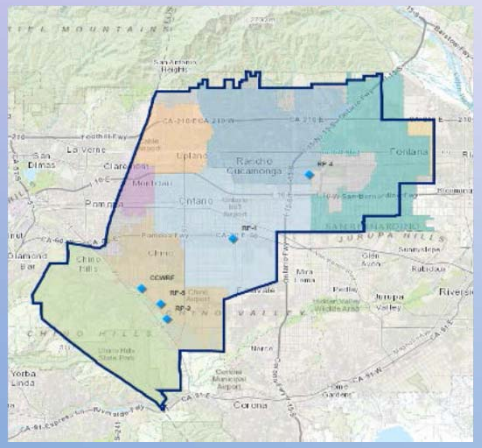
IEUA AND MEMBER AGENCY DEMAND MODEL DEVELOPMENT PROCESS



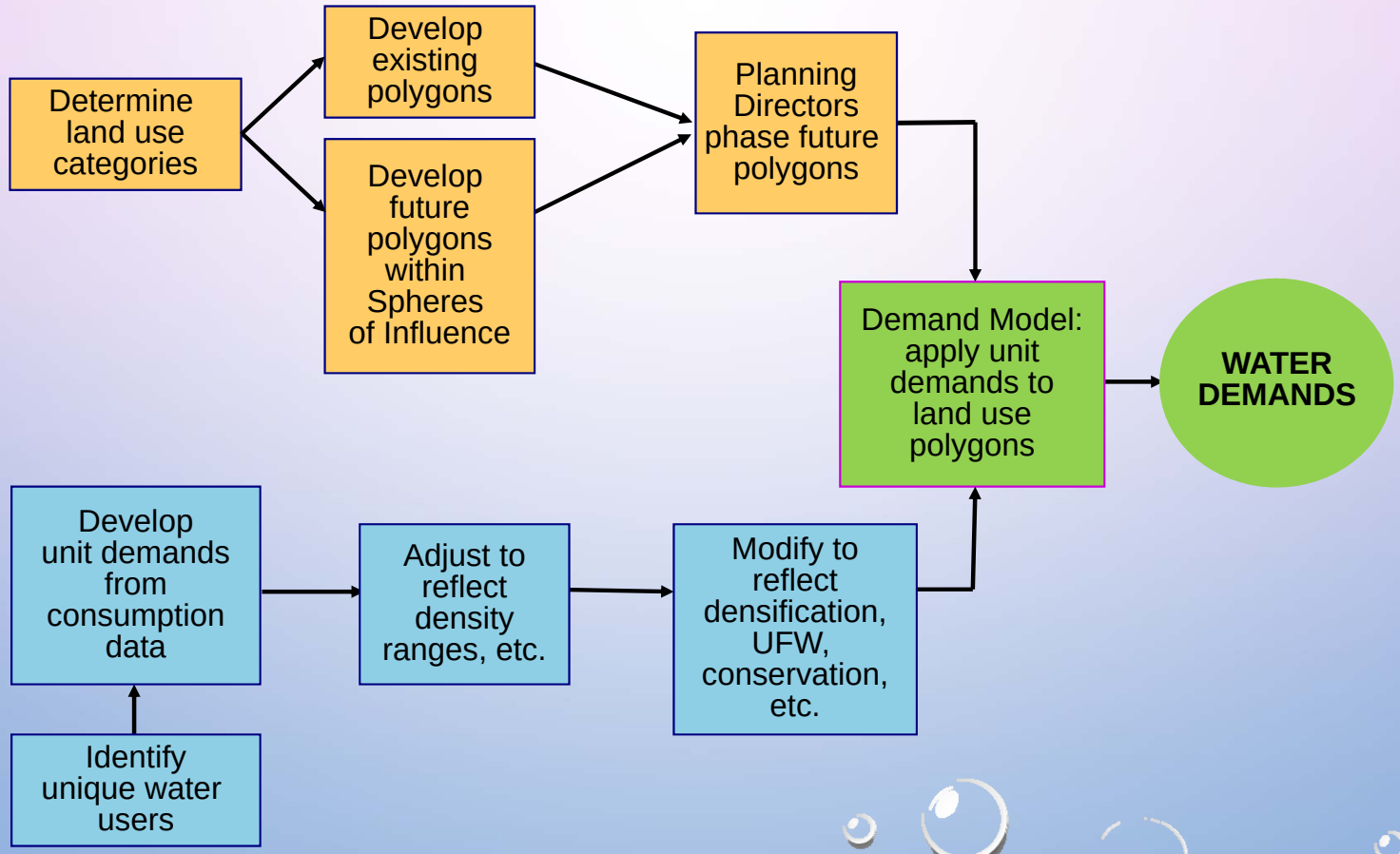
ARCADIS AND WATER RESOURCES PLANNING

MARCH 7, 2016

PURPOSE OF DEMAND MODEL PROJECT

DEVELOP A LAND USE BASED WATER DEMAND MODEL THAT DISAGGREGATES REGIONAL DATA TO THE MEMBER AGENCY LEVEL FOR IEUA'S UWMP

LAND USE APPROACH PROVIDES SPATIAL DEMANDS FOR ALL DEMAND PROJECTION NEEDS



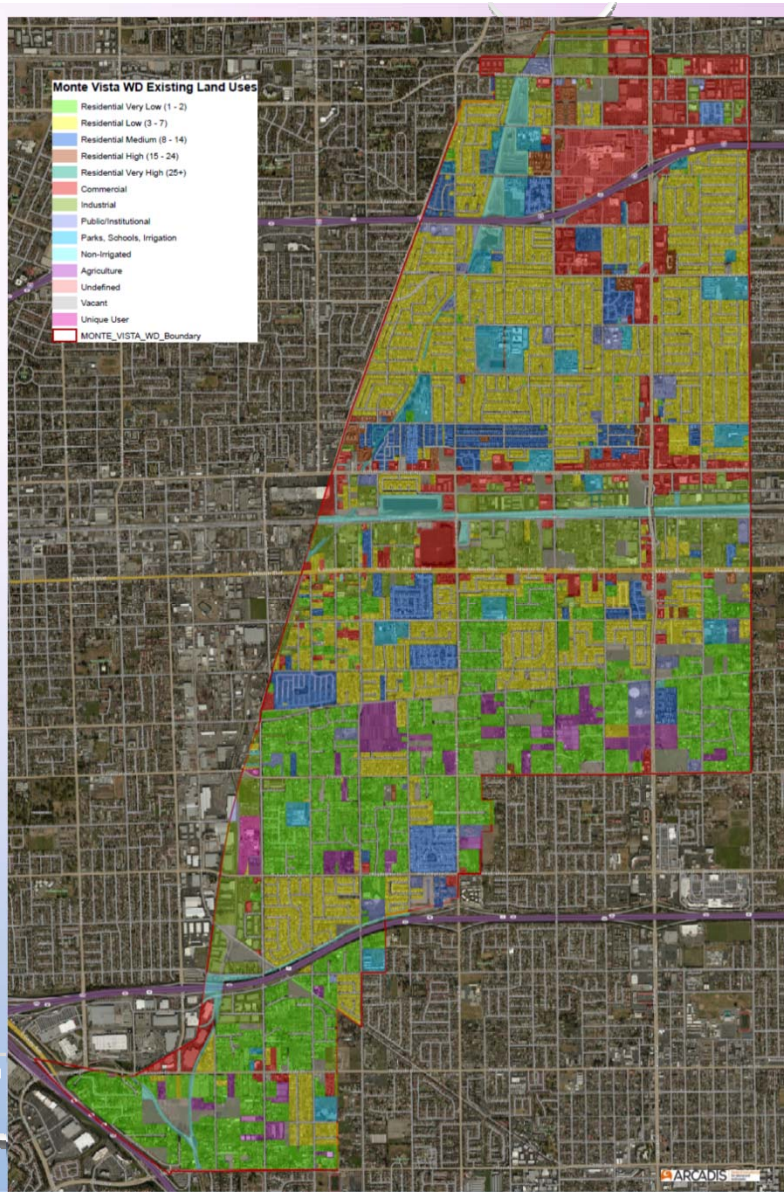
MASTER LAND USES REFLECT 8 CITY GENERAL PLAN CATEGORIES

Master		City of Chino		City of Chino Hills		City of Fontana	
GP LU Categories	**Density (du/ac)**	**Chino GP Land Uses**	**Density (du/ac)**	**Chino Hills GP Land Uses**	**Density (du/ac)**	**Fontana GP Land Uses**	**Density (du/ac)**
