



July 30, 2014

Project No. 1301525

Mr. Phil Graham, Organics and Landfill Manager
Recology Yuba-Sutter/Feather River Organics
3001 North Levee Road
Marysville, CA 95901

RE: AMENDED COMPOST AREA LEACHATE COLLECTION WORK PLAN FOR FEATHER RIVER ORGANICS, RECOLOGY YUBA-SUTTER FACILITY, MARYSVILLE, CALIFORNIA

Dear Mr. Graham:

Golder Associates Inc. (Golder) is submitting this amendment to our January 31, 2014 Compost Area Leachate Collection Water Work Plan to address the management of compost leachate for the Feather River Organics (FRO) compost operations at the Recology Yuba Sutter (RYS) site. As described below, this work plan reflects and includes the conceptual design and schedule for upgrading the compost area leachate collection system to accommodate a 3.16-inch storm event as recommended by Brown and Caldwell (letter dated July 28, 2014, Attachment 1).

1.0 COMPOST AREA LEACHATE COLLECTION IMPROVEMENTS

Brown and Caldwell (July 28, 2014) evaluated three options for managing compost leachate for a 3.16-inch storm event, which corresponds to a 25-year, 24-hr storm event per California Department of Water Resources data. These options included: 1) storage of compost leachate; 2) discharge of compost leachate to the Marysville sewer system; and 3) a combination of storage and discharge to the City of Marysville (City) sewer system. Brown and Caldwell indicate that a potential restriction on discharge is the capacity of the sewer line, which the capacity has not been formally determined by the City. Therefore, Brown and Caldwell recommended Option No. 3 with the currently City-approved 65,000 gallon per day discharge rate.

Golder's hydrology calculations indicate that the total run-off from the approximately 11.4-acres of current compost operations is approximately 183,000 gallons for a 3.16-inch storm. Allowing for 65,000 gallons to be pumped to the City's sewer system, approximately 118,000 gallons of compost leachate will need to be temporarily stored, which can be accommodated by six (6) 21,000 gallon Baker tanks.

Figure 1 shows the proposed improvements to manage the compost leachate from a 3.16-inch storm. These generally include:

- Adding 3 Baker tanks to the 3 Baker tanks currently in use at FRO
- Extending a 4-inch pipeline along the north end of the compost facility to the sewer system discharge point near the RYS truck maintenance facility
- Adding a larger concrete vault in the Hog Farm area to convey compost leachate to the Baker tanks
- Adding two additional five horsepower pumps in the concrete vault
- Upsizing the existing pumps in the southern compost leachate collection vaults to convey larger leachate flows

Additional improvements to the electrical infrastructure may be required to operate the proposed pumps. Vacuum lysimeters will be installed within the upper 2 feet of the soil subgrade below each Baker tank to

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Golder Associates: Operations in Africa, Asia, Australasia, Europe, North America and South America

allow monitoring of the unsaturated zone on a quarterly basis. Attachment 2 includes Golder's hydrology calculations that support the above proposed compost water improvements.

2.0 SCHEDULE

The following schedule is proposed for the finalizing the design and constructing the upgraded storm water improvements:

- Complete Final Design – Week of August 11, 2014
- Start Construction – Week of August 18, 2014
- Complete the Improvements – October 1, 2014

3.0 SUMMARY

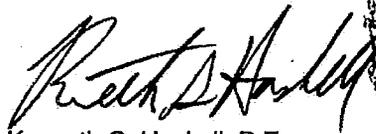
This submittal summarizes the proposed upgrades to the existing compost area leachate collection system to increase the capacity to accommodate FRO composting operations through a combination of on-site storage and discharge to the sewer system as recommended by Brown and Caldwell. Please call if you have any questions or need additional information.

Sincerely,

GOLDER ASSOCIATES INC.



Joel Kelsey
Project Engineer



Kenneth G. Haskell, P.E.
Principal / Practice Leader



Attachments: Attachment 1 – July 28, 2014 Brown and Caldwell Letter
Attachment 2 – Golder's Hydrology Calculations

cc: Drew Lehman - Recology
Jordan Norris – Recology
Ron Crites – Brown and Caldwell

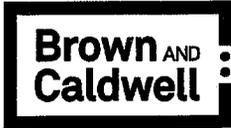
FIGURE

**ATTACHMENT 1
BROWN AND CALDWELL LETTER
DATED JULY 28, 2014**

1590 Drew Avenue, Suite 210
Davis, CA 95618

T: 530.747.0650
F: 530.297.7148

July 28, 2014



Mr. Drew Lehman
Director Environment & Planning
Recology
50 California Street, 24th Floor
San Francisco, California 94111-9796

1017-146499

Subject: Feather River Organics Stormwater Disposal Evaluation

Dear Mr. Lehman:

Brown and Caldwell (BC) is pleased to submit this stormwater disposal evaluation for Feather River Organics (FRO) at the Marysville site. This letter report provides background, a review of options, and recommendations for implementation.

