



August 30, 2005

Mr. Lester Messina  
Department of Agriculture  
County of Glenn  
720 N. Colusa Street  
Willows, California 95988

Dear Lester:

Subject: County of Glenn, Department of Agriculture, LEGACI\* Grant – Report on Impact of Urbanization in the Vicinity of Orland, CA

Wood Rodgers, Inc. is pleased to submit its report entitled, “Impact of Urbanization in the Vicinity of Orland, CA.” Although it is not an extensive report, I do believe it provides a basis for discussing land and water use in the vicinity of Orland and, in particular, in the service area of the Orland Unit Water Users’ Association.

Wood Rodgers appreciates the opportunity to assist Glenn County with this assignment.

Sincerely,

Francis E. Borcalli, P.E.  
Water Resources Department Manager

Enclosure (10)

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# Impact of Urbanization in the Vicinity of Orland, CA

**Glenn County**  
Department of Agriculture

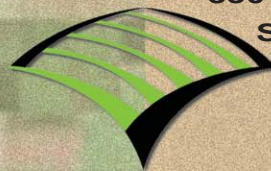
*August 2005*

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Great Valley Center  
LEGACI Grant**

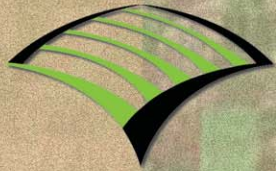


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## TABLE OF CONTENTS

	<b><u>PAGES</u></b>
INTRODUCTION .....	1
THE CITY OF ORLAND.....	1
THE ORLAND UNIT WATER USERS’ ASSOCIATION.....	1
Parcel Sizes.....	1
Land Use.....	2
Water Supply and Distribution System .....	2
IMPACT OF URBANIZATION .....	3
Land Use.....	3
Water Use .....	4
OUWUA Operations and Maintenance .....	4
SUMMARY OF FINDINGS .....	5
REFERENCES .....	6

## TABLES

- 1 Summary of Parcel Sizes
- 2 Land Use: 1993 and 1998

## FIGURES

- 1 Jurisdictional Boundaries and OUWUA –  
Irrigation Distribution System
- 2 OUWUA – Olive Orchards: 2005
- 3 Change in Groundwater Levels From the Baseline  
Condition for Indicator Well 1
- 4 Groundwater Levels in Layer 2 for Baseline and  
100% Urbanization of City of Orland  
at the End of Simulation Period
- 5 Groundwater Levels in Layer 2 for Baseline and  
100% Urbanization of Orland Planning Area  
at the End of Simulation Period





## **INTRODUCTION**

The City of Orland (City), like other communities in the Sacramento Valley, is experiencing unprecedented interest by the development community to develop residential housing at a scale that is relatively new to the area. Although the development proposals are consistent with the City's General Plan, the prospective rate of development is greater than experienced historically.

In the interest of assessing the potential impact of urbanization on the land and water use in the vicinity of the City, the Great Valley Center authorized a grant to examine the impact of urbanization in the area. With respect to the impact of urbanization, particular concern was expressed regarding olives. Accordingly, historical data regarding the amounts of land planted to olives is also addressed in this report.

## **THE CITY OF ORLAND**

The City completed its General Plan 2003 – 2020 in March 2003. The City had a population of 6,281 in 2000, and projected it to increase to approximately 10,000 in 2020. The total increase in land used to accommodate this projected increase in population is approximately 400 acres.

The existing City, as well as the majority of the City's planning area as represented in the City's General Plan, is within or largely within the boundaries of the Orland Unit Water Users Association (OUWUA) as shown on Figure 1. The area within the City limits is approximately 1,600 acres. This land will be fully developed before 2020. The area within the City planning area beyond the City limits is approximately 2,000 acres. The land required beyond the existing City Limits to accommodate the projected increase in population represents approximately five percent of the land within the City's planning area.

The primary source of water for the City is groundwater. As land is annexed into the City, it is de-annexed from the OUWUA. Thus, over time, as the land within the City increases the land within the service area of the OUWUA decreases. At the same time, the application of surface water for irrigation will decrease while the extraction of groundwater will increase to serve the urbanized area.

## **THE ORLAND UNIT WATER USERS' ASSOCIATION**

The OUWUA owns and operates the Orland Project, one of the oldest U.S. Bureau of Reclamation projects in the United States. The OUWUA provides irrigation water to approximately 20,000 acres in the vicinity of the City. Presented on Figure 1 is the boundary of the OUWUA and its distribution system in relation to the existing limits of the City and the City's planning area.

### **Parcel Sizes**

The land within the OUWUA is comprised of numerous small parcels that are the product of land use decisions made in the early 1900's. The composition of the OUWUA in terms of parcel sizes is presented on Table 1. Over 80 percent of the parcels within the OUWUA are 20 acres or





less. Many of the small parcels or legal lots less than 20 acres are outside the City or City planning area and are subject to “ranchette” type development, which brings with it similar impacts as urbanization with respect to water use and agricultural production. Therefore, the impact of urbanization is not attributed only to annexations into the City. It is occurring outside the City as well as on smaller parcels. By virtue of decisions made in the early 1900’s, the OUWUA and commercial agricultural production is being adversely impacted as new homes are constructed on parcels less than 20 acres.