Residential		Agriculture		Agriculture/Ranches	0-0.2		
Very Low	<1.0-2.0	RD 1	0-1	Rural Residential	up to 2	Residential Estates	2.0
		RD 2	1-2				
Low	3.0-7.0	RD 4.5	3-4.5	Low Density Res	up to 6	Single Family Res	2.1-5
						Residential Planned Community	3-6.4
		RD 8	4.5-8			Medium Density Res SFR detached	5.1-7.6
Medium	8.0-14.0			Medium Density Res	up to 12	SFR attached or MFR	7.7-12
		RD 12	8-12				
		RD 14	12-14				
High	15.0-24	RD 20	14-20	High Density Res	up to 25	Multi-Family Res	12.1-24
		Mixed Use 20	0-20; 1.25 FAR				
Very High	25.0+	Mixed Use 30	0-30; 1.5 FAR	Very High Density Res	up to 35	MFR Medium/High	24.1-39
						MFR High	39.1-50

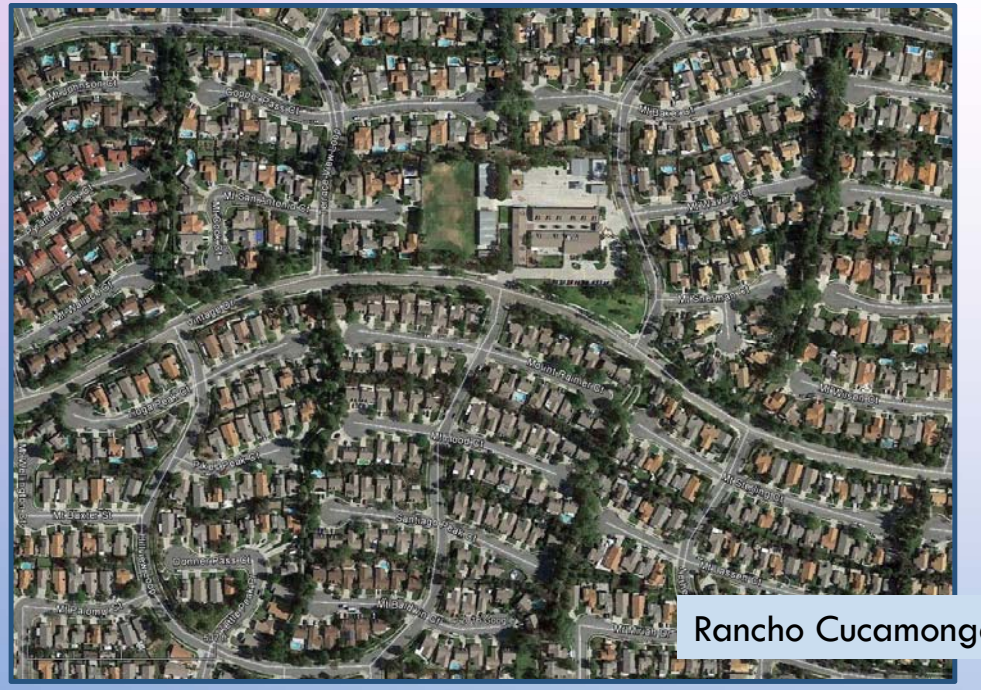
- 13 categories
- 5 residential categories
- Reflect water use patterns

