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CONTAINMENT AREA FOR COMPOST PROCESSING OPERATIONS PLAN

Agromin- Commercial Organics Processing Operation
South end of Edwards Ranch Road
Santa Paula, CA 93060

February 2017

Prepared for:	Agromin 201 Kinetic Drive Oxnard, California 93030
Prepared by:	Sespe Consulting, Inc. 374 Poli Street, Suite 200 Ventura, California 93001

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Agromin
Commercial Organics Processing Operation
Santa Paula, CA

February 2017

TABLE OF CONTENTS

FIGURES

- Site Location
- Site Plan
- Process Flow
- Utility Plan

ATTACHMENTS

1. Recommendations for Cement Treatment in Composting Areas, Earth Systems, February 19, 2016
2. Drainage Area Map

CONTAINMENT AREA FOR COMPOST PROCESSING OPERATIONS PLAN

Commercial Organics Processing Operation
Santa Paula, CA

A. GENERAL INFORMATION

This Containment Area for Compost Processing Operations Plan (Plan) was prepared in accordance with the Ventura County Watershed Protection District's (VCWPD) standard permit condition of approval for composting facilities. The plan addresses two primary issues:

- Preventing site inundation during a 100-year storm event.
- Providing impermeable surfaces for working areas to protect groundwater.

Agromin is requesting the issuance of a Conditional Use Permit (CUP) for a new 70 acre Commercial Organics Processing Operation (Project) in an unincorporated area of Ventura County, near the City of Santa Paula. The Project would include composting of green material in open windrows and composting of green and food materials in covered aerated static piles (CASP) and in enclosed anaerobic digestion (AD) systems.

The total expected Project life is a minimum of 50 years.

Business Name: Agromin Inc.

Site Address: Agromin Inc.
South end of Edwards Ranch Road
Santa Paula, CA 93060
(see attached Site Location map)

Business Contact: Bill Camarillo
Agromin Inc.
201 Kinetic Drive
Oxnard, CA 93030
Telephone: (805) 485-9200
bcamarillo@agromin.com

Property Owners / Parcel Numbers: The project is located on one large parcel:

Parcel Number (acres)	Property Owner / Mailing Address
090-0-180-085 (452.741 ac.)	Limoneira Company / 1141 Cummings Road, Santa Paula, CA 93060

B. OPERATIONS INFORMATION

1. Operating Hours:

Proposed hours of operation will vary depending on the Project operation:

Operation	Employee Shift	Shifts per Day	Days per Week
Waste Receiving	7:00 AM to 5:00 PM	1	Mon.-Sat.
Material Processing Buildings	6:00 AM to 3:00 PM 3:00 PM to 10:00 PM	2	7
Packaging Building	6:00 AM to 3:00 PM 3:00 PM to 10:00 PM	2	Mon.-Sat.
Maintenance	7:00 AM to 5:00 PM	1	Mon.-Sat.
Outdoor Processing	sunrise to sunset	1 or 2	7
Office	7:00 AM to 5:00 PM	1	5

2. Types, Sources and Quantity of Feedstock

INCOMING FEEDSTOCK	EXPECTED ANNUAL QUANTITY[1] (tons/year)	SOURCE EXAMPLES
Food material including vegetative food material	65,500	Primarily pre-consumer food material from grocery stores, food processing facilities, restaurants, etc.
Green Material (including agricultural by-product material, agricultural material, paper products, wood waste, yard trimmings)	229,500	Clean lawn & landscape cuttings (grass, leaves, branches, plants, etc.) picked up from residential customers (yard waste can). Green material separated from other municipal solid waste at an MRF. Clean green and wood material generated by farmers, commercial landscaping companies and other contractors.
Total:	295,000	

1 – Actual incoming feedstock quantity mix depends on market conditions.

3. Site Operations:

Operations proposed to be conducted at the facility are (see the attached Site Plan):

- ***Feedstock Receiving:*** Green and food material will be delivered to the site in commercial collection vehicles, trucks and roll-off bins. An attendant will be on site during operating hours to visually check loads for prohibited materials. Loads with excessive contaminants will be rejected before being allowed past the scale house. The incoming material will be weighed at the scale house and then unloaded, processed, screened, and sorted inside two (2), 80,925 square foot buildings. One building will process green material while the other will exclusively process food material. Both buildings will have similar designs, with:

    - Tipping areas where delivery trucks will deposit the organic materials
    - Trommel screens (pre-screens) that will remove oversized material.
    - Picking conveyors where unwanted trash such as glass, film plastics and metals will be removed. These conveyors will also use magnets to remove metals.

Contaminants removed from the feedstock will be placed in a roll off trash bin and ultimately taken to Simi Valley landfill for disposal.
- o A grinder to reduce the incoming material to the appropriate size for composting.
- o A blending pad will be utilized in the food material building to blend the food material with green material at the appropriate ratio for use in either the Covered Aerated Static Piles (CASP) or Anaerobic Digesters (AD).

These buildings will protect the feedstock materials from rain contact. Please refer to the attached Process Flow Diagram and Site Plan for more detail.

- ***Windrow Composting Process*:** After grinding, the green material will be placed into windrows for composting. Green material will be composted in the designated paved areas or areas treated with soil cement to achieve the appropriate soil hydraulic conductivity for working areas in compost operations of 1.0×10^{-5} cm/s or less (see Section D below). The composting process goes through two stages before a finished compost is produced:

  - o Active composting - An aerobic process where the compost feedstock is in the process of being rapidly decomposed and is unstable. Active compost generates temperatures of at least 122 degrees Fahrenheit during decomposition. This process requires that the material be maintained at a proper moisture level and be frequently turned in order to introduce oxygen to the material.

  - o Curing - Following the active composting period, the material is moved into curing piles for additional aging and drying. This curing process allows partly decomposed compost particles to finish the composting process at a lower temperature.

  NOTE: Open windrow composting of food material is not conducted.

  After curing, the stabilized compost will be processed with a trommel screen, which separates the larger pieces and fines from the finished product to achieve the desired final compost product. Once the stabilized compost is screened it is either transferred offsite in bulk for sale, or is bagged on-site and then transferred offsite for sale. It may also be blended with amendments prior to sale. Bagging occurs indoors in the 23,107 square foot production/packaging building which houses a Hamer FFS Bagging System. This is an electric powered bagging system consisting of a feed hopper, a conveyor system and a bagging line.

  Runoff from the composting and curing areas will be diverted to two (2) water drainage retention ponds located on the south, down gradient, edge of the Project site. See Site Planfor more detail.

- ***CASP System:*** A portion of the food material received by the facility will be processed in covered aerated static piles (see Site Plan). The CASP method of composting will utilize food material which is blended with green materials to no more than 40% food material. The CASP system will be constructed atop concrete pavement which will be sloped to collect any runoff. This runoff will be reintroduced it to the piles to maintain moisture.

- ***Dry Anaerobic Digestion Systems:*** The proposed Project involves the installation of dry anaerobic digesters. The AD's are enclosed composting systems that transform a mixture of 60% food material and 40% green material into biogas during a 21-day batch process. The

biogas will be collected in an external biogas storage bladder and sent to combined heat and power systems (IC engines) that will burn the biogas to generate electricity. The AD's will be situated atop concrete pavement.

- ***Products and Product Sales:*** The facility will produce three primary products, all of which will be transferred to the west side of the Project site for sale or for bagging in the packaging building. These products include:

    - Stabilized cured compost - As needed amendments may be added to the compost on a mixing pad.

    - Mulch - There is currently no statutory or regulatory definition for mulch. It is commonly defined as a soil covering used to control weeds or erosion; retain moisture in soil; and insulate soil from cold weather. The mulch produced at the facility will generally be comprised of wood chips, ground up landscape trimmings, shredded bark and coarse compost material.

    - Chipped wood sold as biomass fuels.

    Amendment materials that may be added to "stabilized or cured" compost to provide attributes for certain finished compost products or may be sold along with compost based products produced at the facility. Amendments currently utilized by Agromin include but are not limited to:

    - Apex T & S 24·4·12
    - Landscape Color 14·14·14
    - Bloom 14-14-14
    - Triple Super Phosphate 0·4S·O
    - Blood Meal 13-0-0
    - Potassium Nitrate 13-0-46
    - Urea (46·0·0)
    - Ammonium Phosphate 16-20·0
    - Gypsum (80 & SO lbs)
    - Dolomite Lime
    - Triple Pro Best lS ·lS·lS
    - Cool Weather 21·7·6
    - Hydroprills 21-7-14
    - Rootshield Granular
    - Sulfur Coated Urea 2S·8·8
    - 6·24·24 XB
    - Sulfur Soil Prills
    - Palm Plus 13-S-8
    - Calcium Nitrate lS·O·O
    - Hydroform Blue Chip 38·0·0
    - EZ Green Chicken Fertilizer
    - Bone Meal 2.S-12·0
    - Gro Power S-3·1
    - Gro Power Plus S-3·1
    - Turf Supreme 16·6·8
    - Ferrous Sulfate 21%
    - Organic Crumbles 7-8·4
    - Zinc Sulfate 36% Granular
    - Ammonia Sulfate 21·0·0
    - Sulfur of Potash 0-0-5O

These amendments will be stored inside the packaging building (see Site Plan).

