TO: COMMITTEE MEMBERS

FROM: DON SPAGNOLO
GENERAL MANAGER

DATE: OCTOBER 7, 2010

AGENDA ITEM
2

OCTOBER 11, 2010

REVIEW STATUS OF SOUTHLAND WWTF UPGRADE PROJECT

ITEM

Review status of Southland WWTF Upgrade Project [Receive Report].

BACKGROUND

Attached is the latest Monthly Design Status Report from AECOM. Mike Nunley, AECOM, is scheduled to present the report to the Committee and answer questions. AECOM is proceeding with development of the draft concept report for the final design of the planned Phase 1 upgrade and submitted Technical Memorandum #2 related to sludge thickening systems. See Agenda Item 4.

Doug Wood and Associates (DWA) is proceeding with preparation of the Draft Environmental Impact Report. AECOM's schedule includes the updated EIR schedule.

It should be noted that the Board has already funded the proposed Phase 1 project and the District already owns the land for construction for the Phase 1 project.

RECOMMENDATION

Staff recommends that the Committee receive AECOM's presentation and ask questions as appropriate.

ATTACHMENT

- AECOM MONTHLY STATUS REPORT

AECOM
AECOM
1194 Pacific Street
Suite 204
San Luis Obispo, CA 93402
www.aecom.com
805 542 9840 tel
805 542 9990 fax

Memorandum

To	Don Spagnolo, PE, General Manager - NCSD	Page	1
CC	Peter Sevcik, Jon Hanlon, Eileen Shields		
Subject	Southland WWTF Phase 1 Improvements – Design Phase Status Report		
From	Michael K. Nunley, PE		
Date	October 6, 2010		

The Project Team has completed the following items this month:

1. AECOM completed the Draft Technical Memorandum #2 – Sludge Thickening Systems and provided copies to District staff for review and comment.
2. AECOM is continuing work on the Draft Concept Design Report.

Schedule

The Project Schedule is attached. A baseline was set at the August 4, 2010 based on the District's request. The schedule has been updated to reflect changes per Scope Amendment #3, discussions with RWQCB regarding permitting, and changes in the EIR schedule.

Budget Status

The Invoice Summary is attached. The Invoice Summary indicates an amount invoiced which is consistent with the work completed to date. Scope Amendment #3, approved by the District Board, was added to the project budget. The project cost opinion has been updated based on the WWTF Master Plan Amendment. The next update will occur with acceptance of the final Concept Design Report.