Background

The California Regional Water Quality Control Board (Regional Water Board) regulates the Recology Yuba Sutter (RYS) landfill (including the Feather River Organics Compost facility) under Waste Discharge Requirements (WDRs) Order RS-2003-0093 and Cleanup and Abatement Order (CAO) RS-2013-0704 issued on August 29, 2013.

The FRO compost facility is approximately 16 acres in size, but the composting operations are limited to an area of 11.4 acres.

Pursuant to discussions with staff of the Regional Water Board, Recology is evaluating proposals to implement a system at the site that would be capable of handling compost water during the 25-year, 24-hour storm event.

Based on calculations provided by Golder Associates (Folder) using the Regional Water Board recommended DWR database, the 25-yr, 24-hr storm will produce 183,000 gallons per day (gpd) of runoff from the FRO composting operations. The purpose of this report is to recommend the best practicable solution for managing this runoff to achieve the Regional Water Board's stated goal of managing for the 25-yr, 24-hr event.

Review of Options

There are three options for managing the runoff:

1. Store the entire 183,000 gallons on site,
2. Discharge all of the compost stormwater to the City of Marysville sewer system on an ongoing basis throughout a storm event, or
3. Store a portion and discharge the remainder to the Marysville sewer system.

Option 1 – Storage

Golder has evaluated storage in either lined ponds or in free-standing Baker tanks. With respect to the use of tanks, to retain the 183,000 gallons from a 25-yr storm (DWR database) would require 10 Baker tanks of 20,000 gallons each. The stored water would need to be pumped from the tanks into the water truck and used as makeup water during non-rainy days and/or trucked to an onsite sewer manhole at the RYS site for discharge into the City of Marysville treatment system.

At present there are three Baker tanks on site at RYS collecting stormwater runoff in two different locations. One is located at the entrance to the FRO compost operation, and the remaining two are near the flare on the northeast portion of the site.

Option 2 – Management of FRO Discharge to Marysville Sewer System

The City of Marysville owns and operates a wastewater collection, treatment and disposal system. Wastewater is collected in the City of Marysville using a conventional gravity sewer system with pumping stations to lift the wastewater to the treatment plant.

The treatment plant (located on Bizz Johnson Road) is a secondary treatment plant featuring gravity primary clarifiers and tricking filters. The effluent is applied to rapid infiltration basins located near the Yuba and Feather Rivers.

The treatment plant is rated at 1.7 million gallons per day (mgd). Current dry weather flows average 1.3 mgd and peak wet-weather flows are up to 3 mgd. Future flows from the Marysville collection system will be pumped to the larger (5 mgd +) Linda County Water District system. A connecting pipeline has been designed and will be constructed in the next 2 to 3 years.

Under Option 2, compost runoff from FRO would be piped from the concrete vault and the free standing Baker tanks to an existing manhole onsite that is connected to the city sewer system. Compost runoff would be mixed with municipal wastewater and passed through three of the City's existing pumping stations to reach the treatment plant.

The limitation on the flow of compost runoff that the sewer system could accept has been determined by the City to be the sewer system itself, not the treatment plant. This is based on an analysis by David Lamon at the City of Marysville. The sewer system of East Marysville would need to be evaluated according to David Lamon, to determine the exact flow rate of compost area runoff that could be accepted into the system during a rain event (see Attachment 1).

Option 3 – Storage and Discharge

The third option is to store and discharge at the same time. By collecting, storing, and piping a portion of the runoff to the sewer throughout the course of a rain event, the net amount of on-site storage volume is reduced. After the storm recedes the stored water in Baker tanks would be pumped into the sewer at a fixed rate.

Using the City's previously approved 65,000 gpd flowrate for sewer discharge during storms; the net on-site storage required would be reduced to 118,000 gallons, which could be accommodated using six (6) Baker tanks during the rainy season.

Mr. Drew Lehman
Director Environment & Planning
Recology
July 28, 2014
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Recommendations for Implementation

Our recommended option is the simultaneous Storage and Discharge option #3. To implement this option the existing 3 (three) Baker tanks would be increased to 6 (six). Four tanks would accommodate the northern portion of the composting area and two tanks would be used on the southern portion.

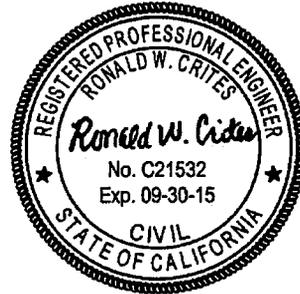
A 4-inch HDPE pipeline would be connected from the vault and Baker tanks to the sewer manhole in the northwest portion of the RYS site. Pumps and appurtenances would be added to accommodate the expected flows.

