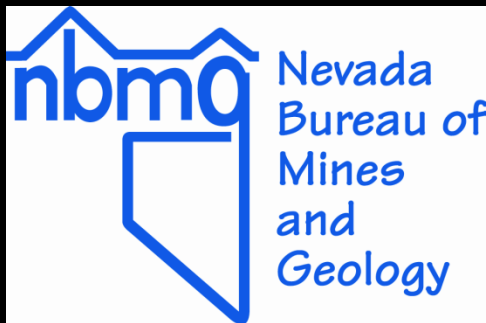


Potential URM's in Nevada

Presentation for the Nevada Earthquake Safety Council

9 November 2011

by Jonathan G. Price, Craig M. dePolo, and Gary L. Johnson
Nevada Bureau of Mines and Geology



Nevada Public Agency
Insurance Pool –
Wayne Carlson





San Marin Hotel, an unreinforced masonry building (URM) that collapsed during the Wells, Nevada earthquake

before the 21 February 2008 magnitude 6.0 earthquake

front and west side



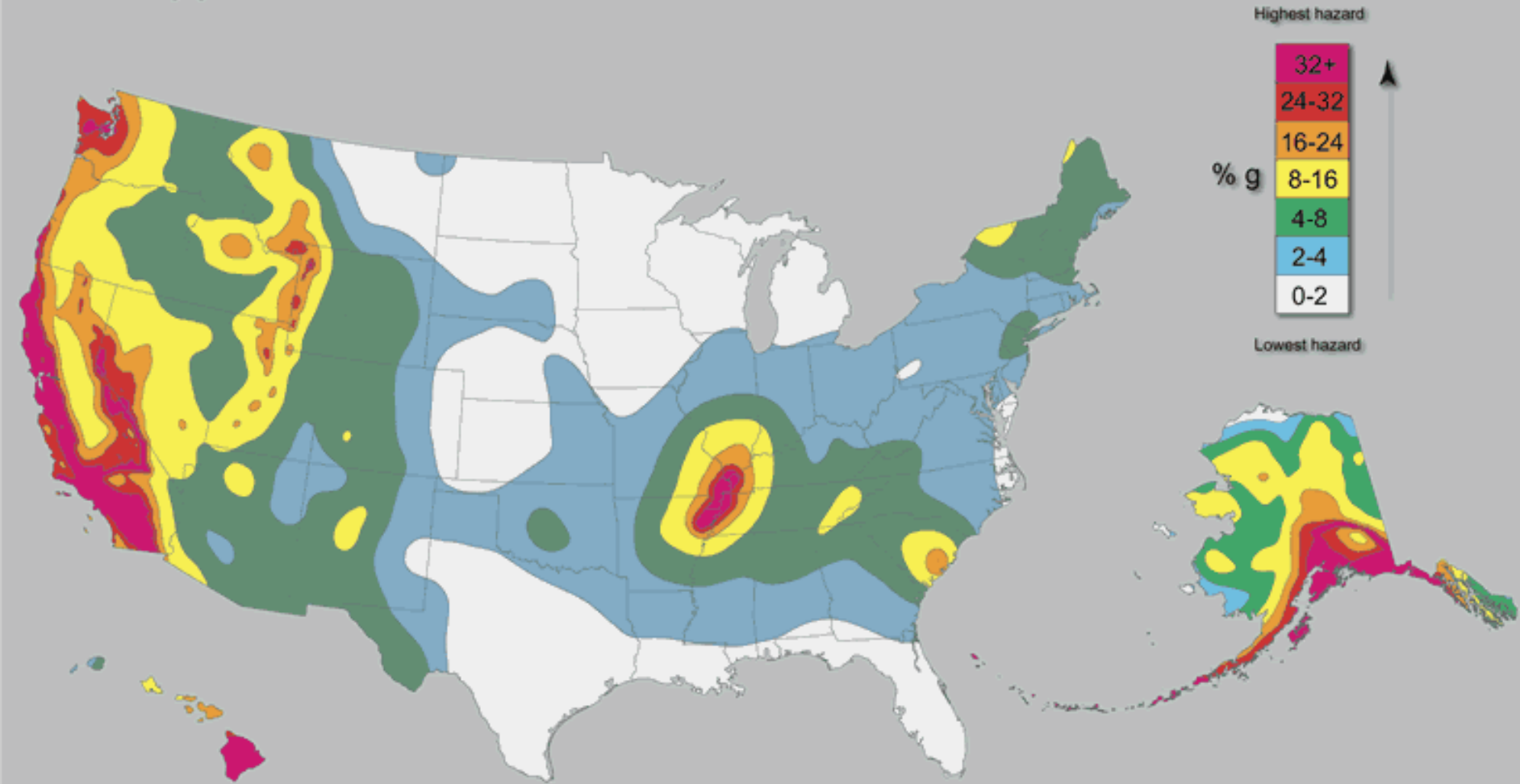
after the earthquake

front



back

See <http://www.nbmng.unr.edu/Pubs/sp/sp36/>



Background:

Nevada is one of the most earthquake-prone states.

Age of Latest Fault Rupture

< 150 years (historical)

< 15,000 years

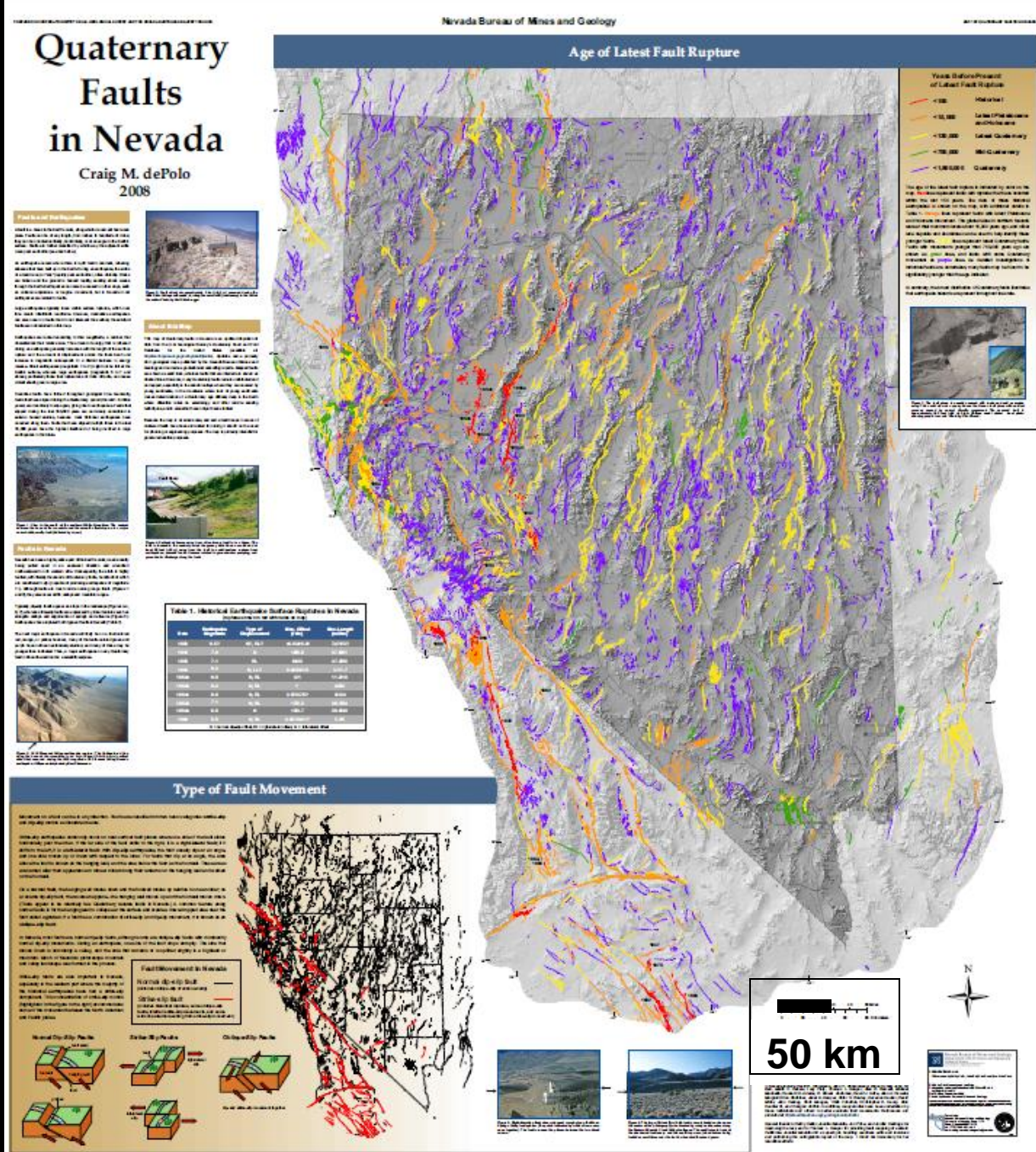
< 130,000 years

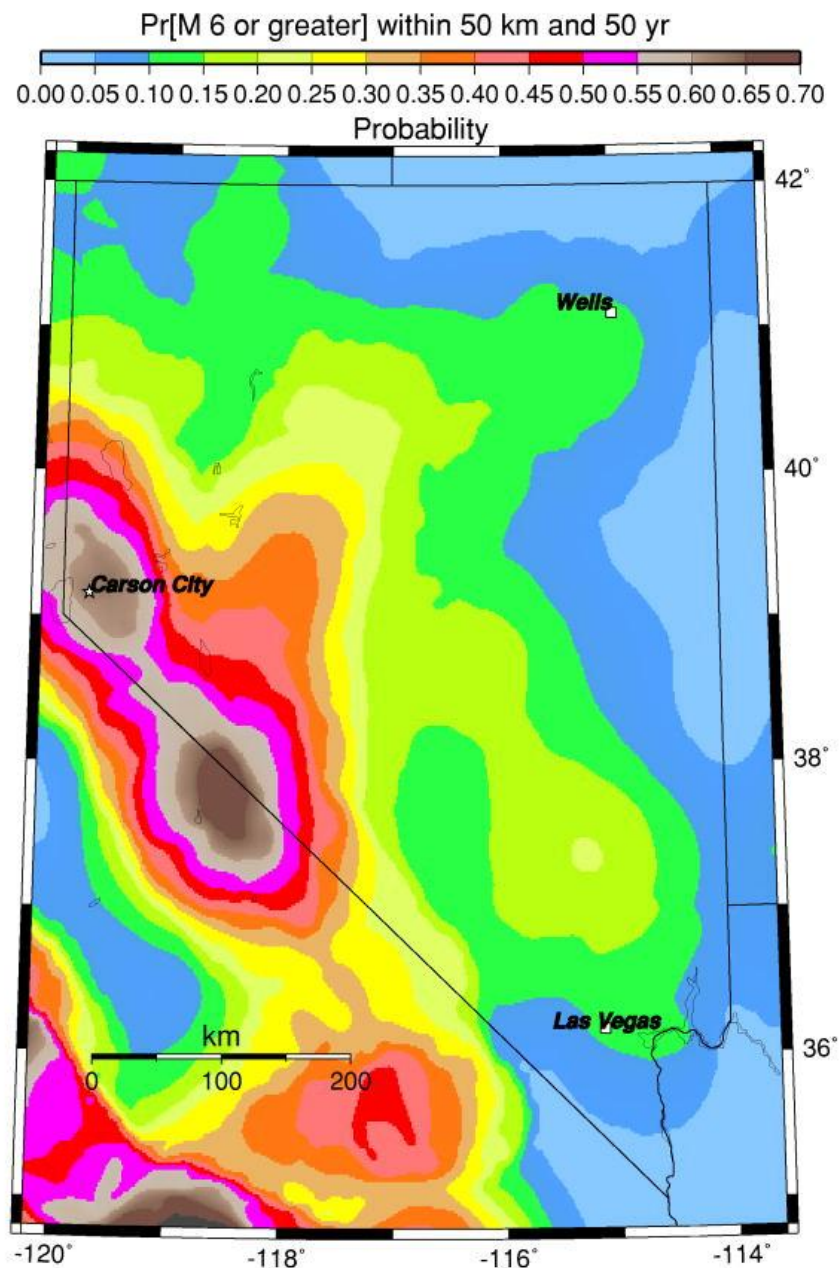
< 750,000 years

< 1,800,000 years
(Quaternary)

There are active faults nearly everywhere in Nevada. A magnitude 6.0 earthquake can occur anywhere in Nevada.

www.nbmng.unr.edu





“What happens in Las Vegas stays in Las Vegas,” but what happened in Wells can happen anywhere in Nevada.

Map by the USGS showing the probability of an earthquake of magnitude 6.0 (the size of the 21 February 2008 earthquake at Wells) or greater occurring within 50 kilometers (31 miles) in 50 years.

See <http://www.nbmng.unr.edu/Pubs/sp/sp36/>

HAZUS estimates for total economic loss from a magnitude 6.0 earthquake and probability of an earthquake of this magnitude or greater occurring within 50 years and within 50 km of the community.

Community	Total Economic Loss	Probability in 50 years within 50 km
Las Vegas	\$7.2 billion	12%
Reno	\$1.9 billion	67%
Sparks	\$1.8 billion	67%
Incline Village	\$510 million	60 to 70%
Elko	\$160 million	10 to 15%
Fallon	\$110 million	35%
Wells	\$30 million	9%

Total economic loss is from HAZUS. Probabilities are from the USGS at <http://eqint.cr.usgs.gov/eqprob/2002/index.php> .

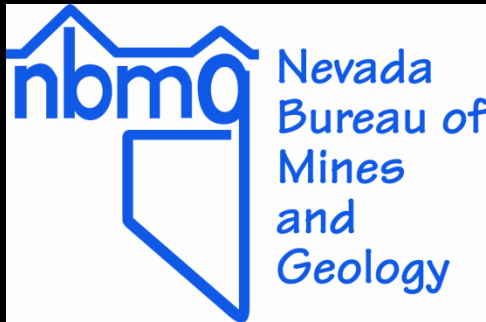
Potential URMs in Nevada

URMs are structures that commonly collapse in large earthquakes.

This is a problem of life safety and economic loss.

There are tens of thousands of potential URMs in Nevada.

We can reduce the risks from URMs.



Nevada Public Agency
Insurance Pool –
Wayne Carlson



Unreinforced masonry building (URM)
that collapsed during the Wells
earthquake on 21 February 2008



View from back, 20 May 2009



View from front, 20 May 2009

See <http://www.nbmj.unr.edu/Pubs/sp/sp36/>

Definition of potential unreinforced masonry (URM) buildings in Nevada:

buildings listed by County Assessors or State Public Works as built before 1974 with brick, stone, or block masonry structure.

Caution: This is a preliminary study based on data provided by the County Assessors and the State of Nevada. We know there are errors in the database:

URMs missed - not recorded as masonry structures

URMs missed – ones on federal or Indian lands

URMs counted due to wrong building type in the database

Wrong locations due to poor address coding

Misidentifications due to lack of construction date

Buildings that may have been seismically retrofitted

Buildings that have been removed.

