2**	**kg/day =**	**243.03**	**lbs/day**

Garry Montgomery

From: Garry Montgomery
Sent: Monday, April 04, 2016 11:42 AM
To: 'Larry Diamond'
Subject: GVSUD W10015360001
Attachments: Response to TCEQ 2015.05.04- Part 2.pdf

Second email.

Garry Montgomery, P.E., CFM, SIT
Engineer IV

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Green Valley Special Utility District - Santa Clara Creek No. 1
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Interim Phase

SBR OXYGEN REQUIERMENTS

Actual Oxygen Transfer Rate (AOTR)

TCEQ Criteria:	2.20	lbs O_2 / lb BOD removed
BOD_5 Removed =	7,089.000	lbs/day
AOTR =	15,596	lbs O_2 / day

Standard Oxygen Transfer Rate (SOTR)

$$SOTR = AOTR\left[\frac{C_{s,20}}{\alpha F(\beta C_{sd} - C)}\right]\left(1.024^{20-T}\right)$$

T = 30 °C

$$C_{s,20} = 9.07 \times \left(1 + \frac{0.4 \times D}{34}\right)$$

D = 28 ft (depth, SWD)

$C_{s,20}$ = 12.06 mg/l (DO saturation at standard conditions)

$$C_{sd} = Cst \times \left(Fe + \frac{0.4 \times D}{34}\right)$$

Cst =	8.24	mg/l (DO saturation at liquid temp & sea level)
Fe =	0.97	Elevation Factor
Csd =	10.71	mg/l (DO saturation at design conditions)
α =	0.85	coefficient/correction factor
β =	0.95	Salinity-surface tension correction factor
F =	1.00	Fouling factor
C =	2.0	mg/l (operating Oxygen concentration)
SOTR =	21,357	lbs O_2 / day

Design SOTR

Aeration time/cycle =	2	hrs/cycle
Cycles/day/basin =	4	
Total Aeration time =	8	hrs/day/basin
No. of Basins =	2	
Design SOTR for Aeration =	1,309	lbs O2/hr/basin

Minimum Design Air Flow

Density of Air at Temp. of	30	°C =	0.07270626 lbs/cf
Amount of Oxygen =	0.01685	lbs/cf	
Minimum Design Air Flow =	3,698	SCFM (per basin being aerated)	

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Interim Phase

AEROBIC DIGESTER

Average Sludge Yield from SBR:	43,236	gal/day		
TCEQ Minimum Sludge Retention Time:	15	days		
SRT from SBR Treatment Basins:	29.1627	days		
Minimum SRT needed in Aerobic Digester:	0	days		
Minimum Proposed Aerobic Digester Volume:	750,000	gallons =	100,261	cubic feet
Minimum Digester Sludge Retention Time:	17.3	days		
Total Sludge Retention Time:	46.5	days		

Oxygen Requirements

Criteria:	30.0	scfm per 1000 cf of volume
Minimum Design Air Flow =	3008	scfm

SBR EFFLUENT EQUALIZATION

Minimum Working Volume Equal to:	2.5	Cycles
Volume per Cycle:	312,500	gallons
Minimum Working Volume:	**781,250**	**gallons**

UV DISINFECTION

Average Flow:	2.5	MGD =	1737	gpm
Peak Flow:	7.5	MGD =	5209	gpm
No. of Lamps per Module:	40			
Lamp Length:	62	in		
Recommended Flow per Lamp:	18.0	gpm		
Minimum No.of Lamps Needed:	290	lamps		
No. of Modules Needed:	**7.3**	**modules, use:**	**8**	**modules**

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Interim Phase

BELT FILTER PRESS

Solids Generated

Percent Solids in Sludge:	1.5	%
BOD_5 removed	7,089	lbs/day
Dry Sludge Produced	5,409	lbs/day
Wet Sludge Produced	360,590	lbs/day
Wet Sludge Produced	43,236	gal/day

Length of Sustainded Peak (days)	Peaking Factor	Waste Sludge Mass Loading (lbs/day)	Total Sustained Loading (lb)
1	2.4	12,981	12,981
14	1.32	7,140	99,955

Belt Press Sludge Loading Rate: 600 lb/m*hr (200 to 1500 lb/m*hr typical)

Two 2.5 m Belt Filter Presses

Total Sludge Loading Rate: 3,000 lb/m*hr

Belt Press Average Mass Loading Condition (Press 7-days of Sludge in 5-day work week)

5,409 lbs/day x 7 days = 37,862 lbs
37,862 lbs / 5 days = 7,572 lbs /day

7,572 lbs/day / 3,000 lb/m*hr = **2.52 hrs/day**

Peak Mass Loading Condition (Press 14-days of Peak Sludge in 10-days)

7,140 lbs/day x 14 days = 99,955 lbs
99,955 lbs / 10 days = 9,996 lbs /day

9,996 lbs/day / 3,000 lb/m*hr = **3.33 hrs/day**

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Final Phase

INFLUENT

Flow:

Average:	5	MGD
Peak:	15	MGD

Site Elevation: 550 ft MSEL

Composition:

	Design Values	
Assumed Values		
Peak Biological Oxygen Demand 5-day (BOD_5):	350	mg/l
Total Suspended Solids (TSS):	300	mg/l
Ammonia (NH3-N):	26	mg/l
Chemical Oxygen Demand (COD):	700	mg/l
Alkalinity	200	mg/l
Total Dissolved Solids (TDS):	550	mg/l
Total Nitrogen (N):	50	mg/l
Phosphorus (P):	9	mg/l

Temperatures:

Winter Temp (Min.):	15	°C
Summer Temp (Max.):	30	°C

EFFLUENT

Composition:

Biological Oxygen Demand 5-day (BOD_5):	10	mg/l
Total Suspended Solids (TSS):	15	mg/l
Ammonia (NH3-N):	3	mg/l
Dissolved Oxygen:	5	mg/l

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Final Phase

CHARACTERISTICS & COEFFICIENTS

MLSS =	3000	mg/l at normal operating level
Volatile Suspended Solids =	70	% of Total Suspended Solids
Minimum DO during aeration =	2.0	mg/l

Kinetic Coefficients for heterotrophic bacteria

Y=	0.40	g VSS / g bCOD
k_d =	0.12	g VSS / g VSS*d
k_d =	1.04	unitless
$k_{d,\ 14°C}$ =	0.099	g / g*d
f_d =	0.15	unitless

Kinetic Coefficients for nitrification

Y_n =	0.12	g VSS / g NH4-N
K_o =	0.50	g / m^3
Kn =	0.74	g NH4-N / m^3
Kn =	1.053	unitless
$K_{n,\ 14°C}$ =	0.572	g / m^3
k_{dn} =	0.080	g VSS / g VSS*d
k_{dn} =	1.040	unitless
$k_{dn,\ 14°C}$ =	0.066	g / g*d
μ_{mn} =	0.75	g VSS / g VSS*d
μ_n =	1.07	unitless
$\mu_{m,14°C}$ =	0.535	g / g*d

a: Metcalf & Eddy, Wastewater Engineering Treatment & Reuse, 4th Ed., Tables 8-10 & 8-11, Pgs 704-705

LOADING

BOD5 Loading:

BOD5 Removed = $\dfrac{8.34 x Q(BOD_5\ \text{inf} - BOD_5 eff)}{10^6}$

BOD5 Removed = 14,178 lbs/day

TSS Loading:

TSS Removed = $\dfrac{8.34\ xQx\ (TSS\ \text{inf}\ -\ TSSeff\ )}{10^{\ 6}}$

TSS Removed = 11,885 lbs/day

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Final Phase

FINE SCREEN

Bar Spacing:	0.25	in
Average Flow Rate:	5.0	MGD
Approximate Volume of Screenings:	13	cf/MG
Anticipated Volume of Screenings:	65	cf per day

COARSE SCREEN (BYPASS/OVERFLOW BAR SCREEN)

