Stormwater Control Plan

for

The 1440 Centre

(on the former campus of Bethany University in Scotts Valley, CA)

June 12, 2014

prepared by:

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Appendix A: Sources and Source Control Measures

This Stormwater Control Plan was prepared using the template dated 11 February 2014.

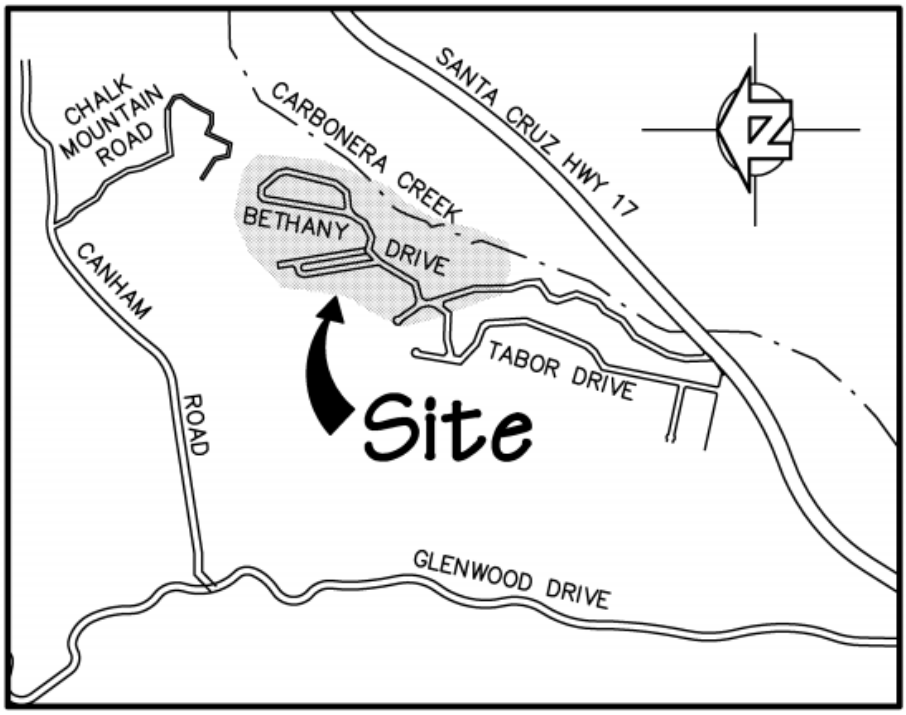


Figure 1: Vicinity Map

I. Project Data

Table 1. Project Data

Project Name/Number	The 1440 Centre
Application Submittal Date	(refer to city application files)
Project Location	800 Bethany Drive, Scotts Valley CA
Project Phase No.	Phases 1 & 2
Project Type and Description	(refer to city application files)
Total Project Site Area (acres)	1,327,430 SF / 30.47 Acres
Total New Impervious Surface Area	85,150 SF
Total Replaced Impervious Surface Area	176,446 SF
Total Pre-Project Impervious Surface Area	250,354 SF
Total Post-Project Impervious Surface Area	310,461 SF (60,107 SF increase)
Net Impervious Area	310,461 SF
Watershed Management Zone(s)	2
Design Storm Frequency and Depth	2.6 inches
Urban Sustainability Area	No
10-year Pre-Development Runoff Rate	31.69 cfs
10-year Post-Development Runoff Rate	33.95 cfs

II. Setting

II.A. Project Location and Description

The site is located at 800 Bethany Drive at the far north end of Scotts Valley, CA on the west side of Highway 17. Access to the campus comes via Scotts Valley Drive to Bethany Drive and past a number of residential parcels. The Bethany campus is tucked in and among hillsides and valleys all sloping down to Carbonera Creek which runs along the southeasterly edge of the campus. The campus consists of numerous parcels, rights-of-way, utility easements, commercial structures, residential structures, parking lots and a partially completed dining commons that was abandoned during construction when Bethany University was closed in 2011/2012.

The proposed 1440 Centre project will redevelop large portions of the former Bethany University campus. In general, new buildings will be constructed in the same location as buildings scheduled for

demolition. In addition to construction of the new buildings and remodel of existing buildings, redevelopment of the site will include realignment of Bethany Drive, new parking on the former athletic field and a new connector road between Gaston Circle and the athletic field parking. Refer to the Site Plan in the Civil Improvement Plans for an overview of the proposed improvements.

II.B. Existing Site Features and Conditions

As previously mentioned, the site is located amongst a series of ridges and valleys all sloping toward Carbonera Creek. The elevation change from north to south is approximately 100 feet. The terrain is steep and heavily wooded in places with the campus core being more open and devoid of significant trees or vegetation. For a complete discussion on the geology and geotechnical conditions of the site please refer to reports by Zinn Geology and Pacific Crest Engineering, respectively.

The existing campus drainage system consists mostly of catch basins, curb inlets and pipelines from Bethany Loop (a residential area east of the campus core), Gaston Circle and Bethany Drive to three primary outfalls along the westerly bank of Carbonera Creek. Discharge points are not located sufficiently at the toe of slope but instead discharge directly onto steep mid-slope areas which have resulted in erosional gullies. The proposed project will extend these outfalls to suitable locations nearer the creek.

II.C. Opportunities and Constraints for Stormwater Control

Opportunities: There is a fairly level area near the toe of the fill slope at the southerly end of the athletic field that could provide a location for an infiltration facility. Release of overflow stormwater from this facility would be directed to existing inlets at the north end of Bethany Way. An existing pipeline and series of inlets carry stormwater south along Bethany Way and Bethany Drive.

The parking area south of the Redwood Auditorium could potentially be modified to provide some limited pervious pavement in order to provide treatment of runoff flowing down to and around the Auditorium. A stone bed under any such pervious paving would require lining to prevent infiltration of water into the underlying soils which would threaten the stability of nearby steep slopes down to Carbonera Creek.

The Gaston Circle parking lot will continue to be utilized for parking in Phase 1 and visitor accommodations in Phase 2, but the lower portion of the existing parking lot will be removed and converted to an active farm for Centre visitors. The farm could be located at the lower end of this area directly across from the Chapel and a new plaza. The upper end of the farm area could be reserved for a raingarden to filter and infiltrate stormwater runoff coming from Gaston Circle and a portion of the connector road to the athletic field parking lot. Overflow from this facility would be piped to the drainage system within the adjacent street and discharged to the pond area infiltration basin (see next paragraph).