EXISTING LAND USES MAPPED

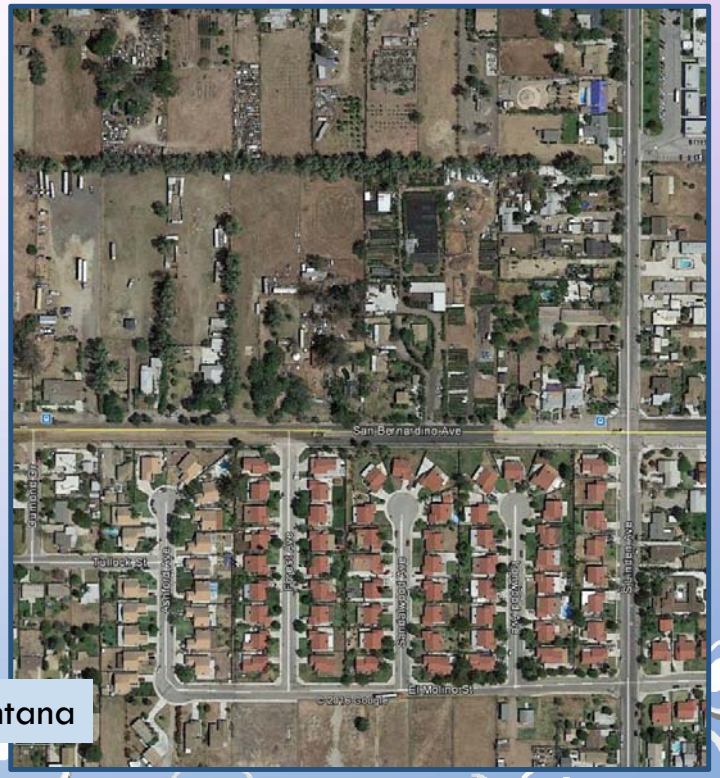
- Data from cities required extensive effort to identify actual land uses; many were “undefined”, residential were not identified by density
- Removed lands that do not receive water service
- Identified Vacant parcels
- Unique water users identified