Yours Sincerely,

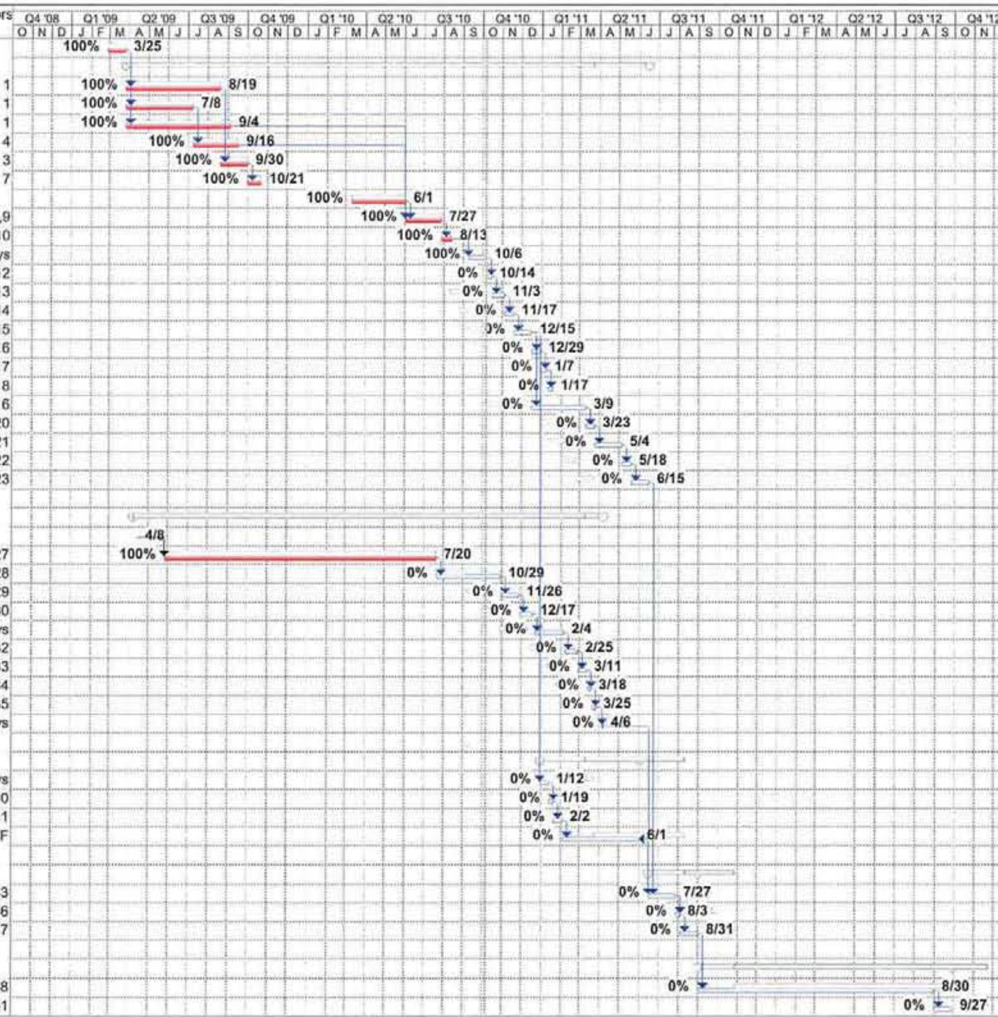
Michael K. Nunley

Michael K. Nunley, PE

Enclosures: Project Schedule
Invoice Summary
Project Budget Summary

Southland WWTF Phase 1 Improvements Design Schedule

ID	Task Name	% Work Complete	Duration	Start	Finish	Predecessors
1	Negotiation and Notice to Proceed	100%	20 days	Thu 2/26/09	Wed 3/25/09	
2	**Design**	**0%**	**580 days**	**Thu 3/26/09**	**Wed 6/15/11**	
3	Survey	100%	105 days	Thu 3/26/09	Wed 8/19/09	1
4	Preliminary Soils Report	100%	75 days	Thu 3/26/09	Wed 7/8/09	1
5	Draft Site Plan	100%	117 days	Thu 3/26/09	Fri 9/4/09	1
6	Draft Soils Report	100%	50 days	Thu 7/9/09	Wed 9/16/09	4
7	Draft Operations Plan - TM #1	100%	30 days	Thu 8/20/09	Wed 9/30/09	3
8	Revised Draft Soils Report	100%	15 days	Thu 10/1/09	Wed 10/21/09	7
9	Facility Master Plan Amendment #1	100%	12 wks	Wed 3/10/10	Tue 6/1/10	
10	Administrative Draft Concept Report	100%	8 wks	Wed 6/2/10	Tue 7/27/10	5,6,9
11	District Staff Review	100%	13 days	Wed 7/28/10	Fri 8/13/10	10
12	Draft Sludge Dewatering System - TM#2	100%	20 days	Thu 9/9/10	Wed 10/6/10	11FS+18 days
13	District Staff & Committee Review	0%	6 days	Thu 10/7/10	Thu 10/14/10	12
14	Draft Concept Report	0%	14 days	Fri 10/15/10	Wed 11/3/10	13
15	District Staff / Peer Review & Present to Committee & Board	0%	10 days	Thu 11/4/10	Wed 11/17/10	14
16	Final Concept Report	0%	20 days	Thu 11/18/10	Wed 12/15/10	15
17	Revised Draft Operations Plan - TM#1	0%	10 days	Thu 12/16/10	Wed 12/29/10	16
18	District Staff Review	0%	7 days	Thu 12/30/10	Fri 1/7/11	17
19	Final Operations Plan - TM#1	0%	6 days	Mon 1/10/11	Mon 1/17/11	18
20	60% Plans, Specifications, and Estimates	0%	60 days	Thu 12/16/10	Wed 3/9/11	16
21	District Staff / Peer Review	0%	10 days	Thu 3/10/11	Wed 3/23/11	20
22	95% Plans, Specifications, and Estimates	0%	30 days	Thu 3/24/11	Wed 5/4/11	21
23	District Staff / Peer Review	0%	10 days	Thu 5/5/11	Wed 5/18/11	22
24	Final Plans, Specifications, and Estimates	0%	20 days	Thu 5/19/11	Wed 6/15/11	23
25						
26	**Environmental Impact Report**	**0%**	**521 days**	**Wed 4/8/09**	**Wed 4/6/11**	
27	Notice of Award	100%	1 day	Wed 4/8/09	Wed 4/8/09	
28	Completion of subconsultant analyses	100%	15 mons	Wed 5/27/09	Tue 7/20/10	27
29	Administrative Draft EIR	0%	73 days	Wed 7/21/10	Fri 10/29/10	28
30	District Staff Review	0%	4 wks	Mon 11/1/10	Fri 11/26/10	29
31	Preparation of Public Draft EIR	0%	3 wks	Mon 11/29/10	Fri 12/17/10	30
32	EIR Public Review Period	0%	33 days	Wed 12/22/10	Fri 2/4/11	31FS+2 days
33	Preparation of Admin Final EIR	0%	3 wks	Mon 2/7/11	Fri 2/25/11	32
34	Receipt of Comments from District on Admin. Final EIR	0%	2 wks	Mon 2/28/11	Fri 3/11/11	33
35	Preparation of Final EIR	0%	1 wk	Mon 3/14/11	Fri 3/18/11	34
36	Completion of Finding of Facts	0%	1 wk	Mon 3/21/11	Fri 3/25/11	35
37	Public Hearings/EIR Certification	0%	1 day	Wed 4/6/11	Wed 4/6/11	36FS+7 days
38						
39	**RWQCB Permitting**	**0%**	**110 days**	**Thu 12/30/10**	**Wed 6/1/11**	
40	Prepare admin draft ROWD	0%	2 wks	Thu 12/30/10	Wed 1/12/11	16FS+10 days
41	District Staff Review	0%	5 days	Thu 1/13/11	Wed 1/19/11	40
42	Prepare draft ROWD	0%	10 days	Thu 1/20/11	Wed 2/2/11	41
43	RWQCB review and issuance of WDRs	0%	4.25 mons	Thu 2/3/11	Wed 6/1/11	42,37FF
44						
45	**Bid Phase**	**0%**	**55 days**	**Thu 6/16/11**	**Wed 8/31/11**	
46	Advertisement	0%	30 days	Thu 6/16/11	Wed 7/27/11	24,43
47	Bid Opening	0%	5 days	Thu 7/28/11	Wed 8/3/11	46
48	Bid Review and Notice of Award	0%	20 days	Thu 8/4/11	Wed 8/31/11	47
49						
50	**Construction**	**0%**	**281 days**	**Thu 9/1/11**	**Thu 9/27/12**	
51	Construct	0%	261 days	Thu 9/1/11	Thu 8/30/12	48
52	Startup & Testing	0%	20 days	Fri 8/31/12	Thu 9/27/12	51



Project: Southland Design 8 03 09 Date: Wed 10/6/10						
Task	Milestone	Rolled Up Critical Task	Rolled Up Baseline Milestone	External Tasks
Progress	Baseline Milestone	Rolled Up Milestone	Split	Group By Summary
Baseline	Summary	Rolled Up Baseline	Baseline Split	Deadline

Project Budget Summary

10/1/2010

Engineering Services for NCSD - Southland WWTF Upgrade **Nipomo CSD**

	Total Budget	Amount Previously Invoiced	Current Invoice Amount	% of Budget Earned to date	% of Work Complete
Task Group 1 - Concept Design Phase	$242,179.00	$186,790.72	$18,053.55	85%	85%
Task Group 2 - Construction Documents	$566,856.00	$20,843.73	$1,971.00	4%	4%
Task Group 3 - Project Management	$97,796.00	$49,496.40	$2,565.00	53%	53%
Task Group 4 - Assistance During Bid	$39,539.00	$0.00	$0.00	0%	0%
Task Group 5 - Office Engineering Services	$147,198.00	$0.00	$0.00	0%	0%
Task Group 6 - Amendment 1 Facility MP	$37,020.00	$37,020.00	$0.00	100%	100%
Task Group 7 - Waste Discharge Report	$30,130.00	$0.00	$0.00	0%	0%
Total	$1,160,718.00	$294,150.85	$22,589.55	27%	27%

Date Printed 10/6/2010

Nipomo CSD
Southland WWTF Phase 1 Improvements
Project Budget

Date Printed: 10/5/2010

Item	Description	Budgeted Amount Jan 2009 Master Plan	(1)(2)(3)	Updated Amount 2010 MP Amendment	(9)(10)
1	Frontage Road sewer upgrade (street to influent pump station)	$366,000	(4)(5)	--	(11)
2	Influent pump station upgrade	$670,900		$571,600	
3	Influent screening system	$327,400		$371,600	
4	Grit removal system	$402,700		$284,100	(12)
5	Phase I Extended Aeration + Secondary Clarifiers	$3,877,500		$3,671,300	
6	Phase I Sludge digesters	$67,700		$166,300	(13)
7	Phase I Sludge drying beds	$1,160,700		$992,300	
8	Controls and Blower Building			$232,600	(14)
9	Non-Potable Plant Water System			$191,200	(14)
10	Site Piping			$642,000	(15)
	Construction Subtotal	**$6,872,900**		**$7,123,000**	
11	Contingency	$2,061,870	(6)	$1,780,750	(16)
12	Design-Phase Engineering	$923,093		$966,615	
13	Construction Management	$1,138,777	(7)	$1,095,255	(7)
14	Environmental Mitigation	--	(8)	--	(8)
15	Environmental Monitoring	--	(8)	--	(8)
16	Permitting Fees	--	(8)	--	(8)
	WWTF PROJECT TOTAL (Rounded to 1000)	**$10,997,000**		**$10,966,000**	