INFLUENT FLOW RATE:

Average Influent Flow Rate:	5.00	MGD	=	3472 gpm	=	7.736	cfs
Peak Influent Flow Rate:	15.00	MGD	=	10417 gpm	=	23.209	cfs

CHANNEL GEOMETRY:

Channel Width:	5.0	ft
Design Channel Flow Depth:	1.2	ft
Max. Channel Depth:	2.8	ft

BAR RACK GEOMETRY:

Bar Size:	0.375	in
Clear Space Between Bars:	0.500	in
Incline Angle:	60	degrees
No. of Bars in Rack:	68	
Clear Space:	2.875	sf per ft of channel depth

HEADLOSS THROUGH BAR SCREEN:

Channel Area (Avg):	5.8	sf
Channel Area (Max):	13.8	sf
Approach Velocity (Avg):	1.33	fps (using design channel depth)
Approach Velocity (Peak):	1.69	fps (using max. channel depth)
Bar Screen Area (Avg):	3.35	sf
Bar Screen Area (Max):	7.91	sf
Velocity Through Bars (Avg):	2.31	fps (using design channel depth)
Velocity Through Bars (Max):	2.94	fps (using max. channel depth)

$$HeadLoss = \frac{V^2 - v^2}{0.7 \times 2 \times g}$$

V= Velocity of flow through openings in rack
v= Approach velocity
g= Acceleration of gravity, 32.2

Assuming No Clogging:

Head Loss (Design):	0.0790	ft
Head Loss (Max):	0.128	ft

Assuming Clogging:

Clogging Factor:	0.500	
Head Loss (Design):	0.316	ft
Head Loss (Max):	0.512	ft

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Final Phase

INITIAL SBR BASIN DESIGN

Number of Basins =	4	
Number of Cycles per Day =	4	per Basin
Total Cycle Time =	6.00	hrs / cycle
Volume per Cycle =	312,500	gal / cycle
Side Water Depth (SWD) =	28.0	ft

Fill

Time to Fill = 24 hrs/day / Total No. of Cycles per day

Time to Fill (Tf)= 1.50 hrs / cycle

Average Flow Rate = Volume per Cycle / Time to Fill

Average Flow Rate = 3,472.2 gpm

React

Minimum Required Aeration Volume:

Maximum Organic Loading: 25 lbs BOD5/day/1000 cf

(TCEQ Chap. 217.154, Conventional Activated Sludge with Nitrification, with temperatures between 13°C and 15°C)

BOD_5 Loading: 14,178 lbs/day

Minimum Required Aeration Volume (V_a): 567,120.0 cf

Initial Assumption:

Aerated Portion of Fill:	0%	
Aerated Portion of React:	100%	
React Portion of Total Cycle:	59%	
React Cycle Time (Tr):	3.54	hrs
Aerated React Cycle Time (Tra):	3.54	hrs

Minimum Total Volume Required (Vt) = Va / Ta

Vt = 961,220 cf = 7,190,409 gal

Minimum Total Volume Required per Basin =	240,305.1	cf =	1,797,602.2	gal	
Minimum Surface Area Required per Basin =	8,582.3	sf			
Proposed Basin Size =	94.0	ft x	160.0	ft x	28.0 ft SWD
Round Basin Size =	104.5	ft diameter			
Proposed Volume per Basin =	421,120.0	cf			

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Final Phase

Settle

Maximum Overflow Rate @ 2-Hr Peak Flow =	1200	gal/day/sf
		(TCEQ Chap. 217.154, Conventional Activated Sludge with Nitrification, with temperatures between 13°C and 15°C)
Min. Surface Area Required (Proposed Surface Area per basin) =	15,040.0	sf
Maximum Overflow Rate =	12,533.3	gpm
Volume per Cycle =	312,500	gal
Minimum Settle Time (T_s) =	24.93	min
Use Ts =	25.00	min = 0.42 hrs

Decant

Assumed Flow Rate of Decanter =	6,950.0	gpm
Decanters per Basin =	2	
Total Decant Flow Rate per Basin =	13,900.0	gpm
Volume per Decant =	312,500	gal
Decant Time (T_d) =	22.48	min = 0.37 hrs

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Final Phase

SBR DESIGN

Number of Basins =	4					
Number of Cycles per Day =	4					
Volume per Cycle =	312,500	gal				
Side Water Depth (SWD) =	28.0	ft				
Minimum Total Volume Needed =	961,220	cf				
Minimum Volume per Basin =	240,305.1	cf				
Minimum Surface Area Required per Basin =	15,040.0	sf				
Proposed Basin Size =	94.0	ft x	160.0	ft x	28.0	ft SWD
Proposed Surface Area =	138.4	ft diameter				
Volume Proposed Per basin	421,120	cf				
Volume Proposed Total	1,684,480	cf				
Total Cycle Time =	6.00	hrs				
Max. Fill Time (T_f):	1.50	hrs (at design flow)				
Anoxic Fill Time ($T_{f,an}$):	*1.50*	*hrs*				
Aerated Fill Time ($T_{f,aer}$):	*0.00*	*hrs*				
React Time (T_r):	3.54	hrs				
Settle Time (T_s):	0.42	hrs				
Decant Time (T_d):	0.37	hrs				
Idle Time (T_i):	0.17	hrs				

Hydraulic Retention Time

$$\tau = V / Q$$

Hydraulic Retention Time = 2.52 days

F/M

$$F/M = \frac{Q \times BOD_{5,\text{inf}}}{MLSS \times V}$$

F/M = 0.046 gBOD/gMLSS-d

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Final Phase

Wastewater Characteristics

bCOD = 1.6(BOD) =	560	mg/l (Biodegradable COD)
nbCOD = COD - bCOD =	140	mg/l (non-biodegradable COD)

iTSS = TSS - VSS

TSS =	300	mg/l
VSS =	210	mg/l
iTSS =	90	mg/l

$$\frac{bpCOD}{pCOD} = \frac{(bCOD/BOD)(BOD - sBOD)}{COD - sCOD}$$

sBOD: soluble BOD
sCOD: soluble COD
bpCOD: Biodegradable particulate COD
pCOD: Particulate COD

Assume: sCOD =	33%	of COD =	231	mg/l
Assume: sBOD =	33%	of BOD =	116	mg/l

bpCOD/pCOD = 0.80

$$nbVSS = \left[1 - \left(\frac{bpCOD}{pCOD}\right)\right] BOD$$

nbVSS = 70.0 mg/l (non-biodegradable VSS)

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Final Phase

Sludge Retention Time

$$(P_{X,TSS})SRT = \frac{QY(S_o - S)SRT}{[1+(k_d)SRT](0.85)} + Q(nbVSS)SRT + \frac{QY_n(NO_x)SRT}{[1+(k_{dn})SRT](0.85)} + \frac{(f_d)(k_d)Q(Y)(S_o - S)SRT^2}{[1+(k_d)SRT](0.85)} + Q(TSS_o - VSS_o)SRT$$

$$(P_{X,TSS})SRT = (V)(X_{MLSS})$$

XMLSS =	3000	g/m^3		
V =	421,120.0	cf/basin =	11,924.78	m^3 / basin
Q (per Basin) =	1.25	MGD =	4,731.76	m^3 / day