EACH COMMUNITY HAS UNIQUE LAND USE PATTERNS



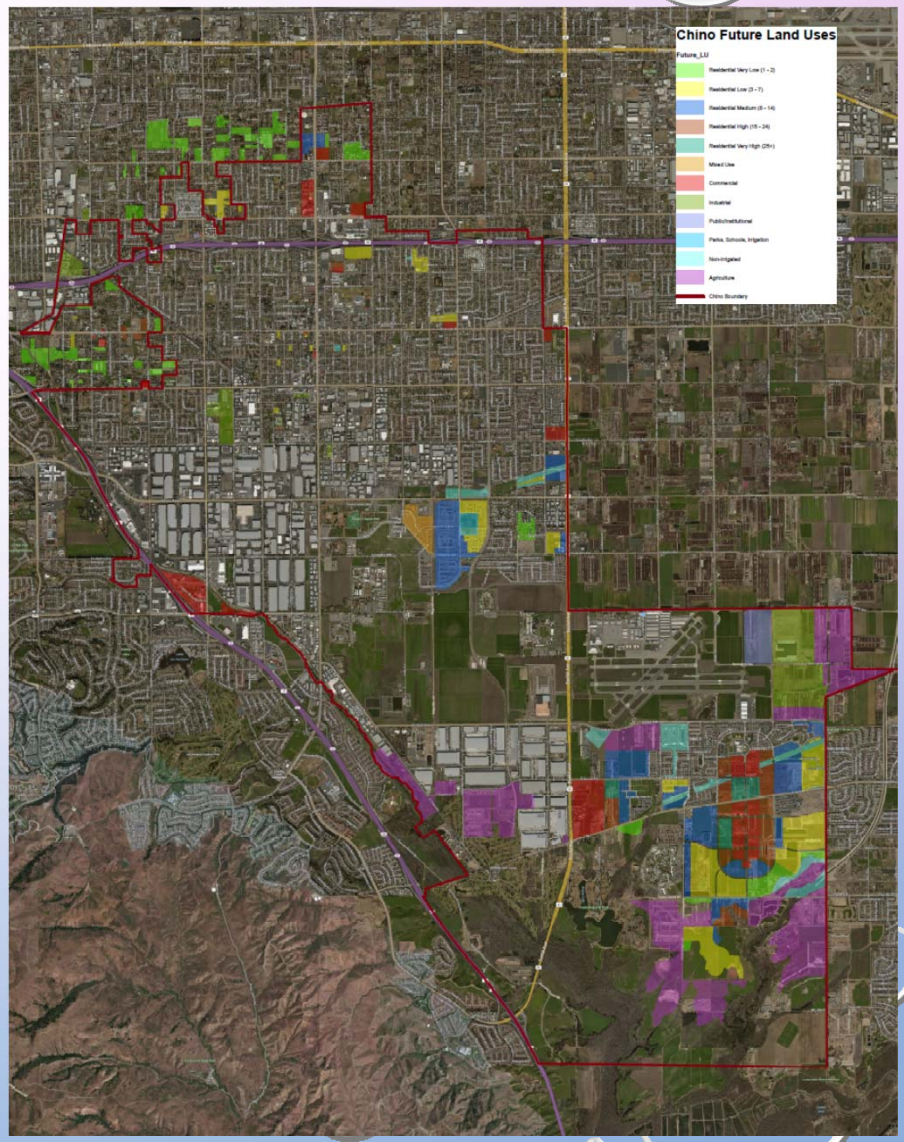
Rancho Cucamonga



Fontana

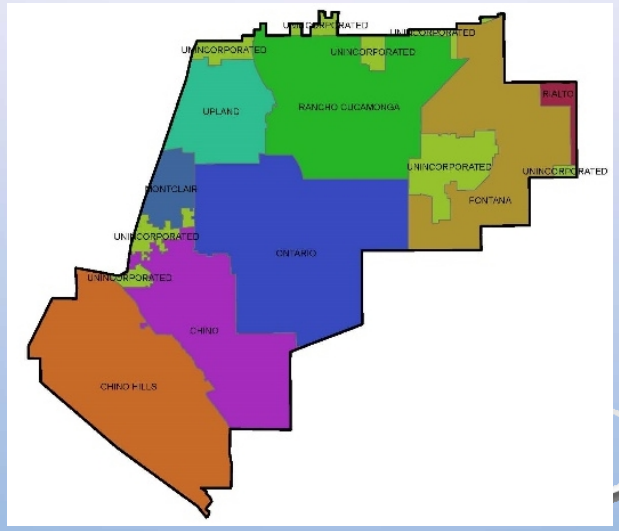
FUTURE LAND USES MAPPED

- General Plan land uses identified for Vacant lands
- Redevelopment areas discussed with land use agencies



8 LAND USE AGENCIES PROVIDED INPUT

- Future land uses confirmed
- Phasing in 5-year increments by Planning Directors
- Trends discussed



Cities

- Chino
- Chino Hills
- Fontana
- Montclair
- Ontario
- Rancho Cucamonga
- Rialto
- Upland

ACREAGE INVENTORIES GENERATED FOR EACH MEMBER AGENCY

Sample Agency	2015	2020	2025	2030	2035	2040
Residential Very Low (<1 - 2)	786	786	786	786	786	786
Residential Low (3 - 7)	2,811	2,813	2,813	2,817	2,846	2,846
Residential Medium (8 - 14)	306	384	410	414	414	418
Residential High (15 - 24)	319	351	354	413	413	413
Residential Very High (25+)	26	32	32	39	39	46
Commercial	685	693	706	706	755	755
Industrial	327	337	337	353	353	353
Public/Institutional	124	119	119	119	124	124
Parks, Schools, Irrigation	401	401	457	457	457	457
Non-Irrigated	1,457	1,457	1,448	1,449	1,450	1,450
Agriculture	55	55	55	55	55	55
Vacant	396	264	187	96	11	1
Unique Water User #1	200	200	189	189	189	189
Unique Water User #2	1	1	1	1	1	1
Unique Water User #3	25	25	25	25	25	25
Unique Water User #4	33	33	33	33	33	33
Total	7,957	7,957	7,957	7,957	7,957	7,957

LAND USE UNIT DEMANDS (LUDS) GENERATED FOR EACH AGENCY

Five years of billing data averaged for "normalized" 2015 demands per agency

Billing data adapted for more detailed land use categories

Unique water users treated as separate land uses

Calculate consumption per acre for each land use

Existing unit demands per land use generated

Sample LUDs Development	Existing Acres	Billing Data (AFY)	LUDs (af/ac/yr)
Residential Very Low (<1 - 2)	271	325	1.20
Residential Low (3 - 7)	4,532	9,365	2.07
Residential Medium (8 - 14)	586	3,006	5.13
Residential High (15 - 24)	611	4,522	7.40
Residential Very High (25+)	62	791	12.85
Commercial	1,777	4,872	2.74
Industrial	5,647	2,115	0.37
Public/Institutional	1,054	2,888	2.74
Parks, Schools, Irrigation	1,041	7,585	7.28
Agriculture	139	2,038	14.68
Ontario Unique Water User #1	54	2,516	46.30
Ontario Unique Water User #2	35	638	18.31
Ontario Unique Water User #3	55	537	9.80

CALCULATING LUDS

UPLAND Unit Demand Development				
CITY OF UPLAND	Existing Acres	Billing Data (AFY)	Calculated LUD (af/ac/yr)	Prevalent Density (du/ac)
Residential Very Low (<1 - 2) [1]	786	1,493	1.90	1.9
Residential Low (3 - 7)[1]	2,811	7,982	2.84	4.3
Residential Medium (8 - 14)[1]	306	1,516	4.95	10.0
Residential High (15 - 24)[2]	319	2,859	8.95	20.0
Residential Very High (25+)[2]	26	360	13.96	31.2
Commercial [3]	685	1,456	2.13	
Industrial[3]	327	351	1.07	
Public/Institutional	124	436	3.52	
Parks, Schools, Irrigation	401	2,355	5.87	
Agriculture	55		0.00	
Upland Unique Water User #1	200	266	1.33	
Upland Unique Water User #2	1	242	242.43	
Upland Unique Water User #3	25	115	4.57	
Upland Unique Water User #4	33	101	3.08	