Notes:
(1) ENR CCI: November 2008 = 8602
(2) Costs are from the January 2009 Southland WWTF Master Plan.
(3) Costs are escalated by 4 % per year to anticipated midpoint of construction (assumed January 2011).
(4) The Frontage Rd Sewer Upgrade project includes the sewer main from Division St. to the influent pump station. The portion between the street and the influent pump station is currently included in the Southland WWTF Upgrades project scope of work, but may be moved to the Waterline Intertie Project for expedited construction.
(5) The cost for this portion of Frontage Rd was estimated by prorating the cost opinion for the Frontage Road Sewer Upgrade (based on linear footage) to arrive at the 2008 Construction Cost Opinion. A 4% per year escalation was used to arrive at the 2011 midpoint of construction cost opinion.
(6) Contingency is estimated at 30% of construction subtotal.
(7) To be updated by CM Team; assumed to be 30% of Jan 2009 MP construction subtotal minus the engineering fee.
(8) Costs to be developed with EIR process
(9) ENR CCI: April 2010 = 8677
(10) Costs are from the August 2010 Southland WWTF Master Plan Amendment #1.
(11) The Frontage Road Sewer Upgrade Project has been developed separately.
(12) One of two grit removal systems is required for Phases 1 and 2. A second grit removal system is budgeted for Phase 3.
(13) The design recommendations changed from sludge holding lagoons to digesters in the MP Amendment to provide a reduction in the amount of dry sludge hauled. Earthen berms were added to provide operational flexibility.
(14) Line item has been added since the January 2009 Master Plan.
(15) Site piping was moved to its own line item for accuracy in developing the cost opinion.
(16) Contingency is estimated at 25% of construction subtotal.

TO: COMMITTEE MEMBERS

FROM: DON SPAGNOLO
GENERAL MANAGER

DATE: OCTOBER 7, 2010

AGENDA ITEM
3
OCTOBER 11, 2010

PASQUINI HYDROGEOLOGIC INVESTIGATION – SUPPLEMENTAL MODELING

ITEM

Discuss Pasquini Hydrogeologic Investigation Supplemental Groundwater Modeling [Receive Report and Provide Policy Direction].

BACKGROUND

The Board selected Fugro West Inc. to provide hydrogeologic services to investigate the feasibility of the Pasquini property as an alternate effluent disposal site for the Southland Wastewater Treatment Facility (WWTF). Fugro issued a draft report in February 2010 that identified the potential existence of two additional low permeability layers at depths below the sampling methods previously utilized. Fugro recommended that the presence and nature of these deep layers be investigated. The field work involved the drilling of three deep boreholes to investigate the presence and lateral continuity of the deep clay layers utilizing the sonic drilling method. This method allowed the collection of "undisturbed" soil samples at the required depths.

Fugro completed the necessary field work, developed a groundwater model to simulate effluent disposal at the site, and prepared a final report that was presented to the Committee and the Board in August 2010. The major finding of the report was that the potential exists for groundwater breakout at the bluff face and day-lighting at the ground surface adjacent to the bluff at the planned constant long-term wastewater discharge rate of 1.23 million gallons per day. Furthermore, the report suggested that alternative discharge strategies could possibly mitigate these potential results.

The Board subsequently authorized Fugro to perform supplemental groundwater modeling to determine the appropriate discharge rate and schedule for the site. Attached is a summary of those results. The supplemental modeling estimates that the maximum long-term constant discharge rate for the site is 300,000 gallons per day and that at a rate of 1.23 MGD, the maximum seasonal discharge period would be 3 months.

RECOMMENDATION

Staff recommends that the Committee receive Fugro's presentation, ask questions as appropriate and provide policy direction to staff regarding the consideration of the Pasquini Property as a potential effluent disposal site.

ATTACHMENT

- Supplemental Groundwater Modeling for the Hydrogeologic Assessment of the Pasquini Property dated September 7, 2010 prepared by Fugro West, Inc.

FUGRO WEST, INC.

660 Clarion Court, Suite A
San Luis Obispo, California 93401
Tel: (805) 542-0797
Fax: (805) 542-9311

September 7, 2010
Proposal No. 3596.005.03

Nipomo Community Services District
Post Office Box 326
Nipomo, California 93444

Attention: Mr. Peter V. Sevcik
District Engineer

Subject: Supplemental Groundwater Modeling for the Hydrogeologic Assessment of the Pasquini Property, Nipomo, California

Dear Mr. Sevcik:

This report presents the findings of supplemental groundwater modeling performed by Fugro for the Nipomo Community Services District (District) as part of the hydrogeologic assessment of the Pasquini property as a site for a future percolation pond system. The proposed pond system would be part of the planned upgrade and expansion of the Southland Wastewater Treatment Facility.

Background

A meeting was held on July 16, 2010 between representatives of the District, AECOM, and Fugro to discuss the results documented in a draft report entitled "*Final Report, Hydrogeologic Assessment of the Pasquini Property, Nipomo, California*" (dated July 12, 2010). The major finding of the report was that the potential exists for groundwater breakout at the bluff face and daylighting at the ground surface of the adjacent Santa Maria River alluvium given the long-term discharge of treated wastewater effluent in the proposed pond system at the planned constant rate of 1.23 million gallons per day (mgd). However, the report also recommended that an alternative effluent discharge rate and disposal schedule might exist that would mitigate against the potential for breakout along the bluff face and daylighting in the alluvium.

We met with your Board on August 11, 2010 to present the findings of the final report and discuss the potential alternative discharge rates and disposal schedules. At that meeting, your Board requested Fugro to perform the additional modeling tasks towards the determination of an appropriate discharge rate and schedule at the site.

The first task was to estimate the maximum long-term constant discharge rate that can be achieved at the site without either a breakout at the bluff face or daylighting in the alluvium. The second task was to evaluate the groundwater mounding impacts in the underlying dune sands for three different seasonal discharge periods (i.e., 3 months, 6 months, and 9 months) each at a constant discharge rate of 1.23 mgd. During the 3-month discharge period, for example, the pond system would receive discharge at a constant rate of 1.23 mgd and for the remaining 9 months of the year the pond system would be inactive (i.e., receive no discharge). The purpose of the second task was to determine whether the proposed pond system could be operated on a long-term seasonal basis (i.e., without the occurrence of breakout or daylighting) for any of the three evaluated seasonal discharge periods. The results of the two modeling tasks are presented in the following sections.

Estimation of Maximum Long-term Constant Discharge Rate

A numerical groundwater flow model was developed in MODFLOW for the study area (i.e., model domain) displayed on Figure 1. The model was used to estimate the maximum long-term constant discharge rate in the pond system that would not lead to breakout at the bluff face or daylighting at the ground surface of the adjacent Santa Maria River alluvium. The elevation of the top of the clay layer was defined in the model to be 110 feet (MSL). In the vicinity of the toe of the bluff face, the ground surface was estimated to be between 40 to 70 feet above the top of the clay layer (i.e., a ground surface elevation of 150 to 180 feet (MSL) along the toe of the bluff face). The lowest ground surface elevation in the Santa Maria River alluvium in the area near the bluff face was estimated to be about 30 feet above the assumed top elevation of the clay layer (i.e., a ground surface elevation of 140 feet (MSL) in the alluvium). Therefore, to prevent breakout along the bluff face and daylighting at the ground surface of the river alluvium, the maximum long-term constant discharge rate was estimated as the highest discharge rate that would not result in modeled groundwater levels greater than 40 feet above the top elevation of the deep clay layer in the area along the bluff face by the end of the 20-year simulation period. For analysis purposes, simulated groundwater levels were observed in the model at three different hypothetical monitoring locations along the bluff face (HMW-1, HMW-2, HMW-3) and one hypothetical monitoring location in the Santa Maria River alluvium (HMW-4) at an elevation of 140 feet (MSL) (Figure 1).