## **Land Use**

The delineation of the boundaries of the OUWUA is not consistent among the various sources of information although the differences for purposes of this assignment are not of concern. The delineation presented on Figure 1 was obtained from the Glenn County Groundwater Ordinance. Presented on Table 2 is a breakdown of land use with the boundaries of the OUWUA based upon information prepared by the State Department of Water Resources. Referring to Table 1, the amount of land devoted to urban use with the OUWUA increased from 1,812 acres in 1993, to 2,655 acres in 1998, or about 47 percent through the 5-year period. With respect to olives for which particular concern was expressed by Glenn County in its request for grant funding, the total area planted increased from 2,227 acres in 1993, to 2,506 acres in 1998, representing a 13 percent increase over the 5-year period. Based upon information from the Glenn County Department of Agriculture, there were a total 2,698 acres of olives in the OUWUA in 2005. Presented on Figure 2 is the land within the OUWUA that was in olive production in 2005. Approximately 52 of the 2,698 acres were within the City Limits and 288 acres were within the planning area.

## **Water Supply and Distribution System**

The primary water supply for the OUWUA is surface water from the upper Stony Creek watershed. The water is stored in the upper watershed in the East Park and Stony Gorge reservoirs and released to Black Butte Reservoir where the water is actually released to the OUWUA as needed to meet irrigation demands. The water rights associated with the project include the right to divert 101,500 acre-feet from storage and up to 279 cubic feet per second from Stony Creek. The OUWUA’s water rights have been very reliable with demands being met in all but the most severe droughts, such as the 1976 to 1977 period.

As shown on Figure 1, the OUWUA is divided by Stony Creek; therefore the area is served by a North Canal distribution system and South Canal distribution system. The North Canal distribution system would not be affected by urbanization within the City or the City’s planning area. On the other hand, the South Canal distribution system can be substantially impacted by development within the City and City’s planning area. As shown on Figure 2, development within the City’s planning area essentially bifurcates the South Canal distribution system.

The OUWUA service area overlies a large portion of the Stony Creek Groundwater Basin; however, the OUWUA does not own or operate any groundwater wells. A small number of landowners in the service area use groundwater entirely or in conjunction with surface water supplied by the OUWUA.





## IMPACT OF URBANIZATION

The impact of urbanization would affect the OUWUA most dramatically in terms of water use and physical facilities, accordingly, the data and information is compiled and presented in relation to the OUWUA.

### Land Use

According to the City's General Plan, the population projected to 2020 is expected to range from about 9,000 to 11,000. This increase in population is nearly 1.4 to 1.75 times the population of 6,281 in 2000. In view of recent development interest, however, as indicated in the City's General Plan Annual Report and Growth Assessment in April 2005, the General Plan projection could be reached in 10 years instead of 20 years. The increase in land required to accommodate this increase in population is estimated to range from 254 to 415 acres. This would require urbanization of nearly all remaining land currently within the City. The land beyond the City limits but within the planning area would accommodate an additional 15,000 people and provide about 185 acres for commercial and industrial development based upon information presented in the General Plan.

Based upon the information available, it appears that by 2020 the land within the City Limits would be fully developed and in all probability significant land within the planning area would be annexed into the City.

Referring to Figure 1, it is apparent that full development of the City would significantly interrupt OUWUA's water distribution system as well as the operations and maintenance. The OUWUA, as noted in its Water Use Efficiency Project Report (January 2003), shows plans for a new regional pipeline in lieu of canals passing through the north part of the City and terminating at the Tehama-Colusa Canal. This type of system modification becomes increasingly important from the standpoint of servicing the east part of OUWUA's service area and for dealing with the risk and liability of having an open canal passing through and urbanizing area.

With respect to the land planted to olives, the 52 acres currently within the City would be displaced and potentially a part of the 288 acres of olives outside the City Limits but within the planning area would be displaced as well. It appears that the market for high quality olive oil is gaining acceptance and land in the Tehama, Glenn, and Butte counties is suitable for super high-density plantings of new varieties. Based upon communication with a representative of the California Olive Farm near Oroville, the opportunity for substantially increasing the market for the local production of high quality olive oil is very good. Based upon a review of the information showing olive orchards in 1993, 1998, and 2005, it does not appear that many if any of the orchards are super high-density plantings.





## Water Use

The impact of urbanization on water use is of concern from the standpoint of the change in the water balance, since groundwater extraction is planned to increase to meet the demands for urban use and the delivery of surface water by OUWUA would decrease.

