

The Green Evolution

Conservation & Urbanism in Scenario Planning

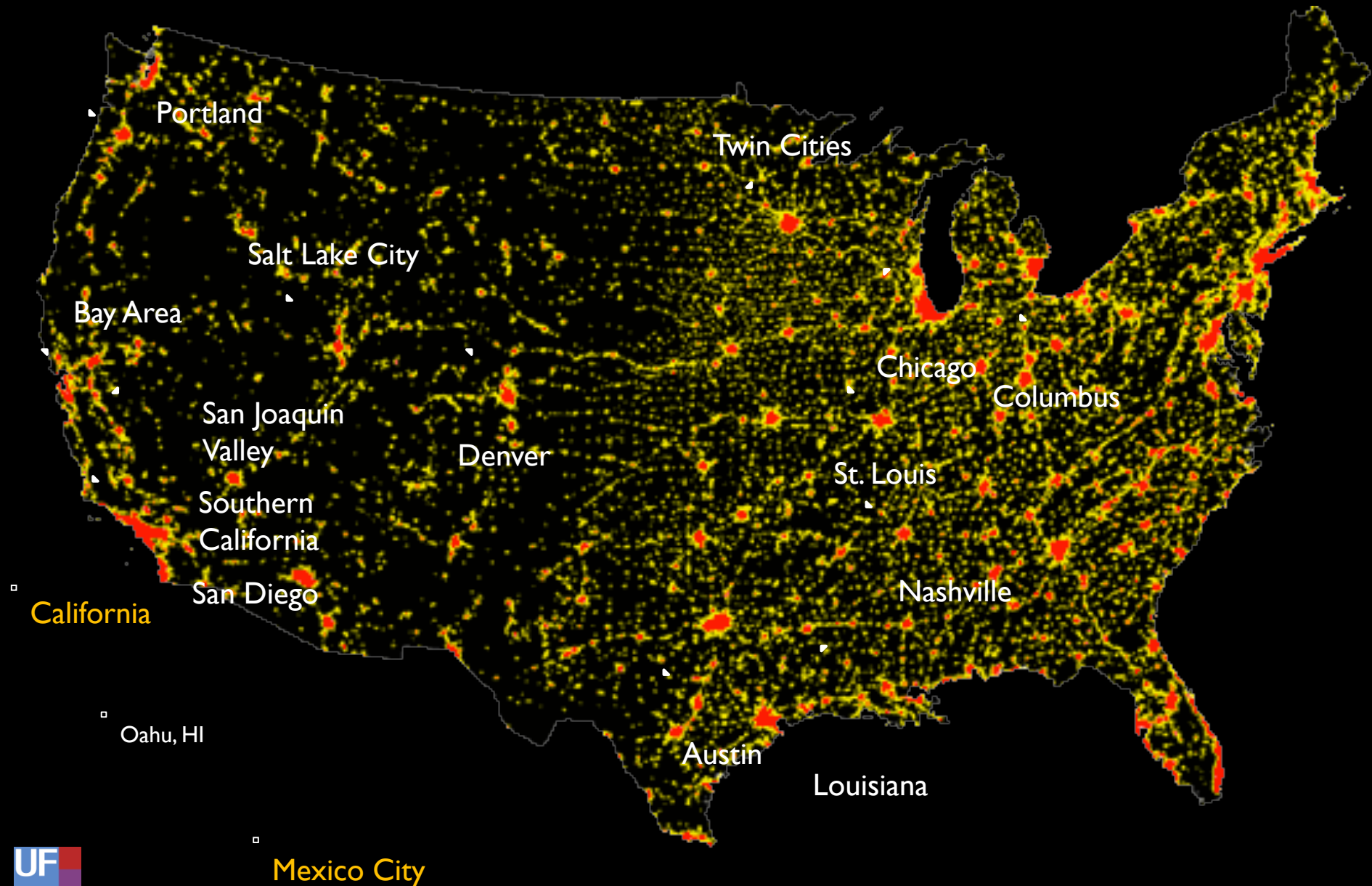


New Partners for Smart Growth – Baltimore 2015
31 January 2015

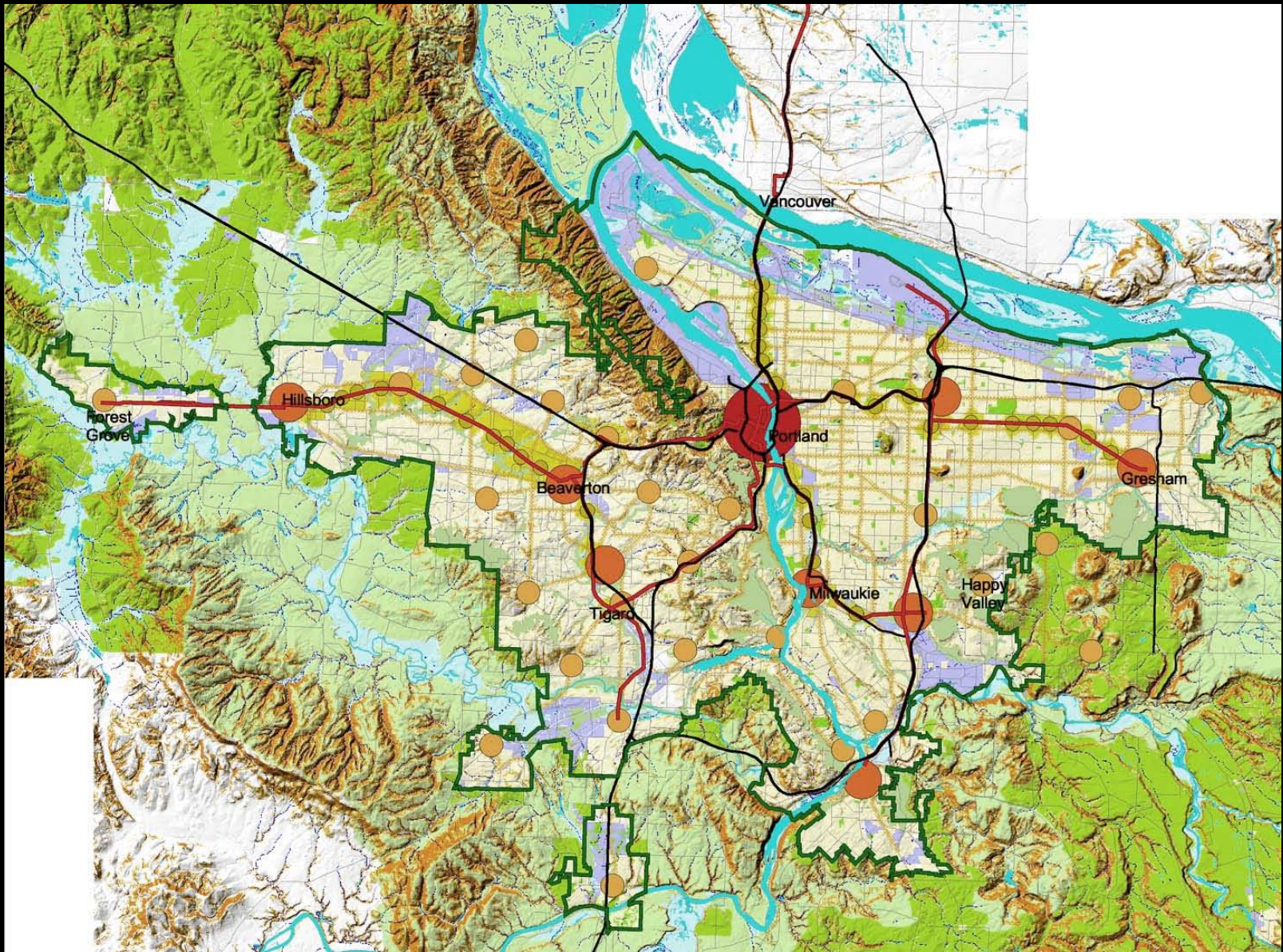
CALTHORPE ANALYTICS

Joe DiStefano

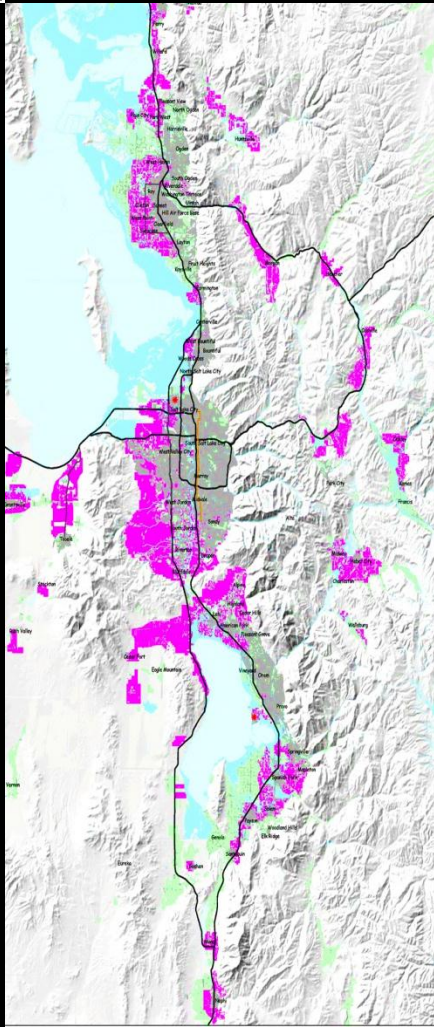
Scenario Planning Across North America



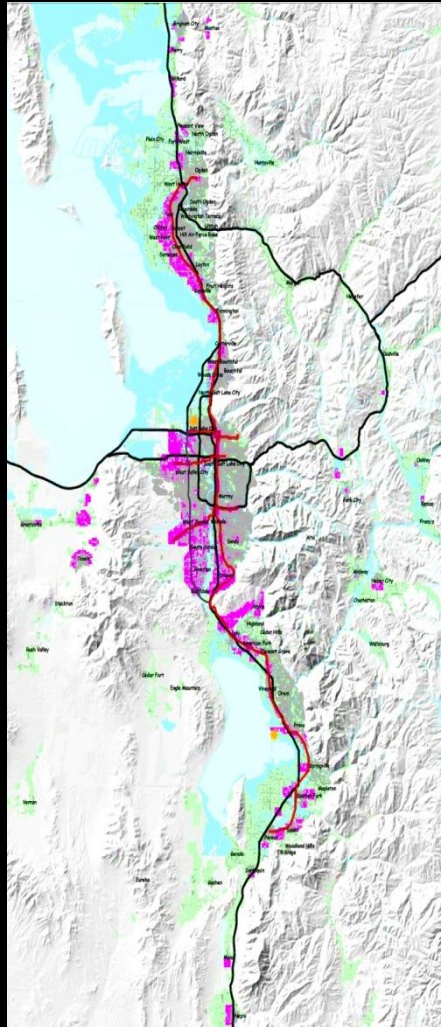
1993: Portland Metro 2040



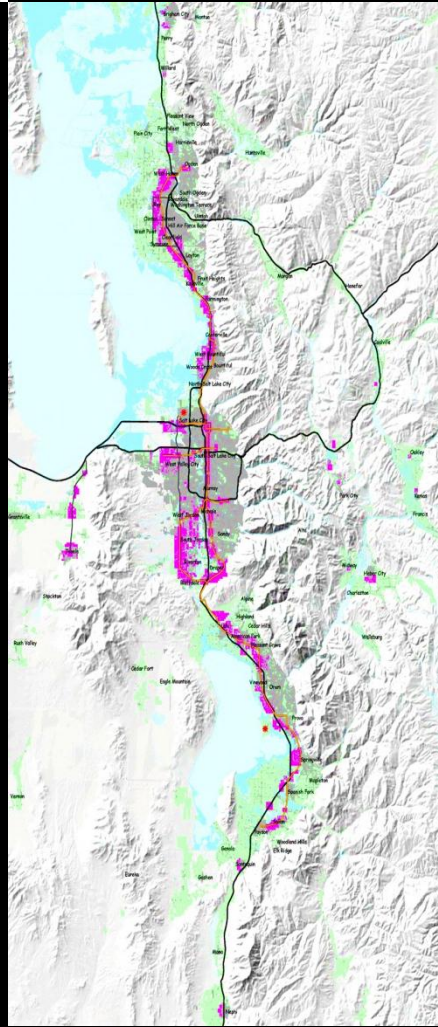
1999: Envision Utah



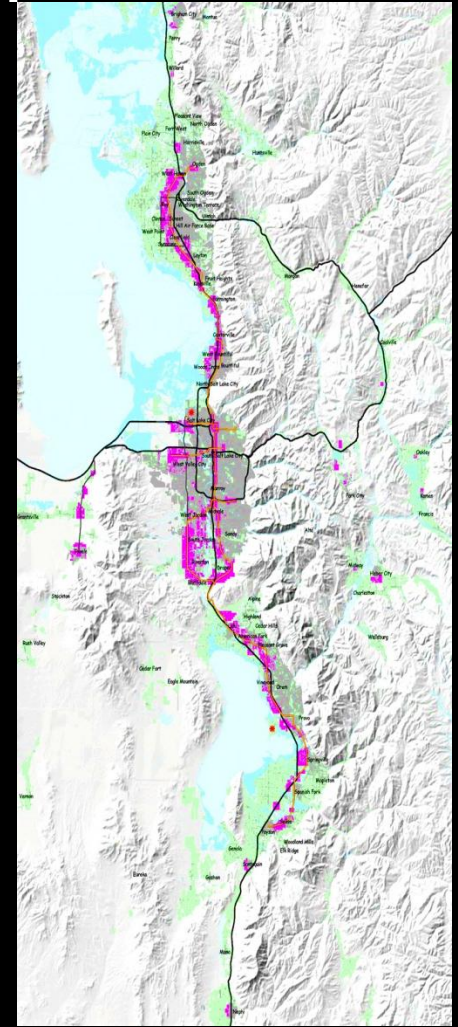
Scenario A



Scenario B



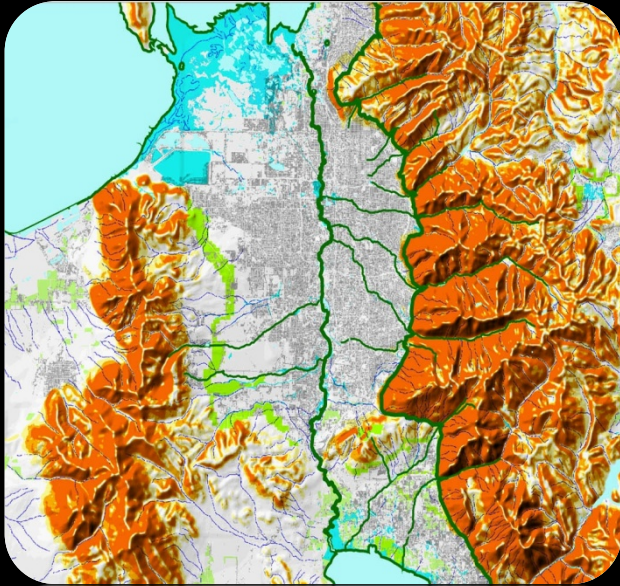
Scenario C



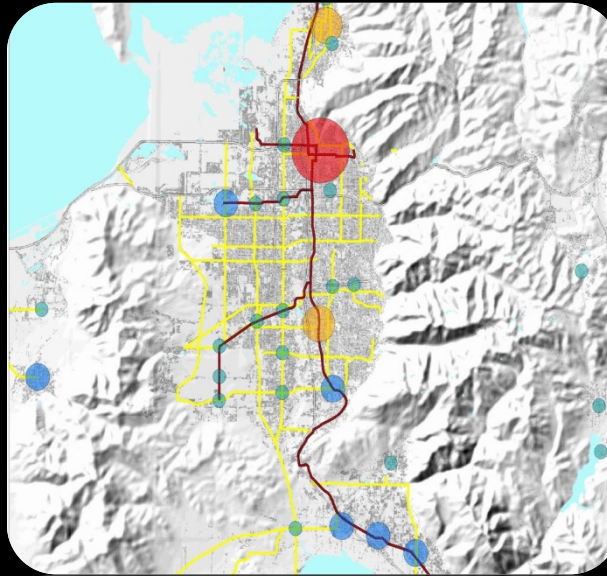
Scenario D

1999: Envision Utah