Very truly yours,

Brown and Caldwell

Ronald W. Crites

Ronald W. Crites
Project Manager



RWC:iu

Attachment:

- Attachment 1:
David Lamon, City of Marysville (personal communication, June 23, 2014)

From: David Lamon [mailto:dlamon@marysville.ca.us]
Sent: Wednesday, July 23, 2014 11:00 AM
To: skendall@recology.com; 'PGraham@recology.com'
Subject: Composting Runoff

I reviewed the possibility of the City accepting storm water runoff from the Recology composting area. We looked at both the water quality and potential quantity. There did not appear to be any issues with the water quality in terms of our ability to treat the runoff. The primary issue, as I indicated in our meeting, is the ability of the City system and treatment facility to treat an increased flow during a storm event.

We normally have an increase in influent flows at our plant as the result of a storm event due to inflow and infiltration into our system. We try to keep our I&I increased flow to 10-15% of dry weather flows. With a 100-year storm, the 24 hour rainfall would be 4.66". Over the 15 acre site, this would total 1.9 million gallons in a 24 hour period (MGD). The city's current dry weather flow is around 1.3 MGD. The only way we can accommodate such an increase in inflow to our system is to meter the runoff over an extended period of time.

Reviewing the rainfall information

([http://www.co.sutter.ca.us/pdf/pw/design_standards/DS8 Section 5 Storm Drainage Revision.pdf](http://www.co.sutter.ca.us/pdf/pw/design_standards/DS8_Section_5_Storm_Drainage_Revision.pdf)), it appears that the 100-year storm total rainfall peaks around 4-8 days duration. Extending the discharge to around 15 days, the storage capacity peaks around day 5 of the storm records. Very roughly, we came up with the following:

1. Using an estimated outflow rate of 0.75 acre-feet (AF) per day, the 100 year rainfall totals (per day) show a peak detention requirement around day 5 at about 7.6 AF. With a continued outflow of 0.75 AF per day, the detained storm water would discharge in another 10 days, for a total design flow period of 15 days.
2. Looking at the outflow of 0.75 AF per day, this would translate to 0.38 cfs. Our lines in East Marysville are generally 8" with an average slope of around 0.3%. Flow capacity would calculate at 0.67 cfs. This indicates that the added flow would be about 60% of the pipe capacity. If existing flows exceed 0.27 cfs (40% of capacity), then the outflow from the detention basin would have to be reduced (extended over a longer period) or adjusted during the day to avoid peak domestic flows.

This should give you some rough numbers to use in looking at your options. In order for the City to accept flows under the conditions outlined, we would have to model our flows in East Marysville to determine if the final proposed flow rate from Recology and the point of connection could be handled without exceeding our pipeline capacities.

Please let me know if we can provide any additional information.

David Lamon, PE
City Services Director
City of Marysville
530-749-3902

**ATTACHMENT 2
HYDROLOGY CALCULATIONS**

CALCULATION SHEET

Page 1 Of 3

Client Recology Subject FRO Compost Pad

Project Yuba Sutter/FRO Drainage

Prepared By JTK Date 7/30/14

Reviewed By KGH Date 7/30/14

Approved By KGH Date 7/30/14

Objective

Design an improved surface water collection system for the Feather River Organics (FRO) composting facility at the Recology Yuba Sutter (RYS) facility in Marysville, California to contain runoff for a 3.16-inch, 24-hour storm event with 65,000 gallons per day being disposed of to the publically owned treatment works (POTW) connection located near the entrance of the RYS facility.

Design Criteria and Assumptions

Runoff collected in Hog Farm vaults is pumped to 4, 21,000-gallon Baker tanks (Tank Storage 1). Runoff collected from either sump on the southern compost area is pumped to a 2, 21,000 Baker tanks (Tank Storage 2). Water collected at both tank storage locations will be pumped to the POTW via pumps with flow meters.

1. The EPA SWMM method was used to model the compost site runoff using Autodesk's Storm and Sanitary Analysis (SSA) software.
2. Approximately 40 percent of the area is covered by compost piles on the compost pad.
3. Evaluate the SCS Type I distribution for a 3.16-inch storm with a duration of 24-hours.
4. The compost pad will be regraded to a 3-percent grade to the northwest.

Calculations

Subbasin Delineations

Subbasins were delineated based on existing major features at the site that would divide runoff and based on continued regrading being performed at the site.

Curve Numbers

Curve numbers were estimated based on compost piles or compost products that are stored on the site. Weighted curve numbers were assigned based on areas of storage piles and the working surface. The composting operation pad consists of a low-permeability, clayey soil intermixed with either an aggregate base or crushed, recycled concrete to create a relatively low-permeability working surface. These soils are assumed to be a soil group "C" type. The soils types for the Curve numbers are summarized on table 1 below.