To assess the potential impact of urbanization, the Integrated Groundwater Surface water Model (IGSM) developed for the Stony Creek Fan Conjunctive Water Management Program was utilized. Two scenarios were evaluated. The first scenario was based upon full urbanization within the City Limits. The second scenario was based upon full urbanization within the planning area. These two scenarios were selected to represent a “worst-case” situation in terms of groundwater extraction and thus, reduction in surface water delivery. Presented on Figure 3 are the results from operating the IGSM for the respective land use conditions through the hydrologic period 1922 to 1994. This hydrologic period contains dry years and wet years, thus is representative of a range in hydrologic conditions. As shown with full development within the City Limits, the overall reduction in groundwater levels in the area is approximately 2.5 feet. For development within the planning area, the reduction in groundwater levels is approximately four feet. Based upon the results of the IGSM analyses, the long-term impact on groundwater levels with full development within the City and planning area do not appear very significant.

Presented on Figure 4 and Figure 5 are the results of the IGSM analyses presented in the form of changes in groundwater elevations as represented by contours of equal elevation. Presentation of the information in this format illustrates the lateral extent of the impact or changes to groundwater levels in the area.

The impact to surface water deliveries by the OUWUA under the two scenarios resulted in an average reduction of approximately 12,500 acre-feet and 20,000 acre-feet, respectively.

In summary, it appears that greater utilization of the groundwater basin in the vicinity of Orland, to meet increasing urban demands, results in an overall increase in manageable surface water supplies from approximately 10,000 acre-feet to 20,000 acre-feet.

## OUWUA Operations and Maintenance

Besides the impact on the management of surface and groundwater in the vicinity of the City, the impact of urbanization on the efficiency of operating and maintaining OUWUA’s distribution system would be most significant and disruptive. The considerations now being given by the OUWUA to make the transition most efficient in terms of the management of the available surface and groundwater supplies and service to its customers east of the City are critical.







## SUMMARY OF FINDINGS

Based upon this assessment of the impacts of urbanization in the vicinity of Orland, consistent with the City's General Plan (March 2003), Wood Rodgers' findings are summarized below as information for consideration by interested parties.

1. The long-term impacts to groundwater levels in the vicinity of Orland are not deemed significant.
2. The projected increase in groundwater extraction, as planned to accommodate urbanization within the City Limits and Planning Area, would result in an overall increase in the manageable surface supply of water from approximately 10,000 to 20,000 acre-feet.
3. Decisions made in the early 1900's regarding parcel sizes in the vicinity of Orland will continue to adversely impact the OUWUA and commercial agricultural production.
4. A gradient of groundwater flow from west to east appears to persist and the creation of a groundwater "sink" underlying the City does not appear to develop.
5. Less than two percent of the olives in production in 2005 within the OUWUA would be displaced by urbanization within the City Limits and approximately 10 percent would be displaced by urbanization within the planning area.





## **REFERENCES**

Glenn County, Department of Agriculture, Olive Production, 2005.

Glenn County, Department of Planning, GIS data files.

Orland Unit Water Users Association, Irrigation Canal System GIS file.

Pacific Municipal Consultants, City of Orland General Plan 2003-2020, March 2003.

Pacific Municipal Consultants, City of Orland, General Plan Final Annual Report & Growth Assessment, April 18, 2005.

State of California, Department of Water Resources, Land Use Surveys: 1993 and 1998.

WRIME, Stony Creek Fan Integrated Groundwater and Surface Water Model, prepared for the Orland Artois Water District, Orland Unit Water Users' Association, and Glenn-Colusa Irrigation District in coordination with the California Department of Water Resources, May 2003.

WRIME, Memorandum from Donghai Wang to Fran Borcalli, Wood Rodgers, Inc., "Glenn County Water Needs Analysis," June 27, 2005.







**TABLE 1**

**GLENN COUNTY DEPARTMENT OF AGRICULTURE  
ORLAND UNIT WATER USERS' ASSOCIATION**

**SUMMARY OF PARCEL SIZES<sup>1</sup>**

Parcel Size	No. of Parcels
5 Acres and Under	511
5.01 - 10.00	372
10.01 - 15.00	116
15.01 - 20.00	252
20.01 and Greater	258
<b>TOTAL</b>	<b>1,509</b>

<sup>1</sup>Information provided by OUWUA. Total area is 20,021.29 acres.



**TABLE 2**  
**GLENN COUNTY DEPARTMENT OF AGRICULTURE**  
**ORLAND UNIT WATER USERS' ASSOCIATION**

**LAND USE: 1993 AND 1998**  
**(acres)**

Land Use	Subarea 4	
	1993	1998
Deciduous Fruits and Nuts	3,347	3,598
Citrus and Subtropical (Excluding Olives)	431	346
Olives	2,227	2,506
Field Crops	449	984
Grain	908	423
Rice	0	0
Truck, Nursery, and Berry Crops	1	15
Vineyards	0	0
Semiagriculture and Incidental to Agriculture	611	1,051
Pasture	10,701	9,047
Fallow/Idle	1,605	400
Subtotal	20,280	18,370
Barren	117	532
Native Vegetation <sup>1</sup>	3,256	3,354
Riparian Vegetation	416	828
Water	97	239
Urban	1,812	2,655
Subtotal	5,698	7,608
<b>TOTAL</b>	<b>25,978</b>	<b>25,978</b>

<sup>1</sup> Adjusted to make total area the same for each year.

