



**CITY OF GILROY
AND
CITY OF MORGAN HILL**

SUSTAINABLE WATER MANAGEMENT PLANNING

FINAL

September 2019

AKEL
ENGINEERING GROUP, INC.



September 26, 2019

City of Gilroy
7351 Rosanna Street
Gilroy, CA 95020

City of Morgan Hill,
17575 Peak Avenue,
Morgan Hill, California 95037

Attention: Mr. Girum Awoke, P.E.
Director of Public Works, City of
Gilroy

Mr. Chris Ghione
Public Services Director, City of Morgan Hill

Subject: Technical Memorandum – Sustainable Water Management Planning

Dear Girum and Chris:

We are pleased to submit this letter report documenting the water supply alternatives analysis and project ranking for the Llagas and Coyote Valley Groundwater Subbasins. This analysis documents on-going and potential projects impacting the water supplies in the local groundwater aquifers, and provides a qualitative analysis and ranking system in an effort to prioritize the impact of each project and the benefits to the Cities of Gilroy and Morgan Hill.

We are extending our thanks to you and your staff, SCRWA staff, and other staff, whose courtesy and cooperation were valuable components in completing this study and producing this report.

Sincerely,

AKEL ENGINEERING GROUP, INC.

Tony Akel, P.E.
Principal

Enclosure: Report

Cc: Mr. Saeid Vaziry, PE, Environmental Programs Manager, South County Regional
Wastewater Authority



Acknowledgements

City of Gilroy

Girum Awoke, Director of Public Works

Gary Heap, City Engineer

City of Morgan Hill

Chris Ghione, Public Services Director

Anthony Eulo, Program Administrator

Dan Repp, Deputy Director of Utility Services

South County Regional Wastewater Authority

Saeid Vaziry, Environmental Programs Manager

Sustainable Water Management Planning

TABLE OF CONTENTS

PAGE NO.

Contents

1.0	BACKGROUND.....	1
2.0	DEFINITIONS.....	2
3.0	GROUNDWATER BASINS	2
	3.1 Llagas and Coyote Valley Groundwater Basins.....	2
	3.2 Existing and Projected Water Supply Balance.....	3
4.0	EXISTING VALLEY WATER BASIN RECHARGE PROGRAM	4
5.0	CITY OF GILROY AND MORGAN HILL CURRENT POLICY OBJECTIVES	4
6.0	POTENTIAL WATER MANAGEMENT PROJECTS	5
	6.1 Currently Considered Projects	5
	6.2 New Projects Added for Consideration	6
7.0	PROJECT EVALUATION AND RANKING	7
	7.1 Criteria.....	7
	7.2 Project Evaluation and Ranking.....	8
8.0	SUMMARY	9
9.0	RECOMMENDATIONS	10

FIGURES

Figure 1	Regional Location Map
Figure 2	Groundwater Subbasins
Figure 3	Creeks and Water Bodies
Figure 4	Groundwater Wells
Figure 5	Gilroy – Morgan Hill Recycled Water Alternatives
Figure 6	Santa Clara Conduit

TABLES

Table 1	Existing and Projected Supply vs Demand Comparison (Coyote Valley Subarea)
Table 2	Existing and Projected Supply vs Demand Comparison (Llagas Subbasin)
Table 3	Evaluation Criteria – Categories and Scores
Table 4	Project Ranking

APPENDIX

Llagas Groundwater Subbasin 2035 Water Budget

1.0 BACKGROUND

The cities of Gilroy (G) and Morgan Hill (MH) are located approximately 25 miles south of San Jose along the State Route 101 corridor (**Figure 1**). The cities are located in the southern portion of County of Santa Clara, within the Santa Clara Valley. Both areas are located within the Llagas Subbasin groundwater aquifer, with the northern-most portion of Morgan Hill located in the Coyote Valley Subbasin groundwater aquifer (**Figure 2**). The cities completed a 2015 Urban Water Management Plan, which provides a groundwater balance for the respective aquifers, and which documents objectives to meet the groundwater supply and demand needs for a 20-year planning horizon.

As part of continued management efforts to provide a sustainable groundwater resource, Valley Water (VW) is in the process of updating the Water Supply Master Plan and County-Wide Recycled Water Master Plan for their service area. Other relevant studies and reports include:

1. Zone of Benefit Study (VW) – In Progress
2. South County Recycled Water Master Plan (G/MH/VW) – 2015
3. Morgan Hill Urban Water Management Plan (UWMP) - 2015
4. Gilroy Urban Water Management Plan - 2015
5. Morgan Hill Water System Master Plan - 2017

Several projects have been recommended in each report that impact the Llagas and Coyote Valley Subbasins. This report evaluates the impact of these projects, while suggesting enhancements or alternate projects, that may be beneficial to the cities and the groundwater basin. Accordingly, the cities have retained the services of Akel Engineering Group to perform a qualitative analysis of the water supply projects, their benefits to the Cities of Gilroy and Morgan Hill, and to provide a ranking of the projects as a useful tool for guiding water supply discussions.

This memorandum includes the following sections:

- Groundwater Basins
- Existing VW Basin Recharge Program
- City of Gilroy and City of Morgan Hill Policy Objectives
- Potential Water Management Projects
- Project Evaluation and Ranking
- Summary
- Recommendations

2.0 DEFINITIONS

Since some of the terms used in this memorandum are not commonplace, it is important to understand the following basic definitions:

Sustainable

Water supplies are available in sufficient volume to maintain a positive annual water budget in the Llagas and Coyote subbasins where water supplies include: imported water, surface water storage, recycled water, and precipitation capture.

Resiliency

Water emanates from a source that is in some ways different than existing sources and less interruptible due to climate change, imported water restrictions, or physical failures in the imported water delivery system.

Non-Potable Reuse (NPR) Water

Common “purple pipe” recycled water resulting from additional treatment processes as a wastewater treatment plant that is typically used solely for irrigation and some industrial processes.

Potable Reuse (PR) Water

Wastewater that has been subject to advanced treatment processes at a wastewater treatment plant that render the water safe for human consumption. Uses for potable reuse can be either indirect or direct.

- **Indirect Potable Reuse (IPR)** – There are 2 types of IPR, and both require an environmental buffer. These items are as follows:
 - Groundwater Recharge – requires 6 months retention time before reaching nearest well
 - Surface Water Augmentation – requires time in a reservoir before entering a treatment plant
- **Direct Potable Reuse (DPR)** – 2 types
 - Raw Water Augmentation (send directly to a drinking water treatment plant)
 - Direct Connection to a public water system

3.0 GROUNDWATER BASINS

This section provides a description of the groundwater basin characteristics and documents the water supply balance for the Llagas Subbasin and Coyote Valley Subarea in accordance with the cities’ respective 2015 UWMPs.

3.1 Llagas and Coyote Valley Groundwater Basins

The City of Morgan Hill is located above the boundary between two groundwater basins: The Coyote Valley Subarea of the Santa Clara groundwater subbasin in the north and the Llagas groundwater subbasin in the south, with Cochrane Road generally serving as the boundary line. The City of Gilroy is located entirely within the Llagas Subbasin. Neither the Coyote Valley Subarea nor the Llagas Subbasin are adjudicated groundwater basins and overdraft has not been a historical problem.

The VW prepared a Groundwater Management Plan (GMP) in November 2016. This 2016 GMP provides a comprehensive overview of the Santa Clara Valley Groundwater Basin and recommends various management strategies for the basin. The plan specifies two Basin Management Objectives, which summarize the overall management objectives for the VW and are summarized as follows:

- Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence
- Groundwater is protected from contamination

The VW GMP and the Cities 2015 UWMPs include detailed discussions on the groundwater basins and on the collaborative efforts currently underway to manage the groundwater supplies. This includes management of the upstream watersheds, which are a significant source of natural groundwater recharge. The watersheds are shown on [Figure 3](#).

The supply reliability is considered for the near-term needs (2020) and the long-term needs (2020-2040). There are two aspects of supply reliability to be considered. The first relates to immediate service needs and is primarily a function of the availability and adequacy of the supply facilities. This aspect is considered for emergency reliability. The second aspect is climate-related, and involves the availability of water during mild or severe drought periods.

