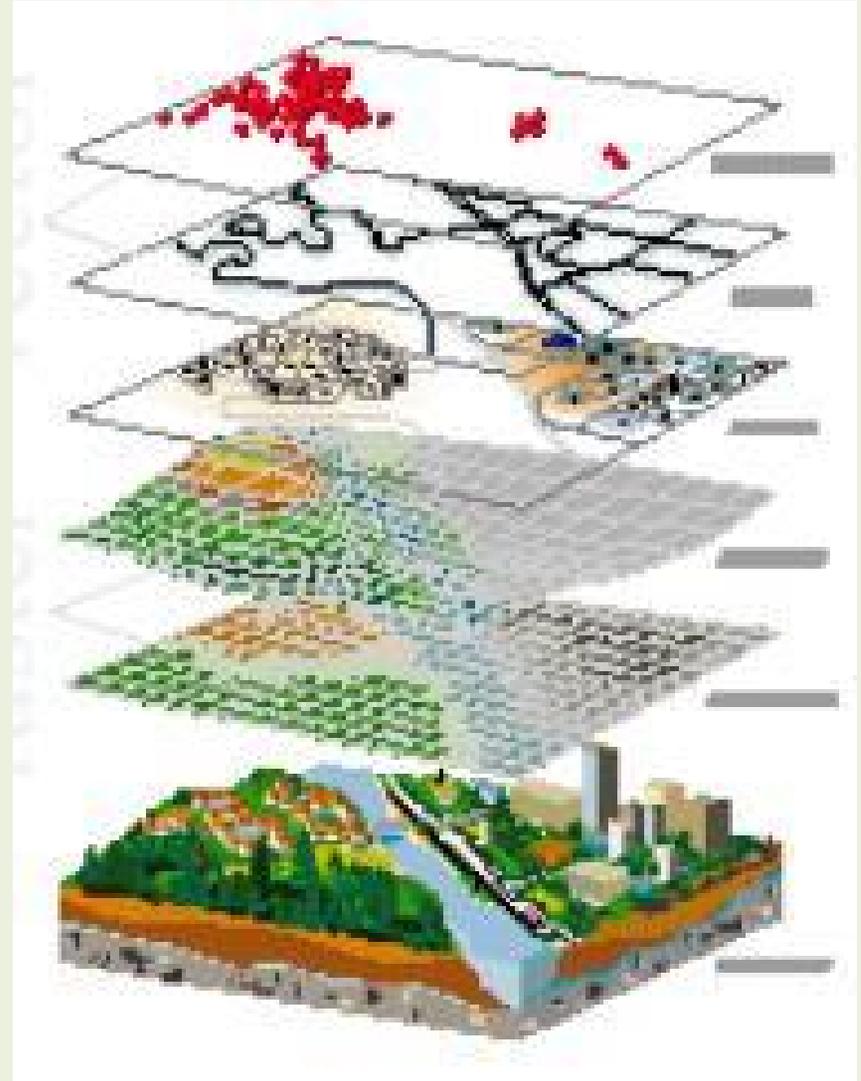


Westside Watershed Restoration Masterplan

Update
April 2012

Paul Crabtree, PE
Crabtree Group, Inc.

For the City of
San Buenaventura



Paul Crabtree, PE

Silo Credentials

Licenses, Certificates & Memberships

Registration as Professional Engineers (Civil) in CA, CO, UT, NM, MN, TX
Member National Society of Professional Engineers and American Society of Civil Engineers

Member Congress for New Urbanism

Graduates of Form Base Code Institute Program FBC 101, 201, 301

Graduates of SmartCode and SmartCode Pro

Certified National Charrette Institute Planner & Manager

Participant at Congress for New Urbanism National Conferences, XIV, XV, XVI, XVII, XVIII

Member Urban Land Institute

Member American Planning Association

Member Local Government Commission

Member Transect Codes Council

Member Ojai Planning Commission (7 years)

Author of the SmartCode Regional Watersheds Module

Winners 2010 CNU Charter Award – Salon des Refuses

Authors of the First Transect-Based Regional Watershed Management Plan

Authors of 1st SmartCode adopted by a Municipality in the State of Colorado

Leader, CNU Rainwater Initiative

McHargian Analysis

Ian McHarg

Scottish Landscape Architect 1920-2001

Design With Nature (1969)

“Father” of GIS

"The engineer's competence is not the design of highways, merely of the structures that compose them—but only after they have been designed by persons more knowing of man and the land."

Environmental Layers



SLOPE



SURFACE DRAINAGE



SOIL DRAINAGE



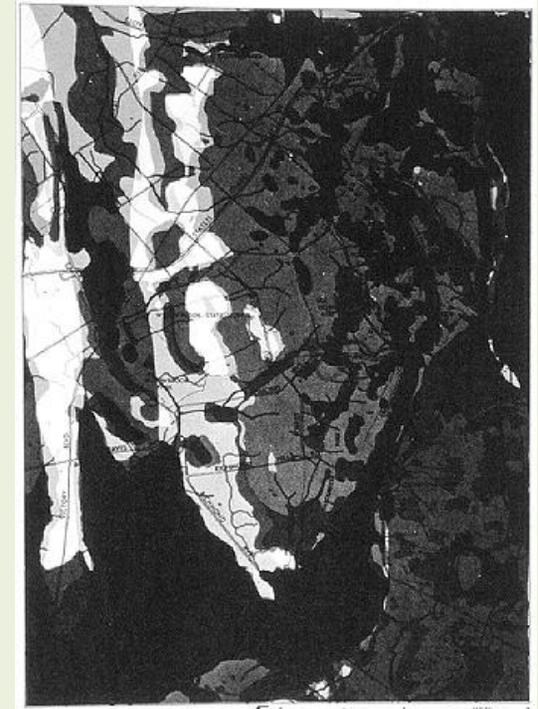
BEDROCK FOUNDATION



SOIL FOUNDATION



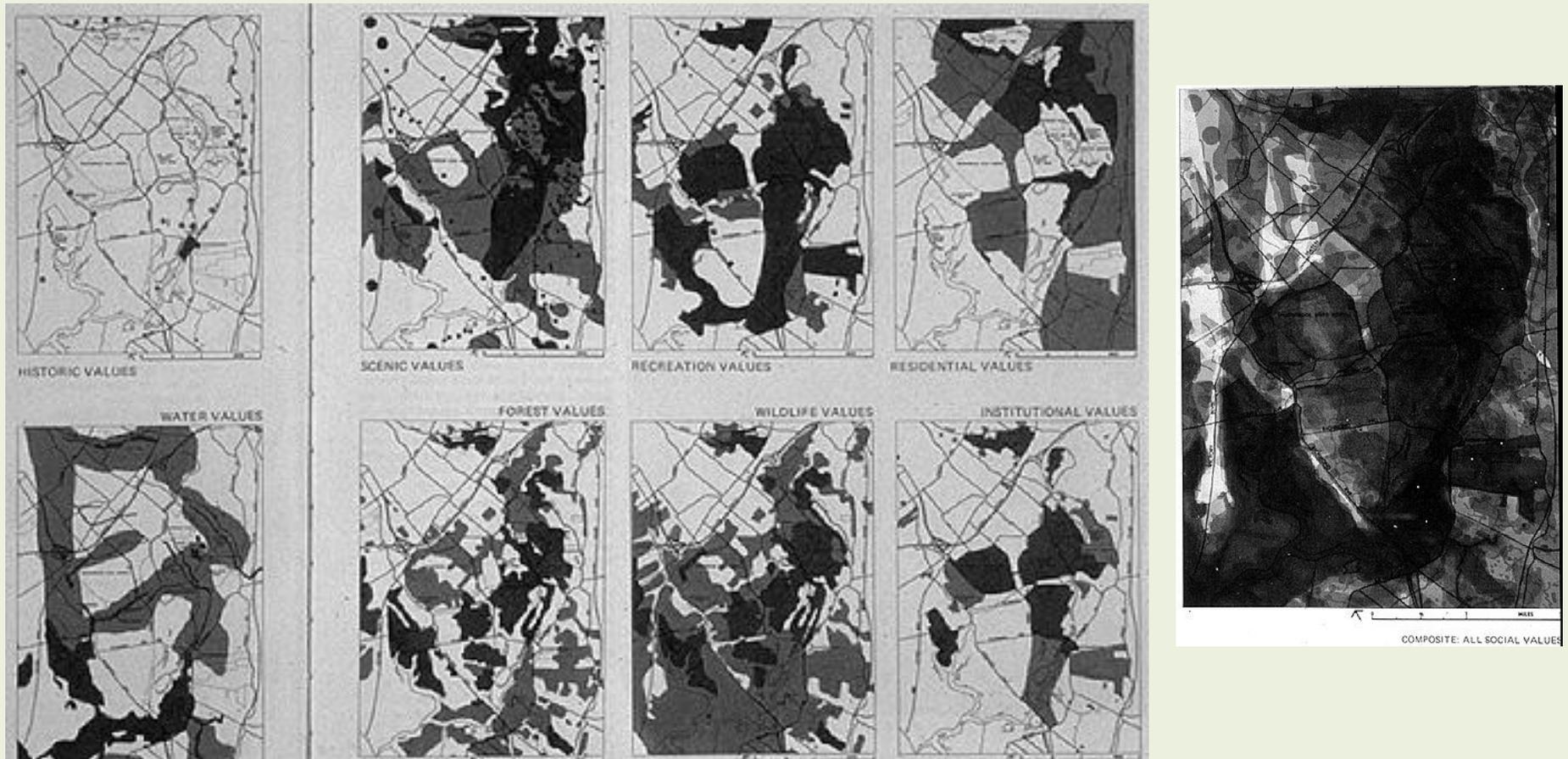
SUSCEPTIBILITY TO EROSION



COMPOSITE: PHYSIOGRAPHIC OBSTRUCTIONS

Locating a new road. Light = appropriate. Dark = not appropriate.

Social Layers



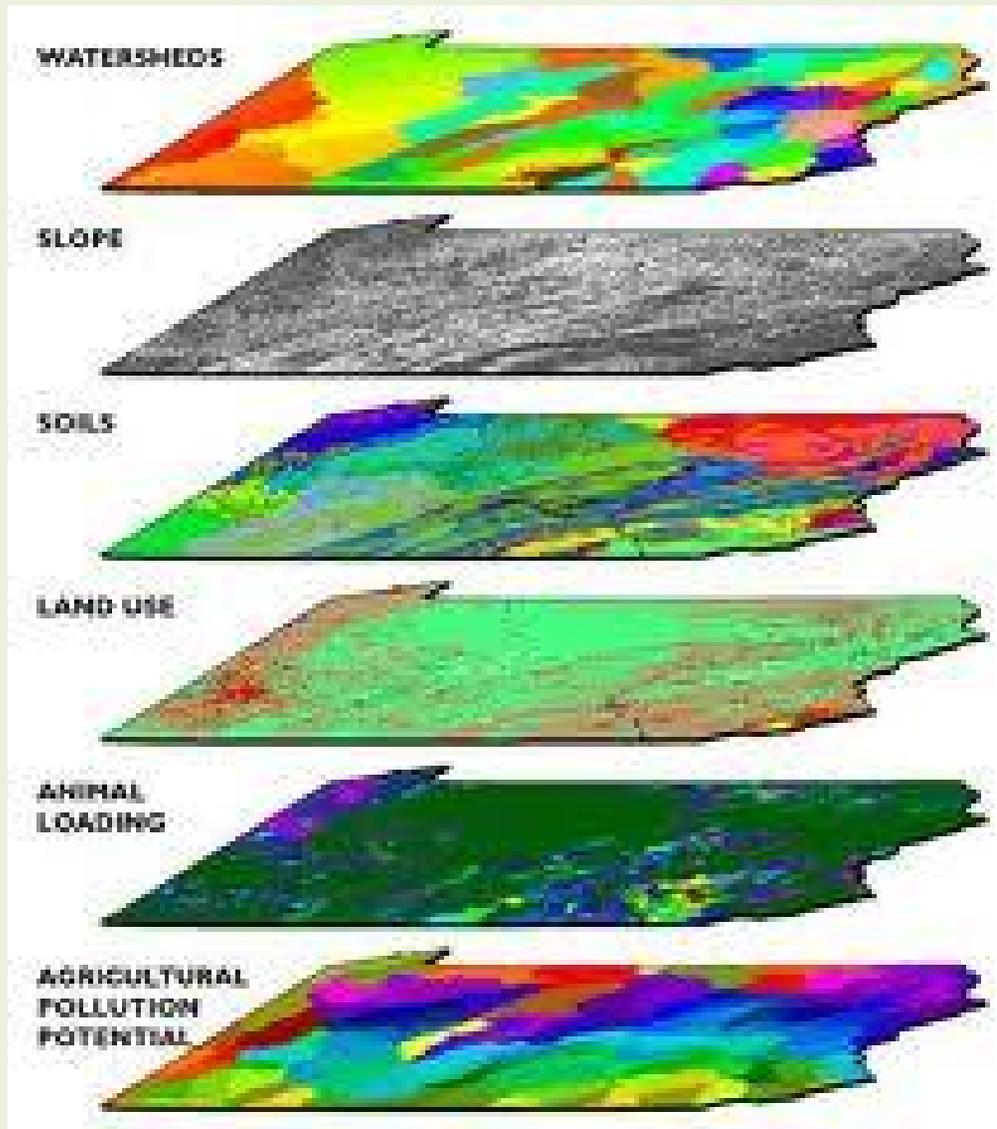
Locating a new road. Light = appropriate. Dark = not appropriate.

