

Regional Board Workshop

Stormwater Expert Panel
Progress Report

Santa Susana Field Laboratory
Outfalls 008 and 009

June 5, 2008

Meeting Agenda

- SSFL Stormwater Expert Panel
 - Panel members, scope, & schedule
 - Overview of ENTS & design storm
- Public Outreach Summary
- ENTS conceptual designs
- Site Specific Design Storm Recommendation
- Future Efforts

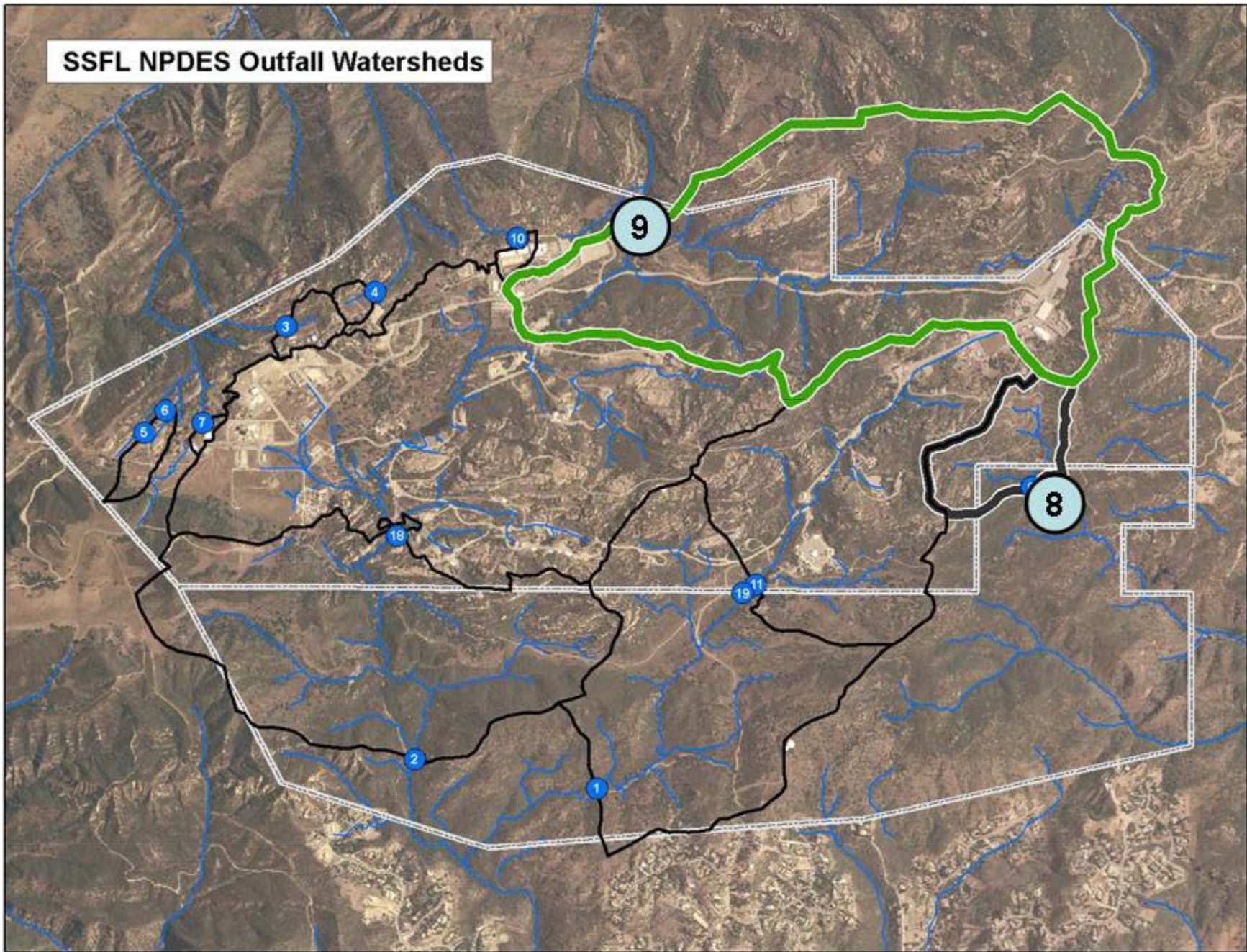
Expert Panel Members

- Dr. Robert Gearheart, P.E.
- Dr. Richard Horner (prior commitment today)
- Jonathan Jones, P.E.
- Dr. Michael Josselyn
- Dr. Robert Pitt, P.E. (prior commitment today)
- Dr. Michael Stenstrom, P.E.

Expert Panel's Scope of Work

- For outfalls 008 and 009 review site data and recommend natural Engineered Natural Treatment Systems (ENTS) capable of providing the required treatment to meet the final effluent limits
- Recommend to the Board a site-wide design storm
- Public Involvement

SSFL NPDES Outfall Watersheds



Expert Panel Work Plan Schedule

Tasks	Proposed Date
Design Storm Recommendation	Complete
ENTS Conceptual Designs	Complete
ENTS Final Designs	July 15, 2008
White Papers on Background/ENTS Effluent Quality and Monitoring	July 31, 2008
ENTS Permitting	August 15, 2008
ENTS Construction Begins	October 31, 2008
Final Permit Limits Become Effective	June 10, 2009

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Public Involvement Component

- Public Participation Meetings
- Periodic reports to RWQCB on project status
- Project information posted on the Internet:

http://www.boeing.com/aboutus/environment/santa_susana/ents/index.html

- Public Field Trips

Expert Panel Public Meetings

Proposed Scope	Proposed Date
Panel introduction/Overview	Complete, January 22
Progress on design storm and ENTS selection & conceptual design	Complete, March 17
Recommended design storm and conceptual ENTS designs	Complete, April 17
Progress on ENTS implementation	July 17 & Nov. (was September, 2008)
Initial ENTS Performance Monitoring Results	Summer 2009

Board Presentations

- March 6th – Brief report on progress
- April 3rd – Longer update and discussion of ENTS and Design Storm
- June 5th (today) – ENTS/Design Storm Workshop

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Extensive Agency Coordination (Examples)

Agency/Group	Action	Status
LARWQCB	Progress reports at Board hearings	Dr Stenstrom spoke at March & April hearings; Panel workshop at June hearing
	Permit reopener to incorporate design storm	Tentatively planned for Sept '08
	401 Certification	Pending
	Review of the ENTS soil management plan	Pending submittal
DTSC	Review of the ENTS soil management plan	Held initial site visit; DTSC staff have also attended public meetings; SMP review pending submittal
Ventura County	CEQA lead agency; CUP modification & zoning clearance; grading permit; oak tree permits	Held initial meetings to discuss application/submittal process; developing application & CEQA documentation now
SM Mountains Conservancy	Approval for ENTS projects on Sage Ranch	Held initial meeting to discuss proposed plans; final conceptual design package submitted
NASA	Approval for ENTS projects on NASA property	Held initial meetings to discuss conceptual ENTS designs; NASA reps participated in Panel calls; submitted final conceptual design package end of May
CDFG	Approval/SAA for projects in jurisdictional drainages	Held initial meeting & site visit April 10; follow-up call May 28; Approved SAA pending submittal
ACOE	Jurisdictional Determination	Submitted application package May 27

ENTS “Treatment Train” Concept

- Combine controls in series to treat runoff for multiple constituents and protect downstream controls
- Reduce peak flows to optimize treatment
- Include “polishing” enhancements (media additions, BMP soils amendments, etc.)
- Optimize unit processes and overall system design
 - Redundancy and complementary processes
- Detain and slow runoff from watershed to maximize space-limited treatment at outfall 009