[1,2] Determining consumption per residential land use				
Land Use	DU from avg and acreage	LUD Correlation	AFY/DU	Total AFY
Single Family Residential: Very Low	1,494	151% avg DU LUD	1.00	1,493
SFR: Low Density	12,085	100% DU LUD	0.66	7,982
SFR: Med Density	3,061	75% DU LUD	0.50	1,516
Total dwelling unit (DU)	16,640			10,991
AFY/DU LUD	0.660			
Multi-family Residential: High Density	6,388	Same LUD/DU	0.448	2,859
MFR: VH	805		0.448	360
Total DU	7,194			3,219
AFY/DU LUD	0.448			

[3] Commercial and Industrial combined in billing. Separate by using common LUD:

Land Use	Acreage	Consumption	LUD Applied*	AFY**
Commercial	685	1,807	2.13	1,456
Industrial	327	0		351

*IRWD and EBMUD typical LUD for commercial plus 25% to reflect Inland Empire

**Com acreage x LUD; balance applied to Ind; results used for "Billing Data"

ADJUSTMENT FACTORS

- Intensification Estimate (6% by 2040)

+

- Climate Change (3% by 2040 applied to residential, parks, agriculture)

+

- Unbilled Water Estimate (provided by Member Agencies 2% to 9% annually)

-

- Passive Conservation (2.8%)