Bulk materials will also be delivered by vendor trucks and directly unloaded into the appropriate outdoor storage bins located on the west side of the Project site.

- Peat Moss
- Perlite (volcanic glass)
- Gypsum
- Washed Sand

- o Vermiculite
- o Pumice
- o Scoria (basaltic lava rock)
- o Ground Bark
- o Decomposed Granite
- o Pea gravel
- o Rock

C. SITE CONDITION INFORMATION

1. Average Rainfall:

Average Annual Precipitation[1] (inches/year)	25-Year, 24-Hour Storm Event (inches)[2]	100-Year, 24-Hour Storm Event (inches)[2]
16.48	6.08	7.52

Sources:
1. NOAA, 2016b. National Centers for Environmental Information, Data Tools: 1981-2010 Normals, Annual/Seasonal Normals, Ventura, CA US.
2. NOAA, 2016c. Atlas 14 Point Precipitation Frequency Estimates, Santa Paula, CA.

Nearby Climate Station Name: Station name: SANTA PAULA-LIMONEIRA RAN (approx. 2 miles north of the facility).

2. Geology:

(Source: "Geotechnical Engineering Report, for Proposed Biogenic Energy Park, Edwards Ranch Road, Santa Paula Area Of Ventura County, California", Earth Systems, April 2014)

Soil Types: *"Based on the test borings drilled at the subject site, alluvial deposits were typically encountered to the maximum depths explored, with the exception of Borings B-3 and B-7. Artificial (undocumented) fill was encountered to depths ranging from approximately 18 feet below existing site grade in Borings B-3 and 5 feet in Boring B-7."*

"The undocumented fill encountered in the test borings consisted of soft to stiff, sandy to clayey silts and soft to medium stiff, sandy to silty clays."

"The alluvial soils encountered in our test borings were indicative of typical overbank stream deposits characterized by interbedded, discontinuous strata of silts, clays, sands, and gravels generally stratified planar to the ground surface. A zone of cobbles within a sand matrix was encountered in Boring B-2 between the depths of 37 and 39 feet below the existing ground surface. Thin lenses of fine grained soil were observed scattered throughout the coarser grained strata, and vice-versa, as a result of varying energies at the time of deposition."

Groundwater Depth: Groundwater in this subbasin is largely unconfined with groundwater flow generally to the southwest (CDWR, 2006). Groundwater was reported to be encountered between 20.5 and 25 feet below ground surface in 2014 during geotechnical borings conducted at the Site (Earth Systems, 2014). This corresponds to groundwater elevations of approximately 158 to 165 feet above mean sea level.

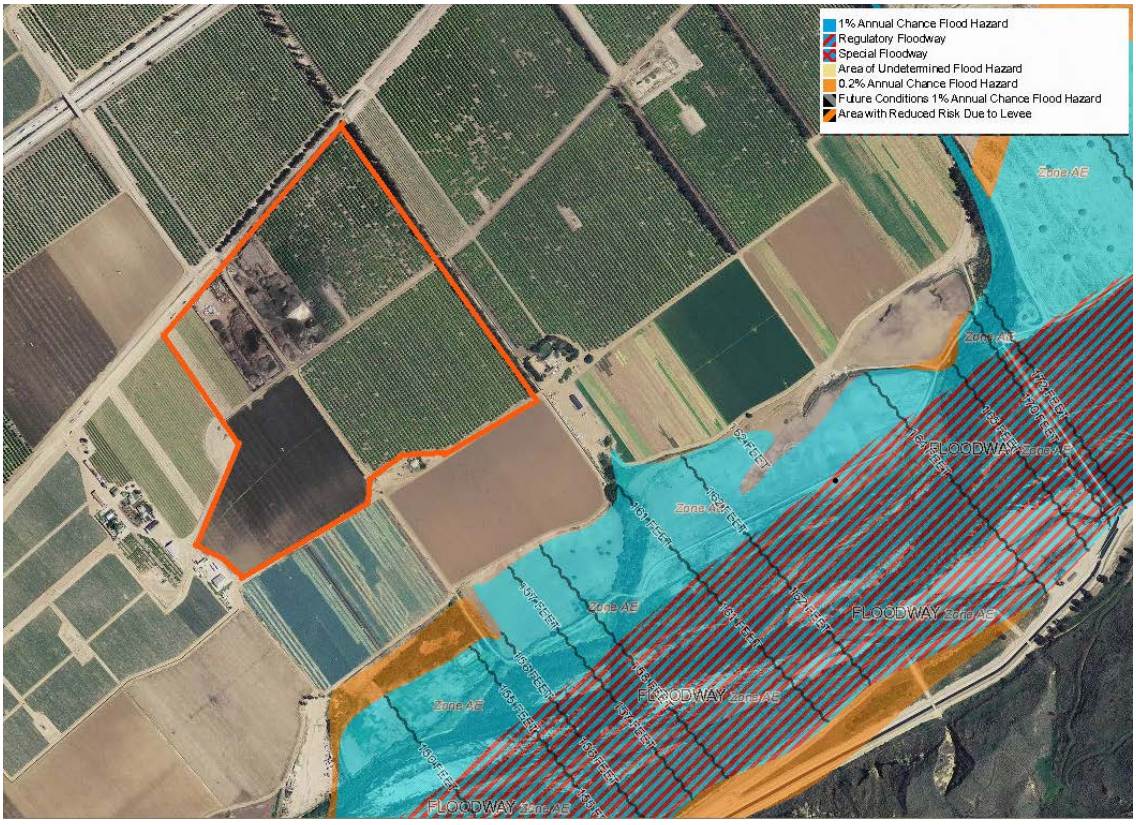
Nearest Surface Water: The Santa Clara River is located roughly 0.25 miles south of the southern boundary of the proposed Project site..

3. Nearest Water Supply Well:

The nearest the nearest active water supply well is Limoneira owned water well 03N21W30H05S located roughly 4,000 feet northeast of the Project site.

4. Federal Emergency Management Agency (FEMA) 100-Year Floodplain:

The facility is not located within a 100-year flood plain according to the FEMA Flood Map.



Screenshot from Ventura County Watershed Protection District, FEMA Flood Hazard Map
http://www.vcwatershed.net/publicMaps/crs/

D. DESIGN INFORMATION

1. Potential Impacts to Groundwater Quality:

According to the State Water Resources Control Board Order WQ 2015-0121-DWQ General Waste Discharge Requirements for Composting Operations:

- Compostable materials may contain nutrients, metals, salts, pathogens, and oxygen-reducing compounds that can degrade water quality if allowed to migrate into groundwater or surface water. The process of composting can allow contaminants to migrate with leachate or wastewater from these materials. Additionally, composting nutrient-rich feedstocks on more permeable soil has the potential to create elevated nitrate concentrations in groundwater.

- Composting operations have the potential to degrade water quality with nutrients (e.g., nitrate), salinity (e.g., sodium chloride), pathogens, oxygen-reducing materials, sediment, and other waste constituents.

- Composting operation setbacks from water supply wells and surface water bodies are provided in this General Order. Setbacks are included as a means of reducing pathogenic risks by coupling pathogen inactivation rates with groundwater travel time to a well or other potential exposure route (e.g. water contact activities). Composting operations shall be setback at least 100 feet from the nearest surface water body and/or the nearest water supply well.

2. Facility Designs to Protect Groundwater and Surface Waters

The primary strategies to control infiltration of wastewater into groundwater or runoff to surface waters include:

- Reducing the permeability of areas where compostable materials are stored or composted.
- Designing the facility to convey drainage to a detention pond system located at the southern, downslope side of the facility. Reducing the permeability of detention ponds.
- Maintaining WDR required setbacks.

Impermeable Surfaces: The State Water Resources Control Board Waste Discharge Requirement (WDR) for Composting Operations, Order WQ 2015-0121-DWQ, adopted on August 4, 2015, requires the soil hydraulic conductivity for working areas in compost operations of this type (Tier II facility) to meet 1.0×10^{-5} cm/s or less. The facility will be constructed such that all process area working surfaces will be paved or underlain with engineered low permeability soils meeting the WDR requirements of a hydraulic conductivity of 1×10^{-5} cm/sec or less. Soil stabilization using a mixture of native soils and Portland Cement Concrete may be used to achieve the 1.0×10^{-5} cm/s requirement. See the Site Plan for the proposed working surface areas.

Detention Ponds: Through a combination of site grading and a subsurface drain system, storm water runoff from working surfaces will be directed to water retention ponds proposed to be installed at the south boundary of the Project at the downslope side of the facility (see Site Plan). The water retention ponds will be designed with liners meeting the WDR requirements of a hydraulic conductivity of 1×10^{-6} cm/s. As required by the WDR, the ponds will be designed to

manage a 25-year 24-hour storm event.

Setbacks: As required under the WDR, the facility will be designed to maintain composting operations at least 100 feet from the nearest surface water body and/or the nearest water supply well.