ENTS Treatment Train - Components



E.g., restore un-used impervious surface to natural state

**1: Site Controls
(reduce runoff volume)**



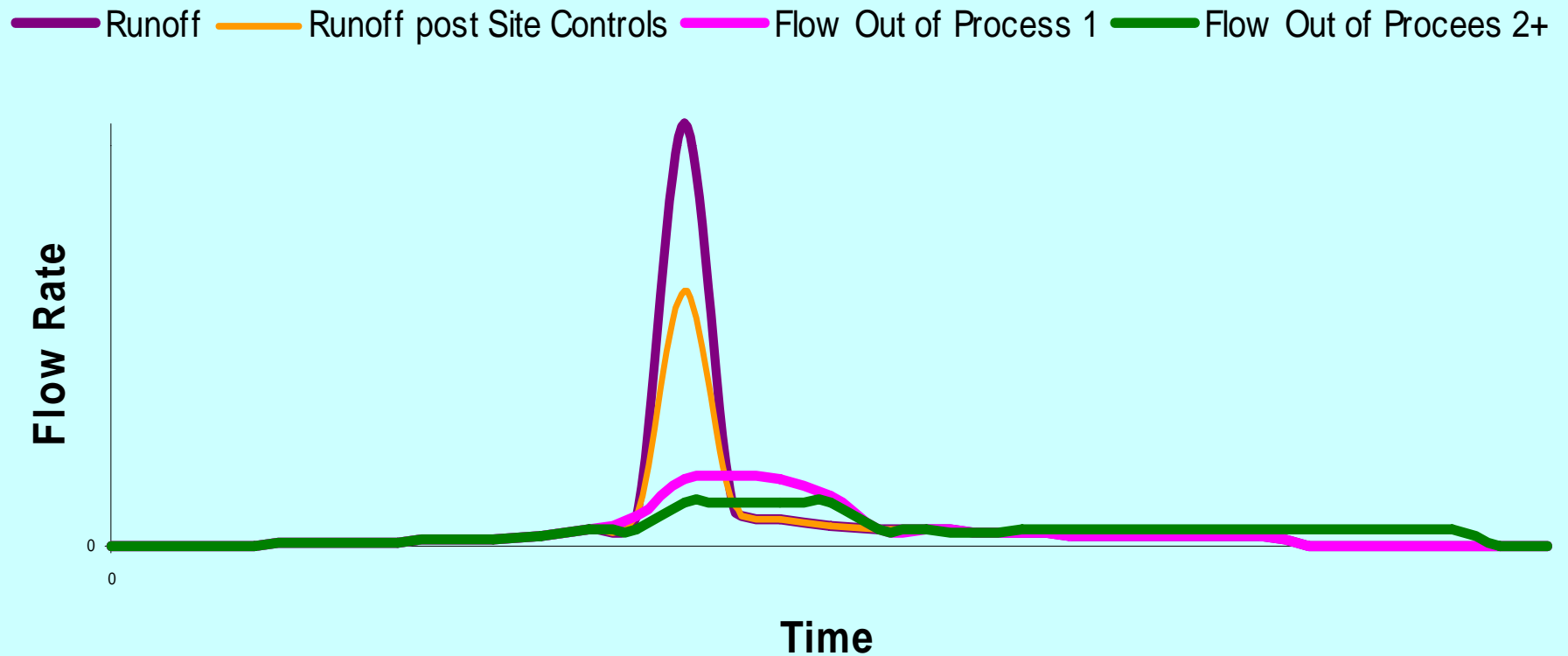
2: Extended Detention



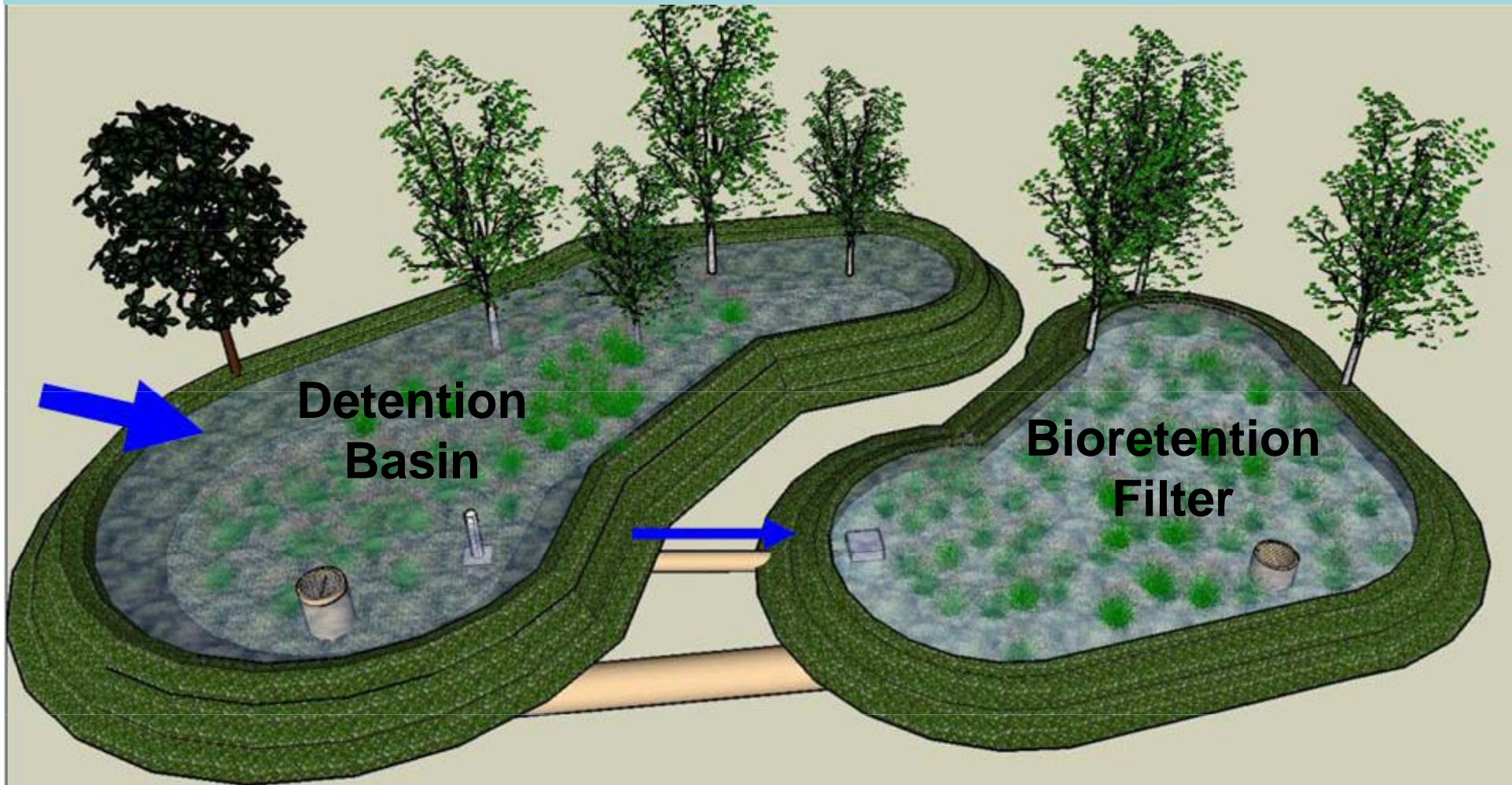
3: Bio-Filter

ENTS Treatment Train - Hydrology

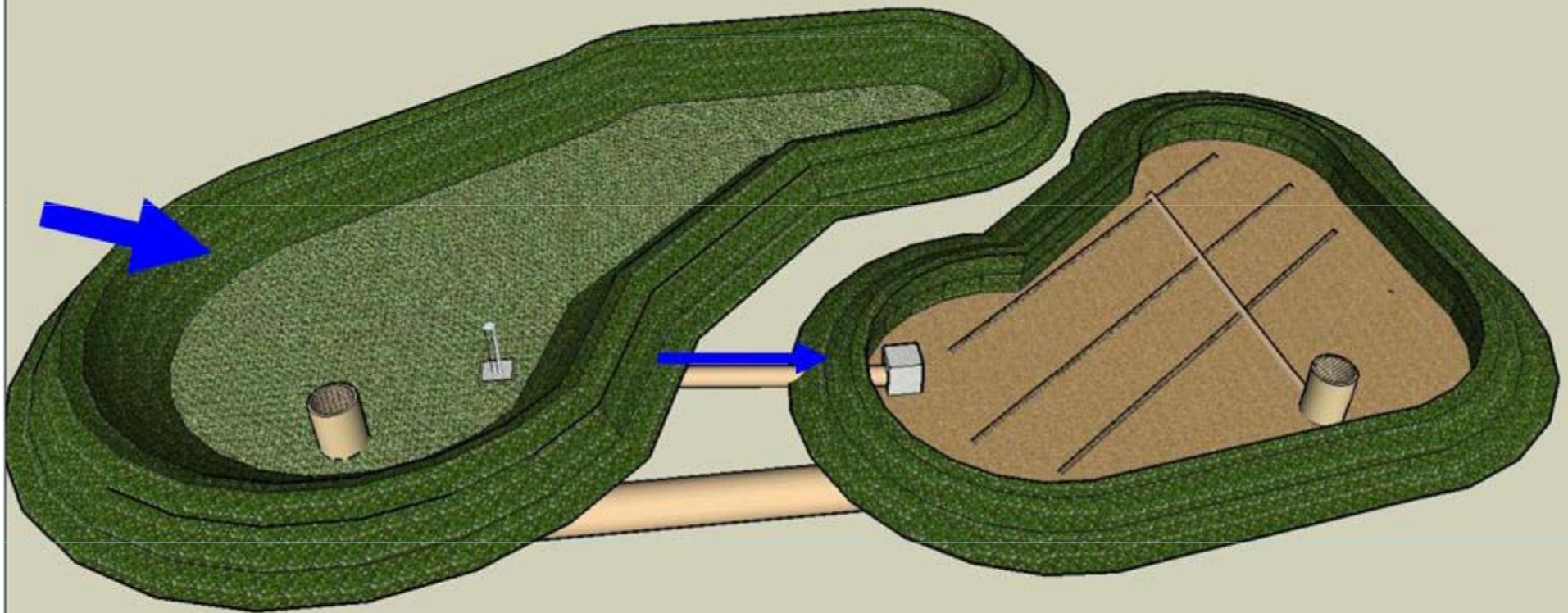
Treatment Train Flow Attenuation Example



ENTS Treatment Train - Example



ENTS Treatment Train - Example

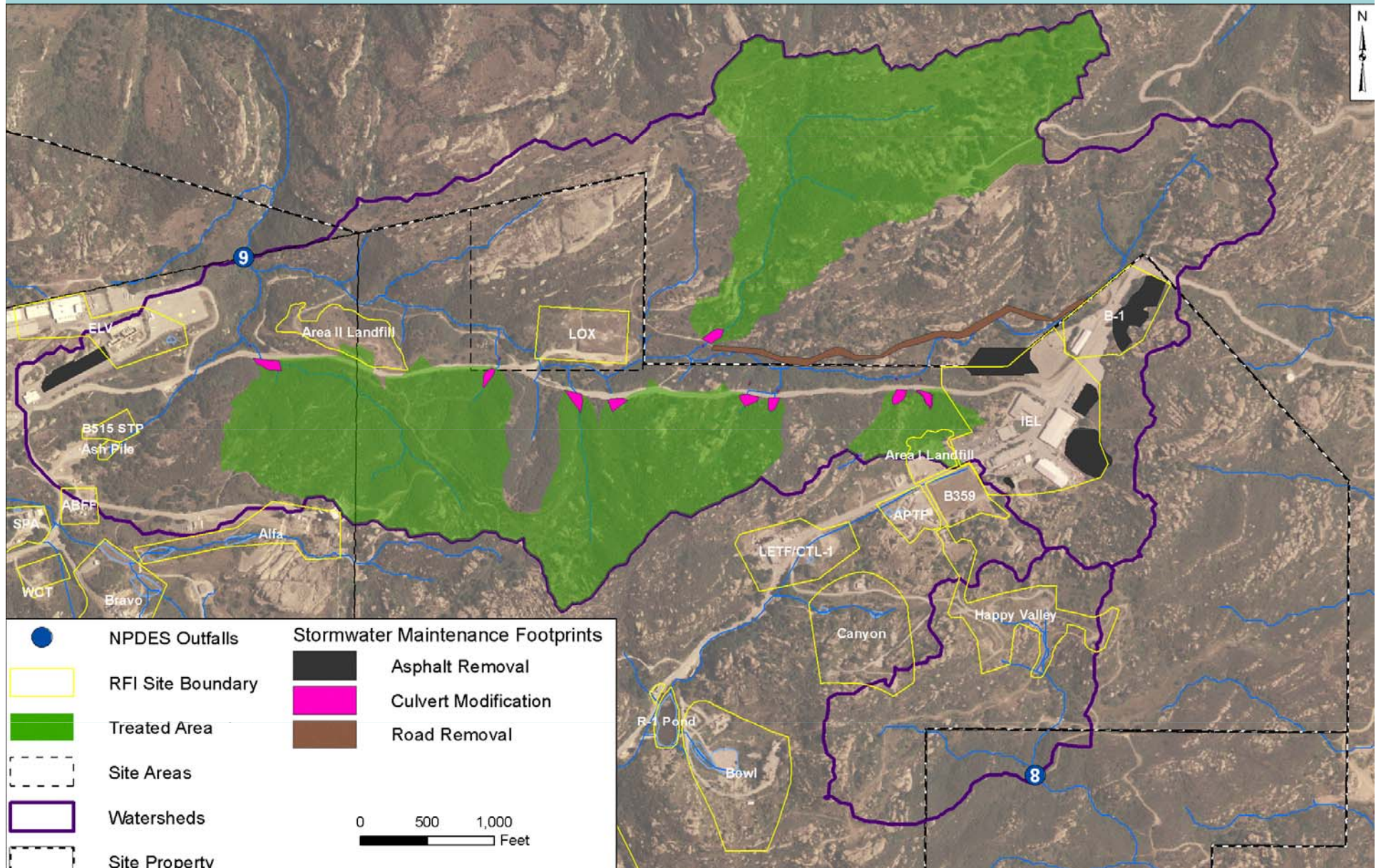


008 and 009 Watersheds

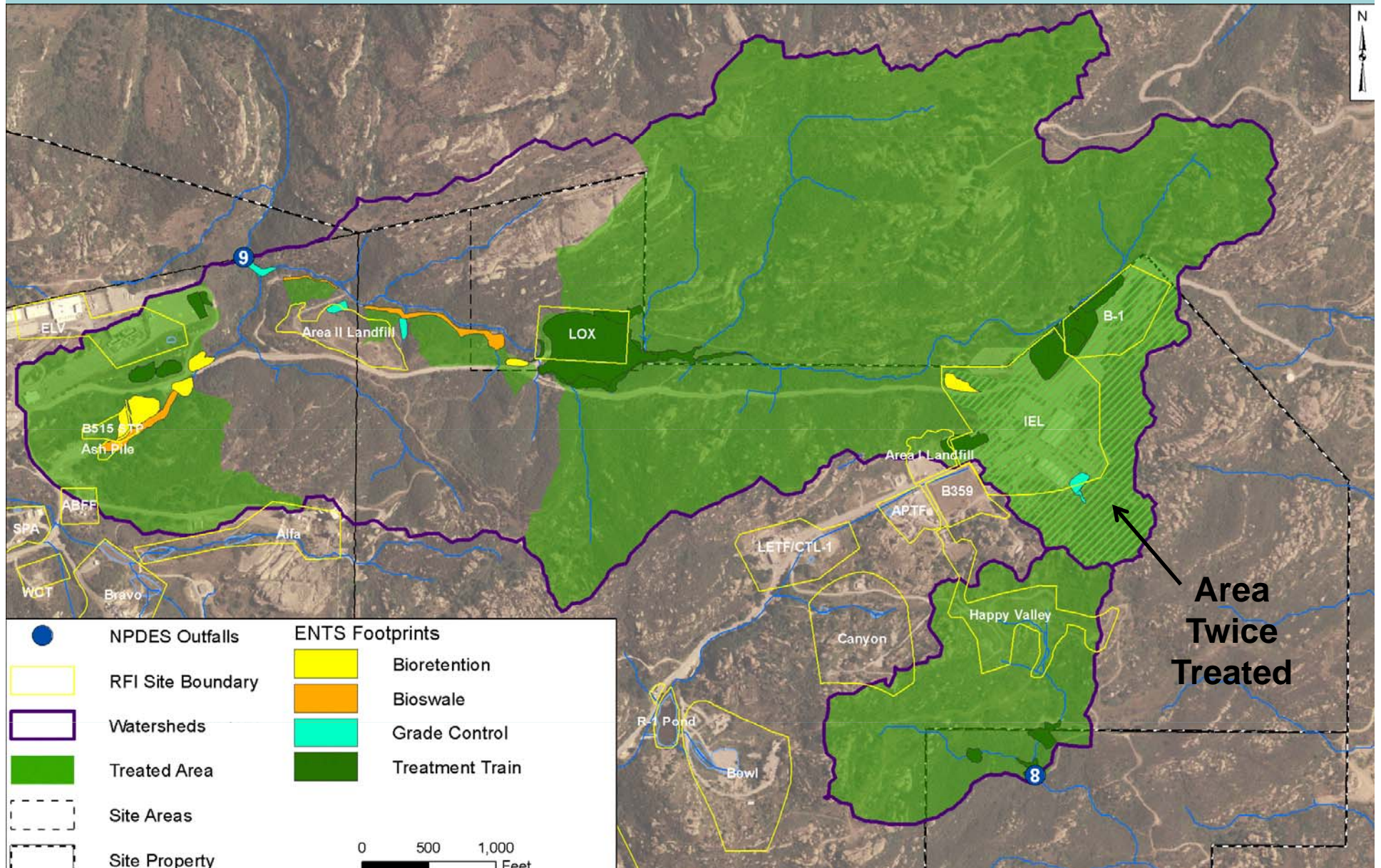
Guiding Principle

- The Panel recommends control and treatment occur throughout the Outfall 008 and 009 watersheds, including off-site areas, such that
 - All feasible areas that can be used for volume reduction and treatment are used to help ensure compliance at the outfall
 - Treat runoff at sub-regional scale and at critical source locations, as large as possible
 - Also include source controls

Phase I - Stormwater Maintenance and Asphalt Removal Projects – Immediate Implementation