3.2 Existing and Projected Water Supply Balance

As part of the 2015 Urban Water Management Plans (2015 UWMP), each City prepared a supply versus demand comparison that evaluated the Llagas Subbasin and Coyote Valley Subarea. [Figure 4](#) documents the location of each City's groundwater wells with respect to the groundwater aquifers. The groundwater wells indicate which groundwater aquifers impact the City's overall production. A discussion of the groundwater supply balance for each aquifer is included in the following, and an infographic explaining the water supply balance concept is included in the [Appendix](#):

- **Coyote Valley Subarea.** [Table 1](#) documents the water supply balance for the Coyote Valley Subarea. In accordance with the City of Morgan Hill's 2015 UWMP, the Coyote Valley Subarea was projected to have an 1,168 acre-feet per year (AFY) deficiency in 2020, with the deficiency expanding to 1,982 AFY by the year 2040.
- **Llagas Subbasin.** [Table 2](#) documents the water supply balance for the Llagas Subbasin, and in accordance with the Gilroy 2015 UWMP. The Llagas Subbasin is currently projected to have a surplus of 900 AFY in 2020, and a 1,400 AFY deficiency by 2035. However, accounting for recycled water from the South County Regional Wastewater Authority (SCRWA), the 2020 surplus increases to 3,700 AFY and the deficiency is offset and becomes a 2,300 AFY surplus by 2035.

Recycled water was addressed as part of a joint effort between VW, the City of Morgan Hill, the City of Gilroy, and the South County Regional Wastewater Authority. Alternatives for

servicing the City of Gilroy and the City of Morgan Hill with recycled water are shown on [Figure 5](#).

4.0 EXISTING VALLEY WATER BASIN RECHARGE PROGRAM

VW imports Central Valley Project water from San Luis Reservoir via the Pacheco Tunnel, the Pacheco Conduit, and the Santa Clara Conduit. The Santa Clara Conduit traverses the east side of the City of Gilroy and the City of Morgan Hill, with connections supplying raw water for recharge purposes in the City of Morgan Hill. The Santa Clara Conduit is shown on [Figure 6](#).

Valley Water manages several groundwater recharge projects that receive deliveries from the Santa Clara Conduit, and discussed as follows:

- **San Pedro Ponds:** These ponds are located in the City of Morgan Hill and recharge the Llagas Subbasin. However, due to septic tanks in the area, the full capacity of this recharge basin is not utilized.
- **Main Avenue Ponds:** These ponds are on the east side of the City of Morgan Hill and recharge the Llagas Subbasin.
- **Madrone Channel:** This channel is used for stormwater runoff management in the wet season, and receives raw recharge water via the Madrone Pipeline during the summer months. While the northern end of the Channel recharges the Coyote Valley Subarea when stormwater is present, the Channel primarily recharges the Llagas Subbasin.
- **Llagas In-Stream Recharge:** This managed recharge occurs using natural runoff in Llagas Creek to recharge the Llagas Subbasin.

These projects are part of the managed groundwater recharge program administered by VW. The 2016 Groundwater Management Plan for VW indicates that there is a recharge capacity of 19,000 AFY.

5.0 CITY OF GILROY AND MORGAN HILL CURRENT POLICY OBJECTIVES

The cities of Morgan Hill and Gilroy currently acknowledge that:

- If imported water were unavailable for an extended period, groundwater aquifers would suffer dramatically.
- Their water supplies are isolated single source systems, with no potential interties (connections to other systems) or other infrastructure to improve resiliency.
- The Llagas Subbasin does not have formal allocation limits, and no corresponding water supply agreements exist between the cities and VW, thus the status of the supplies is difficult to determine.

- The respective municipal water systems have benefitted from the managed recharge programs implemented by VW.
- The amount and reliability of imported water supplies is likely to diminish in the future due to climate change, biological restrictions that limit pumping in the Delta, and physical disruptions, (e.g., levee failures), to the Delta infrastructure.

6.0 POTENTIAL WATER MANAGEMENT PROJECTS

This section documents projects that are currently being considered by VW, as well as other projects that have been added based on feedback during planning workshops held jointly with City of Gilroy and City of Morgan Hill staff.

6.1 Currently Considered Projects

VW is currently in the process of updating their Water Supply Master Plan, and which includes projects intended to balance and promote sustainability of the Llagas and Coyote Valley aquifers. The projects include the following:

Groundwater Recharge Projects

- **GW-1 Butterfield Channel Recharge.** This project is anticipated to have an annual yield of 2,000 AFY in the Llagas Subbasin, and would extend the Madrone Pipeline to the Butterfield Channel.
- **GW-2 Anderson Dam Reconstruction.** This project includes retrofits to Anderson Dam, and raising the spillway. This project is anticipated to increase annual yields to Coyote Creek by 10,000 AFY, and benefits the Coyote Valley Subarea. Valley Water recently completed a project that enables Anderson water to now flow into the Madrone Channel and recharge the Llagas aquifer as well.
- **GW-3 San Pedro Ponds.** This project would extend sewer services to nearby homes currently relying on septic tanks in order to allow the full capacity of the San Pedro Ponds to be utilized. This project has an anticipated yield of approximately 1,000 AFY.
- **GW-4 Uvas Pipeline.** This project would install a pipeline from Uvas Reservoir to Llagas Creek. This project has an anticipated yield of approximately 1,000 AFY.
- **GW-5 Church Avenue Pipeline.** This project would install a new pipeline off of the Santa Clara Conduit and to the Church Ponds. This project has an anticipated yield of approximately 1,000 AFY.
- **GW-6 Uvas Reservoir Expansion.** This project would expand the Uvas Reservoir holding capacity. This project has an anticipated yield of approximately 1,000 AFY.

Other Water Supply Projects

- **OS-1 South County Water Treatment Plant.** This project would construction a surface water treatment plant in the South County area, and receive raw water from the Santa Clara Conduit. This project has an anticipated yield of approximately 2,000 AFY (OS-1a).

As an alternative (OS-1b), a secondary scenario was included to increase the yield of the South County Water Treatment Plant to 11,000 AFY. This was done in an effort to substantiate the Water Treatment Plant option, should supplies be available.

In addition to the projects list above, Valley Water is currently working on a County-Wide Recycled Water Master Plan. This master plan evaluated four scenarios to deliver recycled water to the South County area, and discussed as follows:

Recycled Water Projects

- **RW-1 South Bay Water Recycling (SBWR).** This project is considered as Alternatives 1 and 2 in the Recycled Water Master Plan, and would deliver enhanced non-potable reuse (NPR) water to Morgan Hill for the purposes of reuse.
- **RW-2 Scalping Plant.** This project is considered as Alternatives 3 and 4 in the Recycled Water Master Plan, and would construct a recycled water scalping plant in Morgan Hill, and treat and deliver advance purified water to the Church Ponds for indirect potable reuse (IPR) groundwater recharge.

6.2 New Projects Added for Consideration

Finally, other projects were consider that altered, or expanded on, the currently considered projects. Some additional projects were considered by the Cities of Morgan Hill and Gilroy that are not yet included in the VW planning documents. These alternatives are as follows:

Groundwater Recharge Projects

- **GW-7 Stormwater Capture.** This project would increase stormwater retention basin capture in an effort to enhance groundwater recharge during rainfall events.

Recycled Water Projects

- **RW-3 Scalping Plant for NPR.** This project would treat wastewater for delivery as NPR to a recycled water system in the City of Morgan Hill.
- **RW-4 SCRWA Pump Station to Morgan Hill.** This project would construct a pump station at the SCRWA treatment plant and pump recycled water to Morgan Hill for NPR.
- **RW-5 SCRWA IPR Upgrade and Pump Station to Morgan Hill.** This project would upgrade the SCRWA treatment plant to Advanced Water Treatment. A pump station would be

constructed at the SCRWA treatment plant and pump recycled water to Morgan Hill for IPR in the Butterfield Channel.