(PX,TSS)SRT = 35,774,338 g

Assume So ≈ So -S

So = bCOD = 560 g/m^3

Assume Nox ≈ 80% of TKN = 40.0 g/m^3

SRT = 29.16 days

MLVSS

$$(P_{X,VSS})SRT = \frac{QY(S_o - S)SRT}{[1+(k_d)SRT]} + Q(nbVSS)SRT + \frac{QY_n(NO_x)SRT}{[1+(k_{dn})SRT]} + \frac{(f_d)(k_d)Q(Y)(S_o - S)SRT^2}{[1+(k_d)SRT]}$$

$$(P_{X,VSS})SRT = V_T(X_{MLVSS})$$

(Px,vss)SRT = 21,300,780 g

MLVSS = 1786 mg/l

Sludge Yield

$$P_{X,TSS} = \frac{(V)(MLSS)}{SRT}$$

PX,TSS = 10,818

$$Q_{Sludge} = \frac{P_{X,TSS}}{8.34 \times PercentSolids}$$

Assume Percent Solids = 1.5 %

Qsludge = 86,472 gal/day

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Final Phase

NITRIFICATION / DENITRIFICATION

Nitrification

$$K_n \ln\frac{N_o}{N_t} + (N_o - N_t) = X_n\left(\frac{\mu_{mn}}{Y_n}\right)\left(\frac{DO}{k_o + DO}\right)t$$

N_t = NH_4-N concentration at time t (mg/L)
X_n = Nitrifying bacteria concentration (mg/L)
DO = Dissolved Oxygen concentration= 2.0 mg/L

$$NO_x = TKN_o - N_e - 0.12P_{x,bio}/Q$$

NOx = Nitrogen oxidized (mg/L)
TKN_o = Influent TKN (mg/L)
N_e = Effluent NH_4-N (mg/L)
$P_{x,bio}$ = Nitrogen in cell tissue

$$P_{x,bio} = \frac{QY(S_o - S)}{1+(k_d)SRT} + \frac{QY_n(NO_x)}{1+(k_{dn})SRT} + \frac{(f_d)(k_d)QY(S_o - S)SRT}{1+(k_d)SRT}$$

Q =	1,250,000	gpd/basin =	4,731.8	m^3/day/basin
So - S =	560	g/m^3 (from SRT calculation)		
Nox =	40.0	g/m^3 (from SRT calculation)		
SRT =	29.16270082	days		
Px,bio =	399,188	g/day =	399.2	kg/day
NOx =	36.9	g/m^3		

NOx added per cycle = Fill Volume x NOx = 43,623 g per fill cycle
NH_4-N remaining before Fill Cycle = Settle Volume x N_e = 32,225.56 g
Total Oxidizable N at beginning of Cycle = 75,848 g

N_o = Total Oxidizable N at beginning of Cycle / Total Basin Volume = 6.36 g/m^3

$$X_n = \frac{Q(Y_n)(NO_x)SRT}{[1+(k_d)SRT]V}$$

X_n = 17.55 g/m^3

Time Needed: 0.06057 days = 1.454 hours
Aeration Time Proposed: 3.54 hours
Adequate Aeration time available for Nitrification

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Final Phase

Denitrification

NO_x Added per Cycle:	43,623	g/fill cycle		
Vt:	11,924.8	m^3		
NO_3-N:	3.66	g/m^3 at end of aeration with tank full		
Vs:	10,741.8	m^3		
NO_3-N:	39,295	g after decant		

$$x_b = \frac{QY(S_o - S)SRT}{(1+(k_d)SRT)Vt}$$ xb= 668.7 g/m^3

Biomass in System.	7,974	kg		
BOD Feed Rate:	1,656	kg/day		
F/Mb:	0.208	g/g*day		
SDNRb:	0.07	g/g*day at 20°C		

From Metcalf & Eddy, Fig. 8-23, Pg 755, for rbCOD/bCOD of 0.10

$SDNR_{14}$:	0.062	g/g*day		

NO_x = (SDNRb)(xb)(Vt) = NO_3-N removal capacity

NOx:	490,949	g/day		
Fill Time:	1.5	hrs		
NOr at	1.5	hrs =	30,684	g
NO3-N Available:	39,295	g		

NO3-N removed during Fill: 78.1%

Alkalinity

Alkanity Required for Nitrification:	263	mg/l		
Alkanity Recovered in Denitrification:	103	mg/l		
Net Alkanity Required:	160	mg/l		
Residual Alkalinity Needed to maintain pH:	80	mg/l		
Total Alkalinity Required in Influent:	240	mg/l		
Alkalinity Available in Influent:	200	mg/l		
Alkalinity Addition Needed:	**40**	**mg/l**		
Added as $CaCO_3$:	**766.5**	**kg/day =**	**1689.81**	**lbs/day**

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Final Phase

SBR OXYGEN REQUIERMENTS

Actual Oxygen Transfer Rate (AOTR)

TCEQ Criteria:	2.20	lbs O_2 / lb BOD removed
BOD_5 Removed =	14,178.000	lbs/day
AOTR =	31,192	lbs O_2 / day

Standard Oxygen Transfer Rate (SOTR)

$$SOTR = AOTR\left[\frac{C_{s,20}}{\alpha F(\beta C_{sd} - C)}\right](1.024^{20-T})$$

T =	30	°C

$$C_{s,20} = 9.07 \times \left(1 + \frac{0.4 \times D}{34}\right)$$

D =	28	ft (depth, SWD)
$C_{s,20}$ =	12.06	mg/l (DO saturation at standard conditions)

$$C_{sd} = Cst \times \left(Fe + \frac{0.4 \times D}{34}\right)$$

Cst =	8.24	mg/l (DO saturation at liquid temp & sea level)
Fe =	0.97	Elevation Factor
Csd =	10.71	mg/l (DO saturation at design conditions)
α =	0.85	coefficient/correction factor
β =	0.95	Salinity-surface tension correction factor
F =	1.00	Fouling factor
C =	2.0	mg/l (operating Oxygen concentration)
SOTR =	42,714	lbs O_2 / day

Design SOTR

Aeration time/cycle =	3.54	hrs/cycle
Cycles/day/basin =	4	
Total Aeration time =	14	hrs/day/basin
No. of Basins =	4	
Design SOTR for Aeration =	754	lbs O2/hr/basin

Minimum Design Air Flow

Density of Air at Temp. of	30	°C =	0.07270626 lbs/cf
Amount of Oxygen =	0.01685	lbs/cf	
Minimum Design Air Flow =	2,131	SCFM (per basin being aerated)	

Green Valley Special Utility District - Santa Clara Creek No. 1
Wastewater Treatment Design Calculations
Final Phase

AEROBIC DIGESTER

Average Sludge Yield from SBR:	86,472	gal/day		
TCEQ Minimum Sludge Retention Time:	15	days		
SRT from SBR Treatment Basins:	29.1627	days		
Minimum SRT needed in Aerobic Digester:	0	days		
Minimum Proposed Aerobic Digester Volume:	750,000	gallons =	100,261	cubic feet
Minimum Digester Sludge Retention Time:	8.7	days		
Total Sludge Retention Time:	37.8	days		

Oxygen Requirements

Criteria:	30.0	scfm per 1000 cf of volume
Minimum Design Air Flow =	3008	scfm

SBR EFFLUENT EQUALIZATION

Minimum Working Volume Equal to:	2.5	Cycles
Volume per Cycle:	312,500	gallons
Minimum Working Volume:	**781,250**	**gallons**

UV DISINFECTION

Average Flow:	5.0	MGD =	3473	gpm
Peak Flow:	15.0	MGD =	10417	gpm
No. of Lamps per Module:	40			
Lamp Length:	62	in		
Recommended Flow per Lamp:	18.0	gpm		
Minimum No.of Lamps Needed:	579	lamps		
No. of Modules Needed:	**14.5**	**modules, use:**	**16**	**modules**

UNITED STATES DEPARTMENT OF AGRICULTURE

RURAL DEVELOPMENT

3251 North Highway 123 Bypass
Seguin, TX 78155-6115

Voice: (830) 372-1043
Fax: (830) 372-0020
TDD: (254) 742-9712

Mr. Richard R. DeMunbrun, President
Green Valley Special Utility District
P.O. Box 99
Marion, TX 78124-0099

DEC 18 2002

Dear Mr. DeMunbrun:

This letter establishes conditions which must be understood and agreed to before further consideration may be given to this application. These conditions must be met before loan closing or start of construction. State and Local Office staff of USDA Rural Development will administer the loan and/or grant on behalf of the Rural Utilities Service (RUS). Any changes in project cost, source of funds, scope of services, or any other significant change in the project or applicant must be reported to and approved by USDA Rural Development by written amendment to this letter. If significant changes are made without obtaining such approval, USDA Rural Development may discontinue processing the application.