Source: California Department of Water Resources



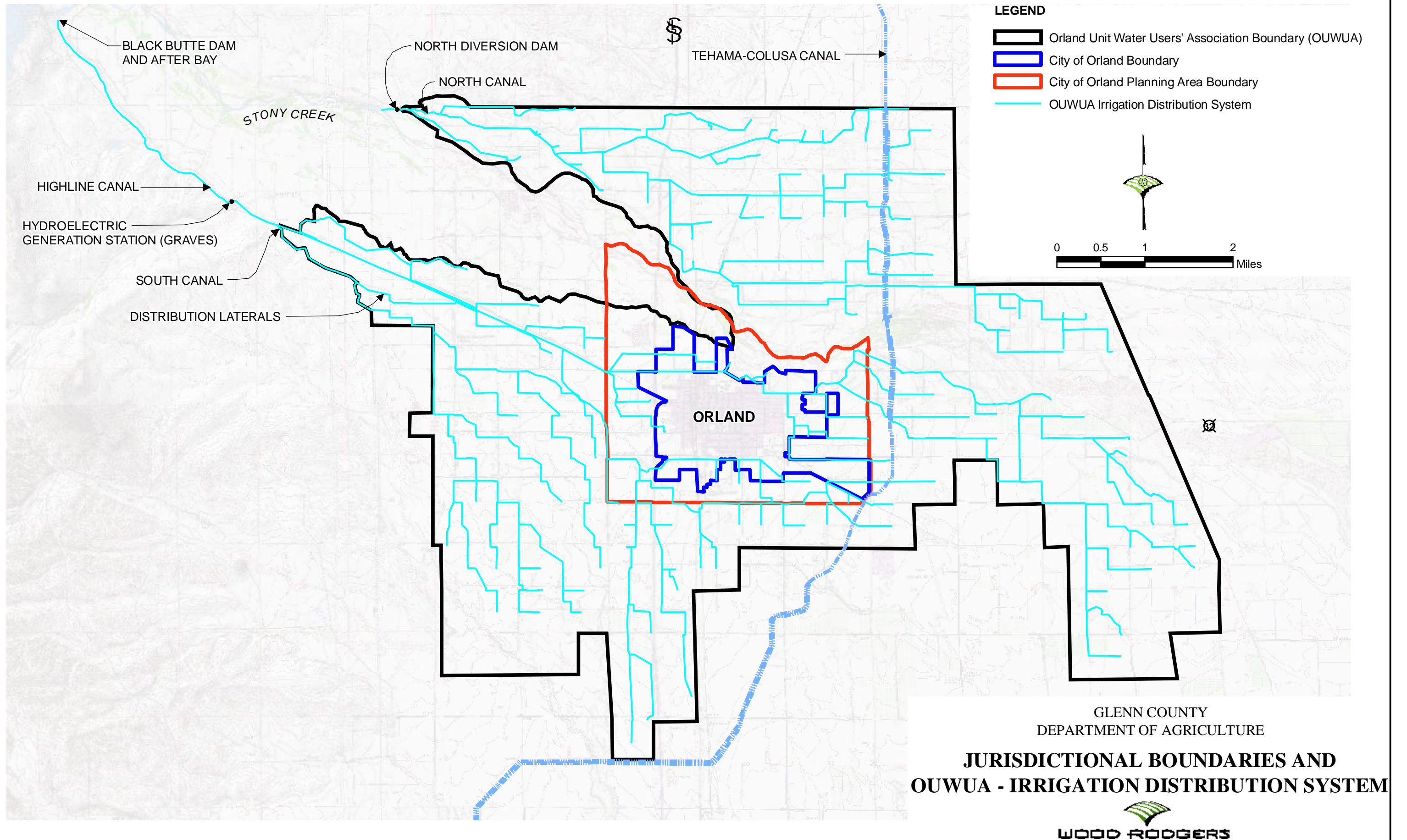
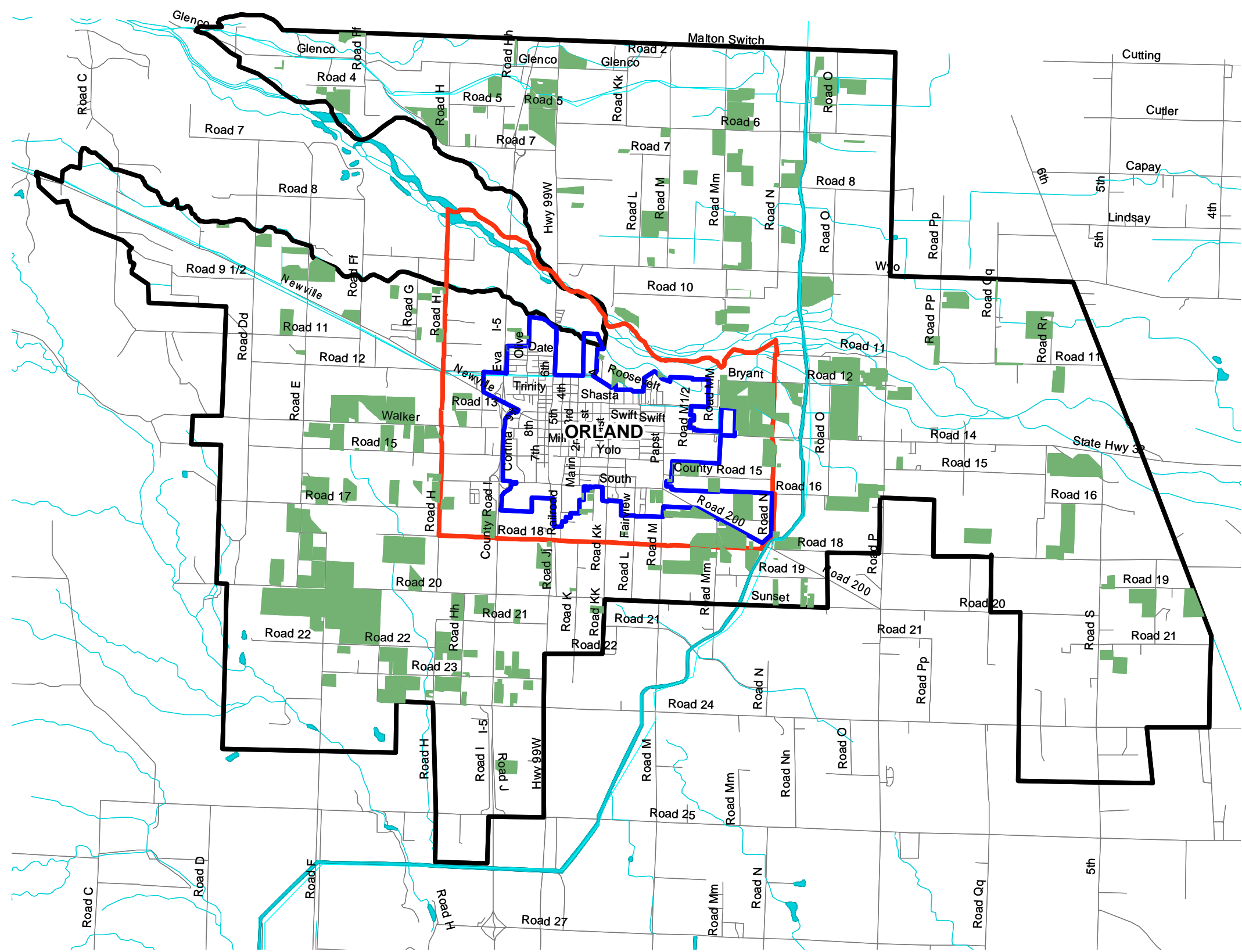
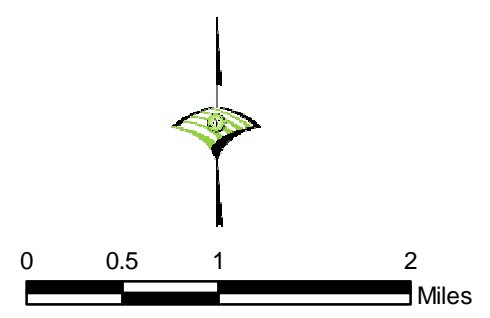