- **RW-6 Scalping Plant to IPR.** This project alters Alternatives 3 and 4 in the Recycled Water Master Plan, and would construct a recycled water scalping plant in Morgan Hill, and treat and deliver advance purified water to the Butterfield Channel for indirect potable reuse (IPR) groundwater recharge.
- **RW-7 SBWR IPR to Butterfield Channel.** This project would alter Alternatives 1 and 2 in the Recycled Water Master Plan, and would deliver IPR water to the Butterfield Channel from the South Bay Water Recycling Plant.

Other Water Supply Projects

- **OS-2 Buy and Wheel Water.** This alternative would involve purchasing water from other potential agencies and municipalities, and “wheeling” the water to the cities of Morgan Hill and Gilroy via a transfer agreement.
- **OS-3 Agricultural and Other Users Offset.** This project would initiate a program to provide a policy and regulatory framework to reduce agricultural pumping within the South County specifically during droughts or imported water supply curtailments.

7.0 PROJECT EVALUATION AND RANKING

This section discusses the criteria used in the evaluation, and the results of the evaluation.

7.1 Criteria

Water supply projects should be evaluated and selected within a water supply policy framework. These policies should address items such as risk, resiliency, sustainability, cost, and source of water supplies. The following are a series of ranking criteria used in this report to evaluate water supply projects. There were seven individual criteria evaluated for each project, and the project was ranked from 0, meaning no benefit, to a 5, which would have a great benefit (**Table 3**). Additionally, the seven criteria receive an independent weighting, which provided the importance of each criteria to the cities. The criteria and their weight are discussed as follows:

- **Criteria 1 - Increase in Yield to the Llagas Subbasin.** The increase in yield is defined as additional water to the basin, and does not account for inter-basin transfers. This criteria received an overall weight of 20%.
- **Criteria 2 - Increase in Yield to the Coyote Valley Subarea.** The increase in yield is defined as additional water to the basin, and does not account for inter-basin transfers. This criteria received an overall weight of 5%.

- **Criteria 3 - Cost per Acre Foot.** This is qualitative analysis of the cost per acre foot of each project based on reported values from VW, and scaled appropriately for projects with cost not yet established. This criteria received an overall weight of 15%.
- **Criteria 4 - Location of Benefit.** This is defined based on the geographical location of the benefit for the project. For example, areas of recharge in the northern most portion of the Llagas Subbasin have the highest benefit to the cities. This criteria received an overall weight of 20%.
- **Criteria 5 - Cost within Cities.** This is a qualitative analysis of the foreseeable cost within the cities related to the project. This can be related to road work, expected operations and maintenance, easement acquisition, new pipeline networks, and other costs related to the project. This criteria received an overall weight of 20%.
- **Criteria 6 - Implementation and Regulatory.** This criteria provides a basis for the feasibility of construction, the likelihood of the project, and whether the current regulatory framework supports the project. This criteria received an overall weight of 5%.
- **Criteria 7 - Resiliency.** This criteria evaluates the susceptibility of a project to the impacts of climate change, as well as the potential for an interruptible Delta supply. Delta supply interruptions could be related to earthquakes, biological concerns, or other factors that may result in a limited water supply availability. This criteria received an overall weight of 15%.

7.2 Project Evaluation and Ranking

Based on the criteria listed above, each project was evaluated by City of Gilroy and City of Morgan Hill staff and scored based on the benefits to the cities and their respective groundwater aquifers. The evaluation was an iterative effort that involved multiple joint workshops with City of Gilroy and City of Morgan Hill staff. Each workshop was intended as a stakeholder coordination meeting, in which feedback on the criteria, criteria weighting, and project scoring were discussed and edited. Each time changes were made, a new workshop was conducted to review the results and to provide team discussions on the results of the evaluation.

The overall scoring matrix is documented on [Table 4](#). The top 5 projects are documented in the following:

- **Rank 1: Agricultural and Other Users Offset.** This alternative scored the highest, based on the criteria, and largely due to the potential large offset in groundwater pumping, and the negligible need for infrastructure.
- **Tie – Rank 2: Butterfield Channel Recharge and SBWR IPR to Butterfield Channel.** Both of these projects score well in terms of location of benefit and overall increases to the Llagas Basin. Butterfield Channel scores well in terms of cost, while SBWR scores well in resiliency.

- **Rank 4: South County Water Treatment Plant (Increased Deliveries).** This project scores well with the provision that a substantial increase in yield is possible. Should deliveries be increased, there is significant potential to rest groundwater wells within the cities.
- **Rank 5: South Bay Water Recycling.** This project scores well in terms of benefits to the groundwater aquifers and resiliency, however, this project will be very costly to implement.

8.0 SUMMARY

As part of continued management efforts to provide a sustainable groundwater resource, Valley Water (VW) is in the process of updating the Water Supply Master Plan and County-Wide Recycled Water Master Plan for their service area. Several projects have been recommended in each report that impact the Llagas and Coyote Valley Subbasins. This report evaluates the impact of these projects, while suggesting enhancements or alternate projects, that may be beneficial to the cities and the groundwater basin. Accordingly, the City of Gilroy has retained the services of Akel Engineering Group to perform a qualitative analysis of the water supply projects, their benefits to the Cities of Gilroy and Morgan Hill, and to provide a ranking of the projects as a useful tool for guiding water supply discussions.

There were seven individual criteria evaluated for each project, and the project was ranked from 0, meaning no benefit, to a 5, which would have a great benefit ([Table 3](#)). Additionally, the seven criteria receive an independent weighting, which provided the importance of each criteria to the cities. Eighteen overall projects were evaluated in accordance with this criteria and are documented on [Table 4](#).

The top 5 projects are documented in the following:

- **Rank 1: Agricultural and Other Users Offset.** This alternative scored the highest, based on the criteria, and largely due to the potential large offset in groundwater pumping, and the negligible need for infrastructure.
- **Tie – Rank 2: Butterfield Channel Recharge and SBWR IPR to Butterfield Channel.** Both of these projects score well in terms of location of benefit and overall increases to the Llagas Basin. Butterfield Channel scores well in terms of cost, while SBWR scores well in resiliency.
- **Rank 4: South County Water Treatment Plant (Increased Deliveries).** This project scores well with the provision that a substantial increase in yield is possible. Should deliveries be increased, there is significant potential to rest groundwater wells within the cities.
- **Rank 5: South Bay Water Recycling.** This project scores well in terms of benefits to the groundwater aquifers and resiliency, however, this project will be very costly to implement.

These 5 potential projects are likely to have significant benefits to the overall sustainability of the groundwater aquifers beneath the City of Gilroy and the City of Morgan Hill. These benefits include potable water offsets, diversification of potable water supply, additional managed recharge of the