Social + Environmental = Proposed Route



Locating a new road. Light = appropriate. Dark = not appropriate.

Determining and Locating Rainwater BMPs



Investigative Procedure

Investigative Procedure:

1. Don't assume.

**2. Pull the String =
What do we not
understand?**

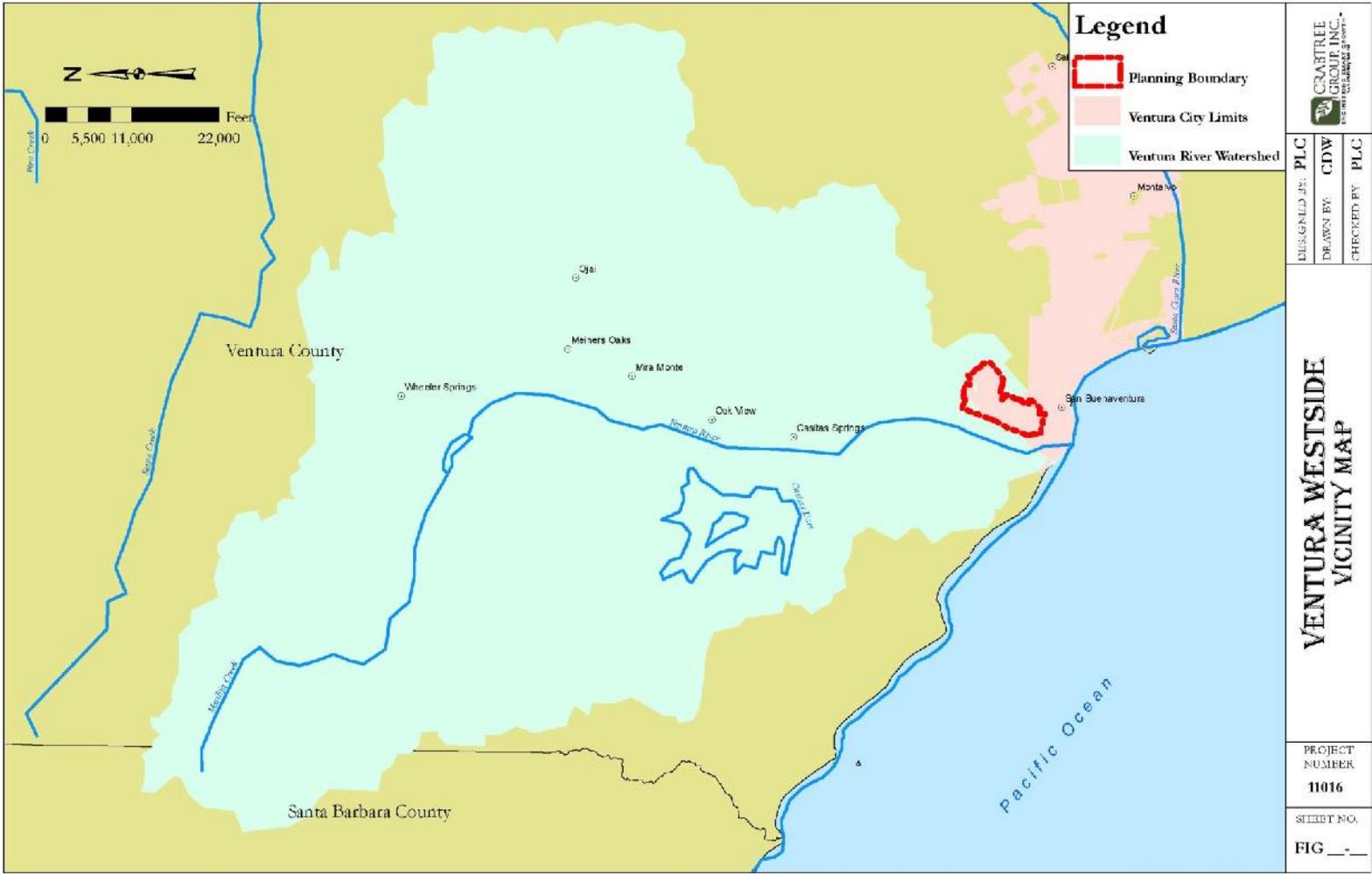
**3. Pull the string(s) until the
big issues are revealed, that
lead to highly aligned
solutions.**



Watershed Analysis Goals

1. Understand the Inter-relationships of the Watershed. (Ecology and culture.)
2. Establish Benchmarks.
3. Identify Constraints.
4. Discover Opportunities.
5. Implement Pragmatic Context-Sensitive Solutions

Ventura River Watershed



1. Understand the Inter-relationships of the Watershed.

- a. Literature Review. (40+ Studies & Books)
- b. GIS Review. (50+ layers)
- c. Personal Interviews with Stakeholders. (15+)
- d. Field Reviews. (10+)
- e. Feedback loops. (I/P)

2. Establish Benchmarks

What problem(s) are we trying to solve?

What benchmark(s) would indicate success?

Water Quantity? (Hydrographs)

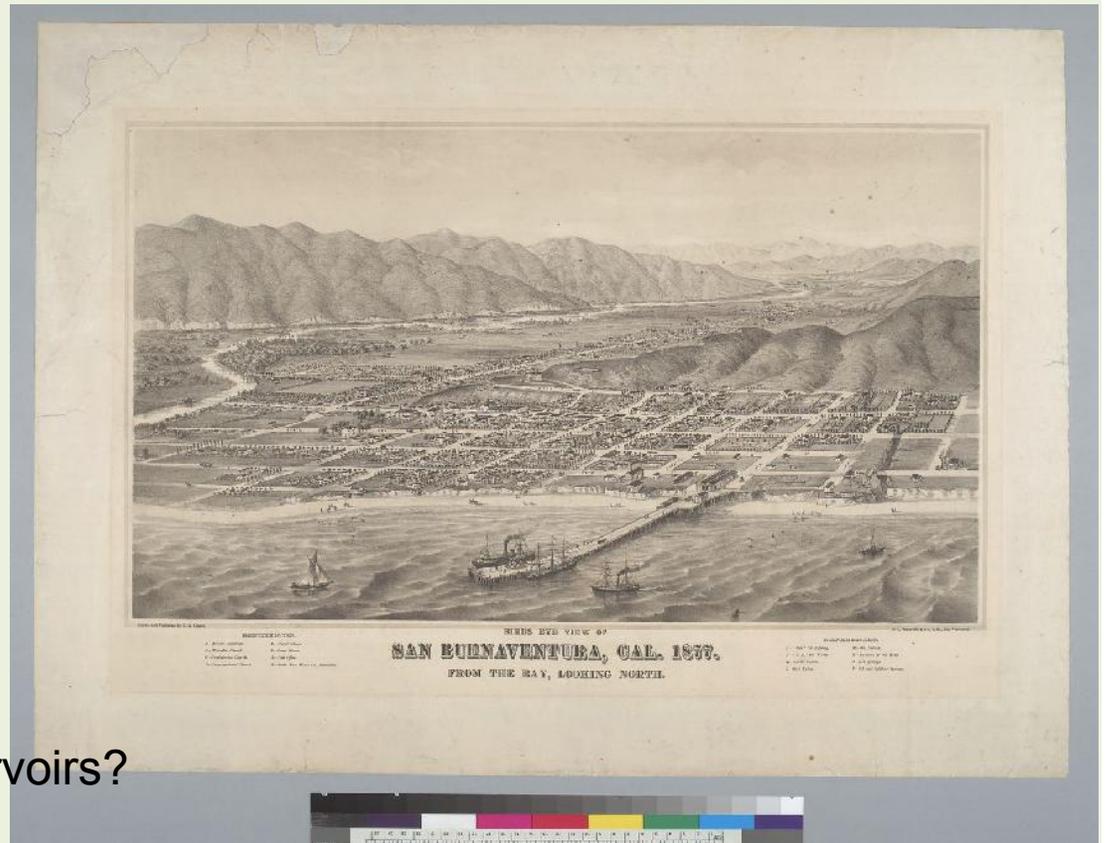
Water Quality? (TMDLs)

Historical? 1877? 1927? Earlier?

Nature? Remove levees and reservoirs?

Cultural? Great places for people to live.

Economic? What is feasible in the current economic situation.



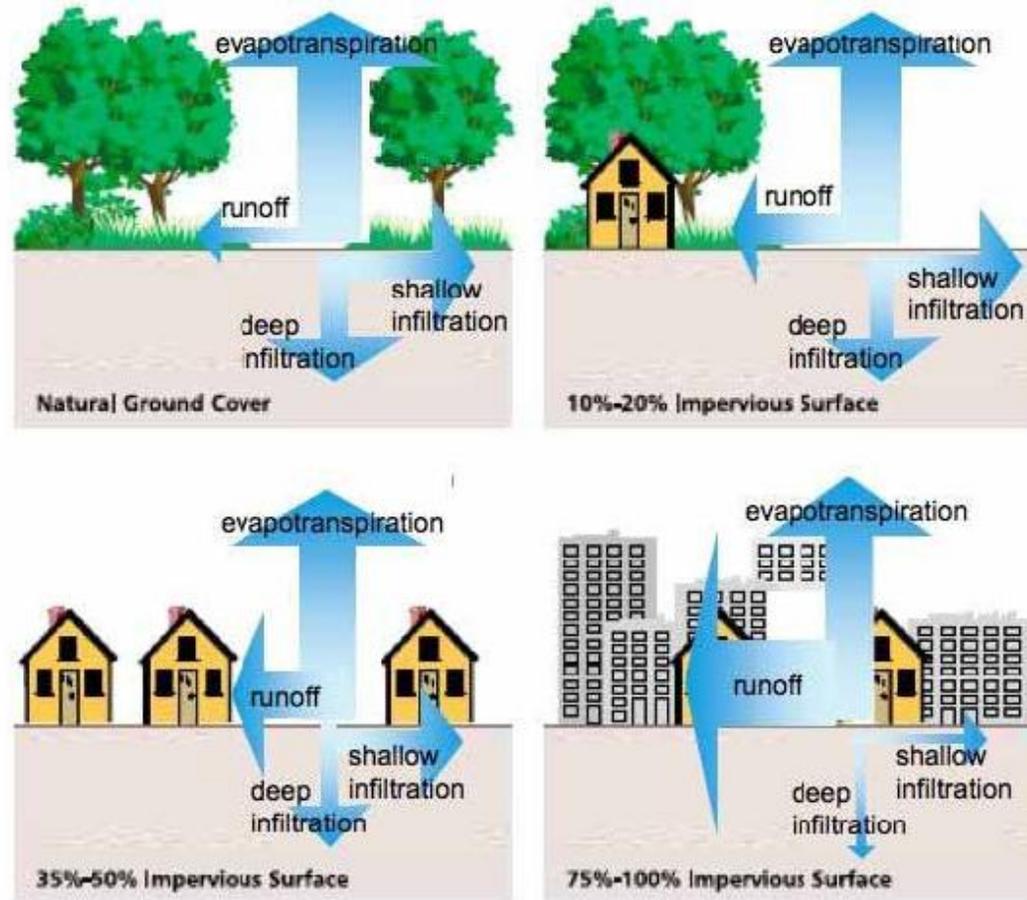
2. Establish Benchmarks

Restoration is defined as: Those actions taken by mankind that bring about more congenial relationships between humans and the rest of nature through the healing and enhancement of the long-term integrity, stability and beauty of ecosystems.