Phase II – Larger ENTs – Implementation Following Agency Permits

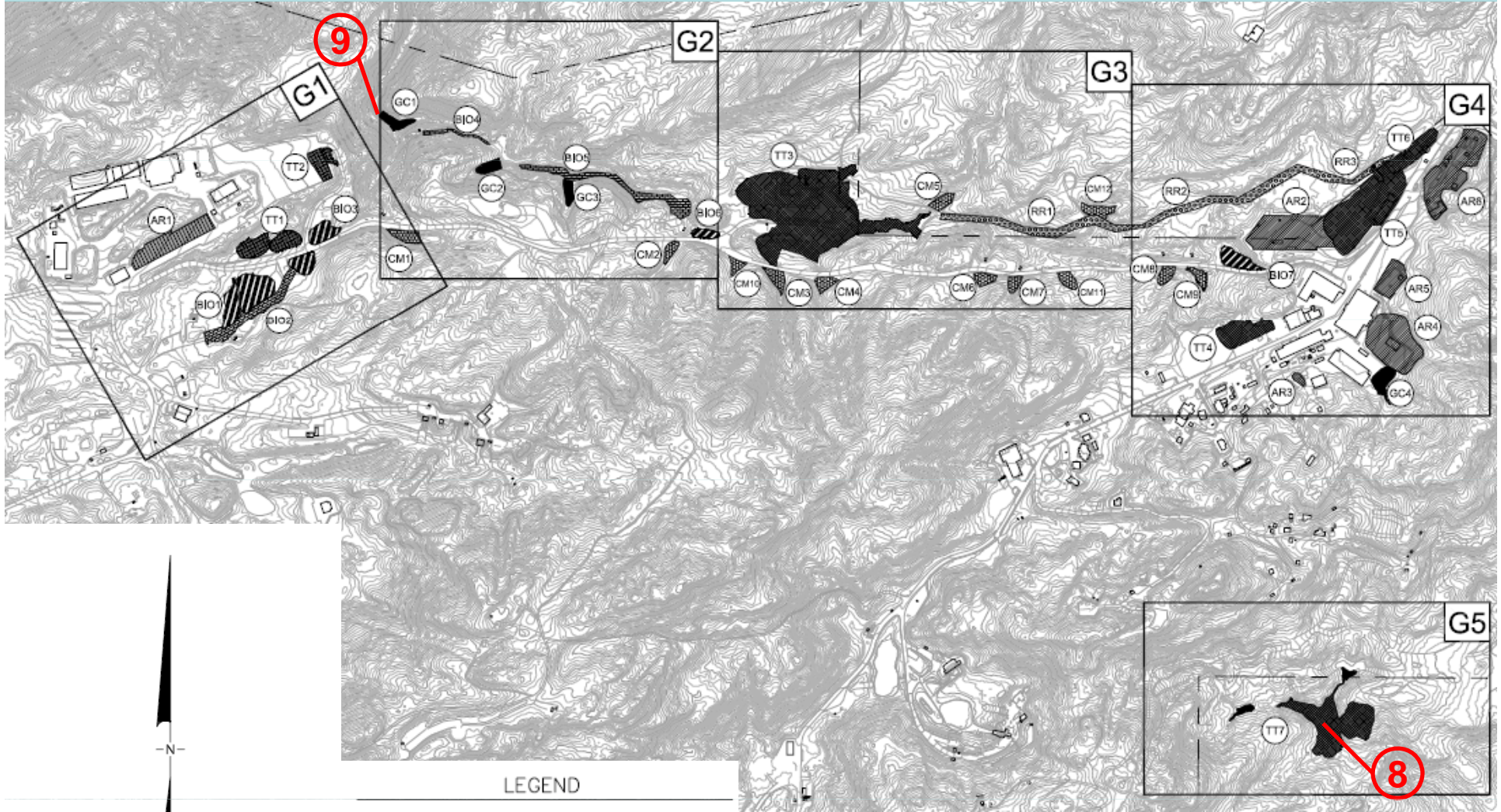


Draft ENTS

Conceptual Designs

- Conceptual Designs include the following:
 - Treatment system footprint
 - Basic structures and concepts
 - Plan and profile views
- All proposed controls located off Boeing property are subject to landowner approval (pending)
- Later design phases are in progress

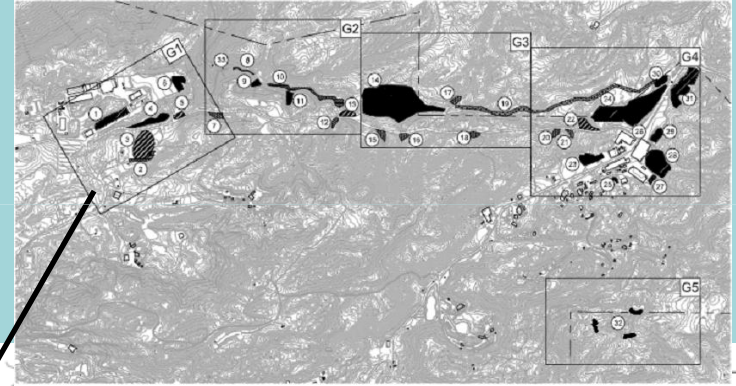
Conceptual Design Key Map



LEGEND

- 730 — EXISTING GROUND CONTOUR (FEET)
- - - - - PROPERTY LINE
- ⊙ CM8 ENT IDENTIFIER

G1 - 009 West (NASA Property)



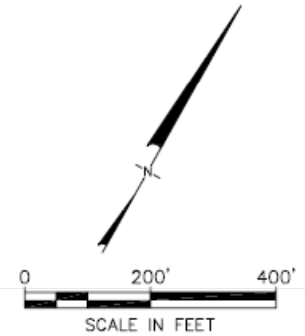
KEY MAP

R (FEET)

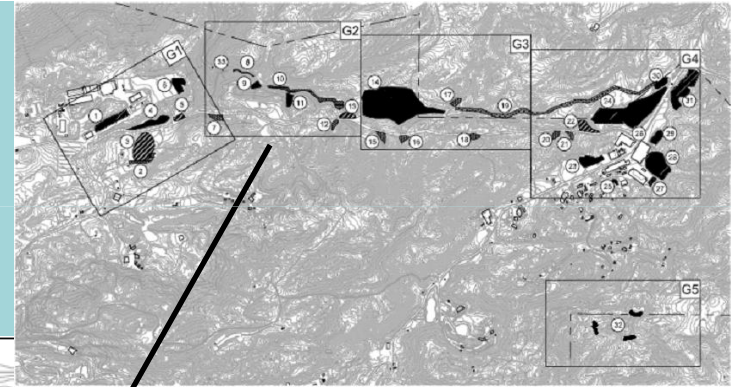
Additional area being planned for ENTS treatment based on rocketdyne.org input



- PROPERTY LINE
- (TT2) ENT IDENTIFIER
- [CULVERT MODIFICATION]
- [ASPHALT REMOVAL]
- [BIORETENTION]
- [TREATMENT TRAIN]
- [BIOSWALE]

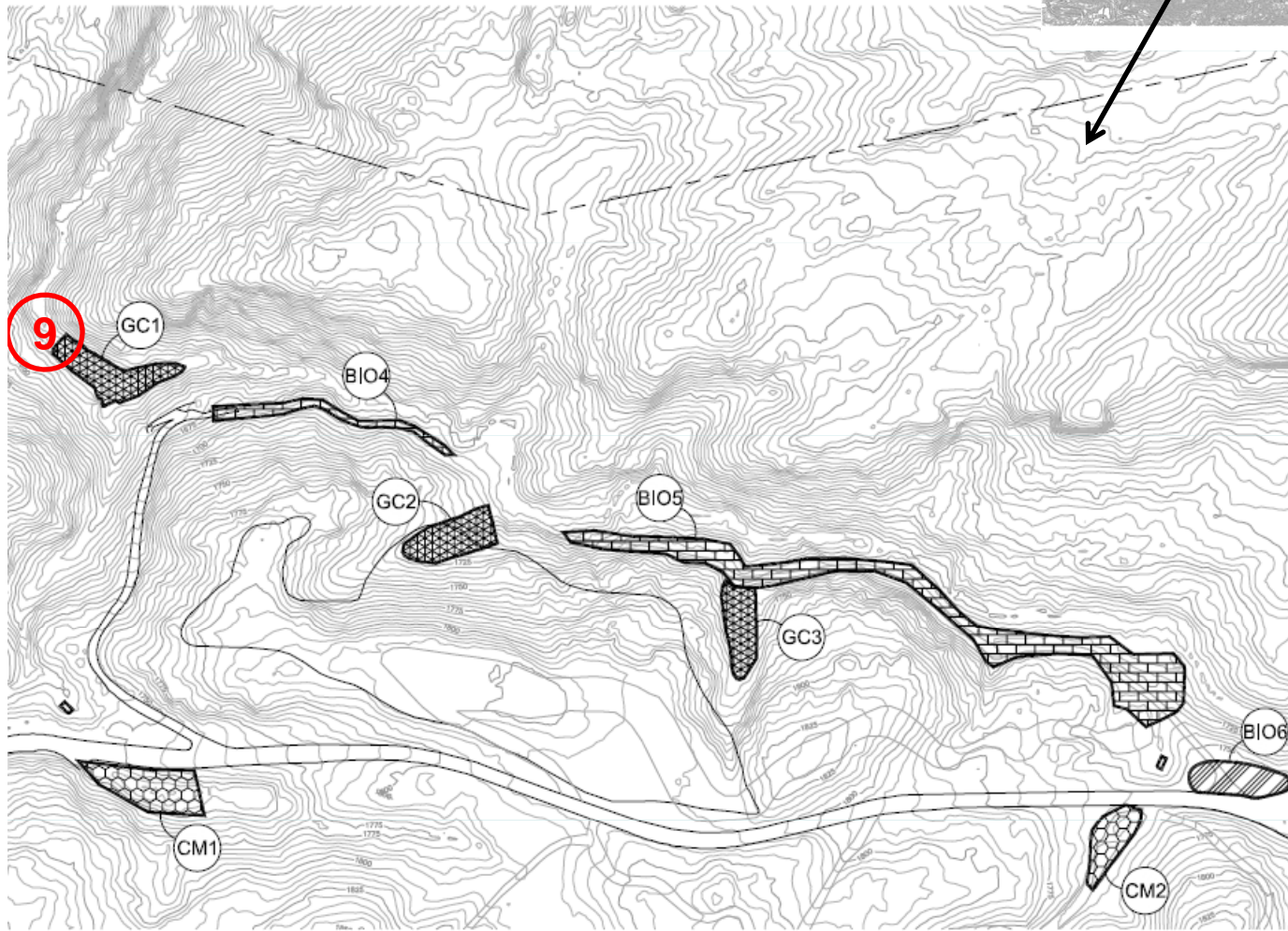


G2 - 009 West Center (Partial NASA Property)

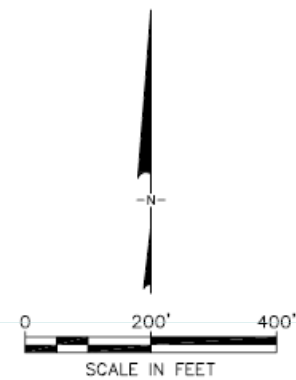


KEY MAP

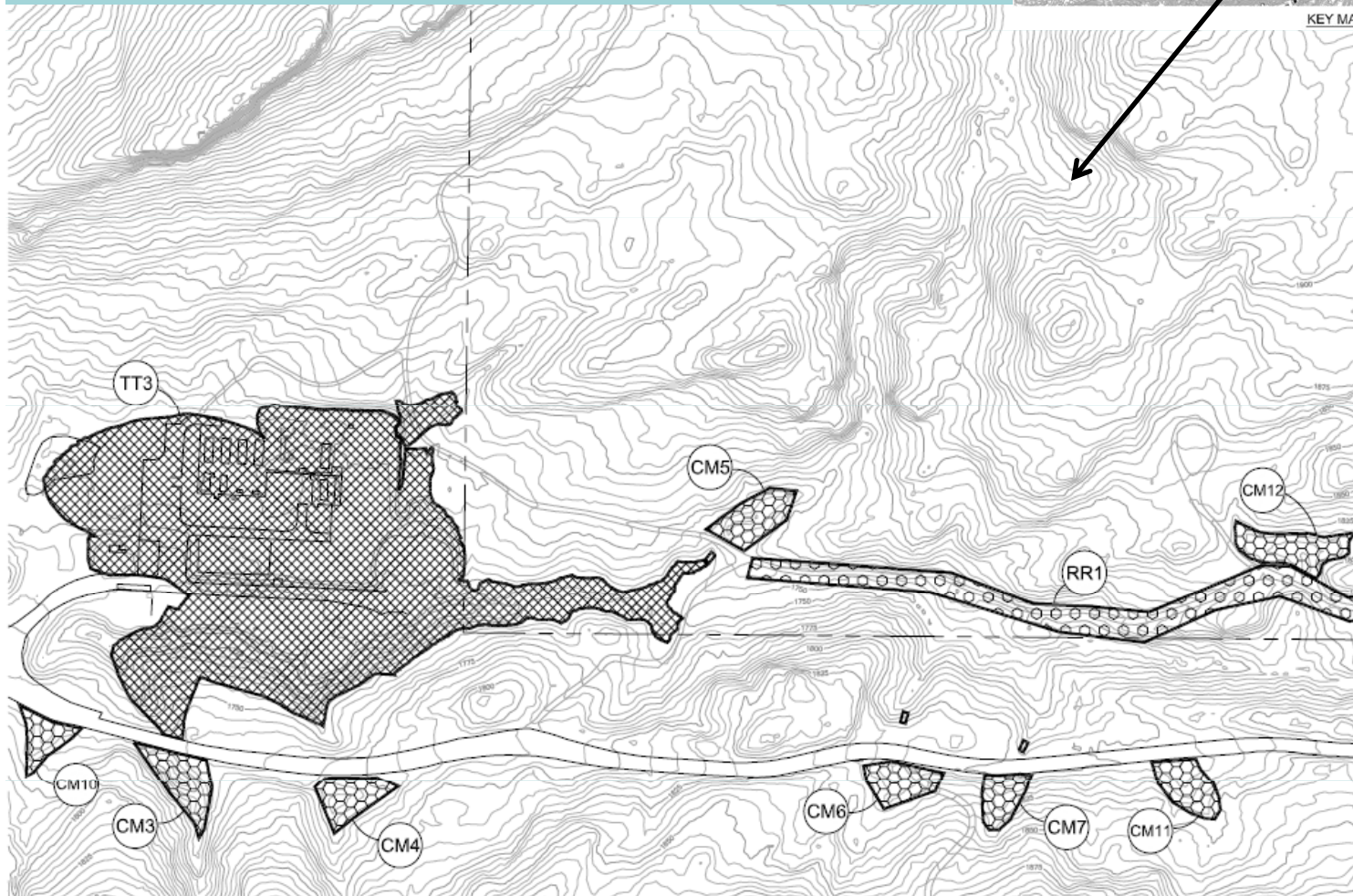
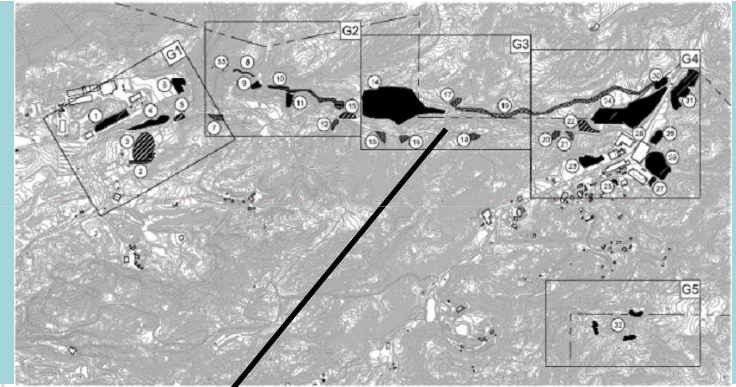
(FEET)