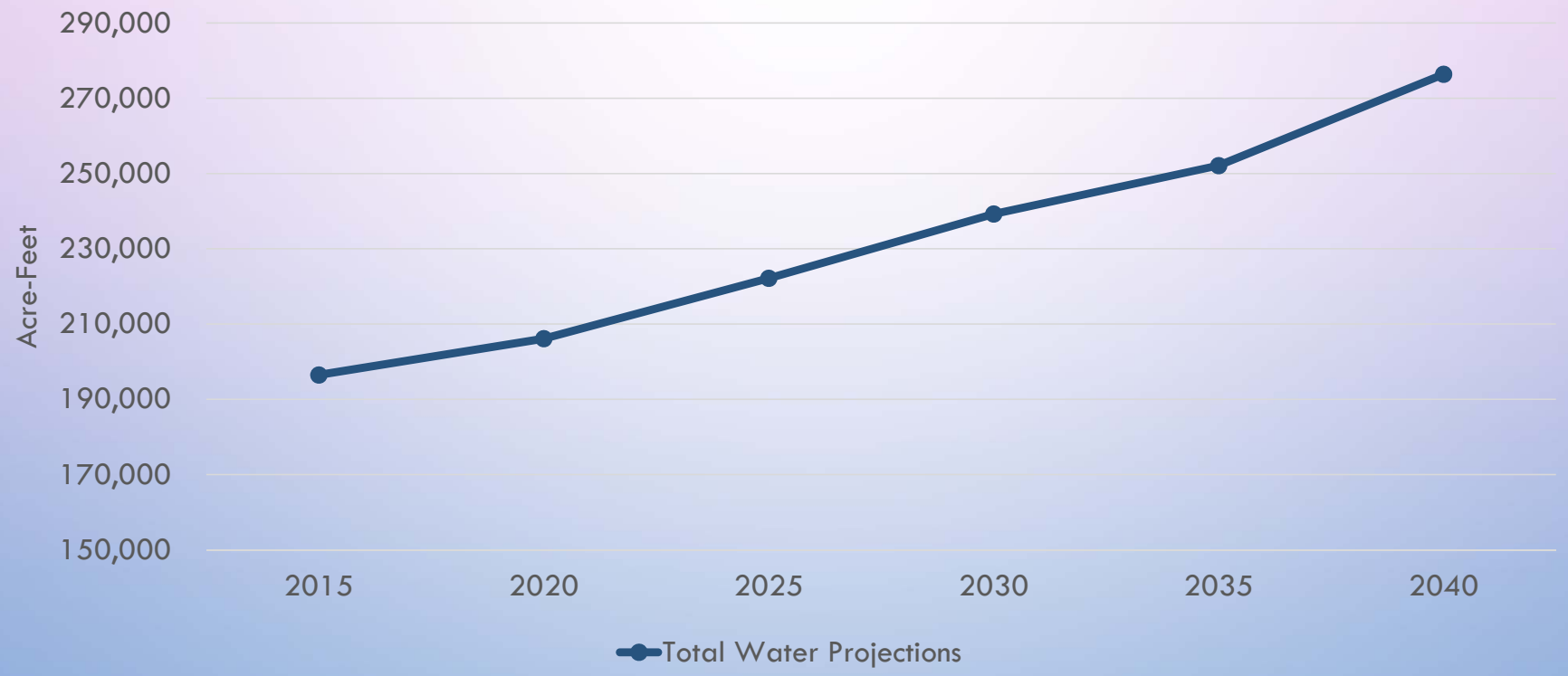
ADJUSTMENT FACTORS FOR EACH YEAR, LAND USE, AND AGENCY

Sample Purveyor	Total Adjustment Factor					
Land Uses	2015	2020	2025	2030	2035	2040
Very Low Density (<1-2 du/ac)	4.00%	5.24%	6.48%	7.72%	8.96%	10.20%
Low Density (2.1-7 du/ac)	4.00%	5.24%	6.48%	7.72%	8.96%	10.20%
Medium Density (8-14 du/ac)	4.00%	5.24%	6.48%	7.72%	8.96%	10.20%
High Density (15-24 du/ac)	4.00%	5.24%	6.48%	7.72%	8.96%	10.20%
Very High (25+ du/ac)	4.00%	4.64%	5.28%	5.92%	6.56%	7.20%
Commercial	4.00%	4.64%	5.28%	5.92%	6.56%	7.20%
Industrial	4.00%	4.64%	5.28%	5.92%	6.56%	7.20%
Public/Institutional	4.00%	4.64%	5.28%	5.92%	6.56%	7.20%
Parks, Schools, Irrigation	4.00%	5.24%	6.48%	7.72%	8.96%	10.20%
Agriculture	4.00%	5.24%	6.48%	7.72%	8.96%	10.20%
Unique Water User #1	4.00%	4.64%	5.28%	5.92%	6.56%	7.20%
Unique Water User #2	4.00%	4.64%	5.28%	5.92%	6.56%	7.20%
Unique Water User #3	4.00%	4.64%	5.28%	5.92%	6.56%	7.20%
Unique Water User #4	4.00%	4.64%	5.28%	5.92%	6.56%	7.20%

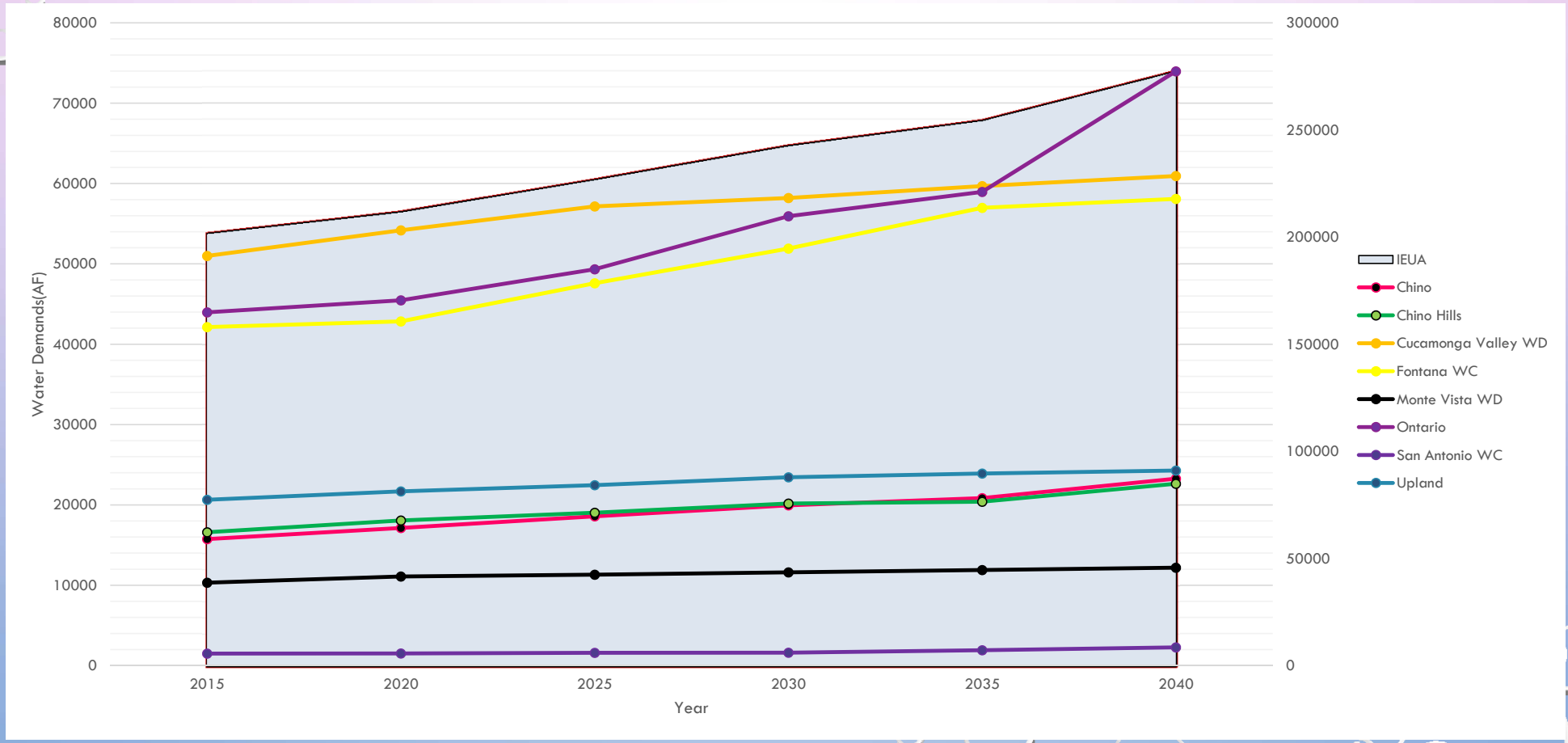
LUDS APPLIED TO ACREAGES FOR DEMANDS

Total IEUA Water Demands (AF)						
Land Use (du/ac)	2015	2020	2025	2030	2035	2040
Residential Very Low (<1 - 2)	15,761	16,753	18,097	18,557	18,778	21,306
Residential Low (3 - 7)	73,060	75,949	80,499	84,647	88,825	94,201
Residential Medium (8 - 14)	16,012	18,376	20,967	24,117	25,807	33,263
Residential High (15 - 24)	18,610	21,212	25,739	27,062	27,753	28,829
Residential Very High (25+)	2,633	2,904	3,300	5,104	6,009	8,294
Commercial	19,607	19,922	20,885	23,862	26,646	29,031
Industrial	6,974	7,601	8,143	8,317	8,436	8,529
Public/Institutional	7,286	7,354	7,628	7,746	8,139	8,257
Parks, Schools, Irrigation	32,891	33,609	33,755	35,988	36,974	38,926
Agriculture	2,274	1,466	1,187	559	310	23
Unique Water User #1	3,848	3,872	3,879	3,902	3,926	3,949
Unique Water User #2	1,488	1,497	1,506	1,515	1,524	1,534
Unique Water User #3	1,068	1,075	1,081	1,088	1,094	1,101
Unique Water User #4	368	370	373	375	377	379
	201,880	211,960	227,039	242,839	254,598	277,622