Restoration is accomplished through establishing performance benchmarks that consider the natural, cultural and scientific history of the region and the site; the form of the habitat within the rural-to-urban transect; survival, health and happiness thresholds for both humans and other species; realistic economic expectations; and pragmatic implementations.

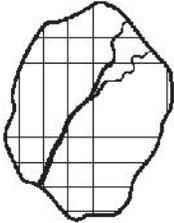
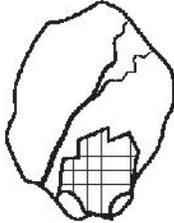
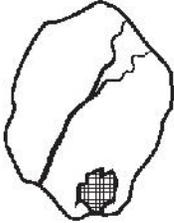
2. Establish Benchmarks - Hydrology

Avoid Assumptions



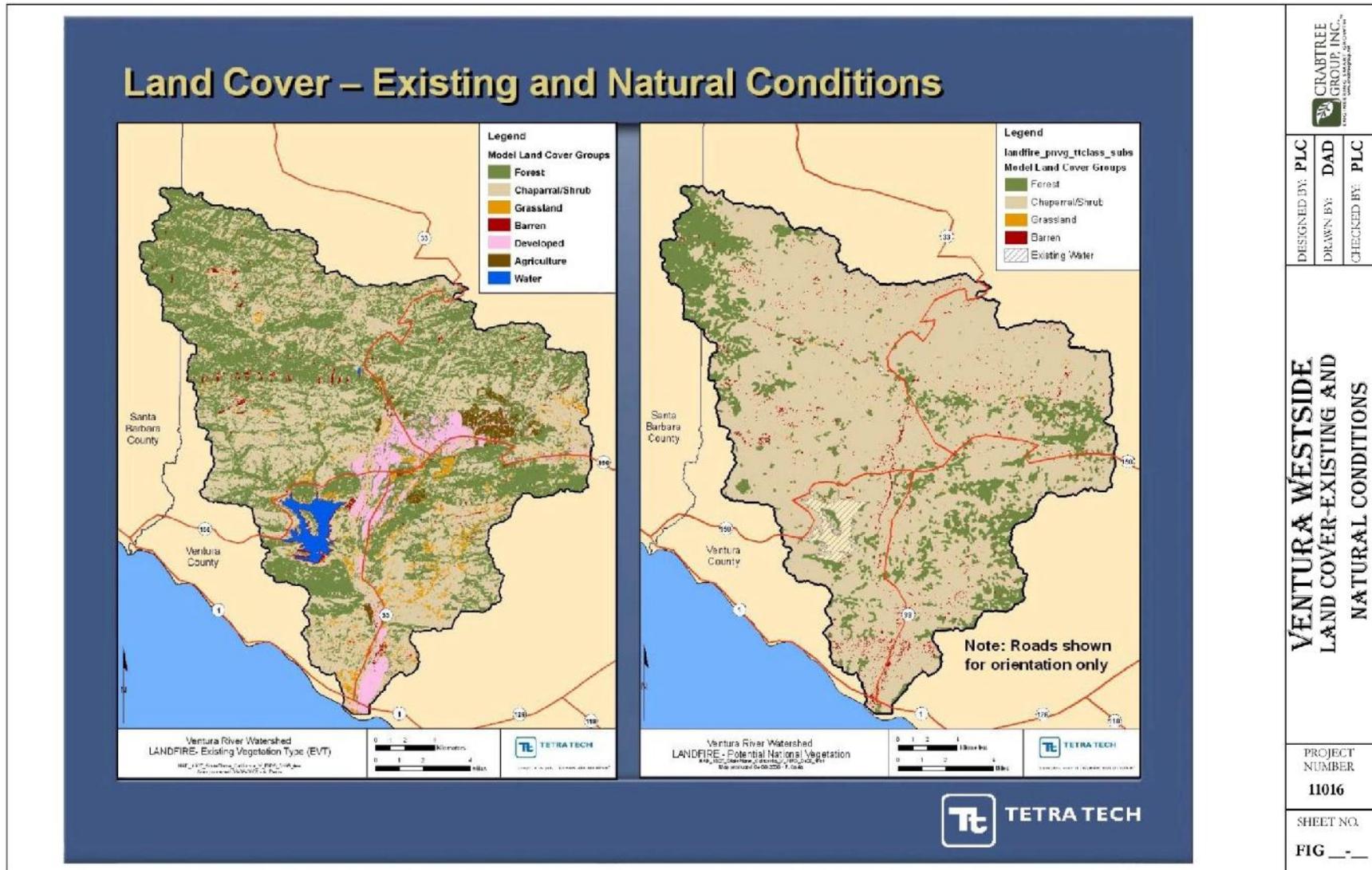
2. Establish Benchmarks - Hydrology

EXHIBIT 5: 10,000-Acre Watershed Accommodating 10,000 Houses

Scenario A	Scenario B	Scenario C
		
<p>10,000 houses built on 10,000 acres produce: 10,000 acres x 1 house x 18,700 ft³/yr of runoff = 187 million ft³/yr of stormwater runoff Site: 20% Impervious cover Watershed: 20% impervious cover</p>	<p>10,000 houses built on 2,500 acres produce: 2,500 acres x 4 houses x 6,200 ft³/yr of runoff = 62 million ft³/yr of stormwater runoff Site: 38% Impervious cover Watershed: 9.5% impervious cover</p>	<p>10,000 houses built on 1,250 acres produce: 1,250 acres x 8 houses x 4,950 ft³/yr of runoff = 49.5 million ft³/yr of stormwater runoff Site: 65% Impervious cover Watershed: 8.1% impervious cover</p>

Avoid Assumptions

2. Establish Benchmarks – Now vs 1927



Mouth of
Matilija
Canyon.
2011



Mouth
of
Matilija
Canyon.
1930

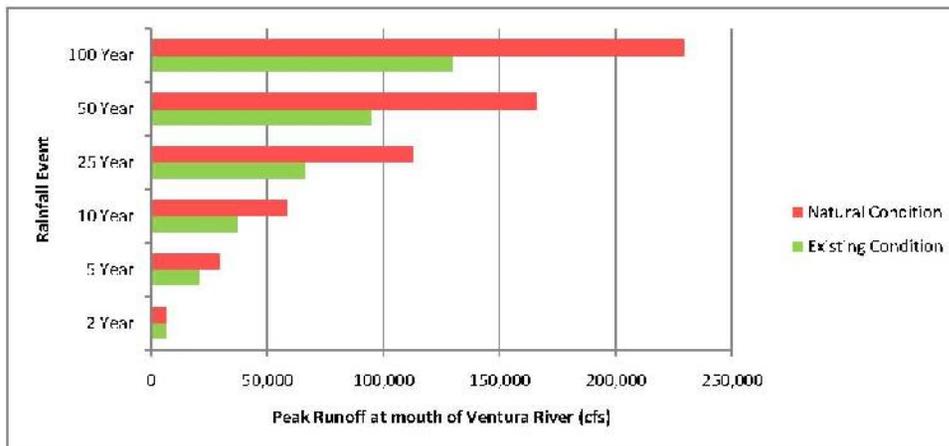


2. Establish Benchmarks – 1927 versus now

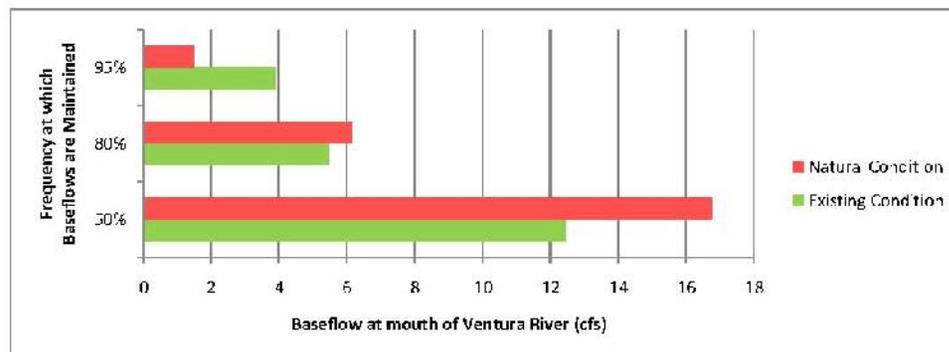


EXISTING HYDROLOGIC CONDITIONS VERSUS NATURAL CONDITIONS

VENTURA RIVER AT MOUTH



**50% less
peak flows**



**More
consistent
base flow
rates**

*Data from "Draft Ventura River Natural Condition Plan" Memorandum, Tetra Tech, Inc. January 5, 2009

2. Establish Benchmarks – Fire and Over-Grazing



**More study is warranted,
going further back in history.**



The greatest impairment SHOULD be the greatest opportunity.



Homeless camps on the lower Ventura River are responsible for massive pollution problems and estuary degradation.

3. Identify Constraints

Lesson Learned:

Diagnosis needed

PRIOR TO

Prescription

STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION
ORDER R4-2010-0108
NPDES PERMIT NO. CAS004002
WASTE DISCHARGE REQUIREMENTS
FOR
STORM WATER (WET WEATHER) AND NON-STORM WATER (DRY WEATHER)
DISCHARGES FROM
THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS WITHIN THE VENTURA
COUNTY WATERSHED PROTECTION DISTRICT, COUNTY OF VENTURA AND
THE INCORPORATED CITIES THEREIN.