Lastly, a water feature is envisioned at the confluence of Gaston Circle and Bethany Drive south of the Chapel. As this area is geologically feasible for infiltration the project design includes utilization of the lower portion of the pond for treatment and infiltration of stormwater runoff. The upper portion of the pond may be a recirculating water feature or dry pond with appropriate plantings per the landscape design.

Exhibit D is a Geologic Feasibility Map showing areas where infiltration of stormwater runoff could be achieved.

Constraints: The campus is situated in hilly terrain with steep slopes down to Carbonera Creek along the southeasterly flank. Evidence of multiple landslides around the site has been identified by the project geologist. The lack of level ground makes placement of Stormwater Control Measures (SCM) challenging. Very few areas are feasible for infiltration of runoff and leveling areas to provide treatment basins requires costly earthmoving and/or retaining walls to create concave areas where water can pond to filter out sediments. An infiltration feasibility map (Exhibit D) is provided as part of this report and the project design seeks to maximize infiltration within these relatively few areas to meet regulatory requirements. As such, proposed SCM's are fairly concentrated rather than distributed, and of larger vs. smaller size to protect sensitive hillsides.

For the purpose of drainage design the site has been separated into 5 drainage "Zones" (A-E) which reflect both watershed areas in combination with geologic feasibility for infiltrating storm runoff. Together, the five zones are a subset of the three watersheds in which the site is located. Large areas of these zones are steep and heavily wooded hillsides. Because these areas are existing, will not be disturbed by construction activities, and are self-treating, they do not influence the calculations for Drainage Management Areas (DMA's).

III. Low Impact Development Design Strategies

III.A. Optimization of Site Layout

The former Bethany campus is largely a pre-developed site. New structures will largely occupy areas currently occupied by older buildings that will be demolished and re-built in similar locations. However, several buildings are being demolished and will not be replaced. Furthermore, areas between existing buildings that are significantly impervious will be modified with new landscaping and/or narrow walking trails to facilitate pedestrian movements across the campus core. Gaston Circle, which is currently a large, paved parking lot, will in Phase 2 be converted into visitor accommodation units with a much narrower road providing fire truck access to the north end of the Circle. As such, the amount of impervious surfacing in and around Gaston Circle will eventually be reduced via the new project.

Overall, the proposed project will increase impervious surfaces by 67,930 SF but that is due to the parking being provided at the athletic field within the westernmost drainage basin. Impervious surfaces will actually be reduced slightly in the middle and easterly drainage basins.

III.A.1. Limitation of development envelope

All proposed redevelopment of the campus will take place within the boundaries of existing development. No structures will be located nearer steep slopes or natural drainage features than existing structures.

III.A.2. Preservation of natural drainage features

No existing natural drainage features will be altered by the proposed development. Furthermore, existing features that are showing signs of erosion will be cleared of debris and have enhanced protective measures put in place.

III.A.3. Setbacks from creeks, wetlands, and riparian habitats

No structures will be located nearer steep slopes or natural drainage features than existing structures. A geologic study has been conducted that includes recommendations for siting new buildings in the vicinity of steep slopes.

III.A.4. Minimization of imperviousness

The use of pervious pavements on the site is limited given relatively few places where stormwater can be infiltrated and the sloping topography of the properties. Phase 1 parking will be provided on the existing Gaston Circle parking lot while Phase 2 parking will be provided via a new parking structure located on the athletic field, neither of which lend themselves to the use of pervious pavements. Street widths and parking stall dimensions are the minimums allowed and buildings are not oversized for the intended use. In fact, given the challenging terrain, multi-story buildings will be utilized to minimize footprints and impervious surface coverage.

III.A.5. Use of drainage as a design element

Phase 1 development will include the design of a large stormwater infiltration/landscape feature located at the junction of Bethany Drive and Gaston Circle. Originally conceived as a recirculating water feature, during development of the drainage design it was recognized as one of the few areas where infiltration of stormwater could take place. Thus, the design of that water feature was altered to suit dual purposes. In the winter/spring the pond will provide storage, treatment and infiltration of stormwater runoff. In the summer/fall it will be a dry riverbed/pond with suitable plantings.

III.B. Dispersal of Runoff to Pervious Areas

To the extent feasible given the sloping topography of the campus, runoff from impervious surfaces will be directed to pervious areas. However, even landscaped areas will be sloping enough that limited infiltration will take place. Instead, these areas will have area drains to collect runoff that doesn't percolate into the ground and transport it to an LID facility for treatment and/or infiltration.

III.C. Stormwater Control Measures

Several SCM's have been designed in conjunction with the project landscape design. Locations are shown on Exhibit E and sizing calculations are provided in Exhibit F.

Note:

It should be noted that it is the understanding of the preparer that the Regional Water Quality Control Boards views parcels as the lowest "unit of measure" when it comes to stormwater management and that even parcels under the same ownership that are part of a larger project, like The 1440 Centre, are required to provide mitigation within each parcel. However, this project may include any number of lot line adjustments and/or parcel mergers which were not fully resolved at the time this report was prepared. Furthermore, the site constraints make parcel-specific mitigation measures infeasible to a large extent. Therefore, it is the preparer's opinion that a broader, project-wide approach as described herein and shown on the preliminary plans will ultimately be necessary to achieve the desired intent of current stormwater regulations.

Lastly, location specific percolation tests at various depths will be conducted prior to final design to facilitate the design of each SCM. Should actual percolation rates exceed the assumed values used in the preliminary calculations, the sizes/depths of SCM's may be reduced accordingly. Final sizing of facilities will affect any required off-site mitigation required due to on-site infeasibility, an analysis of which will be conducted in final project design.

IV. Documentation of Drainage Design

IV.A. Descriptions of each Drainage Management Area

IV.A.1. Table of Drainage Management Areas

Refer to enclosed calculations, Exhibit F.

IV.A.2. Drainage Management Area Descriptions

Refer to enclosed calculations, Exhibit F.

IV.A.3. Tabulation and Sizing Calculations

Refer to enclosed calculations, Exhibit F.

IV.A.4. Information Summary for LID Facility Design

Total Project Area (Square Feet)	1,327,430 SF
Design Storm Depth	2.6 inches
Applicable Requirements	Tier 2/Tier 3/Tier 4

IV.A.5. Self-Treating Areas

Refer to enclosed calculations, Exhibit F.

