

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

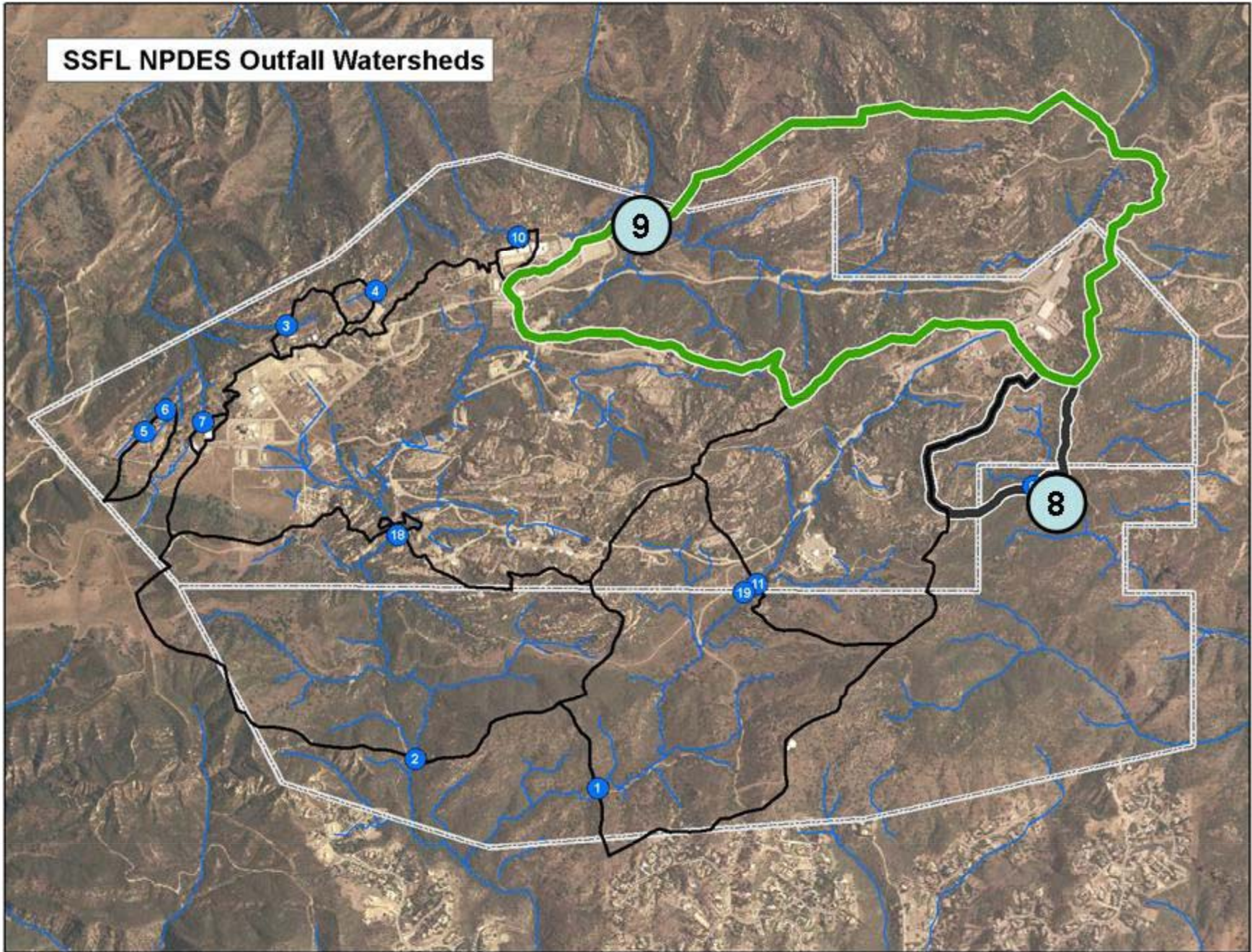
# Expert Panel Members

- 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	<b>Complete</b>
ENTS Conceptual Designs	<b>Complete</b>
ENTS Final Designs	July 15, 2008
<b>White Papers on Background/ENTS Effluent Quality and Monitoring</b>	<b>July 31, 2008</b>
ENTS Permitting	August 15, 2008
ENTS Construction Begins	October 31, 2008
<b>Final Permit Limits Become Effective</b>	<b>June 10, 2009</b>

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

- Public Field Trips



# Expert Panel Public Meetings

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

# Board Presentations

- March 6<sup>th</sup> – Brief report on progress
- April 3<sup>rd</sup> – Longer update and discussion of ENTS and Design Storm
- June 5<sup>th</sup> (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
<b>DTSC</b>	<b>Approval for ENTS contaminated soil management plan</b>	<b>Initial comments received; held initial meeting and site visit to discuss preliminary approach for dealing with impacted soils around ENTS areas; DTSC staff have also attended public meetings</b>
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; submitted final conceptual design package end of May
NASA/GSA	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
ACOE	Jurisdictional Determination	Initial meeting planned