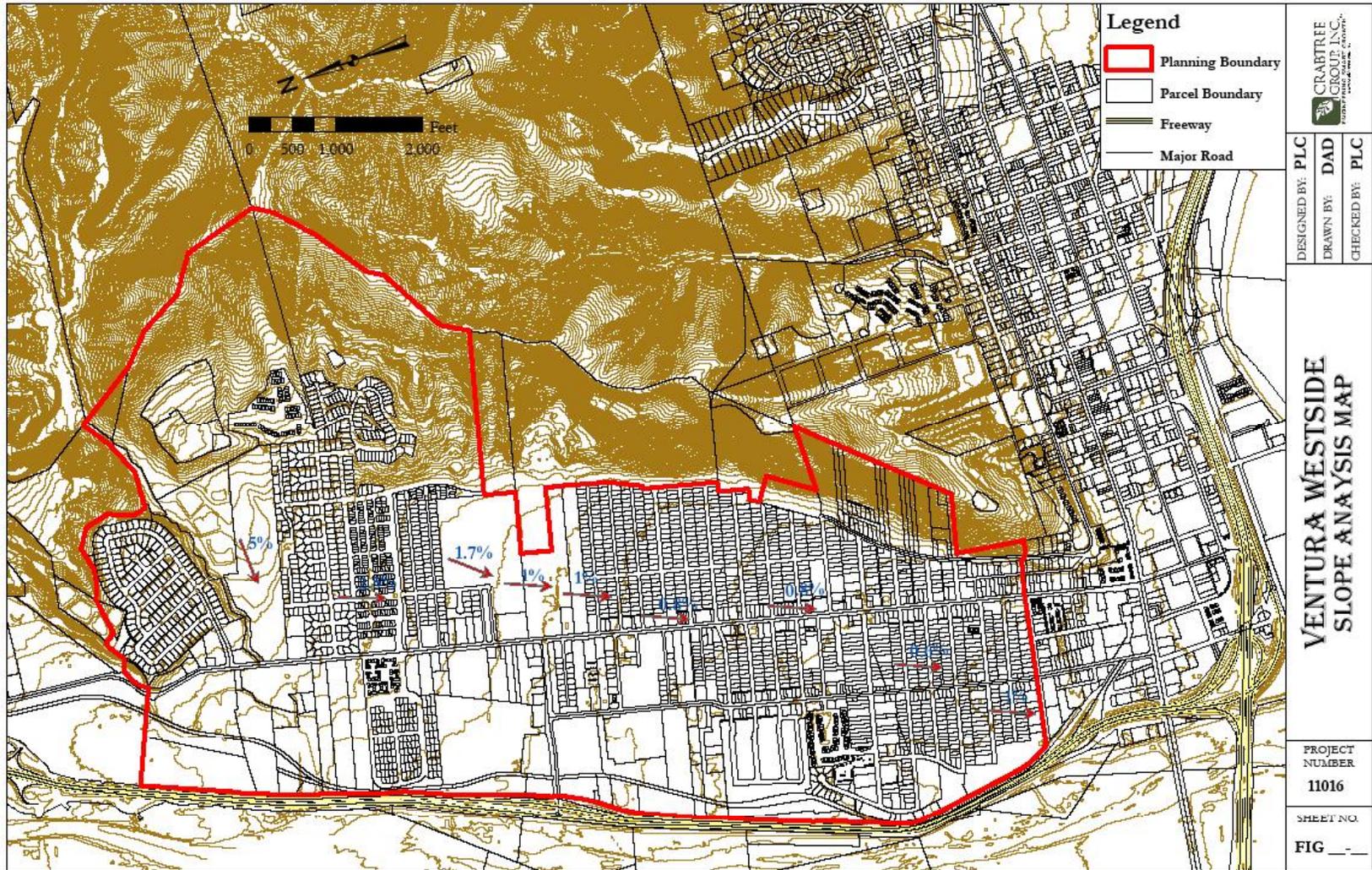
July 8, 2010



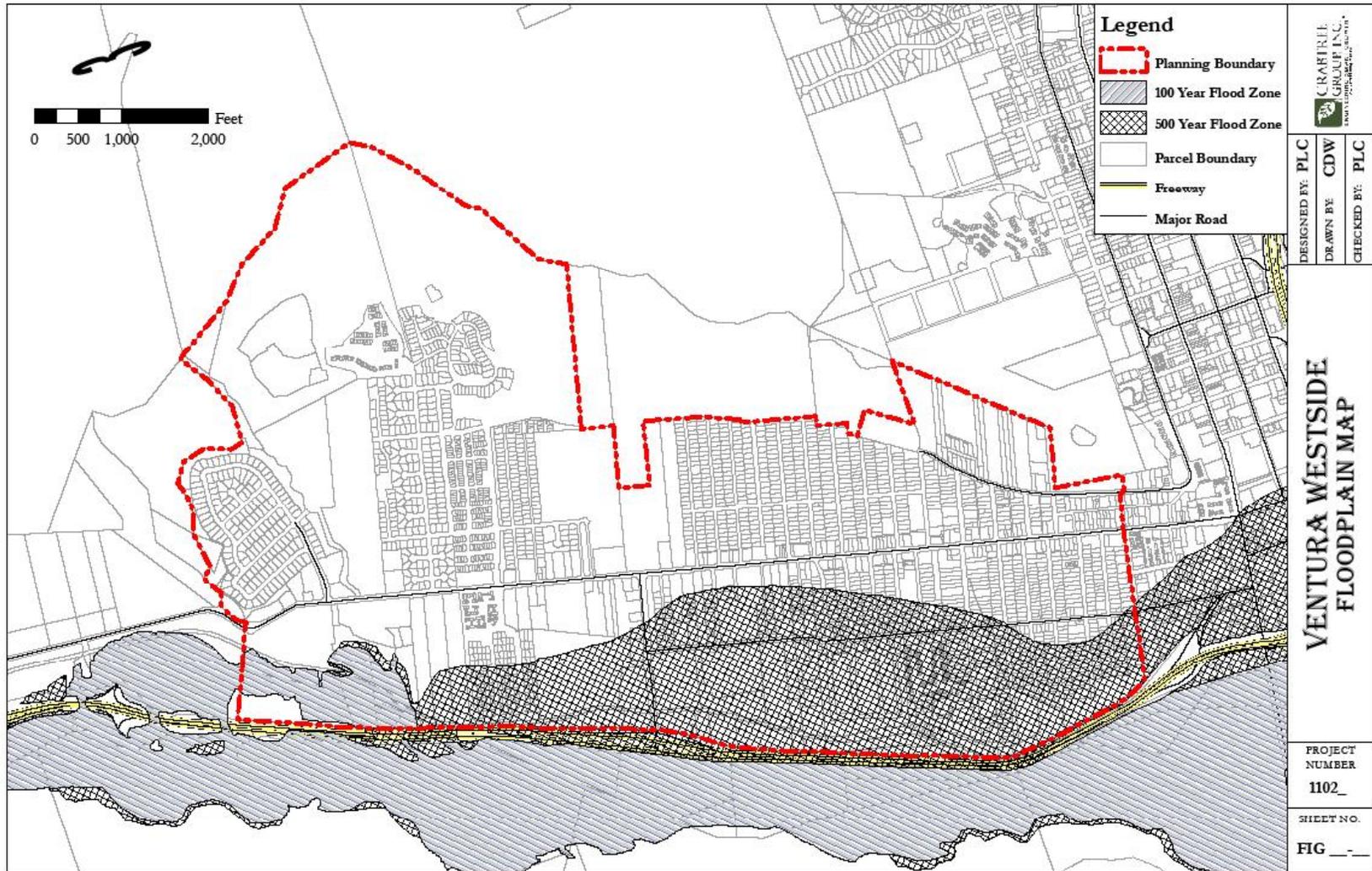
3. Identify Constraints – Westside Planning Area



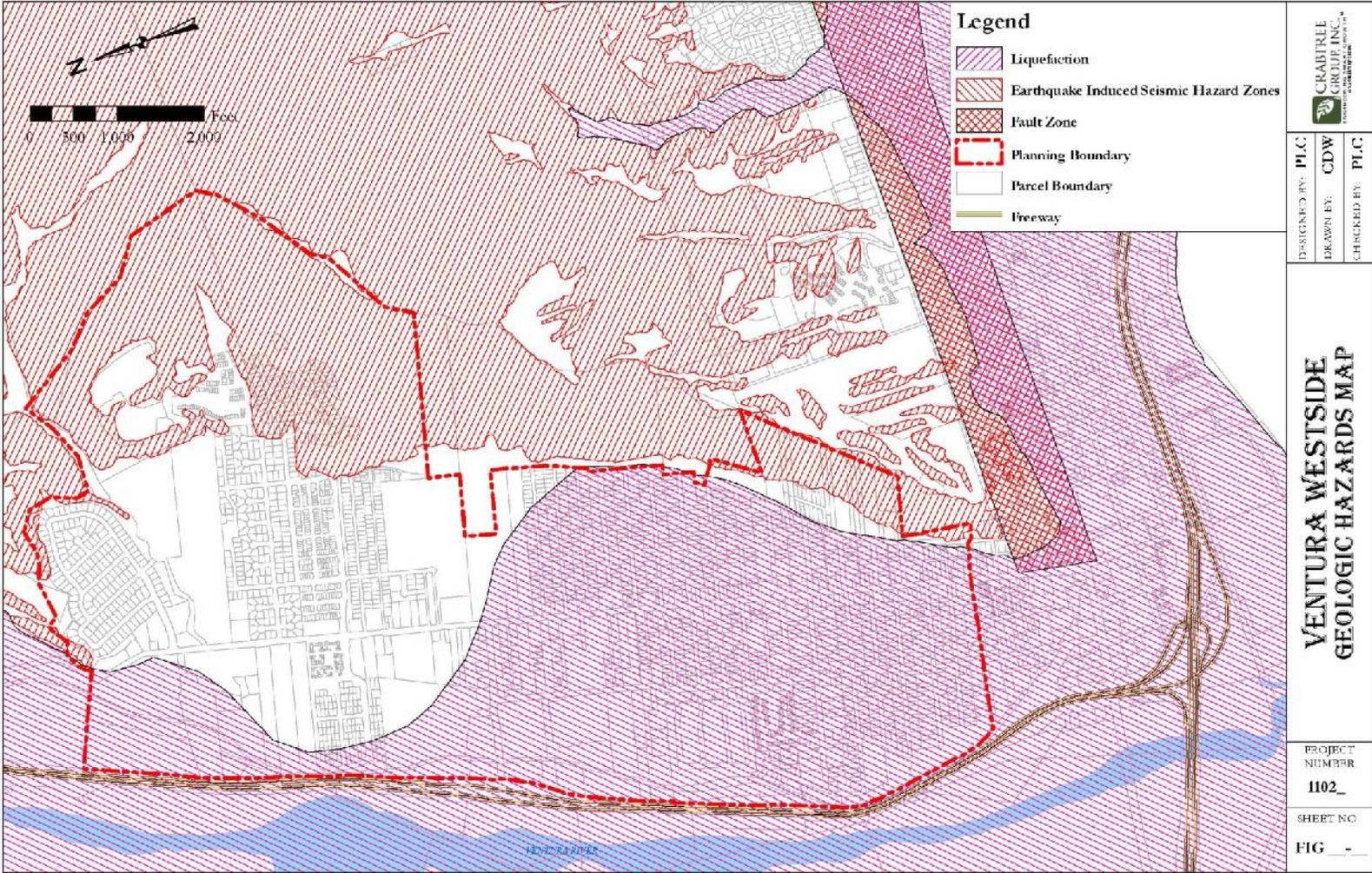
3. Identify Constraints – Slope Analysis



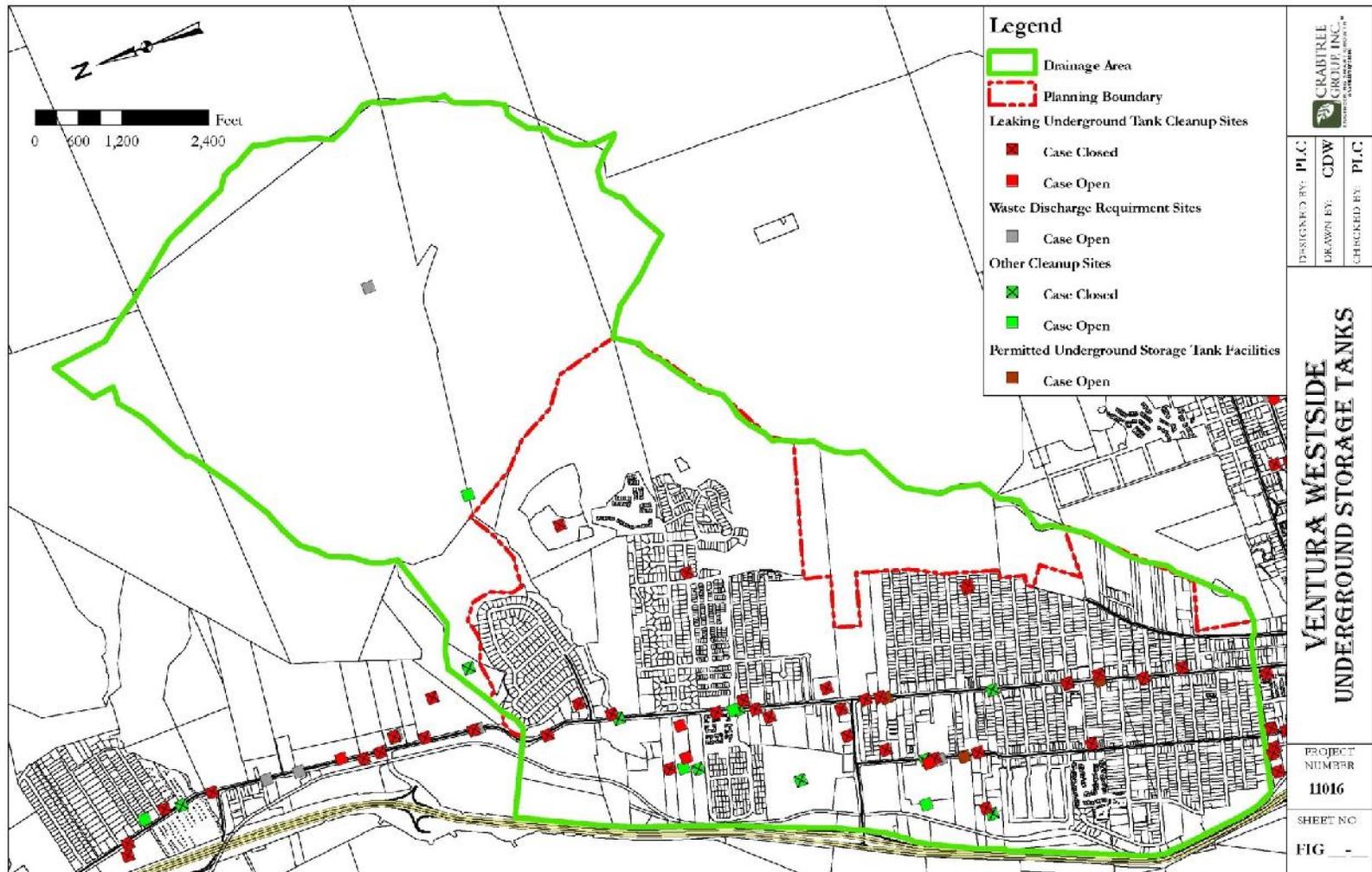
3. Identify Constraints – Floodplain Map