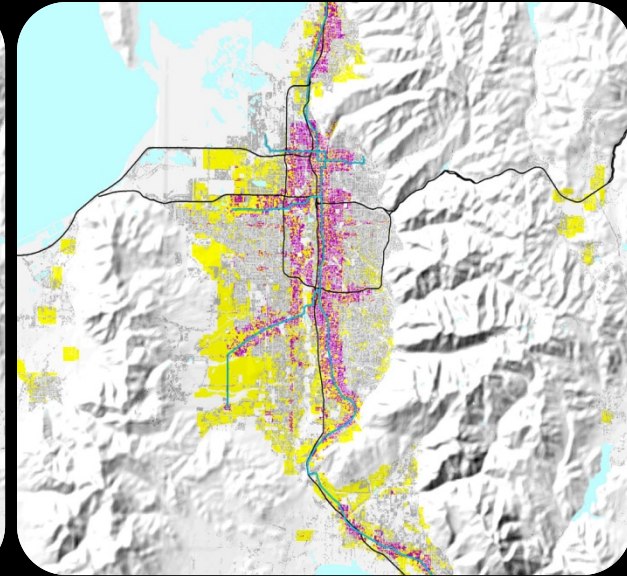
Quality Growth Strategy



Open Space &
Constrained Land

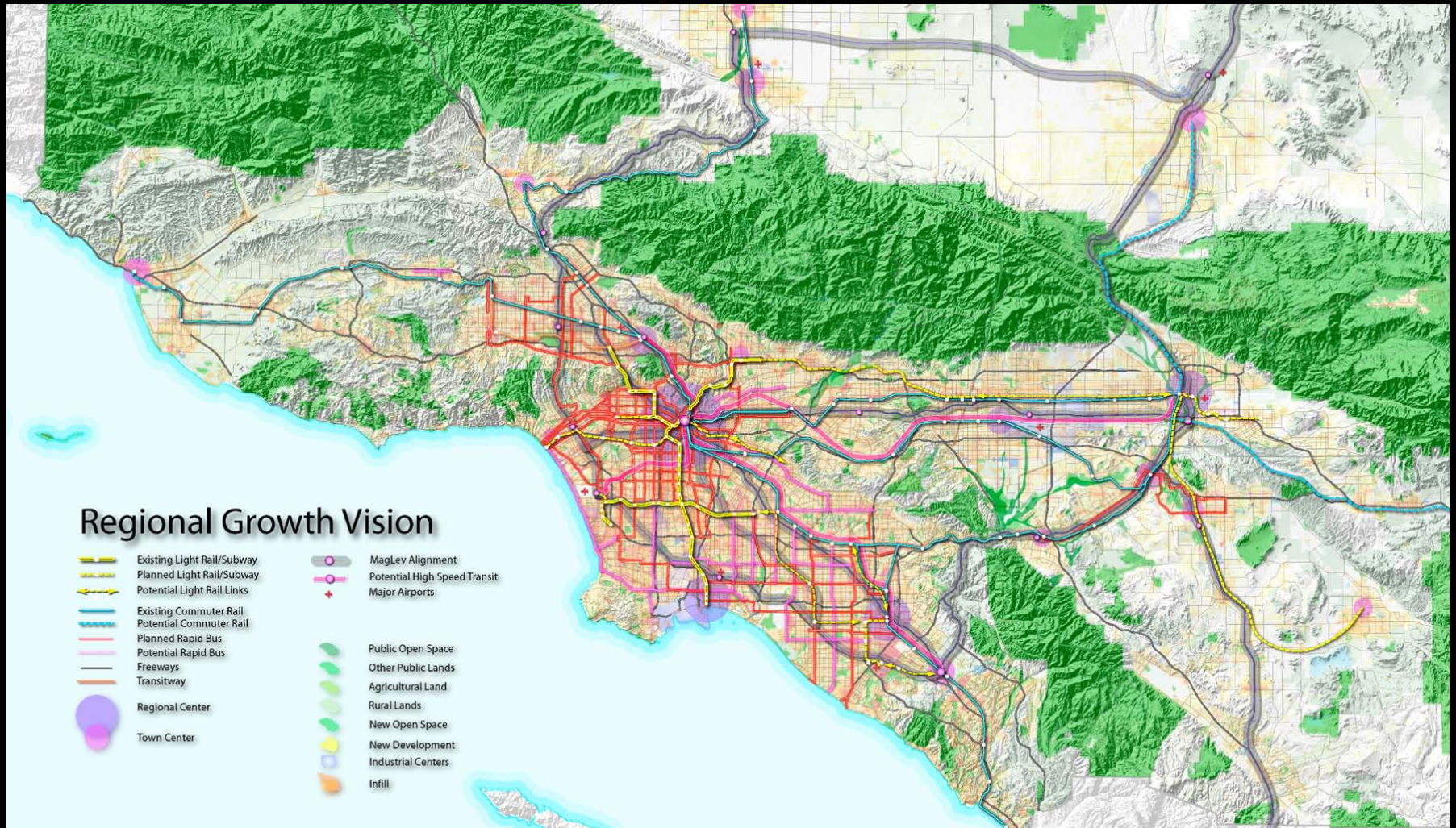


Centers &
Corridors

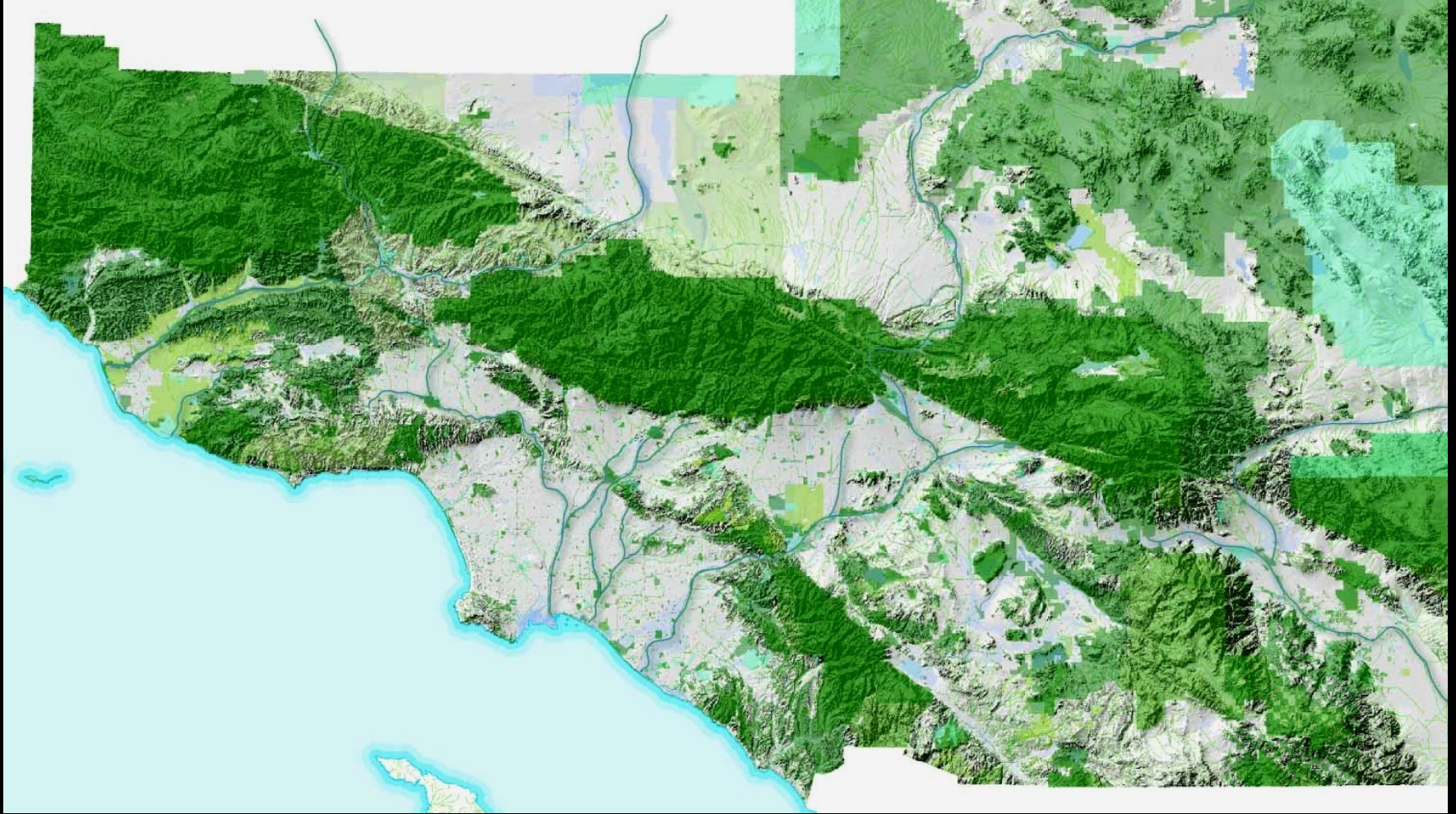


New Growth &
Redevelopment

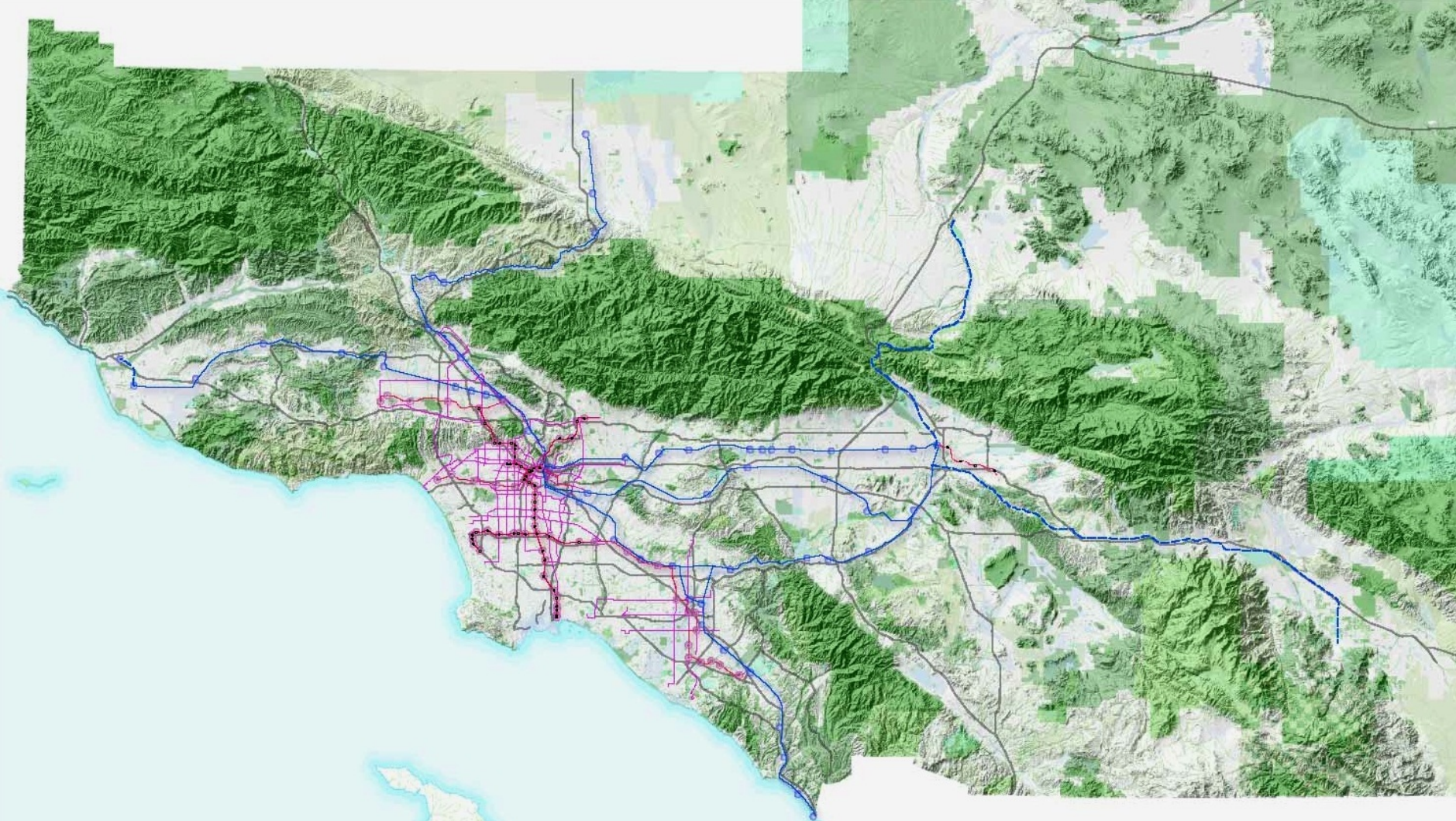
2003: Southern California Regional Vision



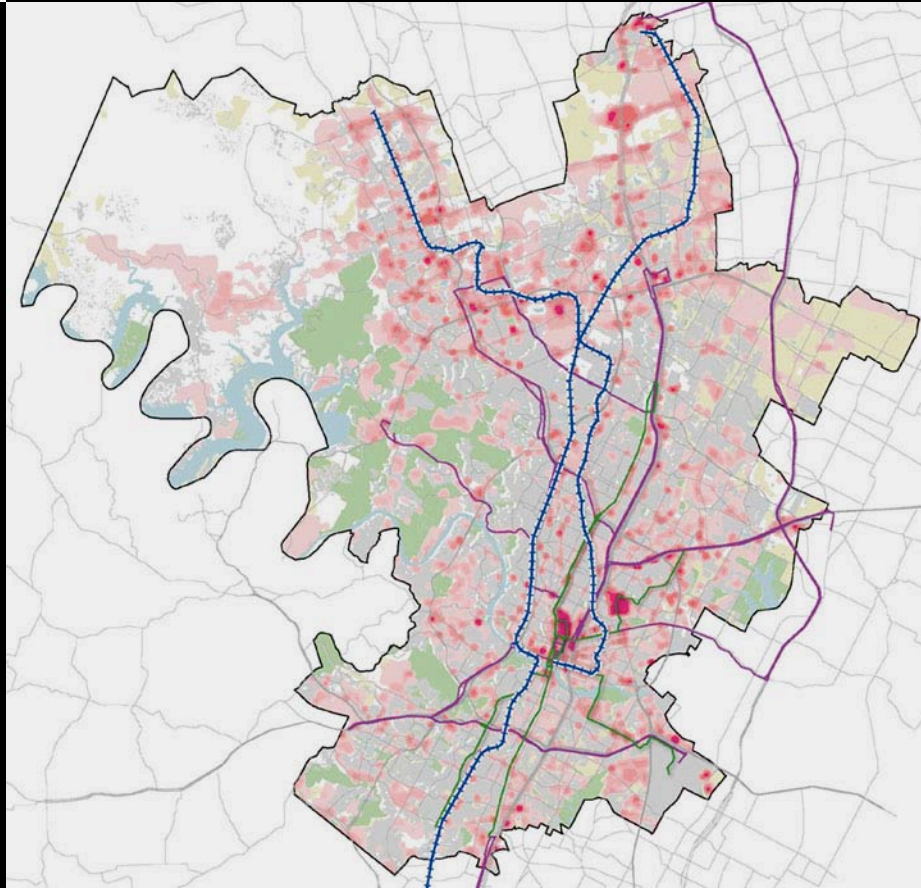
2003: Southern California Regional Vision



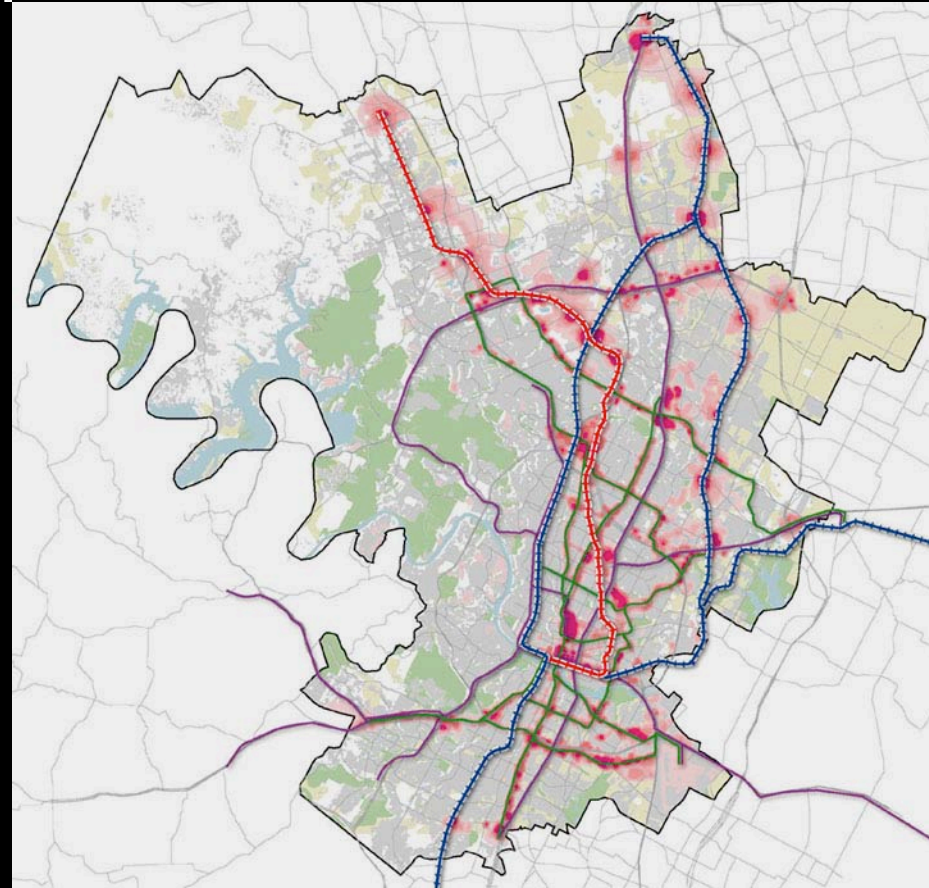
2003: Southern California Regional Vision



2004: Envision Central Texas



Base Case Scenario



Vision Scenario

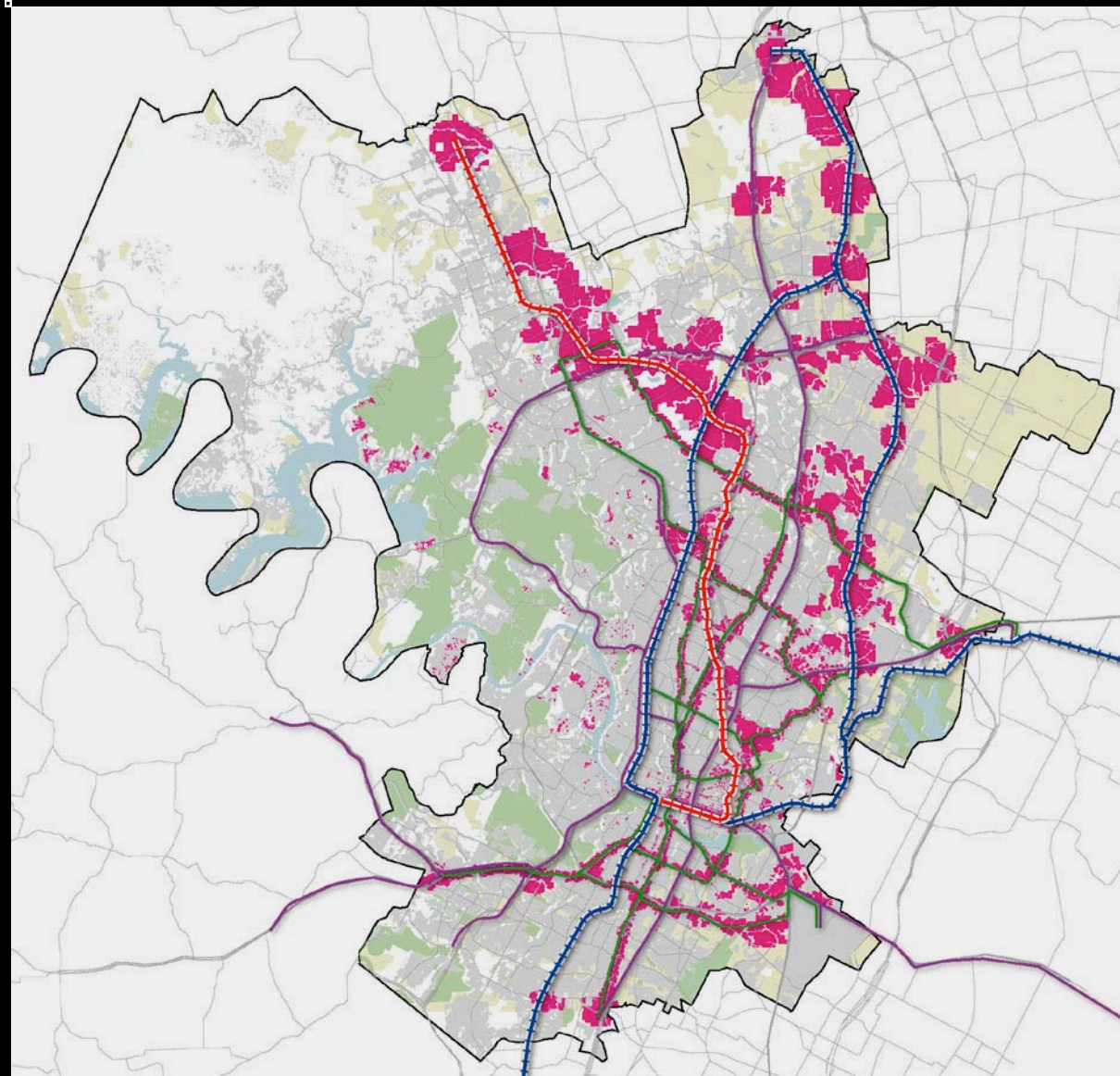
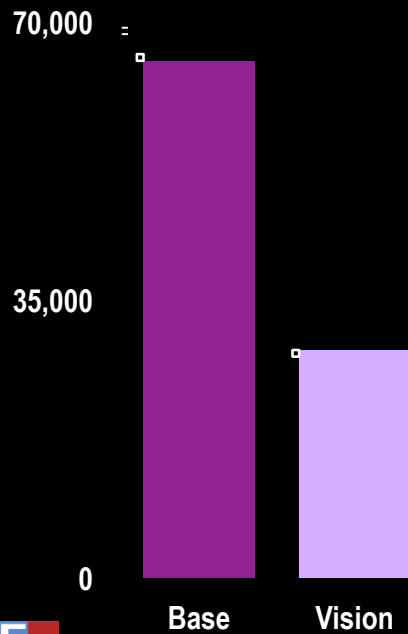
2004: Envision Central Texas