For the estimation of the maximum long-term constant discharge rate, the horizontal hydraulic conductivity of the aquifer underlying the pond system (i.e., the dune sands of the mesa) was defined to be 20 feet/day. The horizontal hydraulic conductivity of the Santa Maria Fault was conservatively assumed to be 0.01 feet/day. These modeling assumptions were the same assumptions and model domain that were used in the simulations presented in the July 12, 2010 final report.

A plot displaying the simulated mound heights above the top of the deep clay layer at HMW-2 over the 20-year simulation period for constant discharge rates of 1.23, 0.615, and 0.3075 mgd is shown on Figure 2. The estimated maximum long-term constant discharge rate given these assumptions was conservatively estimated to be 0.3075 mgd. Although not shown, the simulated groundwater levels at HMW-4 in the Santa Maria River alluvium were less than 30 feet above the assumed top elevation of the deep clay layer.

Evaluation of 1.23 MGD Discharge Rate for Different Seasonal Discharge Periods

The numerical groundwater flow model was also used to evaluate the potential for breakout along the bluff face and daylighting at the ground surface of the Santa Maria River alluvium for three different seasonal discharge periods (i.e., 3 months, 6 months, and 9 months) each at a constant discharge rate of 1.23 mgd. For these three simulations, the horizontal hydraulic conductivity of the aquifer underlying the pond system (i.e., the dune sands of the mesa) was again defined to be 20 feet/day and the horizontal hydraulic conductivity of the Santa Maria Fault was conservatively assumed to be 0.01 feet/day. The simulated groundwater mound heights above the top of the deep clay layer at the three different hypothetical monitoring locations along the bluff face (HMW-1, HMW-2, HMW-3) and the one hypothetical monitoring location in the Santa Maria River alluvium (HMW-4) at an elevation of 140 feet (MSL) for the seasonal discharge periods of 3-months, 6-months, and 9-months are shown on Figures 3, 4, and 5, respectively.

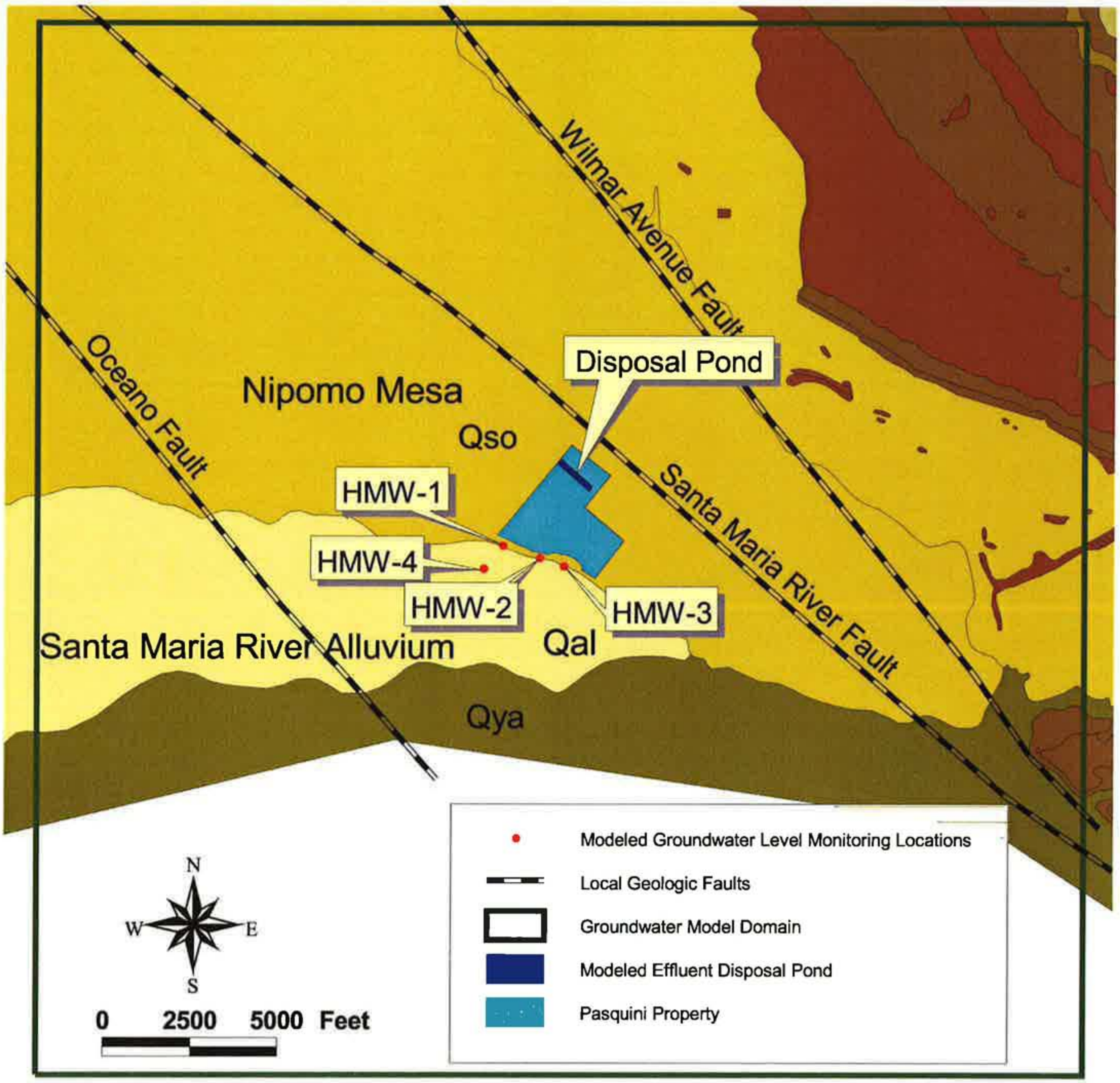
Over the 20-year simulation period, only the 3-month seasonal discharge period generated groundwater levels that were less than 40 feet above the top elevation of the deep clay layer along the bluff face and less than 30 feet above the top of the deep clay layer further into the Santa Maria River alluvium. The results for the 6-month seasonal discharge period suggest that the pond system could receive discharge at the rate of 1.23 mgd for possibly up to 7 years before breakout along the bluff face or daylighting in the alluvium occurs. The results for the 9-month seasonal discharge period indicate that the pond system could receive discharge at the rate of 1.23 mgd for potentially up to 3 years before breakout along the bluff face or daylighting in the alluvium occurs.

If you have any questions, please do not hesitate to call us.