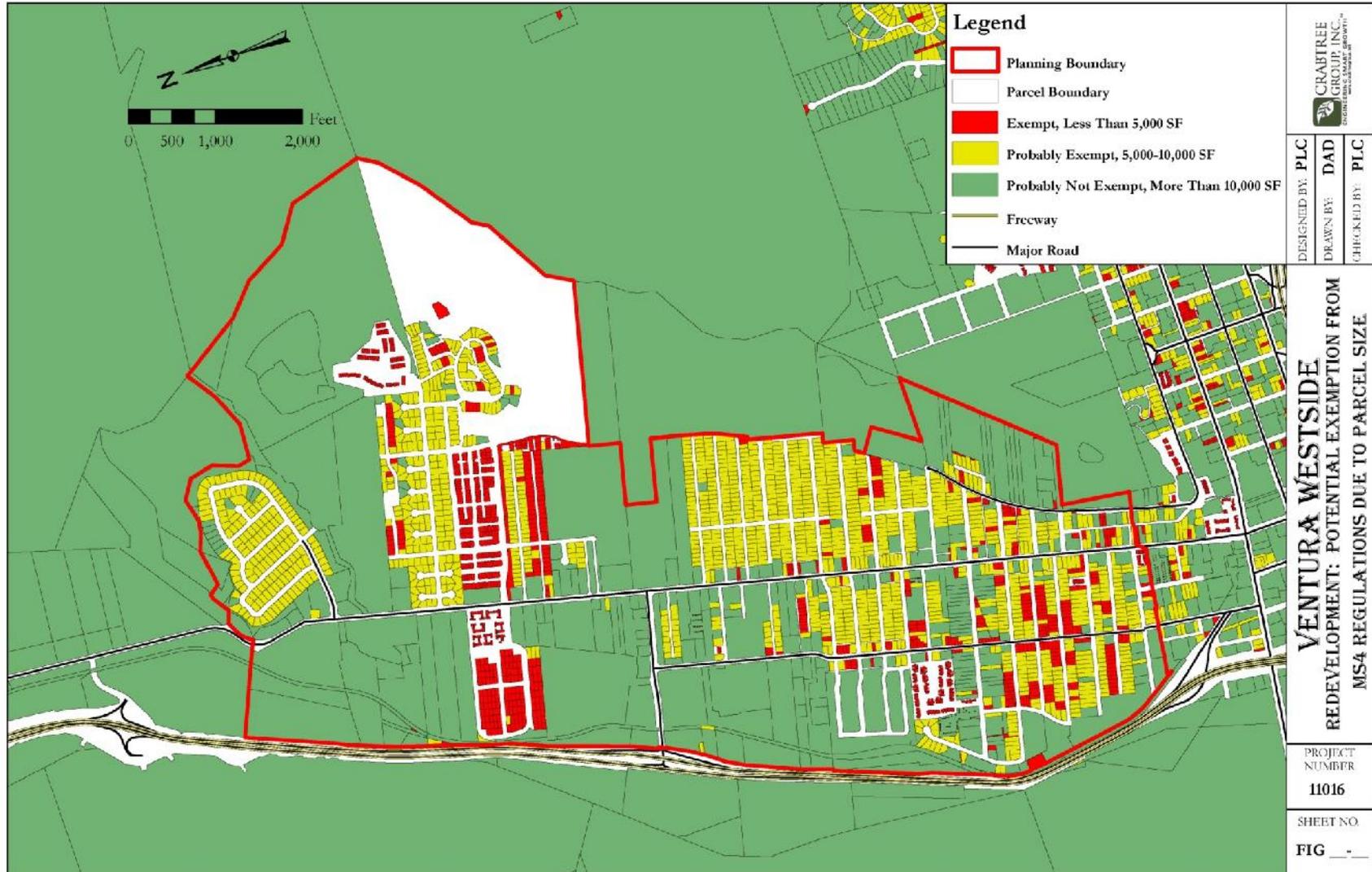
3. Identify Constraints – Geologic Hazards



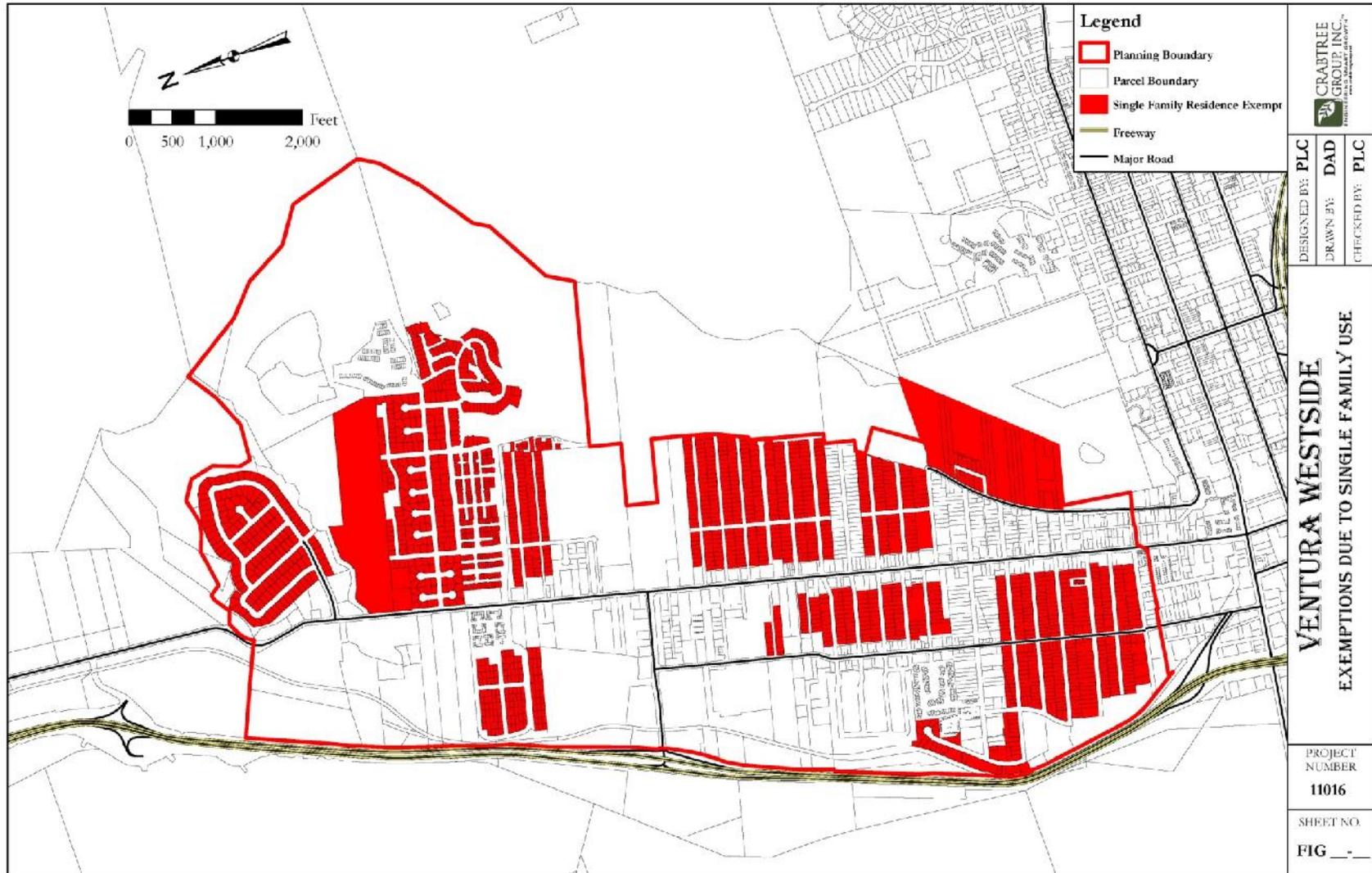
3. Identify Constraints – LUSTs are numerous



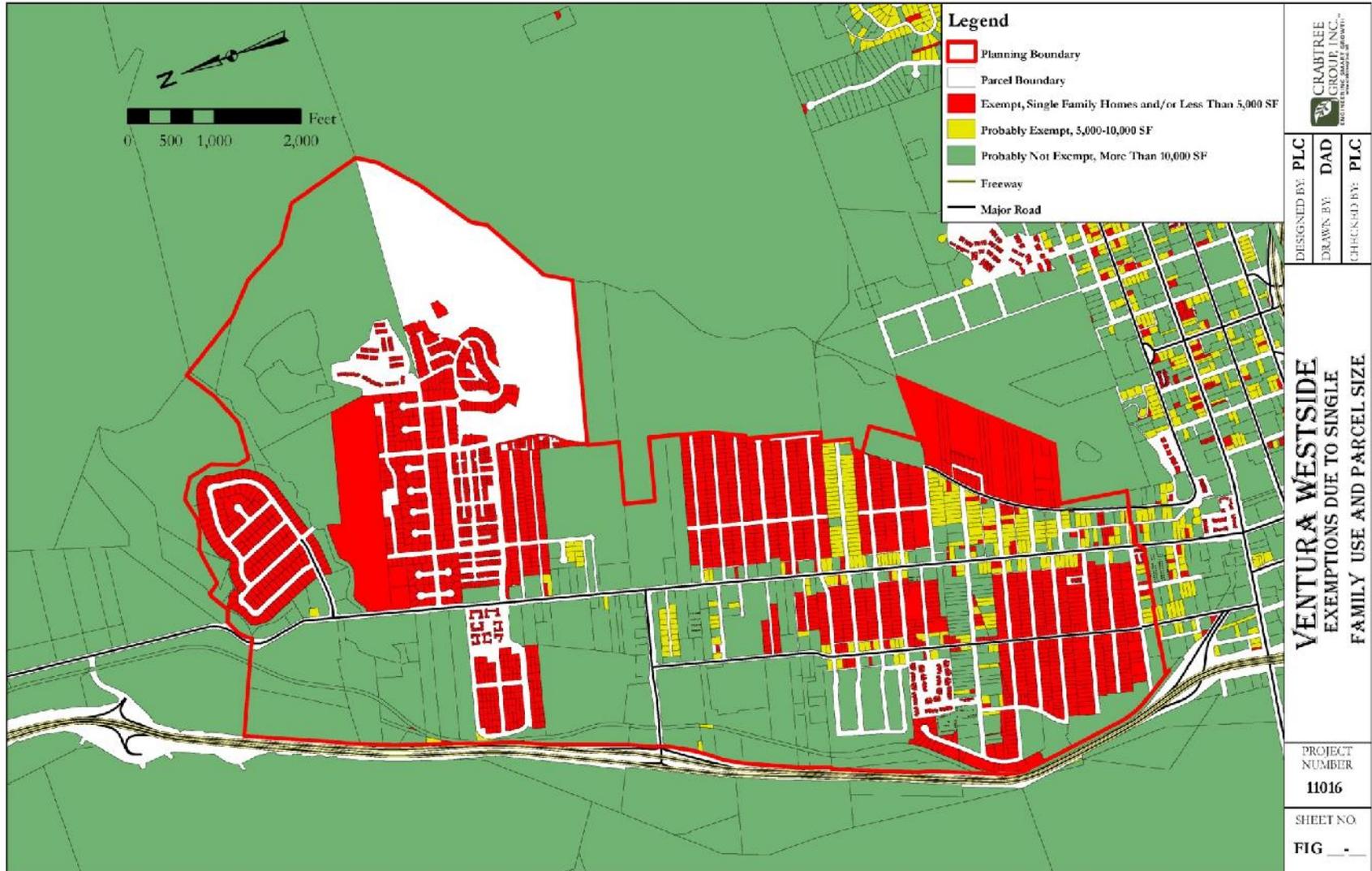
3. Identify Constraints – Lot Area Exemptions