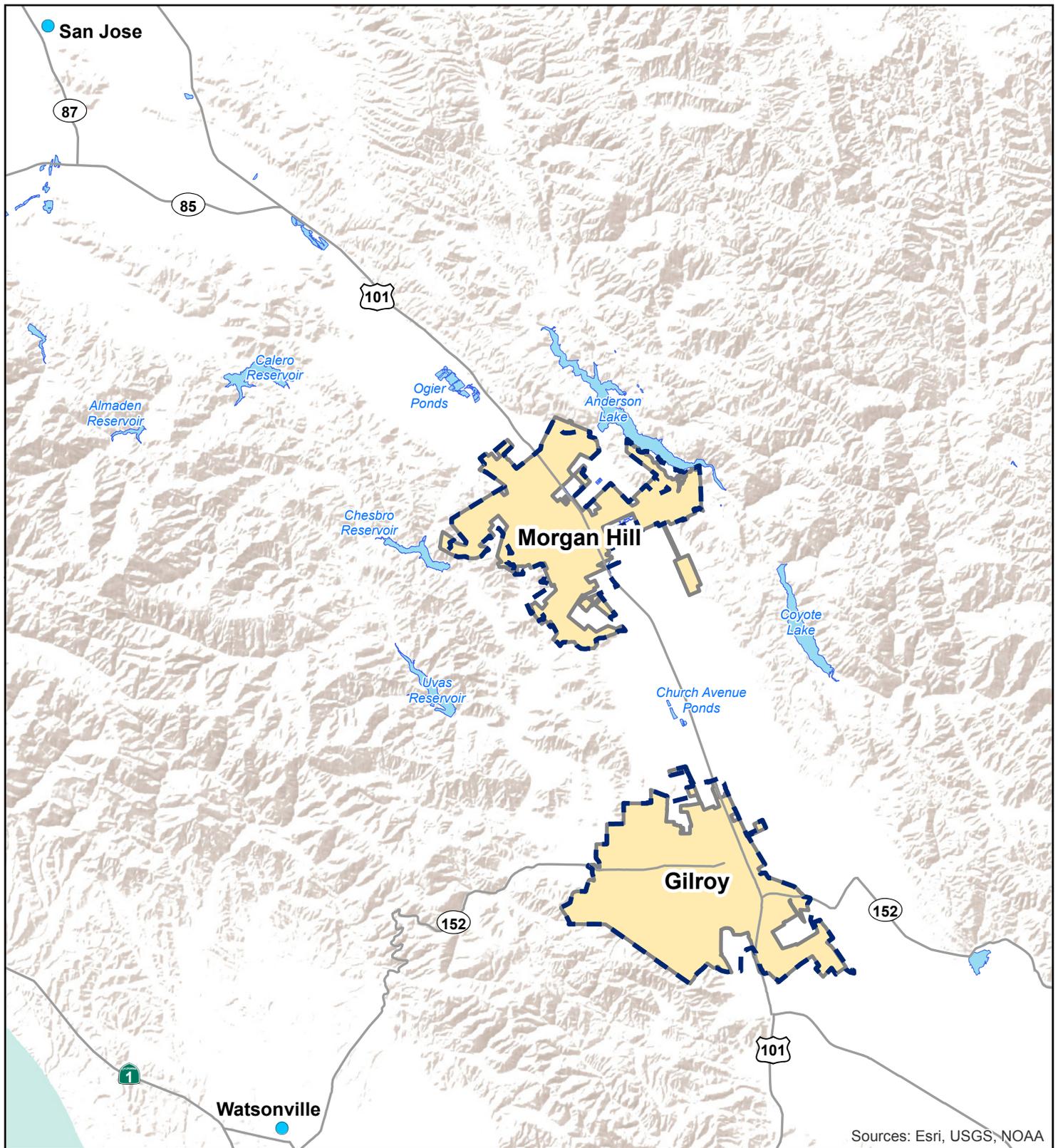
groundwater aquifer, and policy implementation for offsetting aquifer pumping. It is recommended that these identified projects continue to be explored in more-detailed reviews and to establish equitable and sustainable water use and conservation within the South County.

9.0 RECOMMENDATIONS

This report recommends that Morgan Hill and Gilroy continue to explore and expand their joint groundwater policies and objectives. Suggestions for future policy discussions between Gilroy and Morgan Hill may include:

- Explore joint role in regional water supply planning.
- Define minimum level of service for water supply.
- Define risk levels for water supply.
- Identify reasonable recycled water investments benefitting both Morgan Hill and Gilroy.
- Define water supply agreements with Valley Water.

Figures



Sources: Esri, USGS, NOAA

Legend

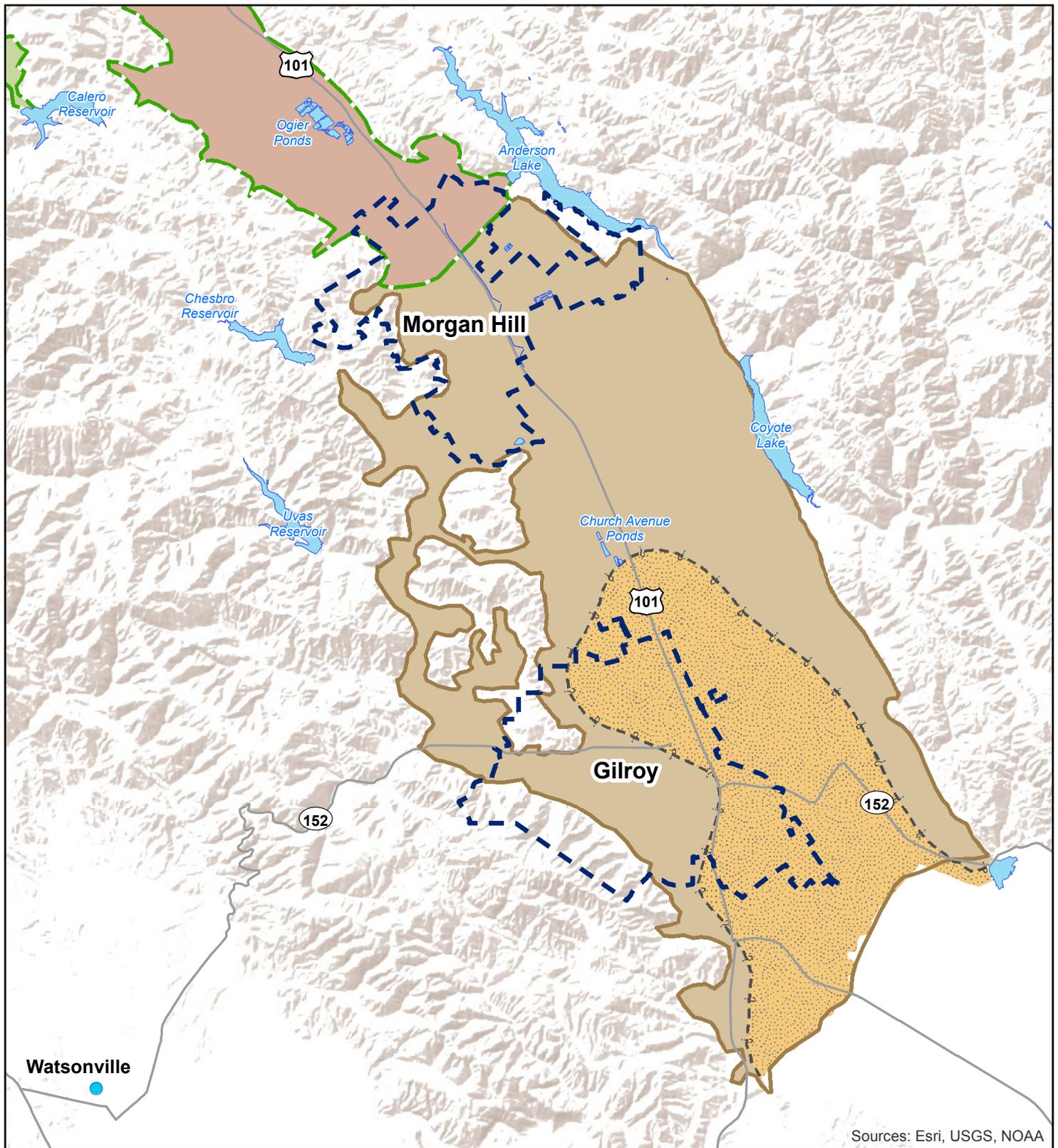
-  City Limits
-  Urban Growth Boundary

**Figure 1
Regional Location Map**

Gilroy - Morgan Hill
Supply Strategy



0 0.5 1 2 Miles



Sources: Esri, USGS, NOAA

Legend

- Urban Growth Boundary
- Groundwater Subbasins**
- DWR Subbasins**
- Santa Clara (2-9.02)
- Llagas (3-3.01)

- Hydrographic Units**
- Santa Clara Plain Recharge Area
- Coyote Valley Recharge Area
- Llagas Recharge Area
- Llagas Confined Area
- Approximate Extent of Confined Area