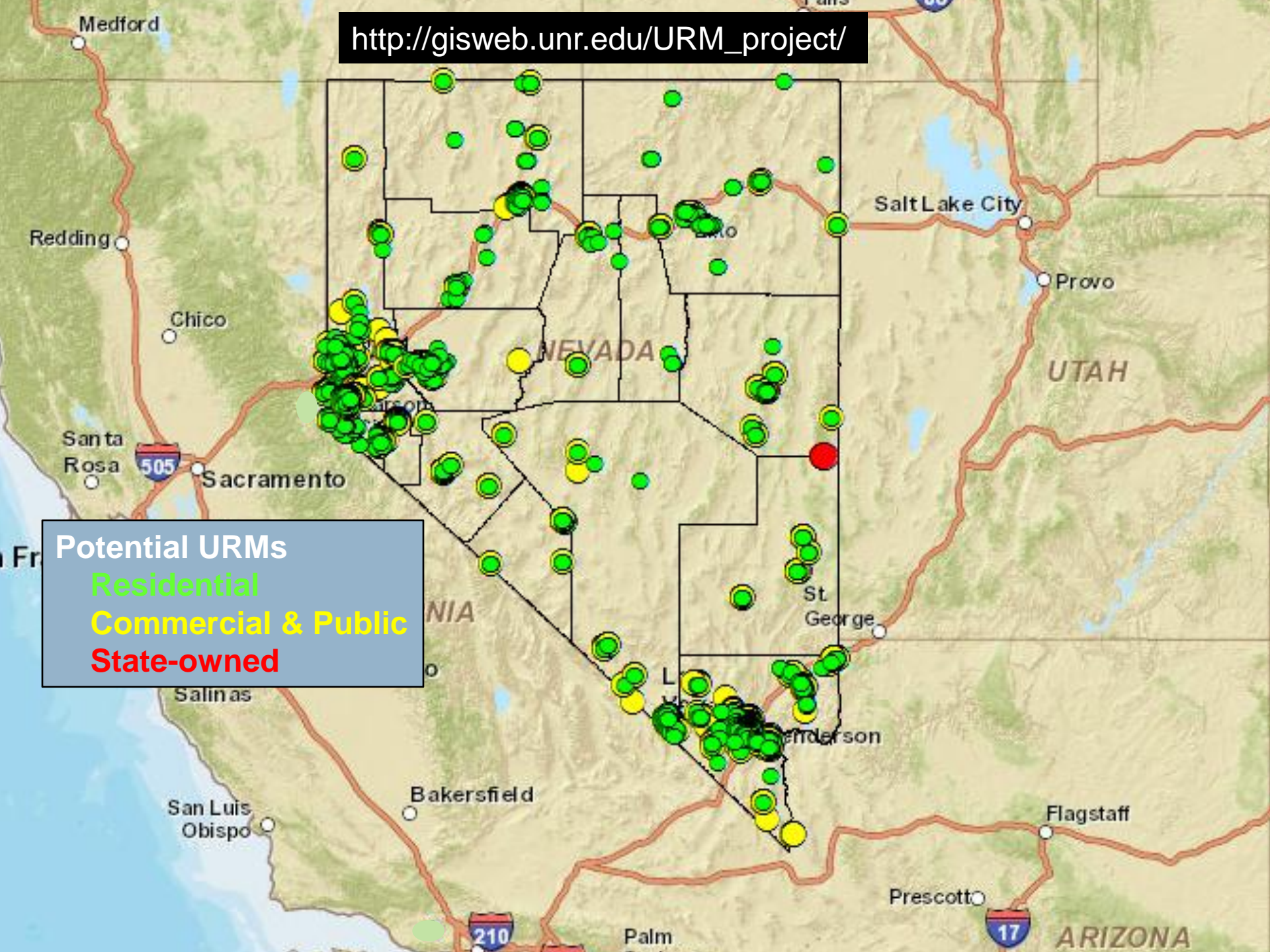
Recommendation 1 (draft): Jurisdictions (cities, counties, state) should use this County Assessors' data to follow up with on-the-ground inspections and checks of building plans. Individuals should determine if their buildings are URMs.

Potential URMs in Nevada – totals*

7,354	Residential
16,145	Commercial & Public (city and county)
<u>98</u>	State-owned
23,597	TOTAL*

* The total does not include buildings owned by the federal government.

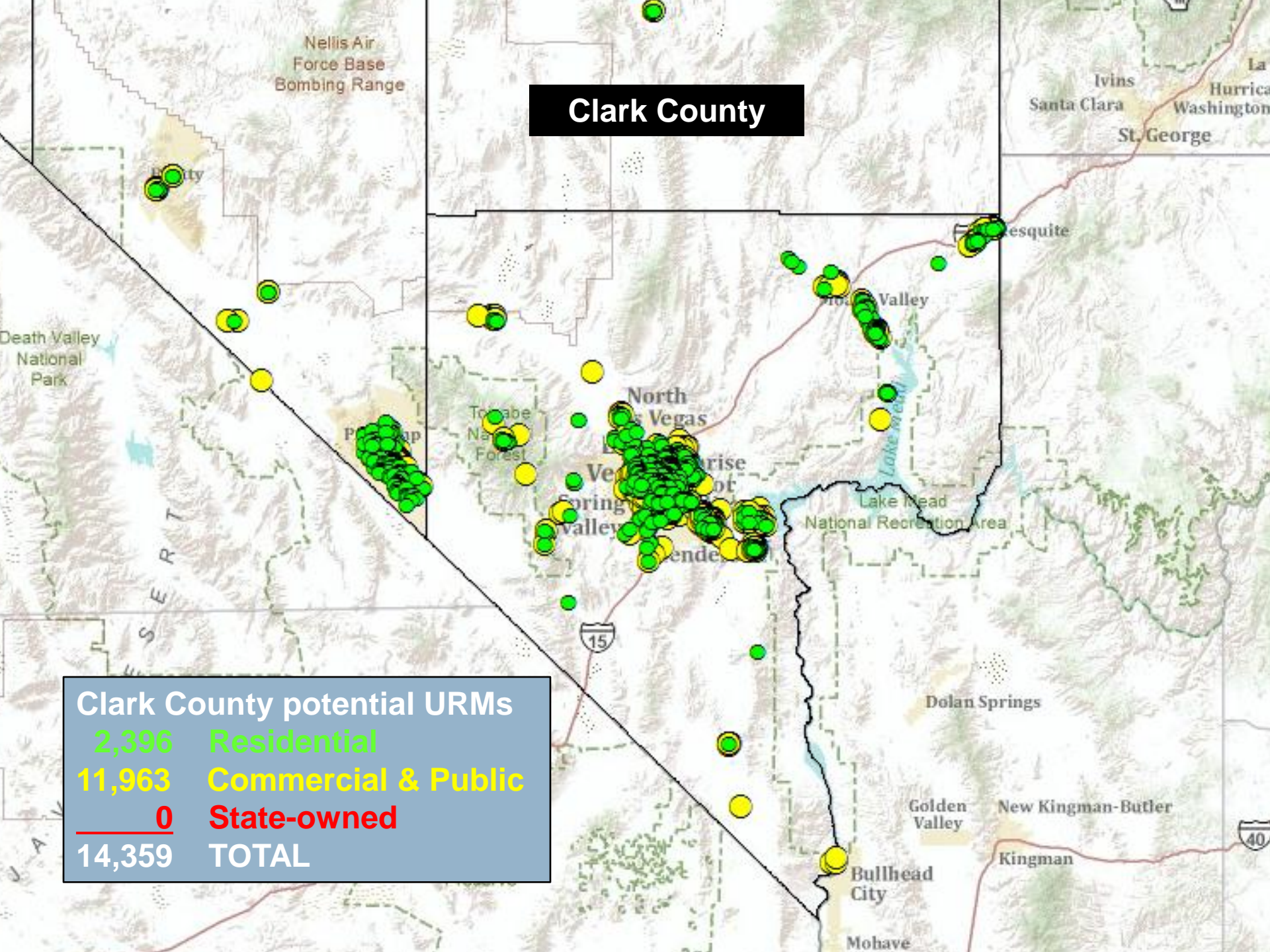
http://gisweb.unr.edu/URM_project/



Clark County

Clark County potential URM's

2,396	Residential
11,963	Commercial & Public
<u>0</u>	State-owned
14,359	TOTAL



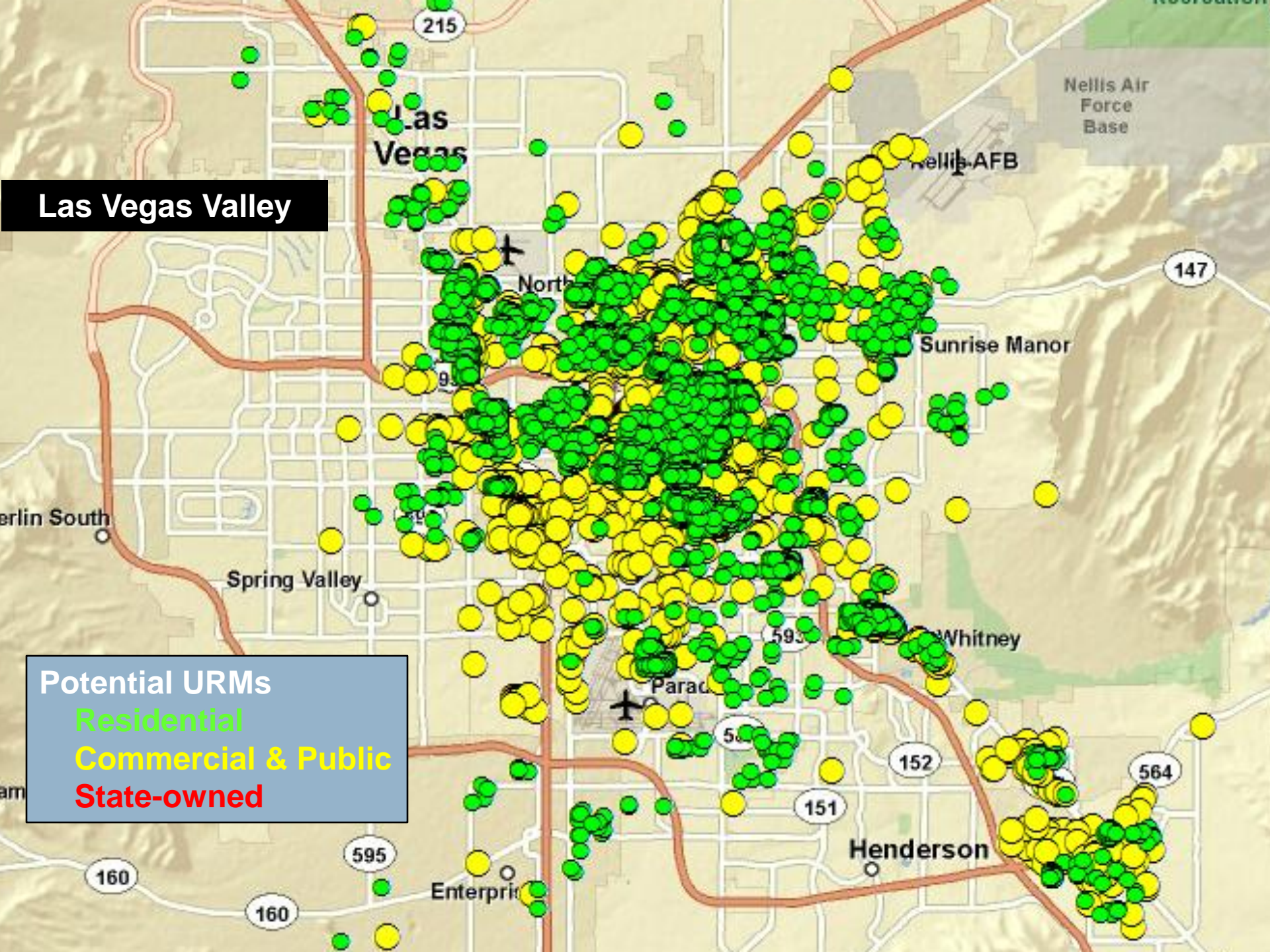
Las Vegas Valley

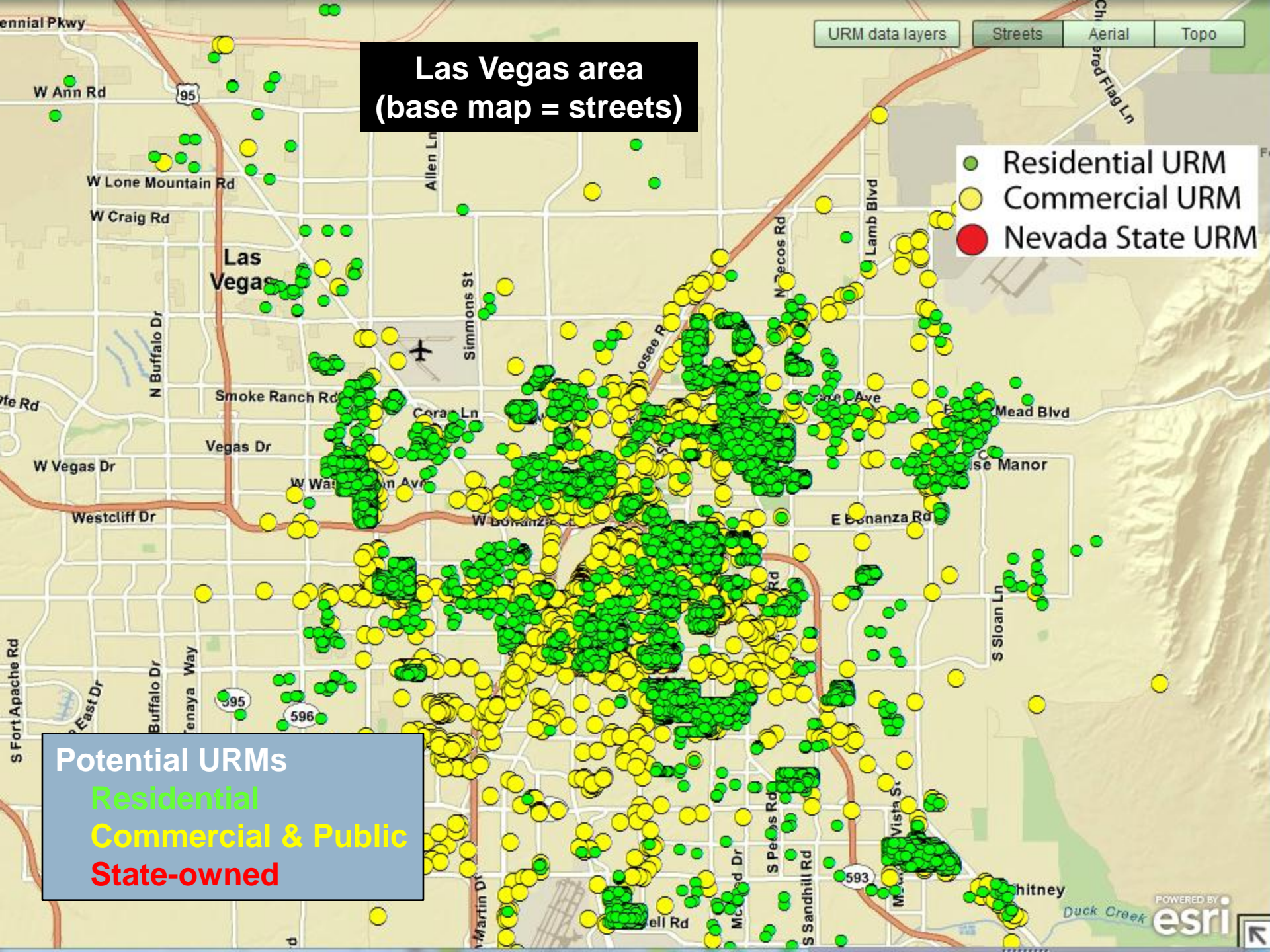
Potential URM

Residential

Commercial & Public

State-owned





Las Vegas area
(base map = streets)