FIGURE 1



- LEGEND**
- Orland Unit Water Users' Association Boundary (OUWUA)<sup>1</sup>
  - City of Orland Boundary<sup>2</sup>
  - City of Orland Planning Area Boundary<sup>3</sup>
  - City of Orland Olives (2,698 acres Total)<sup>4</sup>



GLENN COUNTY  
DEPARTMENT OF AGRICULTURE

## OUWUA - OLIVE ORCHARDS: 2005

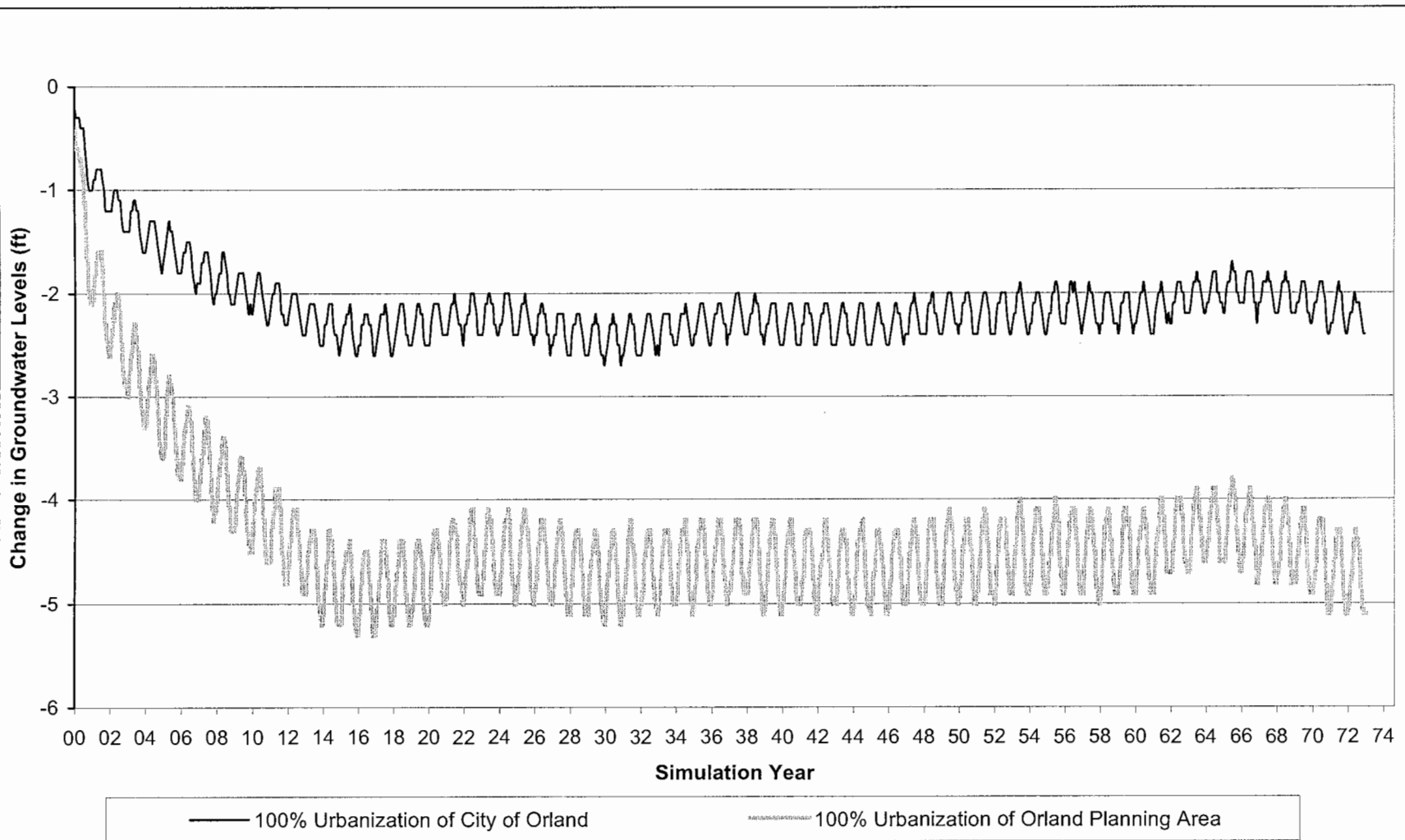


Sources:  
<sup>1</sup> Glenn County Groundwater Management Ordinance No. 1115.  