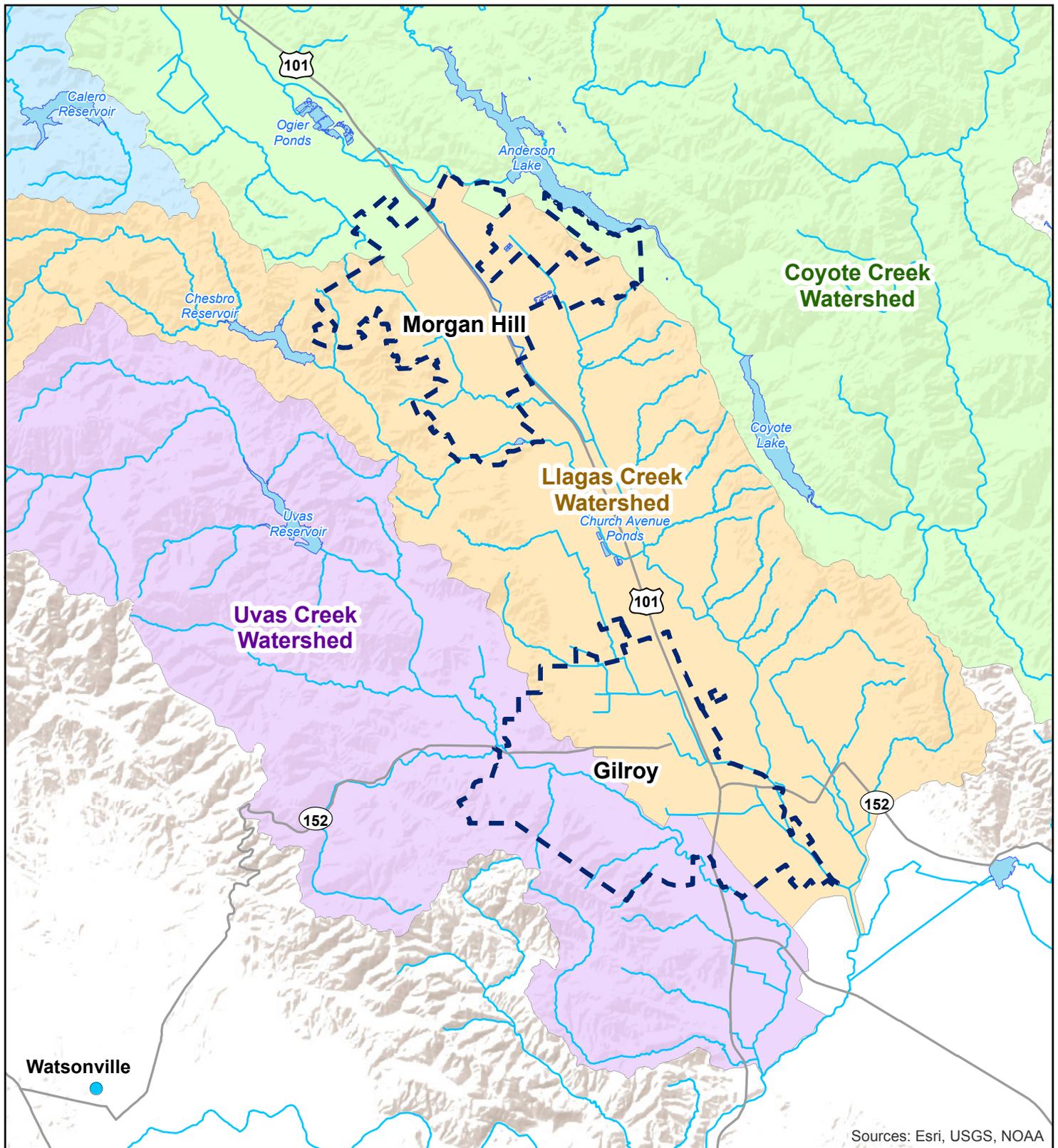
Figure 2
Groundwater Subbasins
 Gilroy - Morgan Hill
 Supply Strategy



Updated: January 11, 2019

0 0.5 1 2 Miles





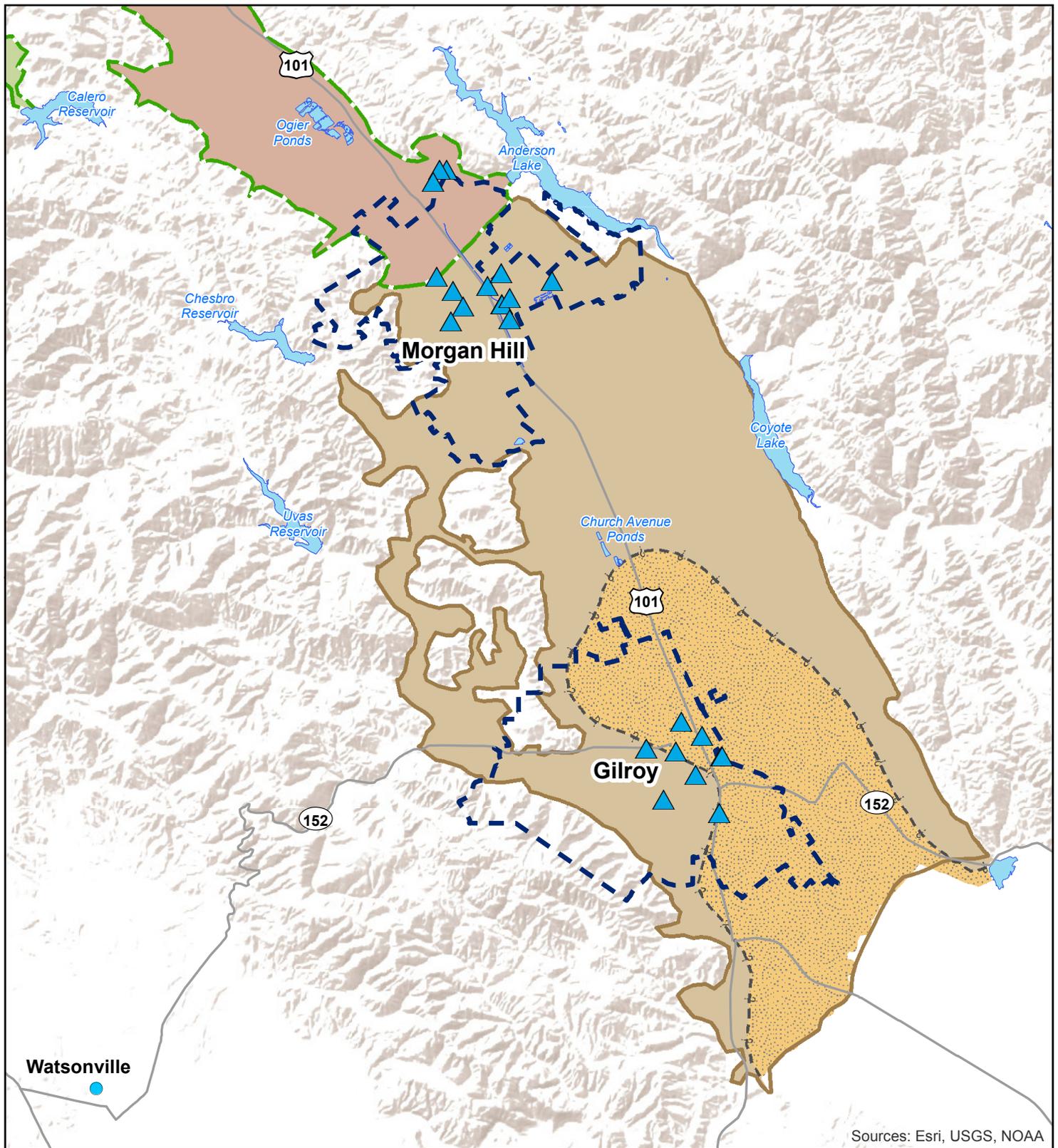
Legend

- Santa Clara County Watershed Boundaries
- Coyote
- Guadalupe River
- Llagas
- Uvas
- Urban Growth Boundary
- Creeks
- Water Bodies