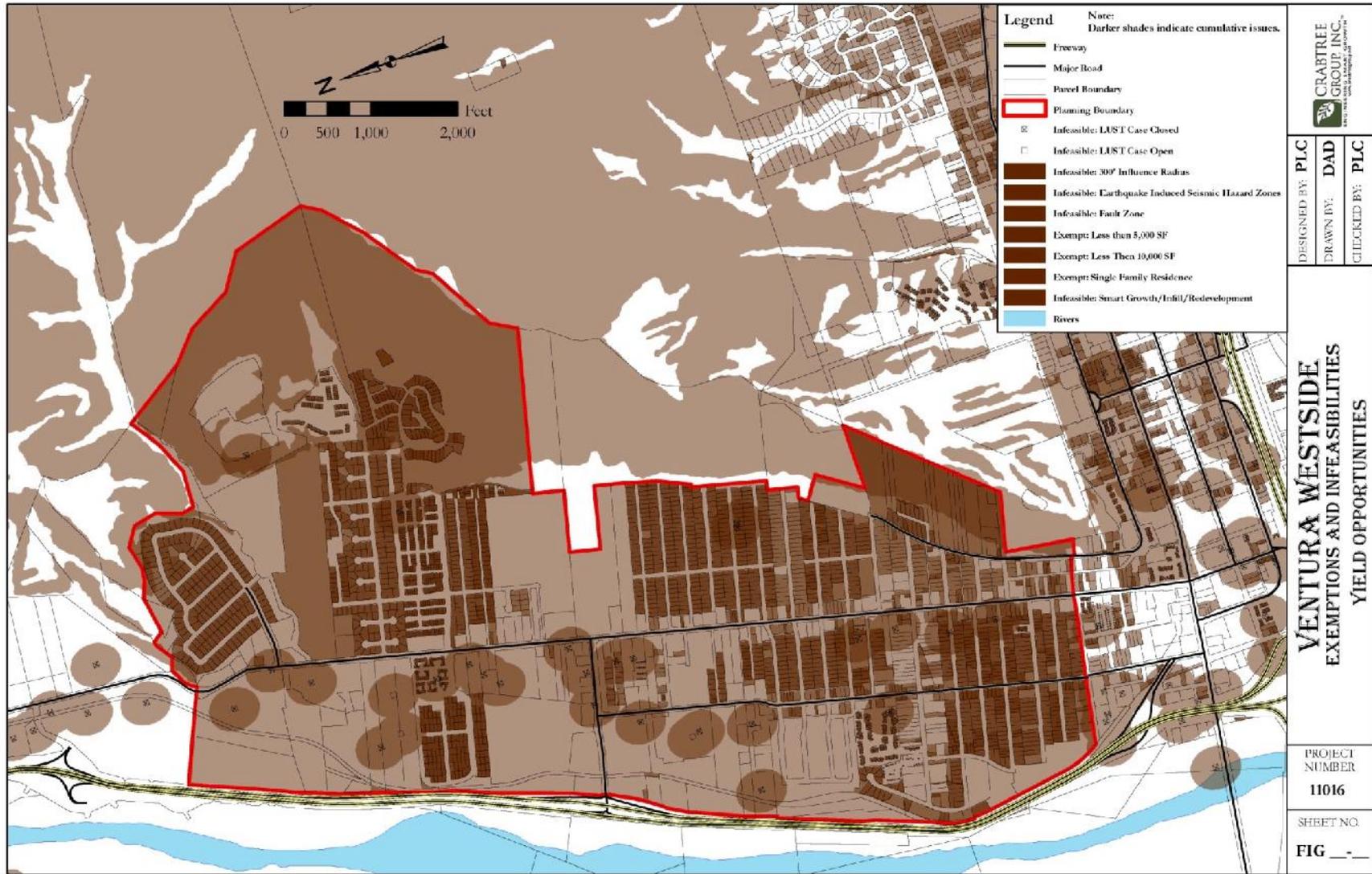
3. Identify Constraints – SF Land Use Exemptions



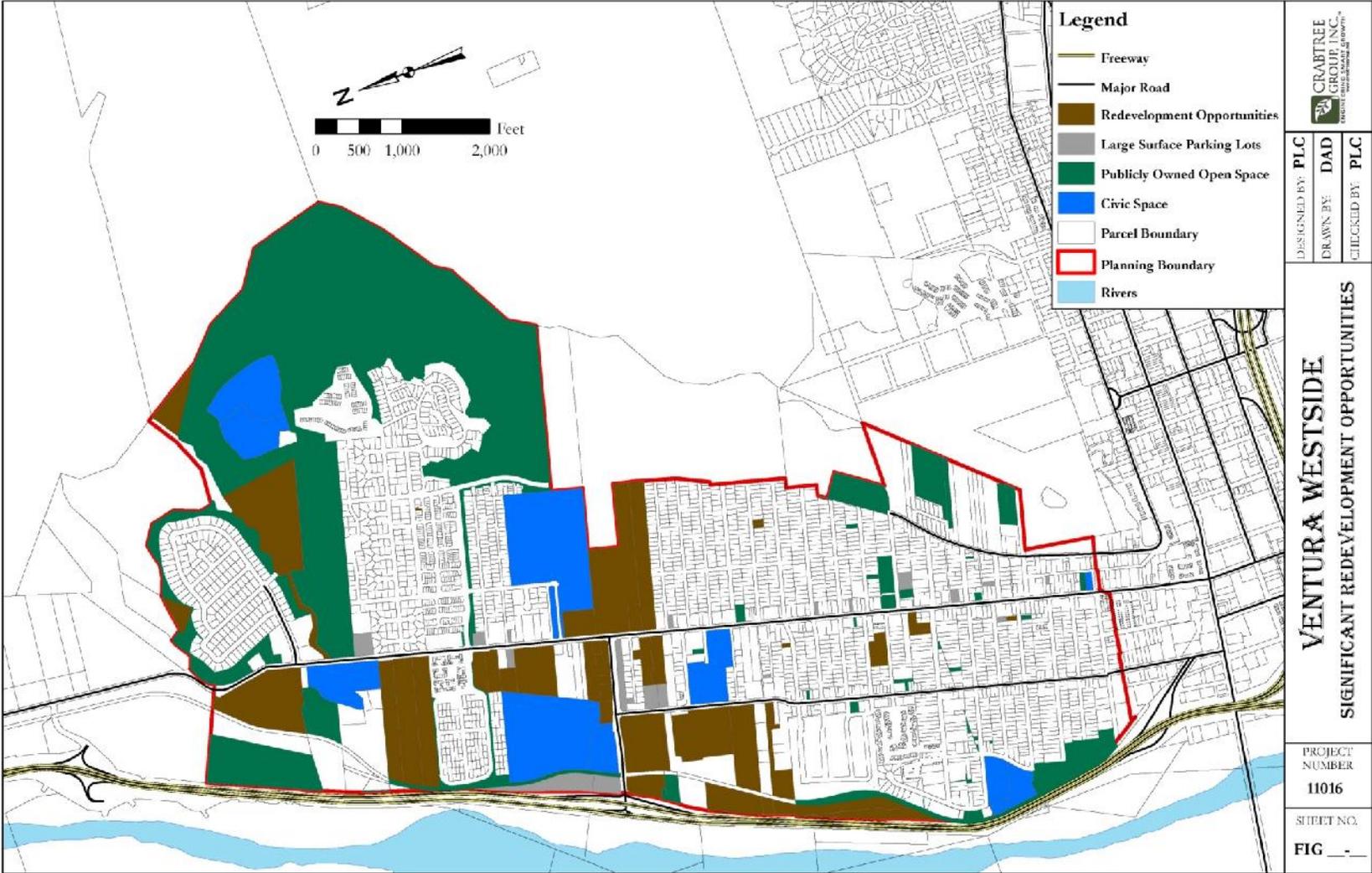
3. Identify Constraints – Combined Exemptions



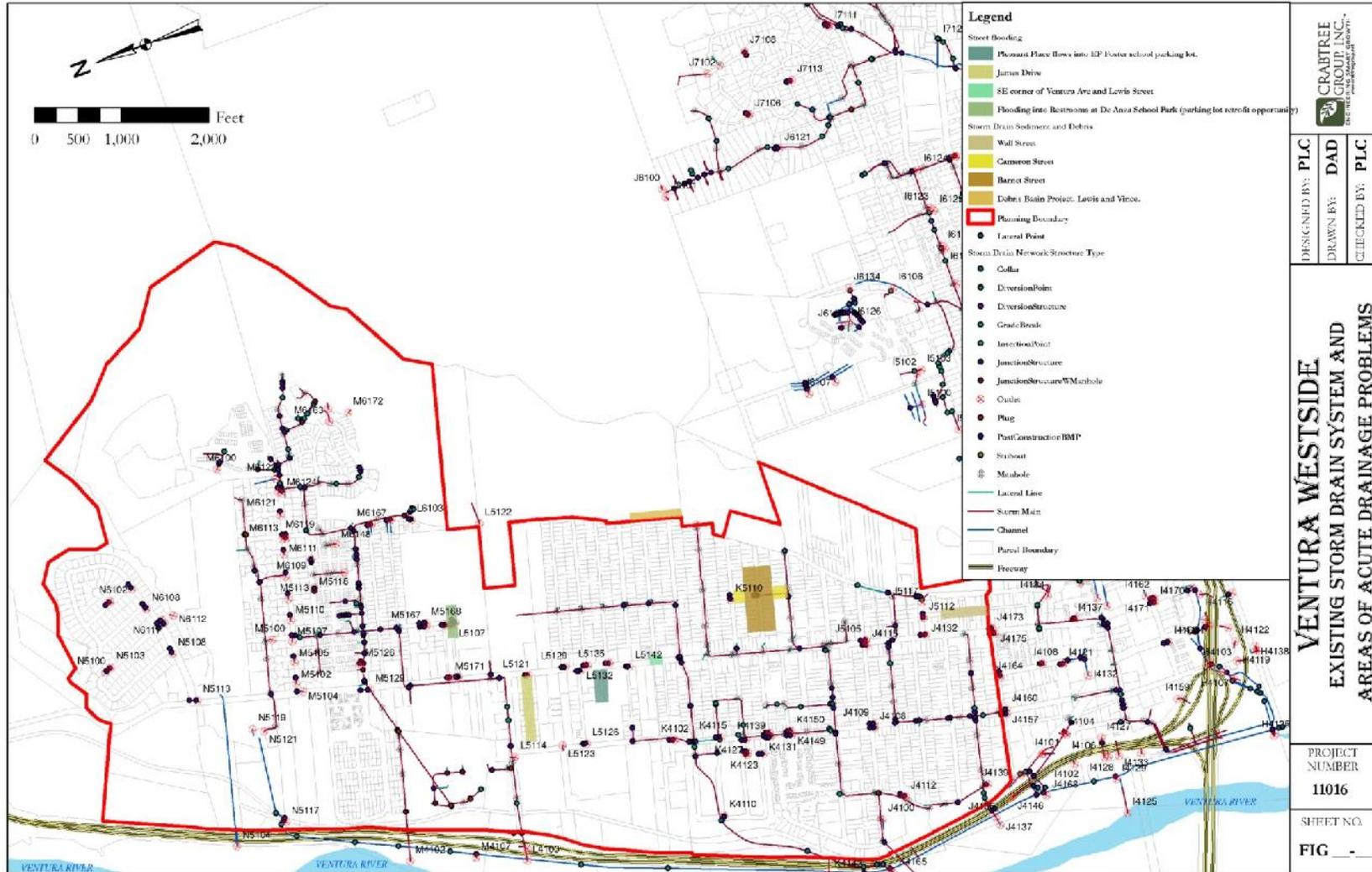
3 and 4. Identify Constraints and Opportunities