Base Case 2030

65,000 Acres

Vision 2030

28,600 Acres



2004: Envision Central Texas

Base Case 2030

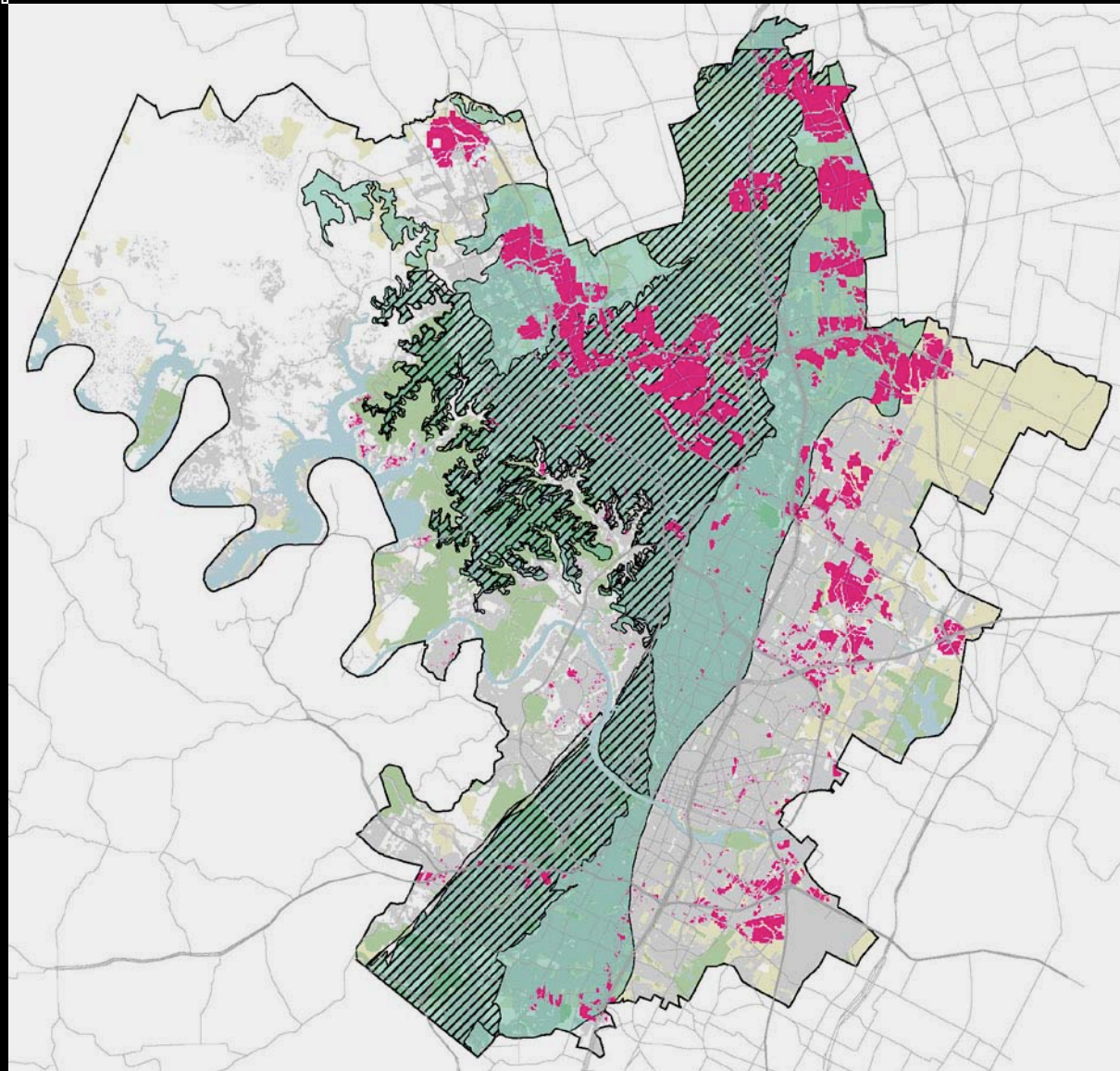
Aquifer: 34,400 Acres

Recharge: 18,500 Acres

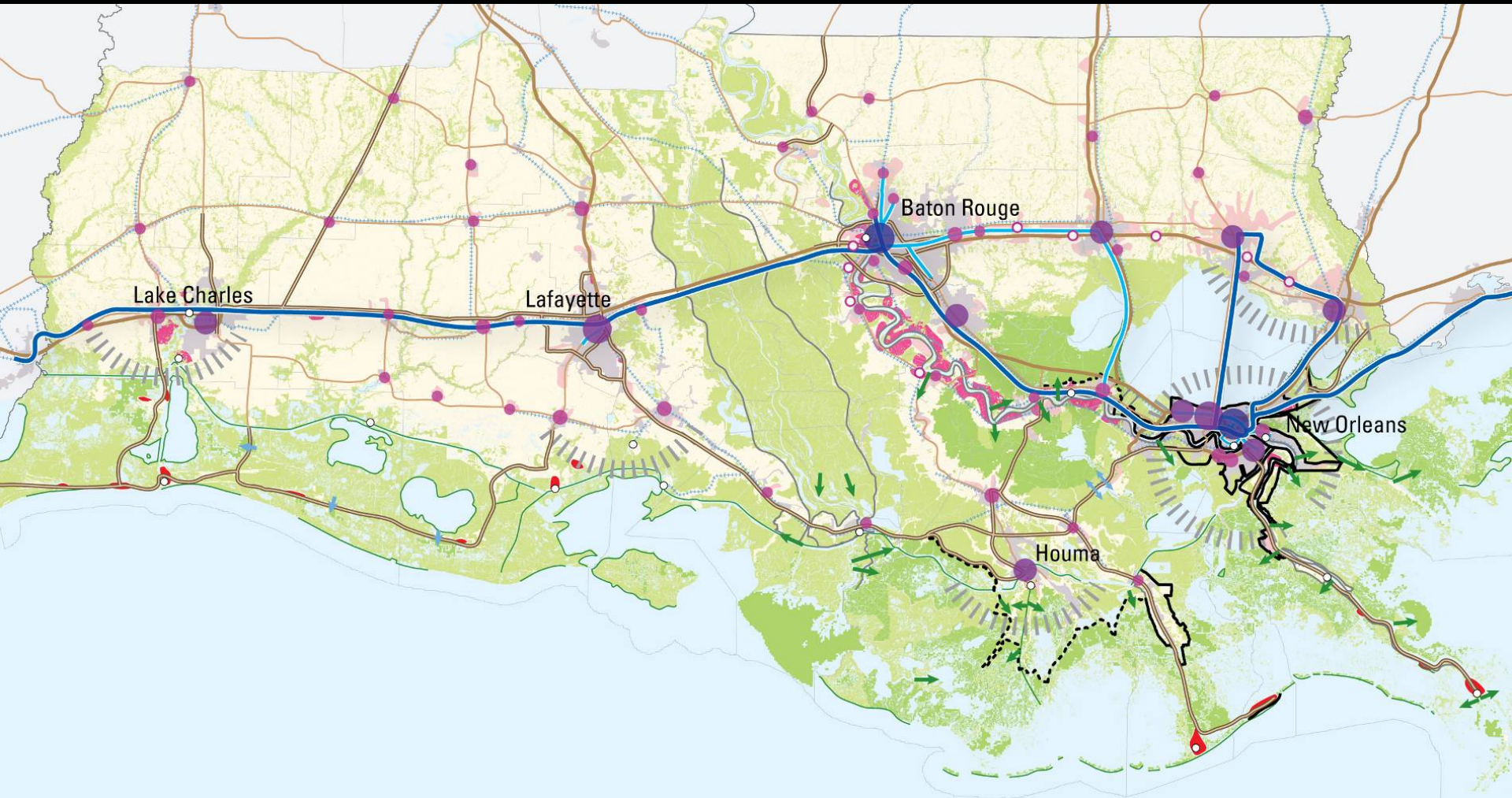
Vision 2030

Aquifer: 18,500 Acres

Recharge: 8,500 Acres

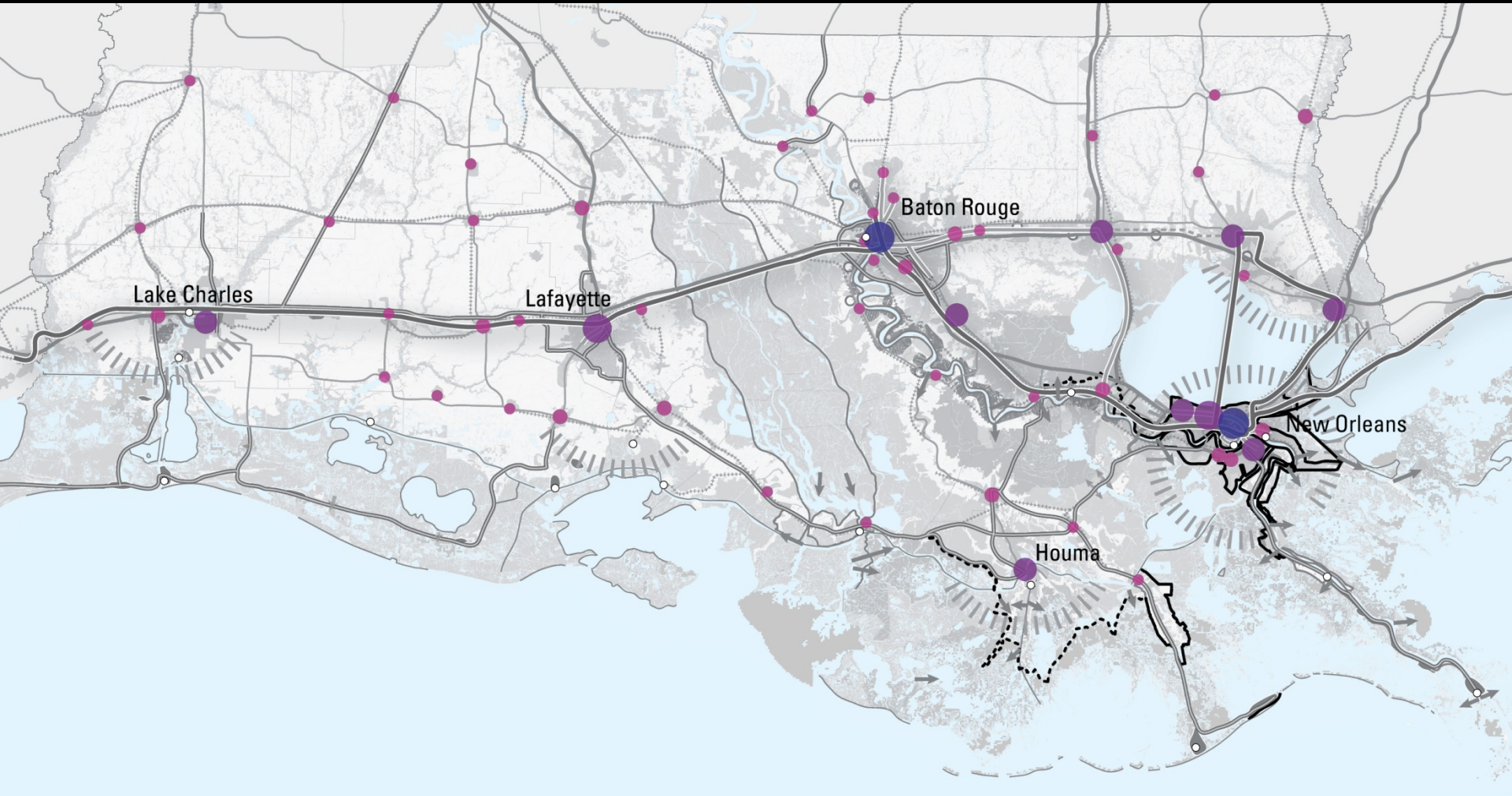


2007: Louisiana Speaks



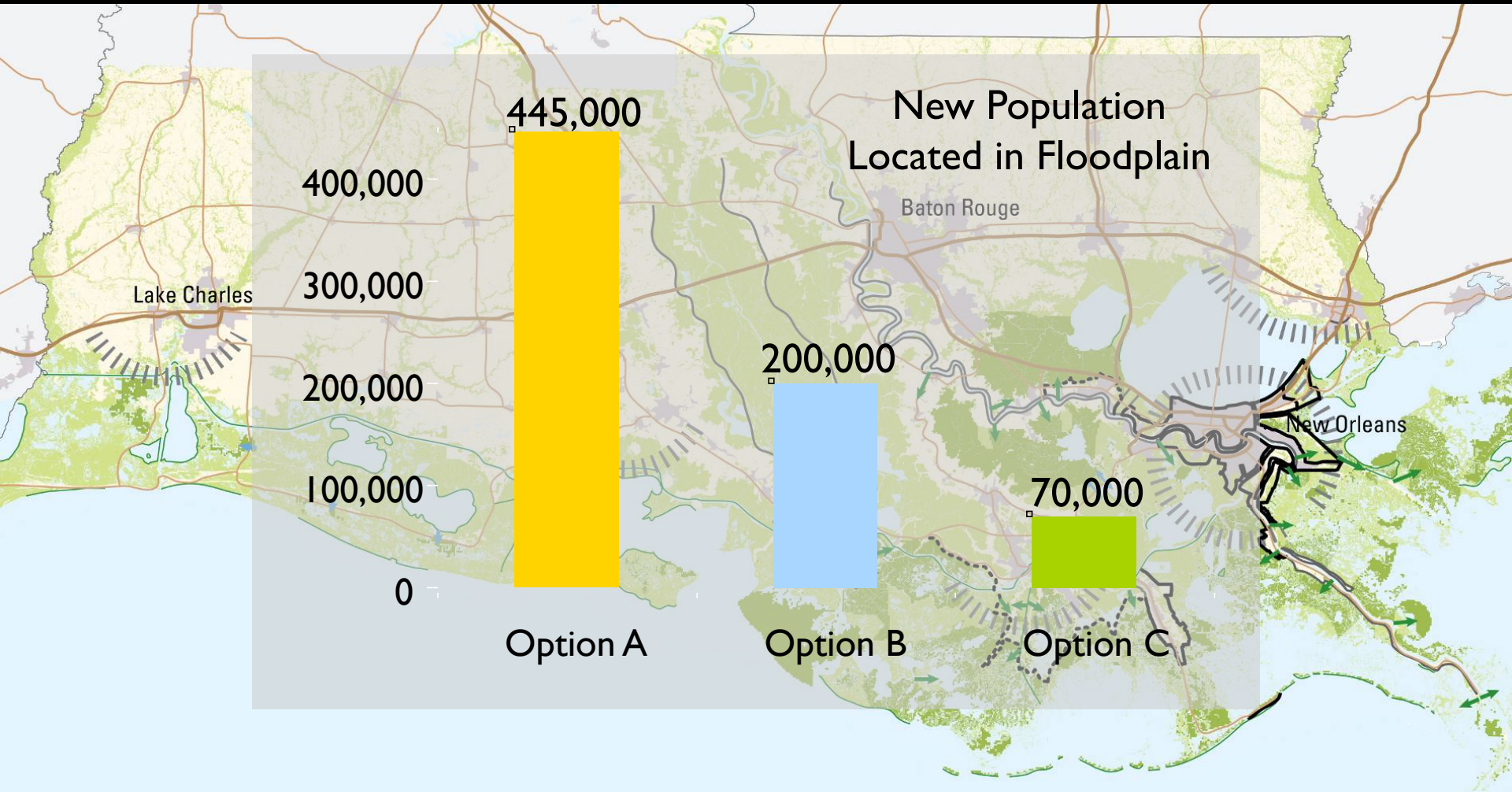
2007: Louisiana Speaks

Focus on Centers Reinvestment

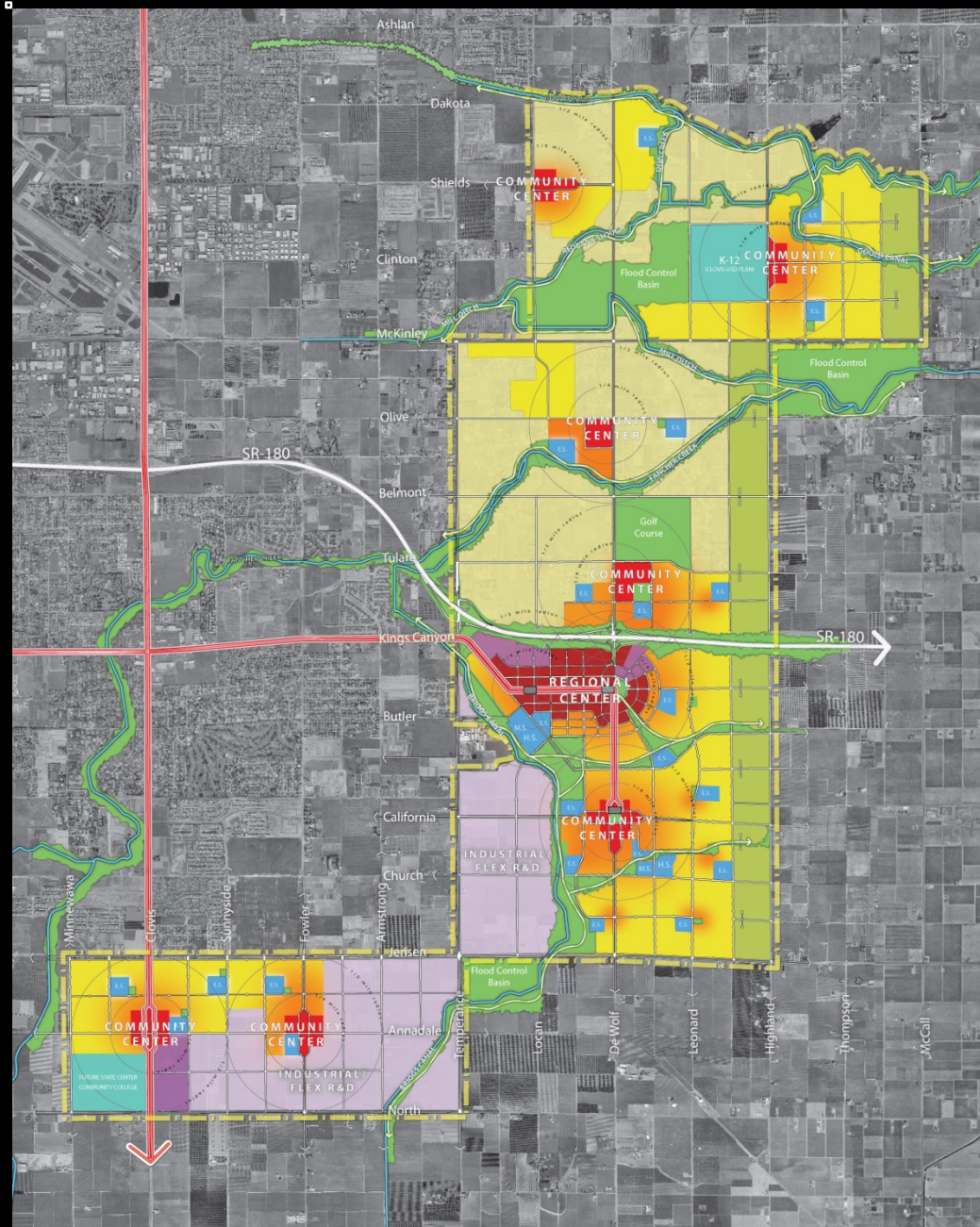


2007: Louisiana Speaks

Foundation of Protection & Restoration



2008 Fresno Southeast Growth Area



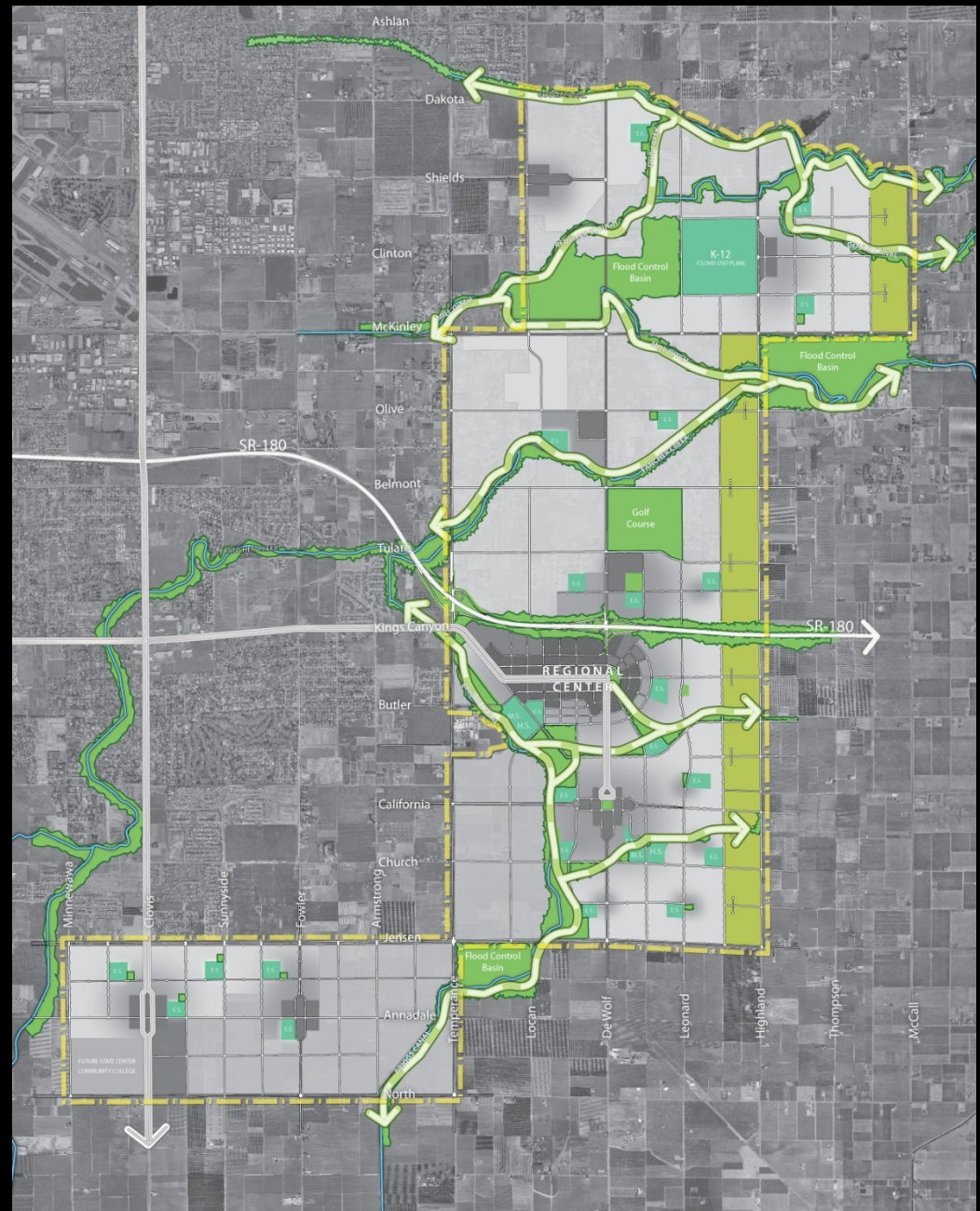
Open Space