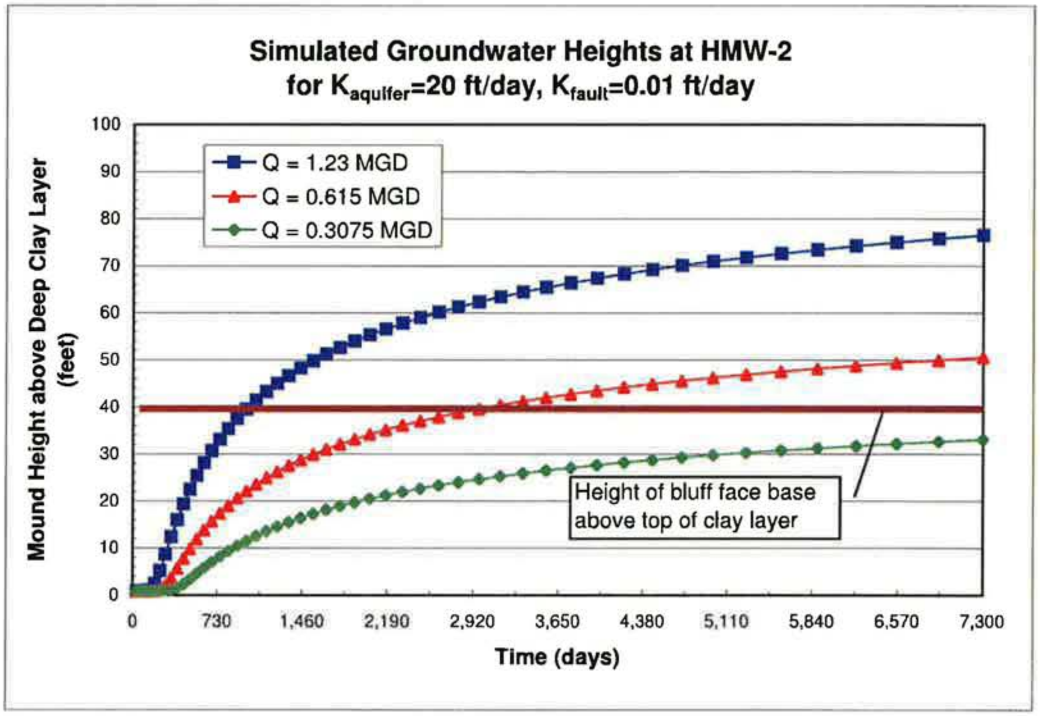
Sincerely,
FUGRO WEST, INC

Nels C. Ruud, PhD
Project Hydrogeologist

Paul A. Sorensen, C.Hg 154
Principal Hydrogeologist

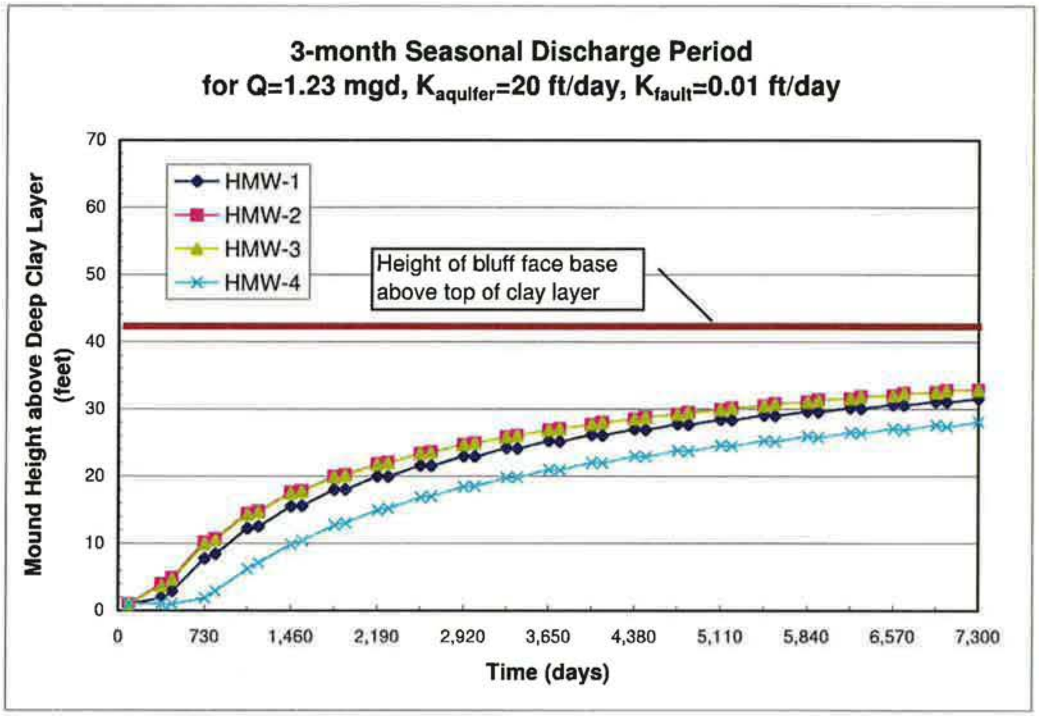


STUDY AREA AND GROUNDWATER MODEL DOMAIN
Hydrogeologic Assessment of the Pasquini Property
Nipomo, California



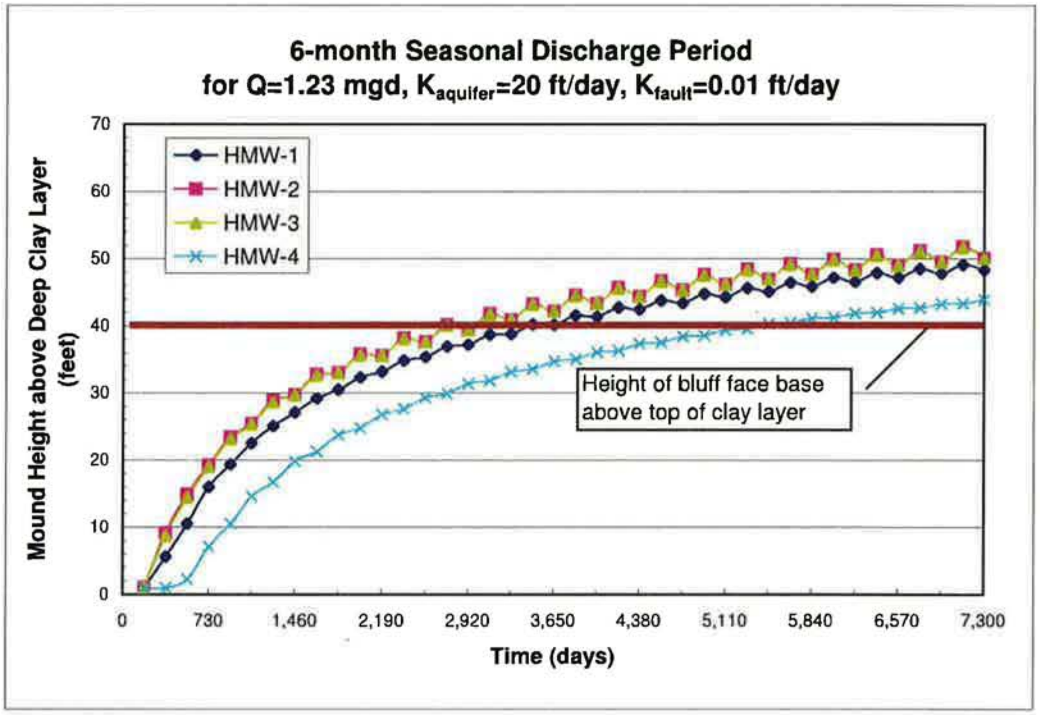
SIMULATED LONG-TERM GROUNDWATER HEIGHTS ABOVE DEEP CLAY LAYER AT HMW-2 FOR THREE DIFFERENT CONSTANT DISCHARGE RATES