4. Identify Opportunities



3 and 4. Identify Constraints and Opportunities



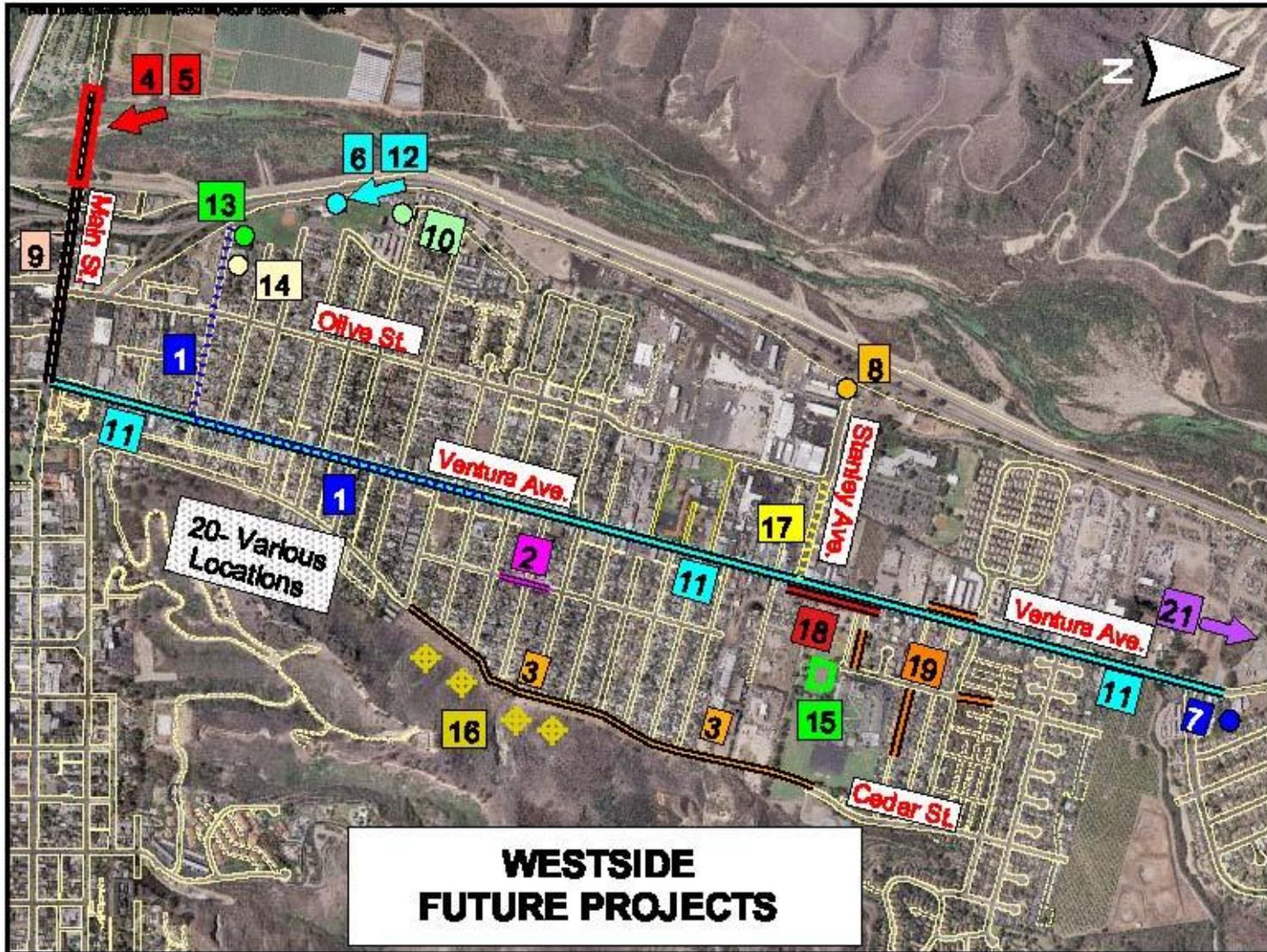
3 and 4. Identify Constraints and Opportunities

**Water Quality
Issue-
Algae**



Levee culvert (48" with flap valve) on River side opposite Park Row Ave

3 and 4. Identify Constraints and Opportunities



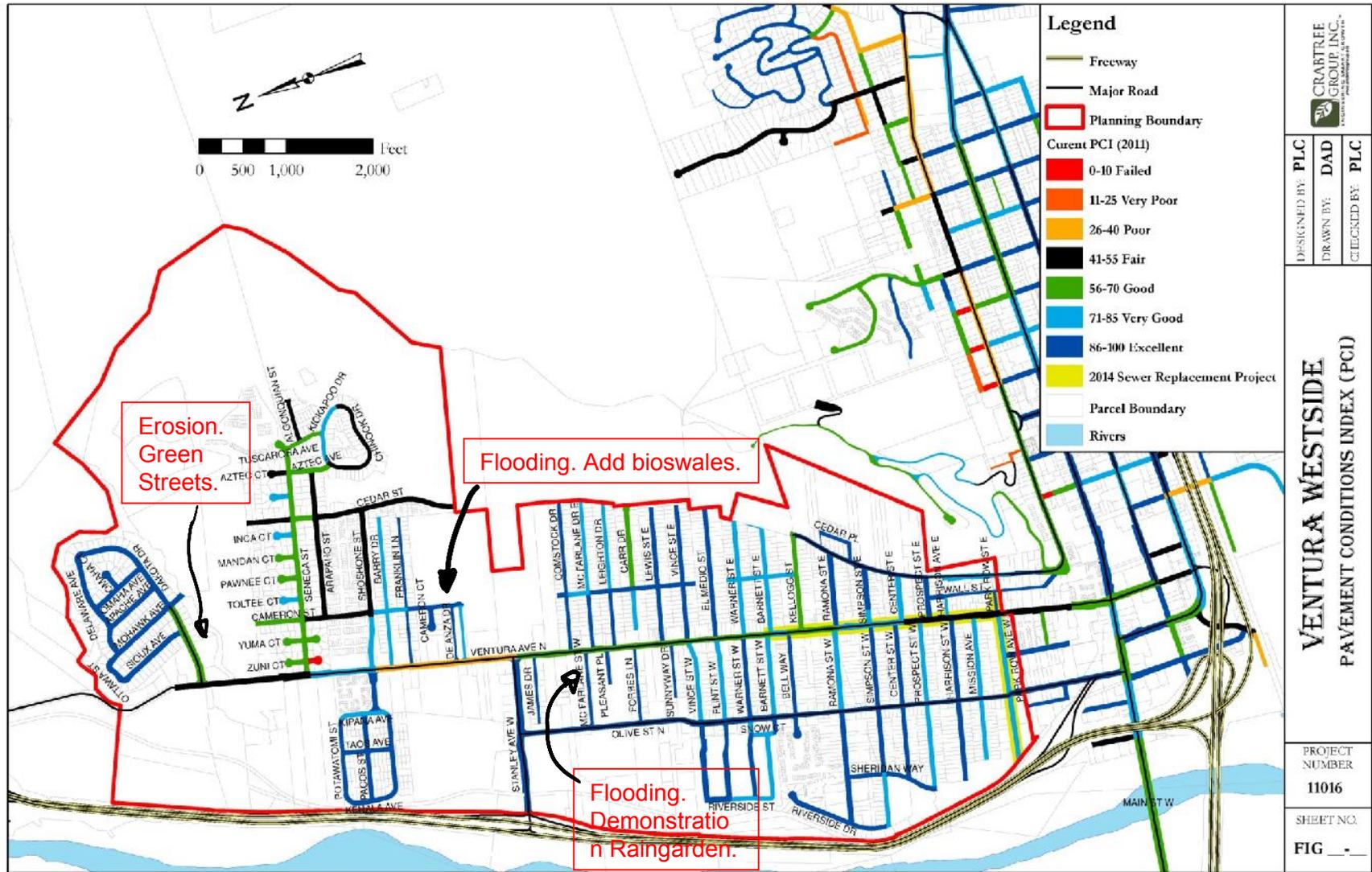
3 and 4. Identify Constraints and Opportunities

WESTSIDE PROJECTS

I.D. No.	Page No.	Project #	Project Name	Project Status	Project Cost	
					Estimate	Funded
1	2-8	96899	Avenue Area Sewer Replacement	Work Plan	\$1,700,000	\$1,700,000
2	6-18	75030	Cameron Street Extension	Pending	\$2,500,000	
3	6-20	75025	Cedar Street Extension	Potential	\$7,000,000	
4	7-30	72040	Main Street Bridge Protection	Pending	\$600,000	
5	7-32	62150	*Main Street Bridge Replacement	Potential	\$25,000,000	\$20,000,000
6	8-34	79126	Public Art - Westpark Improvements	Work Plan	\$65,000	
7	1-40	73035	Rehabilitate Gosnell Pump Station	Work Plan	\$1,470,000	\$1,470,000
8	6-72	66121	Stanely Avenue/HWY 33 Interchange	Potential	\$13,000,000	
9	6-94	91985	Street Resurfacing - Main St. Bridge to Ventura Avenue	Pending	\$630,000	\$400,000
10	6-144	75107	Ventura River Trail - Sheridan Way Bike Path Link	Work Plan	\$250,000	\$250,000
11	6-116	75056	Street Resurfacing - Ventura Avenue	Pending	\$2,800,000	
12	9-68	71074	Westpark Phased Improvements	Potential	\$25,000,000	
13	9-70	71048	Westpark Skateboard Park Improvements	Potential	\$400,000	
14	4-36	72100	Westside Child Care Center Building Removal	Work Plan	\$200,000	
15	9-72	92909	Westside Community Pool	Pending	\$10,500,000	\$880,000
16	3-46	62143	Westside Hillside Debris Basins	Pending	\$350,000	
17	3-26	70095	James Drive Storm Drains	Pending	\$250,000	
18	6-150	78011	Westside Street Improvements - Ventura Ave. Phase II	Work Plan	\$50,000	
18	6-152	78009	Westside Street Improvements - Ventura Ave. Phase III	Work Plan	\$50,000	
18	6-154	78010	Westside Street Improvements - Ventura Ave. Phase IV	Pending	\$50,000	
19	2-50	74042	Ventura Ave. and Franklin Ln. Area Sewer Repaclement	Potential	\$500,000	
20	2-76	74044	Westside Area Sewer Replacement	Potential	\$1,500,000	
21	7-54	77011	Public Safety Facility	Potential	\$6,000,000	
Total:					\$99,865,000	\$24,700,000
Unfunded Total:					\$75,165,000	

* Project would not move forward without 80% from Federal Transportation Safety Grant.

5. Implement Context-Sensitive Solutions



5. Implement Context-Sensitive Solutions

Lyon Park.
Flooding.

Add bioswales.



5. Implement Context-Sensitive Solutions



De Anza Bioswale

5. Implement Context-Sensitive Solutions

EP Foster.
Flooding.

Add
Demonstration
Ocean-Friendly
Raingarden.