IV.A.6. Self-Retaining Areas

Refer to enclosed calculations, Exhibit F.

IV.A.7. Areas Draining to Self-Retaining Areas

Refer to enclosed calculations, Exhibit F.

IV.A.8. Areas Draining to Bioretention Facilities

Refer to enclosed calculations, Exhibit F.

V. Source Control Measures

V.A.1. Site activities and potential sources of pollutants (see Appendix A)

V.A.2. Source Control Table (see Appendix A)

V.A.3. Features, Materials, and Methods of Construction of Source Control BMPs

VI. Stormwater Facility Maintenance

VI.A. Ownership and Responsibility for Maintenance in Perpetuity

The 1440 Foundation agrees to execute any reasonable agreements with the City of Scotts Valley for the ongoing operation, inspection and maintenance of stormwater facilities.

The 1440 Foundation accepts responsibility for operation and maintenance of stormwater facilities until that responsibility is formally transferred. In such an event, the City of Scotts Valley will be notified in writing within 30 days of such transference.

VI.B. Summary of Maintenance Requirements for Each Stormwater Facility

To be provided in final design

VII. Construction Checklist

To be provided in final design

VIII. Certifications

The preliminary design of stormwater treatment facilities and other stormwater pollution control measures in this plan are in accordance with the current edition of the City of Scotts Valley Stormwater Technical Guide.

Appendix A

Sources and Source Control Measures

Appendix A. Stormwater Pollutant Sources/Source Controls Checklist

1 Potential Sources of Runoff Pollutants	2 Structural/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
❑ **A.** On-site storm drain inlets (unauthorized non-stormwater discharges and accidental spills or leaks)	❑ Locations of inlets.	❑ Mark all inlets with the words "No Dumping! Flows to Bay" or similar.	❑ Maintain and periodically repaint or replace inlet markings. ❑ Provide stormwater pollution prevention information to new site owners, lessees, or operators. ❑ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ❑ Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."
❑ **B.** Interior floor drains and elevator shaft sump pumps		❑ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	❑ Inspect and maintain drains to prevent blockages and overflow.
❑ **C.** Pools, spas, ponds, decorative fountains, and other water features.	❑ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet.	If the local municipality requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	❑ See applicable operational BMPs in Fact Sheet SC-72, "Fountain and Pool Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

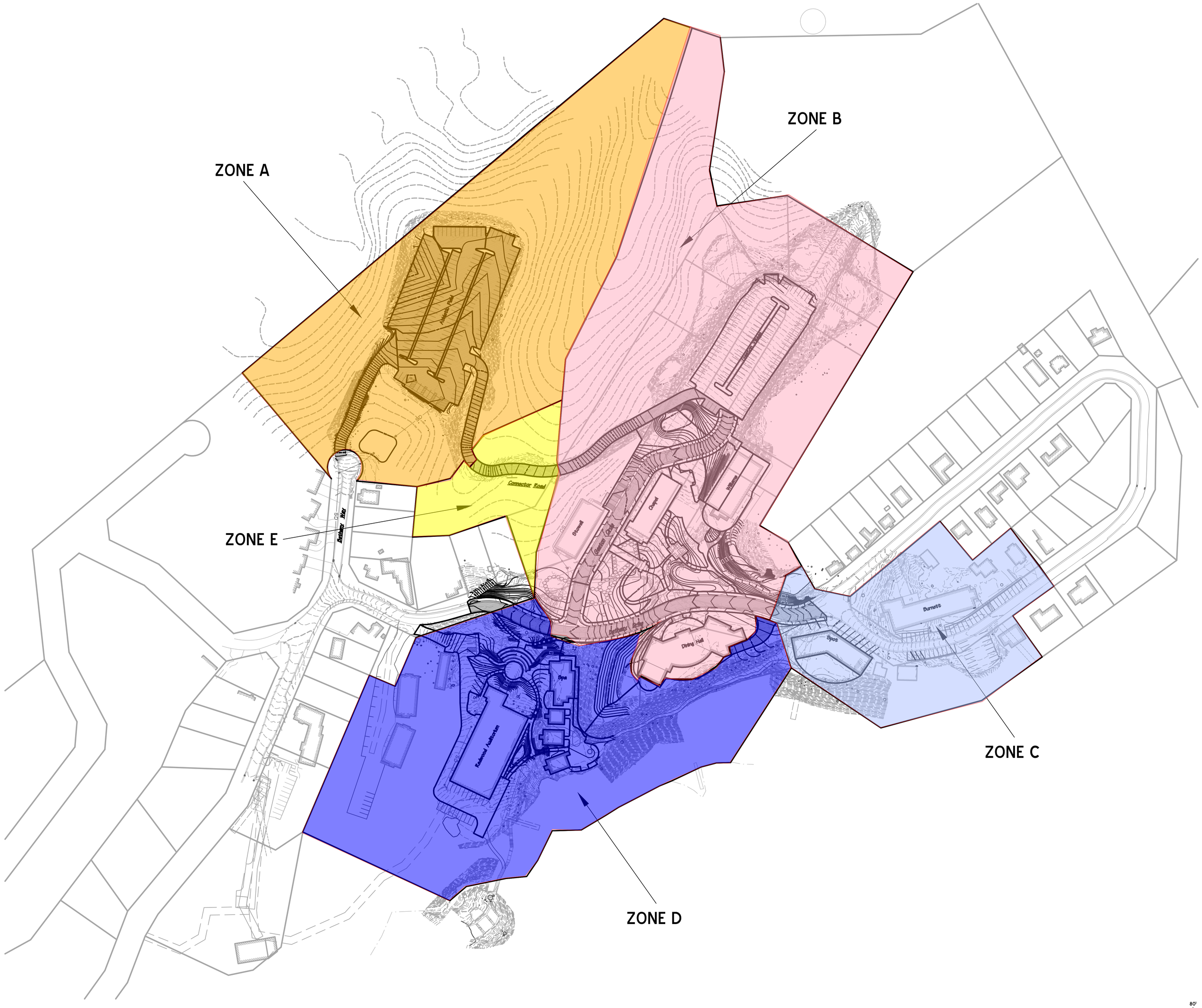
1 Potential Sources of Runoff Pollutants	2 Structural/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
❑ **D.** Food service	❑ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ❑ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	❑ Describe the location and features of the designated cleaning area. ❑ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	
❑ **E.** Refuse areas	❑ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ❑ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. ❑ Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	❑ State how site refuse will be handled and provide supporting detail to what is shown on plans. ❑ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	❑ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