<sup>2</sup> City of Orland General Plan 2003-2020, March 2003. City boundary is defined as the incorporated area.  
<sup>3</sup> City of Orland General Plan 2003-2020, March 2003. Planning area is assumed to be the Sphere of Influence as defined by LAFCO.  
<sup>4</sup> Glenn County Department of Agriculture, June 14, 2005.

FIGURE 2

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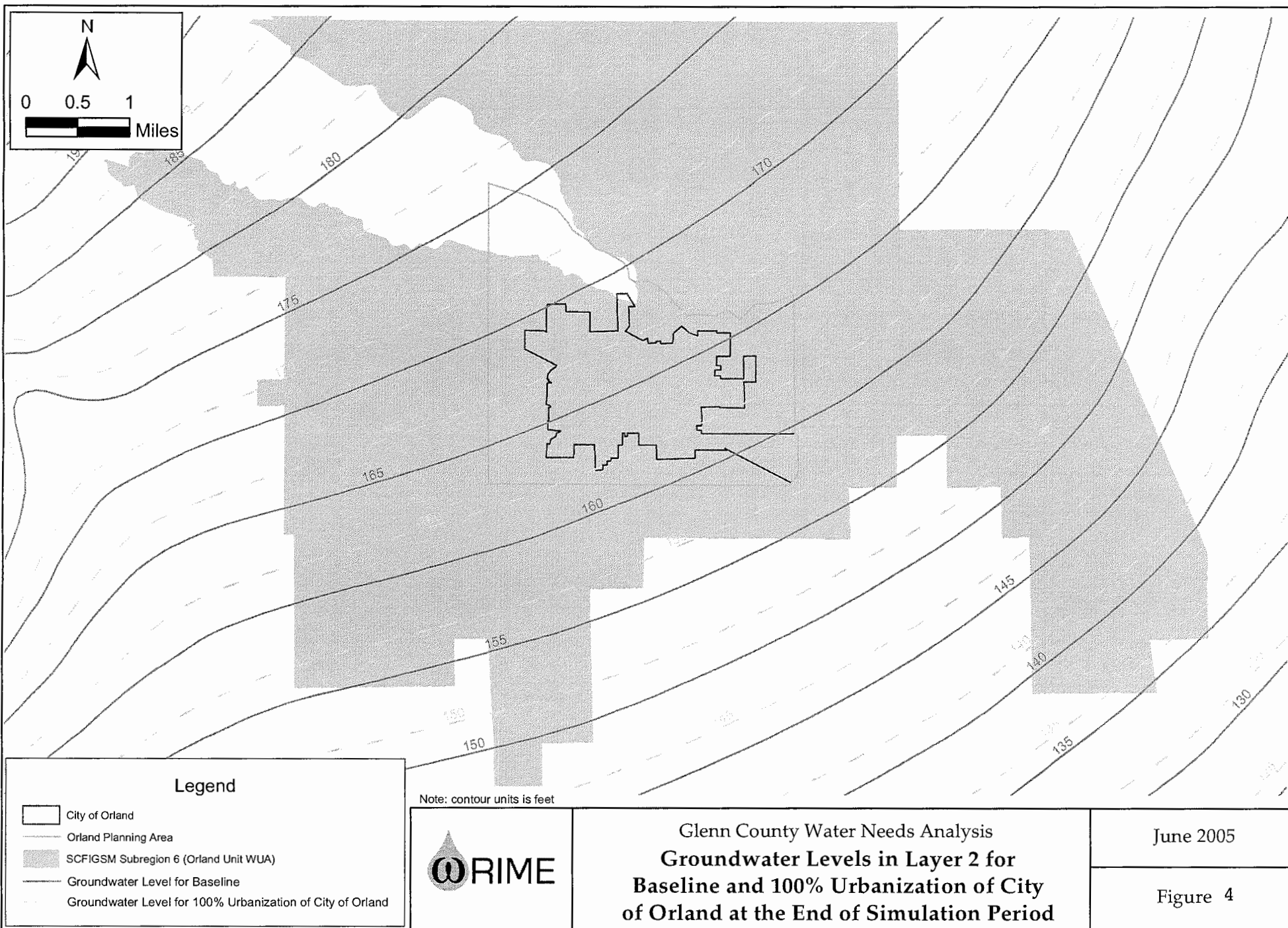