- PROPERTY LINE
- (BIO5) ENT IDENTIFIER
- [Culvert Modification Symbol] CULVERT MODIFICATION
- [Bioretention Symbol] BIORETENTION
- [Bioswale Symbol] BIOSWALE
- [Grade Control Symbol] GRADE CONTROL

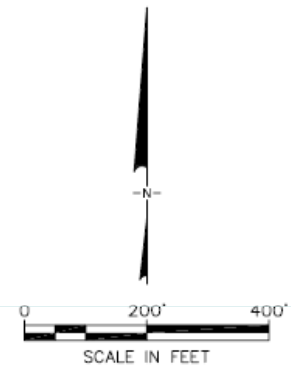


G3 – 009 LOX (NASA & Sage Ranch Properties)

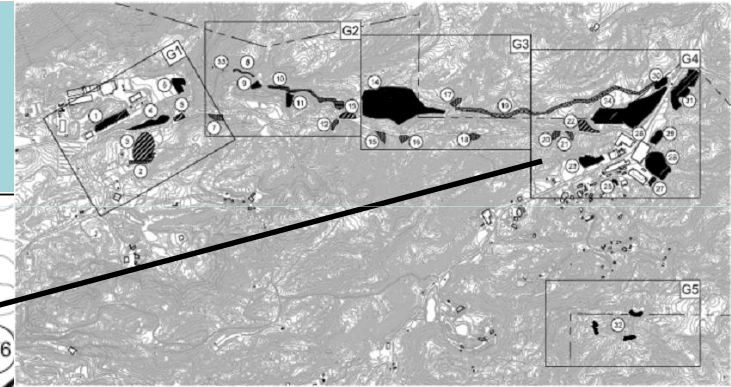


KEY MAP

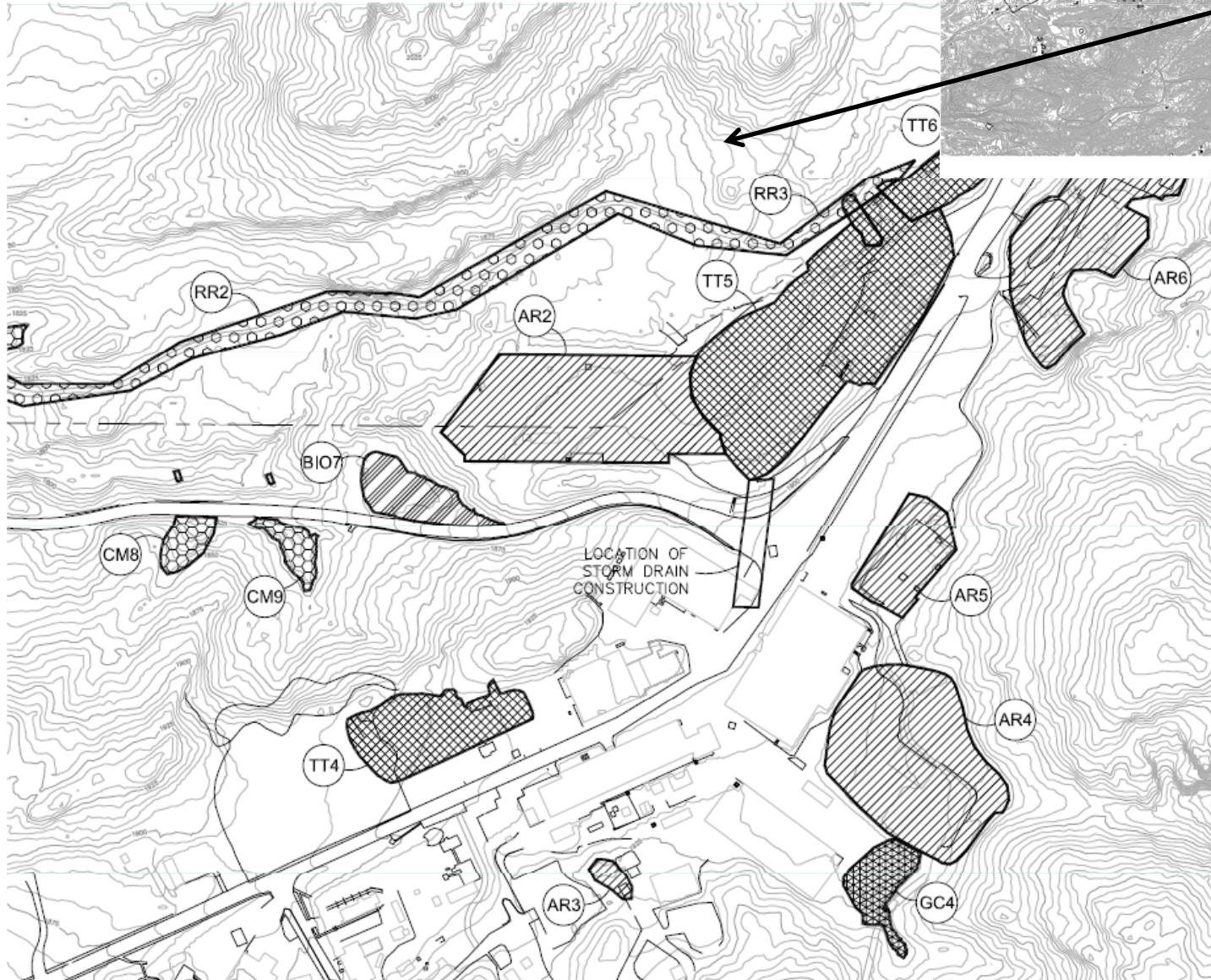
- 730 — EXIST. GROUND CONTOUR (FEET)
- - - - - PROPERTY LINE
- CM5 ENT IDENTIFIER
- ▨ CULVERT MODIFICATION
- ▩ TREATMENT TRAIN
- ◻ RR1 ROAD REHABILITATION








G4 – 009 East (Partial Sage Ranch Property)

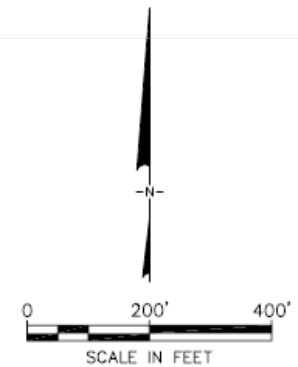


R (FEET)



KEY MAP

-  ASPHALT REMOVAL
-  BIORETENTION
-  TREATMENT TRAIN
-  ROAD REHABILITATION
-  GRADE CONTROL

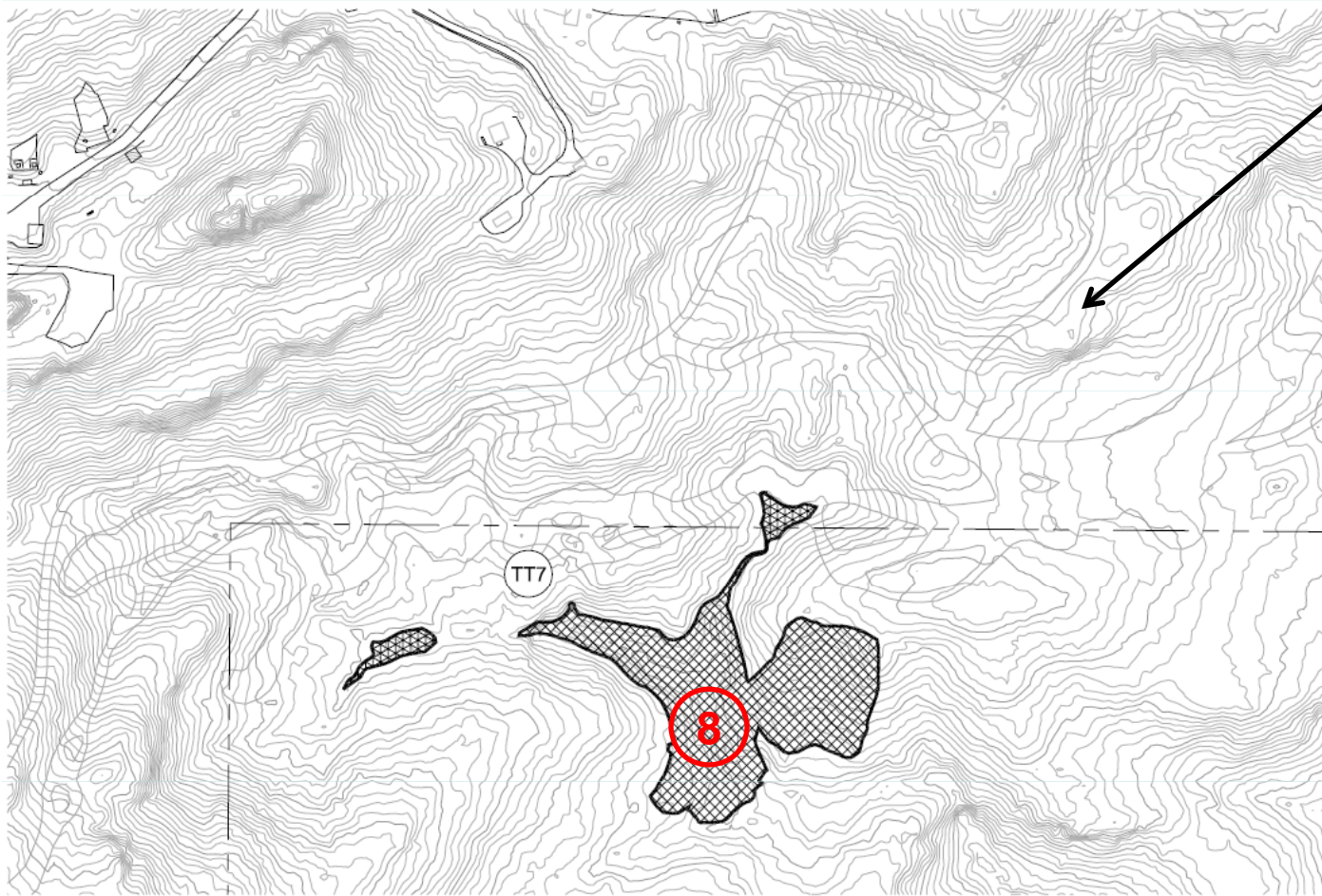
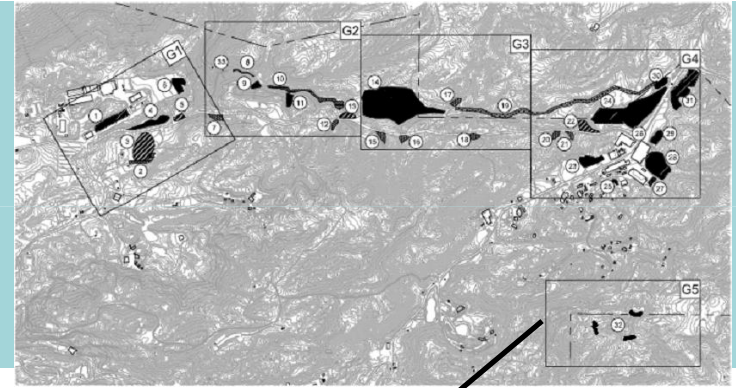