1 Potential Sources of Runoff Pollutants	2 Structural/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
❑ **F.** Loading Docks	❑ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. ❑ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. ❑ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		❑ Move loaded and unloaded items indoors as soon as possible. ❑ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
❑ **G.** Fire Sprinkler Test Water		❑ Provide a means to drain fire sprinkler test water to the sanitary sewer.	❑ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

1 Potential Sources of Runoff Pollutants	2 Structural/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
H. Plazas, sidewalks, and parking lots.			❑ Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

Exhibit A

Existing Drainage Basins



Drainage Management Areas

SCALE: 1" = 80'

GRAPHIC SCALE: 1 INCH = 80 FEET

IFLAND ENGINEERS
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REV	REVISION	DATE

APPROVED For Plan Check Only DATE

DAVID HENKCHEN RCE NO. 49167

Preliminary Grading & Drainage Plan - Phase I (North)

1440 Foundation

800 Bethany Drive, Scotts Valley, California

Bethany University
DESIGN REVIEW

DATE	DESIGN	DRAWN
05/21/14	DAVE	JIM/MARC

SHEET C1

JOB NO. 13024

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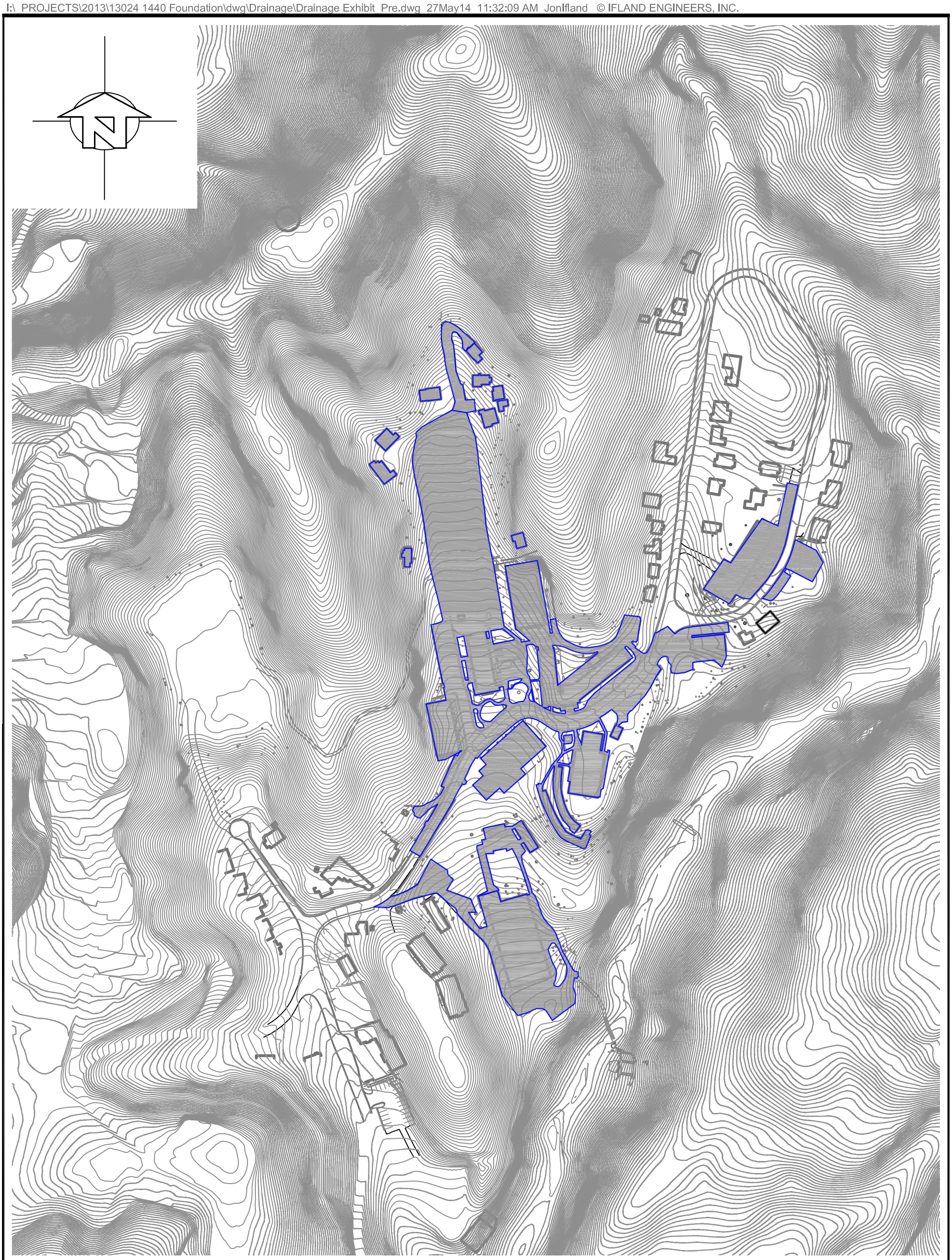
Exhibit B

Existing Impervious Surfaces

 © IFLAND ENGINEERS, INC.



Legend

EXISTING IMPERVIOUS SURFACES (IMPACTED BY PROJECT)

Pre-Development Drainage Exhibit

SCALE: 1" = 200'

200' 0' 100' 200' 400'