This letter does not constitute loan and/or grant approval, nor does it ensure that funds are or will be available for the project. The docket may be completed on the basis of a loan not to exceed $584,000.

The interest rate will be the lower of the rate in effect at the time of loan approval or the time of loan closing. A written request should submitted to USDA Rural Development staff at least 15 calendar days before loan closing, if the Special Utility District does not want the interest rate changed to the rate at loan closing. The loan and/or grant will be considered approved on the date a signed copy of Form RD 1940-1, "Request for Obligation of Funds," is mailed to the Special Utility District.

The loan will be scheduled for repayment over a period of 40 years. A cash reserve fund will be required in an amount equal to one annual installment. This amount will be reached by making monthly deposits, which will accumulate at the rate of one-tenth of the total annual installment each year. The reserve fund is to assure that payments will be made on time and for emergency situations that may arise. This fund will be established in a separate interest bearing account(s) at a federally insured financial institution.

Following are the conditions that must be understood, agreed to, and met:

1. USE OF FACILITY

A local ordinance must be adopted which requires mandatory use of the facilities. The applicant must agree in writing to enforce such ordinance. No free service or use of the facility will be permitted.

2. REPAYMENT SCHEDULE

A. Green Valley Special Utility District will provide its own funds to pay interest during construction.

Principal payments will be deferred one year after loan closing. Payments on this loan will be paid directly to USDA Rural Development. The use of a paying agent is not required.

B. Form SF-5510, "Authorization Agreement for PreAuthorized Payments," must be executed for this loan, as well as all existing loans. A copy of this (these) agreement(s) should be forwarded to the State Office.

3. CONTRIBUTION AND USER VERIFICATION

A. Any required contribution shall be considered as the first funds expended.

B. This Letter of Conditions is based upon 6,217 water users that will use the facilities when service becomes initially available. The number of users will be verified by a USDA Rural Development official using RUS Bulletin-TX 1780-40, "Certification of Users by Rural Development Manager."

4. MULTIPLE ADVANCES

A. In accordance with RUS Instruction 1780, Section 1780.45 (b) (1), multiple advances may be used.

B. RUS Bulletin 1780-10 will be used to inform private lenders of RUS's commitment.

C. The loan docket is to contain a copy of your interim financing arrangements. If you are unable to obtain interim financing, you should furnish a statement to this effect. If you have any questions, I will discuss this with you.

D. The Debt Collection Improvement Act (DCIA) of 1996 requires that, effective January 1999, all Federal payments must be made by Electronic Funds Transfer/Automated Clearing House (EFT/ACH). A benefit of receiving payments by EFT/ACH is that funds are directly deposited to the Green Valley Special Utility District's account at a financial institution and are available on the date of payment.

E. The Green Valley Special Utility District will complete Form SF-3881, "Electronic Funds Transfer Payment Enrollment Form," for each account where funds will be electronically received. The completed form(s) must be received by USDA Rural Development at least thirty (30) days prior to loan closing

F. Cash advances should coincide with cash needs.

5. SECURITY REQUIREMENTS

A. Revenue Bonds in the amount of $584,000 will be delivered to USDA Rural Development, made payable to the United States of America.

B. The principal repayment schedule should be in the amount best adapted to making principal retirement and interest payments which closely approximate equal installments of combined interest and principal.

C. The Bond Ordinance must contain the following:

1. A clause to the effect that, in the event any Bond is mutilated, destroyed, lost or stolen, any security or indemnity as may be required by the Issuer and Registrar from the registered owner applying for the replacement Bond shall not be required from the United States of America as long as it is holder of the Bonds.

2. The attached "Loan Program Requirements and Documents to Control" revised 6/10/02 as prepared by the Office of General Counsel, must be included without change.

3. Refer to the attached unnumbered letter "Minimum Requirements for Bond Counsel Opinions Rural Utilities Service & Community Facilities Programs" dated October 17, 2002.

D. Written consent to incur additional debt must be obtained from the Green Valley Special Utility District's present creditor prior to USDA Rural Development obligating funds for this project.

E. Attached is Form RD 1910-11, "Applicant Certification - Federal Collection Policies For Consumer or Commercial Debts." This form must be executed prior to loan closing.

6. ORGANIZATION

A. A complete list of elected officials, type of organization (whether city, township, water control and improvement district, authority, or special purpose), and the authority under which the Green Valley Special Utility District is organized, should be furnished to USDA Rural Development

B. RUS Bulletin 1780-27, "Loan Resolution (Public Bodies)" must be adopted.

7. BUSINESS OPERATIONS

A. The Green Valley Special Utility District's authorized official must approve the Operating Budget prior to funding approval.

B. The facilities will be operated by the governing body in accordance with State laws, Bond Ordinance or Resolution, and the Bonds serving as security for the loan. During the first full year of operation, the Green Valley Special Utility District will furnish to USDA Rural Development quarterly or monthly if the need arises, a summary of its operations. Form RD 442-2, "Statement of Budget, Income and Equity," will be provided for this purpose. Audits are to be performed in accordance with generally accepted government auditing standards (GAGAS). In addition, the audits are to be performed in accordance with various Office of Management and Budget (OMB) circulars. Annual reports and audits are to be furnished as set forth in RUS Instruction 1780, Section 1780-47.

A supplemental report is required annually containing:

a. Total gallons of water purchased and/or produced
b. Total gallons of water sold
c. Total number of customers
d. Percentage of water loss
e. List of current governing body names, addresses, and telephone numbers

C. All water shall be metered by meters furnished and installed by the Green Valley Special Utility District for the sole use of the member or customer.

D. The loan is subject to the provisions of the Federal Civil Rights and Equal Opportunity laws. The Green Valley Special Utility District must agree to comply with these requirements by executing Forms RD 400-4, "Assurance Agreement," and RD 400-1, "Equal Opportunity Agreement."

E. As part of the docket, the Green Valley Special Utility District will present for USDA Rural Development review and approval a management plan, a facility maintenance plan, and a proposal for the maintenance of accounts and records and obtaining audit reports. Such plans should include written agreements for management, maintenance, accounting and auditor services.

F. The Green Valley Special Utility District must adopt utility rates that will generate sufficient revenue to pay debt service, reserve, operation and maintenance, and any necessary depreciation reserve. The rates must be approved by USDA Rural Development before loan closing or beginning of construction.

G. The loan is subject to the provisions of Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. Section 794). It provides, in part, as follows:

> "No handicapped individual in the United States shall, solely by reason of their handicap, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."

H. Form AD-1047, "Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primary Cover Transactions," must be executed to certify that the Green Valley Special Utility District is not debarred or suspended from Government assistance.

I. For any contract in excess of $25,000, Form AD-1048, "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions," must be executed by any person or entity the Green Valley Special Utility District does business with as a result of this Government assistance certifying that they are not debarred or suspended from Government assistance.

8. GRADUATION - REFINANCING RUS DEBT

If, at any time in the future, the Green Valley Special Utility District is able to refinance the amount of the indebtedness owed the Government by obtaining a loan for such purpose from a responsible cooperative or private credit source at reasonable rates and terms for similar purposes and periods of time, the Green Valley Special Utility District will be required to apply for and accept such a loan in sufficient amount to refinance its RUS indebtedness.

9. INSURANCE AND BONDING

A. The buildings and removable parts of the facility will be covered by insurance covering the usual hazards in the area in an amount approved by USDA Rural Development prior to the final inspection. Public Liability and Property Damage

Insurance will be required according to recommendations of the consulting engineer and attorney. Workmen's Compensation Insurance will be carried as required by State law. Copies of all insurance policies will be obtained prior to loan closing and made part of the loan docket.