# 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



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

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



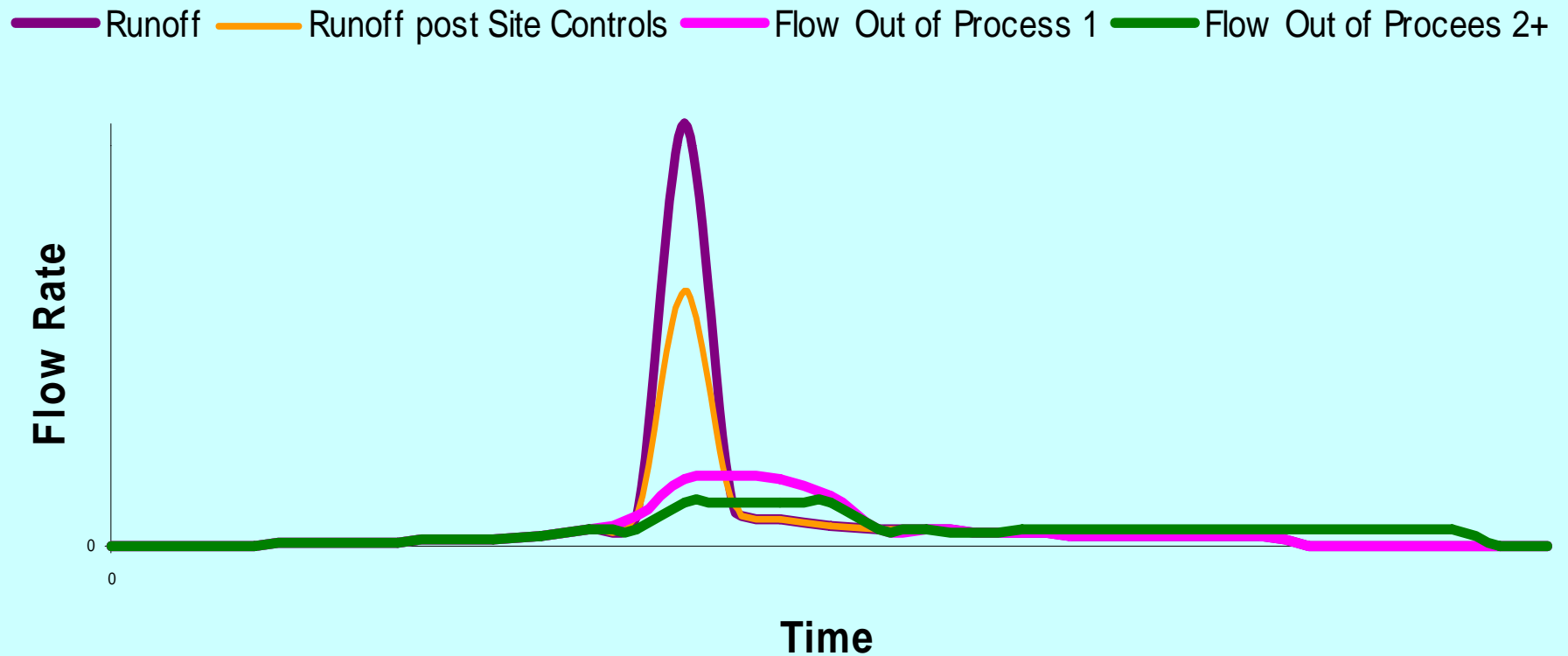
**2: Extended  
Detention**



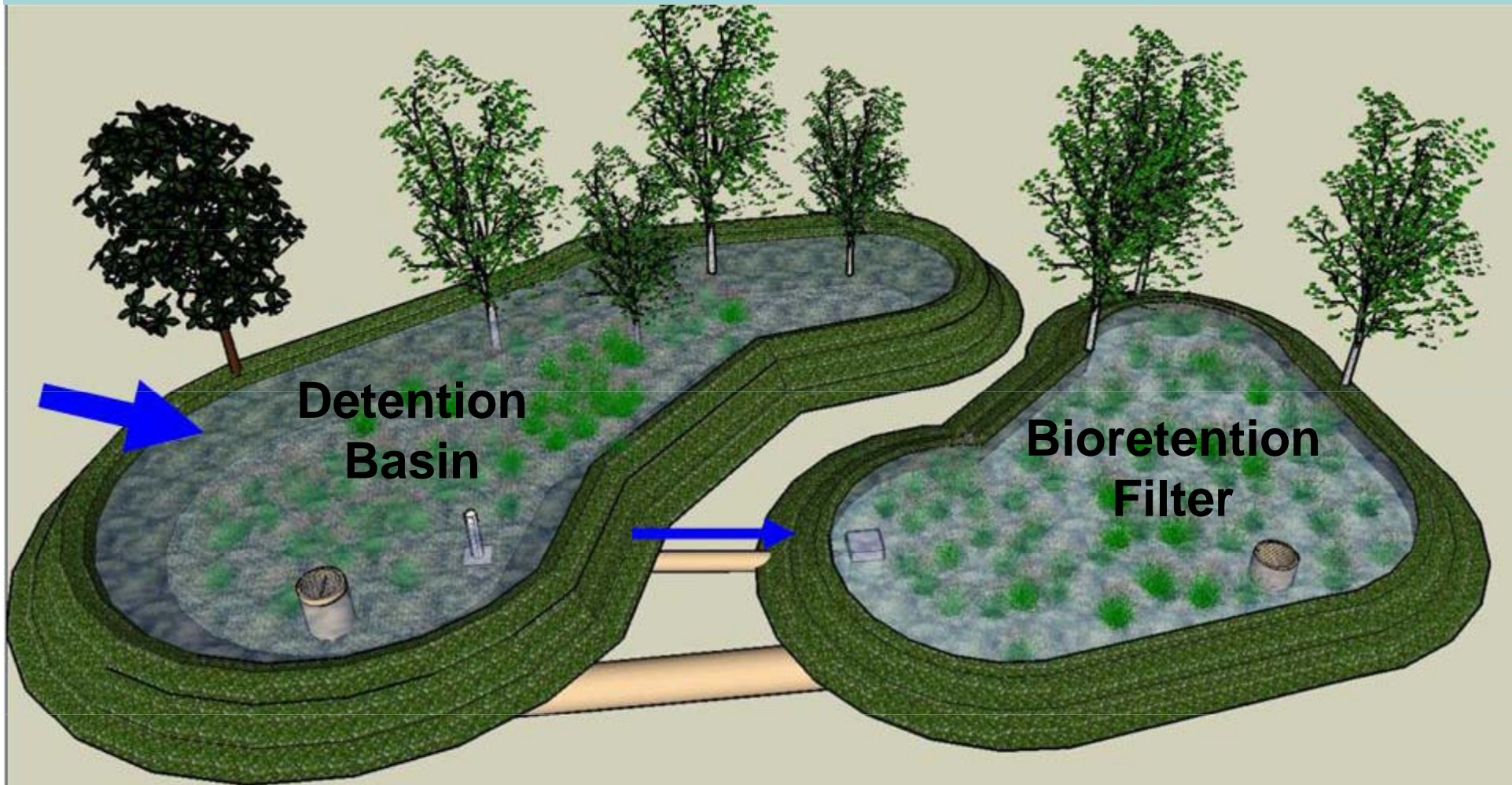
**3: Bio-Filter**

# ENTS Treatment Train - Hydrology

## Treatment Train Flow Attenuation Example

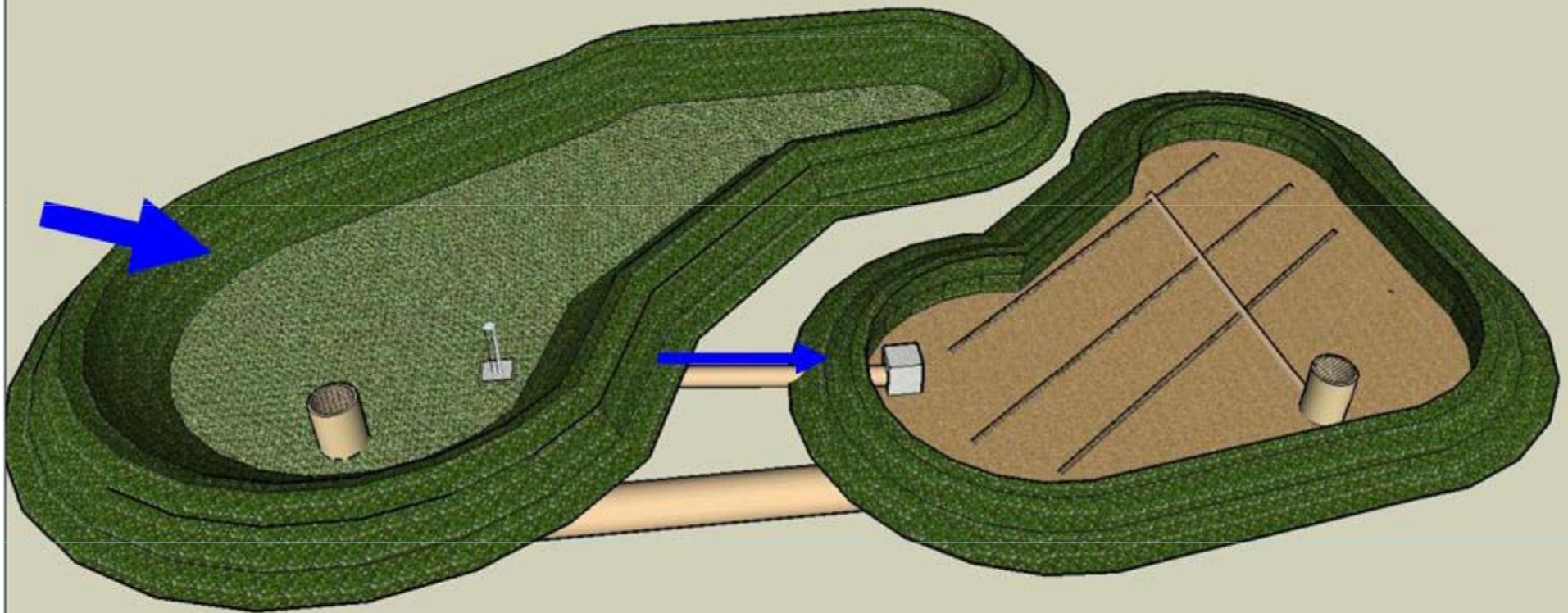


# ENTS Treatment Train - Example





# ENTS Treatment Train - Example

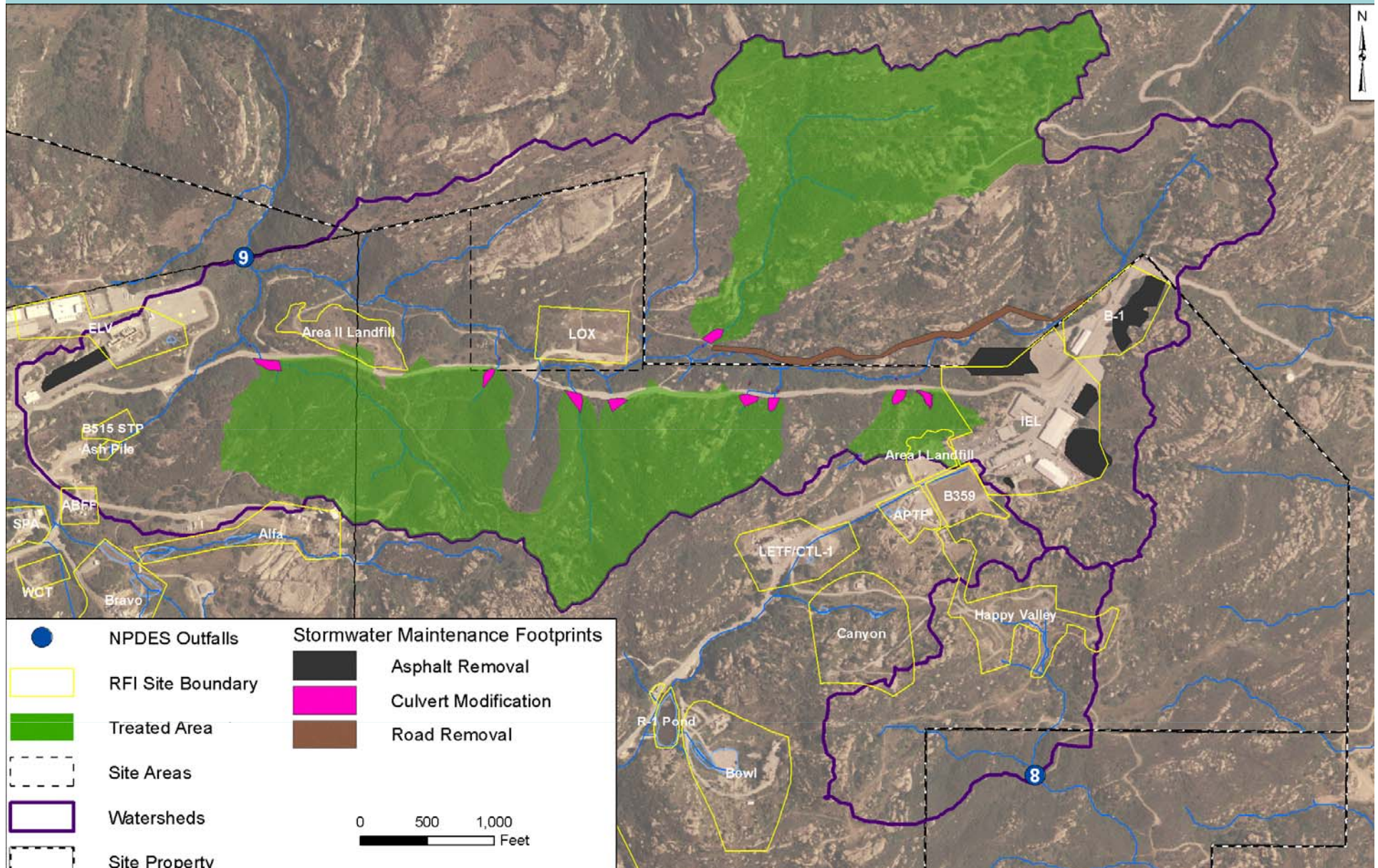


# 008 and 009 Watersheds

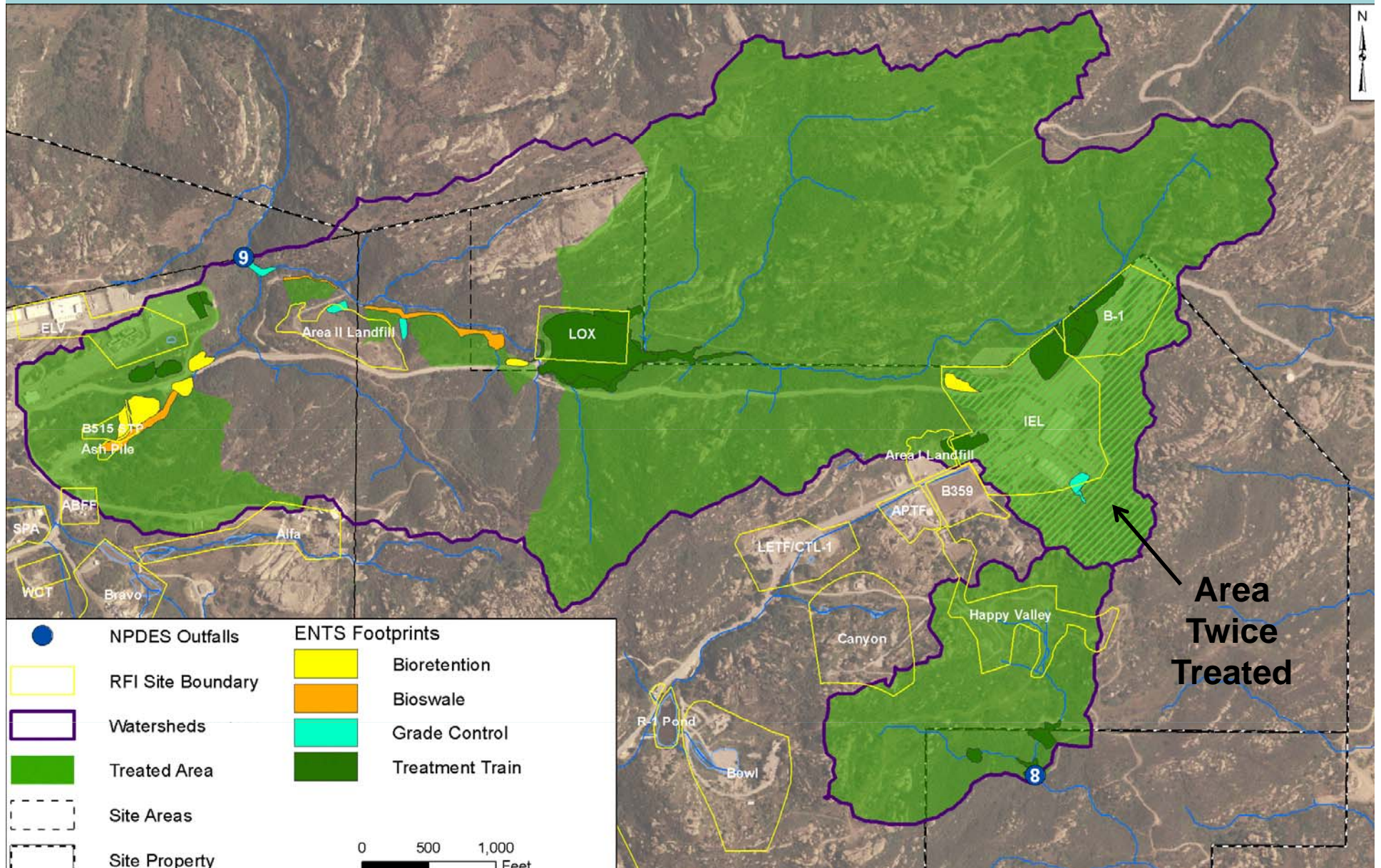
## Guiding Principle

- 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

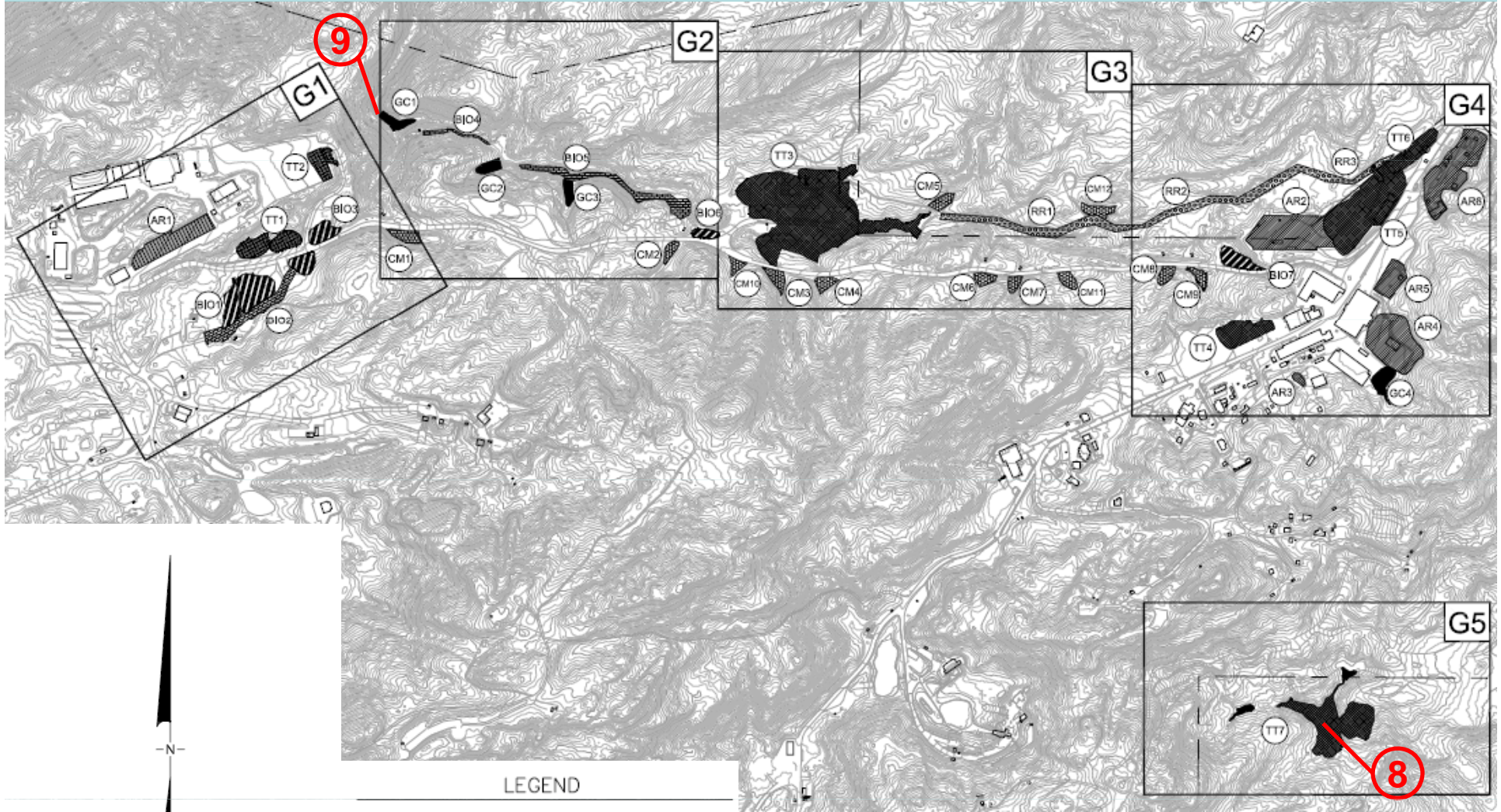