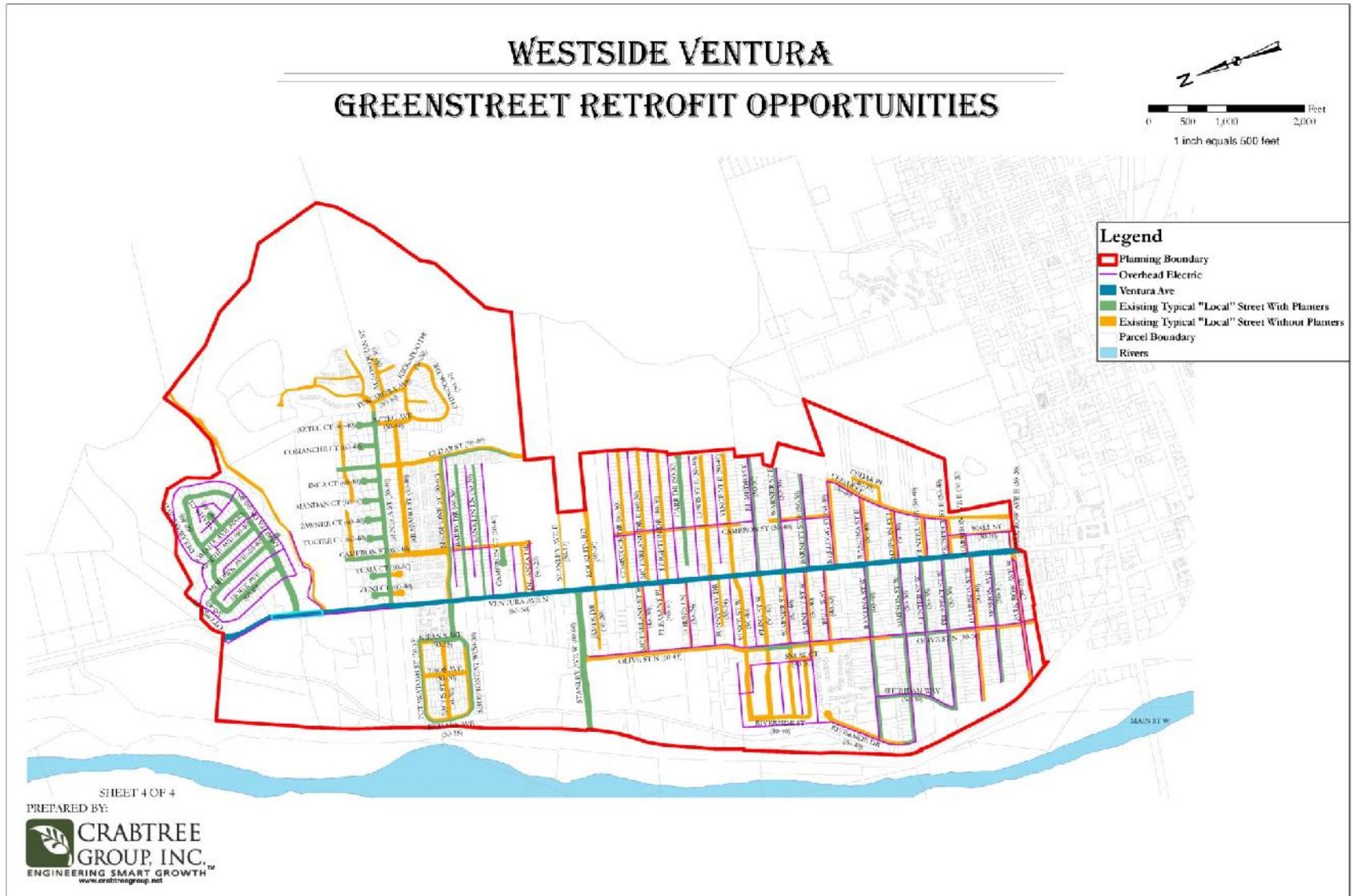


5. Implement Context-Sensitive Solutions



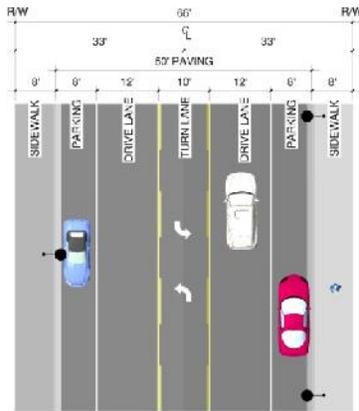
Ocean Friendly Gardens (Volunteer)

3 and 4. Identify Constraints and Opportunities

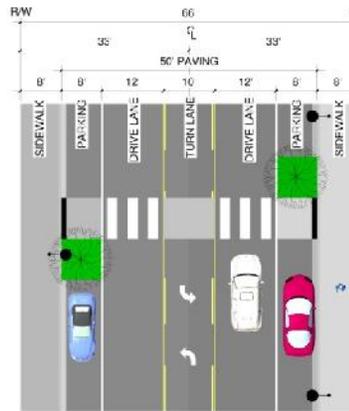


5. Implement Context-Sensitive Solutions

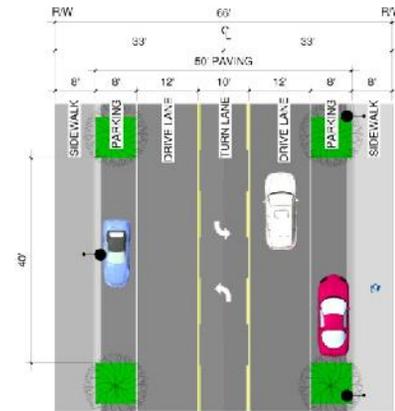
WESTSIDE VENTURA VENTURA AVE GREEN STREET RETROFIT PATTERN



1 PLAN VIEW
1" = 30'-0"
EXISTING STREET PATTERN (66-50)
NORTH VENTURA AVE



MID-BLOCK CROSSING (66-50)
ADD CONCAVE PLANTERS 8'X8'
ADD STREET TREES
EXTEND SIDEWALK 8'X8' WITH CHANNELGRADE
ADD REFUGE ISLAND 8'X10'



DESIRED STREET PATTERN (66-50)
ADD CONCAVE PLANTERS 8'X8'
ADD STREET TREES



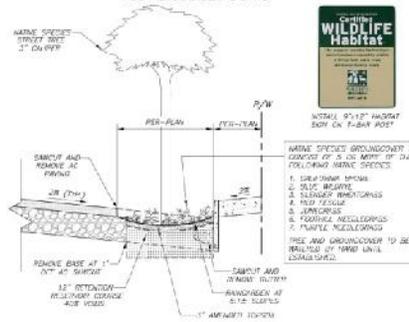
2 SECTION
1" = 10'-0"
EXISTING STREET PATTERN (66-50)
NORTH VENTURA AVE



MID-BLOCK CROSSING (66-50)
ADD CONCAVE PLANTERS 8'X8'
ADD STREET TREES
EXTEND SIDEWALK 8'X8' WITH CHANNELGRADE
ADD REFUGE ISLAND 8'X10'



DESIRED STREET PATTERN (66-50)
ADD CONCAVE PLANTERS 8'X8'
ADD STREET TREES



GREEN STREET RETROFIT TREE POCKET CUTOUT SECTION

SHEET 2 OF 4

PREPARED BY:

CRABTREE GROUP, INC.
 ENGINEERING SMART GROWTH™
 www.crabtreegroup.net

5. Implement Context-Sensitive Solutions



Simple Green Street

5. Implement Context-Sensitive Solutions

 Street Size Tally Westside Watershed Restoration Master Plan Project # 11016					
Street Size and Type (RW-Pavement Width)	Number of Streets with Planters	Length	Number of Streets Without Planters	Length	Ranking (Total Length)
(30-12)	0	0'	1	960'	12
(30-20)	1	1,700'	4	1,790'	7
(30-24)	0	0'	1	830'	13
(35-24)	0	0'	1	600'	14
(40-20)	0	0'	1	1,200'	11
(40-30)	1	1,700'	9	9,270'	4
(50-30)	10	13,300'	8	4,700'	2
(50-35)	4	4,800'	0	1,500'	6
(50-40)	2	1,390'	20	28,190'	1
(60-40)	20	14,550'	3	1,050'	3
(60-48)	1	800'	1	2,630'	8
(66-50)	0	0'	1	10,330'	5
(80-60)	1	1,760'	0	0'	10
(90-40)	1	1,800'	0	0'	9

12 Ac-Feet of Storage needed / 75k LF = 7cf/ft of street

5. Implement Context-Sensitive Solutions



Parking Lot Retrofits

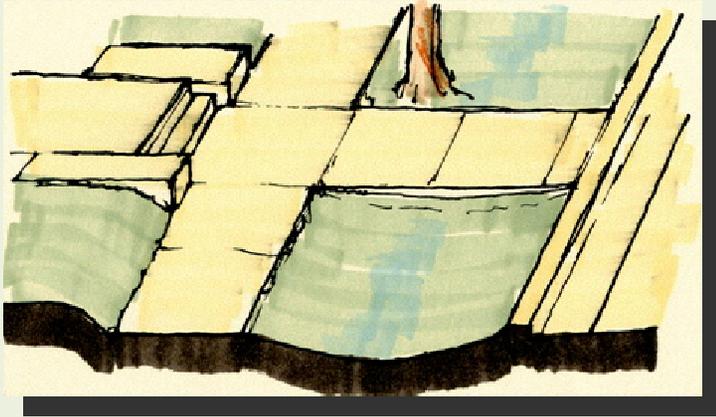
Measure of Success

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Restoration is accomplished through establishing performance benchmarks that consider the natural, cultural and scientific history of the region and the site; the form of the habitat within the rural-to-urban transect; survival, health and happiness thresholds for both humans and other species; realistic economic expectations; and pragmatic implementations.

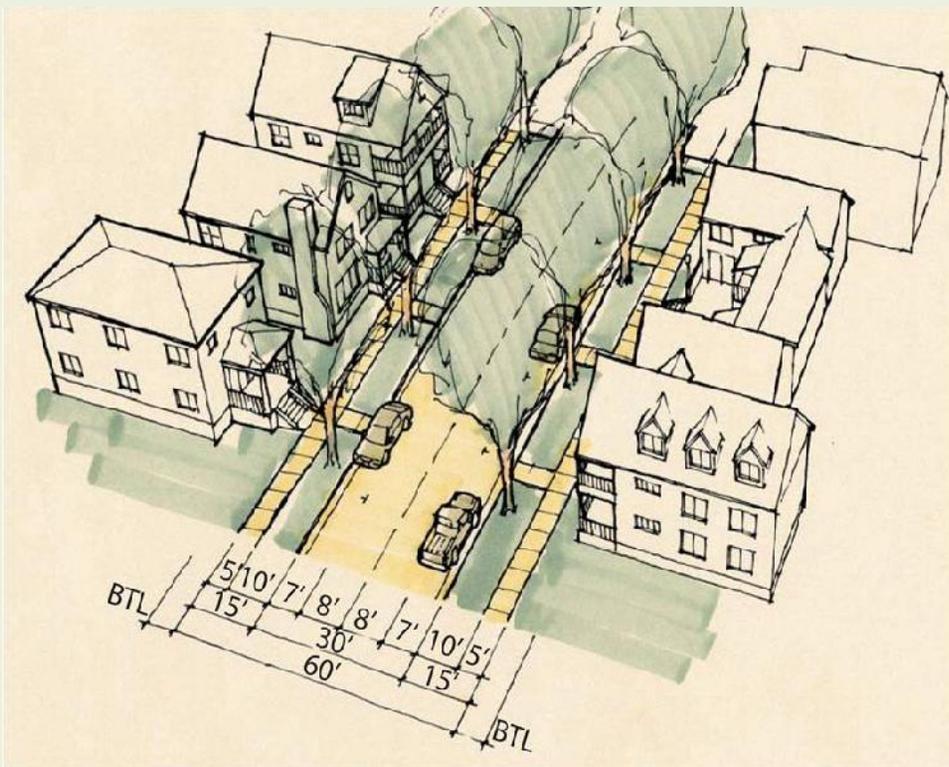
Measures of Success of Green Streets

1. More congenial – better urbanism and better nature. More livable, less heat sink, more habitat for birds and critters.
2. Less paving, more nature.
3. Complies with MS4 off-site requirements by providing storage volume, while also providing filtering. Will help the Algal TMDL.
4. Is low-tech and not expensive. Can be done for the same or less than conventional street practices.



Feedback?

Questions?



pcrabtree@crabtreegroup.net