Geosyntec
CORPORATION
3080 OLD TOWN AVE., SUITE 8-102
SAN DIEGO, CALIFORNIA 92108 USA
PHONE: 619.297.1530

BEIRD
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

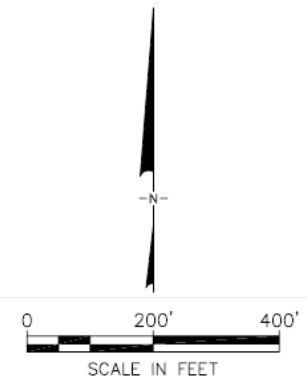
TITLE: GENERAL ENT FOOTPRINTS

G5 – 008 Watershed

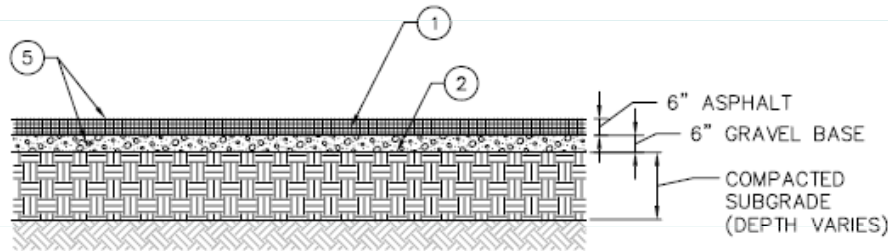


KEY MAP

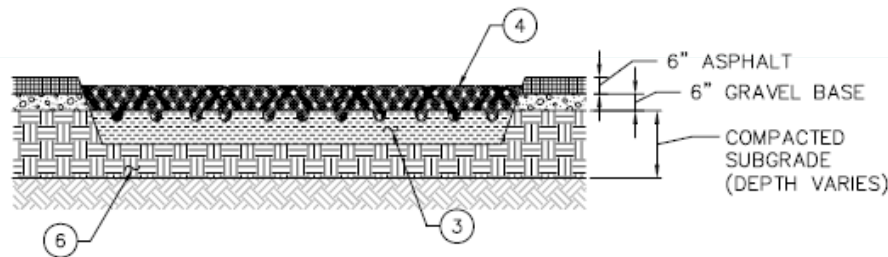
- 700 — EXIST. GROUND CONTOUR (FEET)
- - - - - PROPERTY LINE
- (TT7) ENT IDENTIFIER
- [Cross-hatch pattern] GRADE CONTROL
- [Cross-hatch pattern] TREATMENT TRAIN



Asphalt Removal Detail



EXISTING ASPHALT

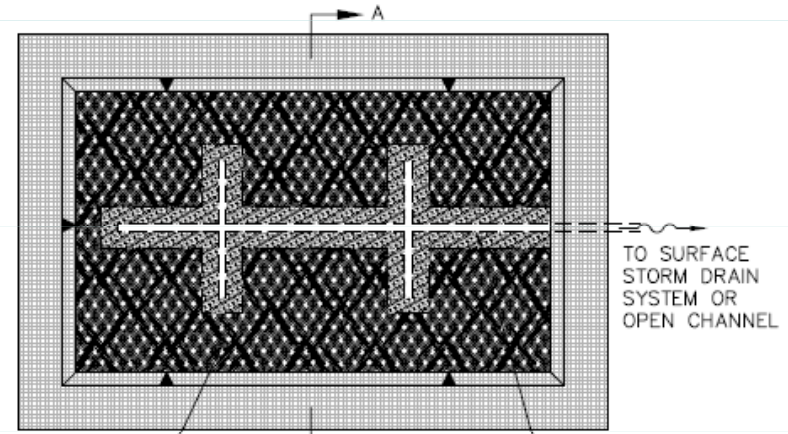


PROPOSED REMOVAL

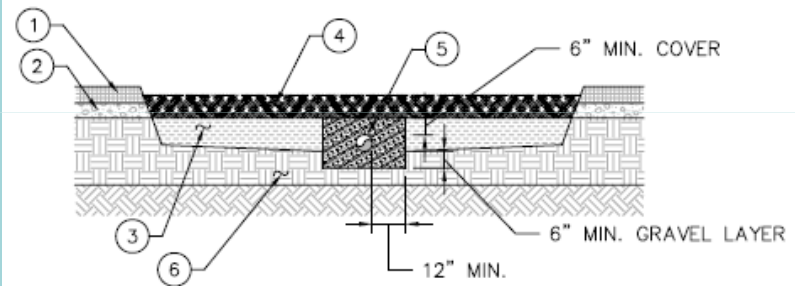
NOTES:

- ① 6" ASPHALT LAYER (APPROX.)
- ② EXCAVATE AND STOCKPILE 6" GRAVEL BASE (APPROX.)
- ③ RIP COMPACTED SUBGRADE TO A DEPTH OF 12" MIN.
- ④ SUBGRADE IS LIKELY TO BULK DURING THE RIPPING PROCEDURE. OVERLAY ORGANIC MATERIAL (MUSHROOM COMPOST OR EQUIVALENT) TO 3" BELOW ORIGINAL ASPHALT ELEVATION.
- ⑤ THE THICKNESS OF ASPHALT AND BASE ARE ASSUMED TO BE 6". AGGREGATE BASE MAY NOT BE PRESENT IN SOME ASPHALT AREAS.
- ⑥ EXISTING SUBGRADE

Incidental infiltration allowed



PLAN VIEW



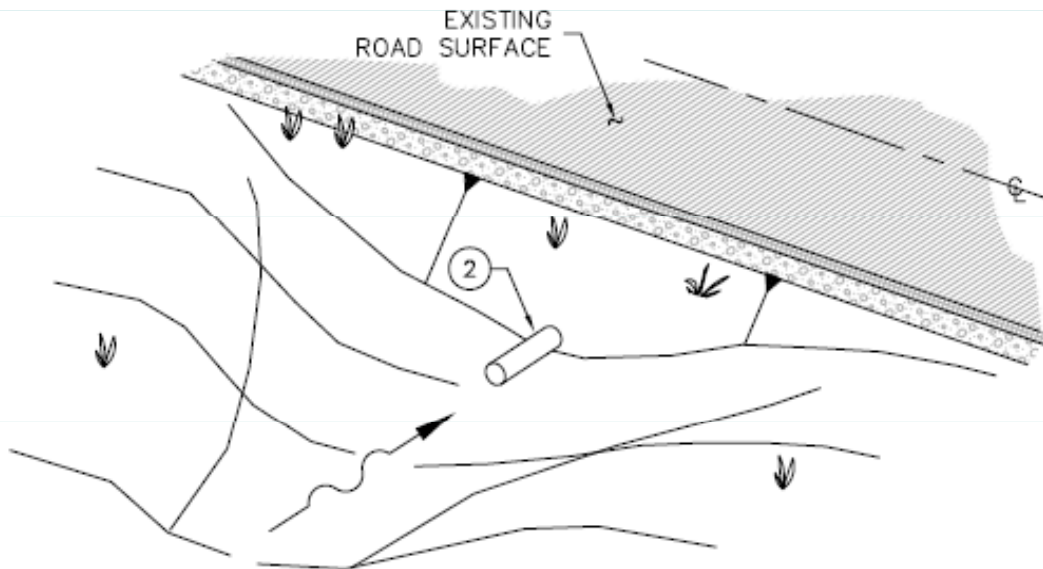
SECTION A-A'

NOTES:

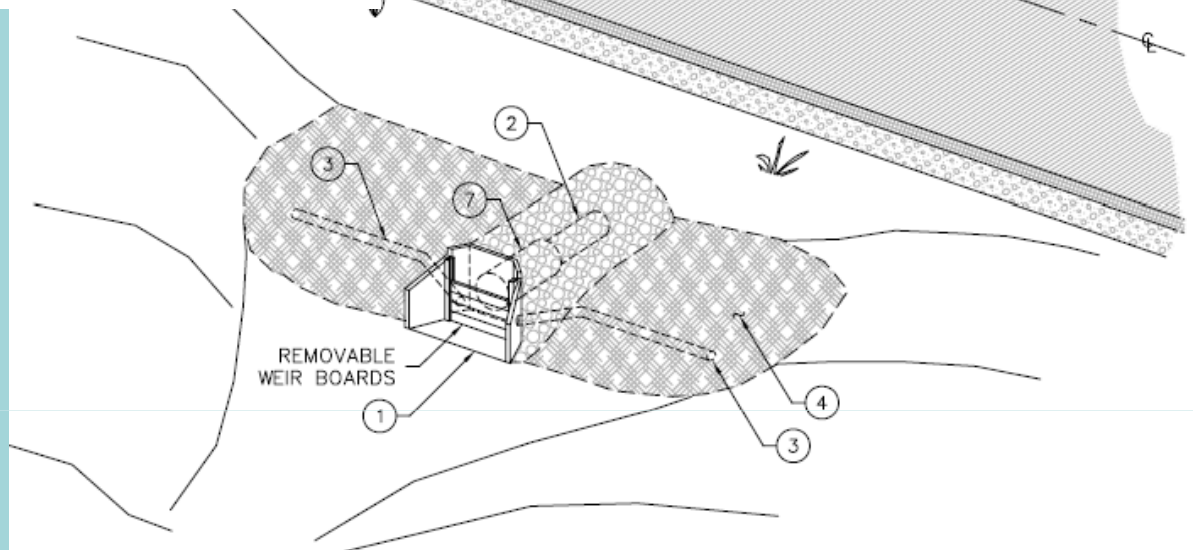
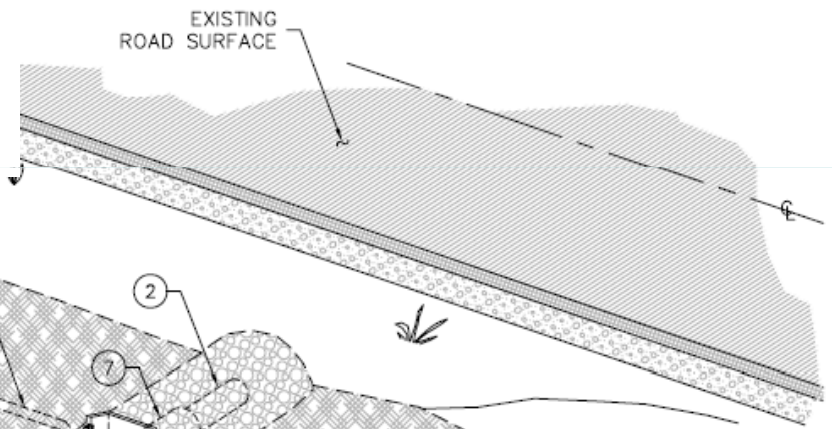
- ① BREAK UP AND HAUL OFF 6" ASPHALT LAYER
- ② EXCAVATE AND STOCKPILE 6" GRAVEL BASE
- ③ RIP COMPACTED SUBGRADE TO A DEPTH OF 12" MIN.
- ④ SUBGRADE IS LIKELY TO BULK DURING THE RIPPING PROCEDURE. OVERLAY ORGANIC MATERIAL (MUSHROOM COMPOST OR EQUIVALENT) TO 3" BELOW ORIGINAL ASPHALT ELEVATION.
- ⑤ 6" MIN. PERFORATED PIPE IN 12" GRAVEL BED, SEE DETAIL B.
- ⑥ EXISTING SUBGRADE