# Draft ENTS

## 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

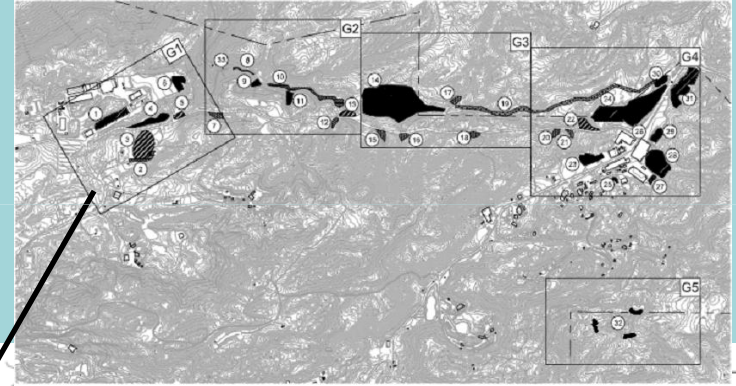


## LEGEND

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

0 800' 1600'  
SCALE IN FEET

# G1 - 009 West (NASA Property)

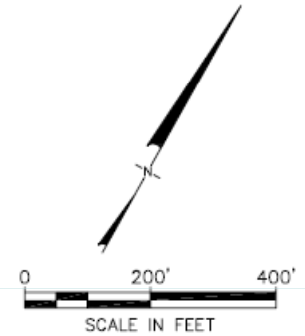


**Additional area being planned for ENTS  
treatment based on rocketdyne.org input**

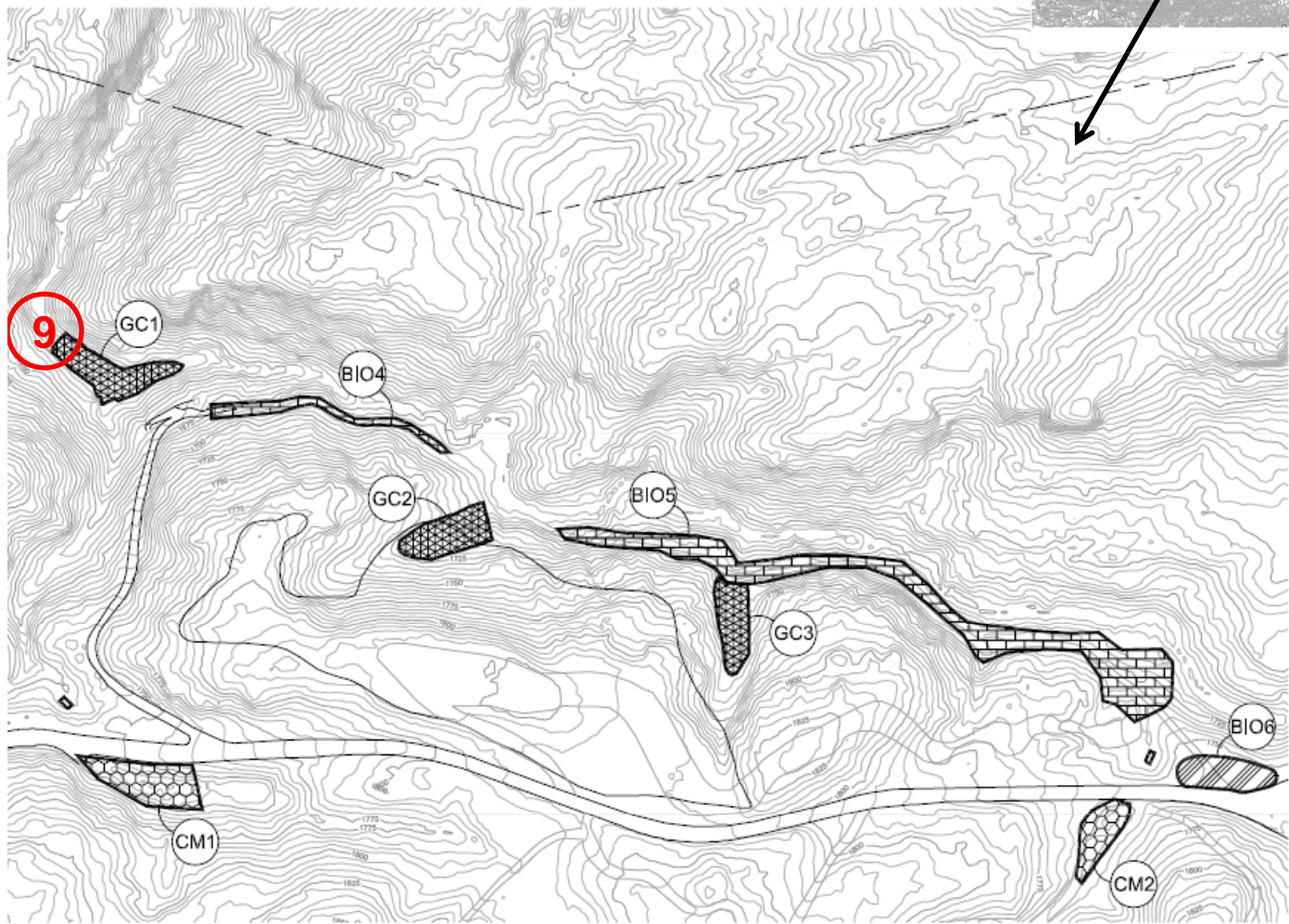
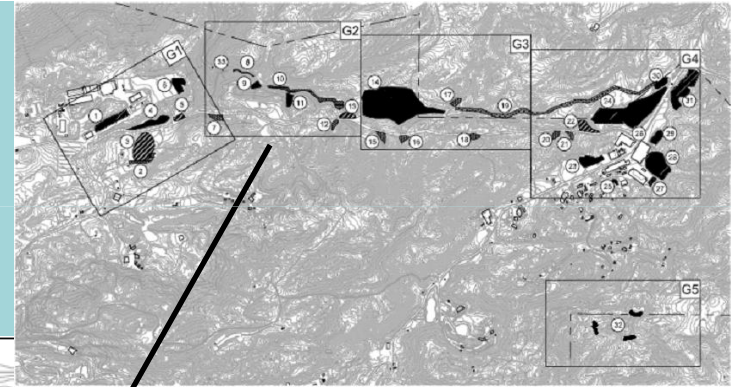


KEY MAP R (FEET)

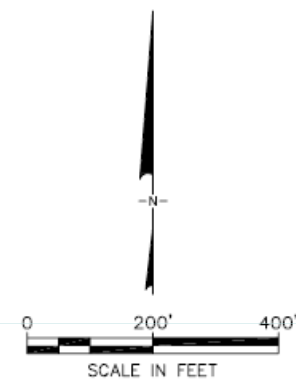
- PROPERTY LINE
- (TT2) ENT IDENTIFIER
- [Cross-hatch] CULVERT MODIFICATION
- [Diagonal lines] ASPHALT REMOVAL
- [Diagonal lines] BIORETENTION
- [Grid] TREATMENT TRAIN
- [Brick] BIOSWALE