1301525 SSA Output Results.txt

Jun-01 0:00:00	0.05	0.22	92.22	0	10:54	0	0
Jun-02 0:00:00	0.05	0.25	91.25	0	10:54	0	0
Jun-03 0:00:00	0.13	0.55	89.55	0	10:59	0	0
Jun-07 0:00:00	11.10	37.07	124.07	0	11:05	0	0
Outlet_HF 0:00:00	0.04	0.20	88.54	0	11:01	0	0
Out-01 0:00:00	0.00	0.00	78.00	0	00:00	0	0
Out-04 0:00:00	0.00	0.00	0.00	0	00:00	0	0
Out-POTW1 0:00:00	0.00	0.00	92.00	0	00:00	0	0
Out-POTW2 0:00:00	0.00	0.00	92.00	0	00:00	0	0
2_Tanks_South 0:00:00	5.52	7.50	107.50	0	20:18	0	0
4-baker_tanks_HF 0:00:00	5.63	8.00	100.00	0	18:57	0	0
Jensen_Tank1_exist 0:00:00	1.68	4.16	83.16	0	11:05	0	0
Jensen_Vault2 0:00:00	1.39	2.00	78.00	0	11:34	0	0
SE_Sump 0:00:00	1.16	5.13	85.13	0	10:57	0	0
SW_Sump 0:00:00	1.02	2.04	82.04	0	10:22	0	0

Node Flow Summary

Node Peak ID Flooding Occurrence hh:mm	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days hh:mm	Maximum Time of Flooding Overflow cfs days
Jun-01	JUNCTION	0.20	0.20	0 10:48	0.00
Jun-02	JUNCTION	0.19	0.39	0 10:49	0.00
Jun-03	JUNCTION	0.22	0.61	0 10:54	0.00
Jun-07	JUNCTION	0.00	0.99	0 11:05	0.00
Outlet_HF	JUNCTION	0.00	0.61	0 11:00	0.00
Out-01	OUTFALL	0.00	0.00	0 00:00	0.00
Out-04	OUTFALL	0.00	0.00	0 00:00	0.00
Out-POTW1	OUTFALL	0.00	0.99	0 18:57	0.00
Out-POTW2	OUTFALL	0.00	0.36	0 20:18	0.00
2_Tanks_South	STORAGE	0.00	0.38	0 10:41	0.00
4-baker_tanks_HF	STORAGE	0.00	0.99	0 11:05	0.00
Jensen_Tank1_exist	STORAGE	0.00	0.61	0 11:01	0.00
Jensen_Vault2	STORAGE	0.00	0.44	0 11:05	0.00

1301525 SSA Output Results.txt

SE_Sump	STORAGE	0.22	0.22	0	10:30	0.00
SW_Sump	STORAGE	0.18	0.18	0	10:24	0.00

Storage Node Summary

Storage Node	Storage Node ID	Maximum Exfiltration Rate	Maximum Time of Max. Poned Exfiltration	Maximum Poned Exfiltration Volume	Maximum Total Exfiltrated Volume	Time of Max Poned Volume	Average Poned Volume	Average Poned volume
Outflow	Rate	Rate	Rate	Volume	Volume	days hh:mm	1000 ft ³	(%)
cfs	cfm	1000 ft ³ hh:mm:ss	1000 ft ³ hh:mm:ss	(%) 1000 ft ³	1000 ft ³			
2_Tanks_South	0.36	0.00	4.958 0:00:00	94 0.000	0 20:18	3.651	69	
4-baker_tanks_HF	0.99	0.00	10.572 0:00:00	94 0.000	0 18:57	7.434	66	
Jensen_Tank1_exist	0.65	0.00	0.367 0:00:00	55 0.000	0 11:05	0.137	21	
Jensen_Vault2	0.82	0.00	0.683 0:00:00	29 0.000	0 11:34	0.474	20	
SE_Sump	0.20	0.00	0.026 0:00:00	85 0.000	0 10:57	0.006	19	
SW_Sump	0.19	0.00	0.010 0:00:00	34 0.000	0 10:22	0.005	17	

Outfall Loading Summary

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-01	0.00	0.00	0.00
Out-04	0.00	0.00	0.00
Out-POTW1	13.64	0.21	0.99
Out-POTW2	9.79	0.19	0.36
System	5.86	0.40	1.33

Link Flow Summary

Link ID	Design Ratio of	Element Ratio of Type	Time of Total Peak Flow Reported	Maximum Velocity	Length Factor	Peak Flow during
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1301525 SSA Output Results.txt