Green Corridors
& Neighborhood
Parks

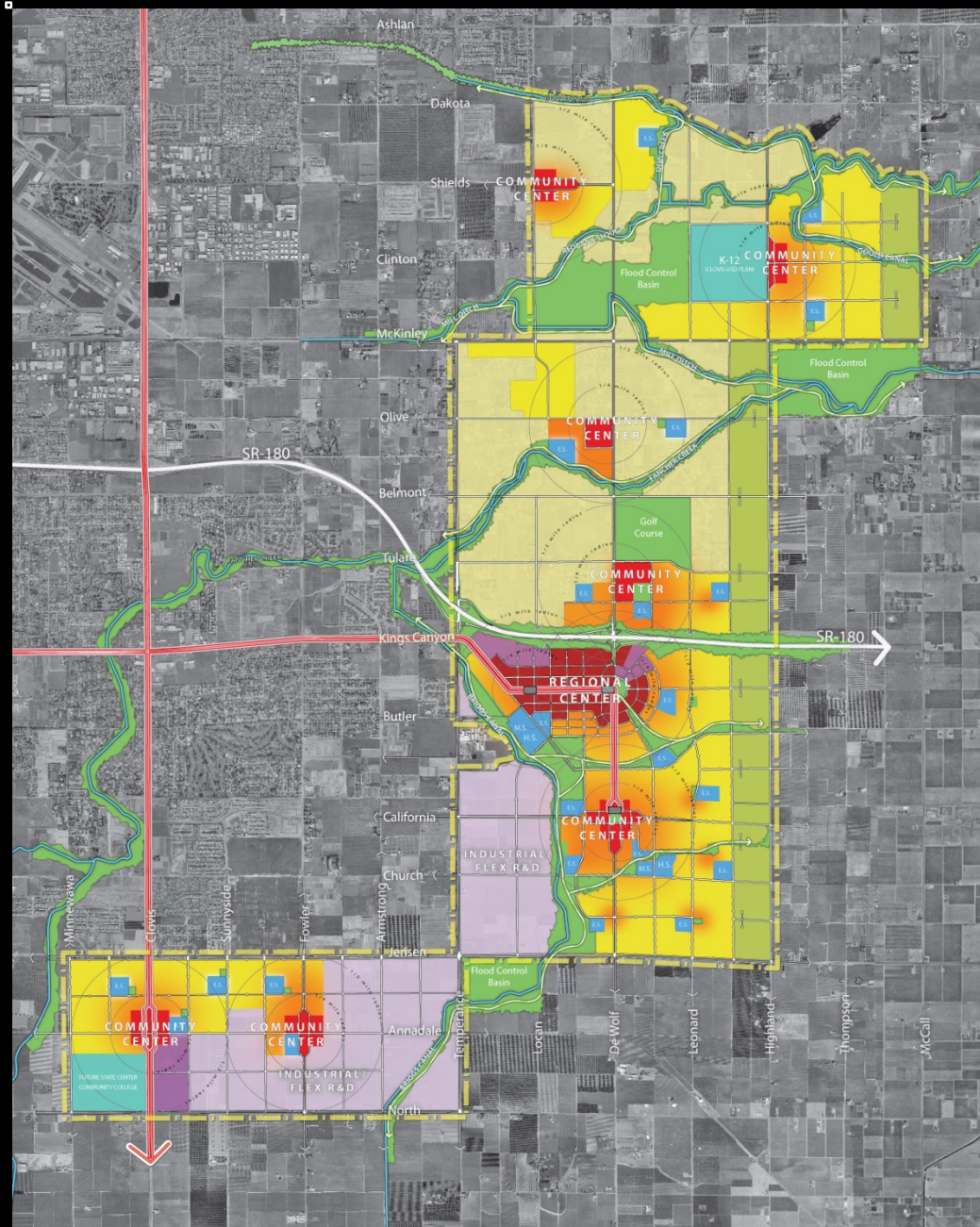
Schools

Rural Cluster

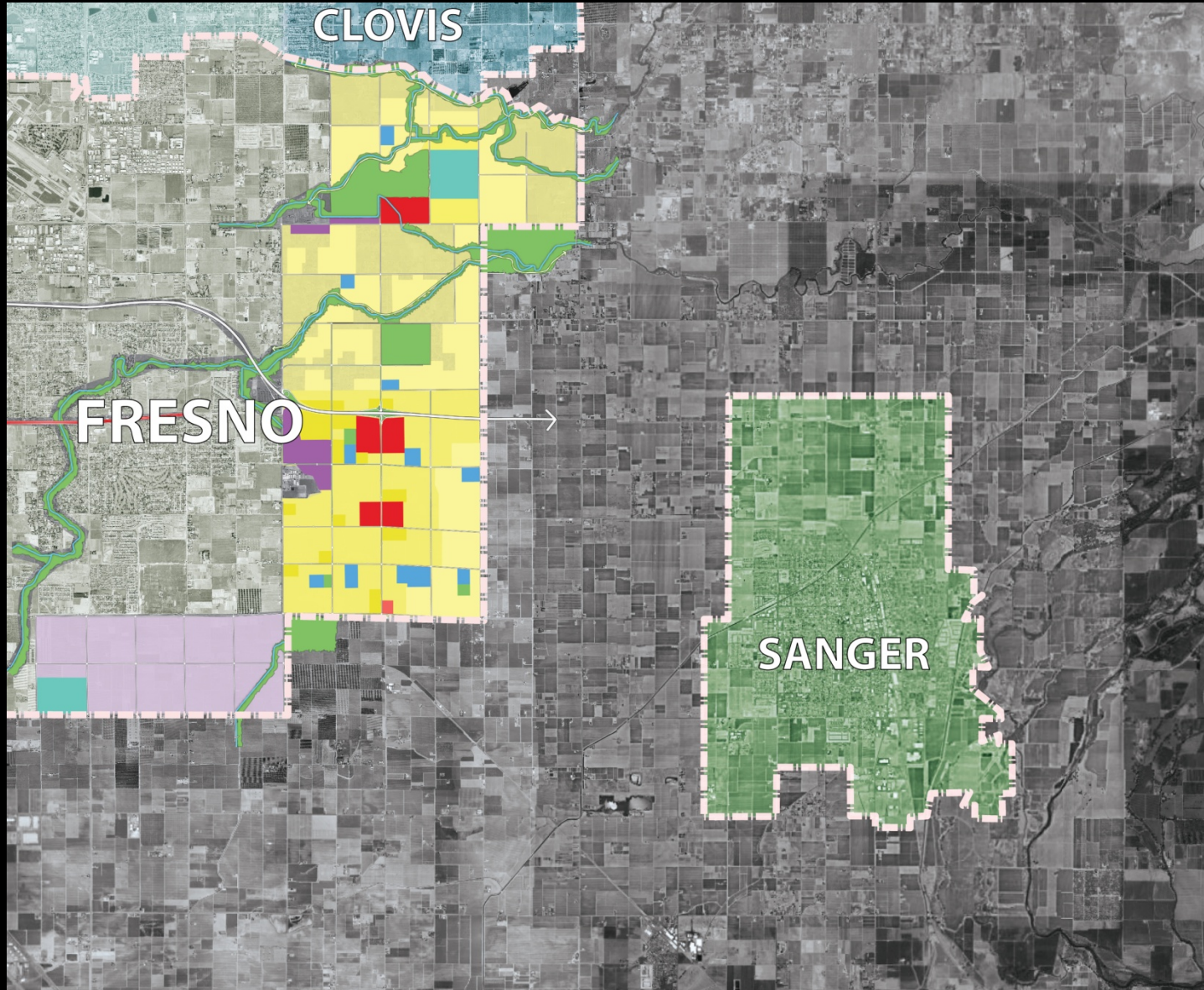
Bike/Pedestrian
Trails



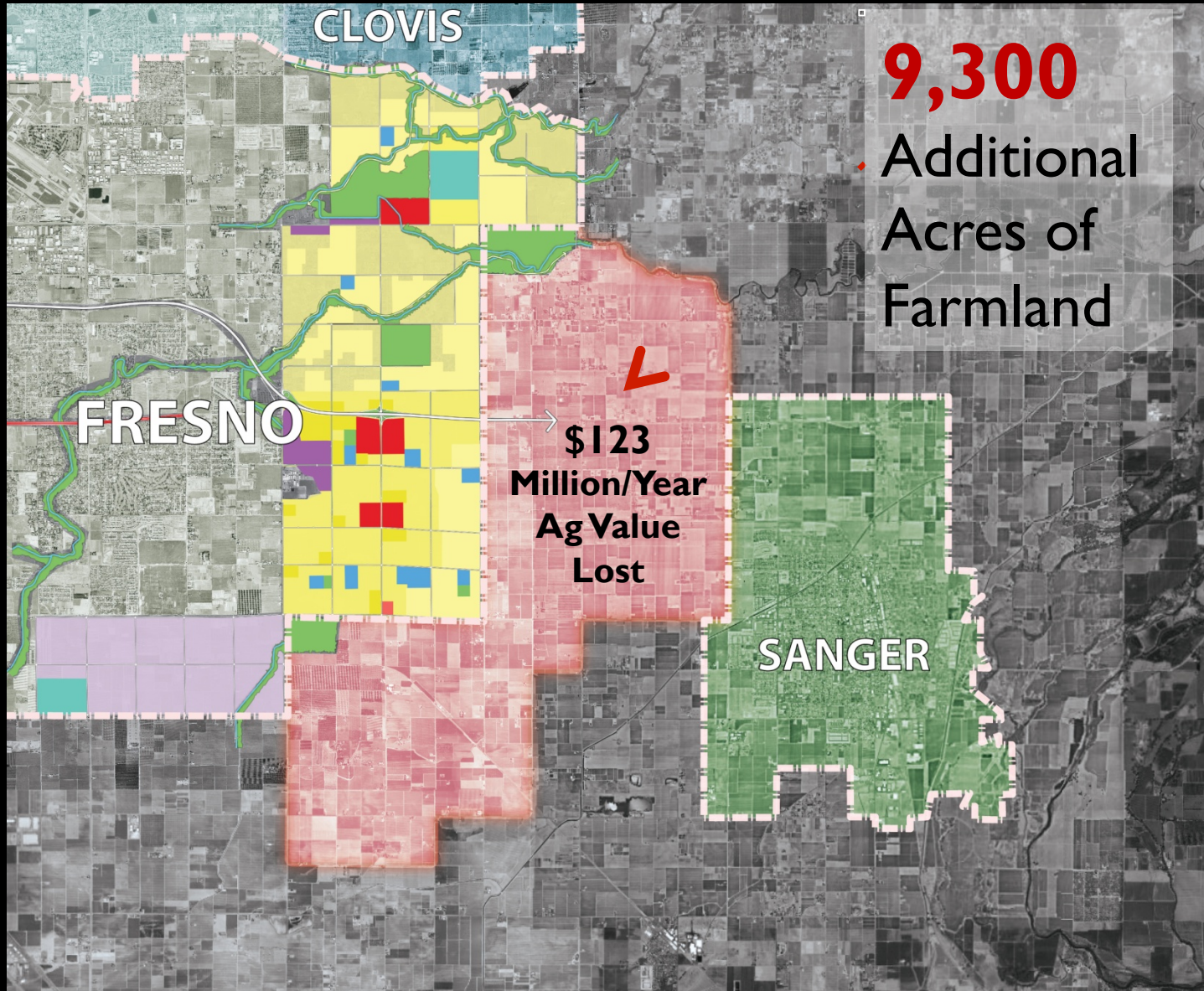
2008 Fresno Southeast Growth Area



Zoning Alternative



Zoning Alternative



2011: Oahu Transit Oriented Development



2011: Oahu Transit Oriented Development

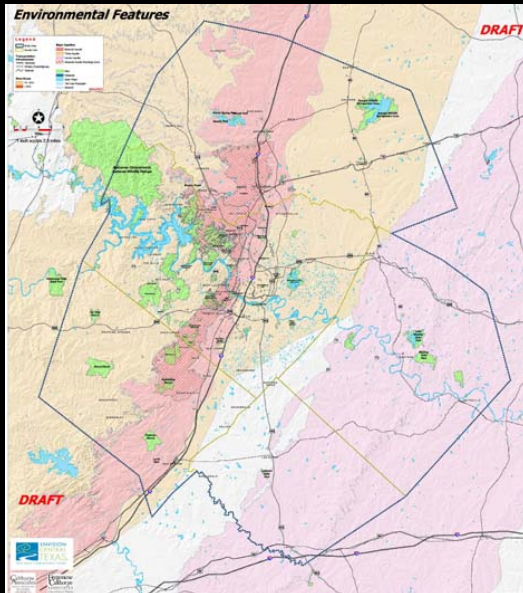


2011: Oahu Transit Oriented Development

	Land Consumed Island-Wide	
	2010-2035	2010-2050
Business As Usual	16.3 sq. miles	21.8 sq. miles
Forecast Future	12.4 sq. miles	16.8 sq. miles
Corridor Focus	5.2 sq. miles	7.1 sq. miles