B. Fidelity or employee dishonesty bonding coverage will be provided to USDA Rural Development for all persons who have access to funds. Coverage may be provided either for all individual positions or persons, or through "blanket" coverage providing protection for all appropriate employees and/or officials. The amount of the coverage required will be no less than the total annual debt service requirement for all RUS loans. Form RD 440-24, "Position Fidelity Schedule Bond," may be used. A copy of the policy will be furnished to USDA Rural Development at loan closing or prior to beginning construction, whichever occurs first.

10. CONSTRUCTION - ENVIRONMENTAL MITIGATION MEASURES

A. All construction will be on contract documents as outlined in RUS Instruction 1780, Subpart C. The consulting engineer, attorney, and USDA Rural Development will assist with this requirement.

B. The consulting engineer will prepare construction contract documents and specifications using RUS Instruction 1780, Subpart C, and State supplements.

C. After the final plans and specifications have been approved in writing by the Texas Commission on Environmental Quality (TCEQ), formerly known as TNRCC, and the USDA Rural Development engineer, and closing instructions have been issued by the Office of General Counsel, construction bids may be received. USDA Rural Development must be represented at all bid openings and negotiations.

D. Bids should not be received on any contract unless the contract can be awarded within sixty days.

E. When bids have been received and it is determined that construction can be completed within the funds available, the successful bidder(s) must be advised that loan funds cannot be made available until all requirements of the closing instructions have been met. The contract will be awarded to the lowest responsive and responsible bidder unless approved by the USDA Rural Development State Office.

F. Executed contracts and bonds are to be approved in writing by USDA Rural Development before any construction is started.

G. In accordance with RUS Instruction 1780, Section 1780.76 (h), any changes in construction, addition and/or deletion will be made only on written change order, Form RD 1924-7, "Contract Change Order." Approval by the authorized Green Valley Special Utility District official(s), contractor, USDA Rural Development

engineer, or USDA Rural Development official is required before any work is done. If any facility design or proposed construction activities deviate from those contained in the approved environmental documents, the Green Valley Special Utility District may be required to undertake additional environmental review activities.

H. An authorized representative of the Green Valley Special Utility District will monitor and provide a report to USDA Rural Development on actual performance during construction. Full time inspection is required for all construction. A resume of qualifications of the resident inspector must be submitted for USDA Rural Development's acceptance. Daily inspection reports will be prepared in accordance with RUS Instruction 1780, Section 1780.76 (d). All estimates for payments to contractors may be made on Form RD 1924-18, "Partial Payment Estimate," prepared and certified by the consulting engineer, certified by the contractor, and approved by the appropriate Green Valley Special Utility District official(s) and USDA Rural Development.

I. The contracts must contain a clause which states "if cultural materials are encountered during construction, work will cease in the immediate area and the Texas State Historic Preservation Officer (SHPO) and USDA Rural Development State Environmental Coordinator (SEC) will be contacted. Work will not resume in the affected area until authorized by the SHPO and SEC."

J. The Green Valley Special Utility District must enact a binding resolution or covenant to prohibit service to structures proposed to be built in floodplains.

Such covenant or resolution must be in place prior to USDA Rural Development's approval of final plans and specifications. Along with a copy of the resolution or covenant, satisfactory evidence must be submitted to RUS that the covenant or resolution is fully enforceable and has been adopted in a manner consistent with all applicable State and local requirements.

K. The Green Valley Special Utility District and the consulting engineer shall insure that all requirements of the U.S. Army Corps of Engineers (USACE) "Nationwide Permit 12" are complied with during the construction of the proposed waterline and appurtenances. This shall include the TCEQ Nationwide Permit Water Quality Certification Conditions. The construction plans, specifications and contract documents shall include all applicable provisions of "Nationwide Permit 12"and TNRCC permit conditions. Upon completion of the proposed improvements, the Green Valley Special Utility District must sign and submit the required certification to USDA Rural Development and USACE that the work, including any required mitigation, was completed in compliance with the "Nationwide Permit 12."

L. To mitigate potential development in wetlands, the Green Valley Special Utility District must enact a binding resolution or covenant in order to prohibit service to areas where wetlands exist without verification that the proper USACE, Section 404

permits have been obtained. Such covenant or resolution must be in place prior to USDA Rural Development's approval of final plans and specifications. Along with a copy of the resolution or covenant, the Green Valley Special Utility District must provide evidence satisfactory to USDA Rural Development that the covenant or resolution is fully enforceable and has been adopted in a manner consistent with all applicable State and local requirements.

11. RESTRICTION ON LOBBYING

A. Federal law requires that each recipient who requests or receives a Federal contract, grant, loan, or a Federal commitment to guarantee a loan disclose the expenditure of any funds for lobbying activities. RD Instruction 1940-Q, Exhibit A-1, "Certification for Contracts, Grants, and Loans" must be executed prior to loan and/or grant approval if the loan request exceeds $150,000 and/or the grant request exceeds $100,000.

B. Any person who requests or receives a contract, subcontract, or subgrant (consulting engineers, construction contractors, etc.) in excess of $100,000 must complete RD Instruction 1940-Q, Exhibit A-1 "Certification for Contracts, Grants, and Loans".

C. Standard Form (SF) LLL, "Disclosure of Lobbying Activities," will be completed by any recipient requesting or receiving a USDA Rural Development contract where the grant exceeds $100,000, or loan exceeds $150,000, and has made or has agreed to make any payment using funds other than appropriated funds to influence or attempt to influence a decision in connection with this specific award.

12. PUBLIC INFORMATION REQUIREMENTS

The general public must be informed regarding the development of this project. A public meeting must be held prior to loan approval to give the citizenry an opportunity to become acquainted with the project and to comment on such items as economic and environmental impact, service area, and alternatives to the project. At least ten (10) days prior to the meeting, the Green Valley Special Utility District will be required to publish a notice of the meeting in a newspaper of general circulation in the service area, to post a public notice at the applicant's principal office, and to notify USDA Rural Development. A copy of the published notice and minutes of the public meeting must be provided to USDA Rural Development.

Closing instructions issued by the Office of General Counsel must be complied with.

Attached please find three additional copies of this letter and attachments. One copy should be furnished to the consulting engineer, to the attorney, and to the bond counsel. I want to meet with the governing board, the consulting engineer, attorney, and bond counsel so that we may discuss the contents of this letter.

Please complete and return the attached Form RD 1942-46, "Letter of Intent To Meet Conditions," if the Green Valley Special Utility District desires that further consideration be given to this funding request.

If the conditions set forth in this letter are not met within 90 days from the date hereof, USDA Rural Development reserves the right to discontinue the processing of this application.

Sincerely,

FOR: RICHARD G. GRAMS
Rural Development Manager
USDA Rural Development, Seguin, Texas

Attachments

REQUIRED PROVISION --- REV. 6-10-02

SECTION ____.

LOAN PROGRAM REQUIREMENTS AND DOCUMENTS TO CONTROL

Section _____. Definitions.

For the purposes of this Section, the following acronyms and terms shall be defined as follows:

(a) *RUS*: The Rural Utilities Service, an agency of the United States of America within the United States Department of Agriculture, and any successor agency thereof.

(b) *FmHA*: The Farmers Home Administration, a former agency of the United States of America within the United States Department of Agriculture and its successor agency, the RUS.

(c) *Loan*: The loan in the amount of $_____ from the [Purchaser] to the [Town][City][County][Borrower], which has been authorized under 7 U.S.C. § 1926, and which is represented by the [Purchaser's] purchase of the [Certificates][bonds].

(d) *Agency rules*: The statutes, rules, regulations and policies of the former FmHA or of the RUS, in effect on the date hereof, which pertain to or which are applicable to the loan and such future statutes, rules, regulations and policies which are not inconsistent with the express provisions hereof.