**Figure 3
Creeks and Water Bodies**

Gilroy - Morgan Hill
Supply Strategy





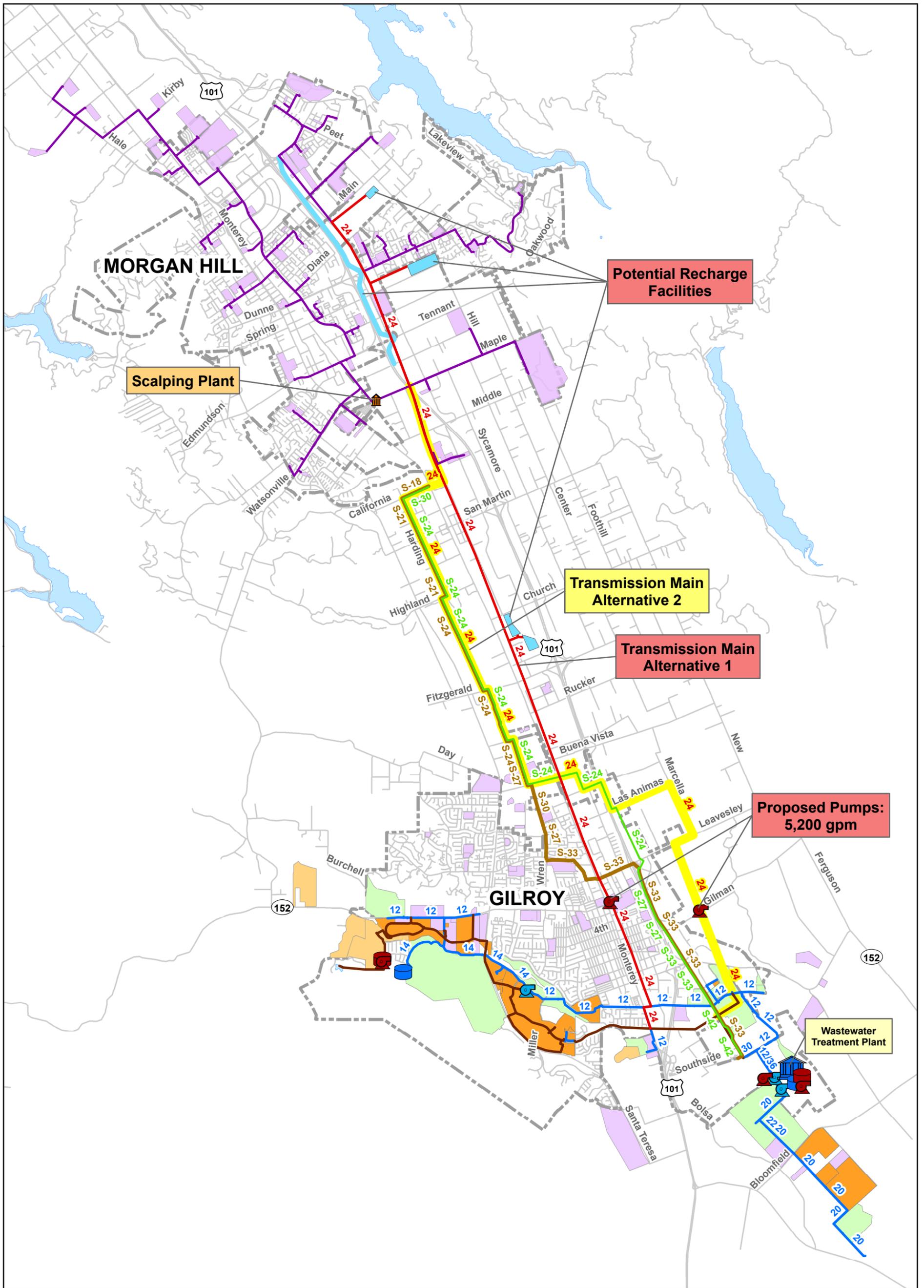
Sources: Esri, USGS, NOAA

Legend

-  Groundwater Wells
-  Urban Growth Boundary
- Groundwater Subbasins**
-  Santa Clara (2-9.02)
-  Llagas (3-3.01)
- Hydrographic Units**
-  Santa Clara Plain Recharge Area
-  Coyote Valley Recharge Area
-  Llagas Recharge Area
-  Llagas Confined Area
-  Approximate Extent of Confined Area

Figure 4
Groundwater Wells
 Gilroy - Morgan Hill
 Supply Strategy





Legend

Proposed	Recharge Pipeline Project Alternative 2	Recharge Ponds	Roads
Storage Tanks	Sewer Relief Trunk	Recycled Water Pipelines	Lakes
Booster Stations	Morgan Hill Recycled Water Conceptual Buildout	Existing Users	
Scalping Plant	Existing	In Progress Users	
Baseline Improvements for all Alternatives	WWTP	Baseline Users	
Recycled Water Recharge Pipeline	Storage Tanks	Potential Users	
Recharge Pipeline Project Alternative 1	Booster Stations	Sewer Joint Trunk	
		City Limits	

Updated: January 11, 2019

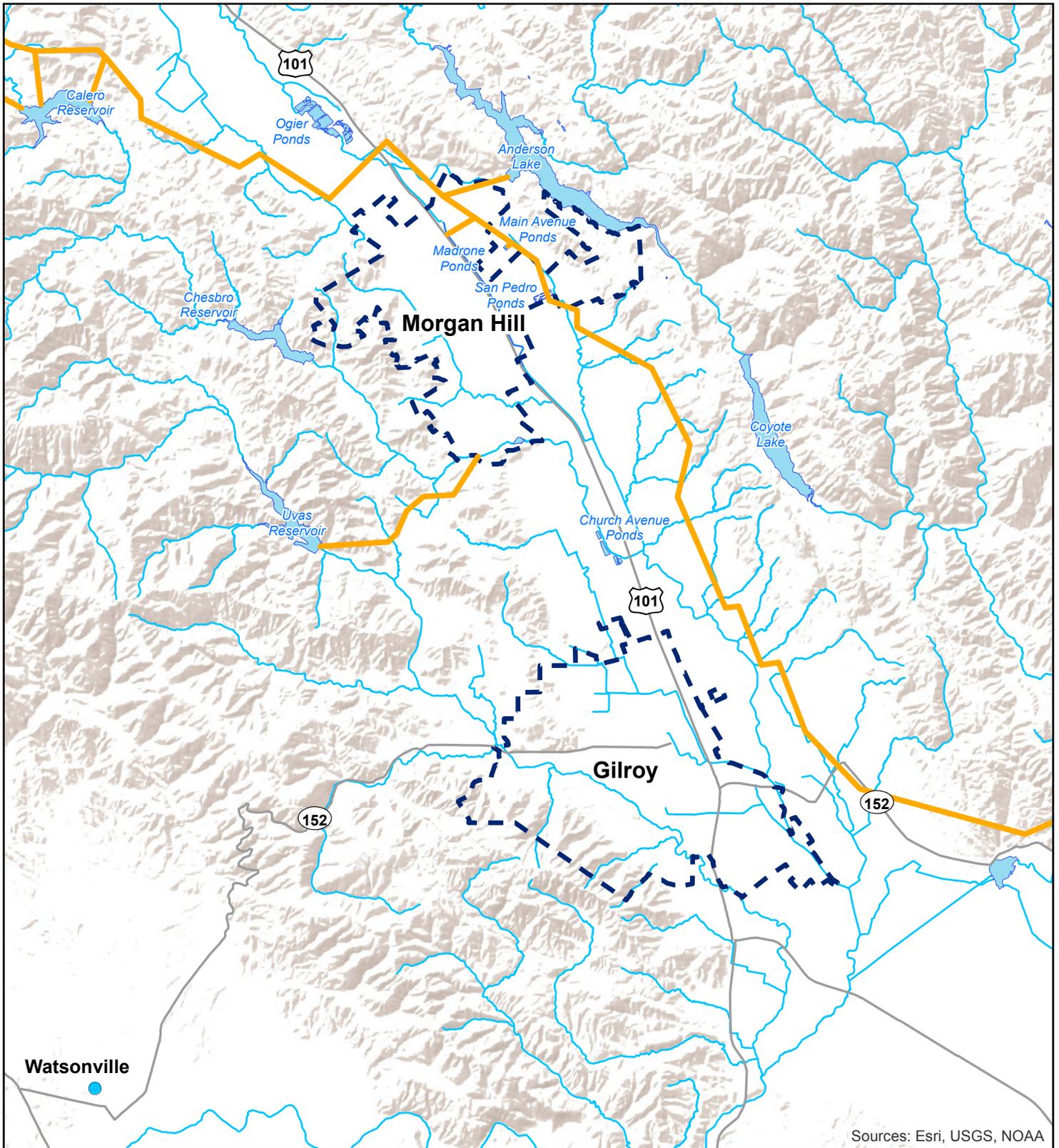
0 0.25 0.5 1 Mile

AKEL ENGINEERING GROUP, INC.