3. Facility Designs to Prevent Wastewater Runoff and Site Inundation:

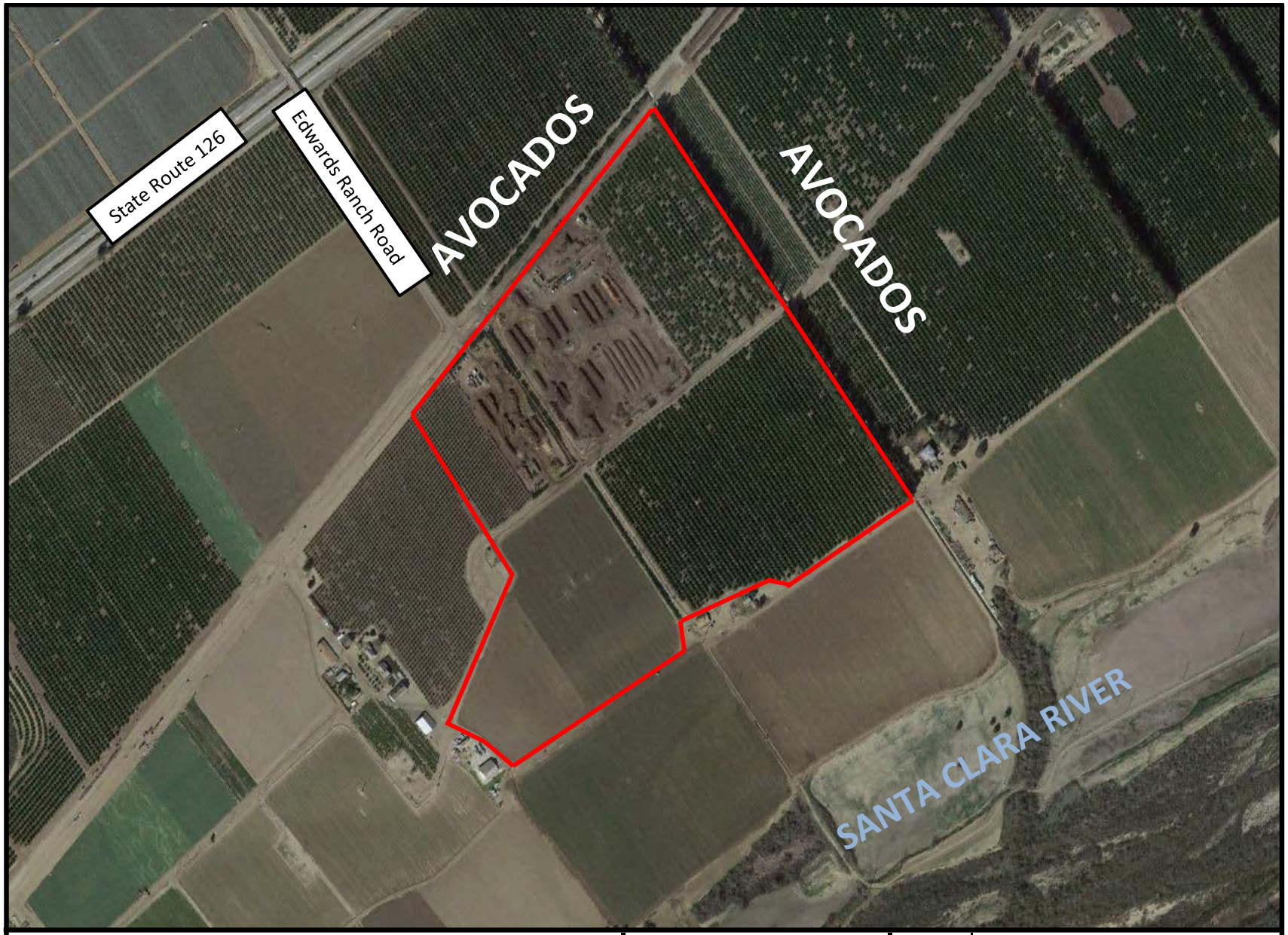
During construction the site will be graded to direct process water and storm water runoff to collection points throughout the site that will drain via a subsurface drain system to detention ponds located at the south side of the facility. Water collected will be used to supplement water used in the composting process.

The site has also been designed to allow offsite flows to bypass around the site which will prevent site inundation during a 100 year storm event (VCWPD requirement). Based on local topography, run on could occur from properties located to the north. On its northern boundary, the site is protected from run on by elevated railroad tracks. Local culverts under the tracks allow the water to migrate to the south via storm drain channels. These channels pass through the site directing water south towards the Santa Clara River:

- *Easterly Concrete Channel:* The existing improved concrete drainage channel along the easterly border conveys off-site drainage water through the site. On-site drainage water will not drain into this channel, and no changes to the channel or flow in the channel is proposed.

- *Westerly Channel:* The current drainage channel through the westerly portions of the site conveys off-site drainage water though the site and will need to be improved. On-site drainage water will not drain into this channel. Double barrel arch-pipe pass-thru drainage culverts will be placed in the channel to convey off-site drainage water through the site (see attached Utility Plan).

The Ventura County Watershed Protection requires compost processing operations be protected against inundation from a 100-year storm event. Attachment 2 contains a Drainage Area Map that evaluates regional storm water flows.



Google Maps 2015

Approximate Site Boundaries

N

SESPE CONSULTING, INC.

FIGURE 1	SITE LOCATION MAP Agromin - Biogenic Energy Park Santa Paula, California		
PROJECT #:	AG01.11.02	DATE:	4/25/16
SCALE:	as shown	DRAWN BY:	GPS

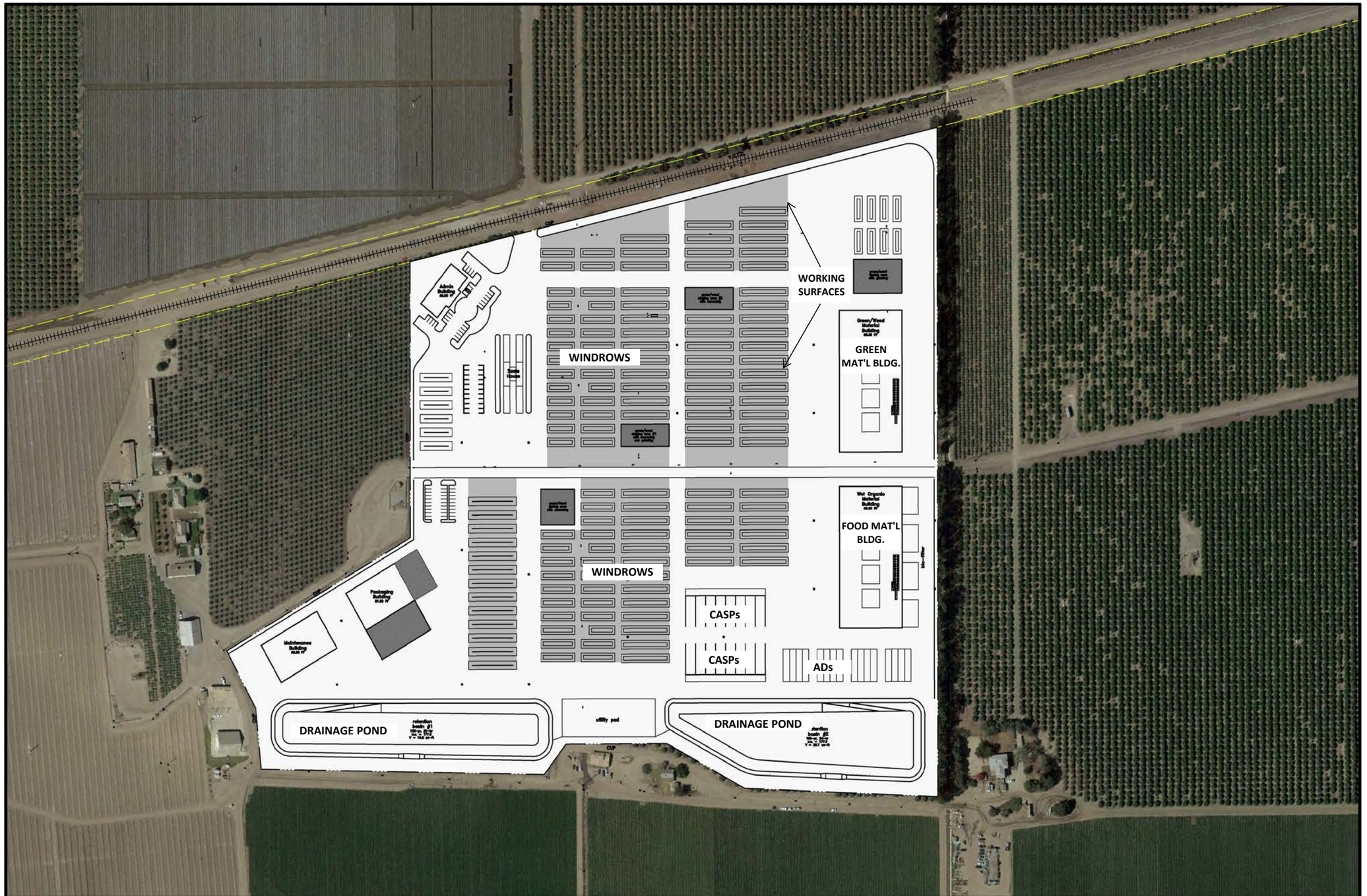


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FIGURE 2

FACILITY SITE PLAN
Agromin - Biogenic Energy Park
Santa Paula, California 93060

PROJECT #:	AG01.11.02	DATE:	2/28/17
SCALE:	as shown	DRAWN BY:	RDF

SOURCES

MATERIAL COLLECTED FROM VENTURA COUNTY AND CITY OF CARPINTERIA

COMMERCIAL FOOD MATERIAL
DIRECT FROM VARIOUS SOURCES
FOOD MATERIAL COLLECTION VEHICLES (HARRISON)
8± TONS / VEHICLE

RESIDENTIAL CO-COLLECTED MATERIAL
DIRECT FROM RESIDENCES
FOOD AND GREEN MATERIAL COLLECTION VEHICLES (HARRISON)
8± TONS / VEHICLE