Hydrogeologic Assessment of the Pasquini Property
Nipomo, California



SIMULATED LONG-TERM GROUNDWATER HEIGHTS ABOVE DEEP CLAY LAYER FOR 3-MONTH SEASONAL DISCHARGE RATE OF 1.23 MGD

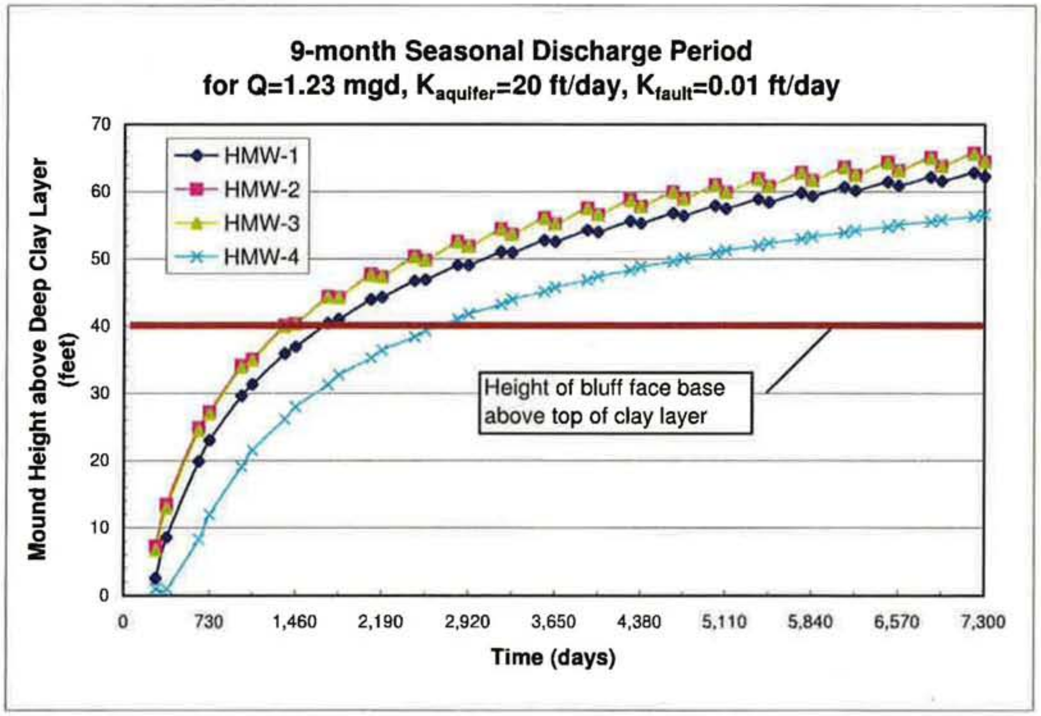
Hydrogeologic Assessment of the Pasquini Property
Nipomo, California



SIMULATED LONG-TERM GROUNDWATER HEIGHTS ABOVE DEEP CLAY LAYER FOR 6-MONTH SEASONAL DISCHARGE RATE OF 1.23 MGD

Hydrogeologic Assessment of the Pasquini Property

Nipomo, California



SIMULATED LONG-TERM GROUNDWATER HEIGHTS ABOVE DEEP CLAY LAYER FOR 9-MONTH SEASONAL DISCHARGE RATE OF 1.23 MGD

Hydrogeologic Assessment of the Pasquini Property

Nipomo, California

TO: COMMITTEE MEMBERS

FROM: DON SPAGNOLO
GENERAL MANAGER

DATE: OCTOBER 7, 2010

AGENDA ITEM
4

OCTOBER 11, 2010

AECOM DRAFT TECHNICAL MEMORANDUM #2 – SLUDGE THICKENING SYSTEMS

ITEM

Discuss AECOM Draft Technical Memorandum #2 Sludge Thickening Systems [Receive Report and Provide Policy Direction].

BACKGROUND

At the July 28, 2010 Board meeting, the Board considered and approved Master Plan Amendment #1 to the Master Plan for the Southland Wastewater Treatment Facility (WWTF). The amendment provides a revised layout, phasing plan, and updated project costs for improvements at the facility. AECOM is proceeding with the development of the concept design report and ultimately final design of the project.

The District asked AECOM to investigate the use of a mechanical sludge thickening system in place of the aerated sludge digesters previously proposed in response to staff's concerns related to the aerated sludge digesters. The attached Draft Technical Memorandum #2 – Sludge Thickening Systems summarizes AECOM's investigation and provides a recommendation that the District include a gravity belt thickener as part of the planned upgrade improvements.

The advantages to the District will be that sludge handling will be less labor intensive on day-to-day operations, electricity requirements to operate the plant will be reduced, and hauling costs will be reduced as a result of thicker sludge being delivered to the drying beds. Furthermore, the initial capital cost of the gravity belt thickener will be offset by the cost of the budgeted sludge digesters and decant pump station that will no longer be required.

RECOMMENDATION

Staff recommends that the Committee receive AECOM's presentation, ask questions as appropriate and provide policy direction to staff to include a gravity belt sludge thickening system as part of the planned Southland WWTF Phase 1 Improvement Project design.

ATTACHMENT

- AECOM Draft Technical Memorandum #2 dated October 6, 2010

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AECOM

AECOM
1194 Pacific Street
Suite 204
San Luis Obispo CA 93401
www.aecom.com

805 542 9840 tel
805 542 9990 fax

Draft Memorandum

To	Don Spagnolo, PE, General Manager	Page	1
CC	Peter Sevcik, PE, District Engineer		
Subject	Southland WWTF Improvements – Phase 1 Technical Memorandum #2 - Sludge Thickening Systems		
From	Eileen Shields, PE Mike Nunley, PE		
Date	October 6, 2010		

Introduction

Nipomo Community Services District (NCSD) is planning improvements to the Southland Wastewater Treatment Facility (WWTF). The improvements, to occur in three phases, will bring the WWTF from the current permitted capacity of 0.9 million gallons per day (MGD) to approximately 1.8 MGD (on a maximum month basis). The project is described in the Southland WWTF Master Plan (January 2009) and the subsequent Southland WWTF Master Plan Amendment #1 (August 2010).

Phase 1, currently under design, will improve effluent quality and maintain the existing permitted capacity. The wastewater improvements include replacement and expansion of the influent lift station, new headworks, a new extended aeration treatment process, and secondary clarifier.