- Residential URM
- Commercial URM
- Nevada State URM

Potential URM
Residential
Commercial & Public
State-owned

**Las Vegas area
(base map = topography)**

URM data layers

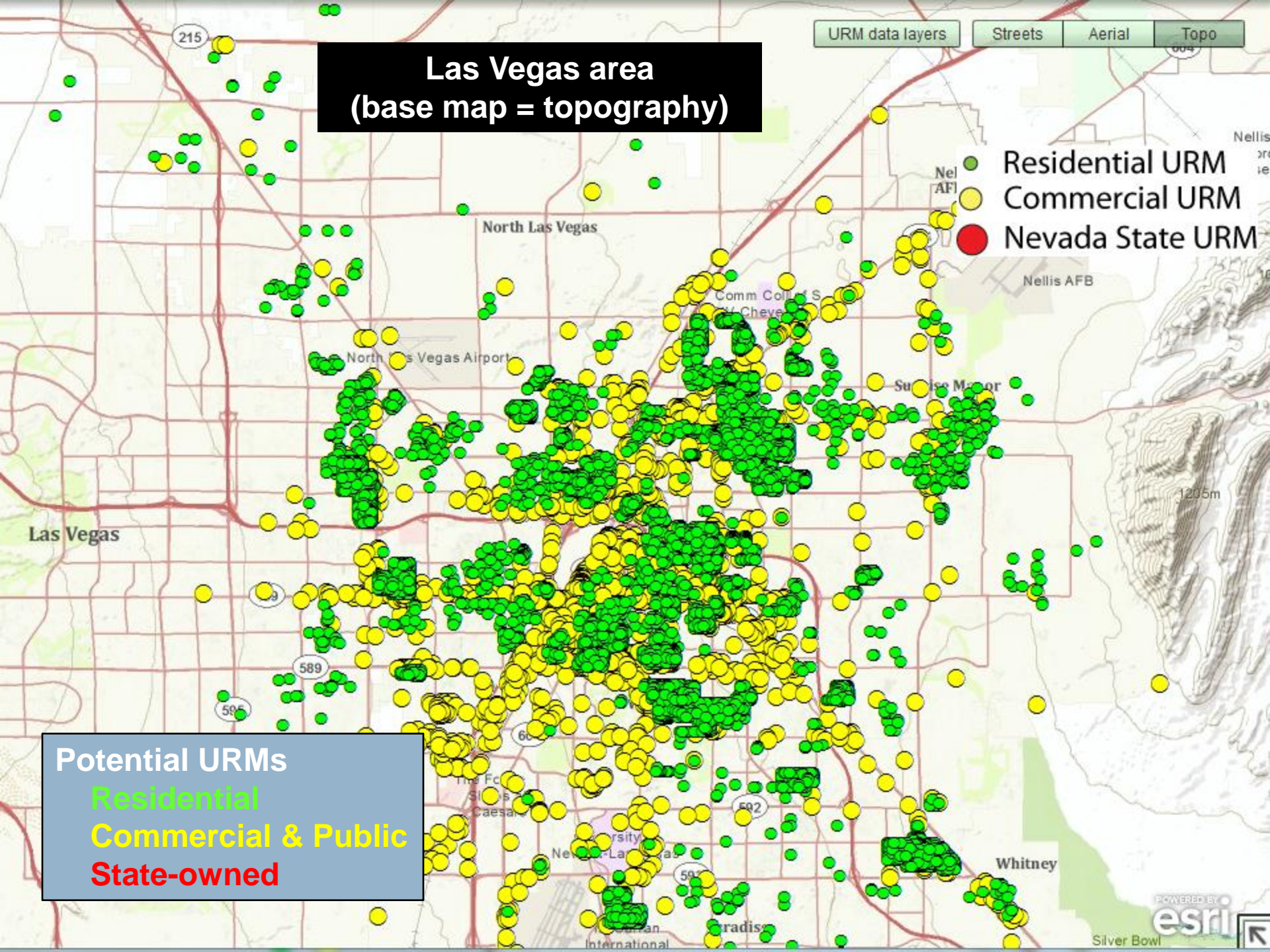
Streets

Aerial

Topo

- Residential URM
- Commercial URM
- Nevada State URM

Potential URMs
Residential
Commercial & Public
State-owned



URM data layers

Streets

Aerial

Topo

Las Vegas area
(base map = aerial photograph)

- Residential URM
- Commercial URM
- Nevada State URM

Potential URMs

Residential

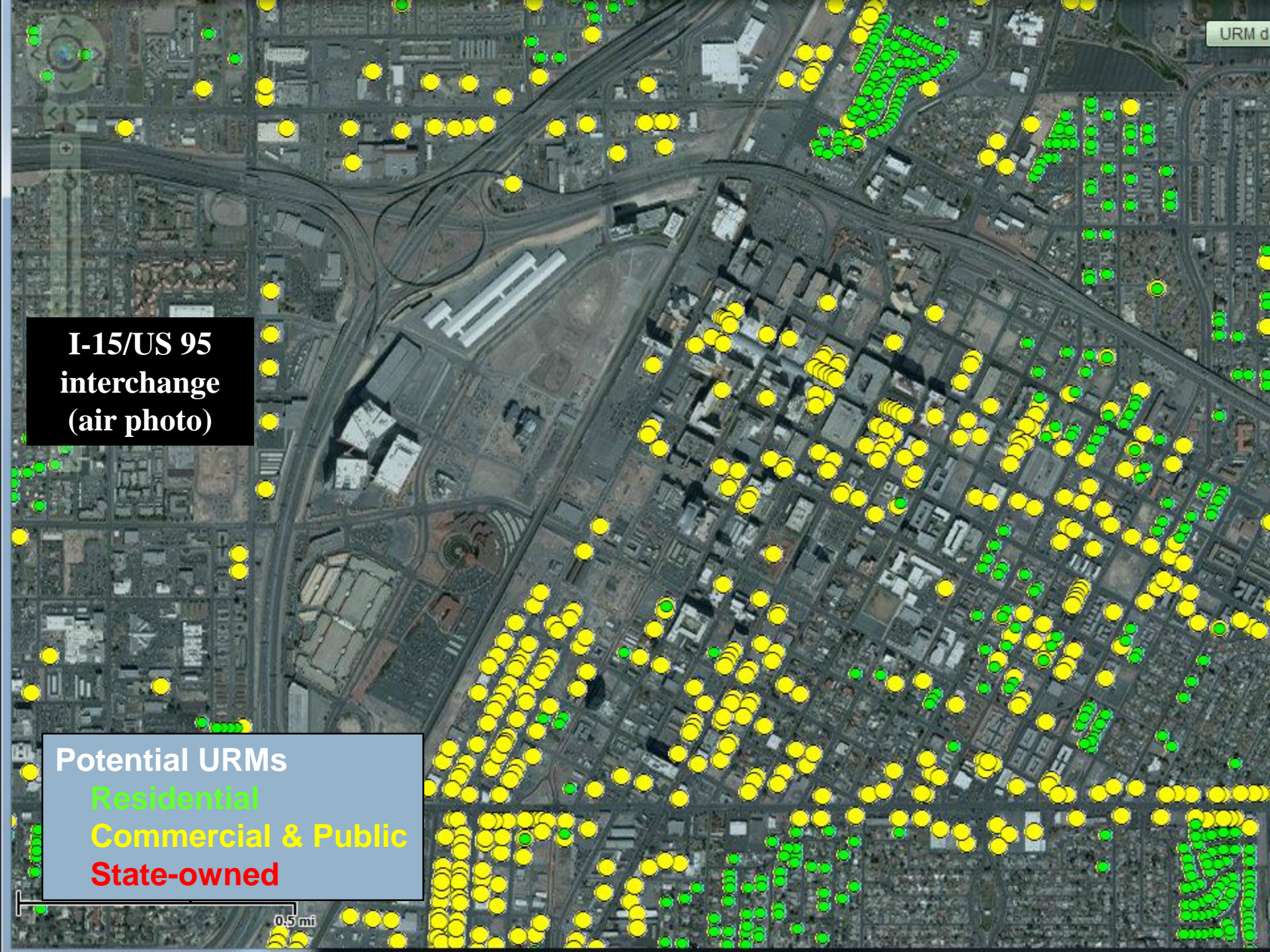
Commercial & Public

State-owned

I-15/US 95
interchange
(air photo)

Potential URMs
Residential
Commercial & Public
State-owned

0.5 mi



**I-15/US 95
interchange
(topo base)**

Potential URM's
Residential
Commercial & Public
State-owned

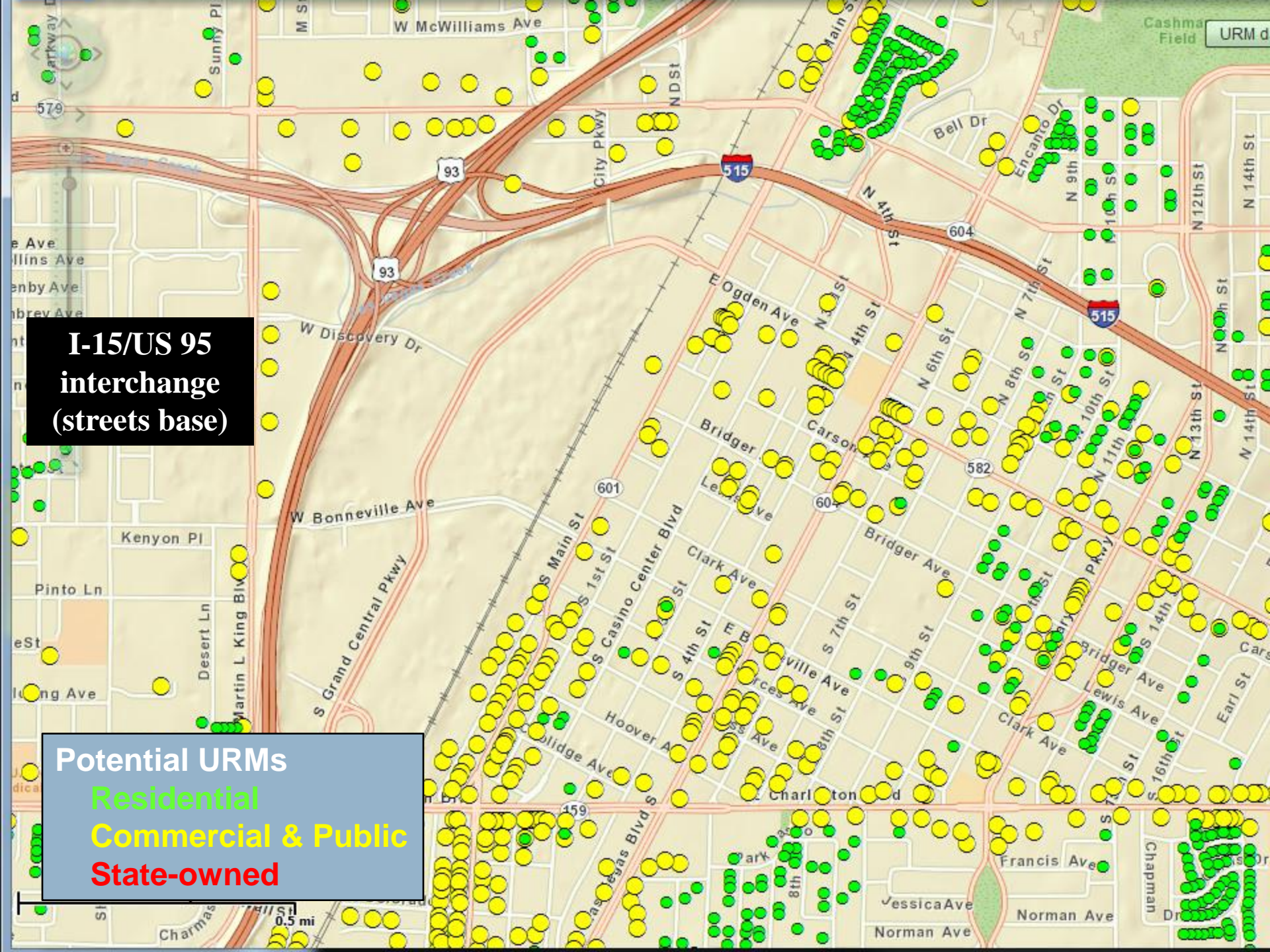
**I-15/US 95
interchange
(streets base)**