GRAPHIC SCALE: 1 INCH = 200 FEET

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JOB NO. 13024 - 1440 CENTER

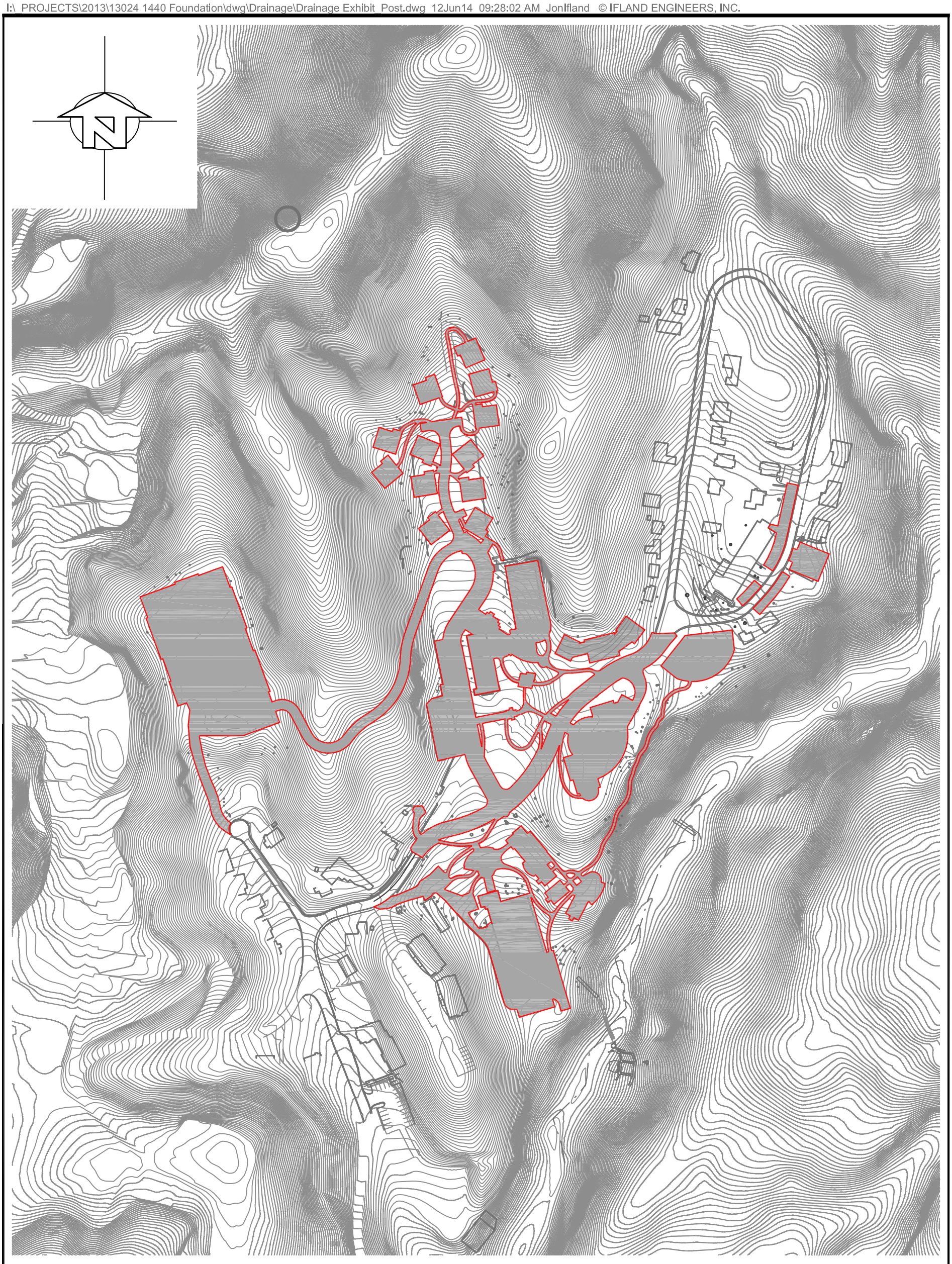
SHEET NO. _____ OF _____

CALCULATED BY RYAN CHAPATTE DATE MAY 2014

SCALE: 1" = 200'

Exhibit C

Proposed Impervious Surfaces



Legend

PROPOSED IMPERVIOUS SURFACE (IMPACTED BY PROJECT)

200' 0' 100' 200' 400'

GRAPHIC SCALE: 1 INCH = 200 FEET

Post-Development Drainage Exhibit

SCALE: 1" = 200'

JOB NO. 13024 - 1440 CENTER

SHEET NO. _____ OF _____

CALCULATED BY RYAN CHAPATTE DATE JUNE 2014

SCALE: 1" = 200'