Flow Capacity	Maximum /Design Flow	Maximum Depth	Flow	Time Occurrence	Condition	Attained	Analysis	
cfs	cfs	ft	minutes	days hh:mm		ft/sec	cfs	
Link-04	4.31	0.05	CONDUIT	0	10:54	1.14	1.00	0.20
				0	Calculated			
Link-05	6.48	0.06	CONDUIT	0	10:54	1.17	1.00	0.39
				0	Calculated			
Link-09	6.83	0.09	CONDUIT	0	11:00	1.52	1.00	0.61
				0	Calculated			
Link-11	31.21	0.02	CONDUIT	0	11:01	3.82	1.00	0.61
				0	Calculated			
Link-14	38.75	0.01	CONDUIT	0	11:05	4.01	1.00	0.44
				0	Calculated			
pipe_Vault-to-tank	2.50	0.39	CONDUIT	0	11:05	6.54	1.00	0.99
				0	Calculated			
Pump-08		0.85	PUMP	0	11:27			0.82
				128				
Pump-10		0.00	PUMP	0	00:00			0.00
				0				
Pump-Exist		1.00	PUMP	0	10:26			0.21
				887				
SE_Sump_Pump		0.94	PUMP	0	10:50			0.20
				451				
SW_Sump_Pump		0.91	PUMP	0	10:06			0.19
				329				
orifice-01		0.00	ORIFICE	0	00:00			0.00
orifice-02		0.00	ORIFICE	0	00:00			0.00
Weir-01		0.00	WEIR	0	20:18			0.36
Weir-02		0.01	WEIR	0	18:57			0.99

Flow Classification Summary

Link	--- Fraction of Time in Flow Class ---							Avg. Froude Number	Avg. Flow Change
	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit		
Link-04	0.63	0.02	0.00	0.35	0.00	0.00	0.00	0.16	0.0000
Link-05	0.59	0.04	0.00	0.37	0.00	0.00	0.00	0.10	0.0000
Link-09	0.21	0.38	0.00	0.41	0.00	0.00	0.00	0.17	0.0000
Link-11	0.21	0.00	0.00	0.00	0.00	0.00	0.79	0.68	0.0000
Link-14	0.73	0.00	0.00	0.00	0.00	0.00	0.27	0.55	0.0000
pipe_Vault-to-tank	0.22	0.48	0.00	0.00	0.00	0.30	0.00	0.22	0.0013

Highest Continuity Errors

Node Jun-07 (1.73%)

1301525 SSA Output Results.txt

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link Pump-Exist (2)
Link pipe_Vault-to-tank (2)

Routing Time Step Summary

Minimum Time Step	:	2.00 sec
Average Time Step	:	2.00 sec
Maximum Time Step	:	2.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.11

WARNING 108 : Surcharge elevation defined for Junction Jun-07 is below junction maximum elevation. Assumed surcharge elevation equal to maximum elevation.

WARNING 110 : Initial water surface elevation defined for Storage Node Jensen_Vault2 is below storage node invert elevation.
Assumed initial water surface elevation equal to invert elevation.

Analysis began on: Mon Jul 28 13:06:51 2014
Analysis ended on: Mon Jul 28 13:06:54 2014
Total elapsed time: 00:00:03