I. Identify Where NOT to Grow

Draw-In Desired Open Space, Green Corridors
and Other Significant Areas

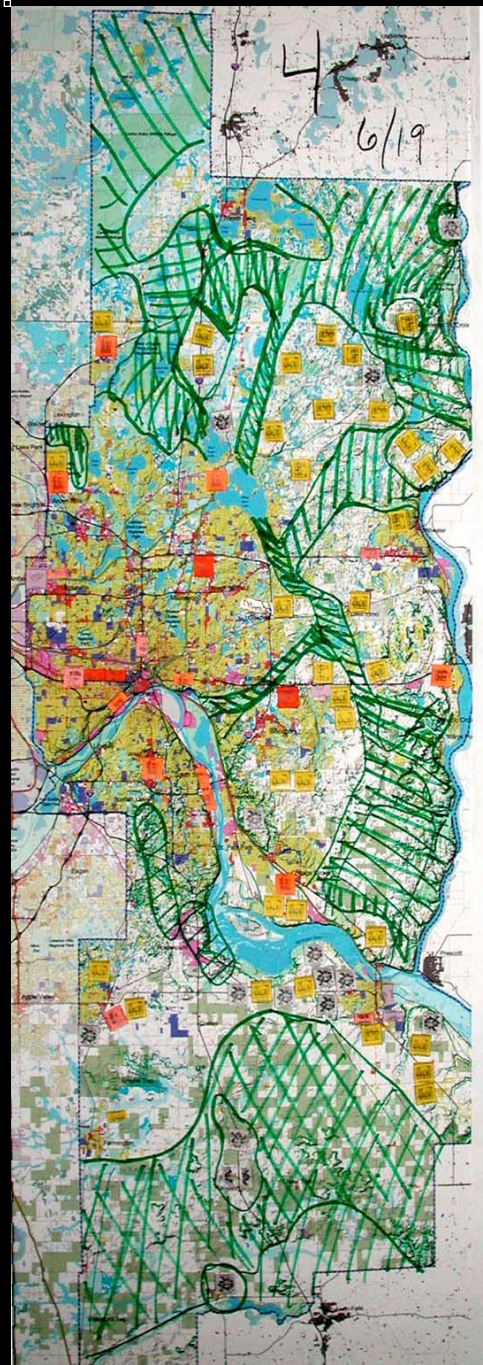
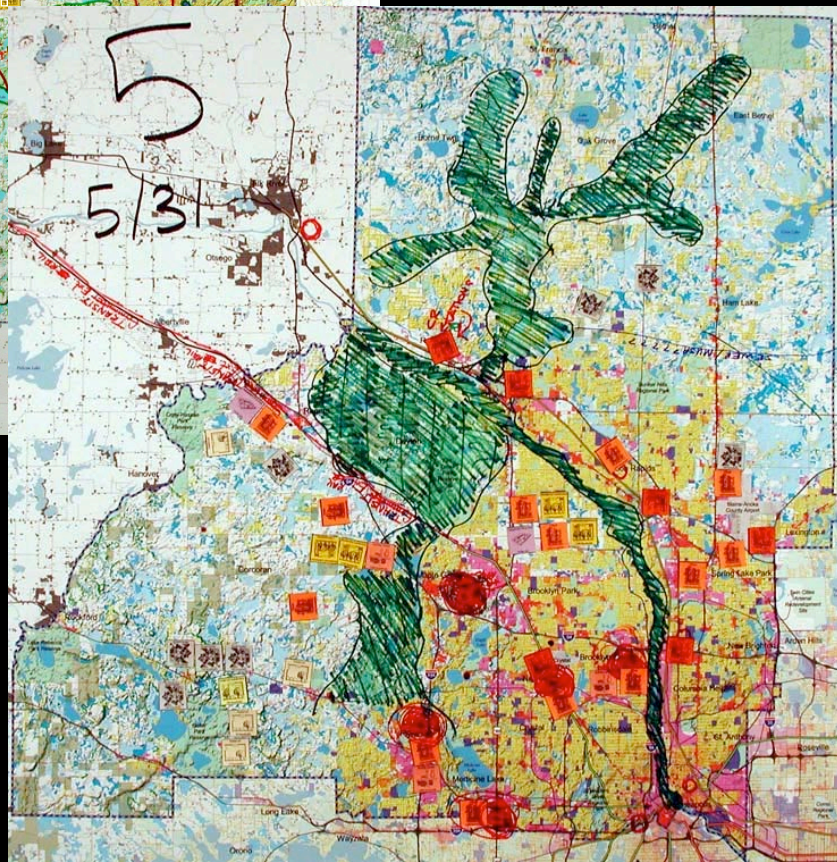
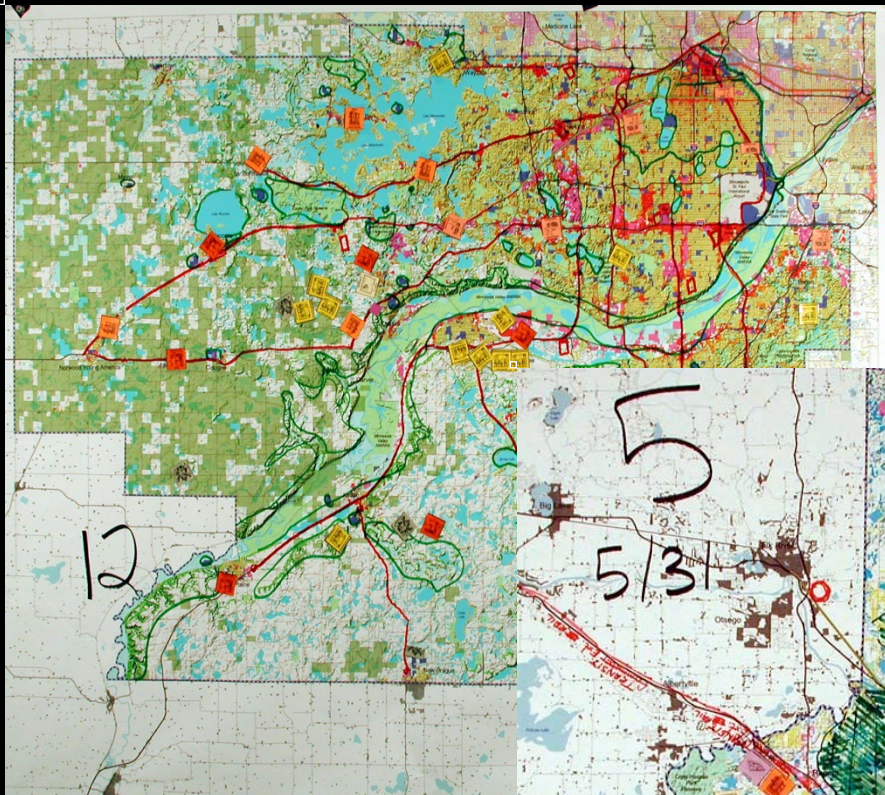


**Environmental
Features Map**

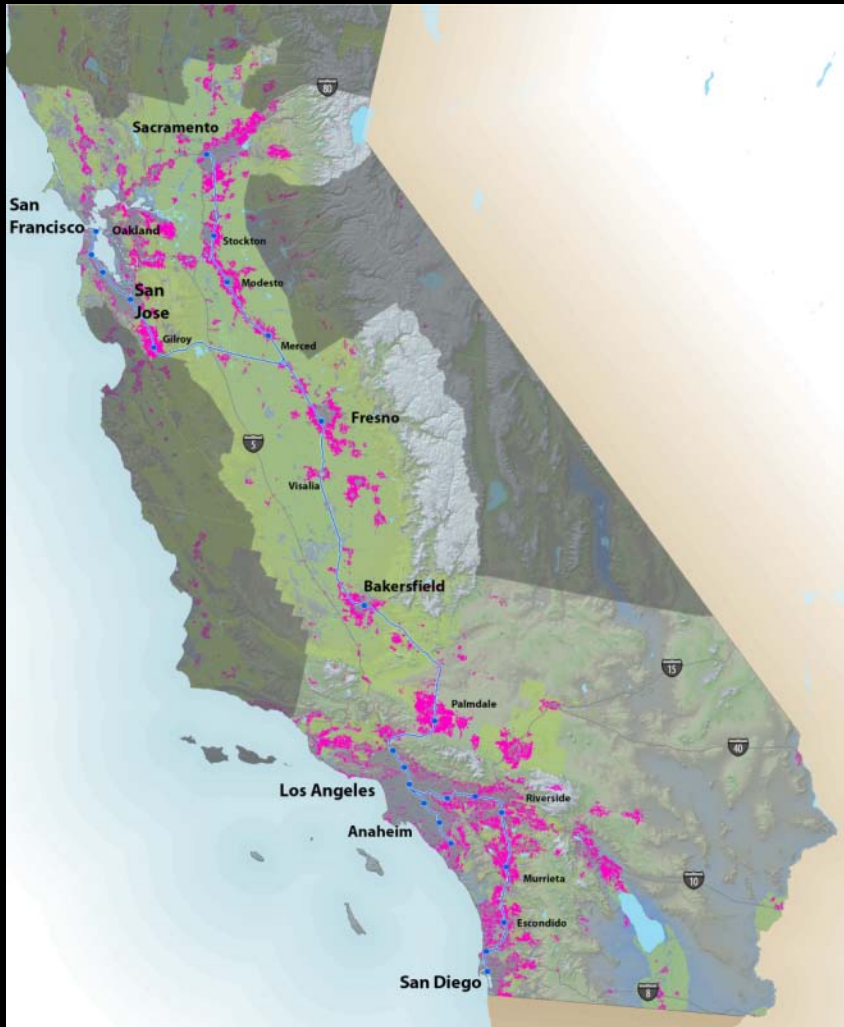


Workshop Map

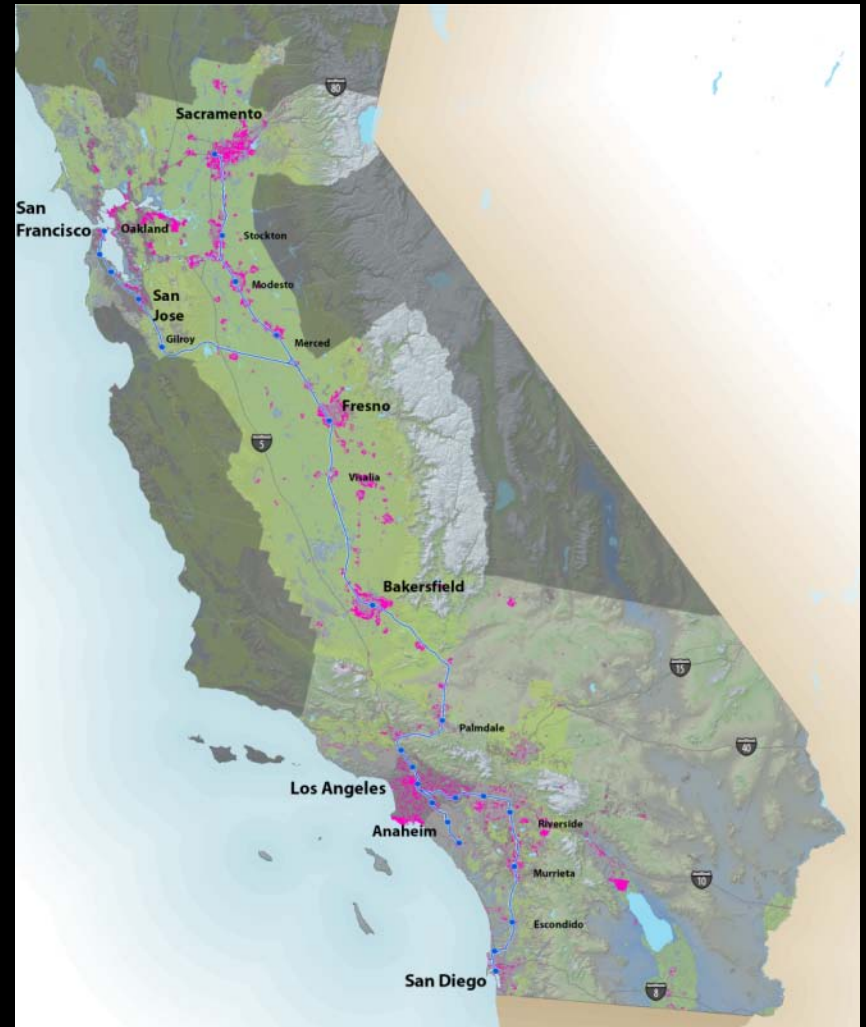




California in 2050

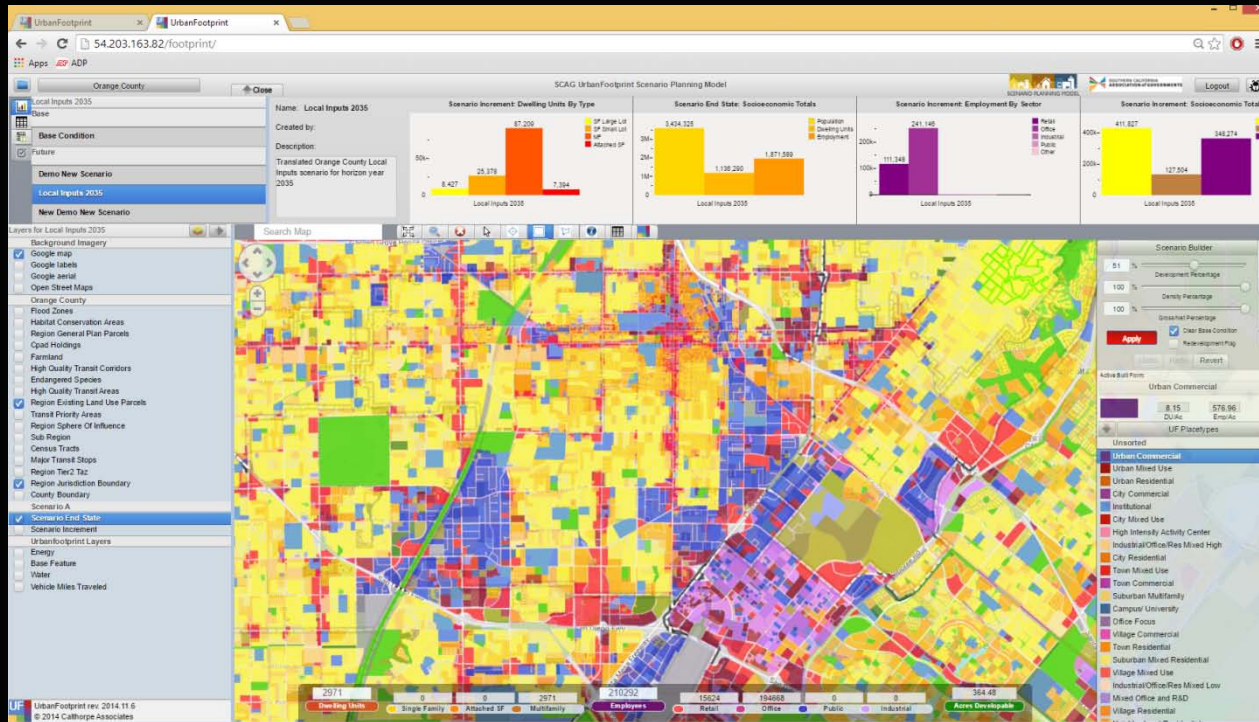


Business as Usual



'Growing Smart'

Next Generation Scenario Models



RapidFire



3. Smart Growth

Scenario	2005-2035	2035-2050	2005-2050
Population	25%	100%	125%
Employment	55%	40%	95%
Housing Units	30%	100%	130%
Land Area	55%	60%	115%

4. Ultra Smart Growth

Scenario	2005-2035	2035-2050	2005-2050
Population	35%	100%	135%
Employment	55%	70%	125%
Housing Units	60%	80%	140%
Land Area	60%	5%	65%

b. LAND DEVELOPMENT CATEGORY (LDC) PROPORTIONS

Enter values in cells below, or click button to restore default LDC proportions

Scenario	Single-Family	Multi-Family	Office	Public	Industrial	Greenfield
Scenario 1 Refill	75%	8%	10%	7%	0%	0%
Scenario 2 Refill	75%	8%	10%	7%	0%	0%
Scenario 3 Refill	75%	8%	10%	7%	0%	0%
Scenario 4 Refill	75%	8%	10%	7%	0%	0%

2. SELECT POLICY PACKAGE(S)

Click buttons to load policy group options:

	FULL POLICY GROUPS			AUTO AND FUEL TECH	
	A	B	C	A	B
TRANSPORTATION	ENRAC Strategic	ENRAC Fuel	Green	Low	Medium
ICE Vehicle efficiency (mi/gal)	2020	19.33	23.7	24.7	24.7
ICE Vehicle efficiency (mi/gal)	2035	19.16	27.0	38.3	38.3
ICE Vehicle efficiency (mi/gal)	2050	19.15	27.8	54.2	54.2
Light-duty vehicle efficiency (mi/kWh)	2020	0%	0%	0%	0%
Light-duty vehicle efficiency (mi/kWh)	2035	0%	0%	10%	10%
Light-duty vehicle efficiency (mi/kWh)	2050	0%	0%	20%	20%
Plug-in Hybrid vehicle efficiency (mi/kWh)	2020	0%	0%	0%	0%
Plug-in Hybrid vehicle efficiency (mi/kWh)	2035	0%	0%	10%	10%
Plug-in Hybrid vehicle efficiency (mi/kWh)	2050	0%	0%	20%	20%
Fuel price (\$/gal, 2005 dollars)	2020	\$4.74	\$3.92	\$3.92	\$3.92
Fuel price (\$/gal, 2005 dollars)	2035	\$5.24	\$5.60	\$5.60	\$5.60
Fuel price (\$/gal, 2005 dollars)	2050	\$5.74	\$6.00	\$6.00	\$6.00
Auto ownership and maintenance (\$/mi, 2005 dollars)	2020	\$0.24	\$0.24	\$0.24	\$0.24
Auto ownership and maintenance (\$/mi, 2005 dollars)	2035	\$0.24	\$0.24	\$0.24	\$0.24
Auto ownership and maintenance (\$/mi, 2005 dollars)	2050	\$0.24	\$0.24	\$0.24	\$0.24
TRANSPORTATION FUEL EMISSION RATES					
Well-to-Wheels Fuel Emissions (lbs CO ₂ /gal)	2020			24.64 lbs/gal	23.54 lbs/gal
Well-to-Wheels Fuel Emissions (lbs CO ₂ /gal)	2035			23.31 lbs/gal	21.20 lbs/gal
Well-to-Wheels Fuel Emissions (lbs CO ₂ /gal)	2050			22.52 lbs/gal	18.54 lbs/gal
Tank-to-Wheels Fuel Emissions	2020	19.62 lbs/gal	17.66 lbs/gal	17.66 lbs/gal	16.25 lbs/gal
Tank-to-Wheels Fuel Emissions	2035	19.62 lbs/gal	17.66 lbs/gal	17.66 lbs/gal	16.25 lbs/gal
Tank-to-Wheels Fuel Emissions	2050	19.62 lbs/gal	17.66 lbs/gal	17.66 lbs/gal	16.25 lbs/gal
CO₂ EMISSION RATES					
Residential & commercial building electricity emissions (lbs CO ₂ /kWh)	2020	0.81 lbs/kWh	0.690 lbs/kWh	0.58 lbs/kWh	0.48 lbs/kWh
Residential & commercial building electricity emissions (lbs CO ₂ /kWh)	2035	0.81 lbs/kWh	0.623 lbs/kWh	0.54 lbs/kWh	0.48 lbs/kWh
Residential & commercial building electricity emissions (lbs CO ₂ /kWh)	2050	0.81 lbs/kWh	0.583 lbs/kWh	0.54 lbs/kWh	0.48 lbs/kWh
Residential & commercial building natural gas emissions (lbs CO ₂ /therm)	2020	11.66 lbs/therm	11.66 lbs/therm	11.66 lbs/therm	11.66 lbs/therm
Residential & commercial building natural gas emissions (lbs CO ₂ /therm)	2035	11.66 lbs/therm	11.66 lbs/therm	11.66 lbs/therm	11.66 lbs/therm
Residential & commercial building natural gas emissions (lbs CO ₂ /therm)	2050	11.66 lbs/therm	11.66 lbs/therm	11.66 lbs/therm	11.66 lbs/therm
BUILDINGS					
New residential energy efficiency (% reduction from 2005)	2020	10%	10%	30%	30%
New residential energy efficiency (% reduction from 2005)	2035	20%	20%	55%	55%
New residential energy efficiency (% reduction from 2005)	2050	30%	30%	80%	80%