Potential URM

Residential

Commercial & Public

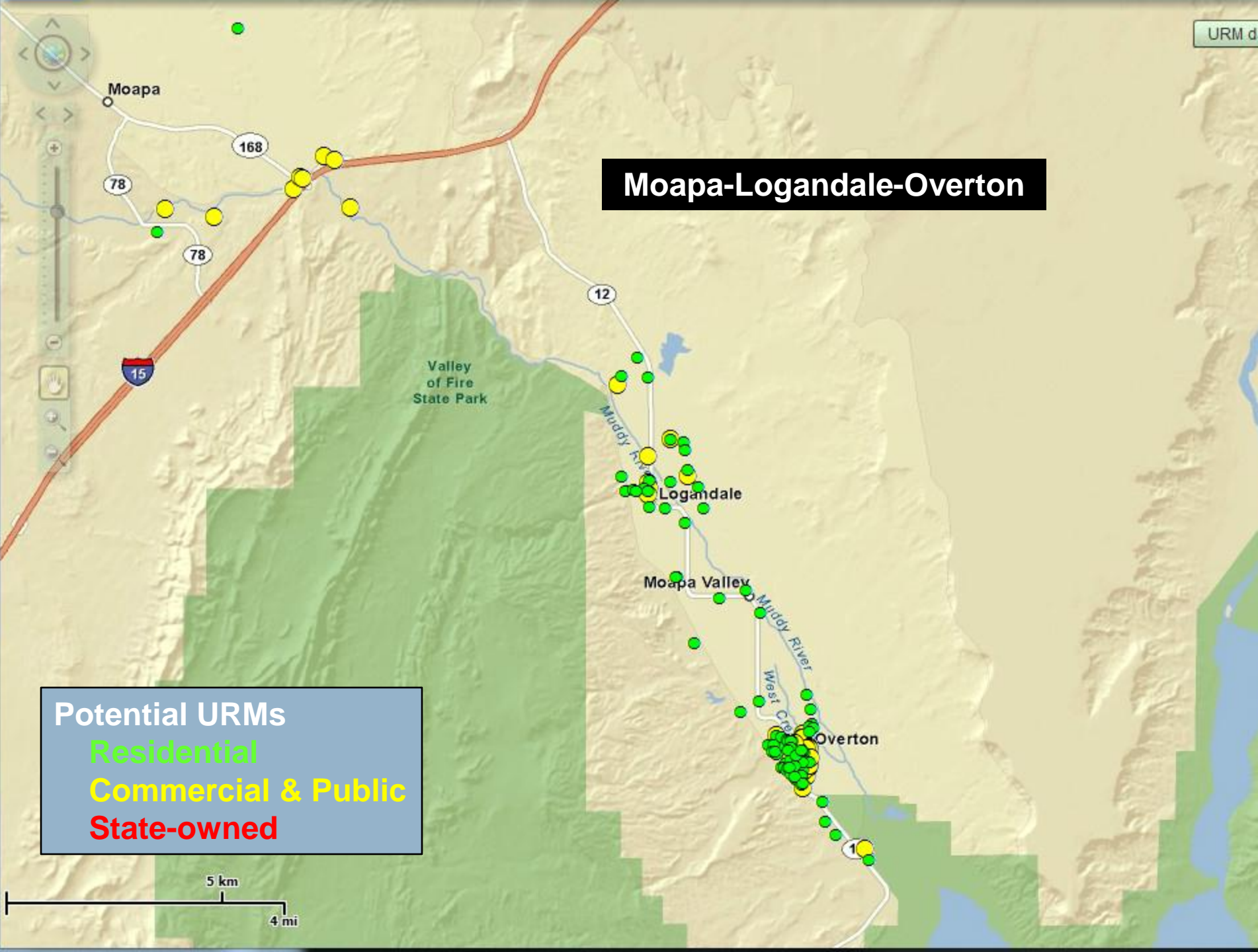
State-owned



Moapa-Logandale-Overton

Potential URM

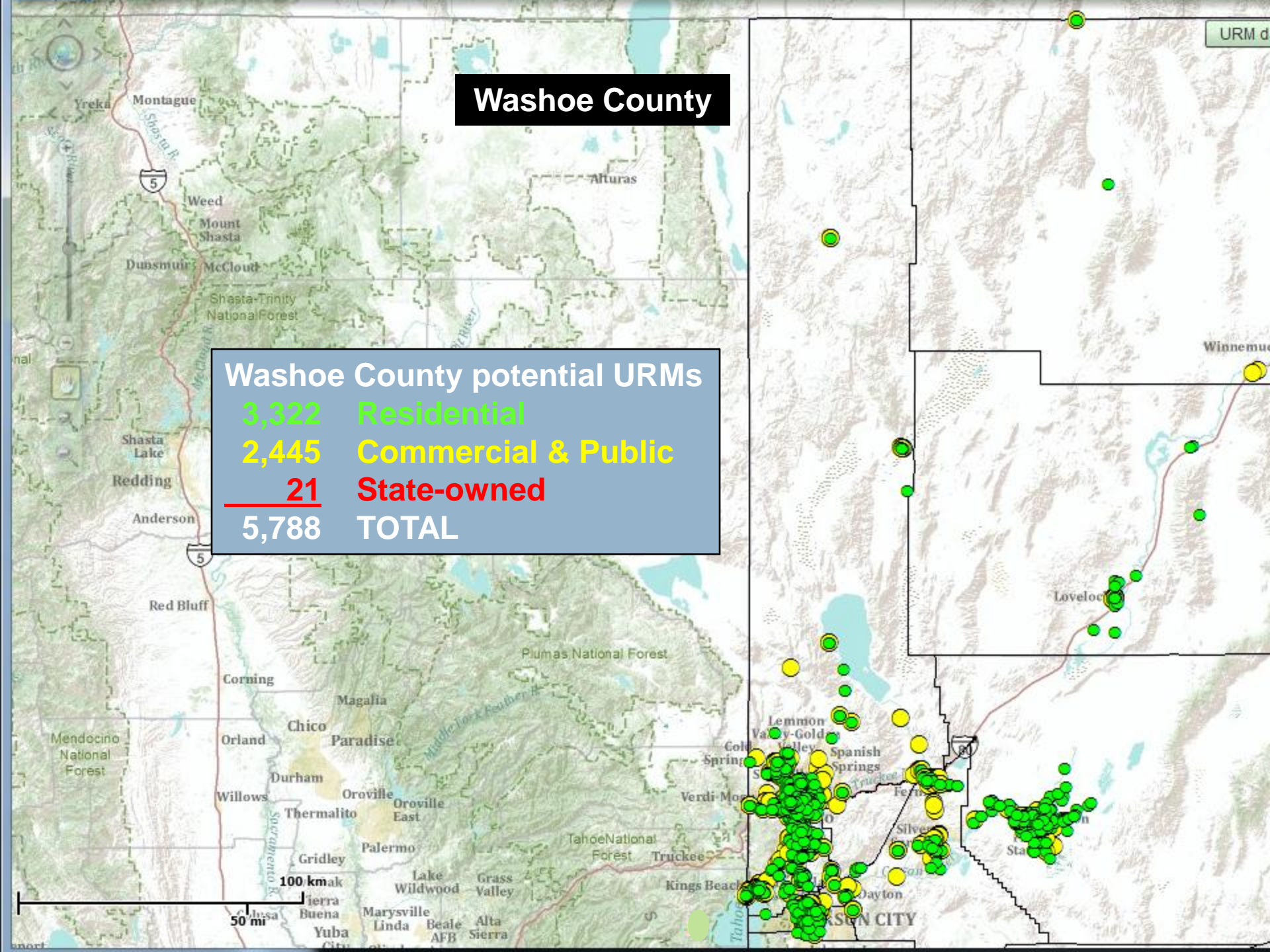
- Residential
- Commercial & Public
- State-owned

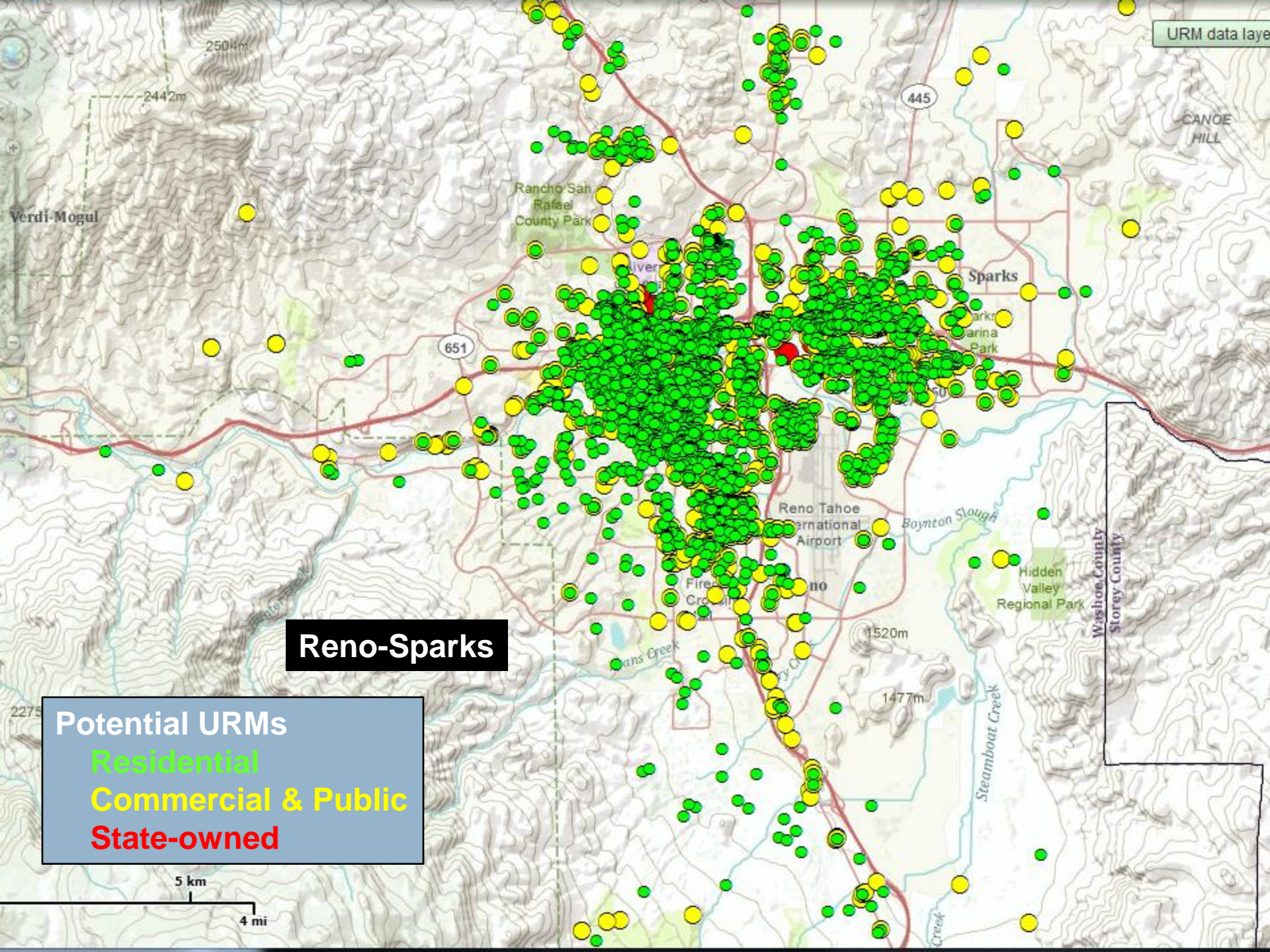


Washoe County

Washoe County potential URM

3,322	Residential
2,445	Commercial & Public
<u>21</u>	State-owned
5,788	TOTAL





Reno-Sparks

Potential URMs

- Residential
- Commercial & Public
- State-owned

5 km
4 mi

Observations:

Because URMs are mostly 50+ years old, many have deteriorated and need maintenance. Some may have been damaged from shaking during previous distant or small earthquakes.