MATERIALS RECOVERY FACILITY
GREEN MATERIAL TRANSFER TRAILERS
22± TONS / VEHICLE

RESIDENTIAL GREEN MATERIAL
DIRECT FROM RESIDENCES
GREEN MATERIAL COLLECTION VEHICLES (HARRISON)
8± TONS / VEHICLE

CONTRACTOR/ AGRICULTURAL/ LANDSCAPE MATERIAL
DIRECT FROM VARIOUS SOURCES
GREEN MATERIAL
1± TON / LOAD

EMPLOYEES

SUPPLIERS/ VENDORS
DIRECT FROM VARIOUS SOURCES

FOOD MATERIAL
WET MATERIAL
DRY MATERIAL
GREEN MATERIAL
DRY MATERIAL

WET ORGANICS BUILDING (INCOMING FOOD MATERIAL PROCESSING BUILDING–ENCLOSED)

TO LANDFILL
TRASH/DEBRIS/CONTAMINANTS
TIPPING AREA #1
BIO-SEPARATORS
TEMP STORAGE
OFFSITE TO ORGANICS PROCESSOR
FOOD SLURRY
HIGH QUALITY FOOD MATERIAL (STRAIGHT TO GRINDER)
MAGNETS
TRASH
GRINDER
FOOD MATERIAL & GREEN MATERIAL
BLENDING
TIPPING AREA #2
TROMMEL SCREEN
PICKING CONVEYOR
MAGNETS
TEMPORARY STORAGE (AS NEEDED)
TRASH/DEBRIS/CONTAMINANTS
TO LANDFILL

DRY ORGANICS BUILDING (INCOMING GREEN MATERIAL PROCESSING BUILDING–OPEN SIDES)

TO LANDFILL
TRASH/DEBRIS/CONTAMINANTS
TIPPING AREA #1
TROMMEL SCREEN
PICKING CONVEYOR
MAGNETS
HIGH QUALITY GREEN MATERIAL PRE-SHRED WOOD MATERIAL (STRAIGHT TO GRINDER)
MAGNETS
GRINDER (INSIDE LOCATION)
GREEN MATERIAL
WOOD CHIPS
MOVE AS NEEDED
TIPPING AREA #2
TROMMEL SCREEN
PICKING CONVEYOR
MAGNETS
TRASH/DEBRIS/CONTAMINANTS
TO LANDFILL
LARGE GREEN ("WOODY") MATERIAL (TREE TRUNKS)

AIR FILTER
BIOFILTERS
VENTILATION BUILDING AT NEGATIVE PRESSURE
WATER SPRAY
OPTIONAL "BIOCHAR" ADDITIVE
40% FOOD: 60% GREEN VOL. (50% / 50% BY WEIGHT)
67% FOOD: 33% GREEN VOL. (70% / 30% BY WEIGHT)
21 DAY RETENTION
ANAEROBIC DIGESTER
PERCOLATE RECYCLED
DIGESTATE
CO_2 & METHANE
GREEN MATERIAL USED AS BULKING AGENT
BLEND
PAD #1
TROMMEL SCREEN
STAGING PAD #2
ACTIVE WINDROWS
RAINWATER + LEACHATE TO POND
PATHOGEN REDUCTION (15 DAYS)
LARGE MATERIALS TO GRINDER
GRINDER (OUTSIDE LOCATION)

AGROMIN FACILITY

295,000 TON/YEAR THROUGHPUT

21 DAY RETENTION
BIOFILTER
CASP
LEACHATE RECYCLED
BIOGAS TREATMENT SYSTEM
CO_2
METHANE
ELECTRIC POWER
USED AT FACILITY
ENERGY ISLAND
BIOFUEL
COLLECTION VEHICLES
21 DAY RETENTION
COMPOST
CURING WINDROWS
(30–60 DAYS)
RAINWATER + LEACHATE TO POND
MULCH
< 0.5 in.
0.5–2.0 in.
> 2.0 in.
TROMMEL SCREEN
3-DECK
PAD #3
BULK MULCH
MULCH BULK SALES
AMENDMENTS
MIXING PAD
MULCH FOR PACKAGING
COMPOST FOR PACKAGING
MIXED PRODUCTS FOR PACKAGING
FINISHED BULK PRODUCTS
FINISHED PRODUCTS BULK SALES
PACKAGING PLANT
– FINISHED COMPOST
– MULCH
– WOODCHIPS
BAGGED PRODUCTS
BAGGED MATERIALS
WOOD CHIPS
WOOD CHIPS
WOOD CHIPS OFFSITE BIOFUELS

- LOADER
- COMPOST TURNER

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AGROMIN BIOGENIC FACILITY
PROCESS FLOW

SCALE: HORIZ. AS SHOWN; VERT. AS SHOWN
DRAWN BY: GC
CHECKED BY: RDF
FIGURE NUMBER 1 OF 1
DATE DRAWN: FEBRUARY 22, 2016

Edwards Ranch Road

V.C.T.C.

distribution box (typ)

fire hydrant (typ)

expansion leach field area (typ)

primary leach field area (typ)

1,000 gal. dosing tank

1,000 gal. wet well

4,000 gal. septic tank

admin building

double barrel arch-pipe pass-thru drain

staging pad #2

tipping area

dry organics building

scale house

staging pad #1

1,000 gal. wet well

2,000 gal. septic tank

staging pad #3

wet organics building

Gaythorne Road

VCWPD Channel

SS FS W SD

N S E W

Prepared By:

Harrison Industries

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Prepared under the direction of:
Mike Harrison RCE 57,320

Entitlement Planning
Proposed Utility Plan

Biogenic Energy Park
County of Ventura

AGROMIN
Soil for a Greener World

scale: 1" = 60'
date: January 2017
sheet 20 of 24

13-1008.230 1st entitlement check submittal — not for construction

scale house

staging pad #1

staging pad #3

production building

wet organics building

1,000 gal. wet well

2,000 gal. septic tank

Gaythorne Road

VCWPD Channel

retention basin #1
100-yr, 24-hr
w.s. = 177.9
V = 16.8 ac-ft

retention basin #2
100-yr, 24-hr
w.s. = 177.9
V = 26.7 ac-ft

utility pad

12'x12' transformer pad

double barrel arch-pipe pass-thru drain

domestic pump

fire pump

power gen-set

5 kV meter/main

SCE point of connection

50,000 gal. domestic water storage tank

120,000 gal. fire water storage tank

fire hydrant (typ)

W

FS

SS

SD

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Harrison Industries

Entitlement Planning
Proposed Utility Plan

Biogenic Energy Park
County of Ventura

AGROMIN
Soil for a Greener World

scale: 1" = 60'
date: January 2017
sheet 21 of 24

13-1008.230 1st entitlement check submittal - not for construction

C:\Work Local\13-1008 - Biogenic Facility\230-Entitlement Planning\Civil-Survey\dwg\13-1008-230-PUTN01A.dwg
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scale house

staging pad #1

staging pad #3

fire hydrant (typ)

Gaythorne Road

1,000 gal. wet well

production building

2,500 gal. septic tank

maintenance building

power sub-station

double barrel arch-pipe pass-thru drain

utility pad

retention basin #1
100-yr, 24-hr
w.s. = 177.9
V = 16.8 ac-ft

retention basin #2
100-yr, 24-hr
w.s. = 177.9
V = 26.7 ac-ft

W SD FS SS

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Harrison Industries

Entitlement Planning
Proposed Utility Plan

Biogenic Energy Park
County of Ventura

AGROMIN
Soil for a Greener World

scale: 1" = 60'
date: January 2017
sheet 22 of 24

13-1008.230 1st entitlement check submittal - not for construction

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Attachment 1

Recommendations for Cement Treatment in Composting Areas
Earth Systems, February 19, 2016

Earth Systems
Southern California

1731-A Walter Street
Ventura, CA 93003
(805) 642-6727
Fax (805) 642-1325

February 19, 2016

Project No.: VT-25164-01
Report No.: 16-2-1

Harrison Industries
Attention: Mike Harrison
P.O. Box 4009
Ventura, CA 93007

Project: Agromin Oxnard Facility
6859 Arnold Road
Oxnard Area of Ventura County, California
Subject: Recommendations for Cement Treatment in Composting Areas

Earth Systems Southern California (Earth Systems) is pleased to provide this report that presents results of a study performed for two new composting areas at the existing Agromin facility located at 6859 Arnold Road in the Oxnard area of Ventura County, California (see attached Vicinity Map). Earth Systems performed this study to evaluate cement treating the subgrade soils beneath new composting areas to mitigate the infiltration of leachate from the compost into the underlying native soils. We understand that the proposed cement treated subgrade beneath the composting areas should have a maximum hydraulic conductivity (permeability) of 1×10^{-5} centimeters per second (cm/sec) to meet the regulatory requirements. In addition to meeting the minimum permeability requirement, the cement treated subgrade should also be durable enough to withstand the equipment traffic and loads from the composting operations that will take place on them.