(e) *Loan document provisions*: The terms, conditions, requirements and provisions of the loan instruments and loan documents, including but not limited to, loan resolutions, security agreements, assurance agreements, certifications, and equal opportunity agreements, which were signed by the _____[borrower] for the benefit of the United States of America and/or of the RUS, and for the purpose of obtaining the loan.

Section _____. Provision for Debt [use for a city or county borrower and where the debt is secured in whole or in part by taxes]

To the extent that the loan document provisions and/or the agency rules create a "debt" of the _____[borrower] (within the meaning of § 7 of Article 11 of the Texas Constitution), the governing body of _____ [borrower] shall compute and ascertain the rate and amount of ad valorem tax, based upon the latest approved tax rolls of said [town][city][county], with full allowances being made for tax delinquencies and costs of collection, which will be sufficient to raise and produce the money required to pay any sums which may be or become due during any such year on account of said "debt", in no instance to be less than two (2%) per cent of such obligation, together with all interest thereon. Said rate and amount of ad valorem tax is hereby ordered to be levied and is hereby levied against all taxable property in said [town][city][county] for each year which any liability exists by reason of the "debt" incurred, and said ad valorem tax shall be assessed and collected each such year until all of the "debt" incurred shall have been

discharged.

[*Alternative debt provision* - Bond counsel may propose their own standard "debt" provision to be reviewed and approved by the agency. This provision, once approved by RUS, will then be used in all future ordinances or orders drafted by that bond counsel.]

Section _____. Compliance with Agency Rules

(a) To the extent permitted by State law and if such law is not otherwise preempted by federal statute, regulation or rule, the _____[borrower] shall comply with all agency rules and loan document provisions.

(b) Notwithstanding any other term, condition, requirement or provision contained in this [Ordinance] [Order], the agency rules and loan document provisions shall, to the extent permitted by State law and if such law is not otherwise preempted by federal statute, regulation or rule, control to the extent of any conflict between the [Ordinance] [Order] and such agency rules or such loan document provisions.

Section _____. Interest Accrual.

Notwithstanding any other term, condition, requirement or provision contained in this [Ordinance] [Order], interest on a [Certificate] [bond] shall continue to accrue and be payable to the United States of America so long as the [Certificate] [bond] remains unpaid and outstanding. Interest will not cease to accrue for any reason (including the establishment of a redemption date or prepayment date) until the date when payment in full has been received at the agency office designated to receive payments. For the purpose of determining "the date when payment in full has been received at the agency office designated to receive payments," such date shall be:

1. when payment is made by hand delivery, the date when such payment has been physically delivered into the possession of such agency at the address given to the Issuer;

2. when payment is made by first class mail, the third day following Issuer's mailing of the payment, postage prepaid, using the U.S. Postal Service and Issuer's receipt of written proof of the mailing from the U.S. Postal Service identifying the date of mailing;

3. when payment is made by overnight delivery, the first day following Issuer's sending of the payment, using the U.S. Postal Service or another delivery service, such as Federal Express, and Issuer's receipt of written proof of sending from the delivery service identifying the date of sending;

4. when payment is made by electronic transfer of funds, the date that the electronic transfer of funds for the payment is completed; or

5. when payment is made by preauthorized electronic debit or draft, the date that the electronic debit or draft for the payment is paid.

Section _____. Redemption or Prepayment.

Notwithstanding any other term, condition, requirement or provision contained in this [Ordinance] [Order], redemption or prepayment of a [Certificate] [bond] may occur without presentation or presentment of the [Certificate] [bond].

Section _____. Limitation on Application of this Section.

(a) The provisions of this section shall be operative only for so long as any of the [Certificates] [bonds] issued under this [Ordinance] [Order] are owned or held by: (1) the United States of America; or (2) any agency thereof.

(b) The provisions of this section shall not be used to or shall not be construed so as to allow the [Ordinance] [Order] to violate any applicable provision of Texas law to the extent that such law is not otherwise preempted by applicable federal statute, regulation or rule.

SECTION ____.

CHAPTER 9, BUSINESS AND COMMERCE CODE REQUIREMENTS

Chapter 1208, Government Code, applies to the issuance of the [bonds/notes/certificates of obligation] and the pledge of the [taxes/revenues/combination thereof] granted by the Issuer under Section ____ of this [resolution/ordinance/order], and such pledge is therefore valid, effective, and perfected. If Texas law is amended at any time while the [bonds/notes/certificates of obligation] are outstanding and unpaid such that the pledge of the [taxes/revenues/combination thereof] granted by the Issuer under Section ____ of this [resolution/ordinance/order] is to be subject to the filing requirements of Chapter 9, Business & Commerce Code, then in order to preserve to the registered owners of the [bonds/notes/certificates of obligation] the perfection of the security interest in said pledge, the Issuer agrees to take such measures as it determines are reasonable and necessary under Texas law to comply with the applicable provisions of Chapter 9, Business & Commerce Code and enable a filing to perfect the security interest in said pledge to occur.

List of Approved "Debt" Provisions

1. Mark Mendel, Kemp, Smith, Duncan & Hammond, P.C., El Paso, Texas --

> To provide for the payment of any other legally incurred obligations of the [Town][City][County] with respect to the United States under the Agency rules or Loan Document Provisions, there is hereby levied for the current year and each succeeding year thereafter while the [Certificates] [Bonds] or interest thereon or any such other legally incurred obligations remain outstanding and unpaid, a tax on the taxable property in the [Town][City][County] that is sufficient to pay such other legally incurred obligations, within the limits prescribed by law, full allowance being made for delinquencies and costs of collection. The tax, if any, levied by this Section [9.3(c)] shall be assessed and collected each year and retained by the [Town][City][County] for application to the payment of such other legally incurred obligations, and such tax shall not be diverted to any other purpose.

[NOTE: The words appearing within brackets may vary or change from one ordinance or order to another depending upon the type of borrower and the terms used in the ordinance or order.]

NOTICE OF CONFIDENTIALITY RIGHTS: IF YOU ARE A NATURAL PERSON, YOU MAY REMOVE OR STRIKE ANY OR ALL OF THE FOLLOWING INFORMATION FROM ANY INSTRUMENT THAT TRANSFERS AN INTEREST IN REAL PROPERTY BEFORE IT IS FILED FOR RECORD IN THE PUBLIC RECORDS: YOUR SOCIAL SECURITY NUMBER OR YOUR DRIVER'S LICENSE NUMBER. 028726 STC-DR

JOANN F. MURPHEY, ET AL -TO- GREEN VALLEY SPECIAL UTILITY DISTRICT

CORRECTION
WARRANTY DEED

DATE: December 19, 2014

GRANTOR: JOANN F. MURPHEY, joined pro forma by her husband, JERRY MURPHEY; and JAMES W. TURK A/K/A JAMES TURK, Independent Executor of the Estate of Claudette B. Turk (a/k/a Claudette Blumberg Turk and Claudette June Turk), Deceased, and joining pro forma as her husband

GRANTOR'S MAILING ADDRESS: 606 Springvale, San Antonio, Texas 78227 (Bexar County)

GRANTEE: GREEN VALLEY SPECIAL UTILITY DISTRICT

GRANTEE'S MAILING ADDRESS: P. O. Box 99, Marion, Texas 78124-0099 (Guadalupe County)

CONSIDERATION: Cash and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged

PROPERTY (including any improvements): All that certain tract or parcel of land containing 19.311 acres of land out of the Guadalupe Torres Survey, Abstract No. 313, Guadalupe County, Texas, and being more fully described by metes and bounds in Exhibit "A" attached.

The Property is conveyed in its present condition, with any defects, and without warranties except warranties of title and warranties in the contract between the parties, if any.

RESERVATIONS FROM CONVEYANCE: For Grantor and Grantor's heirs, successors, and assigns forever, a reservation of an undivided 50% of all oil, gas and other minerals owned by Grantor in and under and that may be produced from the Property.