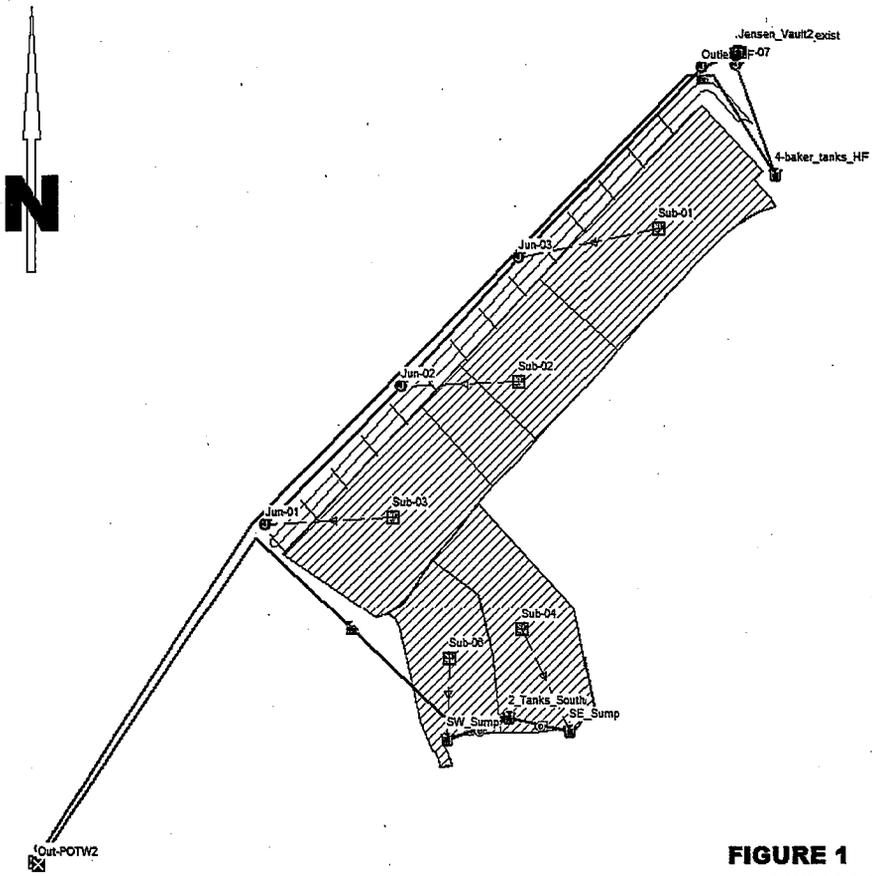


FIGURE 1
FEATHER RIVER ORGANICS
SUB-BASIN DRAINAGE MAP

CALCULATION SHEET

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Client Recology

Subject FRO Compost Pad

Project Yuba Sutter/FRO

Drainage _____

Prepared By JTK

Date 7/30/14

Reviewed By KGH

Date 7/30/14

Approved By KGH

Date 7/30/14

Table 1 – Runoff Curve Numbers

Area I.D.	Area (%)	Surface Type	Soil Group	Individual Curve Number	Weighted Curve Number (CN)
Sub-01	60	Compacted Low-permeability soil surface	C	87	52.6
	40	Compost Pile	N/A	1	
Sub-02	60	Compacted Low-permeability soil surface	C	87	52.6
	40	Compost Pile	N/A	1	
Sub-03	60	Compacted Low-permeability soil surface	C	87	52.6
	40	Compost Pile	N/A	1	
Sub-04	60	Compacted Low-permeability soil surface	C	87	52.6
	40	Compost Pile	N/A	1	
Sub-06	60	Compacted Low-permeability soil surface	C	87	52.6
	40	Compost Pile	N/A	1	

Time of Concentration

The time of concentration for each subbasin was calculated within the SSA model using the EPA SWMM method as follows:

$$T_c = (0.94 * (L^{0.6}) * (n^{0.6})) / ((i^{0.4}) * (S^{0.3}))$$

Where:

T_c = Time of Concentration (min)

L = Flow Length (ft)

n = Manning's Roughness

i = Rainfall Intensity (in/hr)

S = Slope (ft/ft)

The SSA output files include the time of concentration calculations and are provided with this calculation attachment.

Rainfall Depths

A SCS Type I, 3.16-inch storm, 24-hour storm was modeled to estimate runoff for the compost pad and product storage areas. Table 2 shows estimated runoff depths for each area and total volume calculations based on the area of each subbasin

CALCULATION SHEET

Page 3 Of 3

Client Recology Subject FRO Compost Pad

Project Yuba Sutter/FRO Drainage

Prepared By JTK Date 7/30/14

Reviewed By KGH Date 7/30/14

Approved By KGH Date 7/30/14

Table 2 – Runoff Volume Calculations

Description	Area (sf)	Runoff Depth for a 3.16-inch, 24-hour type I SCS storm (in.)	Runoff Volume (Gal.)
Sub-01	125,246	0.59	46,067
Sub-02	98,349	0.59	36,174
Sub-03	109,045	0.59	40,108
Sub-04	94,162	0.60	35,221
Sub-06	67,889	0.60	25,394
Total Area Runoff =			182,964

As shown in Table 2 above, approximately 183,000 gallons of runoff will need to be managed for a 24-hour period for the design storm event. Allowing for 65,000 gallons of discharge to the POTW equals a total of approximately 118,000 gallons that will need to be stored for short-term duration. To store 118,000 gallons, a total of 6 Baker tanks will be required. The site already maintains three (3), 21,000 gallon capacity Baker tanks on site therefore, three (3) additional tanks with the same capacity will be required.

Conclusions

Golder modeled the system and concluded that the following improvements will need to be implemented for the site to be able to manage runoff for the design storm event:

1. Add a total of three (3) additional, 21,000 gallon capacity Baker tanks
2. Add a second vault within the Hog Farm and include two additional, 5-hp pumps
3. Add 4-inch diameter pipes from each tanks storage area that route water to the POTW
4. Include pump controls at each tank storage area with flow meters which will allow FRO to discharge 65,000 gpd maximum.
5. Connect each 6-inch diameter pipe from the northwestern berm to an 18-inch diameter pipe routed in the existing ditch. Connect the 18-inch diameter pipe to the existing vault at the Hog Farm.
6. Reroute the existing 24-inch diameter corrugate metal pipe from discharging into the existing Hog Farm vault to the relocated riprap pad (This pipe will only carry stormwater runoff from areas other than the compost pad)