Figure 5
Gilroy - Morgan Hill
Recycled Water Alternatives

Gilroy - Morgan Hill
 Supply Strategy

File Name & Location: P:\GIS\GIS_Projects\Gilroy_MorganHill\190110 - Supply Strategy\FinalMHGL_Fig5_MHGL-RWalt_011119.mxd



Sources: Esri, USGS, NOAA

Legend

-  Raw Water Pipeline
-  Urban Growth Boundary
-  Creeks
-  Water Bodies

DISCLAIMER: The Raw Water Pipeline is based on a representation of Figure 2 from the DRAFT CVPIA Water Management Plan 2017.

Figure 6
Santa Clara Conduit
 Gilroy - Morgan Hill
 Supply Strategy



0 0.5 1 2 Miles

Updated: January 11, 2019



Tables

Table 1 Existing and Projected Supply vs Demand Comparison (Coyote Valley Subarea)
 Gilroy - Morgan Hill Supply Analysis
 City of Gilroy and City of Morgan Hill

Demand Condition	2020	2025	2030	2035	2040
1	(afy) 2	(afy) 3	(afy) 4	(afy) 5	(afy) 6
Projected Water Supply of the Coyote Valley Subarea¹					
Natural Groundwater recharge	2,400	2,400	2,400	2,400	2,400
Local Surface Water	6,200	6,400	6,300	6,200	6,200
SCVWD CVP Deliveries	3,500	4,400	5,600	6,600	6,800
Total	12,100	13,200	14,300	15,200	15,400
Projected Average Daily Water Demand					
City of Morgan Hill ²	1,282	1,373	1,464	1,555	1,646
Other Users ³	11,986	13,063	14,295	15,474	15,736
Total	13,268	14,436	15,759	17,029	17,382
Supply vs Demand Comparison					
Difference (Supply - Demand)	-1,168	-1,236	-1,459	-1,829	-1,982
Percent of Total Supply	110%	109%	110%	112%	113%



7/26/2018

Notes:

1. Projected supply per South County Supply document received from SCVWD staff May 27, 2016.
2. City of Morgan Hill demand includes pumping from the Boys Ranch wells, which are located in the Coyote Valley subarea.
3. Demand for other users calculated from document received from SCVWD staff May 27, 2016.

Table 2 Existing and Projected Supply vs Demand Comparison (Llagas Subbasin)
 Gilroy - Morgan Hill Supply Analysis
 City of Gilroy and City of Morgan Hill

Demand Condition	2020 (AFY)	2025 (AFY)	2030 (AFY)	2035 (AFY)
1	2	3	4	5
Existing and Projected Water Supply of the Llagas Subbasin				
Natural Groundwater Recharge	22,400	22,400	22,400	22,400
Local Surface Water	16,000	18,100	20,300	21,500
SCVWD CVP Deliveries	10,700	10,700	10,700	10,400
Recycled Water Supply	2,800	3,100	3,700	3,700
Total without Recycled Water	49,100	51,300	53,400	54,300
Total with Recycled Water	51,900	54,300	57,100	58,000
Existing and Projected Average Daily Water Demands for the Llagas Subbasin				
City of Gilroy	9,200	10,300	11,600	12,900
City of Morgan Hill	7,000	7,600	8,200	8,700
Other Groundwater Users	32,000	33,000	33,800	34,100
Total	48,200	50,900	53,600	55,700
Supply vs Demand Comparison - Excluding Recycled Water				
Difference (Supply - Demand)	900	400	-200	-1,400
Percent of Total Supply	98%	99%	100%	103%
Supply vs Demand Comparison - Including Recycled Water				
Difference (Supply - Demand)	3,700	3,400	3,500	2,300
Percent of Total Supply	93%	94%	94%	96%

Notes:

1. Source: 2015 Gilroy UWMP

3/4/2019

Table 3 Evaluation Criteria - Categories and Scores
Gilroy - Morgan Hill Supply Analysis
City of Gilroy and City of Morgan Hill

<p>Criteria 1 - Increase in Yield (Llagas)</p> <p>The scores in this category range from 0 to 5:</p> <ol style="list-style-type: none"> 0. No additional water added into the Basin 1. Less than 1,000 AFY additional Basin Supply 2. Potential for over 1,000 AFY additional Basin Supply 3. Potential for over 2,000 AFY additional Basin Supply 4. Potential for over 3,000 AFY additional Basin Supply 5. Potential for over 4,000 AFY additional Basin Supply <p>Note: New projects that move water already available within the basin are given a 0, as they do not provide additional yield, but transfer the yield from one area to another.</p>
<p>Criteria 2 - Increase in Yield (Coyote)</p> <p>The scores in this category range from 0 to 5:</p> <ol style="list-style-type: none"> 0. No additional water added into the Basin 1. Less than 1,000 AFY additional Basin Supply 2. Potential for over 1,000 AFY additional Basin Supply 3. Potential for up to 2,000 AFY additional Basin Supply 4. Potential for up to 3,000 AFY additional Basin Supply 5. Potential for up to 4,000 AFY additional Basin Supply <p>Note: New projects that move water already available within the basin are given a 0, as they do not provide additional yield, but transfer the yield from one area to another.</p>
<p>Criteria 3 - Cost per AF</p> <p>The scores in this category range from 1 to 5:</p> <ol style="list-style-type: none"> 1. Cost expected over \$5,000 per AF 2. Cost expected up to \$2,500 per AF 3. Cost expected up to \$1,500 per AF 4. Cost expected up to \$1,000 per AF 5. Cost expected up to \$500 per AF
<p>Category 4 - Location of Benefit</p> <p>The scores in this category range from 1 to 5:</p> <ol style="list-style-type: none"> 1. Located outside of the Llagas Unconfined or Coyote Valley Aquifer 2. Located on the periphery of the Llagas Unconfined Aquifer or in Coyote 3. Located in the mid to southern portion of the Llagas Unconfined Aquifer 4. Located in the southern portion of Morgan Hill in the Llagas Unconfined Aquifer 5. Located in the northern portion of Morgan Hill in the top of the Llagas Unconfined Aquifer
<p>Category 5 - Cost within Cities</p> <p>The scores in this category range from 1 to 5:</p> <ol style="list-style-type: none"> 1. Very high cost expected to cities, including O&M, easements, roadwork, etc 2. High cost expected to cities, including O&M, easements, roadwork, etc 3. Moderate cost expected to cities, including O&M, easements, roadwork, etc 4. Low cost expected to cities, including O&M, easements, roadwork, etc 5. Very low cost expected to cities, including O&M, easements, roadwork, etc
<p>Criteria 6 - Implementation / Regulatory</p> <p>The scores in this category range from 1 to 5:</p> <ol style="list-style-type: none"> 1. Project is not feasible based on construction, regulatory, and/or desirability. 2. Project will need to overcome significant construction, regulatory, and/or desirability difficulties. 3. Project will need to overcome some construction, regulatory, and/or desirability difficulties. 4. Project has very few construction, regulatory, and/or desirability difficulties. 5. Project is advantageous from a construction, regulatory, and/or desirability position.
<p>Criteria 7 - Resiliency</p> <p>The scores in this category range from 1 to 5:</p> <ol style="list-style-type: none"> 1. Project is highly susceptible to climate change and/or interruptible Delta supply impacts. 2. Project is susceptible to climate change and/or catastrophic event impacts. 3. Project is somewhat susceptible to climate change and/or catastrophic event impacts. 4. Project is resistant to climate change and/or catastrophic event impacts. 5. Project is not noticeably impacted by climate change and/or catastrophic event impacts. <p>Note: Interruptible Delta supply events can be related to earthquakes, biological concerns, and other factors resulting in limited water supply from the Delta.</p>

Table 4 Project Ranking Summary
 Gilroy - Morgan Hill Supply Analysis
 City of Gilroy and City of Morgan Hill