Grantor waives the right of ingress and egress to and from the surface of the Property relating to the portion of the mineral estate owned by Grantor.

Nothing herein, however, restricts or prohibits the pooling or unitization of the portion of the mineral estate owned by Grantor with land other than the Property; or the exploration or production of the oil, gas, and other minerals by means of wells that are drilled or mines that open on land other than the Property but enter or bottom under the Property, provided that these operations in no manner interfere with the surface or subsurface support of any improvements constructed or to be constructed on the Property.

EXCEPTIONS TO CONVEYANCE AND WARRANTY: Validly existing easements, and rights-of-way, of record or not; all presently recorded and validly existing restrictions, reservations, covenants, conditions, oil and gas leases, mineral interests, that affect the Property; validly existing rights of adjoining owners in any walls and fences situated on a common boundary; any discrepancies, conflicts, or shortages in area or boundary lines; any encroachments or overlapping of improvements; and taxes for 2014, the payment of which Grantee assumes.

Grantor, for the Consideration and subject to the Reservations from Conveyance and the Exceptions to Conveyance and Warranty, grants, sells, and conveys to Grantee the Property, together with all and singular the rights and appurtenances thereto in any way belonging, to have and to hold it to Grantee and Grantee's heirs, successors, and assigns forever. Grantor binds Grantor and Grantor's heirs and successors to warrant and forever defend all and singular the Property to Grantee and Grantee's heirs, successors, and assigns against every person whomsoever lawfully claiming or to claim the same or any part thereof, except as to the Reservations from Conveyance and the Exceptions to Conveyance and Warranty.

When the context requires, singular nouns and pronouns include the plural.

This Correction Warranty Deed is made in place of and to correct a Warranty Deed from Joann F. Murphey, joined pro forma by her husband, Jerry Murphey, and Claudette June Turk, joined pro forma by her husband, James Turk, to Green Valley Special Utility District, dated December 19, 2014, and recorded in Document Number 2014023215 of the Official Public Records of Guadalupe County, Texas. By mistake that Warranty Deed inadvertently conveyed the property as 65.00 acres of land in Guadalupe Torres Survey, A-313, Guadalupe County, Texas, when in truth and fact the property being conveyed is a 19.311 acre tract and a 45.689 acre tract, Guadalupe Torres Survey, A-313, Guadalupe County, Texas, and each tract was to be conveyed by a separate deed to the Grantee. This Correction Warranty Deed, conveying the 19.311 acre tract, is made by Grantors and accepted by Grantee to correct that mistake, is effective on December 19, 2014, the date of the original Warranty Deed, and in all other respects confirms the former Warranty Deed. Another correction deed is being executed concurrently to convey the 45.689 acre tract from Grantor to Grantee.

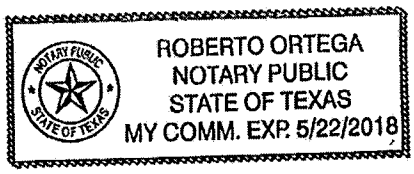
JOANN F. MURPHEY

JERRY MURPHEY

THE STATE OF TEXAS

COUNTY OF Bexar

This instrument was acknowledged before me on the 10 day of November, 2015, by JOANN F. MURPHEY.

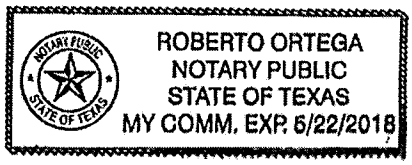


Notary Public, State of Texas
Notary Name: Roberto Ortega

THE STATE OF TEXAS

COUNTY OF Bexar

This instrument was acknowledged before me on the 10 day of November, 2015, by JERRY MURPHEY.



Notary Public, State of Texas
Notary Name: Roberto Ortega

James W. Turk
A/K/A James Turk
JAMES W. TURK A/K/A JAMES TURK, Independent Executor of the Estate of Claudette B. Turk (a/k/a Claudette Blumberg Turk and Claudette June Turk), Deceased, and

James W. Turk
A/K/A James Turk
JAMES W. TURK A/K/A JAMES TURK

THE STATE OF TEXAS

COUNTY OF DALLAS

This instrument was acknowledged before me on the 10 day of NOVEMBER, 2015, by JAMES W. TURK A/K/A JAMES TURK, individually and as Independent Executor of the Estate of Claudette B. Turk (a/k/a Claudette Blumberg Turk and Claudette June Turk), Deceased.

L. Henry Atterman
Notary Public, State of Texas
Notary Name: L. Henry Atterman

L. HENRY ALTERMAN
Notary Public, State of Texas
My Commission Expires
October 21, 2019

ACCEPTANCE BY GRANTEE:

GREEN VALLEY SPECIAL UTILITY DISTRICT

By: _____
PAT ALLEN,
General Manager

THE STATE OF TEXAS

TRACY S. RAPPMUND
Notary Public, State of Texas
My Commission Expires
March 17, 2016

COUNTY OF GUADALUPE

This instrument was acknowledged before me on the 17th day of November 2015, by PAT ALLEN, General Manager of GREEN VALLEY SPECIAL UTILITY DISTRICT, on behalf of GREEN VALLEY SPECIAL UTILITY DISTRICT.

_____
Notary Public, State of Texas
Notary Name: Tracy S. Rappmund

River City Engineering
1011 W. County Line Road * NEW BRAUNFELS, TX. 78130
PHONE (830) 625-0337 FAX (830) 625-0858
dlamberts@rcetx.com
Firm Registration #10193949

All that certain tract or parcel of land containing 19.311 acres of land out of the Guadalupe Torres Survey, Abstract No. 313, Guadalupe County, Texas, being the same land as that certain called 20 acre parcel described in Volume 2821, Page 423 of the Official Records of Guadalupe County, Texas, further being a portion of that certain 65.000 acre parcel of land described in Document No. 2014023215 of said Official Records; Said 19.311 acre parcel being more particularly described by metes and bounds as follows:

BEGINNING at a ½ inch rebar found on the southwesterly right-of-way line of Linne Road for the most easterly corner and POINT OF BEGINNING of this parcel, same being the most easterly corner of said 65.000 acre parcel and the most northerly corner of that certain called 59.95 acre parcel described in Volume 3003, Page 362 of said Official Records;

THENCE departing said right-of-way line and with the common line of this parcel with a portion of said 59.95 acre parcel, South 59 deg 40' 23" West, a distance of 1503.91 feet (called South 61 deg 41' 13" West, 1503.91 feet) to a created point for the most southerly corner of this parcel, same being the most easterly corner of that certain called 20 acre parcel described in Volume 3051, Page 561 of said Official Records;

THENCE with the common line of this parcel with said 20 acre parcel described in Volume 3051, Page 561, North 30 deg 07' 53" West, a distance of 575.96 feet to a ½ inch rebar found for the most westerly corner of this parcel, same being the most northerly corner of said 20 acre parcel and being located on the southeasterly line of that certain called 116 acre tract of land described in Volume 2821, Page 426 of said Official Records;

THENCE with the common line of said 20 acre parcel with said 116 acre tract, North 59 deg 32' 28" East, a distance of 1377.68 feet to a created point on the aforementioned right-of-way of Linne Road for the most northerly corner of this parcel, same being the most easterly corner of said 116 acre tract;

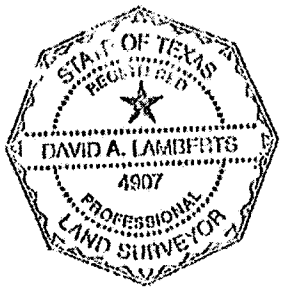
THENCE with said right-of-way line, the following three (3) courses:

1). South 48 deg 51' 21" East, a distance of 206.14 feet (called South 49 deg 00' East) to a concrete monument found;

2). South 40 deg 59' 25" East, a distance of 320.00 feet (called South 41 deg 56' East, 320.0 feet) to a ½ inch rebar set (capped "RPLS 4907");

EXHIBIT "A"

3). South 29 deg 57' 11" East, a distance of 69.21 feet (called South 30 deg 00' East, 70.4 feet) to the POINT OF BEGINNING and containing 19.311 acres of land with all bearings called for herein based of the Texas Coordinate System as established from the North American Datum 0f 1983 (CORS96) for the South Central Zone.