No infiltration allowed

Culvert Maintenance Detail

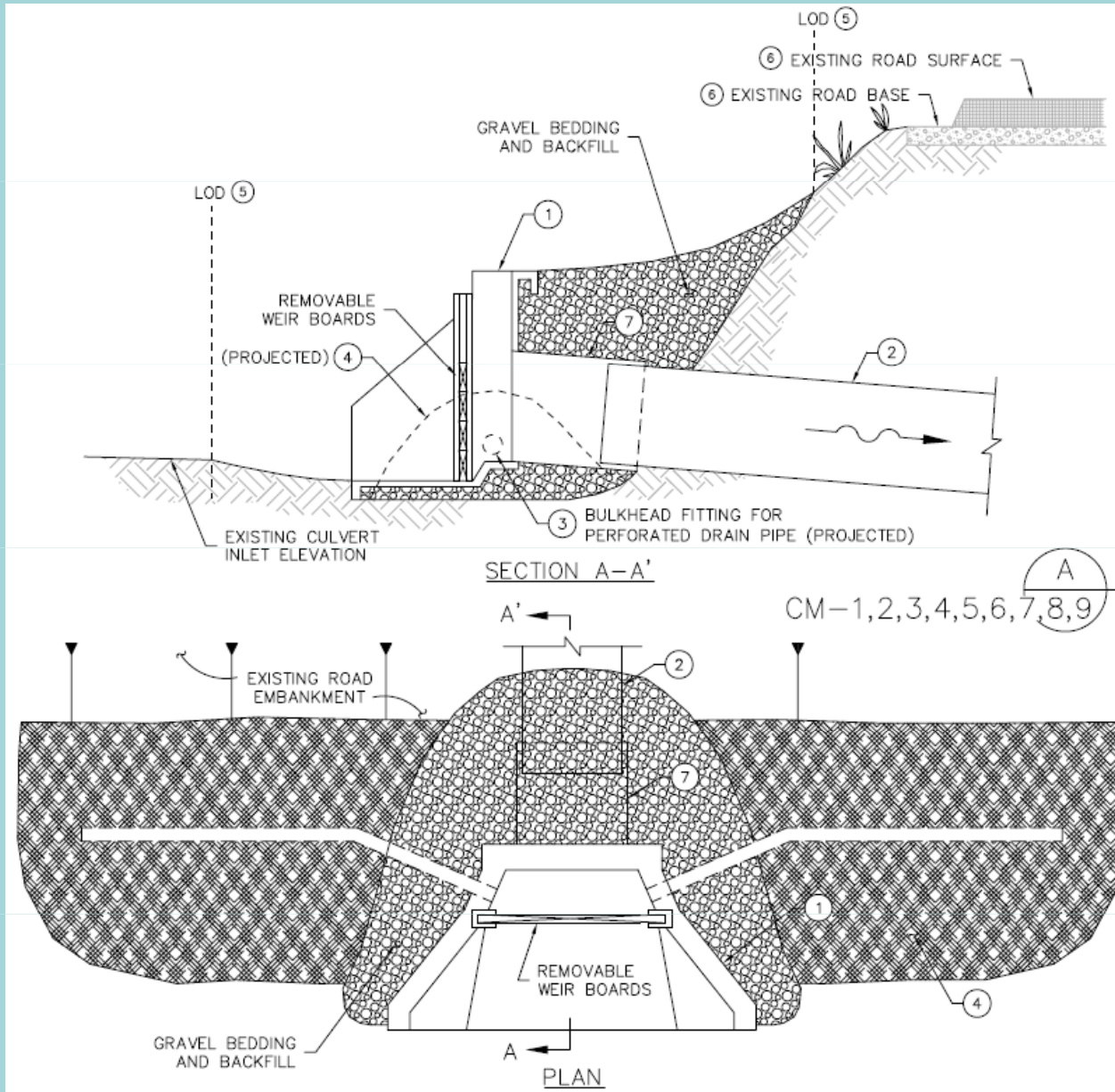


EXISTING CULVERT OBLIQUE VIEW

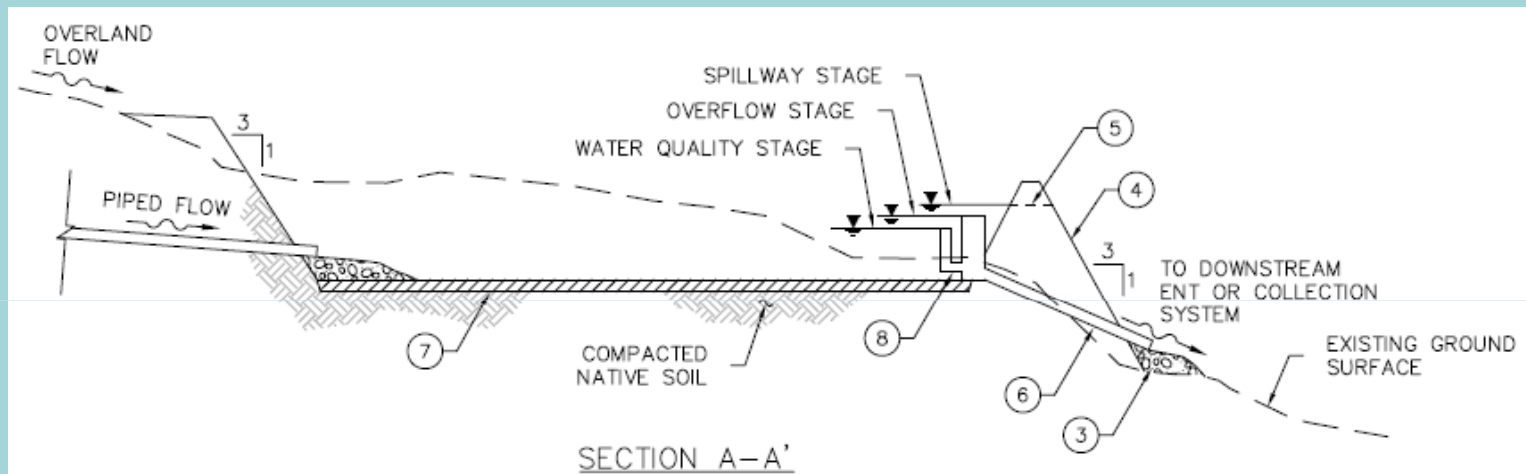
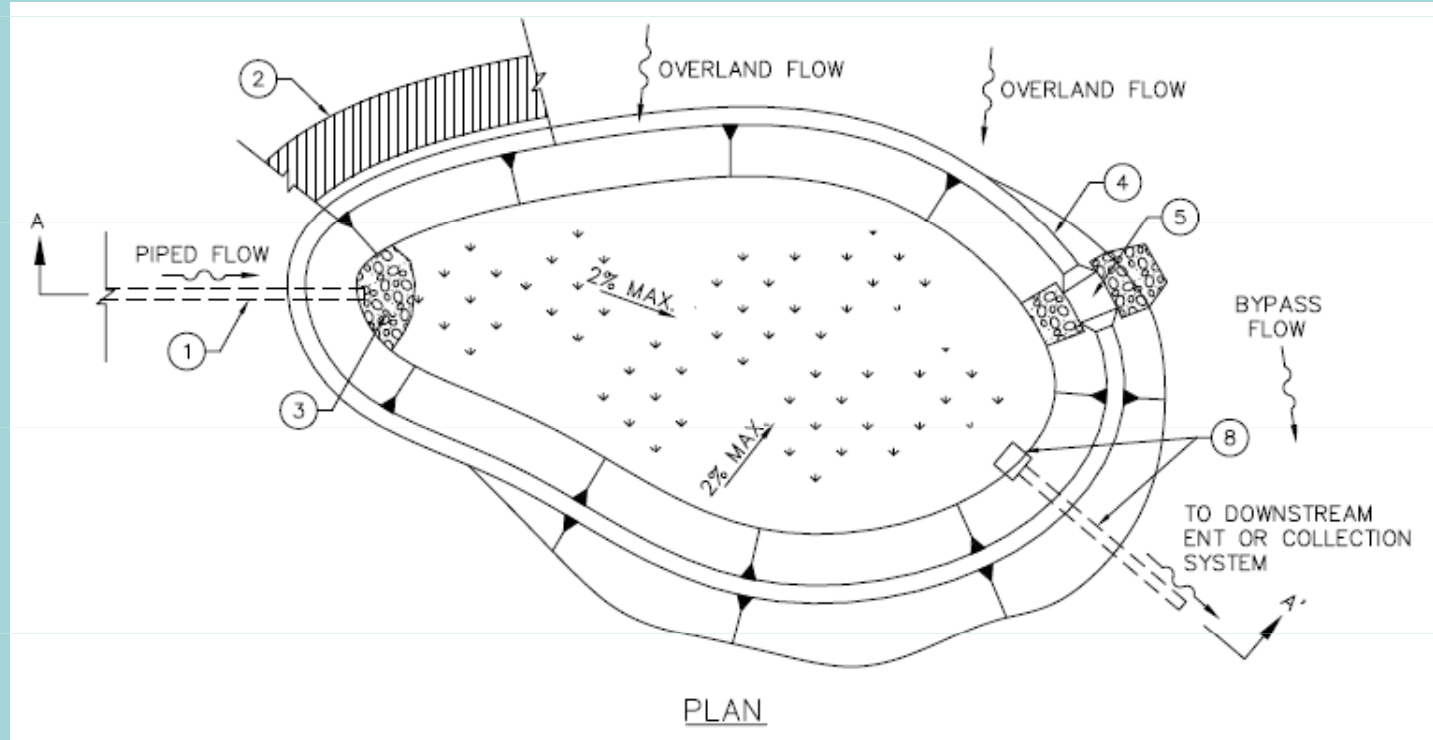


CULVERT MAINTENANCE OBLIQUE VIEW

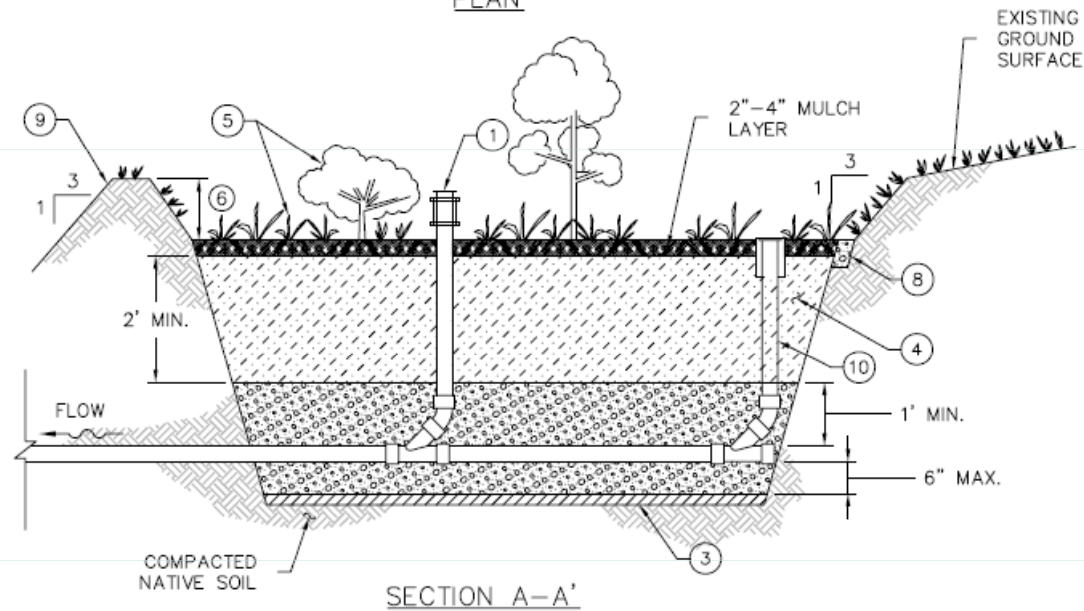
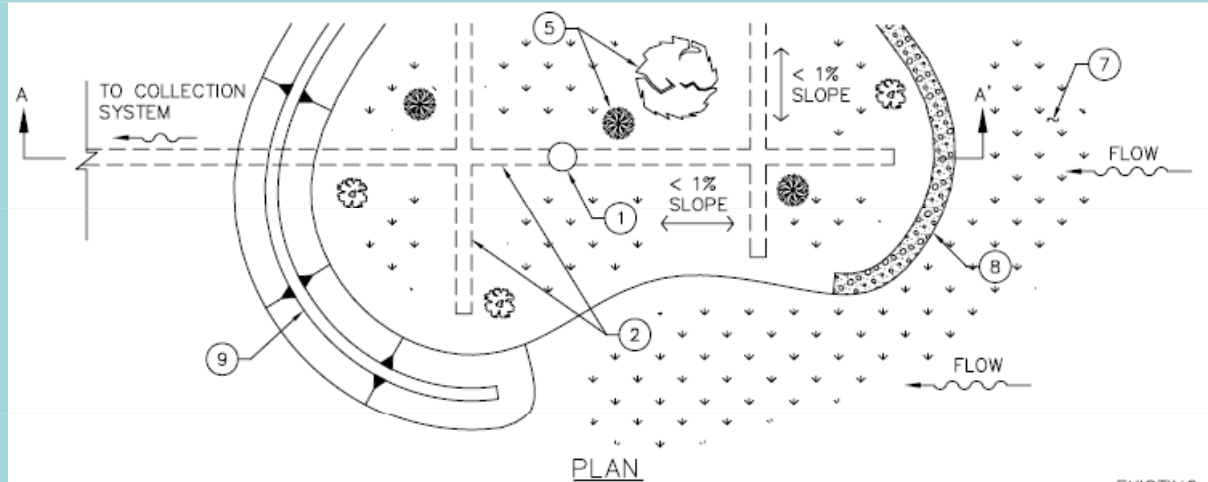
Culvert Maintenance Detail