Project Description

File Name Discharge POTW 3pt16event r2.SPF

Analysis options

Flow Units cfs
 Subbasin Hydrograph Method. EPA SWMM
 Infiltration Method SCS Curve Number
 Link Routing Method Hydrodynamic
 Storage Node Exfiltration.. None
 Starting Date OCT-20-2013 00:00:00
 Ending Date OCT-22-2013 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:05:00
 Wet Time Step 00:05:00
 Dry Time Step 01:00:00
 Routing Time Step 2.00 sec

Element Count

Number of rain gages 1
 Number of subbasins 5
 Number of nodes 15
 Number of links 15
 Number of pollutants 0
 Number of land uses 0

Subbasin Summary

Subbasin ID	Total Area ft²	Equip. width ft	Imperv. Area %	Average Slope %	Raingage
Sub-01	125246.39	311.60	0.00	3.0000	-
Sub-02	98348.50	308.48	0.00	3.0000	-
Sub-03	109044.70	321.23	0.00	3.0000	-
Sub-04	94161.79	500.00	0.00	3.0000	-
Sub-06	67889.08	500.00	0.00	3.0000	-

Node Summary

Node	Element	Invert	Maximum	Ponded	External
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1301525 SSA Output Results.txt

ID	Type	Elevation ft	Elev. ft	Area ft ²	Inflow
Jun-01	JUNCTION	92.00	94.00	0.00	
Jun-02	JUNCTION	91.00	93.00	0.00	
Jun-03	JUNCTION	89.00	91.00	0.00	
Jun-07	JUNCTION	87.00	200.00	0.00	
Outlet_HF	JUNCTION	88.34	91.34	0.00	
Out-01	OUTFALL	78.00	85.00	0.00	
Out-04	OUTFALL	0.00	7.00	0.00	
Out-POTW1	OUTFALL	92.00	100.50	0.00	
Out-POTW2	OUTFALL	92.00	100.00	0.00	
2_Tanks_South	STORAGE	100.00	108.00	0.00	
4-baker_tanks_HF	STORAGE	92.00	100.50	0.00	
Jensen_Tank1_exist	STORAGE	79.00	86.00	0.00	
Jensen_Vault2	STORAGE	76.00	83.00	0.00	
SE_Sump	STORAGE	80.00	86.00	0.00	
SW_Sump	STORAGE	80.00	86.00	0.00	

Link Summary

Link Manning's ID Roughness	From Node	To Node	Element Type	Length ft	Slope %
Link-04 0.0150	Jun-01	Jun-02	CONDUIT	446.1	0.2242
Link-05 0.0150	Jun-02	Jun-03	CONDUIT	395.3	0.5060
Link-09 0.0150	Jun-03	Outlet_HF	CONDUIT	540.0	0.1213
Link-11 0.0240	Outlet_HF	Jensen_Tank1_exist	CONDUIT	40.0	6.4875
Link-14 0.0240	Jensen_Tank1_exist	Jensen_Vault2	CONDUIT	20.0	10.0000
pipe_Vault-to-tank 0.0150	4-baker_tanks_HF	Jun-07	CONDUIT	260.7	6.1364
Pump-08	Jensen_Vault2	Jun-07	TYPE3 PUMP		
Pump-10	Jensen_Vault2	Jun-07	TYPE3 PUMP		
Pump-Exist	Jensen_Tank1_exist	Jun-07	TYPE3 PUMP		
SE_Sump_Pump	SE_Sump	2_Tanks_South	TYPE3 PUMP		
SW_Sump_Pump	SW_Sump	2_Tanks_South	TYPE3 PUMP		
Orifice-01	Jensen_Vault2	Out-01	ORIFICE		
Orifice-02	Jensen_Vault2	Out-04	ORIFICE		
Weir-01	2_Tanks_South	Out-POTW2	WEIR		
Weir-02	4-baker_tanks_HF	Out-POTW1	WEIR		

Cross Section Summary

Link Full Flow ID Hydraulic Radius	Shape Design Flow Capacity	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft ²
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ft cfs

Link	Structure	ft	cfs		
Link-04	CIRCULAR	1.50	1.50	1	1.77
0.38	4.31				
Link-05	CIRCULAR	1.50	1.50	1	1.77
0.38	6.48				
Link-09	CIRCULAR	2.00	2.00	1	3.14
0.50	6.83				
Link-11	CIRCULAR	2.00	2.00	1	3.14
0.50	31.21				
Link-14	CIRCULAR	2.00	2.00	1	3.14
0.50	38.75				
pipe_vault-to-tank	FORCE_MAIN	0.50	0.50	1	0.20
0.13	2.50				

	Volume acre-ft	Depth inches
***** Runoff Quantity Continuity *****		
Total Precipitation	2.991	3.160
Evaporation Loss	0.000	0.000
Infiltration Loss	2.392	2.527
Surface Runoff	0.563	0.595
Final Surface Storage	0.036	0.038
Continuity Error (%)	-0.001	