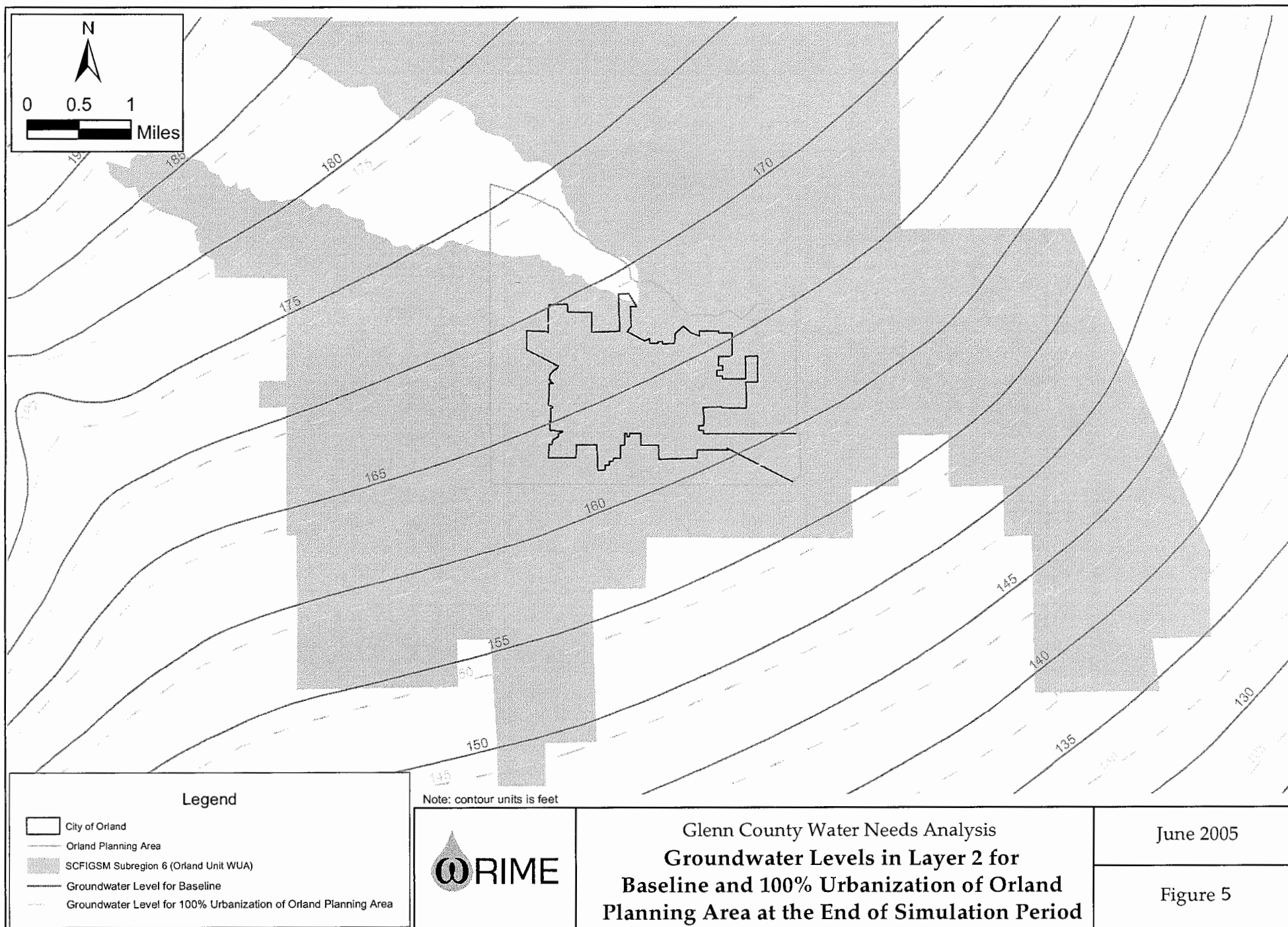
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 Change in Groundwater Levels from the Baseline  
 Condition for Indicator Well 1