# G2 - 009 West Center (Partial NASA Property)

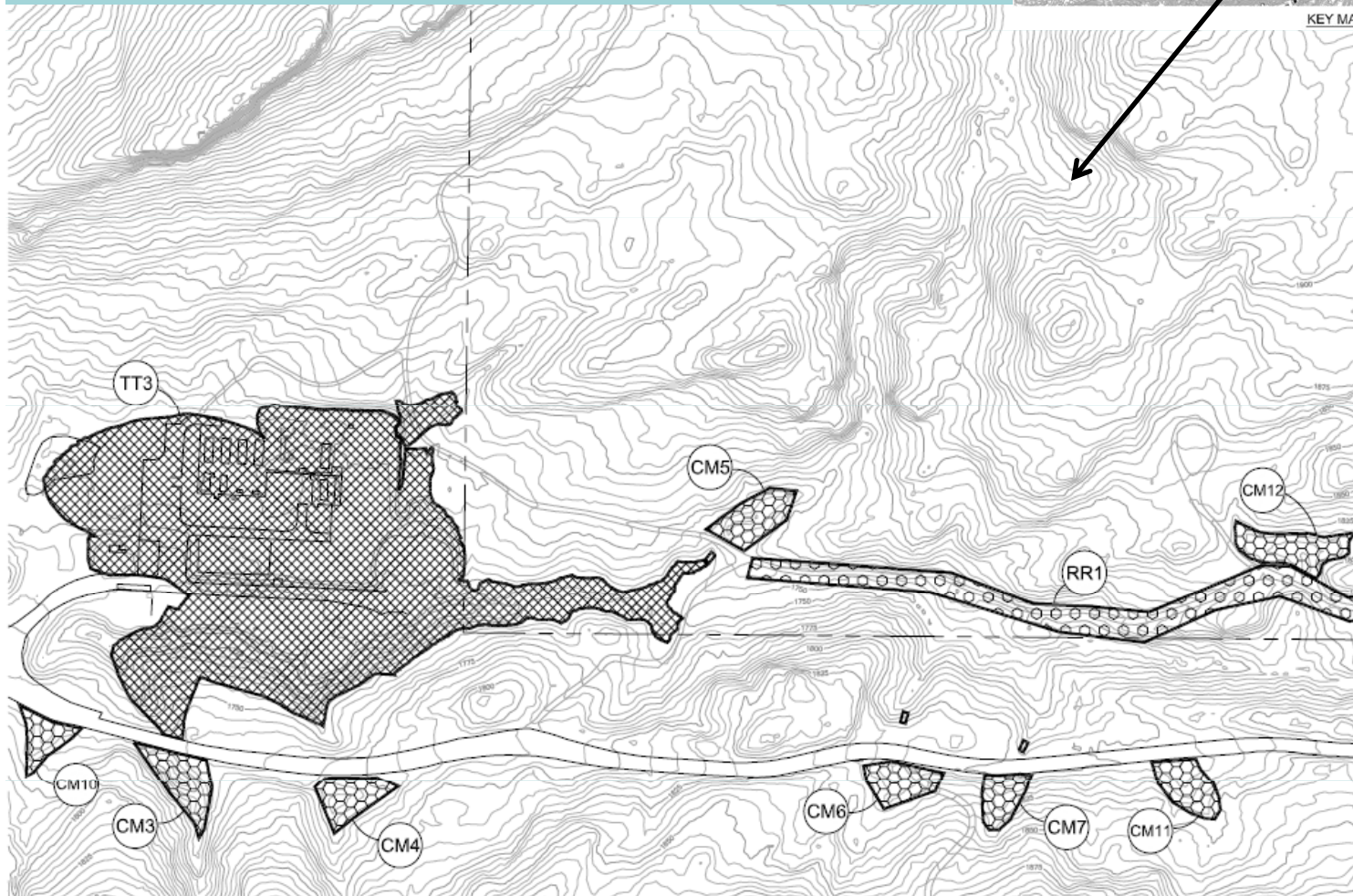
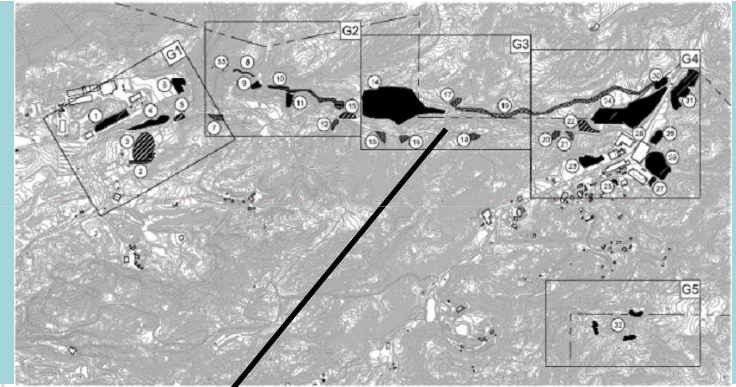


- PROPERTY LINE
- (BIO5) ENT IDENTIFIER
- [Hatched pattern] CULVERT MODIFICATION
- [Diagonal lines] BIORETENTION
- [Brick pattern] BIOSWALE
- [Grid pattern] GRADE CONTROL



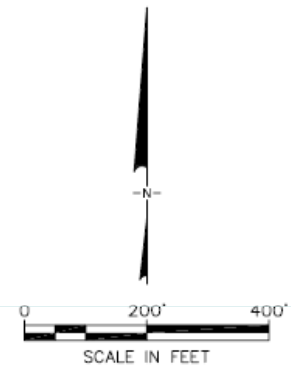


# G3 – 009 LOX (NASA & Sage Ranch Properties)

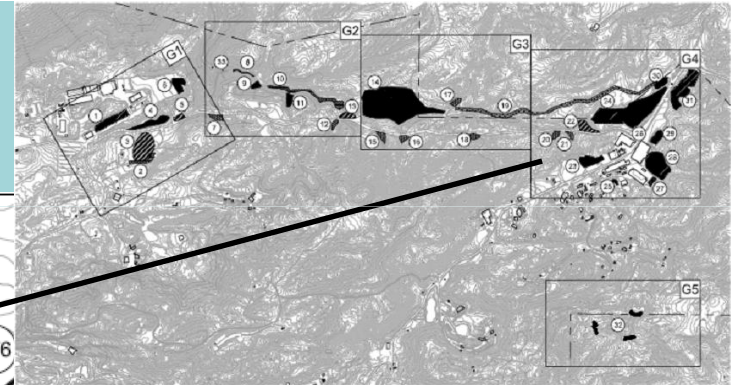


KEY MAP

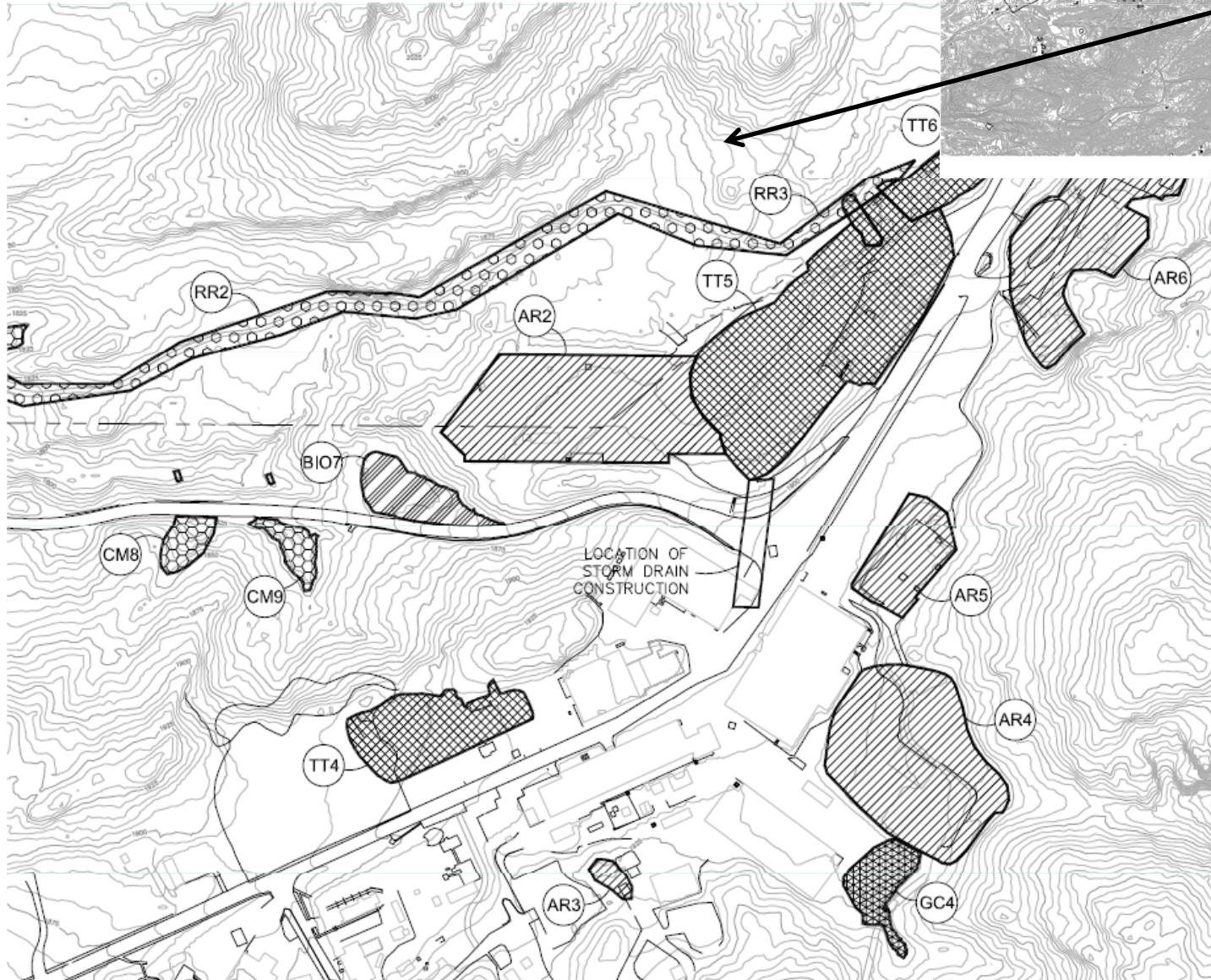
- 730 — EXIST. GROUND CONTOUR (FEET)
- - - - - PROPERTY LINE
- CM5 ENT IDENTIFIER
- ▨ CULVERT MODIFICATION
- ▩ TREATMENT TRAIN
- RR1 ROAD REHABILITATION








# G4 – 009 East (Partial Sage Ranch Property)

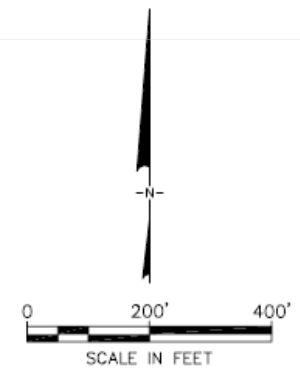


R (FEET)



KEY MAP

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

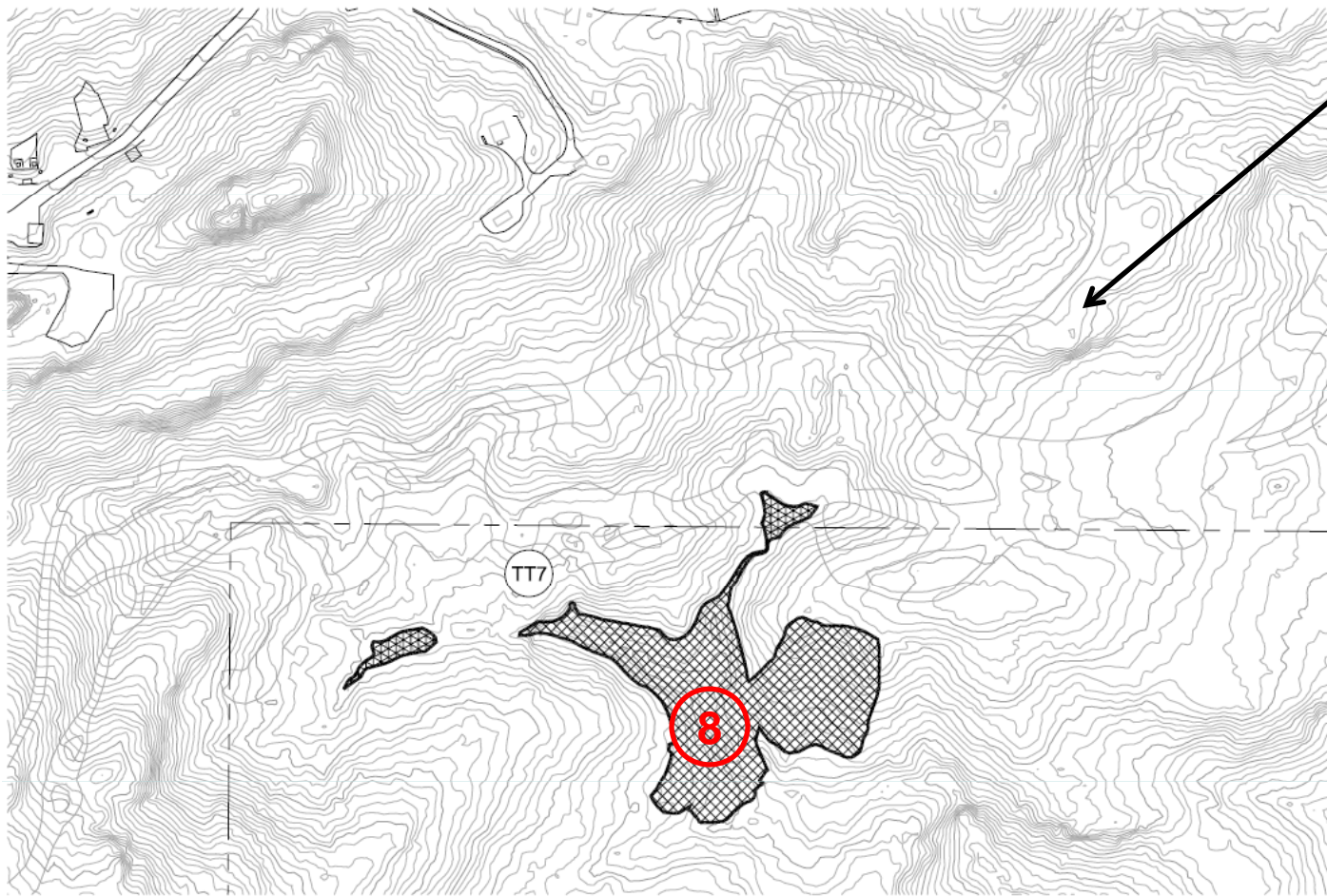
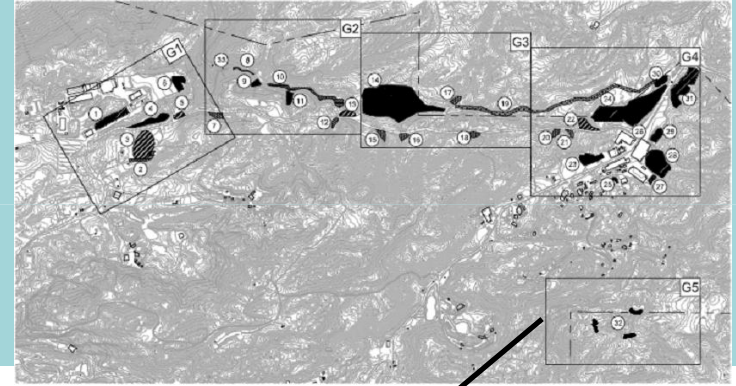