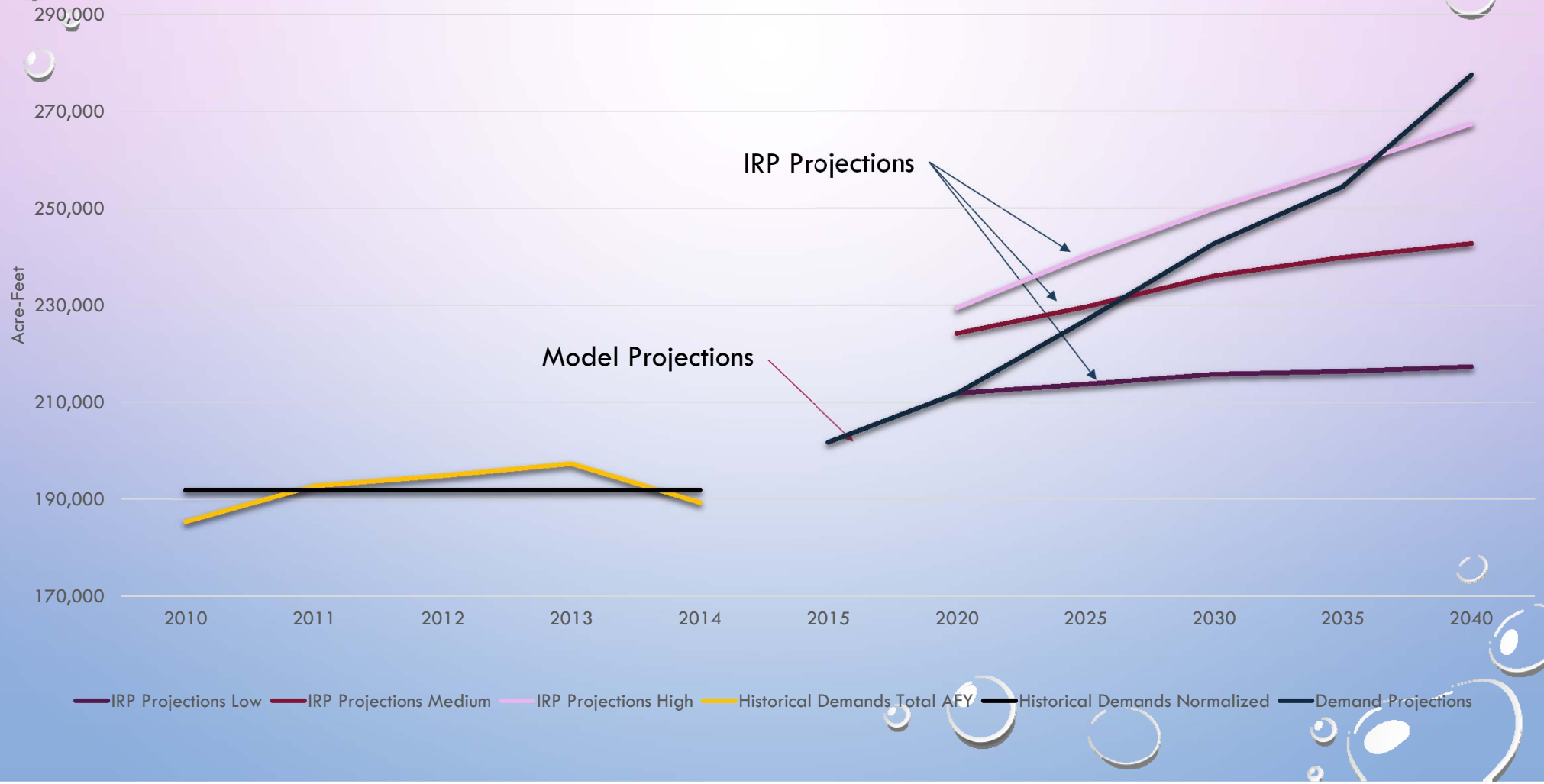
RESULTING DEMAND PROJECTIONS



MEMBER AGENCY PROJECTIONS



DEMAND COMPARISON



USING DEMAND MODEL PROJECTIONS IN YOUR UWMP

Demand Model Land Use Categories

- Very low density residential
- Low density
- Medium density
- High density
- Very high density
- Commercial
- Industrial
- Public/institutional
- Parks, schools, irrigation
- Agricultural
- Unique users

DWR's UWMP Use Types

- Single family
- Multi-family
- Commercial
- Industrial
- Institutional/governmental
- Landscape
- Agricultural irrigation
- Wetlands or wildlife habitat
- Sales/transfers/exchanges
- Losses