On December 22, 2015, Earth Systems collected one bulk sample of the subgrade soils from the two new composting areas. The samples of the subgrade soils were collected from the upper 18 inches at each sample location. The approximate sample locations are shown on the attached Site Plan.

The subgrade soils encountered at the sample location in Area 1 consisted of approximately 4 inches of crushed rock/aggregate base material. Between the depths of 4 and 10 inches, the soil consisted of a mixture of native soil and gravels with some chucks of broken asphaltic concrete. The native soils encountered below a depth of 10 inches consisted of sandy clay to the maximum depth explored.

The subgrade soils encountered at the sample location in Area 2 consisted of sandy clay to the maximum depth explored.

RESULTS OF LABORATORY TESTS

Permeability tests and unconfined compression tests were performed on remolded test specimens of the subgrade soils. The test specimens were compacted to 95 percent of the maximum dry density at various cement contents. For this study, the cement contents used to prepare the test specimens were 4, 8, and 12 percent (by dry weight).

Due to the granular nature of the subgrade soils in Area 1, permeability tests were performed on the subgrade soils from this area. Likewise, the unconfined compression tests were performed on the clayey subgrade soils from Area 2. The reason being that determining the percent cement required to obtain the desired permeability would be more critical with granular soils, whereas determining the percent cement required to obtain sufficient strength would be more critical with the fine-grained soils.

The various layers observed at the sample location in Area 1 were proportioned to represent the material that would cement treated in the upper 18 inches. The composited sample resulted in a soil classified as clayey sand with gravels.

The following table summarizes the results of the permeability tests performed on the sample collected from Area 1.

Percent Cement Added (%)	Hydraulic Conductivity (cm/sec)
4	4.2×10^{-6}
8	2.1×10^{-6}
12	1.4×10^{-6}

The following table summarizes the results of the unconfined compressive strength tests performed on the sample collected from Area 2.

Percent Cement Added (%)	Compressive Strength (psi)
4	150
8	230
12	280

CONCLUSIONS

Based on the laboratory test results, the minimum permeability of 1×10^{-5} cm/sec may be achieved with 4 percent or more cement (by dry weight) for the subgrade soils within the upper 18 inches at the sample location in Area 1. Because the upper 18 inches subgrade soils may vary throughout Area 1, we believe that the use of 6 percent cement may be prudent to account for the variability.

Because the fine-grained soils are in the bottom half of the upper 18 inches of subgrade, mixing and cement treating less than 18 inches in Area 1 would reduce the fines content of the treated material. This reduction in the fines content may increase the permeability.

Because the subgrade in Area 2 consists predominantly of fine-grained soils, the use of 12 percent cement may be needed to provide a workable surface that is durable enough to withstand the equipment traffic and loads from the composting operations. To increase the durability of the cement treated subgrade, while possibly reducing the percent cement needed, a layer of aggregate base material could be placed on the subgrade surface prior to cement treatment. This increase in the sand and gravel content of the treated material should result in an increase in the unconfined compressive strength, and therefore an increase in durability. Although testing was not performed on a composited sample of native soil and aggregate base material to determine the percentage of aggregate base material needed to increase the durability of the cement treated subgrade, Earth Systems anticipates that a 4-inch thick layer of aggregate base material would increase the durability considerably. If desired, additional testing can be performed on a composited sample of native soil and aggregate base material to determine the percentage of aggregate base material needed or if a reduction in the percentage of cement is possible.

RECOMMENDATIONS

Using the results of the laboratory and our understanding of the project, Earth Systems has prepared the following construction recommendations that should be adhered to as a minimum by the contractor. The recommendations are based on a cement treatment depth of 18 inches.

- All trench backfill for culverts, utilities and pipes planned for beneath the composting areas should be properly placed and compacted to at least 90 percent relative compaction (ASTM D1557) up to 18 inches below finished subgrade. Since the upper 18 inches will be cement treated, compaction of this material will be required.

- Based on 12% Portland cement (by dry weight) and an assumed dry unit weight of 110 pcf, a minimum spread rate of 19.8 $\pm$ 0.2 pounds per square foot (psf) will be required for a treatment depth of 18 inches in Area 2. Based on 6% Portland cement (by dry weight) and an assumed dry unit weight of 110 pcf, a minimum spread rate of 10.4 $\pm$ 0.2 pounds per square foot (psf) will be required for a treatment depth of 18 inches in Area 1. The amount of cement being placed should be monitored throughout cement treatment operations, with modifications made as necessary for existing field conditions.

- Portland cement should comply with the latest Specifications for Portland cement (ASTM 150, CSA A-5, or AASHTO M85) Type II.

- The cement should be spread with a mechanical spreader and mixed with a high-speed rotary mixer. The equipment should be capable of pulverizing and thoroughly mixing in the cement to the depth necessary to produce a compacted cement treated thickness of 18 inches.

- At the start of compaction, the mixture should be in a uniform, loose condition throughout its full depth. The moisture content of the mix should be wet of optimum to achieve proper hydration of the cement, and adjusted as needed to achieve the compaction requirements. Water should be clear and free from injurious amounts of oil, acid, alkali, organic matter or other deleterious substance.

- Cement treatment operations should not take place when the air temperature is below 45°F, unless the air temperature is 40°F and rising.

- No area of cement treated subgrade should be left undisturbed for longer than 30 minutes during compaction operations.

- The cement treated soils should be compacted to achieve a minimum relative compaction of 95 percent of the ASTM D1557 maximum dry density. The compaction equipment used should be capable of achieving the required compaction to a depth of 18 inches. Wheel rolling with hauling equipment only is not an acceptable method of compaction. **Compaction of the cement treated subgrade should be verified by testing.**

- Permanently exposed surfaces should be kept in a moist condition for 7 days for curing of the cement treated subgrade.

- Experience has shown that 24-hour compressive strength results for moist cured samples are approximately 50 to 60% of the 7 day strength (moist cured for 6 days and soaked in water for 24 hours). A 24-hour test should be run on the cement treated subgrade soils in each area to obtain a 24-hour compressive strength which will be used to monitor the daily production. Seven day samples should also be taken for final acceptance.

ADDITIONAL SERVICES

This report is based on the assumption that an adequate program of monitoring and testing will be performed by Earth Systems Southern California during construction to check compliance with the recommendations given in this report. The recommended tests and observations include, but are not necessarily limited to the following:

1. Review of the grading plans during the design phase of the project.
2. Observation and testing during cement treatment of the composting areas.
3. Consultation as required during construction.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

The recommendations submitted in this report are based in part upon the subgrade soils encountered at the sample locations. The nature and extent of variations between and beyond the sample locations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.

The scope of services did not include any environmental assessment or investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater or air, on, below, or around this site. Any statements in this report or on the soil boring logs regarding odors noted, unusual or suspicious items or conditions observed, are strictly for the information of the client.

Findings of this report are valid as of this date; however, changes in conditions of a property can occur with passage of time whether they are due to natural processes or works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur whether they result from legislation or broadening of knowledge. Accordingly, findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of one year.

In the event that any changes in the nature, design, or location of the proposed cement treated areas, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing.

This report is issued with the understanding that it is the responsibility of the Owner, or of his representative to insure that the information and recommendations contained herein are called to the attention of the Architect and Engineers for the project and incorporated into the plan and that the necessary steps are taken to see that the Contractor and Subcontractors carry out such recommendations in the field.

As the Geotechnical Engineers for this project, Earth Systems Southern California has striven to provide services in accordance with generally accepted geotechnical engineering practices in this community at this time. No warranty or guarantee is expressed or implied. This report was prepared for the exclusive use of the Client and their authorized agents.

It is recommended that Earth Systems Southern California be provided the opportunity for a general review of final design and specifications in order that cement treatment recommendations may be properly interpreted and implemented in the design and specifications. If Earth Systems Southern California is not accorded the privilege of making this recommended review, it can assume no responsibility for misinterpretation of the recommendations contained herein.

We have appreciated the opportunity to be of service to you on this project. Please call if you have any questions, or if we can be of further service.