Exhibit D

Geologic Feasibility Map

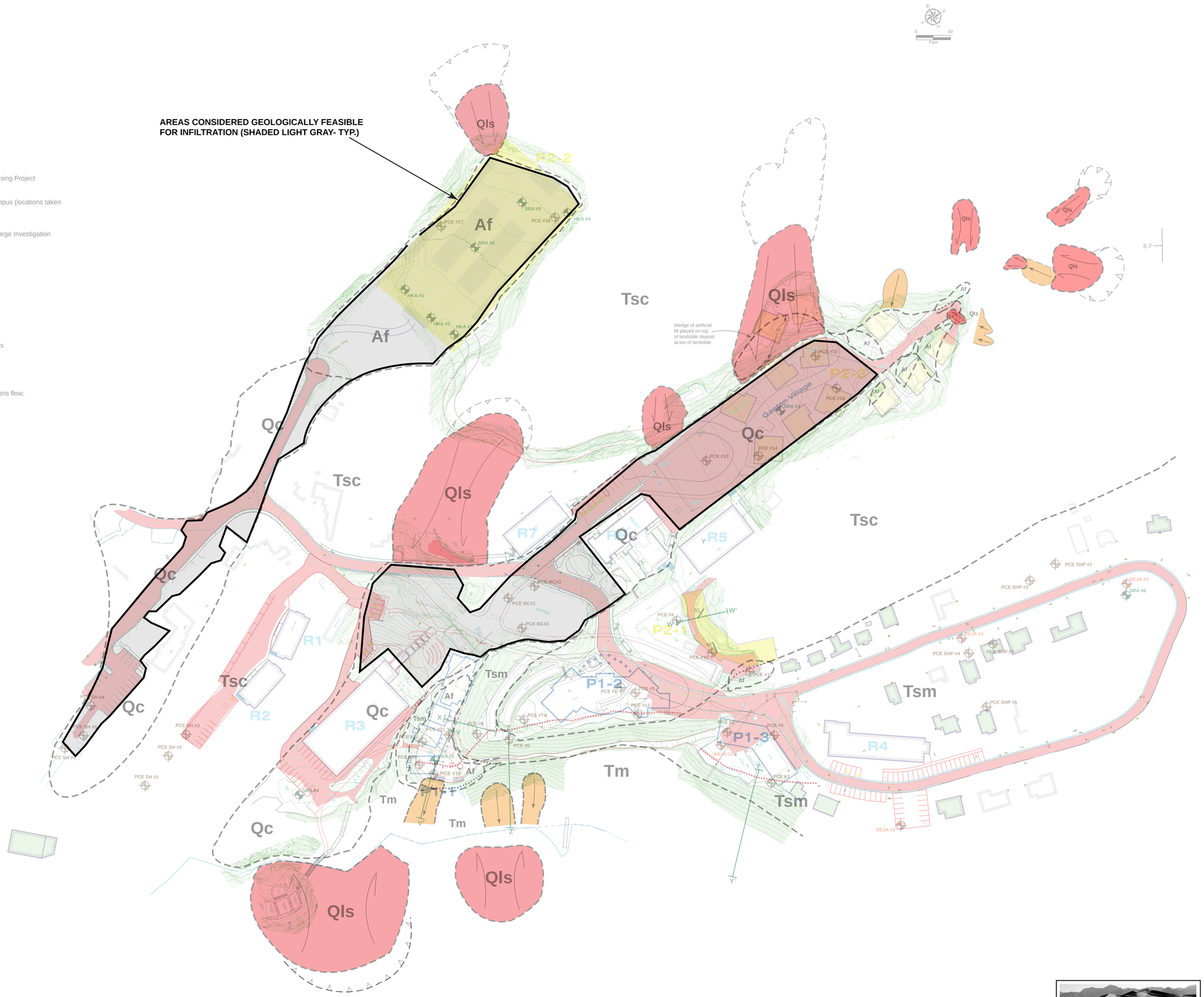
EXPLANATION

EARTH MATERIALS

Af	Artificial fill
Qc	Colluvium
Tsc	Santa Cruz Mudstone
Tsm	Santa Margarita Formation
Tm	Monterey Formation

SYMBOLS

	Earth materials contact - dashed where approximate
PCE #5	Boring advanced by Pacific Crest Engineering for this investigation
PCE BC#3	Boring advanced by Pacific Crest Engineering in 2009 for Bethany Cafe
PCE SH #7	Boring advanced by Pacific Crest Engineering in 2002 for Student Housing Project
PCE SHP #5	Boring advanced by Pacific Crest Engineering in 2002 for Bethany Loop Student Housing Project
REJA #4	Boring advanced by Steven Raas and Associates in 1994 for Bethany University Campus (locations taken from map acccompanying Rogers E. Johnson & Associates 1994 geologic report)
SRA #1	Boring advanced by Rogers E. Johnson & Associates in 1995 for Groundwater Recharge Investigation
HKA #4	Boring advanced by Haro, Kasunich & Associates in 2001 for Soccer Field project
W W'	Line of geological cross section - see section on Plate 2
	Landslide scar - dashed barbed line indicates the outer boundary of scar left behind on landscape after earth materials mobilzed and moved downslope
	Landslide deposit (shaded red) - arrows denote general movment direction of deposits
	Debris flow scar (shaded orange) - evacuation area left behind after occurence of debris flow; arrow indicates direction soil moved during evacuation of the scar
68	Joint or fracture attitude
5-7	Bedding attitude



Phase II New Buildings					
Building	Use	Area (sq. ft.)	Rooms/ Beds	Stories	Comments
P2 -1	Program Space & Lodging	18,000	22 / 44	2	
P2-2	Parking Structure	60,000		2	
P2-3	Lodging 4 Pieces	40,000	48/96	2	
Phase II Totals		158,000	70 / 140		

Phase I New Buildings					
Building #	Use	Area (sq. ft.)	Rooms / Beds	Stories	Comments
P1-1	Spa	7000	0		
P1-2	Dining Hall	13,500	0	1	
P1-3	Lodging	35,000	59 / 118	4	New Spot
Total		55,500			

Phase I Remodeled Buildings					
Building #	Use	Area (sq. ft.)	Rooms / Beds	Stories	Name
R1	Lodging	7050	22 / 44	2	Gerhart Hall
R2	Lodging	7050	22 / 44	2	Harp Hall
R3	Assembly & Lodging	22,074	6 Bunk Dorms 62 Beds	2	Redwood Auditorium
R4	Lodging	21,340	46 /92	3	Burnett Hall
R5	Classrooms & Assembly	15,920		2	Williams Hall
R6	Assembly	5135		1	Craig Chapel
R7	Administration	16,170		3	Stowell Center
Total		94,339	350 Total Beds		

BASE MAP: Topographic base map and proposed development map were extracted from a digital file given to us by Yates Architecture on 11 April 2014. Intended scale of publication displayed on digital map file is 1"=60'. The reader should check to ensure that this base map is current with respect to whatever future elements of the project are being referenced, since this base map is not the final design drawing.

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enzinn@cruzio.com

Map Showing Geologically Feasible Infiltration Areas
Proposed Redevelopment Of
Bethany University Campus By The 1440 Foundation
800 Bethany Drive
Scotts Valley, California

Date: 5 May 2014 Revised: 28 May 2014

Job #2014001-G-SC

Scale: 1"=60'

Drawn by: ENZ/enz

Plate 3

Exhibit E

Drainage Management Areas

Drainage Management Areas

SCALE: 1" = 50'

REGISTERED PROFESSIONAL ENGINEER — REFINA COHEN — NO. C46137 — Civil — STATE OF CALIFORNIA

BY	REVISION	DATE
APPROVED	For Plan Check Only	DATE

DATED DRAWING CONTRACT NO. 41107

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Drainage Management Areas

1440 Foundation

800 Bethany Drive, Scotts Valley, California

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Bethany University
DESIGN REVIEW

DATE	DESIGN	DRAWN
05/21/14	DAVE	JIM/MARC

SHEET
DMA-1

JOB NO. 13024

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Exhibit F

SCM Sizing Calculations

Central Coast Region Stormwater Control Measure Sizing Calculator

Version: 2/26/2014

1. Project Information

Project name:	The 1440 Center - Zone A
Project location:	Scotts Valley
Tier 2/Tier 3:	Tier 3 - Retention
Design rainfall depth (in):	2.6
Total project area (ft2):	340362
Total new impervious area (ft2):	61385
Total replaced impervious in a USA (ft2):	0
Total replaced impervious not in a USA (ft2):	0
Total pervious/landscape area (ft2):	278977