Local Fiscal Impacts



Public Health



Transportation



Land Consumption



Building Energy Use



Household Costs



Greenhouse Gas Emissions



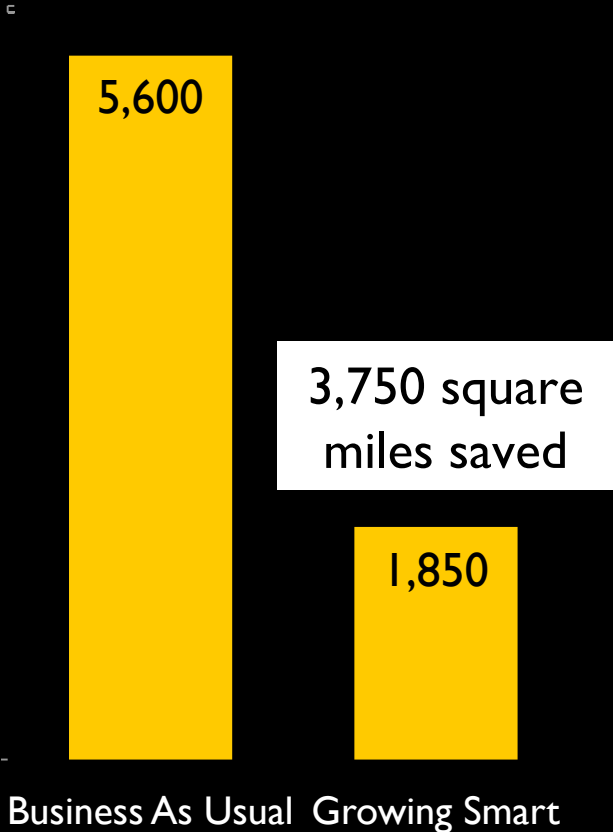
Building Water Use



Land Consumed

For New Growth to 2050 (mi²)

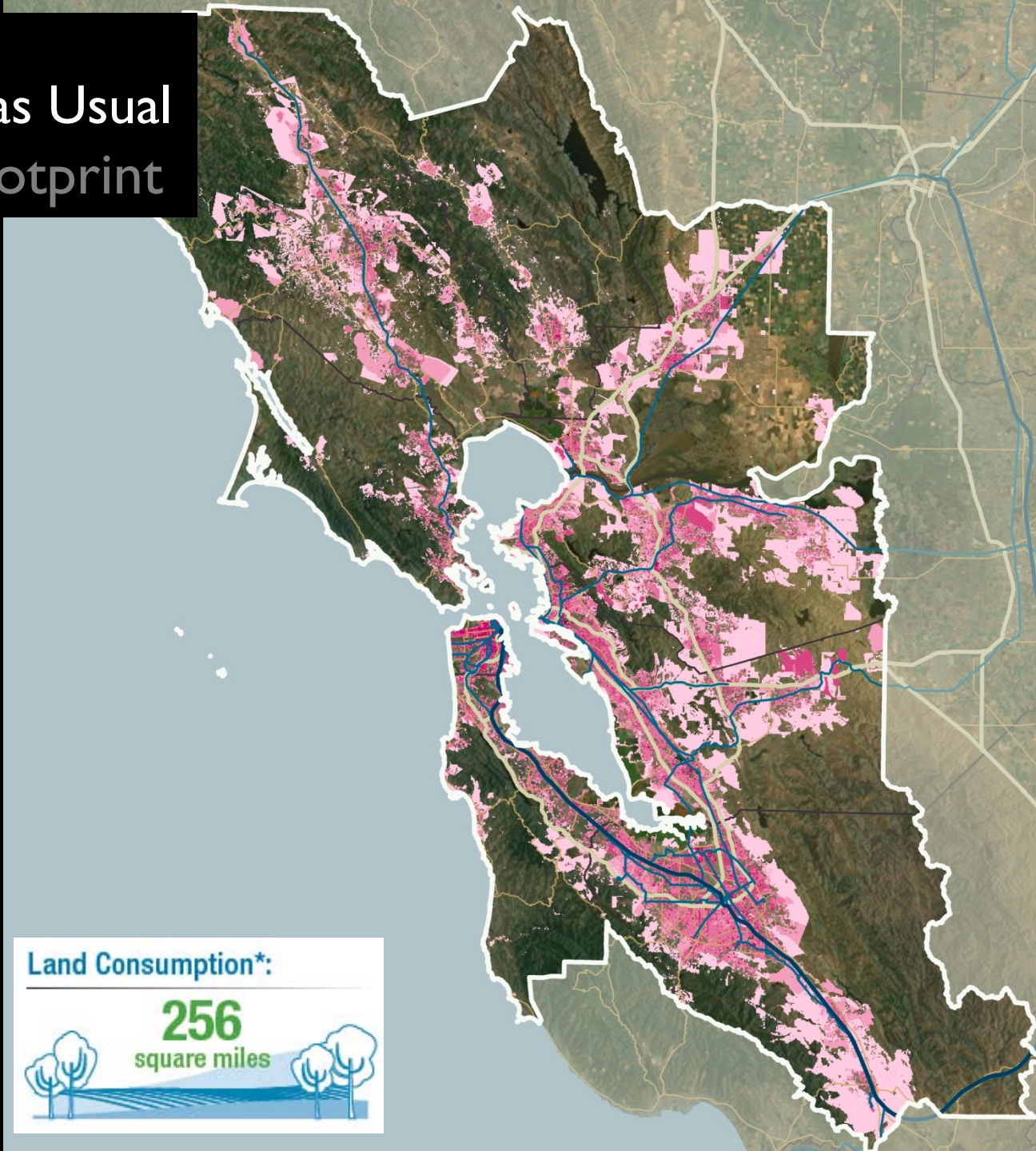
More land than Delaware and Rhode Island combined



Bay Area

Business as Usual

UrbanFootprint



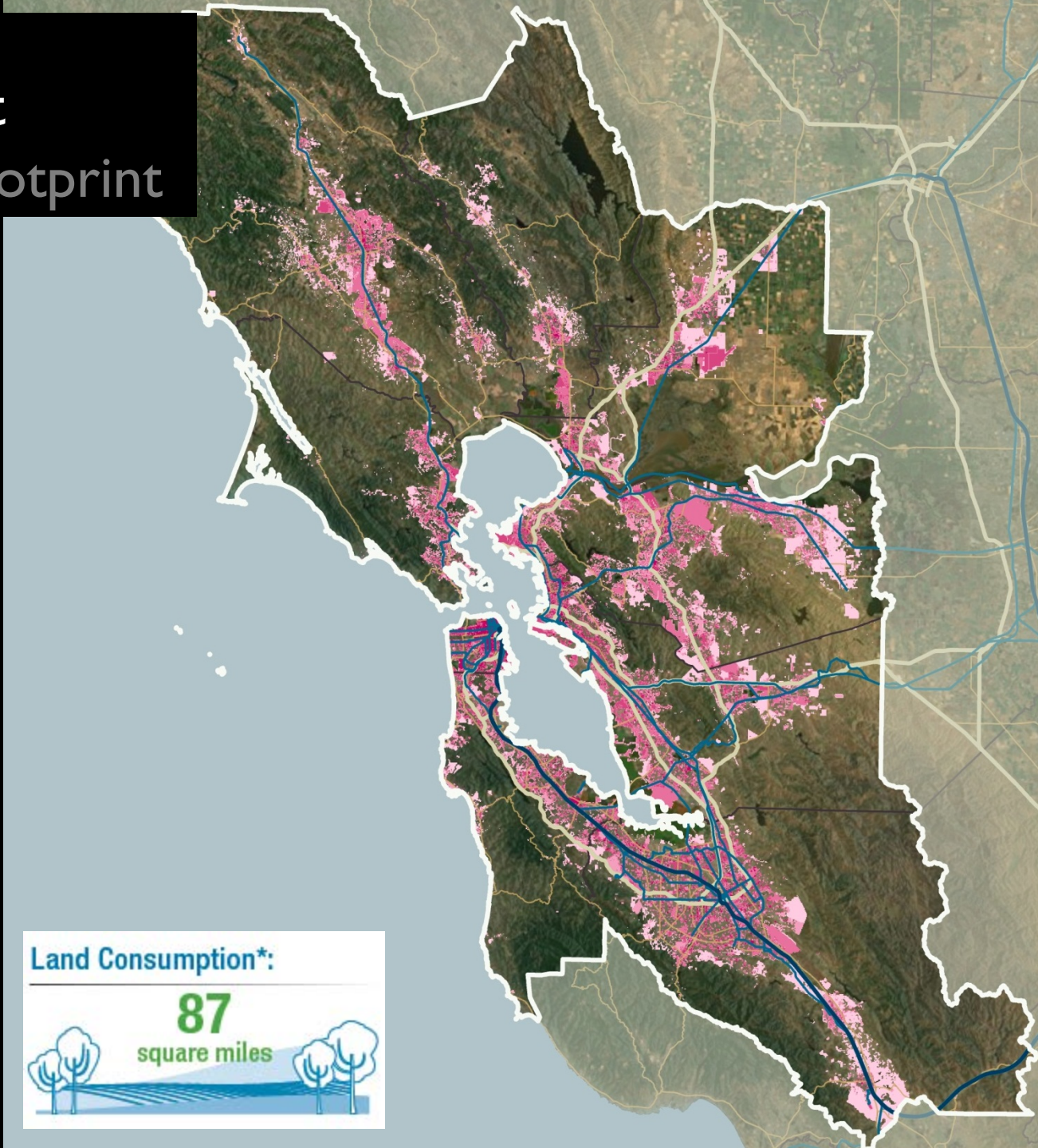
Land Consumption*:

256
square miles



Bay Area

Compact UrbanFootprint



Land Consumption*:

87

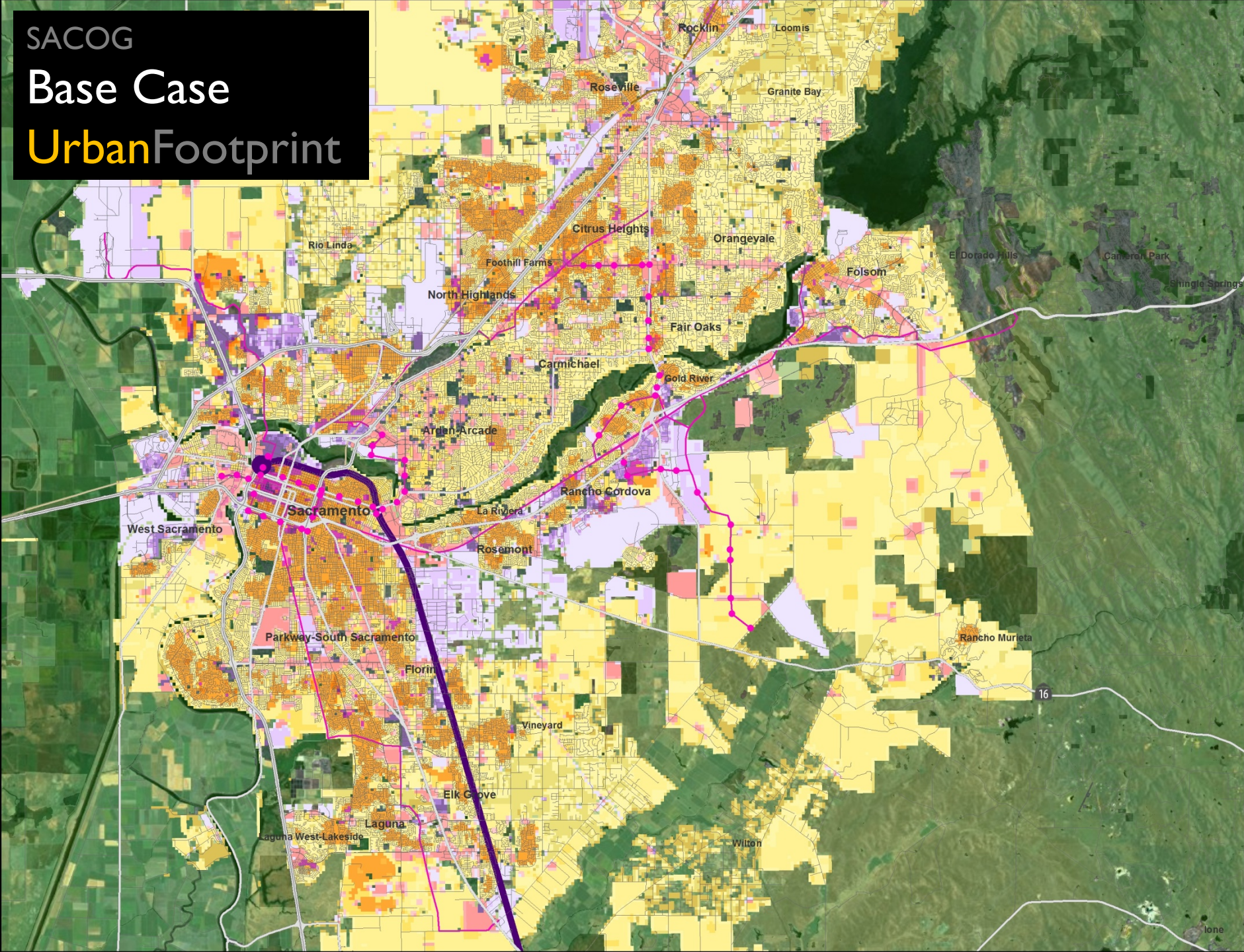
square miles



SACOG

Base Case

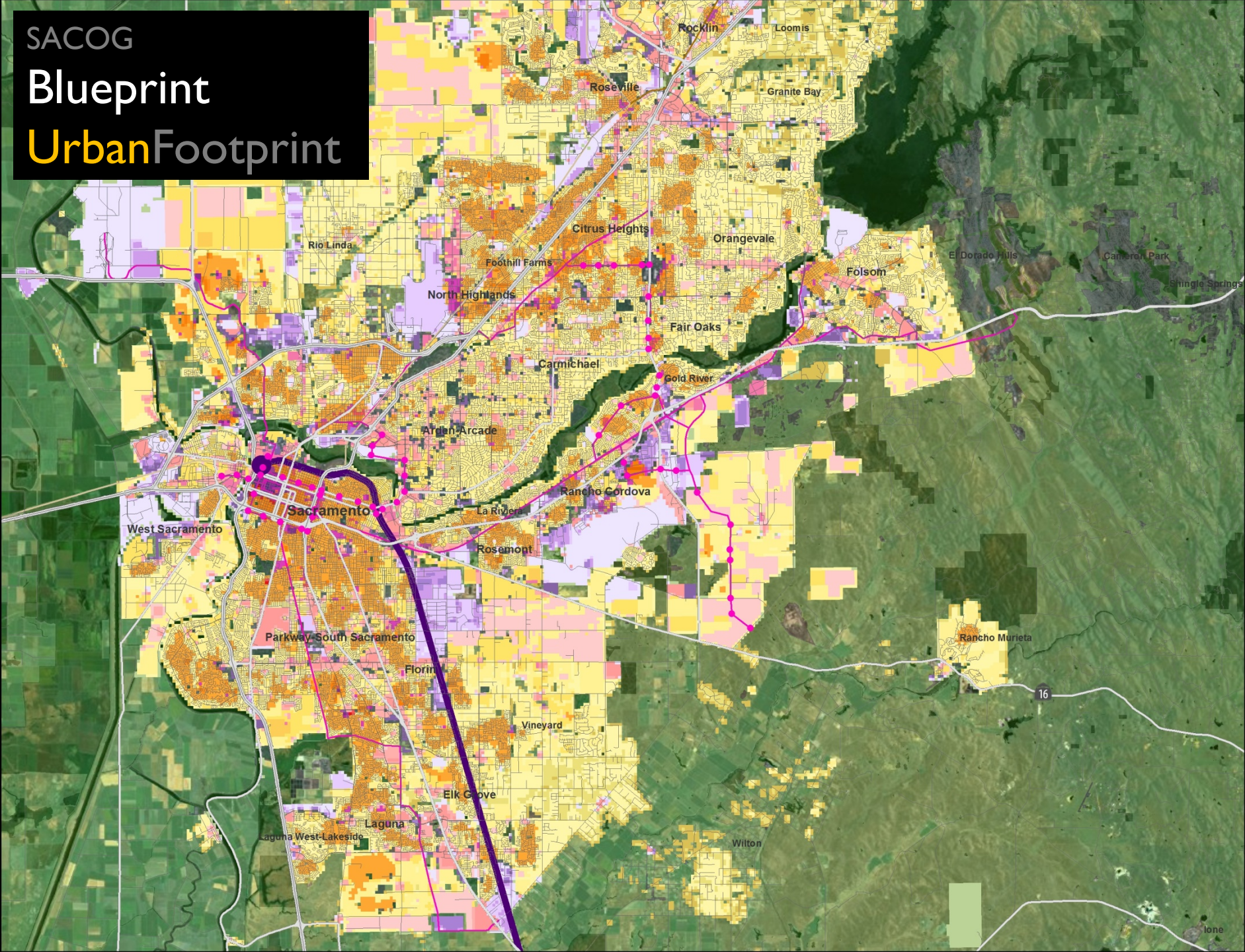
UrbanFootprint



SACOG

Blueprint

UrbanFootprint



Conservation & California's Cap & Trade Program

Conservation EXPANSION







Increases in funding enable significant increases in land protections throughout the county. By 2035, permanently protected acreage in strategic locations around cities, in greenbelts, and on scenic hillsides doubles. Williamson Act contracts are maintained, as are current UGBs.