Respectfully submitted,

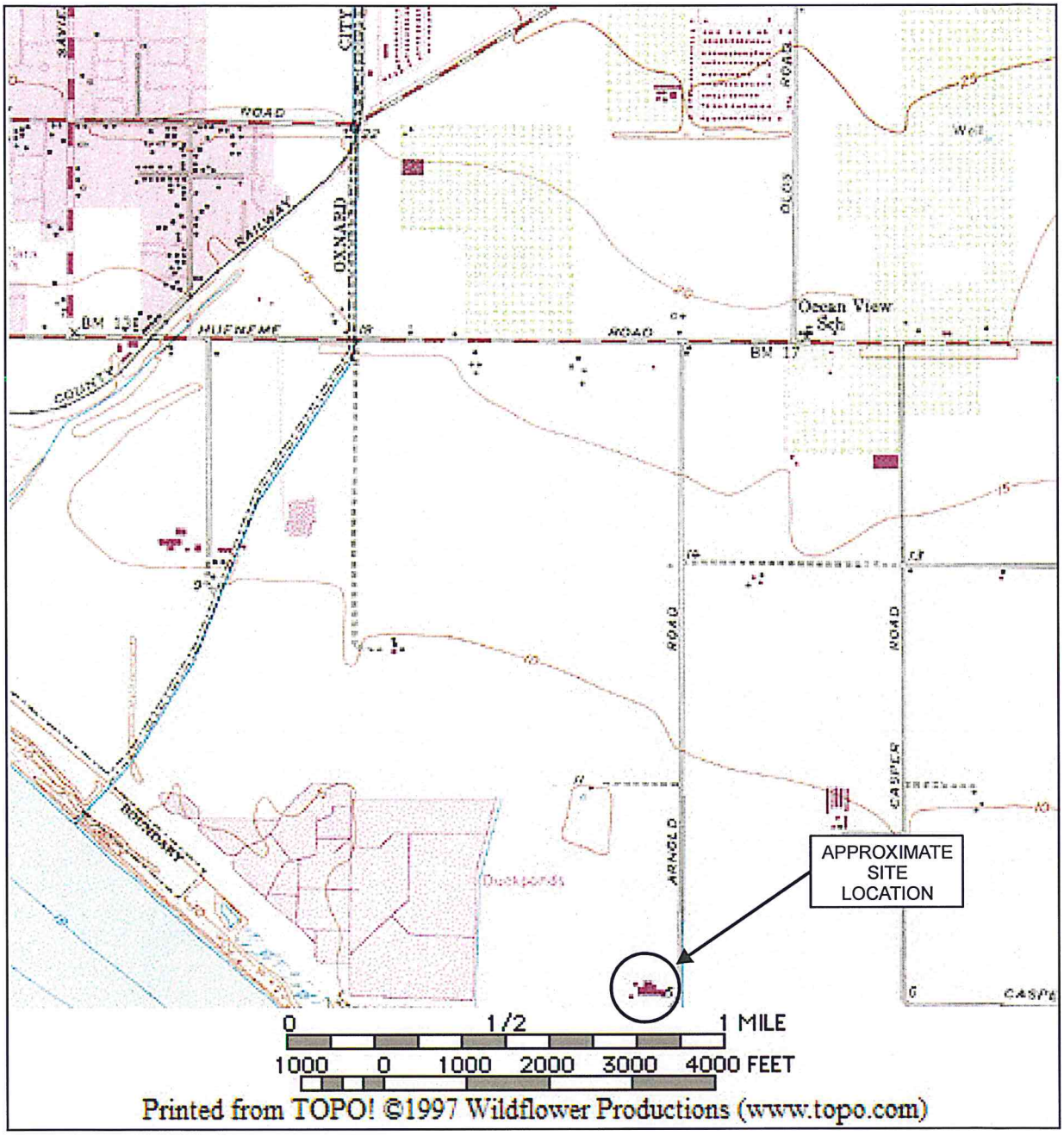
EARTH SYSTEMS SOUTHERN CALIFORNIA

Anthony P. Mazzei
Geotechnical Engineer

Richard M. Beard
Geotechnical Engineer

Attachments: Vicinity Map
Site Plan
Laboratory Test Results

Copies: 3 - M. Harrison (2 via US mail, 1 via email)
1 – Project File



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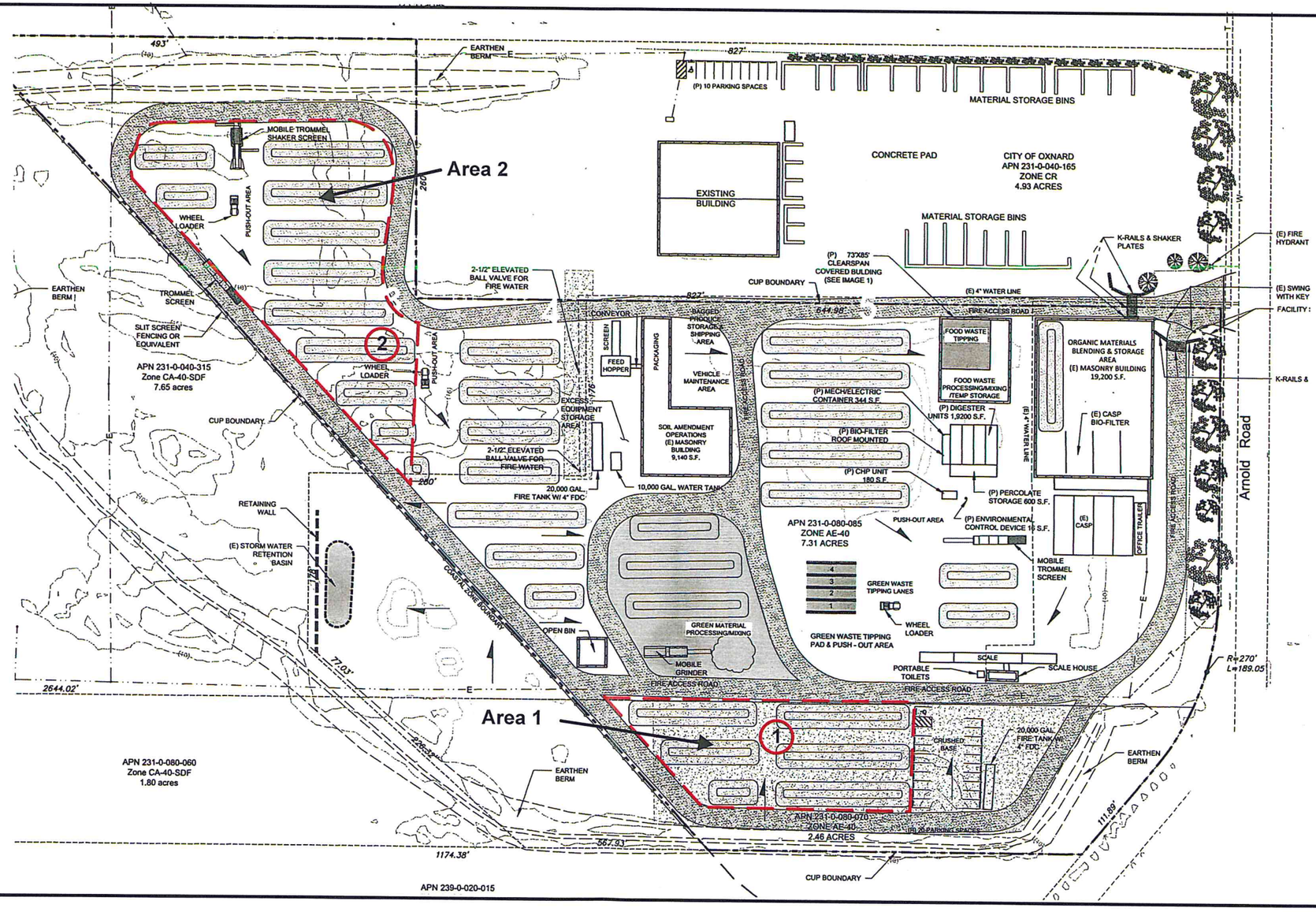
VICINITY MAP

Agromin Oxnard Facility
Oxnard, California

Earth Systems
Southern California

February 2016	VT-25164-01



(1) **Approximate Sample Location**

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Scale 1"=130'

SITE PLAN

Agromin Oxnard Facility
Oxnard, California

Earth Systems
Southern California

February, 2016 | VT-25164-01

Hydraulic Conductivity
ASTM D 5084
Method C: Falling Head Rising Tailwater

Job No:	780-004	**Boring:**	Composite B-1	**Date:**	01/27/16
Client:	Earth Systems Southern California	**Sample:**	+4% Cement	**By:**	MD/PJ
Project:	Agromin Oxnard Facility - VT-Z5164-04	**Depth, ft.:**		**Remolded:**	Target Density = 95% of 135.0pcf @ 12% (Opt +3%)

Visual Classification: Grayish Brown Clayey SAND w/ Gravel

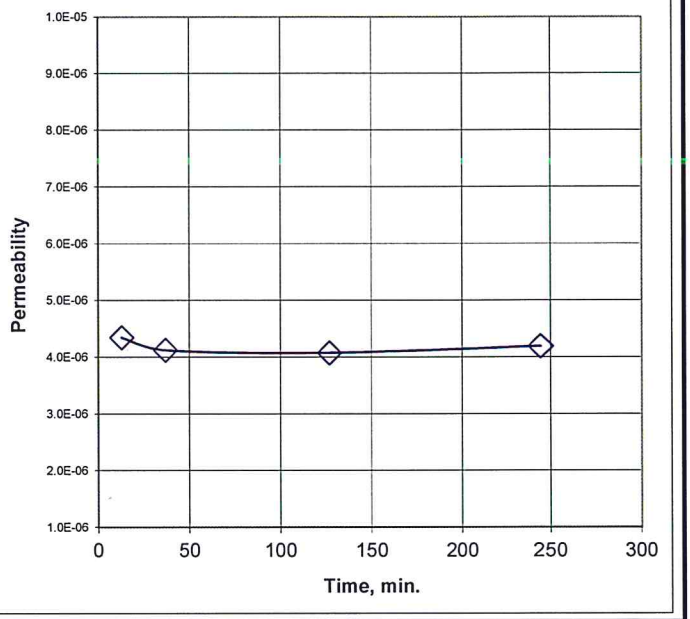
Max Sample Pressures, psi:

Cell:	Bottom	Top	Avg. Sigma3
74	69.5	68.5	5

Date	Minutes	Head, (in)	K,cm/sec
1/21/2016	0.00	36.29	Start of Test
1/21/2016	13.00	35.09	4.3E-06
1/21/2016	37.00	33.14	4.1E-06
1/21/2016	127.00	26.59	4.1E-06
1/21/2016	245.00	19.49	4.2E-06

B: = >0.95 ("B" is an indication of saturation)

Max Hydraulic Gradient: = 11



Average Hydraulic Conductivity: 4.E-06 cm/sec

Sample Data:	Initial (As-Received)		Final (At-Test)
Height, in	3.19		3.21
Diameter, in	2.38		2.37
Area, in2	4.43		4.43
Volume in3	14.13		14.19
Total Volume, cc	231.6		232.5
Volume Solids, cc	164.3		164.3
Volume Voids, cc	67.2		68.1
Void Ratio	0.4		0.4
Total Porosity, %	29.0		29.3
Air-Filled Porosity (θa),%	6.9		3.3
Water-Filled Porosity (θw),%	22.1		26.0
Saturation, %	76.2		88.6
Specific Gravity	2.70	Assumed	2.70
Wet Weight, gm	495.0		504.1
Dry Weight, gm	443.7		443.7
Tare, gm	0.00		0.00
Moisture, %	11.6		13.6
Wet Bulk Density, pcf	133.4		135.3
Dry Bulk Density, pcf	119.6		119.1
Wet Bulk Dens.ρb, (g/cm^3)	2.14		2.17
Dry Bulk Dens.ρb, (g/cm^3)	1.92		1.91

Remarks: Unable to achieve target density. Stiff samples such as cement treated soils do not respond to the B parameter like soils do. It is common to get a B reading of 0.95 or better only to have the after test degree of saturation low.

Hydraulic Conductivity
ASTM D 5084
Method C: Falling Head Rising Tailwater

Job No:	780-004	**Boring:**	Composite B-1	**Date:**	01/27/16
Client:	Earth Systems Southern California	**Sample:**	+8% Cement	**By:**	MD/PJ
Project:	Agromin Oxnard Facility - VT-Z5164-04	**Depth, ft.:**		**Remolded:**	Target Density = 95% of 135.0pcf @ 12% (Opt +3%)

Visual Classification: Grayish Brown Clayey SAND w/ Gravel

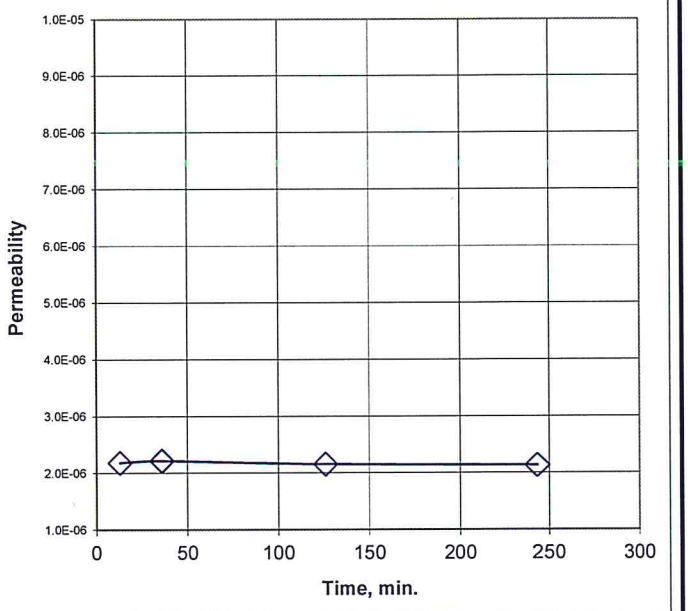
Max Sample Pressures, psi:

Cell:	Bottom	Top	Avg. Sigma3
74	69.5	68.5	5

Date	Minutes	Head, (in)	K,cm/sec
1/21/2016	0.00	38.39	Start of Test
1/21/2016	13.00	37.74	2.2E-06
1/21/2016	36.00	36.59	2.2E-06
1/21/2016	126.00	32.54	2.2E-06
1/21/2016	244.00	27.89	2.1E-06

B: = >0.95 ("B" is an indication of saturation)

Max Hydraulic Gradient: = 12



Average Hydraulic Conductivity: 2.E-06 cm/sec

Sample Data:	Initial (As-Received)		Final (At-Test)
Height, in	3.17		3.17
Diameter, in	2.38		2.37
Area, in2	4.43		4.43
Volume in3	14.04		14.03
Total Volume, cc	230.1		229.9
Volume Solids, cc	166.7		166.7
Volume Voids, cc	63.4		63.1
Void Ratio	0.4		0.4
Total Porosity, %	27.6		27.5
Air-Filled Porosity (θa),%	6.5		2.3
Water-Filled Porosity (θw),%	21.1		25.2
Saturation, %	76.4		91.8
Specific Gravity	2.70	Assumed	2.70
Wet Weight, gm	498.6		508.1
Dry Weight, gm	450.1		450.1
Tare, gm	0.00		0.00
Moisture, %	10.8		12.9
Wet Bulk Density, pcf	135.2		137.9
Dry Bulk Density, pcf	122.1		122.2
Wet Bulk Dens.ρb, (g/cm^3)	2.17		2.21
Dry Bulk Dens.ρb, (g/cm^3)	1.96		1.96

Remarks: Unable to achieve target density. Stiff samples such as cement treated soils do not respond to the B parameter like soils do. It is common to get a B reading of 0.95 or better only to have the after test degree of saturation low.

Hydraulic Conductivity
ASTM D 5084
Method C: Falling Head Rising Tailwater

Job No:	780-004	**Boring:**	Composite B-1	**Date:**	01/27/16
Client:	Earth Systems Southern California	**Sample:**	+12% Cement	**By:**	MD/PJ
Project:	Agromin Oxnard Facility - VT-Z5164-04	**Depth, ft.:**		**Remolded:**	Target Density = 95% of 135.0pcf @ 12% (Opt +3%)

Visual Classification: Grayish Brown Clayey SAND w/ Gravel

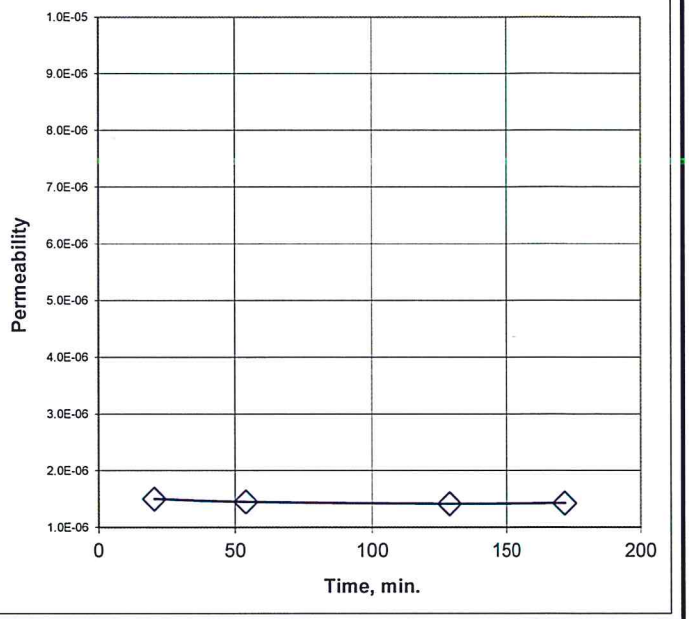
Max Sample Pressures, psi:

Cell:	Bottom	Top	Avg. Sigma3
74	69.5	68.5	5

Date	Minutes	Head, (in)	K,cm/sec
1/22/2016	0.00	42.69	Start of Test
1/22/2016	20.50	41.89	1.5E-06
1/22/2016	54.00	40.69	1.5E-06
1/22/2016	128.50	38.19	1.4E-06
1/22/2016	172.00	36.89	1.4E-06

B: = >0.95 ("B" is an indication of saturation)