No.	Project	Description	Costs				Scoring and Weights (5=Highest Benefit. 0=No Benefit)														Project Ranking		Conflict with Other Alternative	Notes	
			Present Value Cost to District	Average Annual Yield	Increase to Basin	Cost/AF	Criteria 1 Increase in Yield (Llagas)		Criteria 2 Increase in Yield (Coyote)		Criteria 3 Cost Per AF		Criteria 4 Location of Benefit		Criteria 5 Cost within Cities		Criteria 6 Implementation / Regulatory		Criteria 7 Resiliency		100%	Rank			
							Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight					
			20%	5%	15%	20%	20%	5%	15%	100%															
Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Aggregate Score	Rank						
Groundwater Recharge Projects																									
GW-1	Butterfield Channel Recharge	Deliver water from the SCP to Butterfield Channel.	\$20	2,000	2,000	\$400	3	0.6	0	0.0	5	0.8	5	1.0	5	1.0	5	0.3	1	0.2	3.75	2	(14, 15, 16)	This project increases in benefit and potential yield if connected north to the Fisher Pond in Morgan Hill.	
GW-2	Anderson Dam Reconstruction	Increase the capacity of Anderson Dam and increase yield to Coyote Creek.	\$1,200	10,000	10,000	\$5,000	3	0.6	5	0.3	1	0.2	2	0.4	5	1.0	3	0.2	3	0.5	3.00	-	-	Benefit to the basin is limited to Coyote Valley unless additional infrastructure is added.	
GW-3	San Pedro Ponds	Retrofit the San Pedro Ponds to reduce impact to local septic.	\$10	1,000	1,000	\$400	2	0.4	0	0.0	5	0.8	5	1.0	5	1.0	4	0.2	1	0.2	3.50	-	-	Benefit limited to 1,000 AFY and dependent on availability	
GW-4	Uvas Pipeline	Construct pipeline from Uvas Reservoir to Llagas Creek.	\$80	1,000	1,000	\$2,500	2	0.4	0	0.0	2	0.3	4	0.8	5	1.0	2	0.1	2	0.3	2.90	-	-	-	
GW-5	Church Avenue Pipeline	Deliver water from the SCP to the Church Ponds.	\$30	1,000	1,000	\$900	2	0.4	0	0.0	4	0.6	3	0.6	5	1.0	2	0.1	1	0.2	2.85	(10)	-	-	
GW-6	Uvas Reservoir Expansion	Expand the Uvas Reservoir capacity and increase yields to Uvas Creek.	\$330	1,000	1,000	\$21,200	2	0.4	0	0.0	5	0.8	1	0.2	5	1.0	2	0.1	3	0.5	2.90	-	-	-	
GW-7	Stormwater Capture	Implement an aggressive stormwater capture program as a means of recharge.					3	0.6	3	0.2	2	0.3	5	1.0	2	0.4	4	0.2	3	0.5	3.10	-	-	Requires land acquisition, development code consistency, and revised storm drainage infrastructure planning.	
Recycled Water Projects																									
RW-1	RW Master Plan (Alt. 1 and 2) ¹	Deliver AWTF enhanced NPR water from SBWR to NPR in Morgan Hill.	\$80	3,000	3,000	\$1,100	4	0.8	4	0.2	3	0.5	5	1.0	1	0.2	3	0.2	5	0.8	3.55	5	(4, 11)	Requires distribution network in City.	
RW-2	RW Master Plan (Alt. 3 and 4) ¹	Divert flow from the Joint Trunk and recycle the water for IPR in the Church Ponds.	\$80	3,000	0	\$1,100	2	0.4	0	0.0	3	0.5	3	0.6	1	0.2	2	0.1	5	0.8	2.50	(6)	(6)	Requires distribution network in City.	
RW-3	Morgan Hill Scalping Plant (NPR)	Divert flow from the Joint Trunk and recycle the water for NPR in Morgan Hill.	\$80	3,000	0	\$1,100	0	0.0	0	0.0	3	0.5	5	1.0	1	0.2	2	0.1	5	0.8	2.50	(9, 11)	-	-	
RW-4	SCRWA Pump Station to Morgan Hill	Deliver NPR water from SCRWA to Morgan Hill.		3,000	0		0	0.0	0	0.0	1	0.2	5	1.0	1	0.2	2	0.1	5	0.8	2.20	(4, 9)	(4, 9)	Requires distribution network in City.	
RW-5	SCRWA IPR Upgrade and Pump Station to Morgan Hill	Deliver IPR water from SCRWA to Butterfield Channel.		3,000	0		2	0.4	0	0.0	1	0.2	5	1.0	2	0.4	2	0.1	5	0.8	2.80	(1, 15, 16)	-	-	
RW-6	RW Master Plan - AWTF IPR to Butterfield	Divert flow from the Joint Trunk and recycle the water for IPR in the Butterfield Channel.		3,000	0		2	0.4	0	0.0	3	0.5	5	1.0	3	0.6	3	0.2	5	0.8	3.35	(1, 14, 16)	-	-	
RW-7	RW Master Plan - SBWR IPR to Butterfield	Deliver AWTF water from SBWR to IPR in Butterfield Channel.		3,000	3,000		4	0.8	0	0.0	3	0.5	5	1.0	3	0.6	3	0.2	5	0.8	3.75	2	(1, 14, 15)	-	-
Other Water Supply Projects																									
OS-1a	South County Water Treatment Plant	Construct a new Potable Water Treatment Plant with SCP deliveries.	\$110	2,000	2,000	\$2,300	3	0.6	1	0.1	1	0.2	5	1.0	4	0.8	3	0.2	1	0.2	2.90	-	-	Yield of 2,000 AFY is too low. Request range of available yield from SCP.	
OS-1b	South County Water Treatment Plant	Construct a new Potable Water Treatment Plant with SCP deliveries.		11,000			5	1.0	5	0.3	2	0.3	5	1.0	4	0.8	3	0.2	1	0.2	3.65	4	-	-	The yield has been updated to be realistic of the current water supply needs.
OS-2	Buy and Wheel Water	Purchase and wheel water to the cities.					5	1.0	5	0.3	1	0.2	5	1.0	1	0.2	1	0.1	2	0.3	2.95	-	-	-	
OS-3	Agricultural and Other Users Offset	Policy and regulatory guidance to reduce agricultural and other users pumping.					5	1.0	5	0.3	1	0.2	3	0.6	5	1.0	3	0.2	5	0.8	3.90	1	-	-	-

AKEL
ENGINEERING GROUP, INC.

Definitions of Acronyms
 NPR: Non-Potable Reuse
 IPR: Indirect Potable Reuse
 SCP: Santa Clara Pipeline
 SBWR: South Bay Water Recycling
 AWTF: Advanced Water Treatment Facility
 SCRWA: South County Regional Wastewater Authority

Definitions of Criteria

Increase in Yield: This criteria scores whether there is a net positive yield to the basins (ie Scalping in Morgan Hill transfers an existing yield, it does not increase it).
 Cost Per AF: Cost per AF of water as provided by SCVWD in the Water Supply Master Plan update December 2018
 Location of Benefit: Based on input from SCVWD staff, it is more beneficial for groundwater recharge in the upper Llagas Basin in Morgan Hill, thus scores are based on proximity to that area.
 Cost within Cities: Based on additional cost within the City (road work, expected O&M, easements, new pipeline networks, etc)
 Implementation / Regulatory: This criteria is based on the feasibility of construction for the project, and the likelihood of the project. This also addresses regulatory feasibility.
 Resiliency: This criteria is intended to address whether long term effects of climate change or an interruptible Delta supply will have a negative impact on the project.

Notes:

1. RW Master Plan Costs and Yields Consistent with the Scalping Plant Alternative.

Appendix

Llagas Groundwater Subbasin 2035 Budget

Morgan Hill

Other Users

Gilroy

Ag Users

SCRWA Reuse
+ 3,700
AFY



Supply Wells
Morgan Hill

SCVWD
Planned Recharge
Projects

Supply Wells
Other Users

Natural
Groundwater
Recharge

Supply Wells
Gilroy

04/26/19

Withdrawal
- 8,700
AFY

Deposit
+ 10,400
AFY

Withdrawal
- 34,100
AFY

Deposit
+ 43,900
AFY

Withdrawal
- 12,900
AFY