Sedimentation Basin Detail

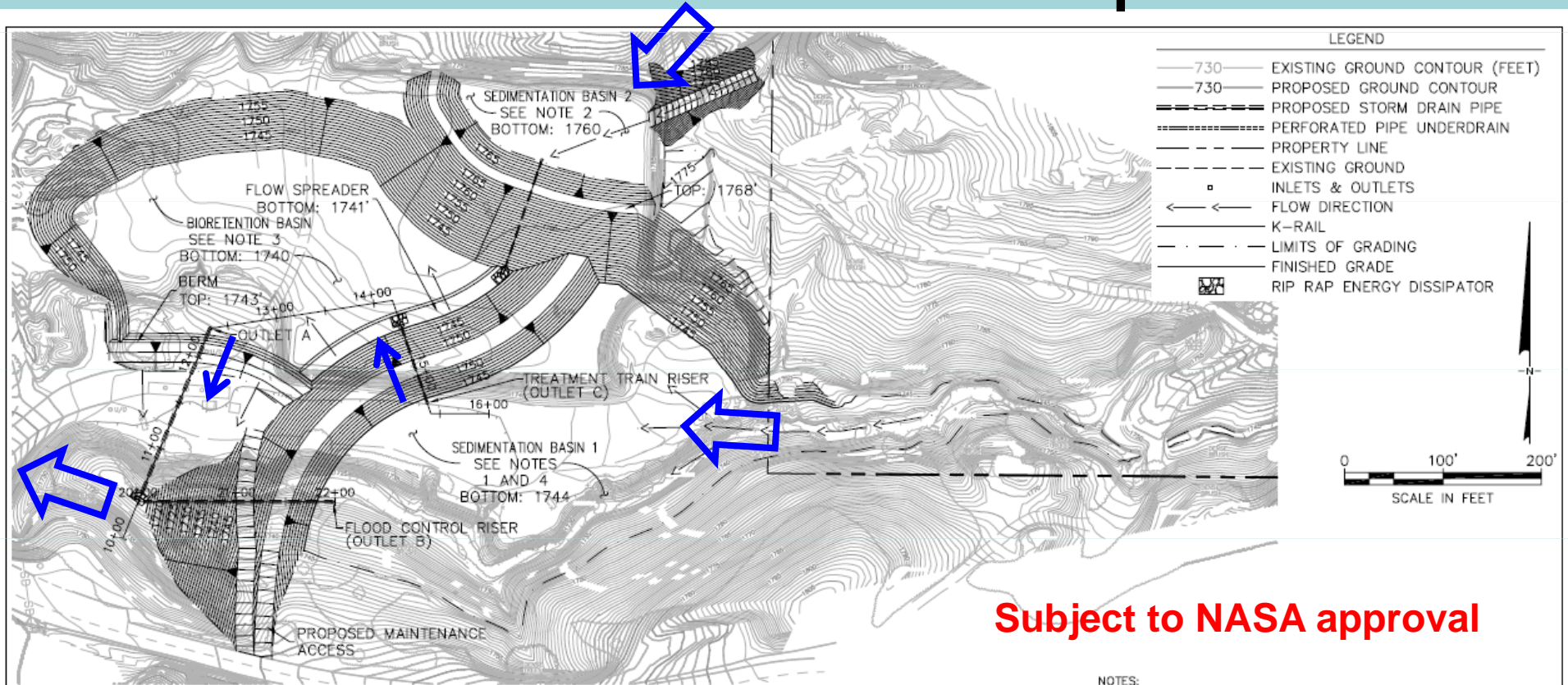


Bioretention Detail



A
 DETAIL
 BIO1, 3, 6, 7
 BIORETENTION
 NTS
XREF: SB0363L-X41 BIO retention.dwg

Draft LOX Concept

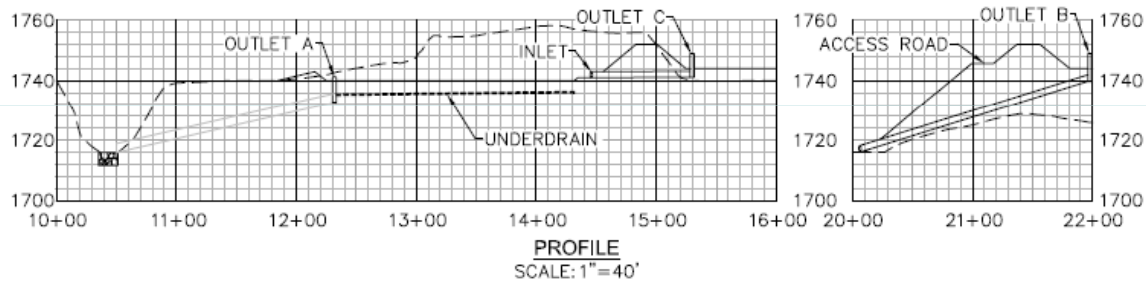


PLAN VIEW

Subject to NASA approval

NOTES:

1. CONSTRUCT SEDIMENTATION BASINS 1&2 PER DETAILS ON SHEET D13.
2. SEDIMENTATION BASIN 2 CONVEYS THE OFF-SITE DRAINAGE TO THE BIORETENTION BASIN.
3. CONSTRUCT BIORETENTION BASIN PER DETAILS ON SHEET D3. UNDERDRAIN PIPE NOT SHOWN IN PLAN VIEW FOR CLARITY. PIPE LAYOUT WILL BE SHOWN ON DETAILED DESIGN DRAWINGS.
4. THE STORAGE VOLUME FOR SEDIMENT BASIN 1 DOES NOT EXCEED 15 ACRE-FT.



PROFILE
SCALE: 1"=40'

<small>3090 OLD TOWN AVE., SUITE 2-101 SAN DIEGO, CALIFORNIA 92108 USA PHONE: 619.297.1533</small>		<small>SANTA BARBARA FIELD LABORATORY VENTURA COUNTY, CALIFORNIA</small>	
<p>TITLE: TREATMENT TRAIN</p>			
<p>PROJECT: BOEING SSFL - WATERSHEDS 008 AND 009 ENTS - FINAL CONCEPTUAL DESIGNS</p>			
DESIGN BY: JH/WJ	REVIEWED BY: ES	DATE: MAY 2008	DRAWING:
DRAWN BY: BJP	APPROVED BY: BS	PROJ. NO.: SB0363L	TT3

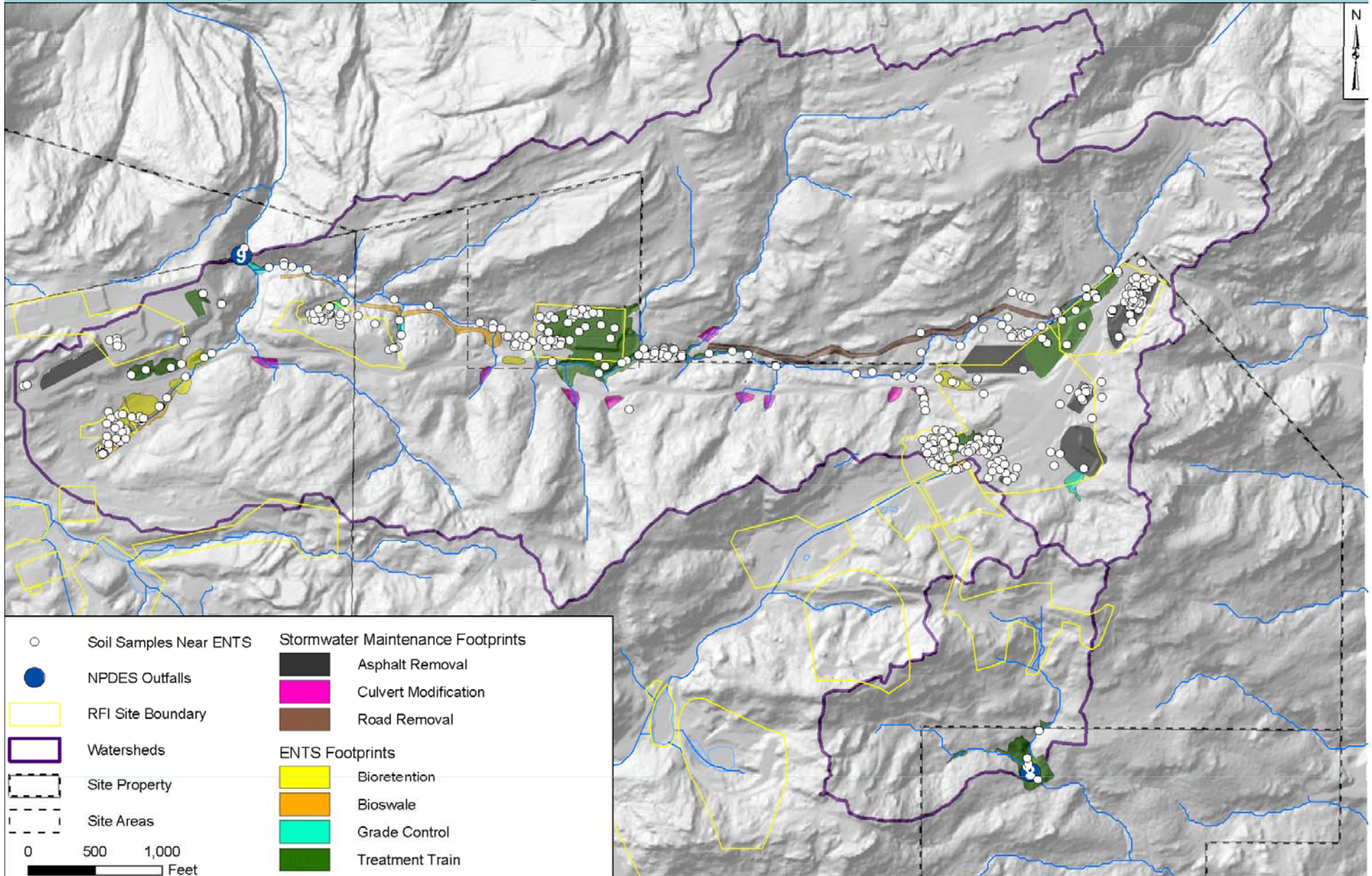
Public Recommendations to Panel

- ENTS recommendations received from CleanupRocketdyne.org in early April
- Expert Panel appreciates all input and has reviewed these recommendations
- General responses provided at April 17 public meeting:
 - Additional ELV drainage will be routed to helipad ENTS (see G1)
 - (Clarification) Skyline, SPA, Alfa, Bravo RFI areas do not drain to outfall 009, but receive treatment at outfall 018
 - Proposed ENTS locations have been strategically located near or downstream of areas of historic activity or known surface soil contamination as suggested
 - Public recommendations in many cases are consistent with the strategic ENTS locations proposed by the Panel

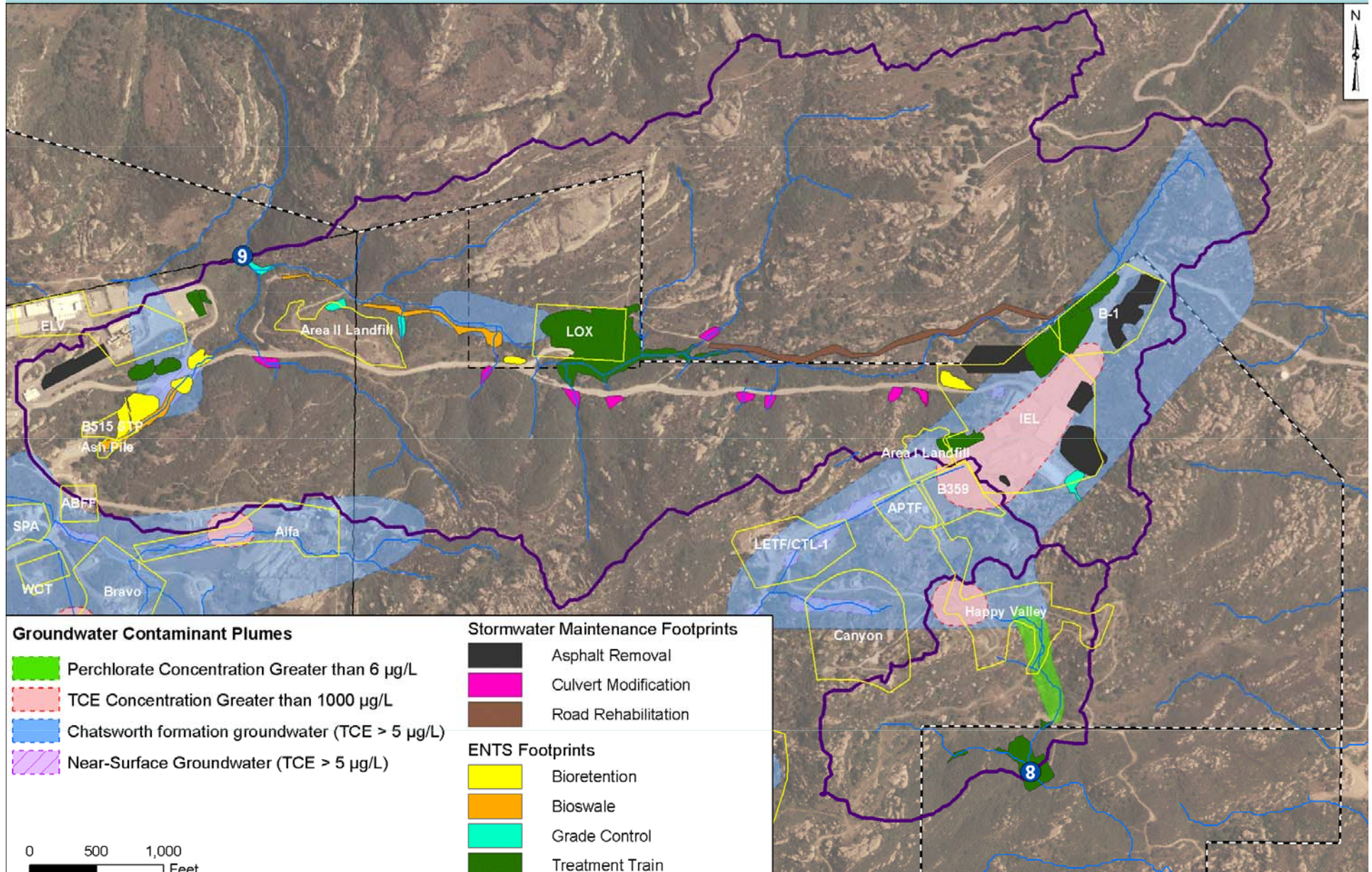
Preliminary Plan for ENTS Construction at or Near Cleanup Areas

- Some ENTS construction will be done in contaminated areas
- Construction will require:
 - Pre construction sampling to fill data gaps
 - Construction sampling to inform clean/impacted soil segregation & management
 - Removal of contaminated soils below and adjacent to ENTS footprints
 - Installing underdrains or liners to minimize infiltration from ENTS to groundwater plumes
 - Consider possible need for future vapor treatment at/beneath ENTS locations

Existing soil characterization data -- Additional characterization has been proposed by panel to fill data gaps in areas of ENTS construction



ENTS Construction Overlying Areas of Known Groundwater Contamination



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What is a Site-Specific Design Storm?