Max Hydraulic Gradient: = 13



Average Hydraulic Conductivity: 1.E-06 cm/sec

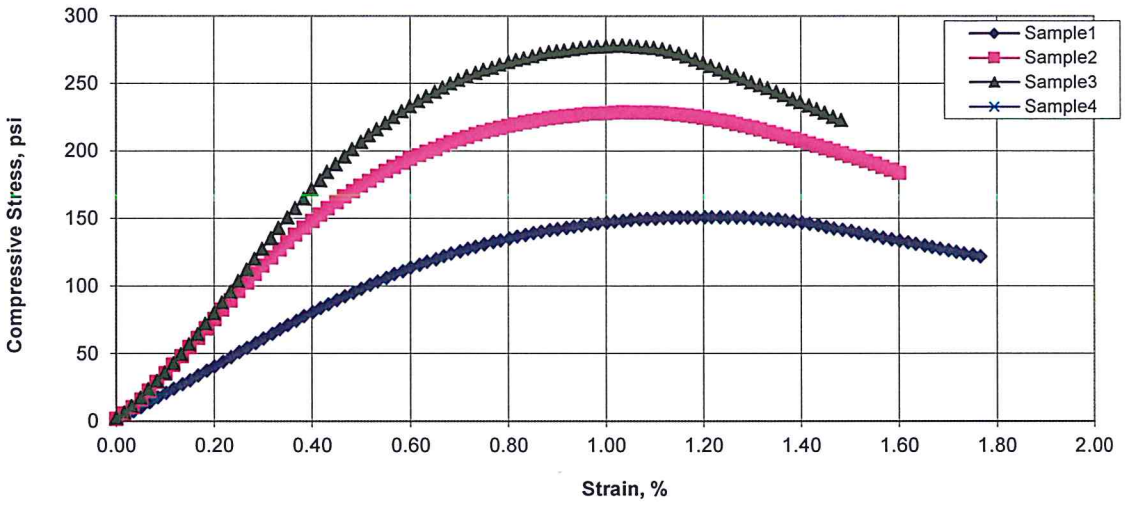
Sample Data:	Initial (As-Received)		Final (At-Test)
Height, in	3.19		3.19
Diameter, in	2.38		2.37
Area, in2	4.43		4.42
Volume in3	14.11		14.13
Total Volume, cc	231.2		231.5
Volume Solids, cc	166.7		166.7
Volume Voids, cc	64.6		64.8
Void Ratio	0.4		0.4
Total Porosity, %	27.9		28.0
Air-Filled Porosity (θa),%	7.9		2.8
Water-Filled Porosity (θw),%	20.0		25.2
Saturation, %	71.8		90.1
Specific Gravity	2.70	Assumed	2.70
Wet Weight, gm	496.3		508.4
Dry Weight, gm	450.0		450.0
Tare, gm	0.00		0.00
Moisture, %	10.3		13.0
Wet Bulk Density, pcf	133.9		137.0
Dry Bulk Density, pcf	121.4		121.3
Wet Bulk Dens.ρb, (g/cm^3)	2.15		2.20
Dry Bulk Dens.ρb, (g/cm^3)	1.95		1.94

Remarks: Unable to achieve target density. Stiff samples such as cement treated soils do not respond to the B parameter like soils do. It is common to get a B reading of 0.95 or better only to have the after test degree of saturation low.

Unconfined Compressive Strength of Molded Soil-Cement Cylinders (ASTM D1633 method B)

CTL No.:	780-004	**Project Number:**	VT-Z5164-01		
Client:	Earth Systems Southern California	**Date:**	1/26/2016	**By:**	MD/RU
Project Name:	Agromin Oxnard Facility				

Compressive Stress vs. Strain

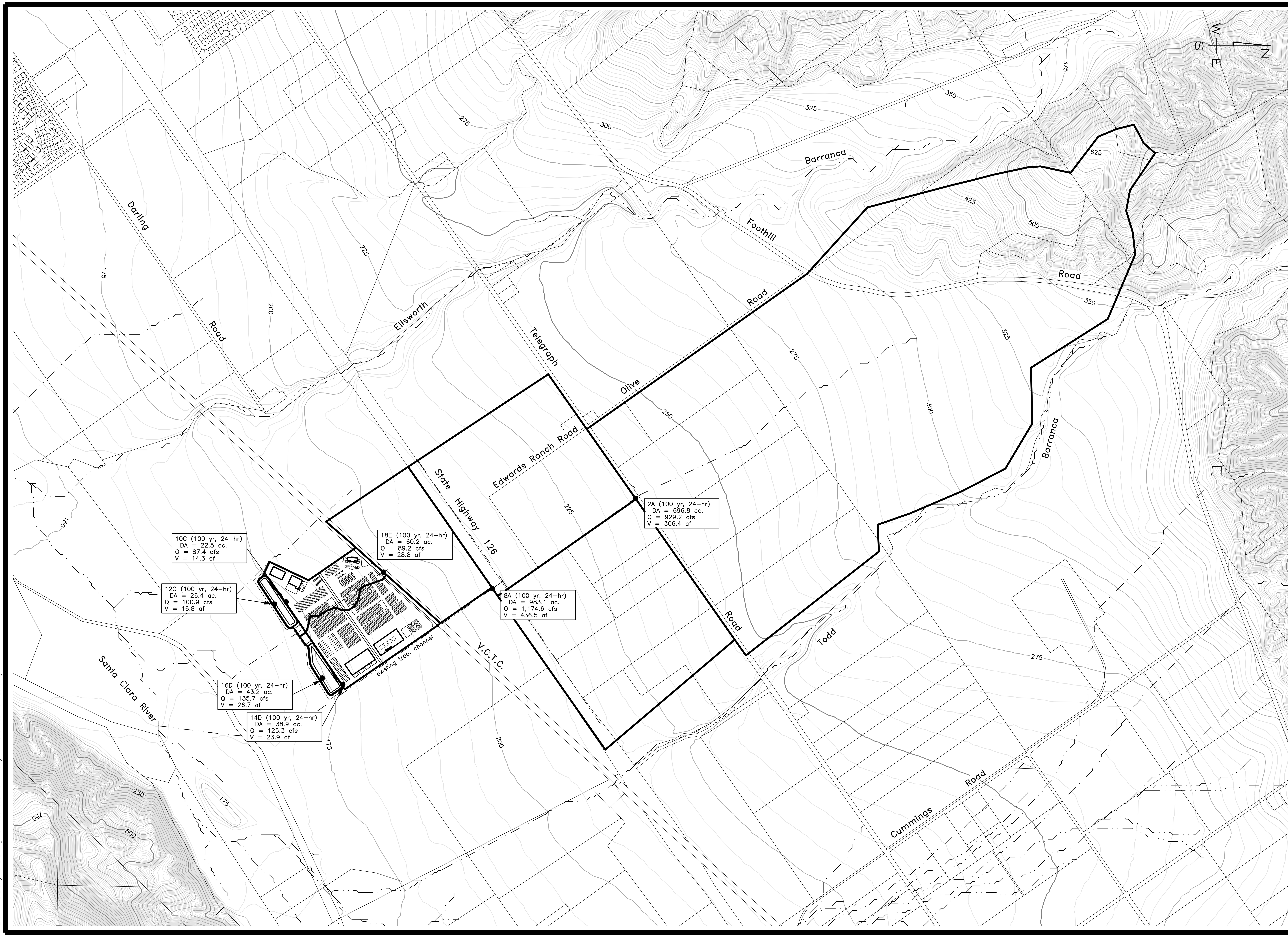


Sample No.:	1	2	3	4
Boring:	Composite B-2	Composite B-2	Composite B-2	
Sample:				
Depth, ft.:				
Visual Description:	Dark Grayish Brown Sandy CLAY	Dark Grayish Brown Sandy CLAY	Dark Grayish Brown Sandy CLAY	
Source of Cement Used:	Client	Client	Client	
Type of Cement Used:	Unknown	Unknown	Unknown	
Designed Moisture Content, %:	16.5	16.5	16.5	
Designed Dry Density, pcf:	109.7	109.7	109.7	
Designed Cement Content, %:	4.0	8.0	12.0	
Diameter, in:	2.41	2.42	2.42	
Height, in:	5.07	5.08	5.06	
Cross Sectional Area, in^2:	4.56	4.60	4.60	
Height to Diameter Ratio:	2.1	2.1	2.1	
As Remolded Moisture Content, %:	16.5	16.5	16.5	
As Remolded Dry Density, pcf:	107.0	105.9	106.3	
At Test Moisture Content, %:	16.0	15.1	14.6	
At Test Dry Density, pcf:	107.4	107.2	108.0	
At Test Degree Of Saturation, %:	76.0%	71.3%	70.4%	
Age of Specimen, Days:	7	7	7	
Curing Temperature, °F:	71.0	71.0	71.0	
Curing Humidity, %:	98	98	98	
Max Load, lb:	690	1050	1280	
Compressive Strength, psi:	150	230	280	
Remarks:				

The samples were not soaked prior to testing.

Attachment 2

Drainage Area Map



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Ventura, California 93007
Voice: (805) 647-1414
Facsimile: (805) 659-9656
www.ejharrison.com

Prepared under the direction of:
Mike Harrison RCE 57,320

Biogenic Energy Park

Entitlement Planning Drainage Area Map

County of Ventura

AGROMIN
Soil for a Greener World

scale: 1" = 600'
date: January 2017
sheet 24 of 24

1st entitlement submittal – not for construction

13-1008.230