**Geosyntec**  
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3080 OLD TOWN AVE., SUITE 8-102  
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PHONE: 619.297.1530

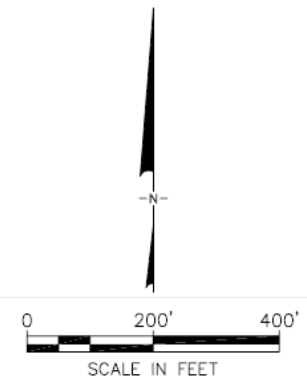
**BEIRD**  
SANTA SUSANA FIELD LABORATORY  
VENTURA COUNTY, CALIFORNIA

TITLE: GENERAL ENT FOOTPRINTS

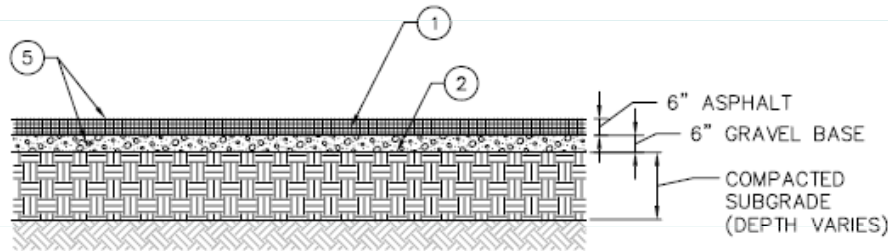
# G5 – 008 Watershed



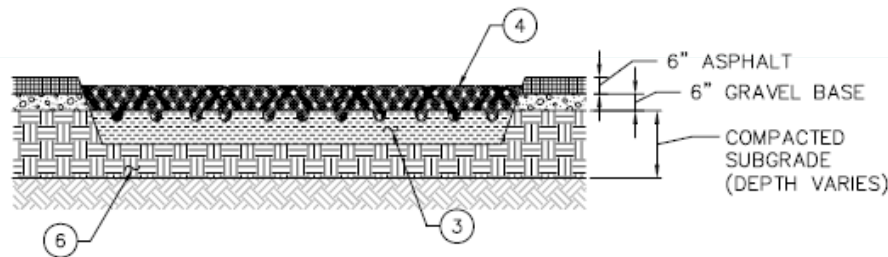
- KEY MAP
- 700 — EXIST. GROUND CONTOUR (FEET)
  - - - - - PROPERTY LINE
  - (TT7) ENT IDENTIFIER
  - [Cross-hatch] GRADE CONTROL
  - [Cross-hatch] TREATMENT TRAIN



# Asphalt Removal Detail



EXISTING ASPHALT

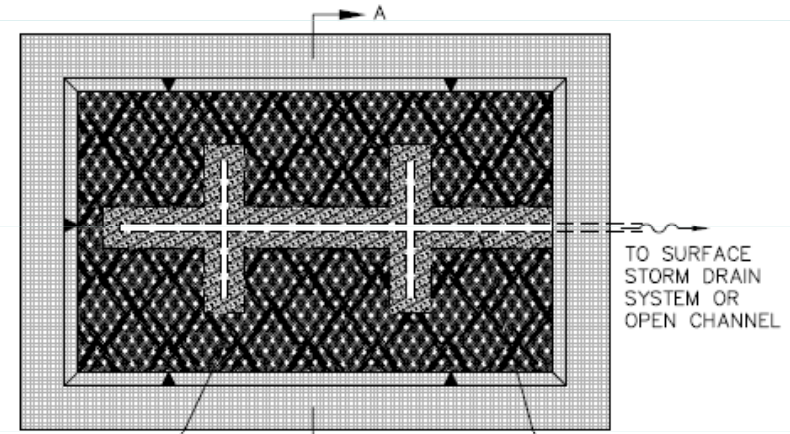


PROPOSED REMOVAL

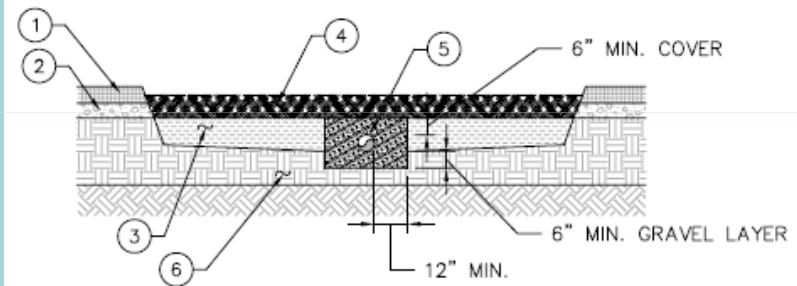
NOTES:

- 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



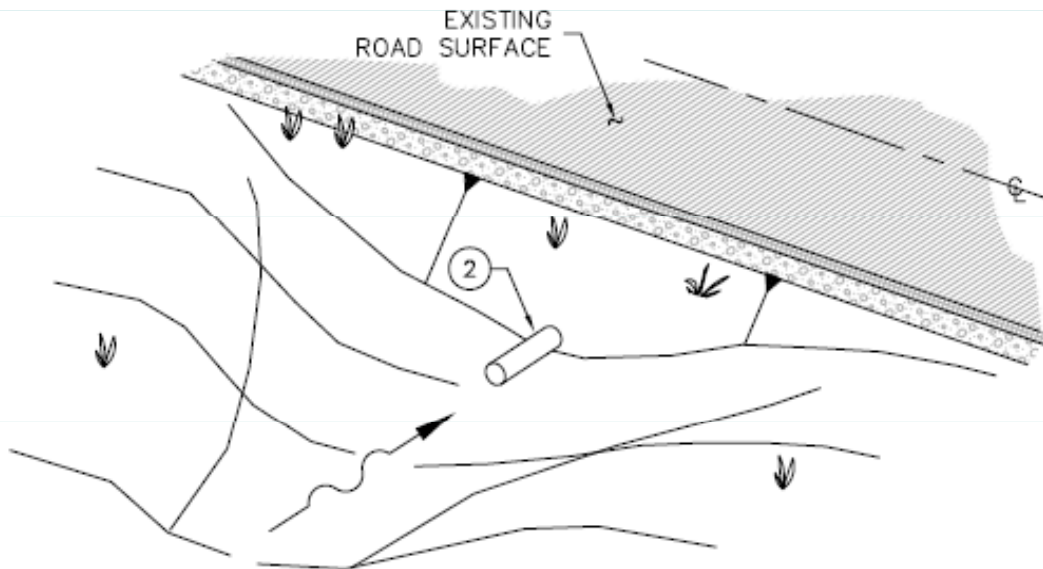
SECTION A-A'

NOTES:

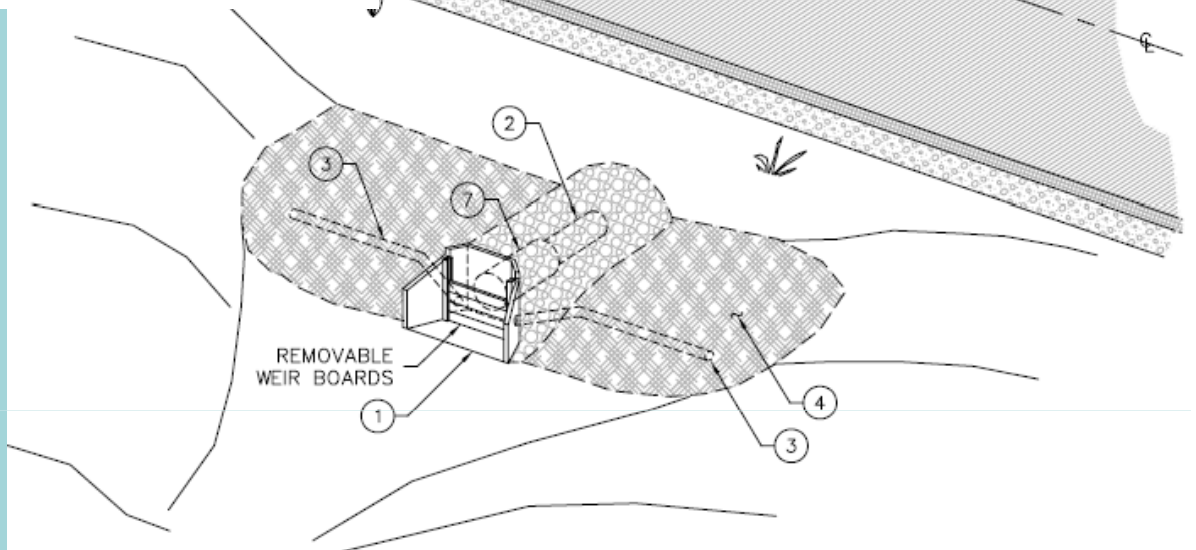
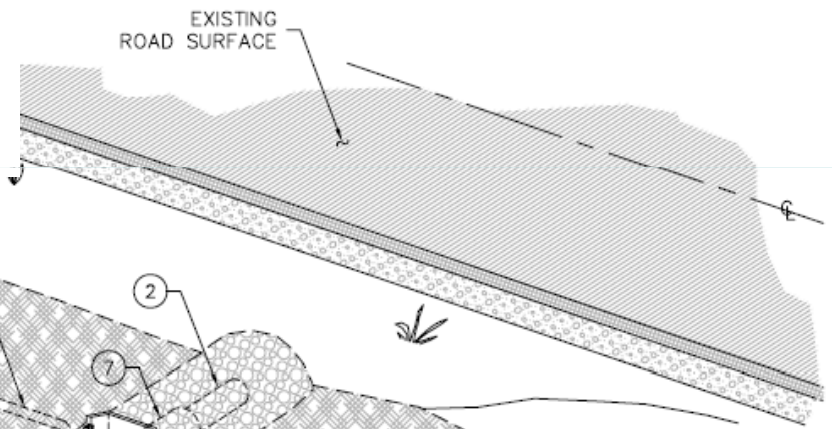
- ① BREAK UP AND HAUL OFF 6" ASPHALT LAYER
- ② EXCAVATE AND STOCKPILE 6" GRAVEL BASE
- ③ RIP COMPACTED SUBGRADE TO A DEPTH OF 12" MIN.
- ④ SUBGRADE IS LIKELY TO BULK DURING THE RIPPING PROCEDURE. OVERLAY ORGANIC MATERIAL (MUSHROOM COMPOST OR EQUIVALENT) TO 3" BELOW ORIGINAL ASPHALT ELEVATION.
- ⑤ 6"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