Providing a higher level of treatment will produce more sludge than the existing aerated pond system. The August 2010 Master Plan Amendment recommended aerobic digesters for equalization and minor reduction of waste activated sludge. This involves installation of two earthen berms in one of the existing ponds to create three cells and existing surface aerators to promote aerobic digestion. The aerobic digesters present an increase in capital construction cost, but will perform the following:

- Reduction of the volatile solids content of the sludge
- Reduction of total solids sent to disposal
- Pathogen reduction

In July 2010, AECOM submitted the Administrative Draft Concept Design Report for Phase 1 WWTF Improvements. Feedback and discussions with District staff identified staff concerns regarding the aerated sludge digesters and proposed operations. The primary concern was transfer of sludge from the digesters to the drying beds without constructing an expensive pumping facility. AECOM began a preliminary investigation into design modifications and alternatives to the aerated sludge digesters to improve sludge transfer operations, minimizing capital and operations and maintenance costs. Through this investigation, AECOM has identified mechanical thickening systems that may be a feasible alternative. Advantages of thickening systems over the previous design include:

- Lower power requirement, reducing electrical cost
- Thicker sludge transferred to the drying beds, enhancing solar drying, and allowing the District to dry the sludge to a greater extent before hauling. This reduces handling labor and hauling costs.
- Smaller footprint with above ground equipment

This memorandum summarizes the comparison and evaluation of mechanical thickening alternatives.

Alternatives

AECOM has identified two reliable alternatives for sludge thickeners in small size facilities:

- Rotary drum thickener (RDT)
- Gravity belt thickener (GBT)

Both alternatives will thicken waste activated sludge (WAS) from 0.5 to 1.0 percent solids up to 4 to 7 percent solids and have a solids capture rate of 90 to 98 percent (Tchobanoglous). The solids capture rate can be defined as the percentage of the solids in the thickener influent that are captured by the equipment and sent to the drying beds. Polymer addition is required for both alternatives, to effectively remove water and thicken sludge.

The GBT is a modification of the upper gravity drainage zone of the belt filter press, improved with the emphasis on thickening (WEF and ASCE). A slow-moving fabric belt moves over rollers driven by a variable-speed drive to separate the solids from the water using gravity drainage and capillary suction forces. Polymer is added to the sludge feed for conditioning prior to distribution to the belt. The sludge is distributed evenly across the belt width and water drains through the belt as the increasingly concentrated sludge is carried towards the discharge end. A series of plow blades along the length of the belt ridge and furrow the sludge and increase drainage through the fabric. After discharge, the belt runs through a high-pressure wash cycle.

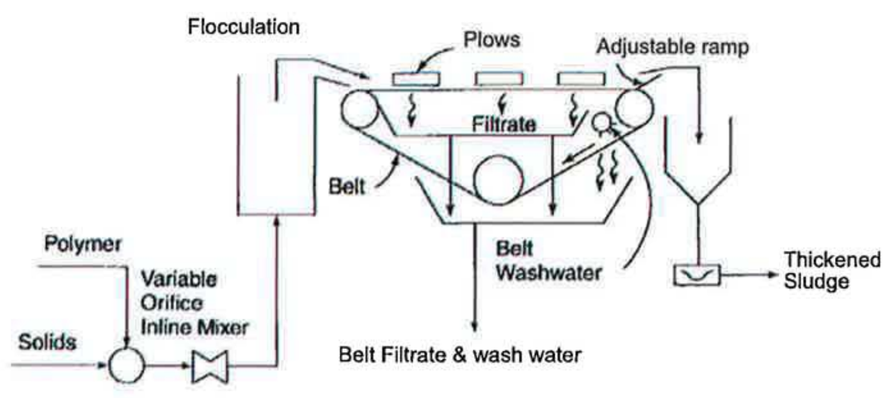

Figure 1 Gravity Belt Thickener Schematic (adapted from WEF)

Figure 2 Enclosed Gravity Belt Thickener (BDP)

An RDT thickens sludge using a rotating media-covered cylindrical screen. Polymer is mixed with dilute sludge and the conditioned sludge is fed internally to the rotating screen drum, driven by a variable- or constant-speed drive, which separates the flocculated solids from the water. An internal screw promotes movement through the drum, transporting the thickened solids along the length. RDTs have a built-in spray backwashing system, operated by timers, for cleaning. The flow schematic is essentially the same as the GBT, with a rotating drum in place of the belt assembly. In both cases, belt filtrate, washewater, and/or centrate will flow back to the headworks for treatment.

Figure 3 Rotary Drum Thickener (BDP)

Both the GBT and RDT can provide effective thickening with a small footprint, low power requirements, and relatively low day-to-day operator interface. The performance of each is highly dependent on the solids characteristics and correct polymer mixing and dosing. Table 1 provides a comparison of factors for the two thickening systems.

Table 1 Comparison of Gravity Belt and Rotary Drum Thickeners

Parameter	Gravity Belt	Rotary Drum
Design WAS Load (Phase 1)	1,208 lbs/d	1,208 lbs/d
WAS Solids Content	0.5 to 1.0 %TS	0.5 to 1.0 %TS
Capacity	75 -100 gpm	75 -100 gpm
Design Operating Time (1)	30 hr/wk	30 hr/wk
Ph 1 Opinion of Installed Construction Cost (approx.) (2)	$256,000	$242,000
Odor potential	Low	Low
Ph 1 Footprint (approx.)	10-ft x 27-ft	10-ft x 20-ft
Energy requirement	Low	Low
Polymer requirement	4 – 8 lb/dry ton	5 – 10 lb/dry ton
Wash water requirement	~ 8 gpm	~ 8 gpm
Labor requirement	Low	Low
Add-on potential	Good	Good
Performance and Operation History	> 25 years	15 - 20 years
Amortized capital cost (3)	$18,800	$17,800
Annual Electrical Cost (4)	$2,000	$2,000
Annual Polymer Cost (5)	$4,000	$5,300
Total Annual Cost	**$24,800**	**$25,100**

Notes:
(1) Based on 0.75 % TS concentration and low end of flow capacity range
(2) Thickening system opinion of probable construction subtotal only[1]. Does not include contingency, design, or other non-construction project costs.
(3) Based on 4 % interest and 20 year period of analysis
(4) Based on $0.13 per kwh
(5) Based on $3.00 per pound

From Table 1, RDTs have a lower installed construction cost and take up a slightly smaller footprint. RDTs require approximately 30% more polymer for comparable performance. The odor potential, labor requirements, and energy and wash water requirements are comparable and relatively low for both units. The potential for odors is considered low because of the high solids retention time (SRT) associated with extended aeration process produces aerobic sludge with low hydrogen sulfide concentration. Polymer requirements are slightly higher for RDTs.

AECOM recommends the GBT for the District's Southland WWTF due to a slightly lower 20 year life cycle cost.

[1] The opinion of probable construction cost prepared by AECOM represents our judgment and is supplied for general guidance to the District. Since AECOM has no control over the cost of labor and materials, or over competitive bidding or market conditions, AECOM does not guarantee the accuracy of such opinions as compared to contractor bids or actual costs.

AECOM

Preliminary Design Discussion

The GBT and associated equipment (hydraulic power unit, polymer system, control panel, and wash water system) can be skid mounted, plumbed and wired together at place of manufacture. While this increases the equipment cost, it is recommended to reduce cost of installation and design. With skid mounting, installation will consist of concrete slab construction, construction and plumbing of non-potable water connection, drain, sludge feed line and sludge discharge line, and installation of a steel canopy structure for protection from UV degradation.