- Storm depth or rain intensity to use for assessing compliance and therefore driving selection and design/sizing of controls:
 - Natural treatment systems for outfalls 008 and 009
 - In-place and enlarged (as needed) engineered treatment systems for other outfalls

Design Storm/ENTS

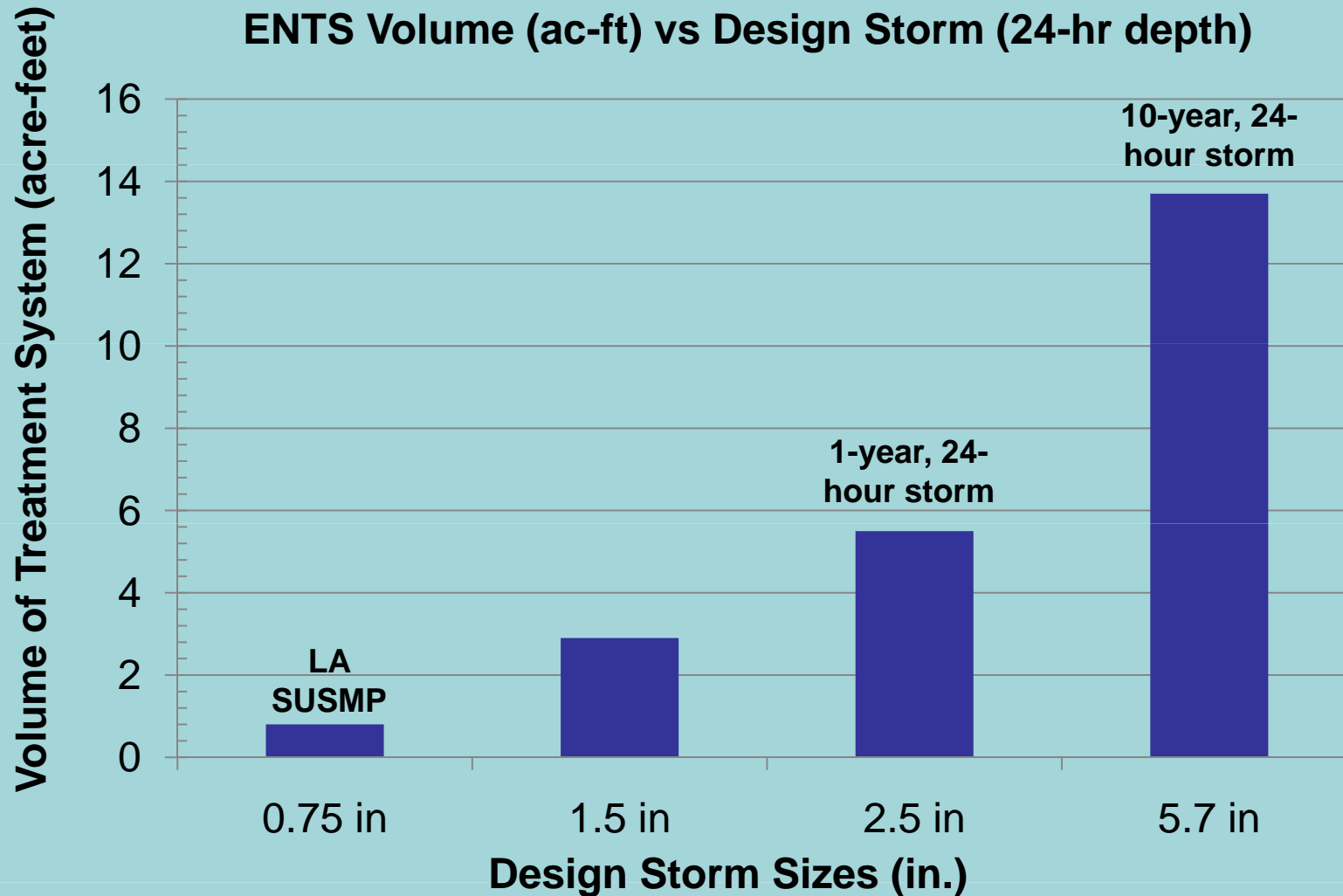
The Panel's Goal is a system of ENTS and other controls and a design storm that:

- Maximize the probability of attaining numeric effluent limits
- Minimize the potential impacts to downstream residents and the environment
- Protect the natural site conditions and is feasible given the site's constraints

Site Specific Design Storm Preliminary Recommendation

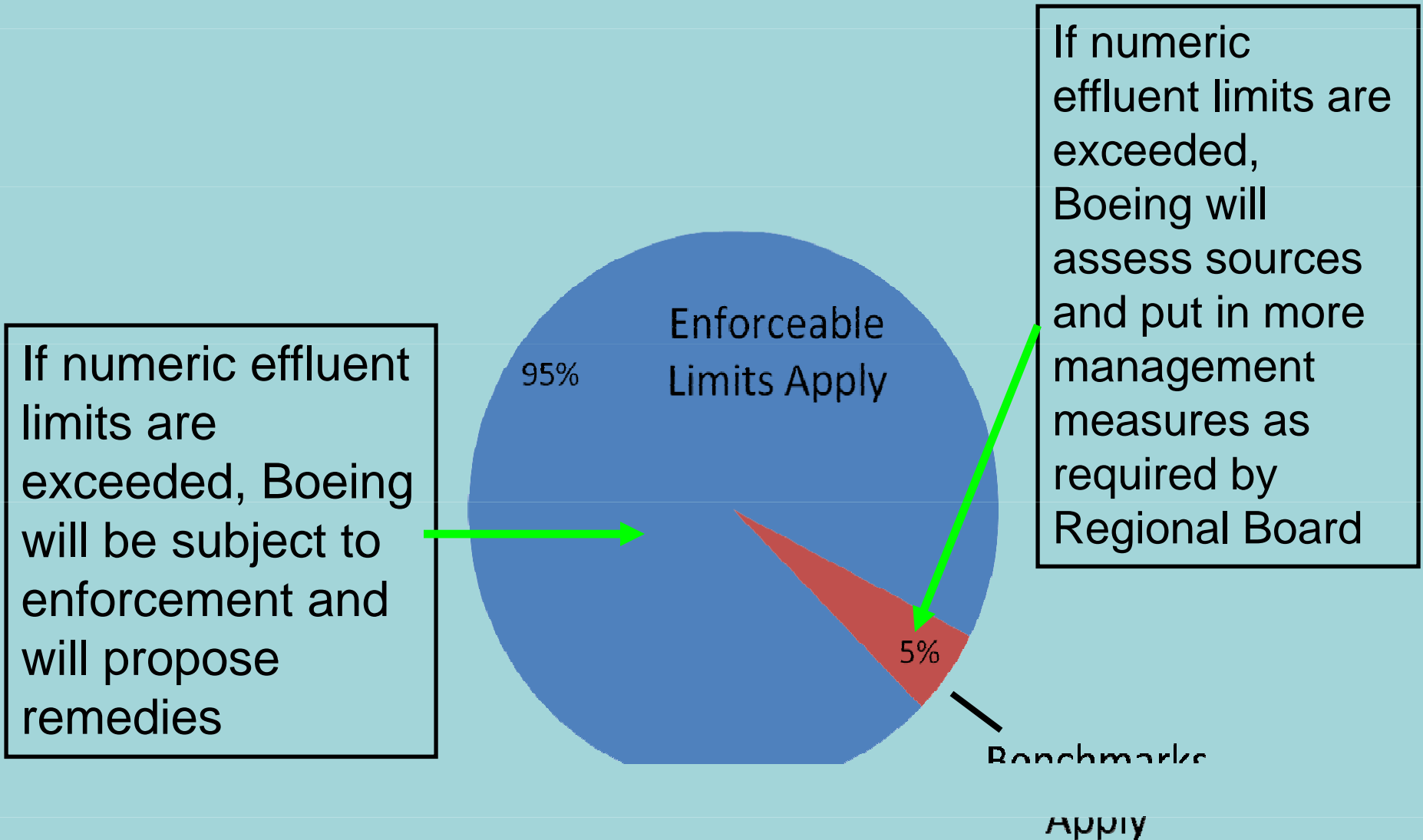
- The Panel recommends that the 1-year return interval storm event be used as the single site-wide design storm:
 - Either a 24-hour storm (2.5 inches) or
 - 0.6 inches per houras measured at an onsite rain gage
- About 95 percent of all storms would be smaller

Design Storm Comparison - Outfall 008 Example



Drawbacks outweigh benefits for designing treatment systems for all or larger storm events

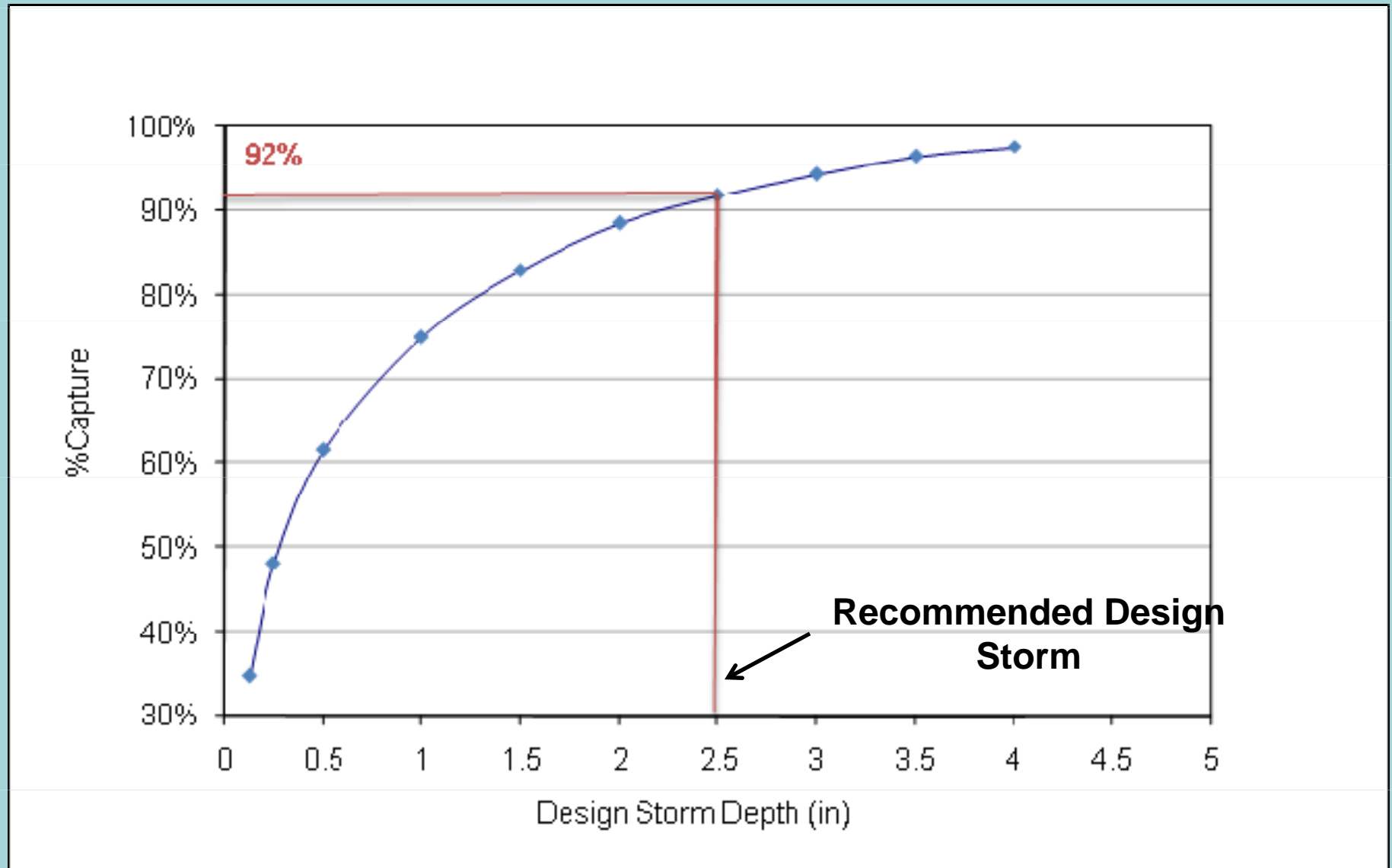
Percent of Storms Treated at SSFL Using 1-Year Design Storm



If numeric effluent limits are exceeded, Boeing will be subject to enforcement and will propose remedies

If numeric effluent limits are exceeded, Boeing will assess sources and put in more management measures as required by Regional Board

Sizing curve for a hypothetical volume-based ENTS at Outfall 008



Panel Future Efforts

- Review preliminary & final ENTS designs
- Review ENTS operations and maintenance plan
- Review ENTS effectiveness & impact monitoring program:
 - Pollutant removal
 - Maintenance/cleanout triggers
- White paper on background stormwater pollutant concentrations and BMP effluent quality performance (e.g., dioxins)
- White paper on grab vs composite sampling methods

A photograph of a rural landscape. In the foreground, there is a dirt road or path leading into a field of tall grass and brush. A wooden fence runs across the middle ground, separating the field from a white building in the background. The background is filled with dense trees and foliage. The text is overlaid on the image.

**Next public meeting scheduled
for July 17 in Simi Valley**

**For more information contact:
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805-455-9591**

bsteets@geosyntec.com