For DWR UWMP Table 4-2

DEMONSTRATION OF LAND USE BASED DEMAND MODEL

Land use based demand model examples

- Changes to LUDs
- Changes to Adjustment Factors
- Changes to Land Use

BACKUP

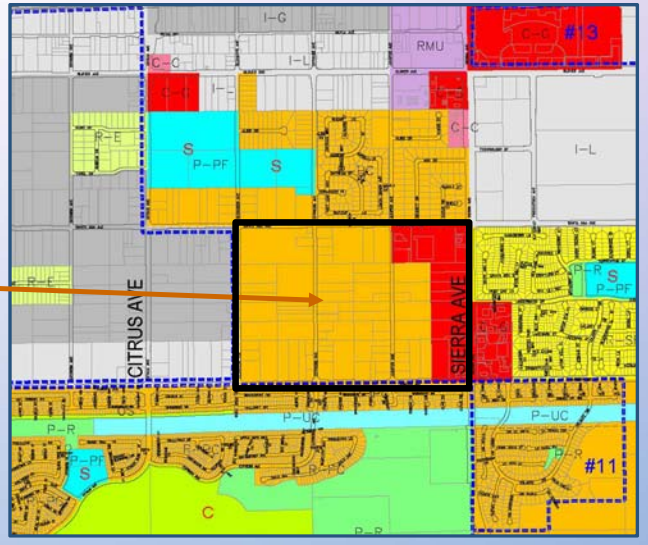
LAND USE TRENDS ASSOCIATED WITH INTENSIFICATION ADJUSTMENT

- Economy is gradually improving after Great Recession
- Industrial growth is rapid with large warehousing and distribution buildings
- When large industrial parcels are build out, consolidation will occur
- Office vacancies are high with no construction. When vacancies decrease, higher densities will be built.
- Residential densities are at the highest end of range that developers can get approved
- Very Low density neighborhoods in Fontana will consolidate with Low density constructed per general plan
- As land values increase, higher intensity of uses will occur (e.g., lower vacancy rates, higher employees per acre, redevelopment with similar but denser use, repurposing of retail and industrial spaces, etc.)
- Virtually no Very Low and Low density residential construction except in Ontario's NMC and Chino's The Preserve and College Park
- Golf courses or portions are converting to Medium and High density residential

STRIP COMMERCIAL USES ARE DENSER

NEW DOWNTOWNS ARE “LIFESTYLE CENTERS”

FONTANA EXAMPLE OF CHANGING LAND USES (LU): 146 ACRES RESIDENTIAL

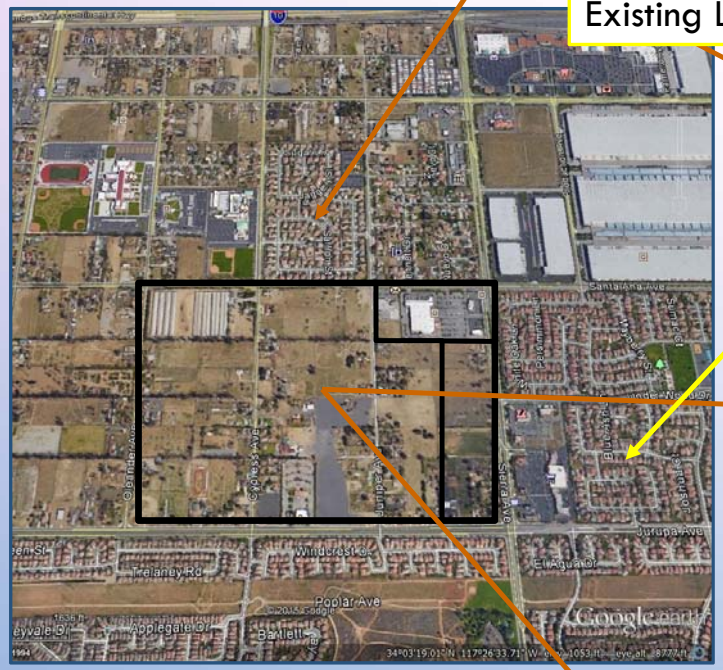


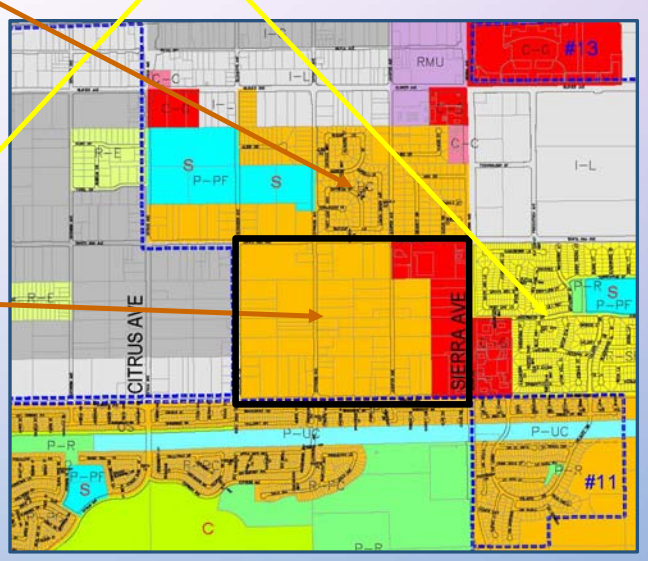
Existing LU: Very low density residential (0-2 du/ac) – 146 acres
Future LU: Residential Planned Community (3-6.4 du/ac) our "Low"

FONTANA EXAMPLE: ADJACENT DENSITIES

Existing LU: 2.1–7 du/ac; GP: 3-6.4 du/ac

Existing LU: 2.1–7 du/ac; GP: 2.1-5 du/ac





Existing LU: Very low density residential (0-2 du/ac)– 146 acres
Future LU: Res Planned Community (3-6.4 du/ac)