	Volume acre-ft	Volume Mgallons
***** Flow Routing Continuity *****		
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.563	0.184
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.186	0.061
Surface Flooding	0.000	0.000
Evaporation Loss	0.000	0.000
Initial stored volume	0.000	0.000
Final stored volume	0.372	0.121
Continuity Error (%)	0.784	

Composite Curve Number Computations Report

Subbasin sub-01

Soil/Surface Description CN	Area (ft ²)	Soil Group

COMPACT_CLAYEY-LOAM_SOIL (ACCESS_ROAD)	71269.67	-
87.00		
COMPOST_PILE	47513.14	-
1.00		
Composite Area & Weighted CN	118782.81	

1301525 SSA Output Results.txt

52.60

Subbasin Sub-02

Soil/Surface Description CN	Area (ft ²)	Soil Group

COMPACT_CLAYEY-LOAM_SOIL (ACCESS_ROAD)	54911.12	-
87.00		
-	36607.41	-
1.00		
Composite Area & weighted CN	91518.54	
52.60		

Subbasin Sub-03

Soil/Surface Description CN	Area (ft ²)	Soil Group

COMPACT_CLAYEY-LOAM_SOIL (ACCESS_ROAD)	61224.20	-
87.00		
-	40816.12	-
1.00		
Composite Area & weighted CN	102040.33	
52.60		

Subbasin Sub-04

Soil/Surface Description CN	Area (ft ²)	Soil Group

Dirt roads	58583.48	C
87.00		
-	39055.65	-
1.00		
Composite Area & weighted CN	97639.13	
52.60		

Subbasin Sub-06

Soil/Surface Description CN	Area (ft ²)	Soil Group

Dirt roads	41220.57	C
87.00		
-	27480.41	-
1.00		

 EPA SWMM Time of Concentration Computations Report

$$T_c = (0.94 * (L^{0.6}) * (n^{0.6})) / ((i^{0.4}) * (S^{0.3}))$$

where:

Tc = Time of Concentration (min)
 L = Flow Length (ft)
 n = Manning's Roughness
 i = Rainfall Intensity (in/hr)
 S = Slope (ft/ft)

 Subbasin Sub-01

Flow length (ft):	401.96
Pervious Manning's Roughness:	0.10000
Impervious Manning's Roughness:	0.01500
Pervious Rainfall Intensity (in/hr):	0.13167
Impervious Rainfall Intensity (in/hr):	0.13167
Slope (%):	3.00000
Computed TOC (minutes):	55.58

 Subbasin Sub-02

Flow length (ft):	318.83
Pervious Manning's Roughness:	0.10000
Impervious Manning's Roughness:	0.01500
Pervious Rainfall Intensity (in/hr):	0.13167
Impervious Rainfall Intensity (in/hr):	0.13167
Slope (%):	3.00000
Computed TOC (minutes):	48.36

 Subbasin Sub-03

Flow length (ft):	339.47
Pervious Manning's Roughness:	0.10000
Impervious Manning's Roughness:	0.01500
Pervious Rainfall Intensity (in/hr):	0.13167
Impervious Rainfall Intensity (in/hr):	0.13167
Slope (%):	3.00000
Computed TOC (minutes):	50.22

 Subbasin Sub-04

Flow length (ft):	188.33
Pervious Manning's Roughness:	0.10000
Impervious Manning's Roughness:	0.01500
Pervious Rainfall Intensity (in/hr):	0.13167
Impervious Rainfall Intensity (in/hr):	0.13167

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Slope (%): 3.00000
 Computed TOC (minutes): 35.26

 Subbasin Sub-06

Flow length (ft): 135.78
 Pervious Manning's Roughness: 0.10000
 Impervious Manning's Roughness: 0.01500
 Pervious Rainfall Intensity (in/hr): 0.13167
 Impervious Rainfall Intensity (in/hr): 0.13167
 Slope (%): 3.00000
 Computed TOC (minutes): 28.98

 Subbasin Runoff Summary

Subbasin Runoff ID Coefficient	Time of Concentration hh:mm:ss	Total Rainfall in	Total Runon in	Total Evap. in	Total Infil. in	Total Runoff in	Peak Runoff cfs
Sub-01 0.186	0 00:55:34	3.16	0.00	0.00	2.53	0.59	0.22
Sub-02 0.188	0 00:48:21	3.16	0.00	0.00	2.53	0.59	0.19
Sub-03 0.187	0 00:50:13	3.16	0.00	0.00	2.53	0.59	0.20
Sub-04 0.190	0 00:35:15	3.16	0.00	0.00	2.53	0.60	0.22
Sub-06 0.191	0 00:28:58	3.16	0.00	0.00	2.51	0.60	0.18

 Node Depth Summary

Node Retention ID Time	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days hh:mm	Total Flooded Volume acre-in	Total Time Flooded minutes
hh:mm:ss						