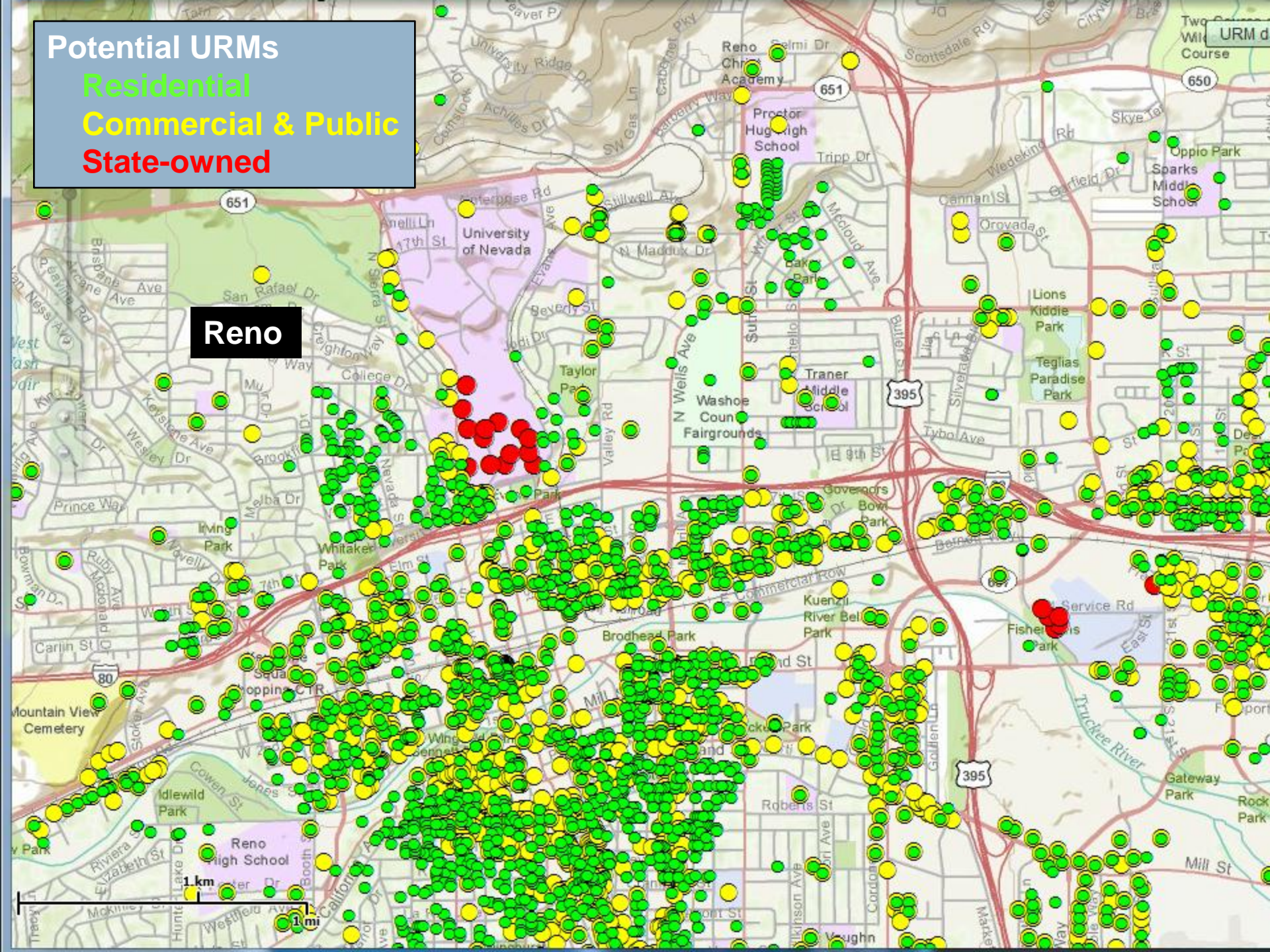
Potential URM

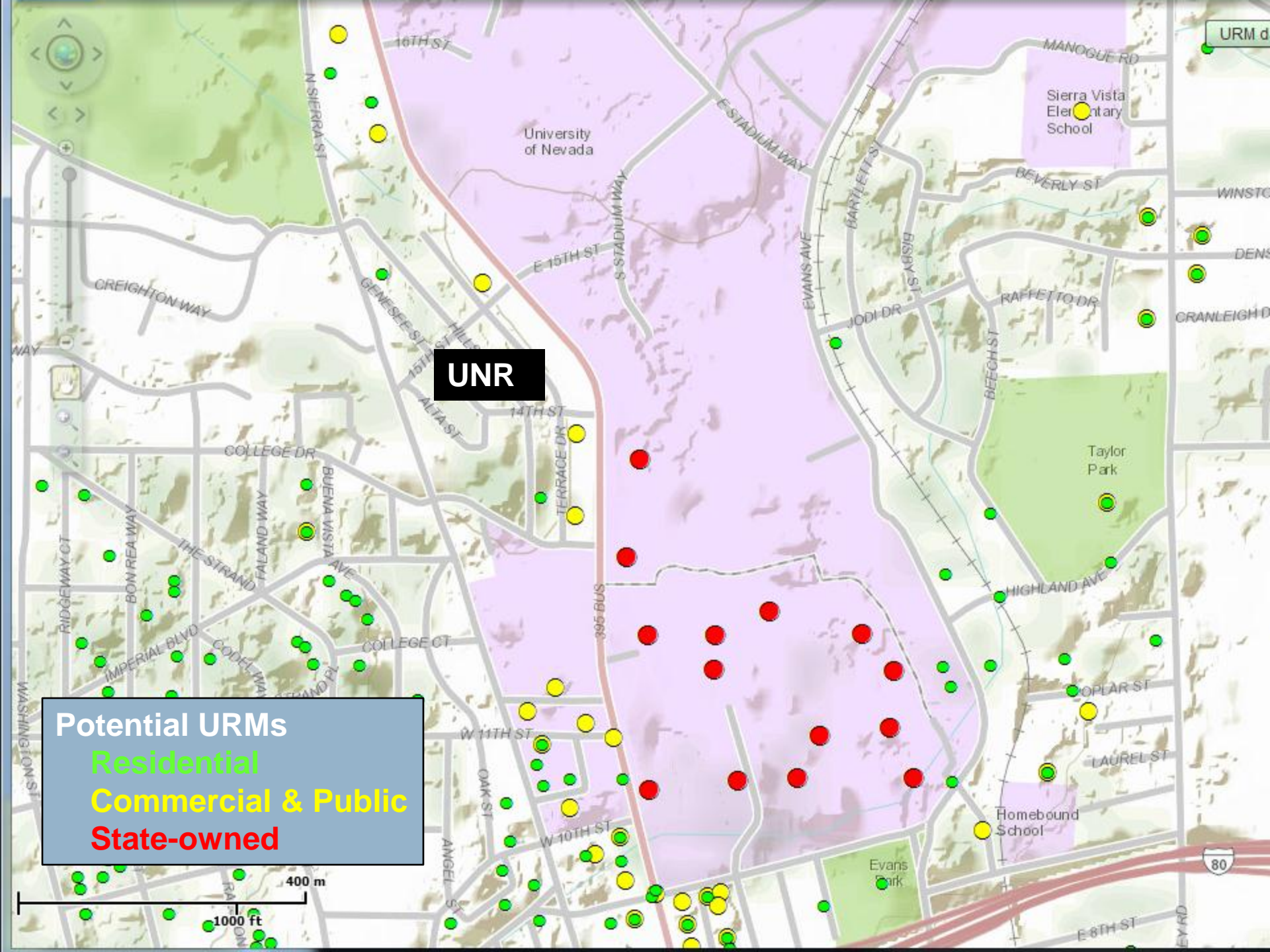
Residential

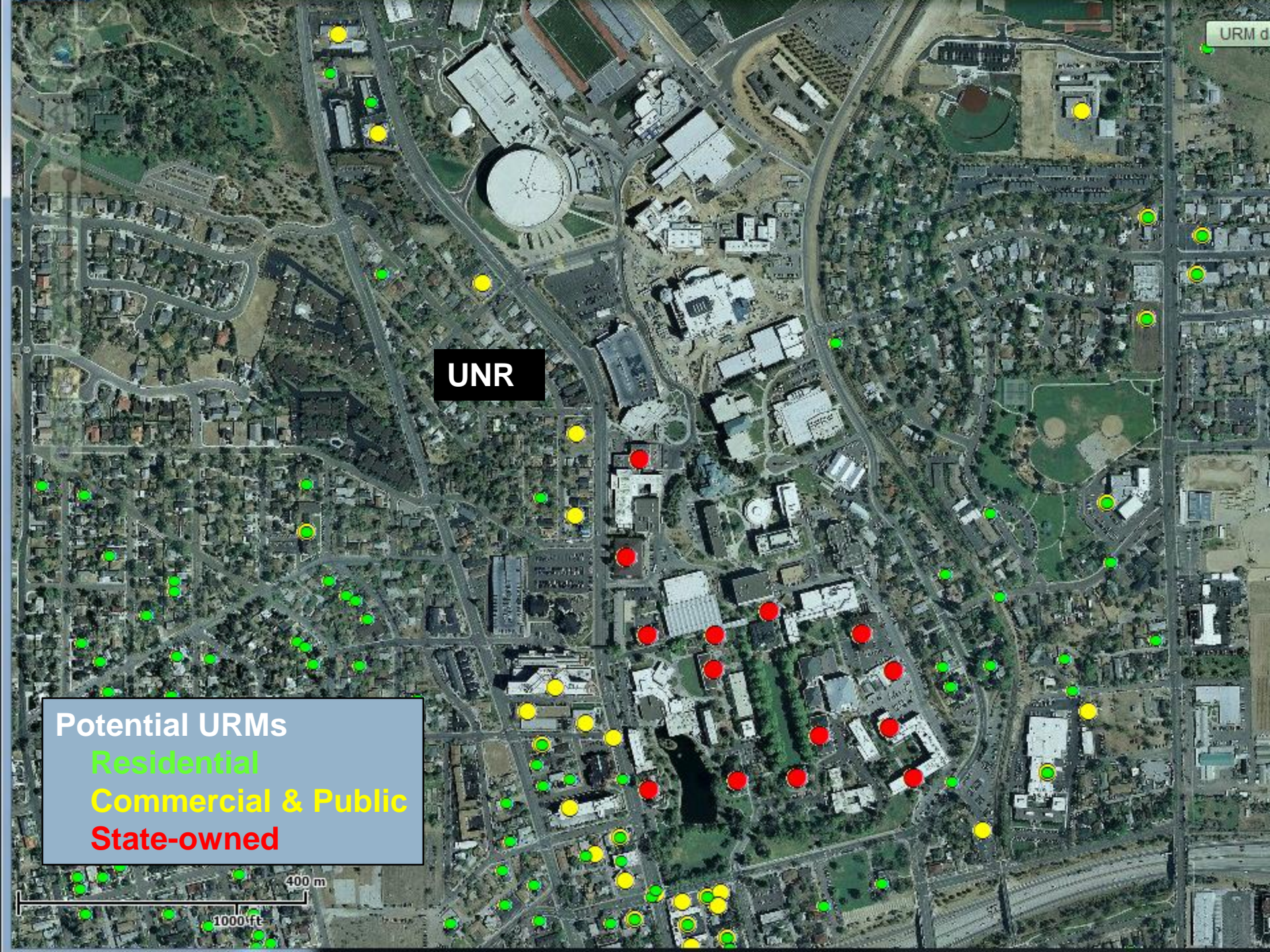
Commercial & Public

State-owned

Reno







Identify

Use the identify tool to identify features on the map:



Potential URM

Residential

Commercial & Public

State-owned

400 m

1000 ft

Identify

URM: YES
Building_N: LINCOLN HALL
Match_type: A
ARC_ZIP: 89557-
Zip: 89557-
Shape: Point
City: Reno
Dept_: NSHE
ARC_State: NV
Status: M

Potential URMs

Residential

Commercial & Public

State-owned

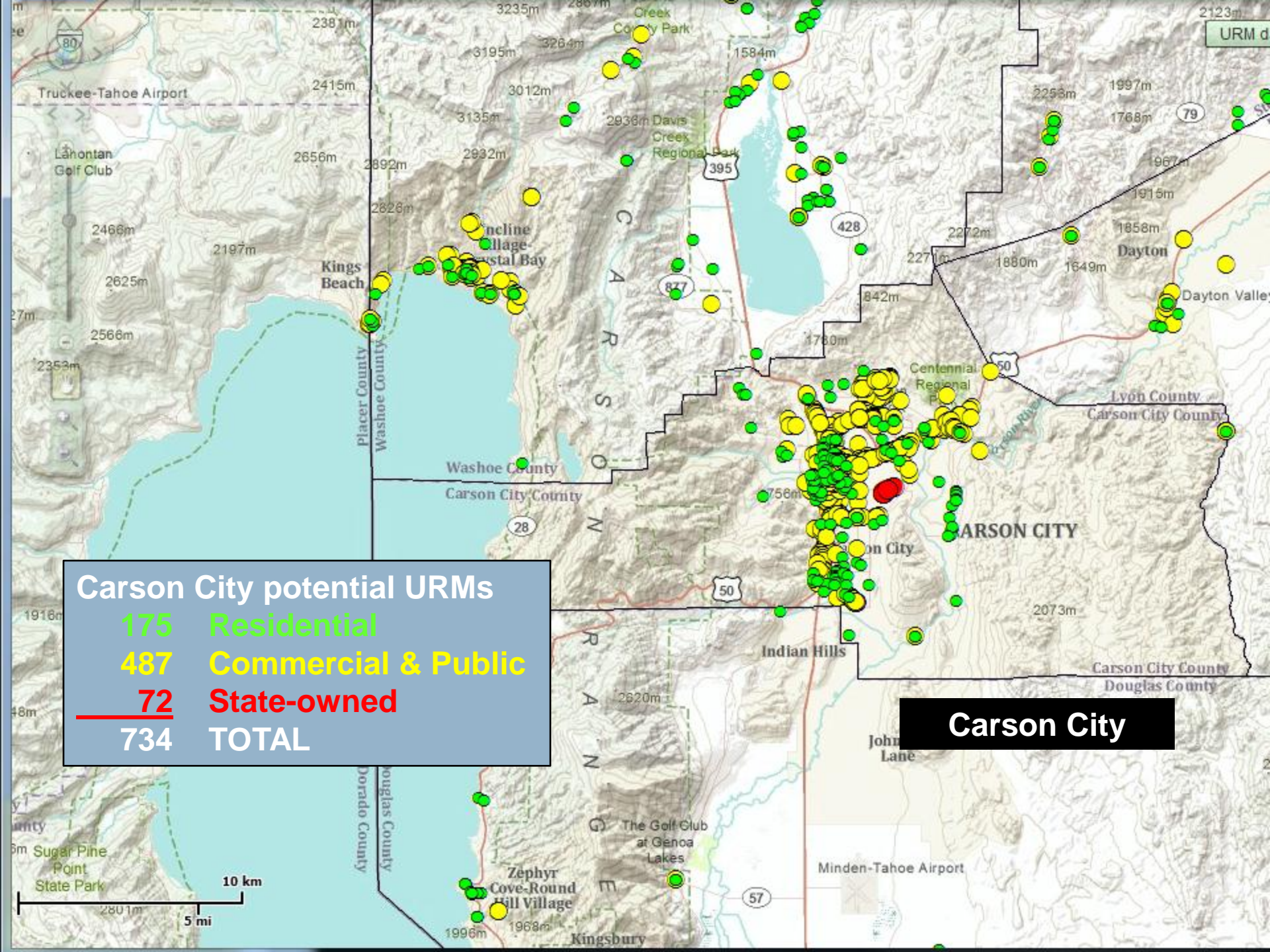
NV_State_URM_Buildings

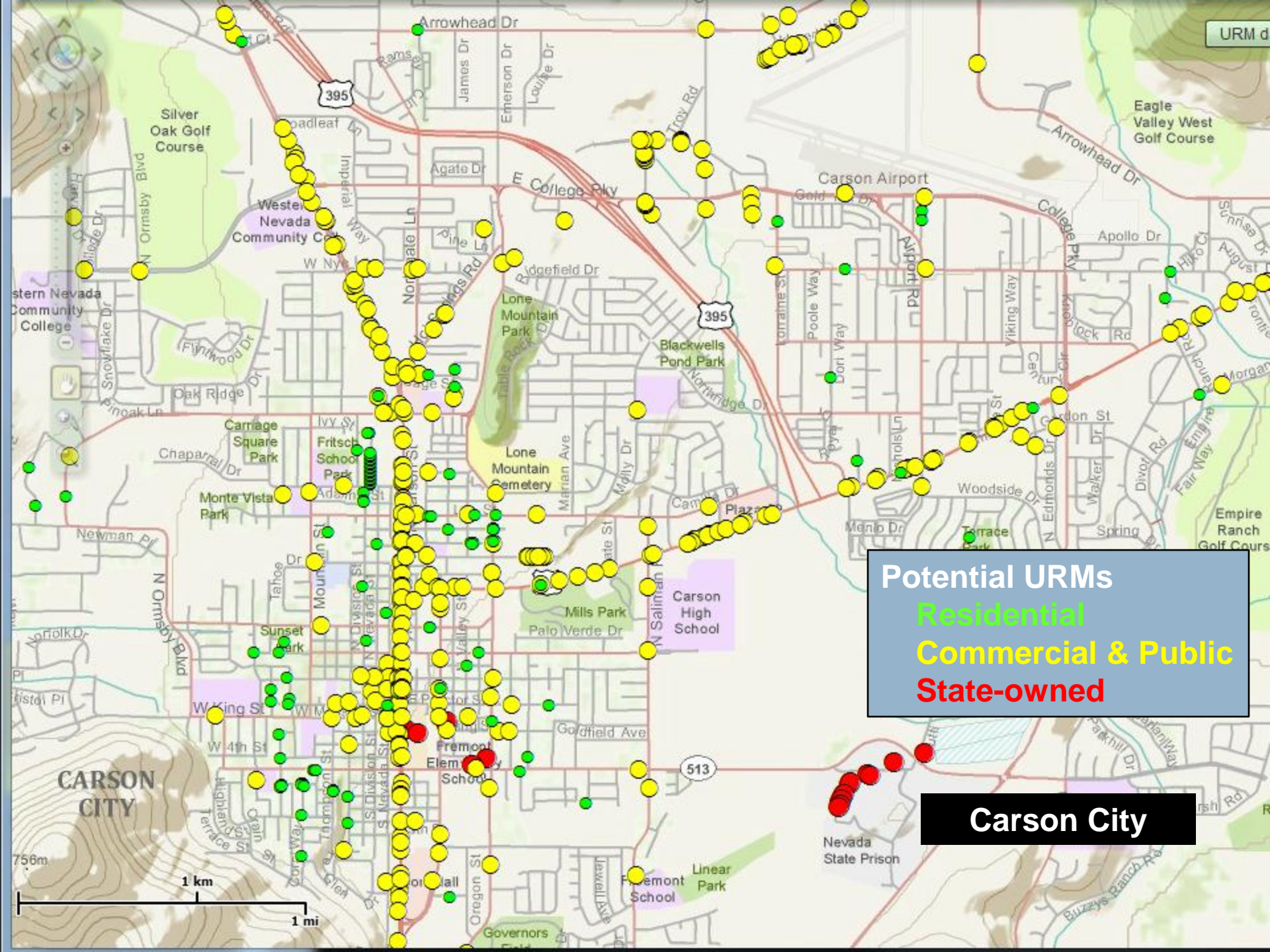
County: Washoe
F16:
Score: 84
SubAgency:
ARC_City: Reno
X: -119.820801
F17:
Address: 1664 N. Virginia St.
State: NV
Y: 39.547041
F15:
Square_Fee: 28298
Agency:

Carson City potential URM

175	Residential
487	Commercial & Public
<u>72</u>	State-owned
734	TOTAL

Carson City





Potential URM's
Residential
Commercial & Public
State-owned

Carson City

Douglas County

Minden

Gardnerville

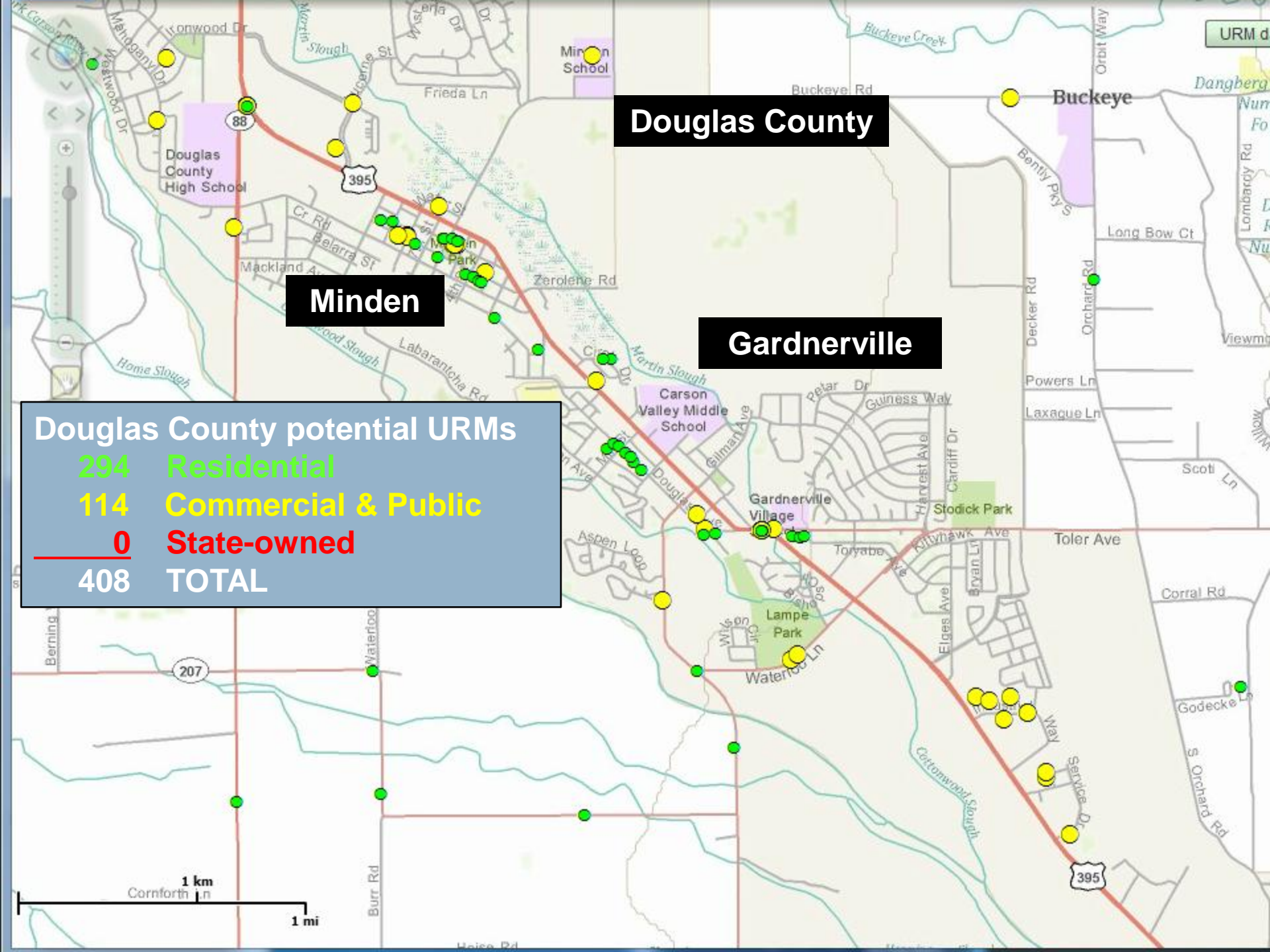
Douglas County potential URM

294 Residential

114 Commercial & Public

0 State-owned

408 TOTAL

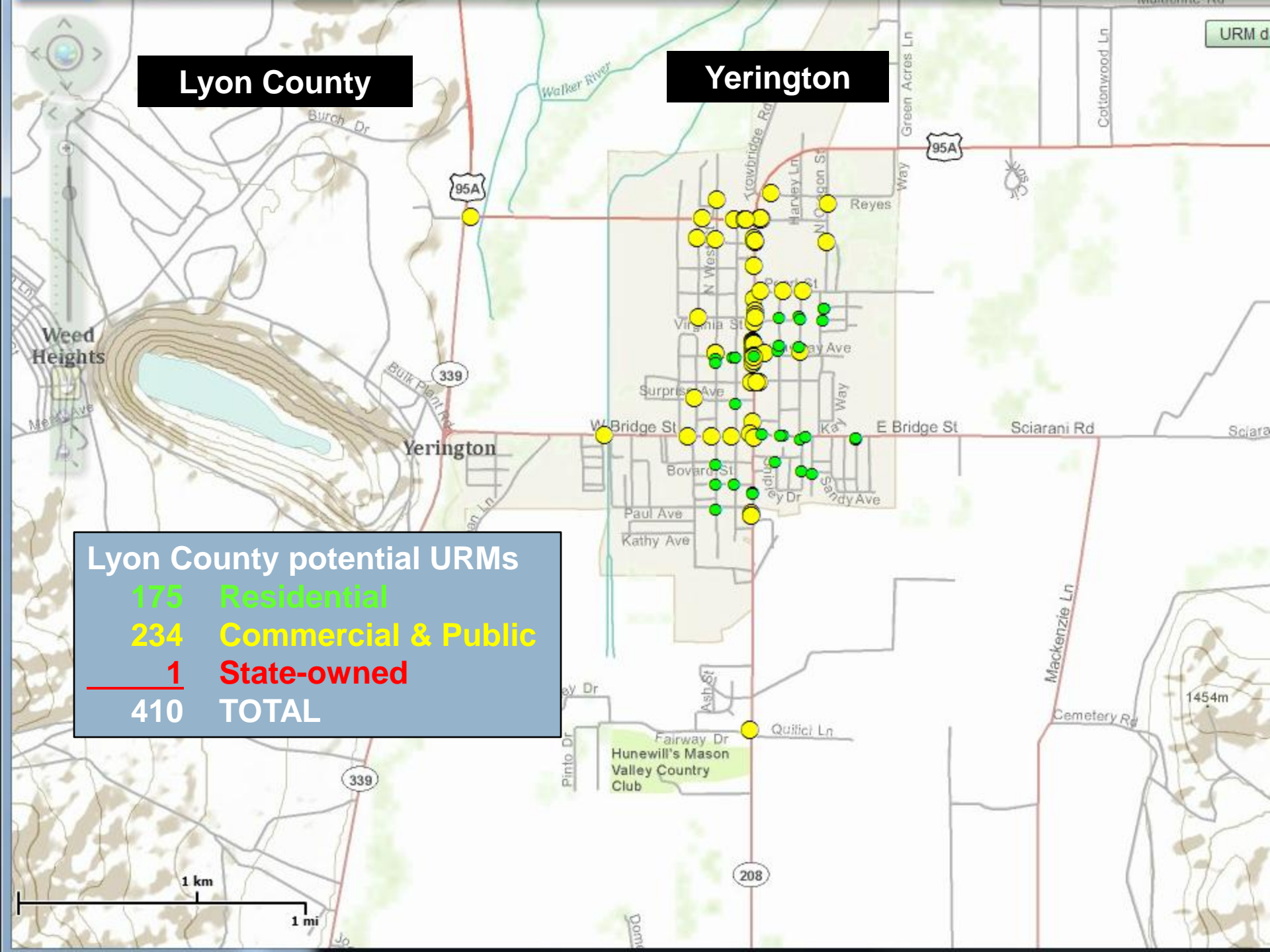


Lyon County

Yerington

Lyon County potential URM

175	Residential
234	Commercial & Public
<u>1</u>	State-owned
410	TOTAL

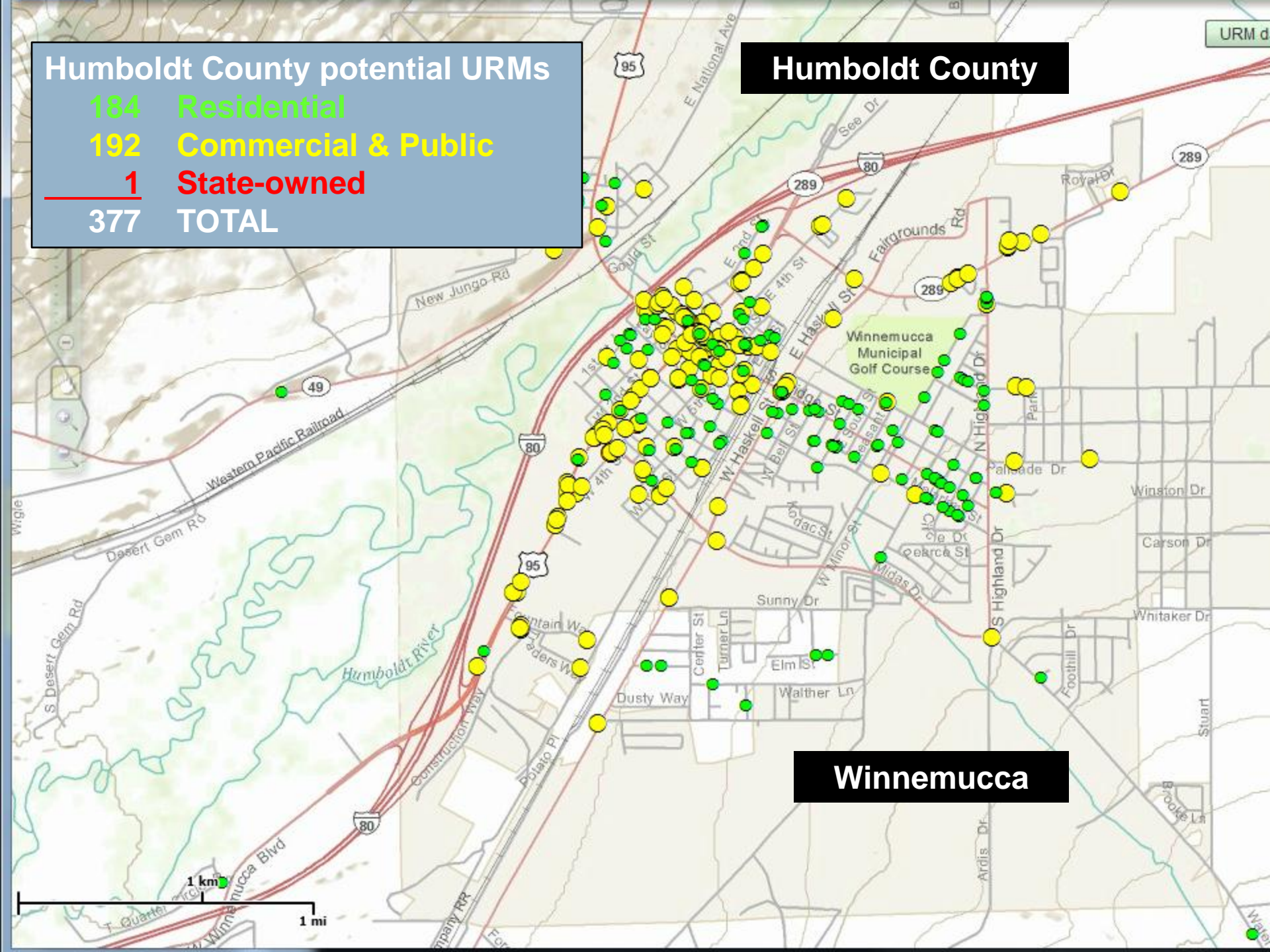


Humboldt County potential URM's	
184	Residential
192	Commercial & Public
1	State-owned
<hr/>	
377	TOTAL