No infiltration allowed

# Culvert Maintenance Detail



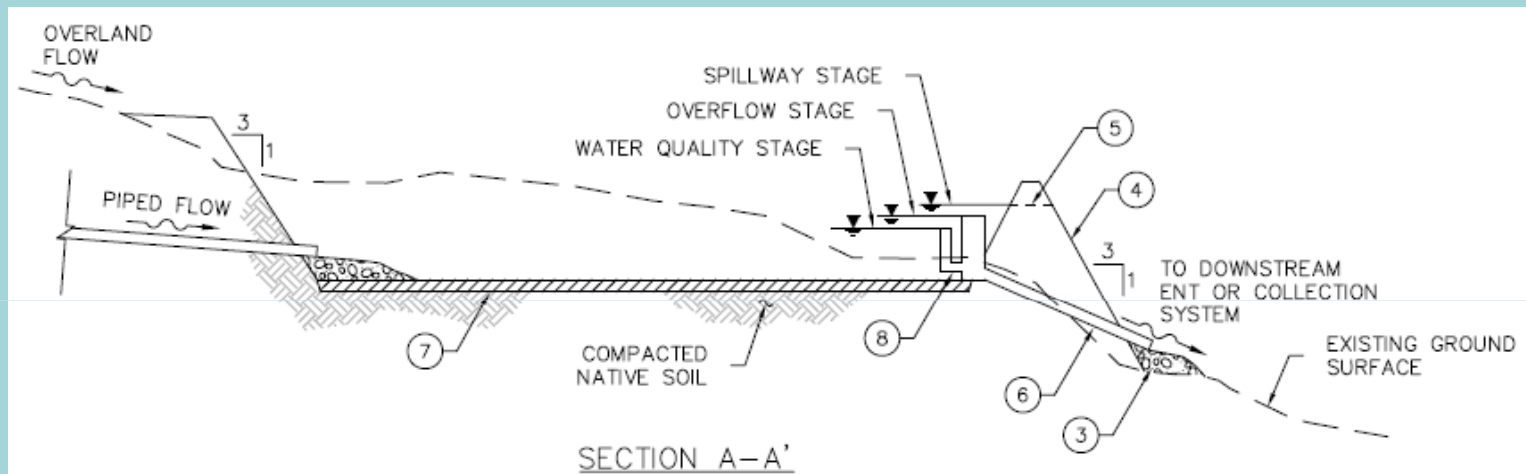
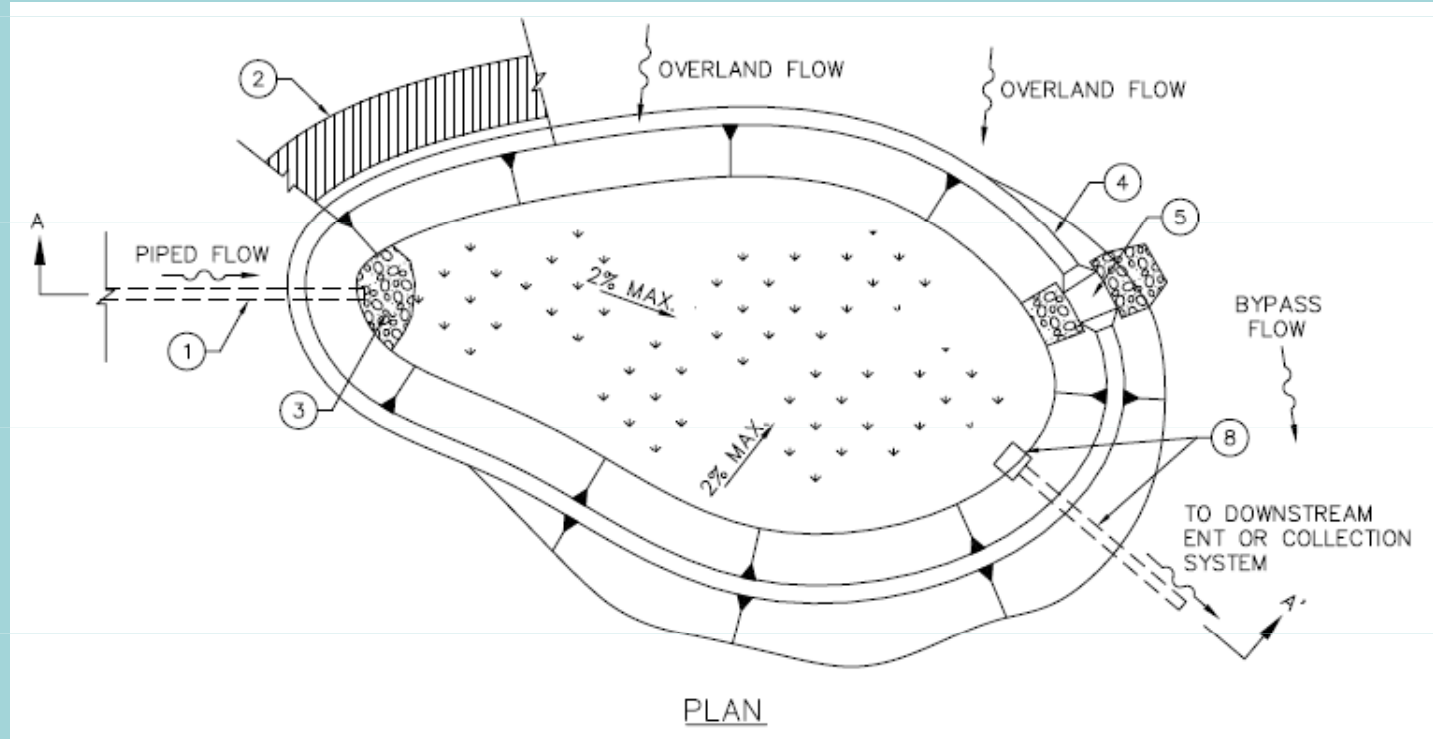
EXISTING CULVERT OBLIQUE VIEW



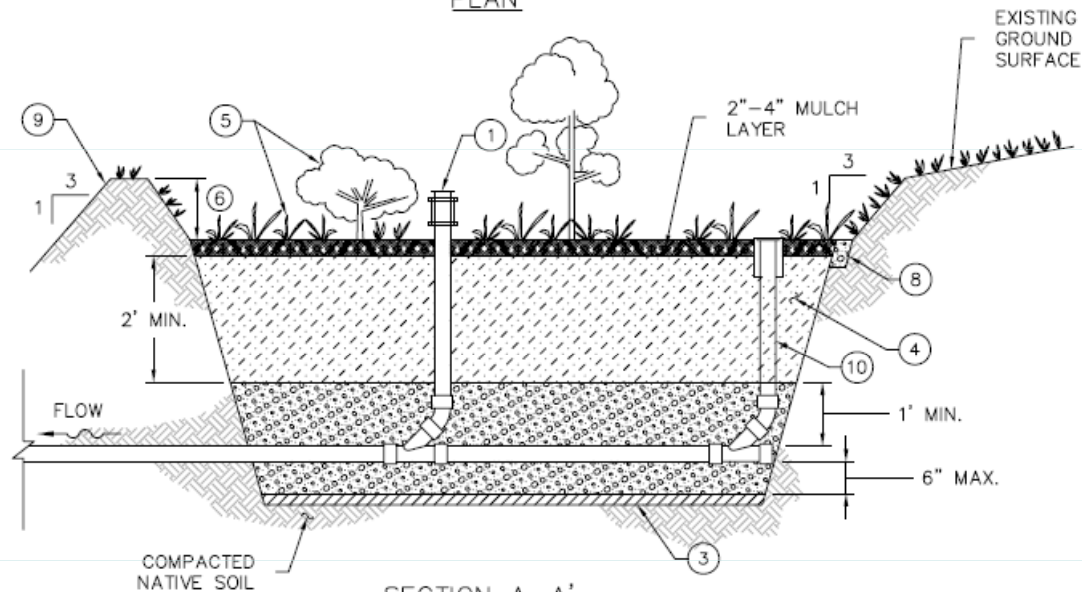
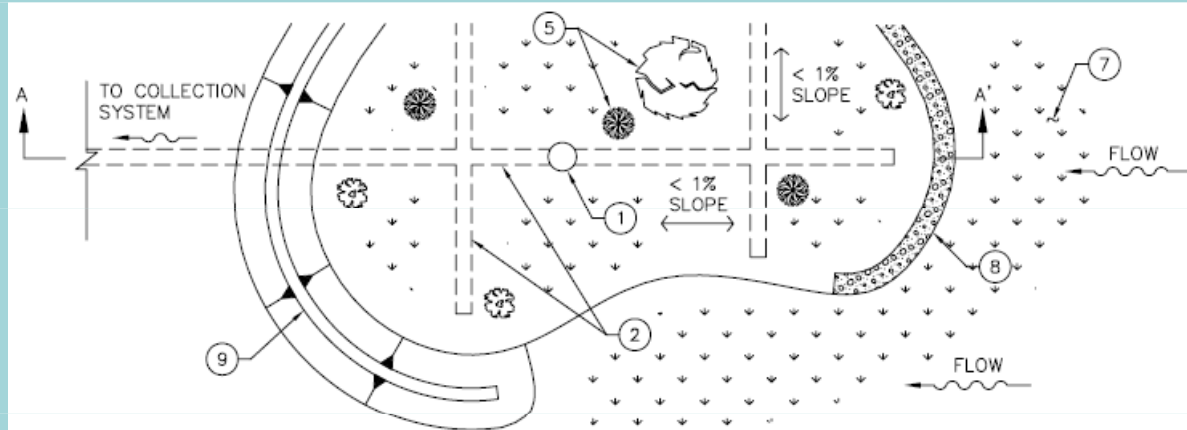
CULVERT MAINTENANCE OBLIQUE VIEW