2. DMA Characterization

Name	DMA Type	Area (ft2)	Surface Type	New, Replaced?	Connection
DMA #2	Drains to SCM	61385	Concrete or asphalt	New	M #2 - Bethany W
DMA #38	Self-Treating	230575			
DMA #1	Self-Treating	5877			
DMA #39	Self-Treating	39414			
DMA #58	Drains to SCM	1273	Landscape		SCM #2 - Bethany W
DMA #59	Drains to SCM	1428	Landscape		SCM #2 - Bethany W

DMA Summary Area	
Total project impervious area (ft2):	61385
New impervious area (ft2):	61385
Replaced impervious within a USA (ft2):	0
Replaced impervious not in a USA (ft2):	0
Total pervious/landscape area (ft2):	2701

3. SCM Characterization

Name	SCM Type	Safety Factor	SCM Soil Type	Infilt. Rate (in/hr)	Area (ft2)
SCM #2 - Bethany Way	Direct Infiltration	2	HSG A/B	0.75	3000

4. Run SBUH Model

5. SCM Minimum Sizing Requirements

SCM Name	Min. Required Storage Vol. (ft3)	Depth Below Underdrain (ft)	Drain Time (hours)
SCM #2 - Bethany Way	17453	14.54	46.5

6. Self-Retaining Area Sizing Checks

Self-Retaining DMA Name	Self-Retaining DMA Area (ft2)	Tributary DMA Name	Tributary DMA Area (ft2)	Tributary / SRA Area Ratio

Central Coast Region Stormwater Control Measure Sizing Calculator

Version: 2/26/2014

1. Project Information

Project name:	The 1440 Center - Zone B
Project location:	Scotts Valley
Tier 2/Tier 3:	Tier 3 - Retention
Design rainfall depth (in):	2.6
Total project area (ft2):	483670
Total new impervious area (ft2):	7723
Total replaced impervious in a USA (ft2):	0
Total replaced impervious not in a USA (ft2):	122614
Total pervious/landscape area (ft2):	353333

2. DMA Characterization

Name	DMA Type	Area (ft2)	Surface Type	New, Replaced?	Connection
DMA #37	Drains to SCM	35695	Concrete or asphalt	Replaced	SCM #1 - Farm
DMA #36	Drains to SCM	7723	Concrete or asphalt	New	SCM #1 - Farm
DMA #4	Drains to SCM	19940	Concrete or asphalt	Replaced	SCM #3 - Pond
DMA #8	Drains to SCM	3998	Roof	Replaced	SCM #3 - Pond
DMA #9	Drains to SCM	7338	Roof	Replaced	SCM #3 - Pond
DMA #10	Drains to SCM	2182	Landscape		SCM #3 - Pond
DMA #11	Drains to SCM	6577	Roof	Replaced	SCM #3 - Pond
DMA #12	Drains to SCM	3307	Landscape		SCM #3 - Pond
DMA #13	Drains to SCM	3611	Landscape		SCM #3 - Pond
DMA #14	Drains to SCM	5840	Landscape		SCM #3 - Pond
DMA #15	Drains to SCM	6343	Landscape		SCM #3 - Pond
DMA #16	Drains to SCM	9471	Landscape		SCM #3 - Pond
DMA #17	Drains to SCM	14302	Concrete or asphalt	Replaced	SCM #3 - Pond
DMA #6	Drains to SCM	19671	Concrete or asphalt	Replaced	SCM #3 - Pond
DMA #30	Drains to SCM	13062	Roof	Replaced	SCM #3 - Pond
DMA #31	Drains to SCM	2031	Concrete or asphalt	Replaced	SCM #3 - Pond
DMA #48	Drains to SCM	3613	Landscape		SCM #3 - Pond
DMA #42	Self-Treating	266047			
DMA #43	Self-Treating	32502			
DMA #60	Drains to SCM	10443	Landscape		SCM #3 - Pond
DMA #26	Drains to SCM	6201	Landscape		SCM #3 - Pond
DMA #61	Drains to SCM	547	Landscape		SCM #3 - Pond
DMA #29	Drains to SCM	1394	Concrete or asphalt	Replaced	SCM #3 - Pond
DMA #49	Drains to SCM	1712	Landscape		SCM #3 - Pond

DMA Summary Area	
Total project impervious area (ft2):	131731
New impervious area (ft2):	7723
Replaced impervious within a USA (ft2):	0
Replaced impervious not in a USA (ft2):	124008
Total pervious/landscape area (ft2):	53270

3. SCM Characterization

Name	SCM Type	Safety Factor	SCM Soil Type	Infilt. Rate (in/hr)	Area (ft2)
SCM #1 - Farm	Direct Infiltration	2	HSG A/B	0.75	1700
SCM #3 - Pond	Direct Infiltration	2	HSG A/B	0.75	4000

4. Run SBUH Model

5. SCM Minimum Sizing Requirements

SCM Name	Min. Required Storage Vol. (ft3)	Depth Below Underdrain (ft)	Drain Time (hours)
SCM #1 - Farm	6267	9.22	29.4
SCM #3 - Pond	12353	7.72	24.7

6. Self-Retaining Area Sizing Checks

Self-Retaining DMA Name	Self-Retaining DMA Area (ft2)	Tributary DMA Name	Tributary DMA Area (ft2)	Tributary / SRA Area Ratio

Central Coast Region Stormwater Control Measure Sizing Calculator

Version: 2/26/2014

1. Project Information

Project name:	The 1440 Center - Zone C
Project location:	Scotts Valley
Tier 2/Tier 3:	Tier 3 - Retention
Design rainfall depth (in):	2.6
Total project area (ft2):	137846
Total new impervious area (ft2):	0
Total replaced impervious in a USA (ft2):	0
Total replaced impervious not in a USA (ft2):	10778
Total pervious/landscape area (ft2):	127068

2. DMA Characterization

Name	DMA Type	Area (ft2)	Surface Type	New, Replaced?	Connection
DMA #34	Drains to SCM	6807	Roof	Replaced	SCM #6 - Spot
DMA #35	Drains to SCM	3971	Concrete or asphalt	Replaced	SCM #6 - Spot
DMA #7	Self-Treating	3759			
Zone C Remainder	Self-Treating	123309			

DMA Summary Area	
Total project impervious area (ft2):	10778
New impervious area (ft2):	0
Replaced impervious within a USA (ft2):	0
Replaced impervious not in a USA (ft2):	10778
Total pervious/landscape area (ft2):	0