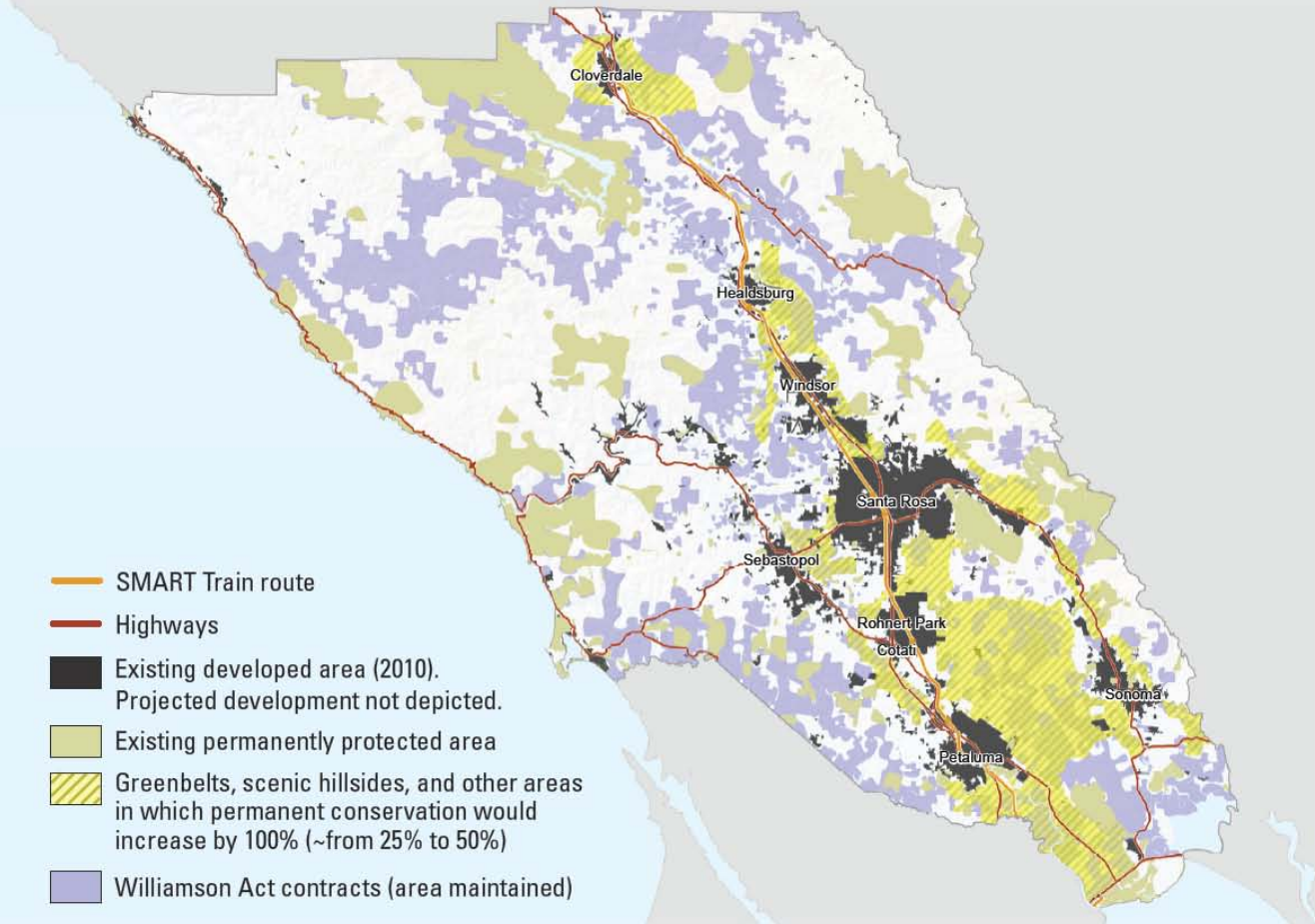
This conservation future would support more compact urban growth patterns that meet SCS goals. Most growth would be met within existing UGBs, with strategic development focused around transit. Some greenfield growth would continue, accommodating mainly smaller-lot single family homes.

Map date: 02 May 2013

Existing developed area: FMMP, 2010.

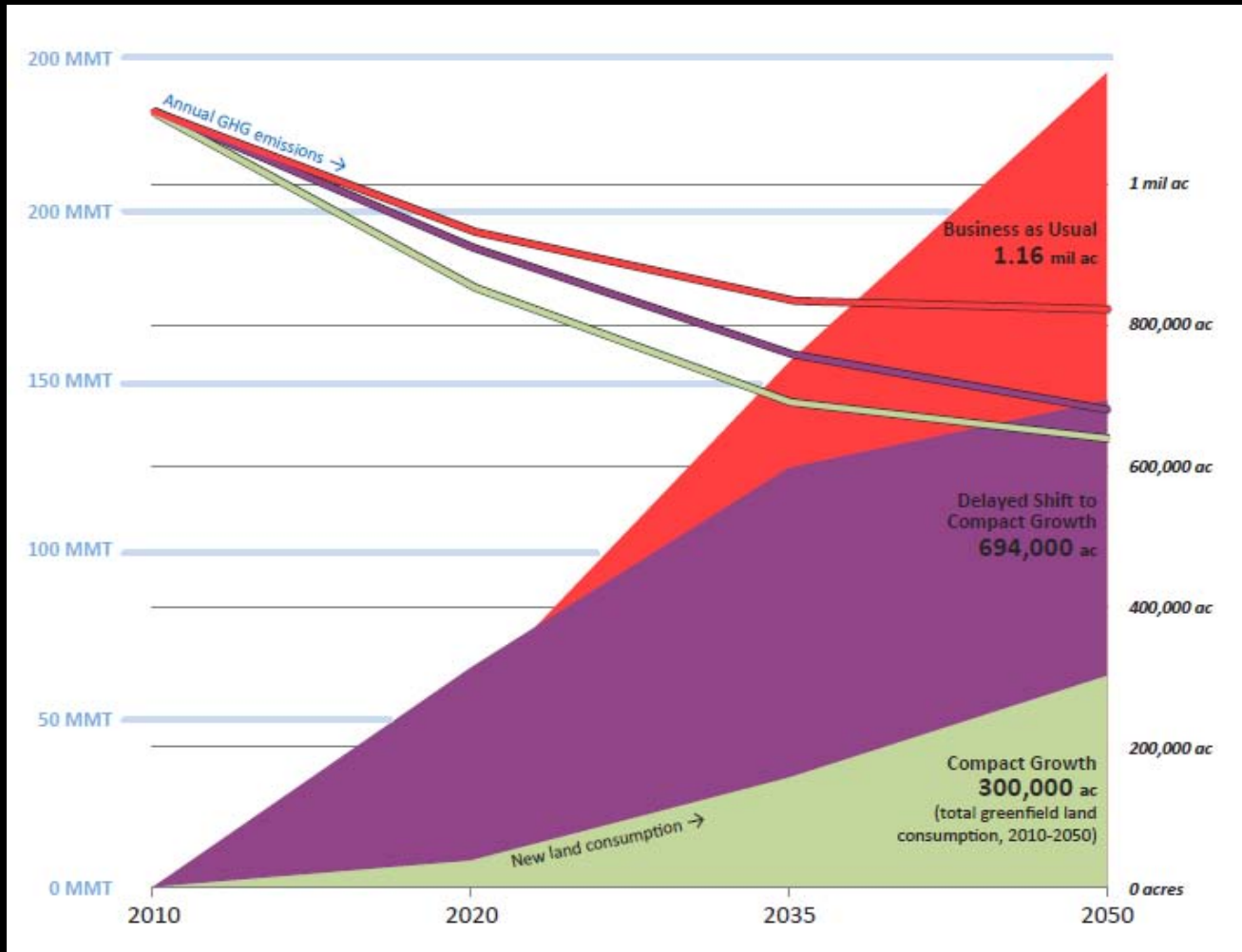
Land conservation data: Sonoma County Agricultural Preservation and Open Space District, 2013.

-  SMART Train route
-  Highways
-  Existing developed area (2010).
Projected development not depicted.
-  Existing permanently protected area
-  Greenbelts, scenic hillsides, and other areas
in which permanent conservation would
increase by 100% (~from 25% to 50%)
-  Williamson Act contracts (area maintained)

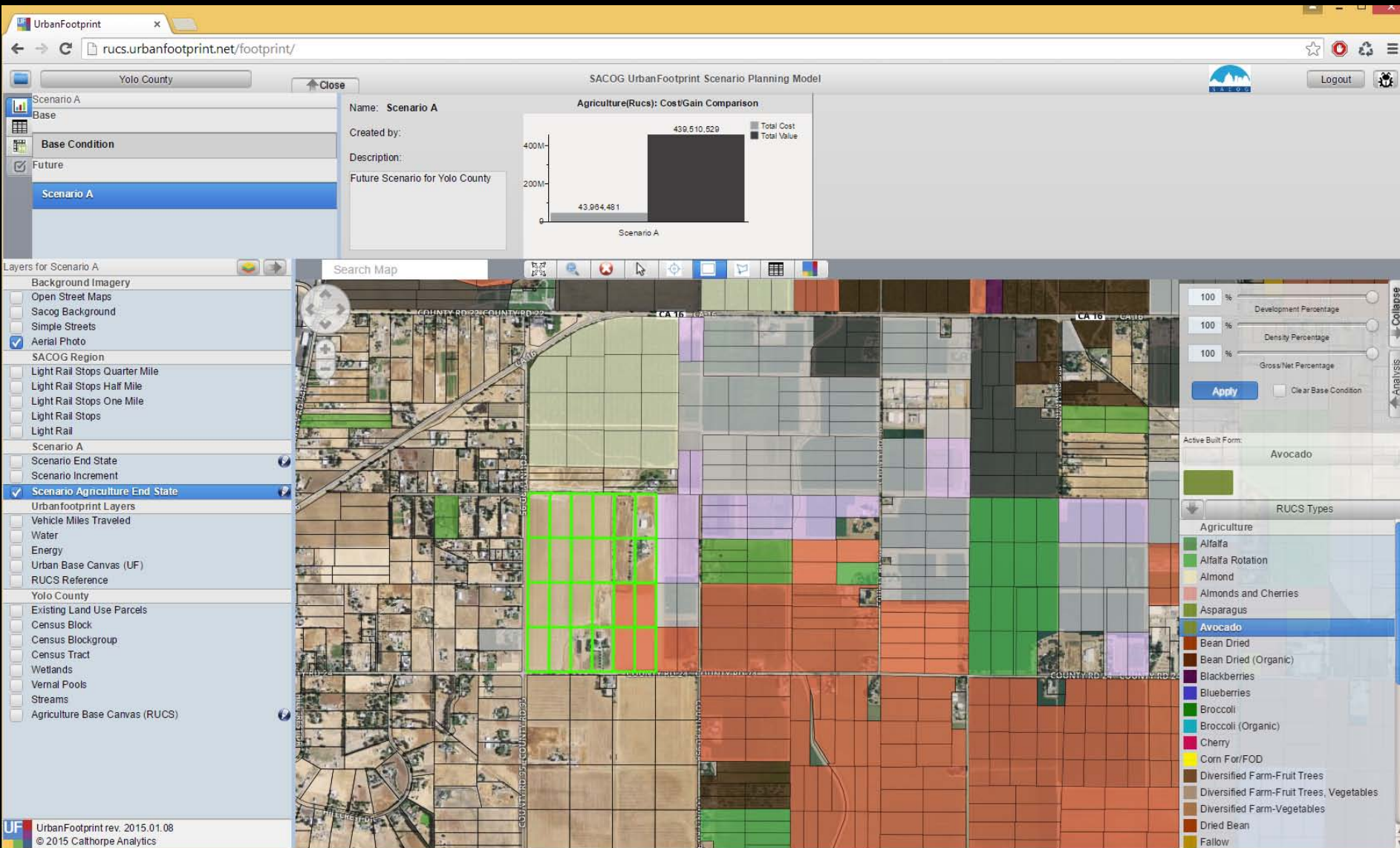


Conservation & California's Cap & Trade Program

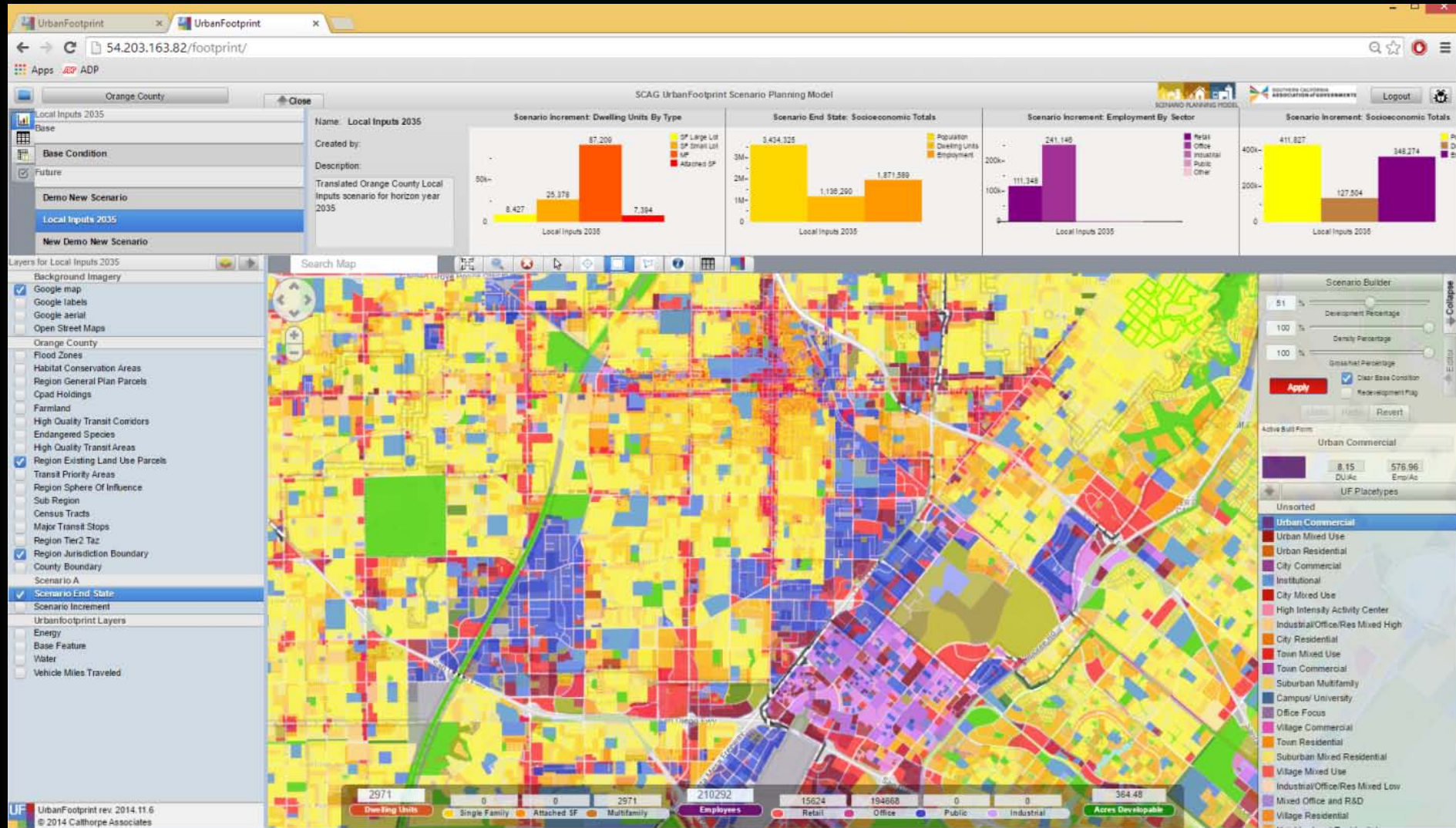
GHG Emissions & Land Consumption – Making the Nexus



Agriculture Scenarios & Analysis



Urban Framework...