Preliminary sizing indicates one 0.5-meter GBT unit will be required to meet Phase 1 waste sludge flow requirements. AECOM recommends a second, identical unit be installed during Phase 2 improvements. The second unit will assist with increasing flows during Phase 2 and provide capacity for Phase 3 flows.

Spare parts for GBTs are relatively inexpensive and typical repairs are not considered difficult. For this reason, AECOM recommends the District maintain spare parts onsite rather than constructing a redundant system. A temporary holding pond can be utilized for emergency cases when the GBT unit must be shut down. We recommend construction of a berm in the existing aerated pond nearest the planned sludge drying beds on the southwestern side of the site. A berm in the location previously recommended for the sludge digesters would create a 1.17 million gallon pond. The second berm (to create 3 cells) would no longer be required. The holding pond will be lined with a UV resistant liner. A sump is recommended for stormwater management and cleaning.

Construction Cost Opinion

An opinion of probable construction cost was developed for the GBT sludge thickening system and holding pond for Phases 1 and 2 (Table 2). The construction cost opinion would be similar for an RDT system.

Table 2 Sludge Thickening System Construction Cost Opinion

		Phase 1	Phase 2
1	Thickening system (GBT)	$192,400	$192,400
2	Associated site work	$62,880	$62,880
3	Holding Pond	$78,100	--
	Construction subtotal	**$334,000**	**$256,000**
	Contingency	$83,500	$76,800
	Construction Total	**$417,500**	**$332,800**

Notes:
1. Contingency is 25% of subtotal for Phase 1 and 30% of subtotal for Phase 2.
2. No additional sludge thickening system improvements are required for Phase 3.
3. Opinion of costs does not include design, construction management, or other "non-construction" project related expenses.

Table 3 summarizes the comparison of the thickening system construction cost to the cost opinion that was developed for the sludge digesters and decant pump station. As previously discussed, the thickening system would replace the sludge digesters, and due to the thickened sludge, the decant pump station will no longer be required. This results in a net construction subtotal of - $224,000. However, a second system will be required during Phase 2 to meet increasing flows. The second system will be designed for Phase 3 capacity and cost approximately $256,000 during Phase 2. An amount of $30,700 was budgeted for the sludge digesters during Phase 3. This amount is credited to the budget for Phase 3. The net construction cost impact for the sludge thickening systems for Phases 1, 2, and 3 is $1,000 (Table 3).

Table 3 Comparison of Construction Cost Opinions: Thickening System and Digesters

		Ph 1	Ph 2	Ph 3
1	Thickening system (GBT)	$192,400	$192,400	--
2	Associated site work	$62,900	$62,900	--
3	Holding Pond	$78,100	--	--
4	Credit for sludge digesters	($156,900)	--	($30,700)
5	Credit for decant pump station	($400,000)	--	--
	Net Construction subtotal	**($224,000)**	**$256,000**	**($31,000)**
	Net Total Impact to Construction Cost			**$1,000**

Annual Electrical and Chemical Cost Opinion

The electrical and chemical cost opinions were developed for the GBT sludge thickening system. Phase 1 electrical requirements for the GBT, associated equipment, and sludge feed and discharge pumps is estimated to be 13 horsepower. Assuming the system runs 5 days per week at 6 hours per day, the total electrical requirement is approximately 15,100 kilowatt-hours (kw-hr) per year. At $0.13 per kw-hr, the annual electrical cost for the Phase 1 sludge thickening system would be approximately $2,000. Phase 3 electrical requirements for the GBT, associated equipment, and sludge feed and discharge pumps is estimated to be 26 horsepower. Assuming the system runs 5 days per week at 8 hours per day, the total electrical requirement is approximately 40,300 kilowatt-hours (kw-hr) per year. At $0.13 per kw-hr, the annual electrical cost for the Phase 1 sludge thickening system would be approximately $5,200

The annual requirement and cost of polymer addition was estimated for Phase 3. Polymer cost is estimated to be approximately $3 per pound. At a dosage range of 4 to 8 pounds per dry ton the polymer cost ranges from $12 and $24 per dry ton of sludge produced, depending on the characteristics of the sludge and the type of polymer used. The sludge production was estimated using the following assumptions:

- Sludge yield of 0.75 lb of sludge per lb of BOD removed
- Influent BOD concentration = 300 mg/L (90^{th} percentile)
- Effluent BOD concentration = 20 mg/L
- Phase 3 maximum monthly flow rate = 1.8 MGD
- Polymer cost = $15 per dry ton of sludge

The Phase 3 annual cost for polymer is estimated to be approximately $8,600.

Together, the annual electrical and chemical costs for the Phase 3 Sludge Thickening System are estimated to be $13,800. This was compared to the estimated electrical cost for the sludge digesters. The summary is contained in Table 4.

The sludge digesters require constant aeration. Phase 3 electrical requirements were estimated in the administrative draft concept design report to be 80 HP. Assuming 24 hours per day, 7 days per week, this equates to 521,400 kw-hr. Assuming $0.13 per kw-hr, the annual electricity cost for sludge digesters is estimated to be approximately $67,800.

Table 4 Comparison of Electrical & Chemical Cost Opinions: Thickening System & Digesters

	Annual Electical Cost Opinion	Annual Chemical Cost Opion	Annual Total
Sludge thickening system	$5,200	$8,600	$13,800
Sludge digesters	$67,800	--	$67,800
Difference			$54,000

Annual operations costs are anticipated to be less because of less labor-intensive sludge transfer operations. Another significant savings is expected for reduction in weight of sludge to be hauled. Though it was not calculated, savings is expected since a thicker sludge will be transferred to the drying beds, enhancing solar drying, and allowing the District to dry the sludge to a greater extent before hauling.

Conclusions and Recommendations

A sludge thickening system is recommended for the District's Southland WWTF Improvements project. The majority of the capital construction cost will be offset by the budgeted sludge digesters and decant pump station, which will no longer be required. Annual operating and maintenance costs are expected to be less due to lower operations and electrical requirements, and the District is expected to save on hauling costs.

Works Cited

Tchobanoglous, Burton, Stensel. Wastewater Engineering Treatment and Reuse, 4th Edition. New Delhi: Tata McGraw-Hill Publishing Company Limited, 2003.

WEF and ASCE. Water Environment Federation and American Society of Civil Engineers. Design of Municipal Wastewater Treatment Plants - 4th edition, WEF Manual of Practice 8. WEF and ASCE, 1998.

TO: COMMITTEE MEMBERS

FROM: DON SPAGNOLO
GENERAL MANAGER

DATE: OCTOBER 7, 2010

AGENDA ITEM
5

OCTOBER 11, 2010

SET NEXT COMMITTEE MEETING

ITEM

Set next committee meeting [Set Date/Time].

BACKGROUND

The Committee usually meets on the Monday preceding the first Board meeting of the month as necessary.

RECOMMENDATION

Staff recommends that the Committee tentatively set a meeting at 2 pm on Monday, November 8, 2010. If staff does not have policy issues to bring to the committee at that time, the meeting can be deferred to the following month with Committee member concurrence.

ATTACHMENT- NONE