June 2005

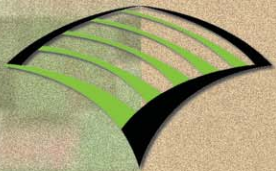
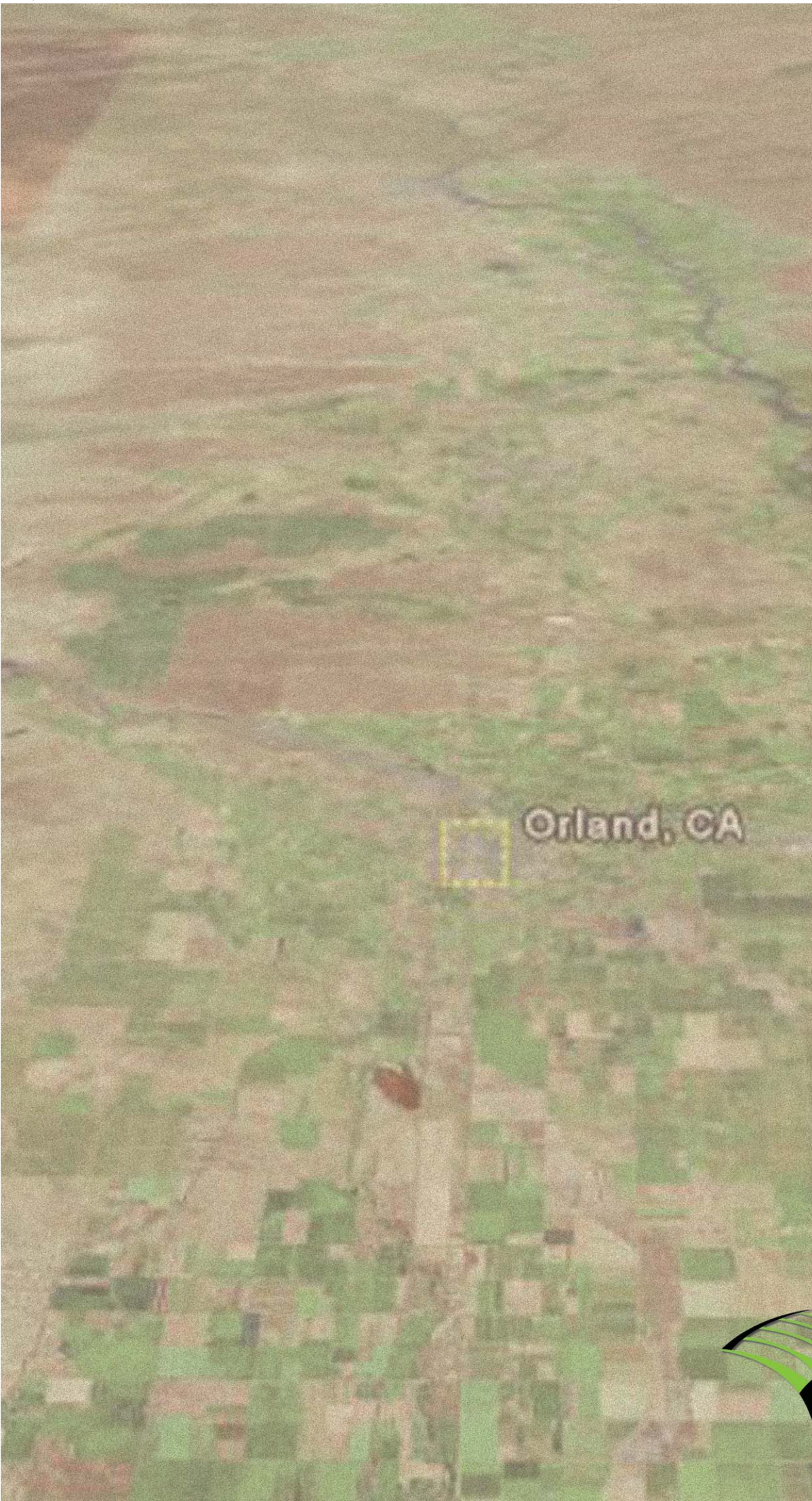
FIGURE 3















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