...Urban Building and Place Types

Inputs scenario for horizon year: 2035
8,427
7,394
1M

Building Building Type Placetype

Campus/College High (LA City College)

Campus/College Low

Church 1

Church 2

Detention/Utilities

Estate Lot (SACOG Very Low Den Res, 1-2 floors)

Estate Lot (SCAG Large Lot, 1-2 floors)

Estate Lot (Average, Beverly Hills)

Estate Lot (Average, Old Palo Alto)

Estate Lot (Daybreak Estate, South Jordan)

Estate Lot (Windemere Estate)

Garden Apartment (F1 Affordable Townhomes)

Garden Apartment (Corte Bella)

Garden Apartment (Victoria Townhomes)

High Rise Office (2)

High-Rise Mixed (1)

High-Rise Mixed (201 Folsom)

High-Rise Mixed (Atwater Place)

High-Rise Mixed (Visionaire)

High-Rise Office (1)

High-Rise Office (3)

High-Rise Office (SACOG CBD Office)

High-Rise Office (Tabor Center)

High-Rise Residential (199 New Montgomery)

High-Rise Residential (AC Mid-Rise Res, 27+5 floors)

High-Rise Residential (Pine & Franklin)

High-Rise Residential (The Metropolitan)

High-Rise Residential (Viridian)

Building Name

High-Rise Office (Tabor Center)

Building Address

Denver, CO

Building Website

<http://casestudies.uili.org/Profile.aspx?i=8218&p=5&c=>

Building Uses

	Square Feet Per Unit	Efficiency (%)	Use Percent
Restaurant	500	85 %	1 %
Other Services	500	85 %	5 %
Office Services	250	94 %	90 %
Retail Services	500	85 %	4 %

Add New Building Use

Parcel/Building

Lot Size (Square Feet)

43560

Parking

Surface Parking Spaces

0

Residential

Building Stories

31

Structured - Above Ground

477

Residential Vacancy Rate

0.06

Household Size (avg)

0

Total FAR

11

Structured - Below Ground

0

330

SqFt/Parking Space

50 %

% Irrigated

Parcel Hardscape/Softscape Square Feet

15456.77

0

10679.23

8711.998

8711.998

Building Footprint

Surface Parking SqFt

Other Hardscape

Non-Irrigated

Irrigated SqFt

Parcel Composition

Building Use Mix

Summary Densities (Per Acre)

All Dwelling Units	0.0
Single Family Large Lot	0.0
Single Family Small Lot	0.0
Attached Single Family	0.0
Multifamily Units	0.0
All Employment	1702.9
Retail Employees	81.5
Office Employees	1621.5
Public Employees	0.0
Industrial Employees	0.0
Agriculture Employees	0.0
Military Employees	0.0

Building Types Using Building

High-Rise Office 30 %

Close

Save

Agriculture Crops & Crop Types

Future Scenario for Yolo County

200M

Building Building Type Placetype **Crop** Crop Type Landscape Type



Alfalfa
Alfalfa Rotation
Almond
Asparagus
Avocado
Bean Dried
Bean Dried (Organic)
Blackberries
Blueberries
Broccoli
Broccoli (Organic)
Cherry
Corn For/FOD
Diversified Farm-Fruit Trees
Diversified Farm-Fruit Trees, Vegetables
Diversified Farm-Vegetables
Dried Bean
Fallow
Grape, Wine
No Data
Oats for/FOD
Pasture
Prunes
Rangeland
Rice Rotation
Safflower
Seed Rotation
Sorghum for/FOD

Crop Name:

Diversified Farm-Fruit Trees

Agriculture Attributes

Crop yield (units) per acre

15

Market price of one crop unit

255

Water consumption per acre

123

Labor input per acre

1200

Truck trips per acre of crop

250

Production Costs (\$ / Acre)

Seed

5

Chemical

0

Fertilizer

0

Custom

0

Contract

10

Irrigation

0

Labor

0

Equipment

0

Fuel

0

Other

15

Feed

0

Pasture

0

Land

30

Establishment

0

Cash Overhead

0

Non-Cash Overhead

0

Total Cost

60.00

CropTypes using Crop

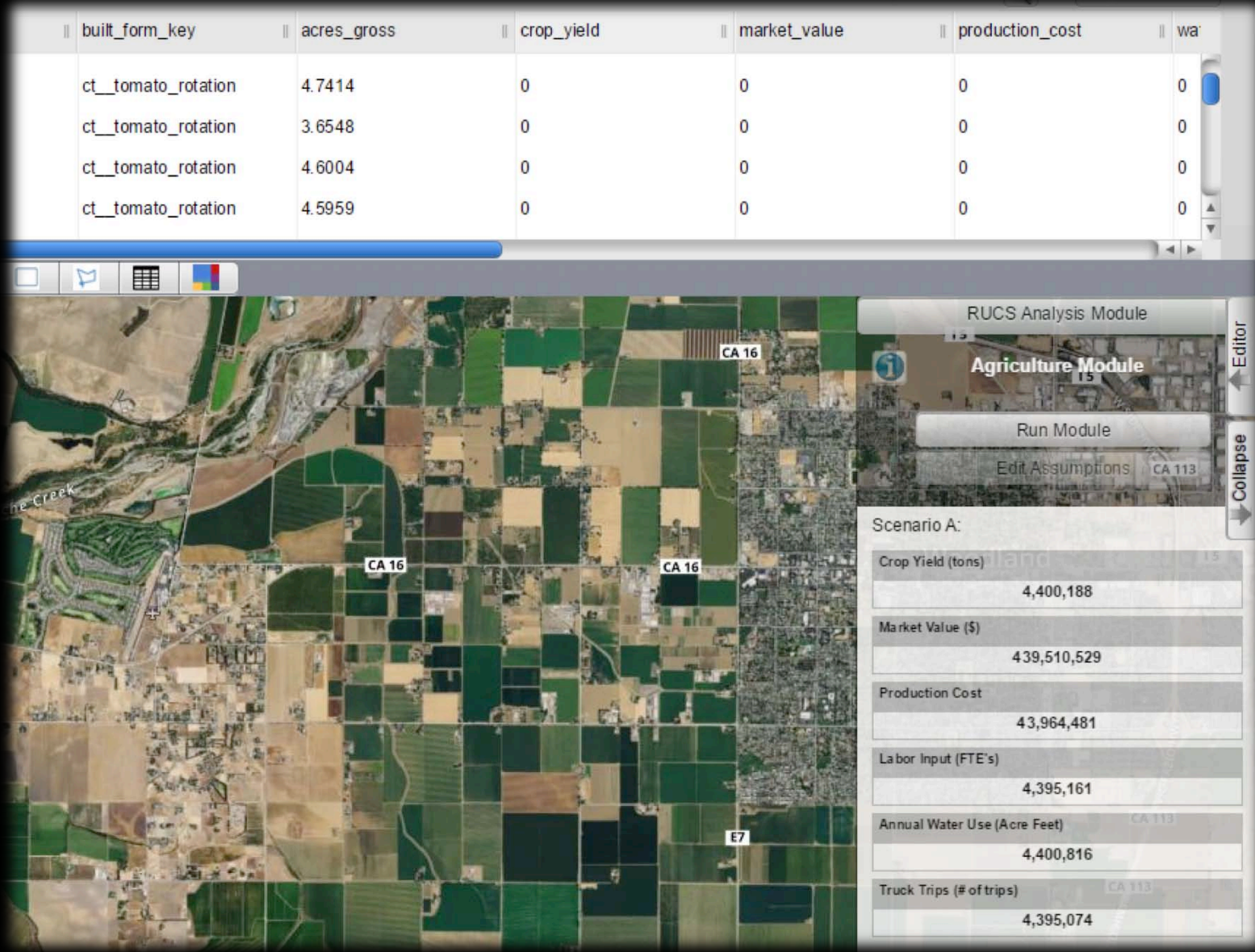
Diversified Farm-Fruit Trees 100 %

Close

Save

Cherry

Agriculture Analysis



Agriculture Analysis

UrbanFootprint

rucs.urbanfootprint.net/footprint/

Yolo County

Scenario A

Base

Base Condition

Future

Scenario A

Layers for Scenario A

- Background Imagery
- Open Street Maps
- SACOG Background
- Simple Streets
- ☒ Aerial Photo
- SACOG Region
- Light Rail Stops Quarter Mile
- Light Rail Stops Half Mile
- Light Rail Stops One Mile
- Light Rail Stops
- Light Rail
- Scenario A
- Scenario End State
- Scenario Increment
- ☒ Scenario Agriculture End State
- Urbanfootprint Layers
- Vehicle Miles Traveled
- Water
- Energy
- Urban Base Canvas (UF)
- RUCS Reference
- Yolo County
- Existing Land Use Parcels
- Census Block
- Census Blockgroup
- Census Tract
- Wetlands
- Vernal Pools
- Streams
- Agriculture Base Canvas (RUCS)

RUCS Analysis Module

Agriculture Module

Run Module

Edit Assumptions

Scenario A:

Crop Yield (tons)	4,400,188
Market Value (\$)	439,510,529
Production Cost	43,964,481
Labor Input (FTE's)	4,395,161
Annual Water Use (Acre Feet)	4,400,816
Truck Trips (# of trips)	4,395,074

Development Percentage: 100 %

Density Percentage: 100 %

Gross/Net Percentage: 100 %

Apply

Clear Base Condition

Active Built Form: Avocado

RUCS Types

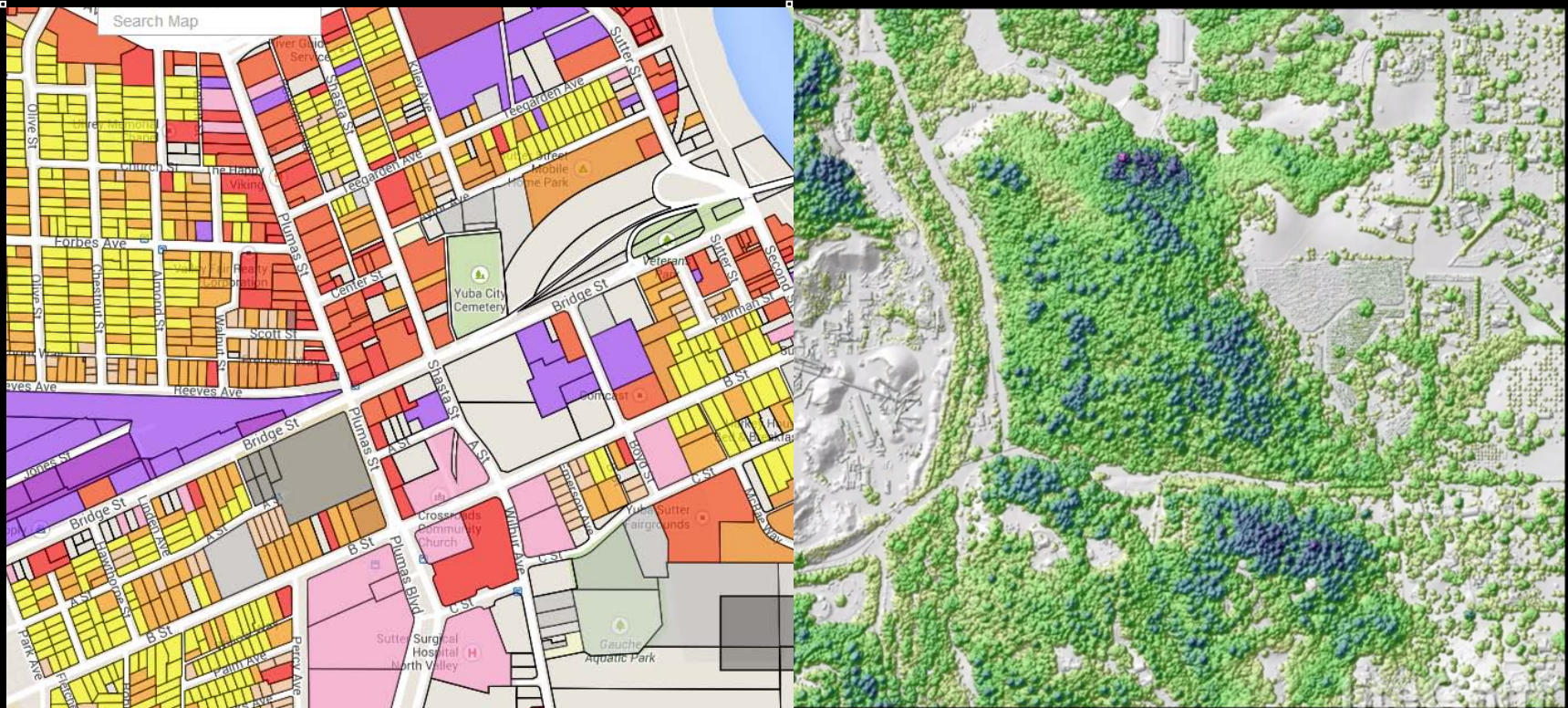
- Agriculture
- Alfalfa
- Alfalfa Rotation
- Almond
- Almonds and Cherries
- Asparagus
- Avocado
- Bean Dried
- Bean Dried (Organic)
- Blackberries
- Blueberries
- Broccoli
- Broccoli (Organic)
- Cherry
- Corn For/FOD
- Diversified Farm-Fruit Trees
- Diversified Farm-Fruit Trees, Vegetables
- Diversified Farm-Vegetables
- Dried Bean
- Fallow

UrbanFootprint rev. 2015.01.08

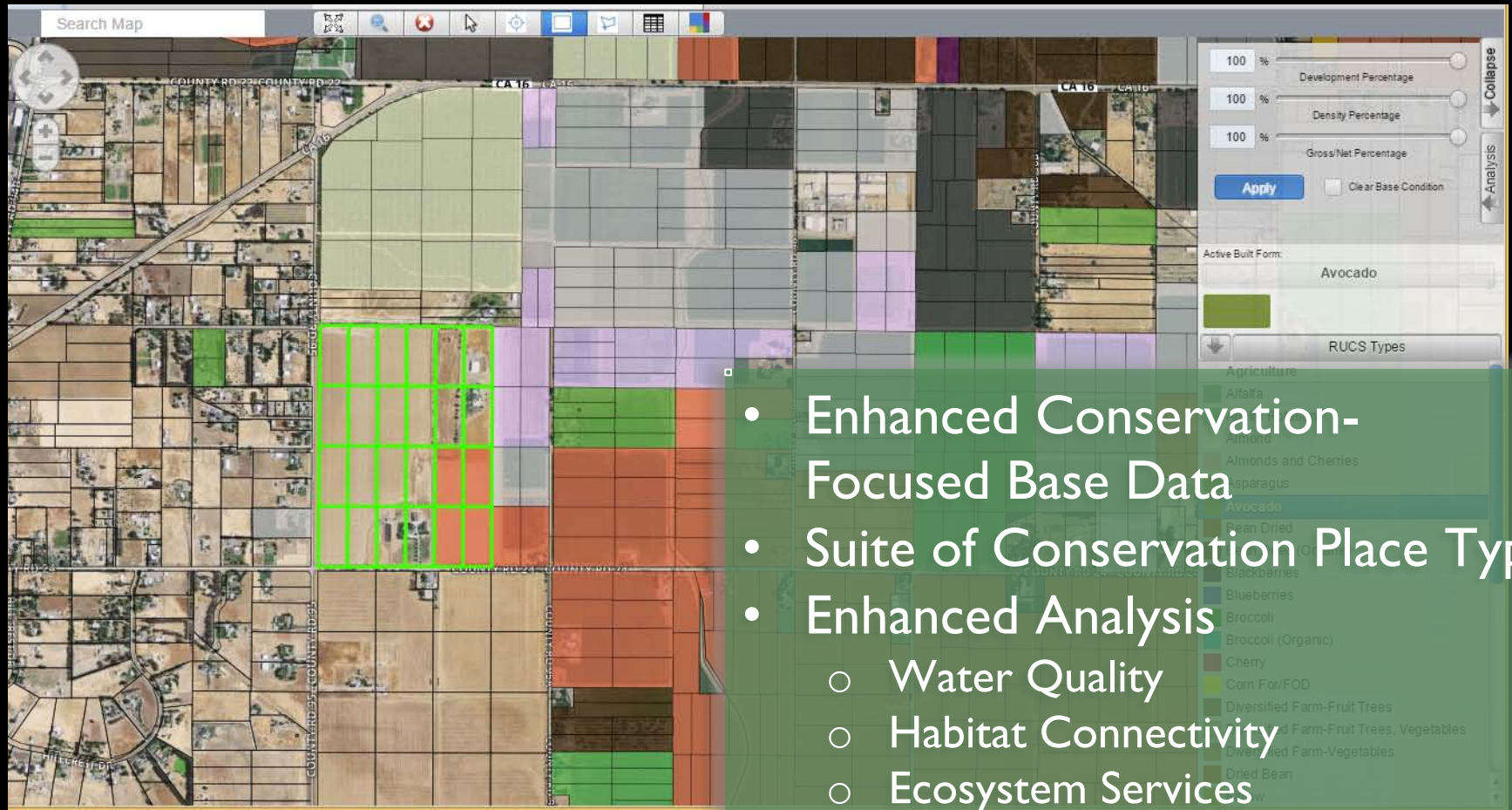
© 2015 Calthorpe Analytics

CALTHORPE ANALYTICS

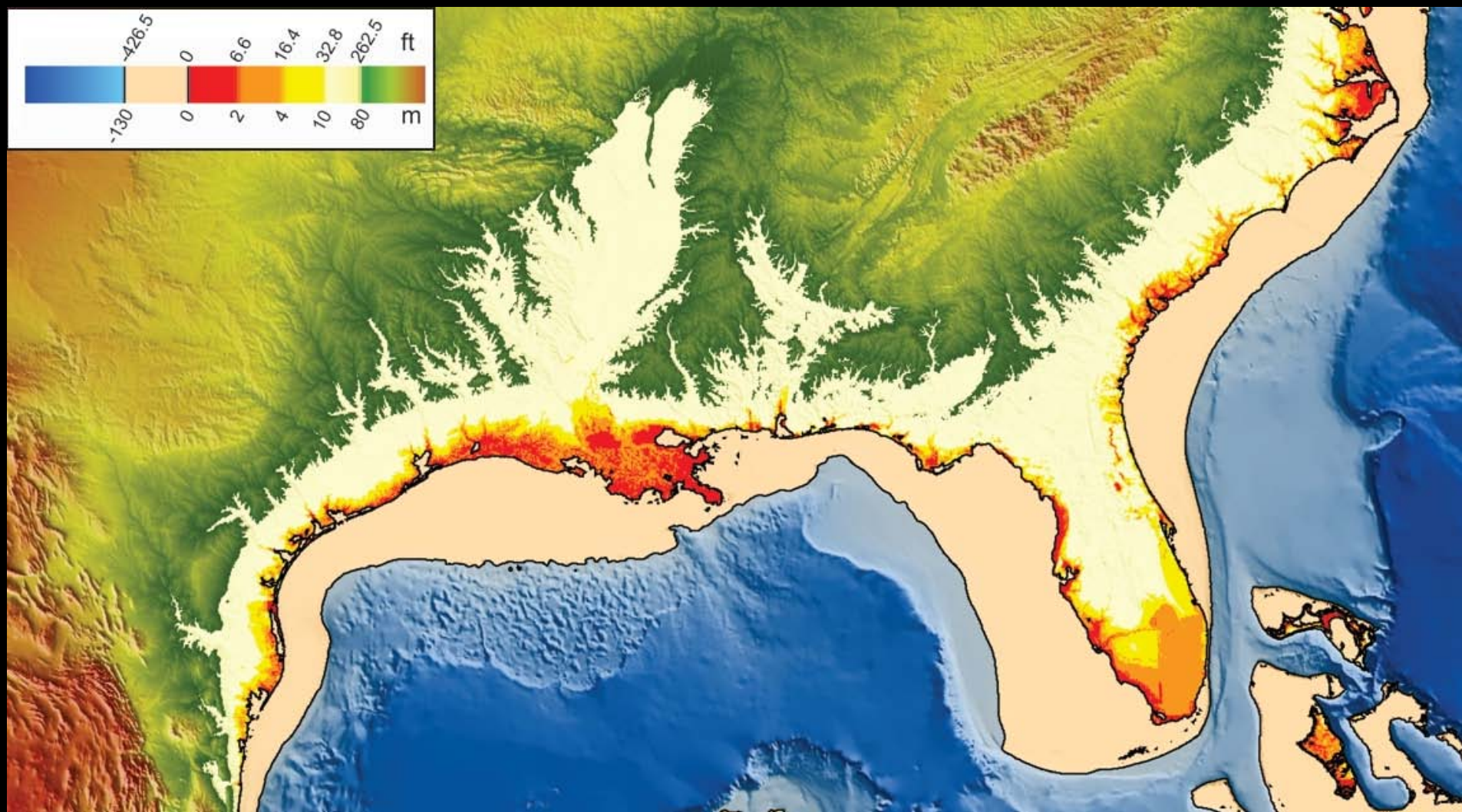
Sonoma County Scenarios & Conservation Module Development



Conservation Module Development



Climate Adaptation & Resilience





CALTHORPE ANALYTICS

Joe DiStefano
joed@calthorpe.com

www.calthorpeanalytics.com



CALTHORPE ANALYTICS