David A. Lamberts R.P.L.S. No. 4907
J.O. No. 6096-104-2 (DRAWING PREPARED)

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TERESA KIEL, COUNTY CLERK
GUADALUPE COUNTY, TEXAS

Teresa Kiel

→ STC

EXHIBIT "A"

NOTICE OF CONFIDENTIALITY RIGHTS: IF YOU ARE A NATURAL PERSON, YOU MAY REMOVE OR STRIKE ANY OR ALL OF THE FOLLOWING INFORMATION FROM ANY INSTRUMENT THAT TRANSFERS AN INTEREST IN REAL PROPERTY BEFORE IT IS FILED FOR RECORD IN THE PUBLIC RECORDS: YOUR SOCIAL SECURITY NUMBER OR YOUR DRIVER'S LICENSE NUMBER. 028726 STC-DR

JOANN F. MURPHEY, ET AL -TO- GREEN VALLEY SPECIAL UTILITY DISTRICT

CORRECTION
WARRANTY DEED

DATE: December 19, 2014

GRANTOR: JOANN F. MURPHEY, joined pro forma by her husband, JERRY MURPHEY; and JAMES W. TURK A/K/A JAMES TURK, Independent Executor of the Estate of Claudette B. Turk (a/k/a Claudette Blumberg Turk and Claudette June Turk), Deceased, and joining pro forma as her husband

GRANTOR'S MAILING ADDRESS: 606 Springvale, San Antonio, Texas 78227 (Bexar County)

GRANTEE: GREEN VALLEY SPECIAL UTILITY DISTRICT

GRANTEE'S MAILING ADDRESS: P. O. Box 99, Marion, Texas 78124-0099 (Guadalupe County)

CONSIDERATION: Cash and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged

PROPERTY (including any improvements): All that certain tract or parcel of land containing 45.689 acres of land out of the Guadalupe Torres Survey, Abstract No. 313, Guadalupe County, Texas, and being more fully described by metes and bounds in Exhibit "A" attached.

The Property is conveyed in its present condition, with any defects, and without warranties except warranties of title and warranties in the contract between the parties, if any.

RESERVATIONS FROM CONVEYANCE: For Grantor and Grantor's heirs, successors, and assigns forever, a reservation of an undivided 50% of all oil, gas and other minerals owned by Grantor in and under and that may be produced from the Property.

Grantor waives the right of ingress and egress to and from the surface of the Property relating to the portion of the mineral estate owned by Grantor.

Nothing herein, however, restricts or prohibits the pooling or unitization of the portion of the mineral estate owned by Grantor with land other than the Property; or the exploration or production of the oil, gas, and other minerals by means of wells that are drilled or mines that open on land other than the Property but enter or bottom under the Property, provided that these operations in no manner interfere with the surface or subsurface support of any improvements constructed or to be constructed on the Property.

EXCEPTIONS TO CONVEYANCE AND WARRANTY: Validly existing easements, and rights-of-way, of record or not; all presently recorded and validly existing restrictions, reservations, covenants, conditions, oil and gas leases, mineral interests, that affect the Property; validly existing rights of adjoining owners in any walls and fences situated on a common boundary; any discrepancies, conflicts, or shortages in area or boundary lines; any encroachments or overlapping of improvements; and taxes for 2014, the payment of which Grantee assumes.

Grantor, for the Consideration and subject to the Reservations from Conveyance and the Exceptions to Conveyance and Warranty, grants, sells, and conveys to Grantee the Property, together with all and singular the rights and appurtenances thereto in any way belonging, to have and to hold it to Grantee and Grantee's heirs, successors, and assigns forever. Grantor binds Grantor and Grantor's heirs and successors to warrant and forever defend all and singular the Property to Grantee and Grantee's heirs, successors, and assigns against every person whomsoever lawfully claiming or to claim the same or any part thereof, except as to the Reservations from Conveyance and the Exceptions to Conveyance and Warranty.

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This Correction Warranty Deed is made in place of and to correct a Warranty Deed from Joann F. Murphey, joined pro forma by her husband, Jerry Murphey, and Claudette June Turk, joined pro forma by her husband, James Turk, to Green Valley Special Utility District, dated December 19, 2014, and recorded in Document Number 2014023215 of the Official Public Records of Guadalupe County, Texas. By mistake that Warranty Deed inadvertently conveyed the property as 65.00 acres of land in Guadalupe Torres Survey, A-313, Guadalupe County, Texas, when in truth and fact the property being conveyed is a 19.311 acre tract and a 45.689 acre tract, Guadalupe Torres Survey, A-313, Guadalupe County, Texas, and each tract was to be conveyed by a separate deed to the Grantee. This Correction Warranty Deed, conveying the 45.689 acre tract, is made by Grantors and accepted by Grantee to correct that mistake, is effective on December 19, 2014, the date of the original Warranty Deed, and in all other respects confirms the former Warranty Deed. Another correction deed is being executed concurrently to convey the 19.311 acre tract from Grantor to Grantee.

JOANN F. MURPHEY

JERRY MURPHEY

THE STATE OF TEXAS

COUNTY OF Bexar

This instrument was acknowledged before me on the 10 day of November, 2015, by JOANN F. MURPHEY.

ROBERTO ORTEGA
NOTARY PUBLIC
STATE OF TEXAS
MY COMM. EXP. 5/22/2018

Notary Public, State of Texas
Name: Roberto Ortega

THE STATE OF TEXAS

COUNTY OF Bexar

This instrument was acknowledged before me on the 10 day of November, 2015, by JERRY MURPHEY.

ROBERTO ORTEGA
NOTARY PUBLIC
STATE OF TEXAS
MY COMM. EXP. 5/22/2018

Notary Public, State of Texas
Name: Roberto Ortega

James W. Turk
A/K/A James Turk
JAMES W. TURK A/K/A JAMES TURK, Independent Executor of the Estate of Claudette B. Turk (a/k/a Claudette Blumberg Turk and Claudette June Turk), Deceased, and

James W. Turk
A/K/A James Turk
JAMES W. TURK A/K/A JAMES TURK

THE STATE OF TEXAS

COUNTY OF DALLAS

This instrument was acknowledged before me on the 10 day of NOVEMBER, 2015, by JAMES W. TURK A/K/A JAMES TURK, individually and as Independent Executor of the Estate of Claudette B. Turk (a/k/a Claudette Blumberg Turk and Claudette June Turk), Deceased.

L. HENRY ALTERMAN
Notary Public, State of Texas
My Commission Expires
October 21, 2019

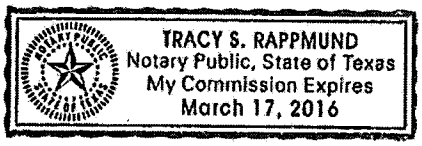
J. Henry Alterman
Notary Public, State of Texas
Notary Name: L. Henry Alterman

ACCEPTANCE BY GRANTEE:

GREEN VALLEY SPECIAL UTILITY DISTRICT

By: Pat Allen

PAT ALLEN,
General Manager



THE STATE OF TEXAS

COUNTY OF GUADALUPE

This instrument was acknowledged before me on the 17th day of November, 2015, by PAT ALLEN, General Manager of GREEN VALLEY SPECIAL UTILITY DISTRICT, on behalf of GREEN VALLEY SPECIAL UTILITY DISTRICT.

Tracy S. Rappmund

Notary Public, State of Texas
Notary Name: Tracy S. Rappmund