3. SCM Characterization

Name	SCM Type	Safety Factor	SCM Soil Type	Infilt. Rate (in/hr)	Area (ft2)
SCM #6 - Spot	Bioretention	1	HSG A/B	0.75	500

4. Run SBUH Model

5. SCM Minimum Sizing Requirements

SCM Name	Min. Required Storage Vol. (ft3)	Depth Below Underdrain (ft)	Drain Time (hours)
SCM #6 - Spot	560	2.80	16.7

6. Self-Retaining Area Sizing Checks

Self-Retaining DMA Name	Self-Retaining DMA Area (ft2)	Tributary DMA Name	Tributary DMA Area (ft2)	Tributary / SRA Area Ratio

Central Coast Region Stormwater Control Measure Sizing Calculator

Version: 2/26/2014

1. Project Information

Project name:	The 1440 Center - Zone D
Project location:	Scotts Valley
Tier 2/Tier 3:	Tier 3 - Retention
Design rainfall depth (in):	2.6
Total project area (ft2):	315357
Total new impervious area (ft2):	12335
Total replaced impervious in a USA (ft2):	
Total replaced impervious not in a USA (ft2):	41660
Total pervious/landscape area (ft2):	261362

2. DMA Characterization

Name	DMA Type	Area (ft2)	Surface Type	New, Replaced?	Connection
DMA #18	Drains to SCM	5627	Concrete or asphalt	Replaced	SCM #4 - Aud. Eas
DMA #22	Drains to SCM	3797	Roof	New	SCM #4 - Aud. Eas
DMA #23 - Front	Drains to SCM	518.5	Roof	New	SCM #4 - Aud. Eas
DMA #24 - Front	Drains to SCM	667.5	Roof	New	SCM #5 - Spa
DMA #28	Drains to SCM	4770	Concrete or asphalt	New	SCM #5 - Spa
DMA #27	Drains to Self-Retaining	2270	Concrete or asphalt		DMA #45
DMA #25 - Front	Drains to SCM	698	Roof	New	SCM #5 - Spa
DMA #24 - Rear	Drains to SCM	667.5	Roof	New	SCM #4 - Aud. Eas
DMA #25 - Rear	Drains to SCM	698	Roof	New	SCM #4 - Aud. Eas
DMA #23 - Rear	Drains to SCM	518.5	Roof	New	SCM #4 - Aud. Eas
DMA #45	Self-Retaining	1543			
DMA #44	Drains to SCM	7632	Landscape		SCM #7 - Aud. Sout
DMA #51	Drains to SCM	1620	Landscape		SCM #7 - Aud. Sout
DMA #56	Drains to SCM	1533	Concrete or asphalt	Replaced	CM #7 - Aud. Sout
DMA #46	Self-Treating	4899			
DMA #21	Drains to SCM	16520	Roof	Replaced	CM #7 - Aud. Sout
DMA #50	Drains to SCM	17980	Concrete or asphalt	Replaced	CM #7 - Aud. Sout
DMA #47	Self-Treating	16679			
DMA #53	Self-Treating	904			
DMA #54	Drains to SCM	634	Landscape		SCM #5 - Spa
DMA #52	Self-Treating	2421			
DMA #57	Self-Treating	1978			
DMA #55	Self-Treating	4623			
Remainder of Zone D	Self-Treating	211019			
DMA #33	Self-Treating	2335			
DMA #32	Self-Treating	2805			

DMA Summary Area	
Total project impervious area (ft2):	56265
New impervious area (ft2):	12335
Replaced impervious within a USA (ft2):	0
Replaced impervious not in a USA (ft2):	41660
Total pervious/landscape area (ft2):	9886

3. SCM Characterization

Name	SCM Type	Safety Factor	SCM Soil Type	Infilt. Rate (in/hr)	Area (ft2)
SCM #4 - Aud. East	Bioretention	1	HSG A/B	0.75	440
SCM #5 - Spa	Bioretention	1	HSG A/B	0.75	340

SCM #7 - Aud. South	Bioretention	1	HSG A/B	0.75	1375

4. Run SBUH Model

5. SCM Minimum Sizing Requirements

SCM Name	Min. Required Storage Vol. (ft3)	Depth Below Underdrain (ft)	Drain Time (hours)
SCM #4 - Aud. East	1268	7.20	46.1
SCM #5 - Spa	843	6.20	39.7
SCM #7 - Aud. South	2362	4.29	27.5

6. Self-Retaining Area Sizing Checks

Self-Retaining DMA Name	Self-Retaining DMA Area (ft2)	Tributary DMA Name	Tributary DMA Area (ft2)	Tributary / SRA Area Ratio
DMA #45	1543	DMA #27	2270	1.47

Central Coast Region Stormwater Control Measure Sizing Calculator

Version: 2/26/2014

1. Project Information

Project name:	The 1440 Center - Zone E
Project location:	Scotts Valley
Tier 2/Tier 3:	Tier 3 - Retention
Design rainfall depth (in):	2.6
Total project area (ft2):	50194
Total new impervious area (ft2):	3707
Total replaced impervious in a USA (ft2):	0
Total replaced impervious not in a USA (ft2):	0
Total pervious/landscape area (ft2):	46487

2. DMA Characterization

Name	DMA Type	Area (ft2)	Surface Type	New, Replaced?	Connection
DMA #3	Drains to SCM	3707	Concrete or asphalt	New	SCM - Zone E
DMA #40	Self-Treating	14573			
DMA #41	Self-Treating	31913			

DMA Summary Area	
Total project impervious area (ft2):	3707
New impervious area (ft2):	3707
Replaced impervious within a USA (ft2):	0
Replaced impervious not in a USA (ft2):	0
Total pervious/landscape area (ft2):	0

3. SCM Characterization

Name	SCM Type	Safety Factor	SCM Soil Type	Infilt. Rate (in/hr)	Area (ft2)
SCM - Zone E	Bioretention	1	HSG A/B	0.75	400

4. Run SBUH Model

5. SCM Minimum Sizing Requirements

SCM Name	Min. Required Storage Vol. (ft3)	Depth Below Underdrain (ft)	Drain Time (hours)
SCM - Zone E	358	2.24	12.4

6. Self-Retaining Area Sizing Checks

Self-Retaining DMA Name	Self-Retaining DMA Area (ft2)	Tributary DMA Name	Tributary DMA Area (ft2)	Tributary / SRA Area Ratio