# Sedimentation Basin Detail



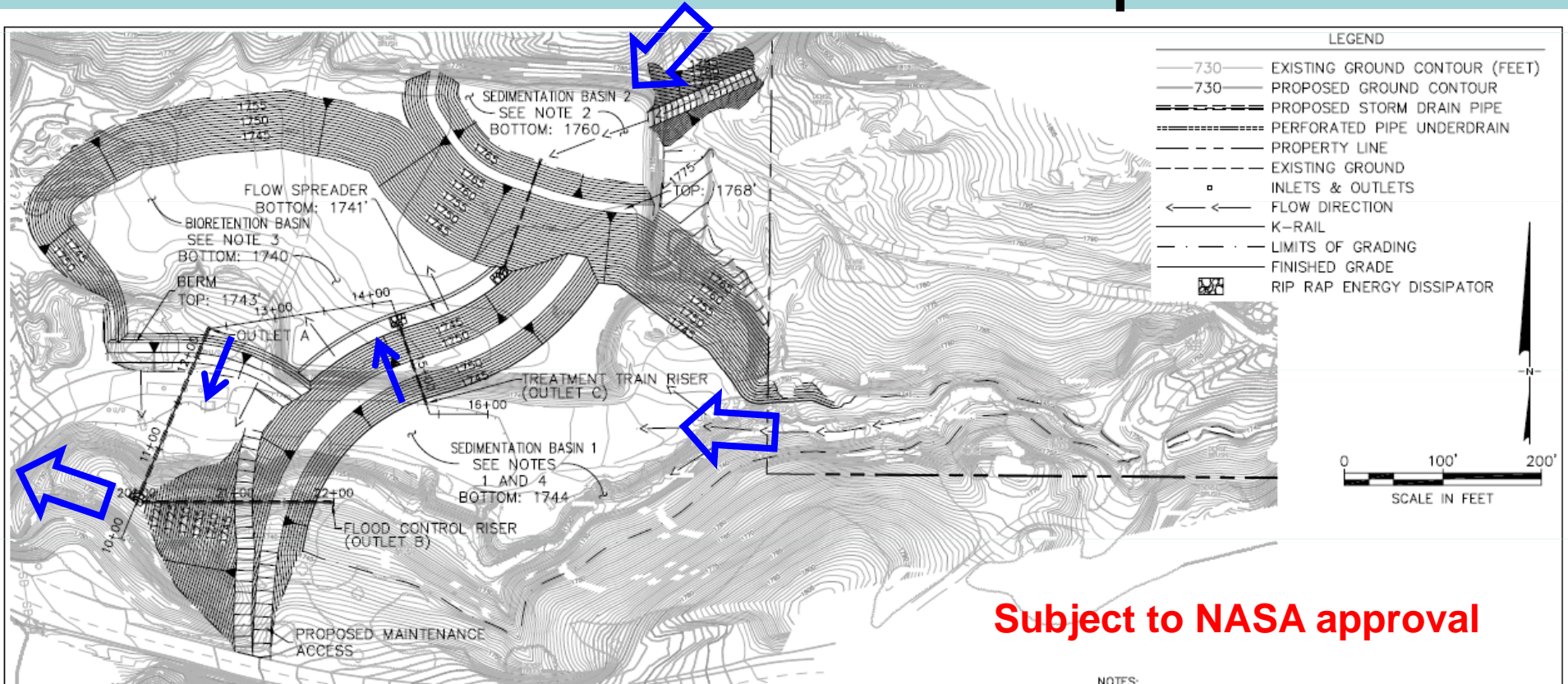
# Bioretention Detail



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



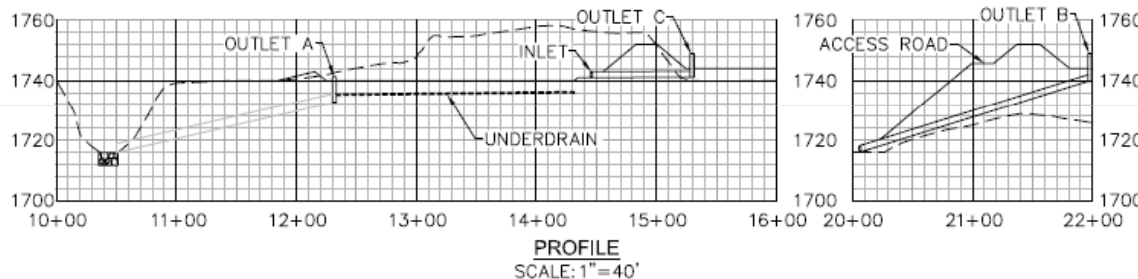
# Draft LOX Concept



**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.



<small>3090 OLD TOWN AVE., SUITE 2-101 SAN DIEGO, CALIFORNIA 92108 USA PHONE: 619.297.1533</small>		<small>SANTA SUSANA FIELD LABORATORY KHUANA COUNTY, CALIFORNIA</small>	
<p>TITLE: <b>TREATMENT TRAIN</b></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	<b>TT3</b>

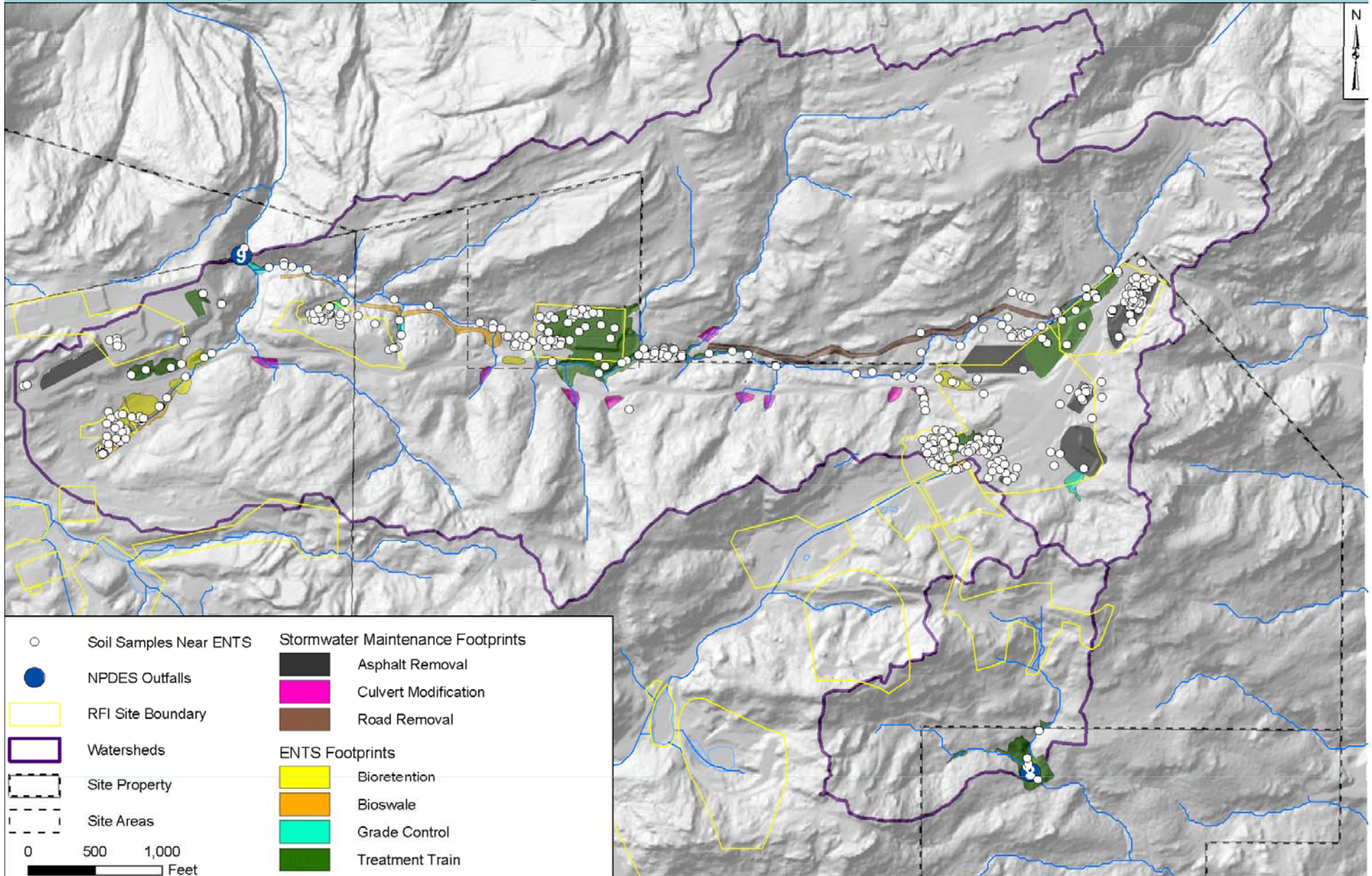
# Public Recommendations to Panel

- 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

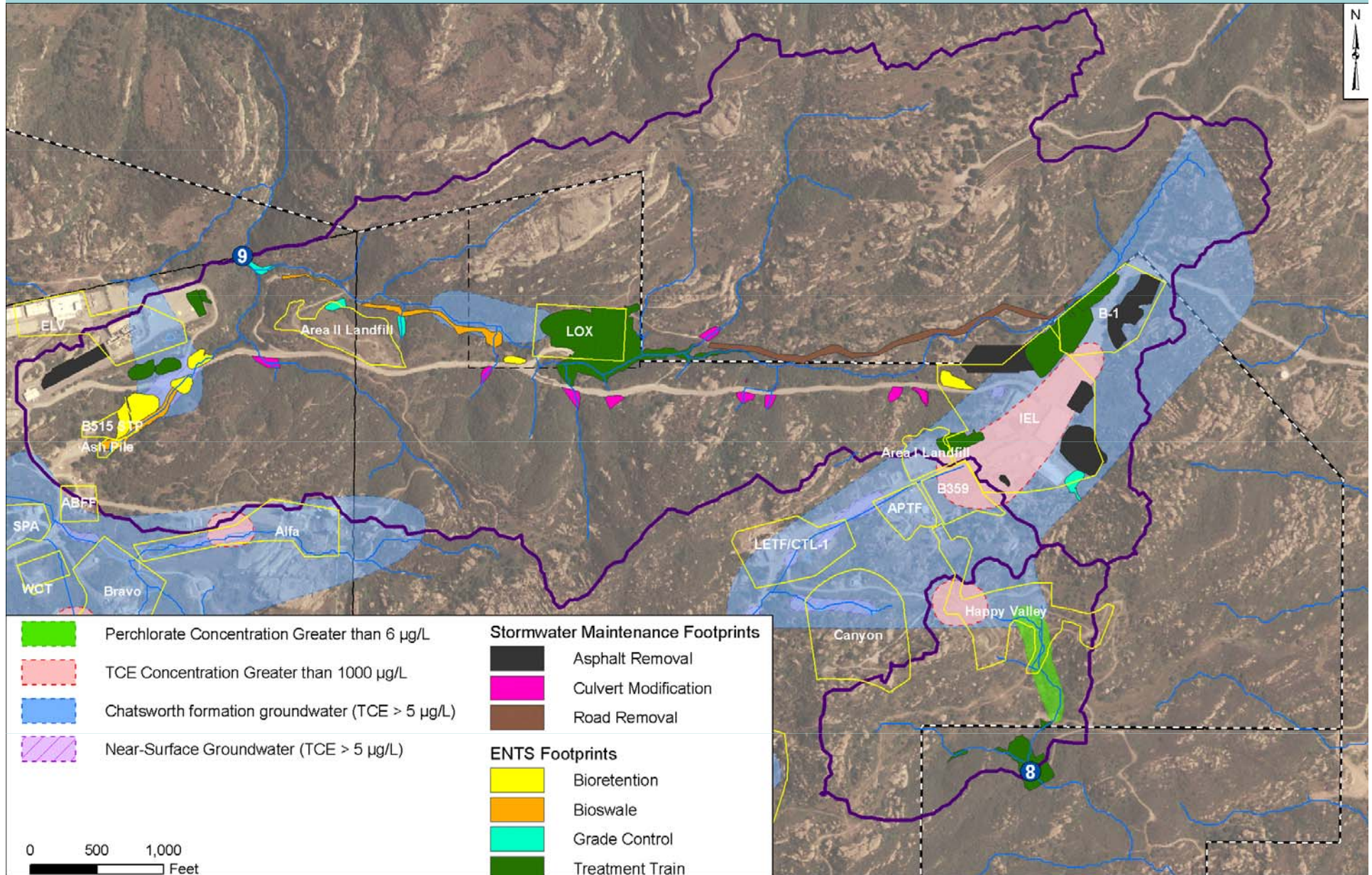
# Preliminary Plan for ENTS Construction at or Near Cleanup Areas

- 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:

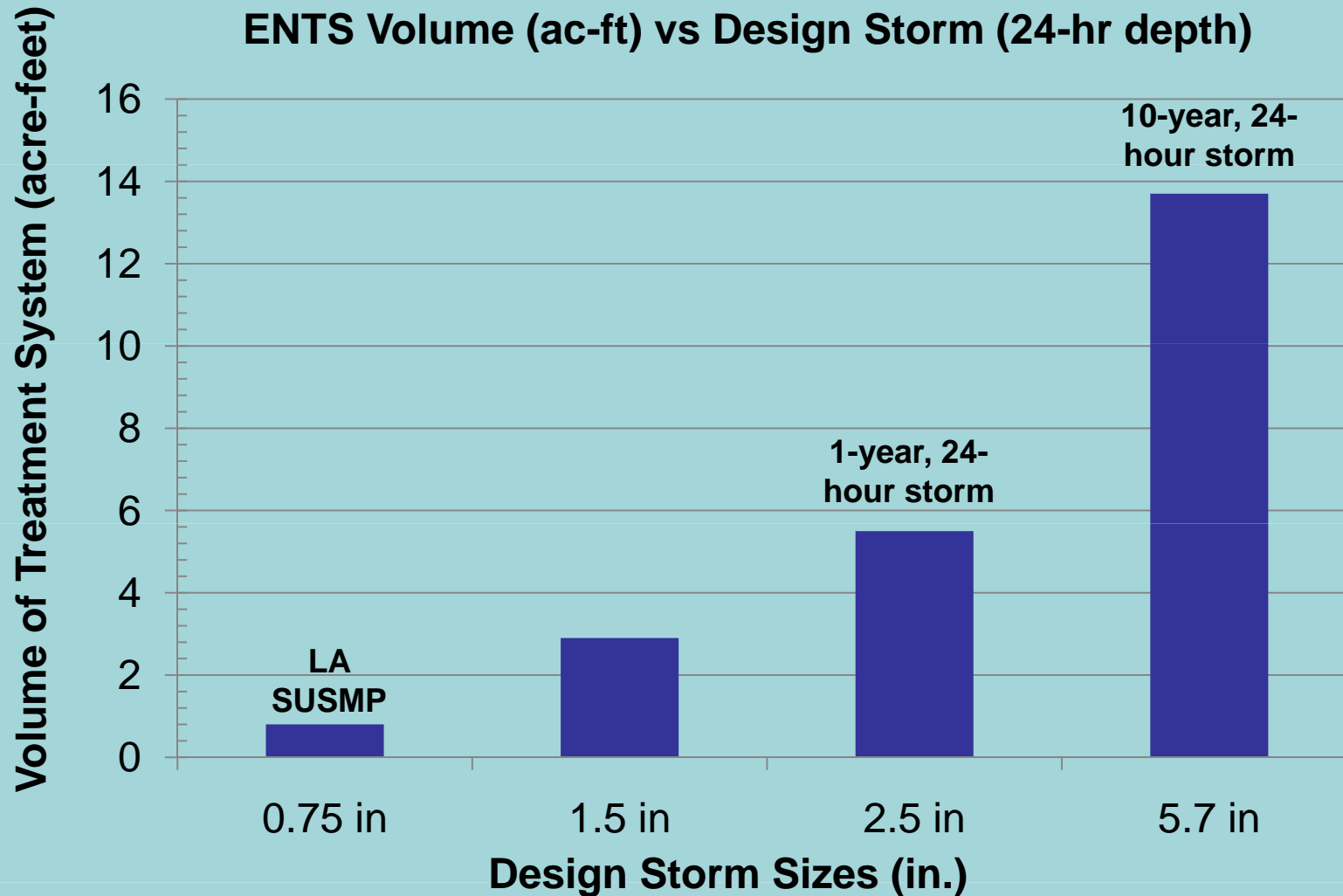
- Maximize the probability of attaining numeric effluent limits
- Minimize the potential impacts to downstream residents and the environment
- Protect the natural site conditions and is feasible given the site's constraints



# Site Specific Design Storm Preliminary Recommendation

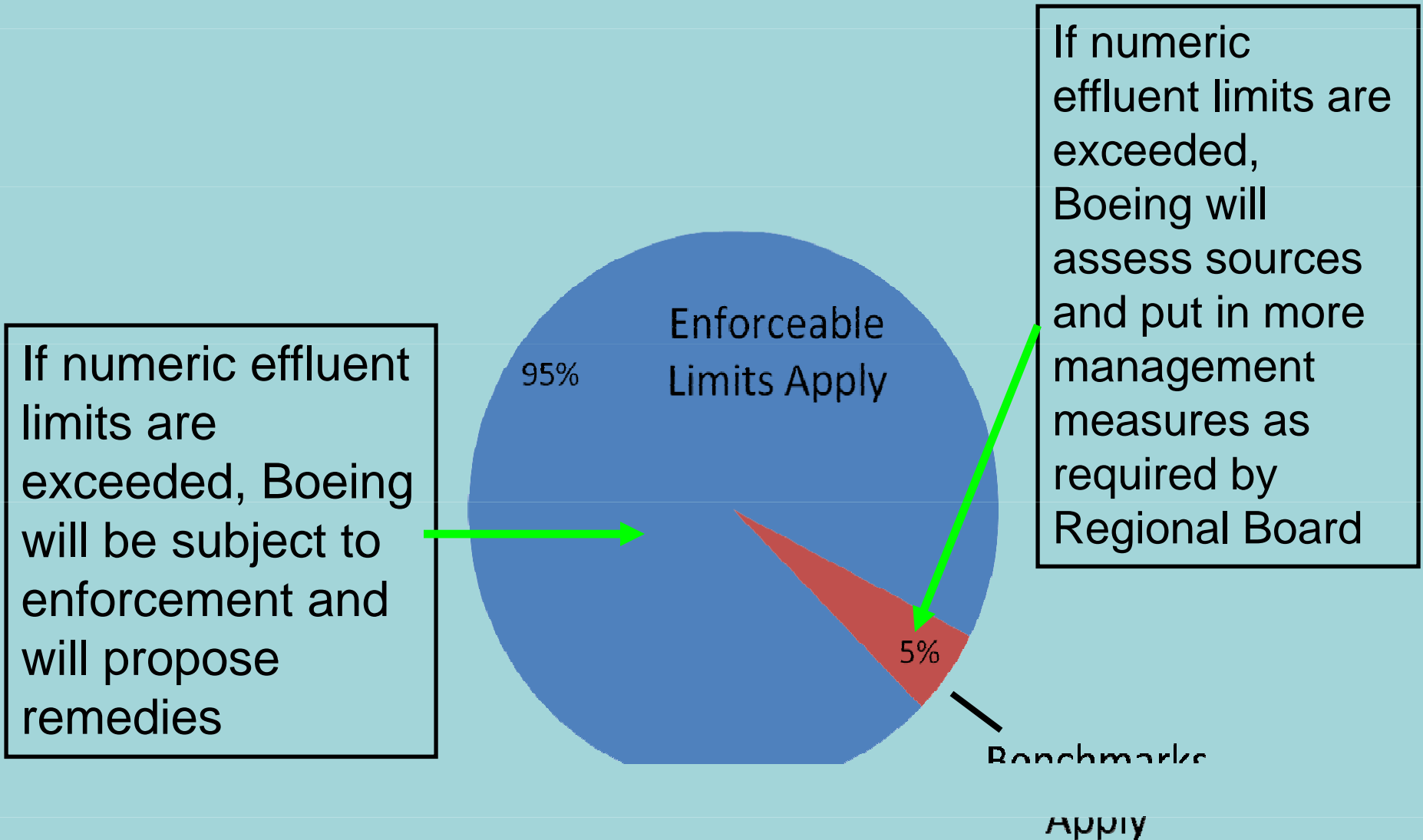
- The Panel recommends that the 1-year return interval storm event be used as the single site-wide design storm:
  - Either a 24-hour storm (2.5 inches) or
  - 0.6 inches per houras measured at an onsite rain gage
- About 95 percent of all storms would be smaller

# Design Storm Comparison - Outfall 008 Example



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

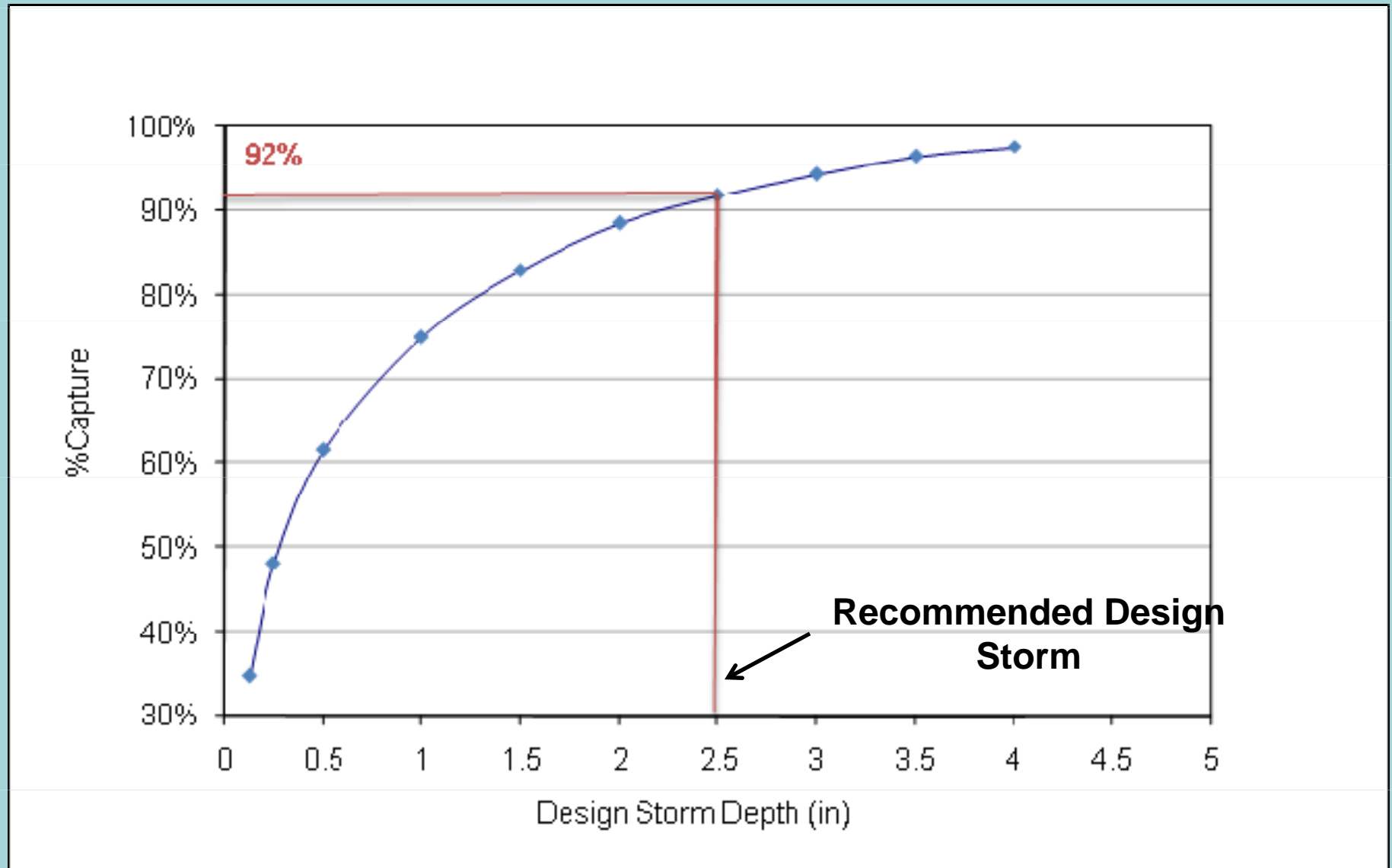
## Percent of Storms Treated at SSFL Using 1-Year Design Storm



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



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

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

**[bsteets@geosyntec.com](mailto:bsteets@geosyntec.com)**