377 TOTAL

Humboldt County

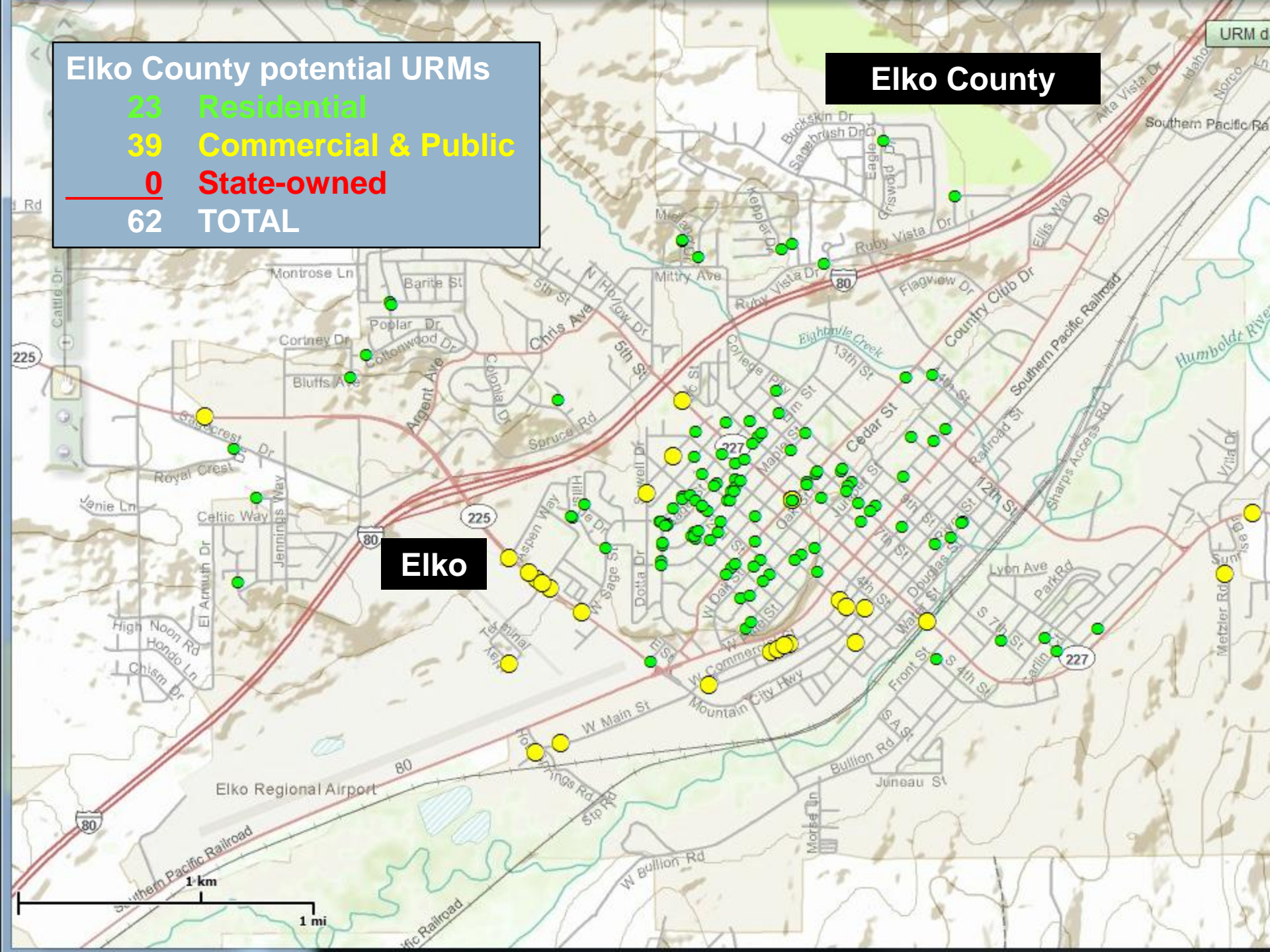
Winnemucca



Elko County potential URM

23 Residential
39 Commercial & Public
0 State-owned
62 TOTAL

Elko County

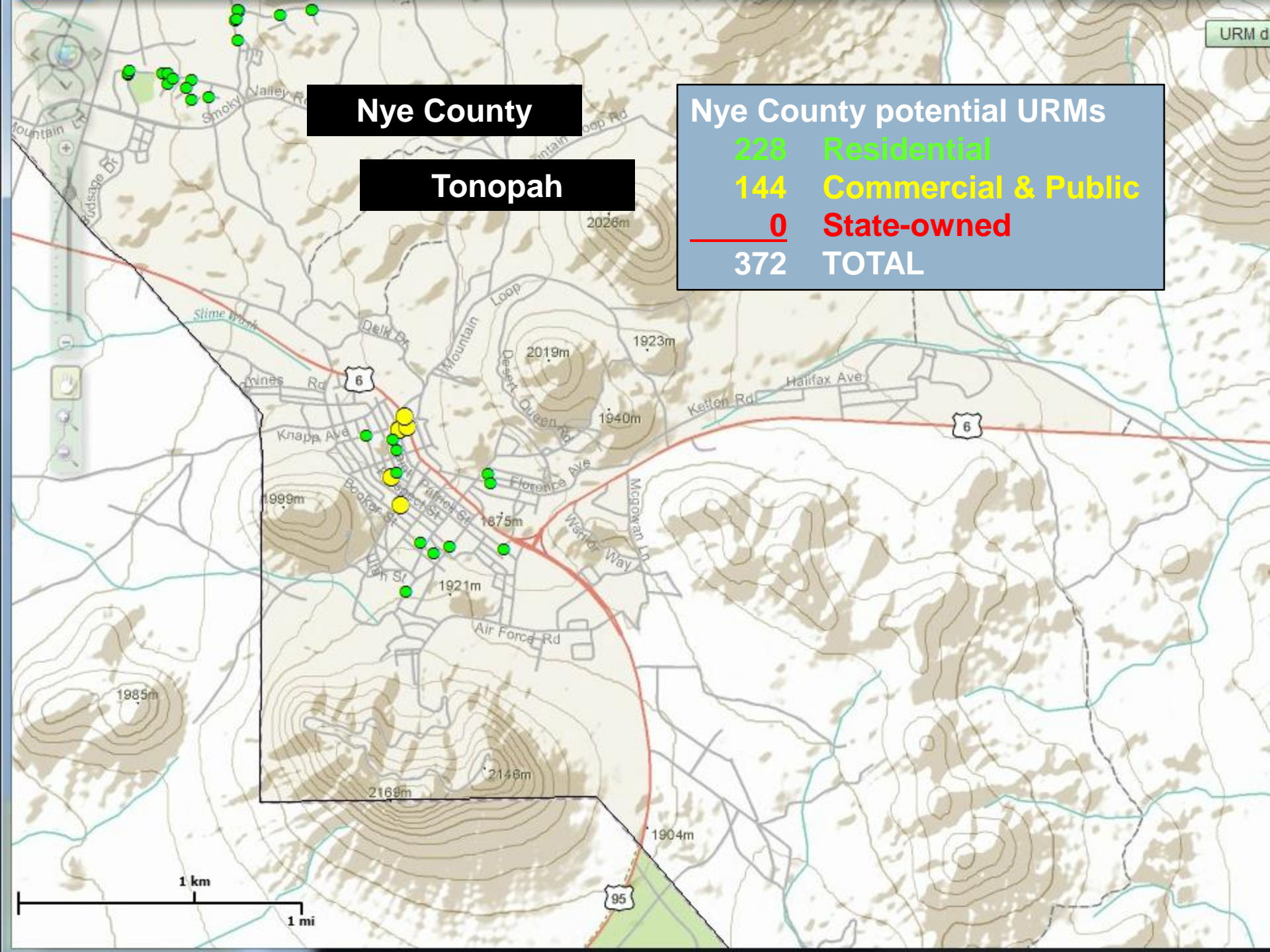


Nye County

Tonopah

Nye County potential URMs

228	Residential
144	Commercial & Public
0	State-owned
372	TOTAL



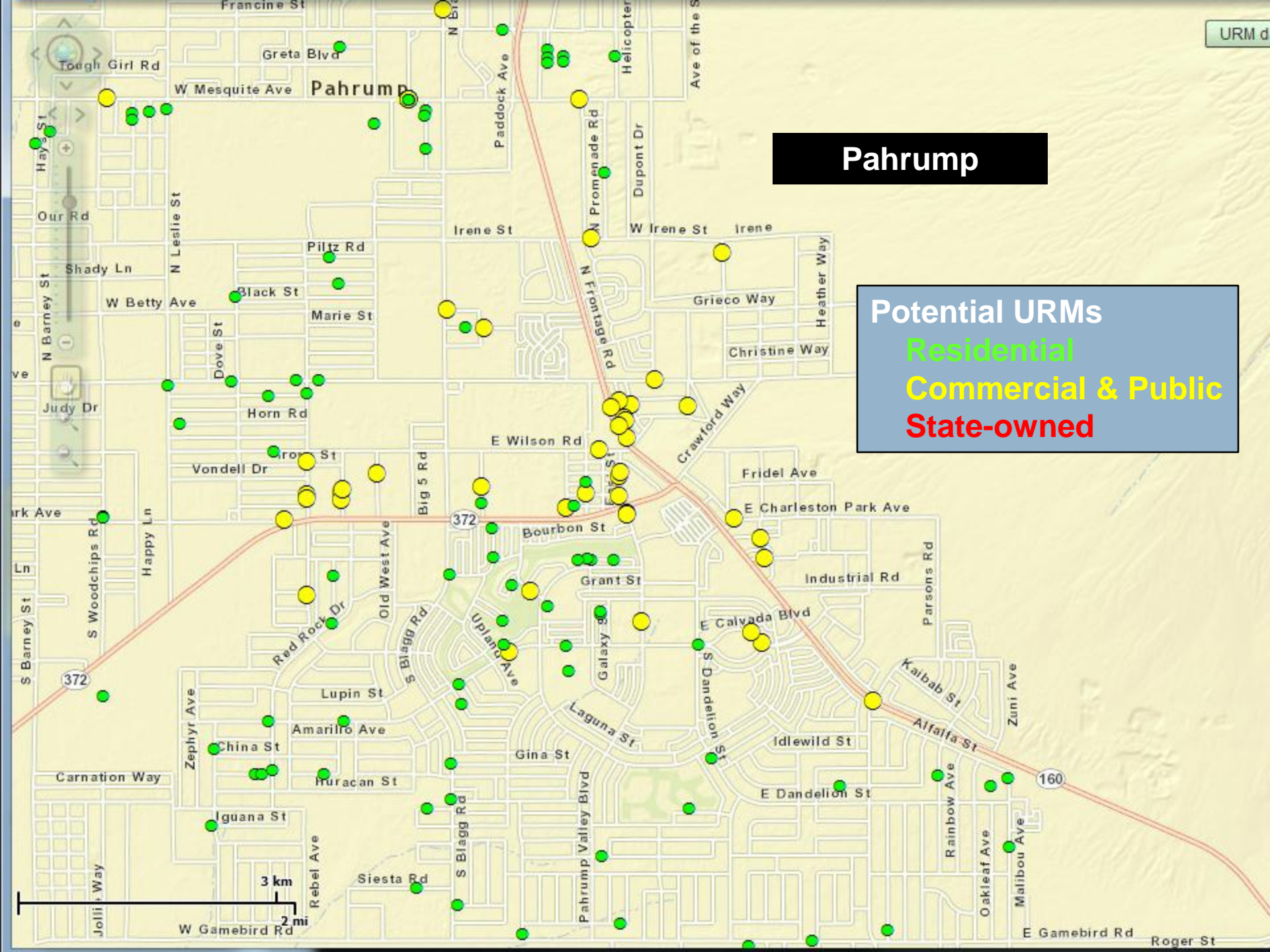
Pahrump

Potential URM

Residential

Commercial & Public

State-owned



Conclusions:

There are tens of thousands of potential URMs in Nevada.

Potential URMs in Nevada – totals*

7,354	Residential
16,145	Commercial & Public (city and county)
<u>98</u>	State-owned
23,597	TOTAL*

URMs are located in every county and nearly every community in Nevada.

Many URMs are historically significant.

Many URMs are concentrated in downtown business districts and along thoroughfares.

* The total does not include buildings owned by the federal government.

URMs are structures that commonly collapse in large earthquakes.

There are thousands of potential URMs in Nevada.

So what? Who cares?

This is a problem of life safety and economic loss.

We can reduce the risks from URMs.

Western States Seismic Policy Council:

“Unreinforced masonry bearing-wall structures represent one of the greatest life safety threats and economic burdens to the public during a damaging earthquake. WSSPC recommends that each state, province or territory adopt a program to **identify the extent of risk that unreinforced masonry structures represent in their communities **and develop recommendations that will effectively address the reduction of this risk.**”** Policy Recommendation 11-4

URMs are structures that commonly collapse in large earthquakes.

There are thousands of potential URMs in Nevada.

So what? Who cares?

We can reduce the risks from URMs.

Recommendation 1 (draft): Jurisdictions (cities, counties, state) should use this County Assessors' data to **follow up with on-the-ground inspections** and checks of building plans. Individuals should determine if their buildings are URMs.

Recommendation 2 (draft): Jurisdictions should work toward **seismically retrofitting URMs or removing them from human occupation**. Take advantage of opportunities for federal funding for mitigation through FEMA. Bring buildings up to current code when remodeling. Learn from what other jurisdictions have done successfully. Provide incentives for individuals and businesses to retrofit URMs or to replace them with new buildings.

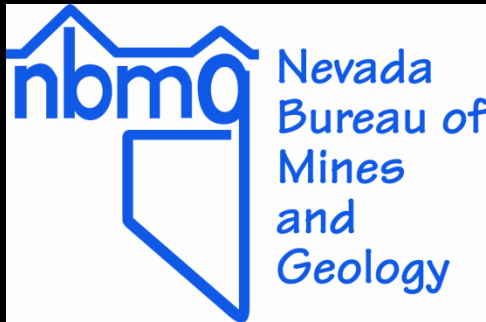
Potential URM's in Nevada

This is a problem of life safety and economic loss.

There are tens of thousands of potential URM's in Nevada.

We can reduce the risks from URM's.

Thank you!



Nevada Public Agency
Insurance Pool –
Wayne Carlson



Number of potential URM's

<u>County</u>	<u>Commercial & Public*</u>	<u>State</u>	<u>Residential</u>	<u>Total#</u>
Carson City	487	72	175	734
Churchill	177		192	369
Douglas	114		294	408
Elko	39		23	62
Eureka	0		35	35
Humboldt	192	1	184	377
Lander	57		67	124
Lyon	234	1	175	410
Mineral	60		57	117
Pershing	37		31	68
Storey	3		21	24
Washoe	2,445	21	3,322	5,788
White Pine	<u>138</u>	<u>1</u>	<u>93</u>	<u>232</u>
Subtotal, N. Nevada	3,983	96	4,669	8,748
Clark	11,963		2,396	14,359
Esmeralda	2		14	16
Lincoln	53	2	47	102
Nye	<u>144</u>	<u>2</u>	<u>228</u>	<u>372</u>
Subtotal, S. Nevada	12,162	2	2,685	14,849
All of Nevada	16,145	98	7,354	23,597

*-Includes city and county buildings but not state or federal ones.

#-Does not include federal buildings.

The hazard: expressed in terms of probability of an earthquake of a given magnitude occurring within 50 years and within 50 km of the community.

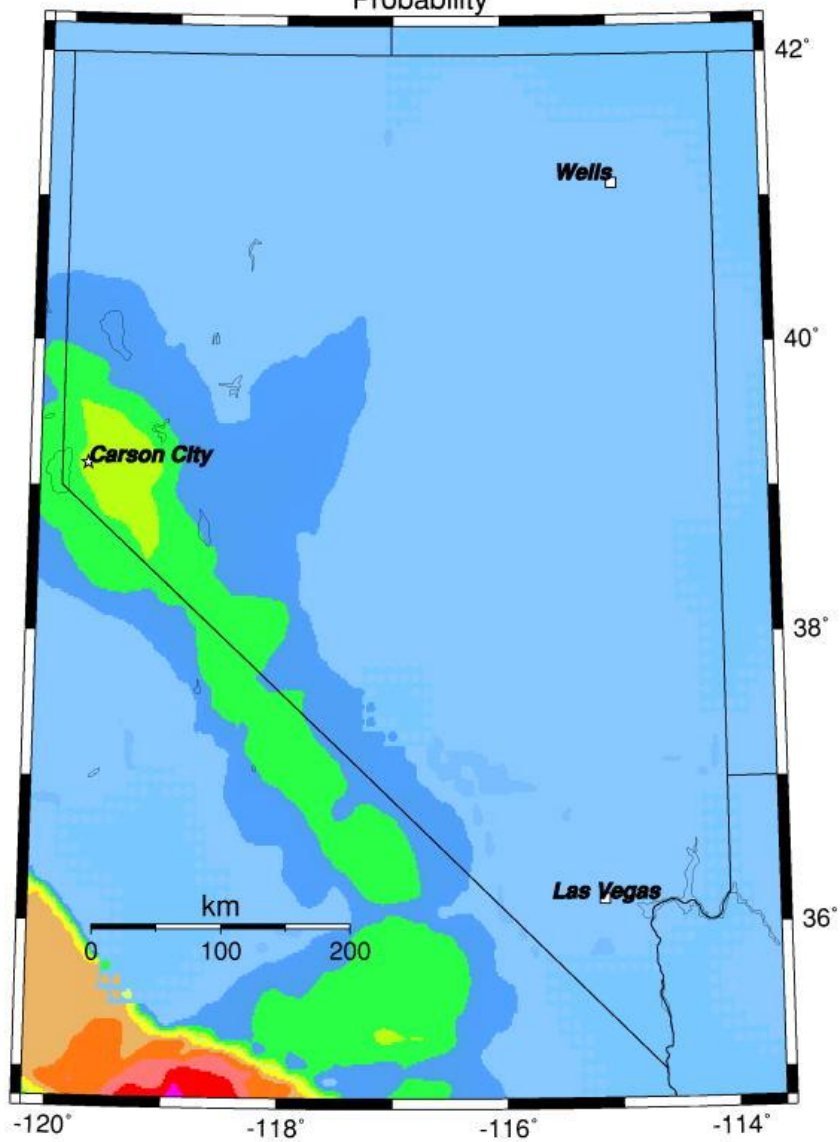
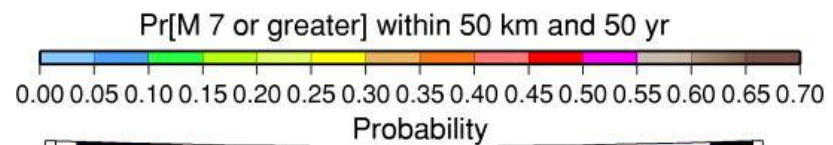
Community	% Probability of magnitude greater than or equal to magnitude				
	5.0	5.5	6.0	6.5	7.0
Dayton	>90	~80	70-75	50-55	12-15
Carson City	>90	~80	70	50-55	12-15
Reno	>90	~80	67	50	12-15
Sparks	>90	~80	67	50	12-15
Incline Village	>90	~80	60-70	40-50	10-12
Stateline	>90	~80	60-70	40-50	10
Fallon	80-90	~60	35	20-25	6-8
Gerlach	40	~25	10-15	6-10	2-3
Las Vegas	40-50	~30	12	4-5	<0.5
Elko	30-40	~25	10-15	6-8	0.5-1
Wells	30-40	~20	9	6	0.5-1
Laughlin	10-20	~5	2-3	0.5-1	<0.5

Data are from the USGS at <http://eqint.cr.usgs.gov/eqprob/2002/index.php> .
 Values for magnitude 5.5 are extrapolated between 5.0 and 6.0.

HAZUS estimates for total economic loss from a magnitude 6.0 earthquake and probability of an earthquake of this magnitude or greater occurring within 50 years and within 50 km of the community.

Community	Total Economic Loss	Probability in 50 years within 50 km
Las Vegas	\$7.2 billion	12%
Reno	\$1.9 billion	67%
Sparks	\$1.8 billion	67%
Incline Village	\$510 million	60 to 70%
Elko	\$160 million	10 to 15%
Fallon	\$110 million	35%
Gerlach	\$39 million	10 to 15%
Wells	\$30 million	9%

Total economic loss is from HAZUS. Probabilities are from the USGS at <http://eqint.cr.usgs.gov/eqprob/2002/index.php> .



Pershing County potential URM

31 Residential

37 Commercial & Public

0 State-owned

68 TOTAL

Pershing County

Lovelock

U P P E R V A L L E Y

Big Meadow Ranch Rd

1 km

1 mi

URM d

80

80

80

80

396

17th St

15th St

13th St

12th St

11th St

10th St

9th St

8th St

7th St

6th St

5th St

4th St

3rd St

2nd St

1st St

Grinnell Ave

Western Ave

Sierra

Bowman St

Maple Dr

Willow Dr

Jamestown Rd

Archie St

E Broadway Ave

E Main St

S Meridian Rd

Archie St

Archie St

Archie St

Archie St

Archie St

Archie St

Archie St

Archie Ln

S Meridian Rd

Lander County potential URM

67 Residential

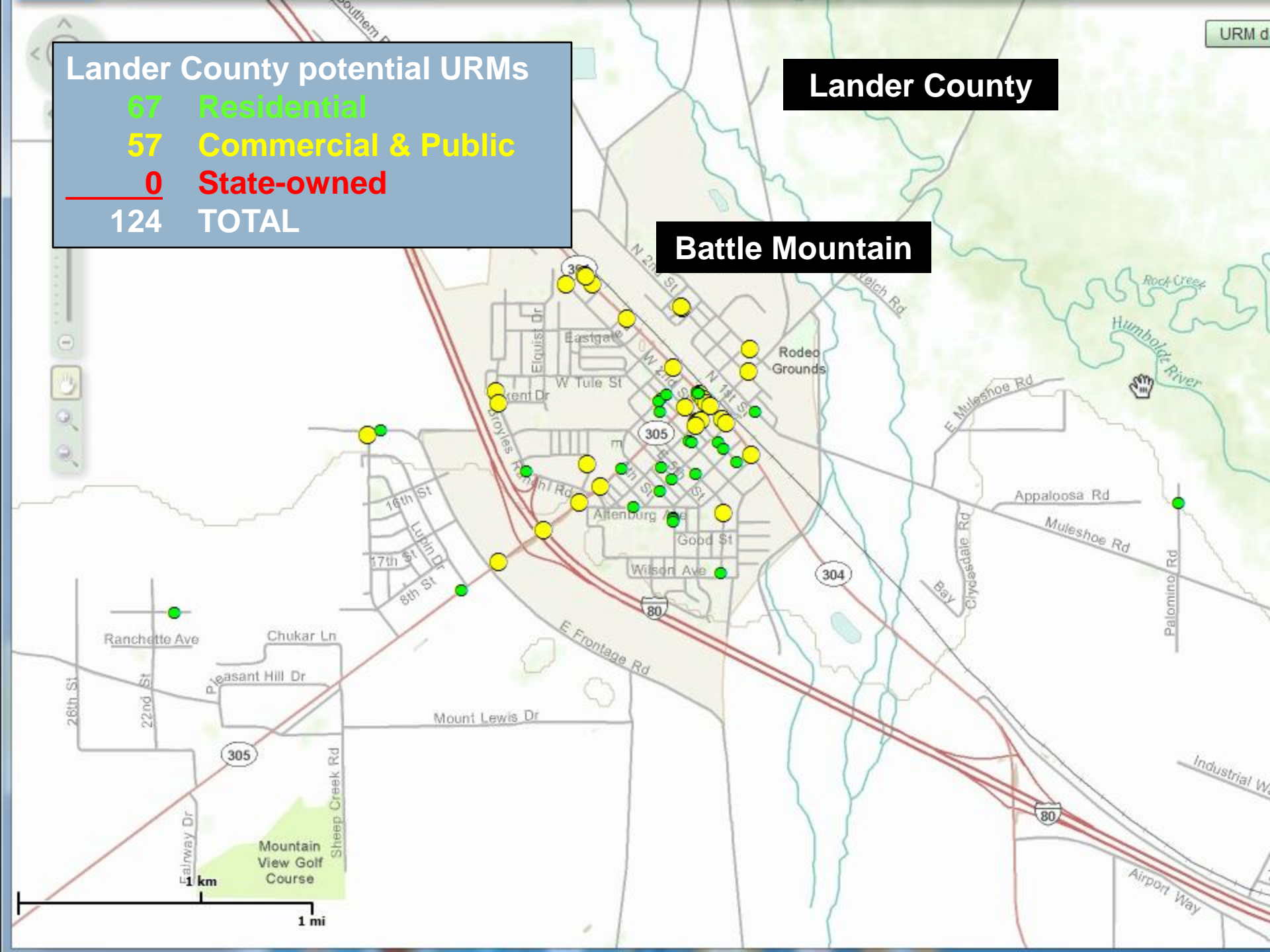
57 Commercial & Public

0 State-owned

124 TOTAL

Lander County

Battle Mountain



White Pine County potential URM

93 Residential

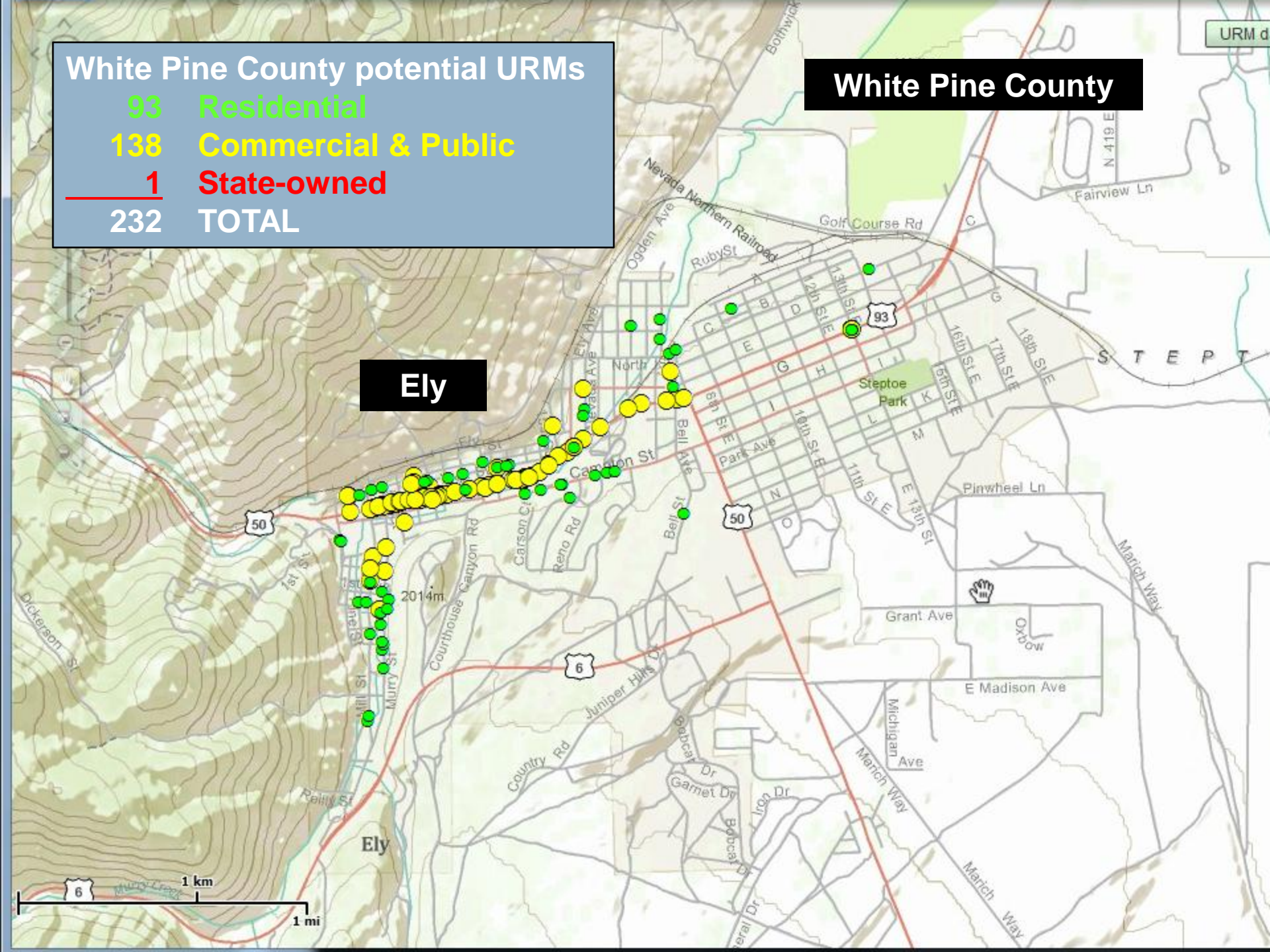
138 Commercial & Public

1 State-owned

232 TOTAL

White Pine County

Ely

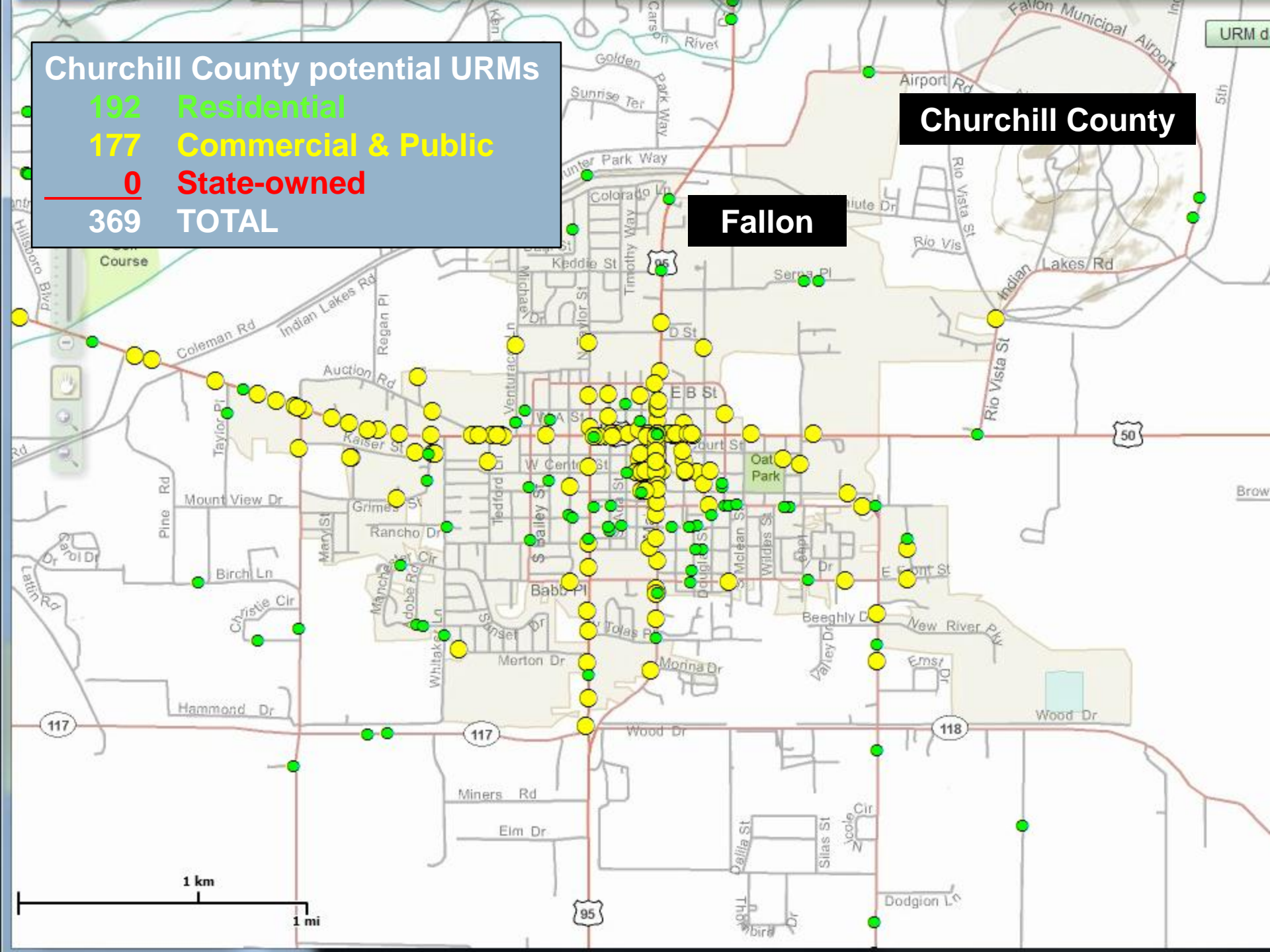


Churchill County potential URM

192	Residential
177	Commercial & Public
0	State-owned
369	TOTAL

Churchill County

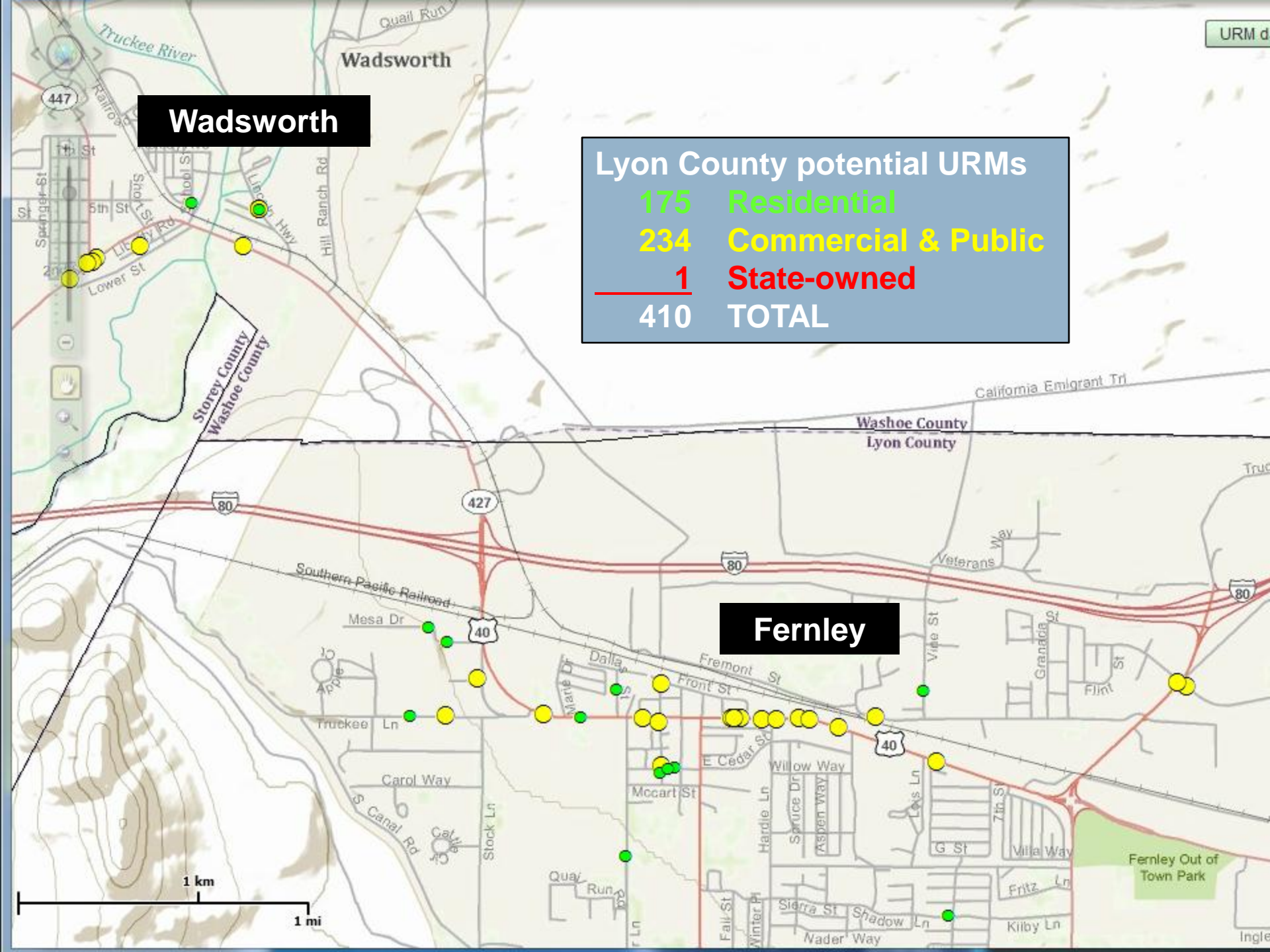
Fallon



Wadsworth

Lyon County potential URM	
175	Residential
234	Commercial & Public
<u>1</u>	State-owned
410	TOTAL

Fernley



Mineral County

Hawthorne

Mineral County potential URM

57 Residential

60 Commercial & Public

1 State-owned

232 TOTAL

