

**LEVEL 'A' COMMUNITY PLAN
TECHNICAL REPORT**

**SANTOLINA MASTER
PLANNED COMMUNITY
WATER MASTER PLAN**

**NOVEMBER 4, 2014 (REVISED WITH ADDENDUM)
MARCH 15, 2013 (ORIGINAL SUBMITTAL)**

Prepared For:

**Western Albuquerque Land Holdings, LLC
P.O. Box 56790
Albuquerque, NM 87187**

Prepared By:

Bohannon  Huston

Engineering

Spatial Data

Advanced Technologies



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FOR
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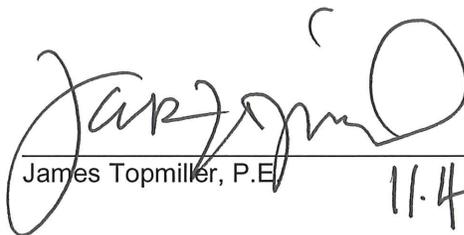
Prepared for:

**WESTERN ALBUQUERQUE LAND HOLDINGS
(WALH, AKA ANTIGUA LAND COMPANY)**

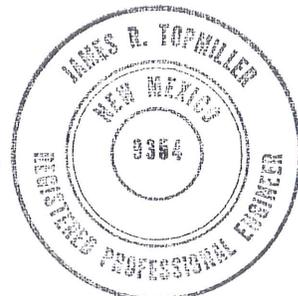
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PREPARED /
REVIEWED BY:


James Topmiller, P.E.

11.4.14 Date



I. INTRODUCTION

The Santolina Level A Water Master Plan report was submitted to the County and the Water Authority (ABCWUA) in August 2013 under Planned Communities Criterial guidelines.

During the County Planning Commission (CPC) process, which included significant public agency and staff review efforts and public hearings, revisions to the master plan's land uses and roadway network were suggested and accepted. Additionally, the Water Authority provided documentation during the CPC process regarding water and sewer serviceability to Santolina, as well as comments regarding the conceptual design and layout of the water system.

These revisions, occurring as they do during a significant public hearing process, are anticipated due to the number and volume of commenting agencies and public input to the master plan. The Santolina applicant concurred with many of the suggested revisions and has committed to appropriate future actions to address concerns and/or revisions.

In keeping with the strategy of revisions to the Santolina technical appendices, this Addendum addresses comments made during the hearing process by supplying new or revised text, adjusted calculations or graphics, without revising the original submitted report.

This Addendum for the Santolina Water Master Plan updates and addresses the impact of the above revisions to water master planning in Santolina, and provides an approach for moving forward beyond the Level A process.

II. PLANNED COMMUNITIES CRITERIA

The Bernalillo County Planned Community Criteria (PCC) defines the level of regulatory detail required for Master Plan submittals. The Level A submittal is the initial submittal and establishes the overall goals of the Master Plan, which will be developed further in Level B and Level C submittals.

The Santolina Level A Water Master Plan analysis is required by the PCC to provide a "conceptual strategy for providing utilities".

Future Level B submittals, in accordance with the PCC, are required to provide a "facilities plan" for water and sewer systems.

III. CPC PROCESS: LEVEL A WATER MASTER PLAN REVISIONS

A. LAND USE PLAN REVISIONS.

As part of the CPC process, County staff and public agencies requested several significant revisions to the transportation network and/or land use planning, including the following which affect the analysis and graphics:

- The 'gridding' of several major arterial roadways, most significantly Paseo del Volcan, Dennis Chaves and Atrisco Vista.
- Relocation of (and enlargement of) the Urban Center to fully reside in the northwest quadrant of Atrisco Vista and Dennis Chaves, extending to Paseo del Volcan.
- Additional defined connectivity to adjacent lands, including Gun Club extension, Gibson extension, Dennis Chaves and more.
- Creation of a new parallel roadway south of the I40 Frontage Road, within the Santolina Master Plan area.

As the above suggests, these revisions to the roadway network and land uses will only mildly affect the conceptual Level A water system layout (primarily the utility alignments and corridors) and report of the August 26, 2013 Level A Water Master Plan.

B. COMMENTS AND CONDITIONS FROM THE WATER AUTHORITY

The Water Authority provided comments and conditions during the CPC process. These were largely supplied in a July 29, 2014 letter to the CPC Chair, please refer to attached letter. The key aspects of that letter is summarized and provided in the section immediately below, also substantially being the Water section text from the Santolina Master Plan document.

IV. CURRENT STATUS AND COMMITMENTS OF THE SANTOLINA WATER MASTER PLAN

The Albuquerque Bernalillo County Water Utility Authority (ABCWUA) has provided a 40-Year Water Plan to the State of New Mexico in which the population growth and water needs of the current and future Bernalillo County/Albuquerque service area are addressed. The 40-year Plan is updated every five years. However, the ABCWUA does not specifically identify developments that are included in the projected water demands.

The ABCWUA has provided a letter dated July 29, 2014, indicating they have the capability and capacity to serve the Santolina Master Plan as it develops over its 40-50 year buildout.

The ABCWUA charges a Water Supply Charge to properties outside of their existing service areas, such as Santolina, to fund the procurement of additional water rights and other water supply initiatives. It is anticipated that Santolina, or at least the majority of the community, will be subject to the Water Supply Charge. The actual amount of the Water Supply Charge will be determined at the time services are taken and at the rate described in

the applicable Water and Sewer Rate Ordinance. WALH is committed to working with the ABCWUA to develop additional/new sources of water.

The ABCWUA has and continues to make tremendous gains in water conservation and reductions in the overall demand by its customers, reducing consumption from 251 gallons/person/day in 1995 to the current 135 gallons/person/day. Santolina will comply with all adopted water conservation and usage policies of the ABCWUA and County. Santolina is committed to meeting the 2024 Water Conservation Plan's current requirements and subsequent amendments as a part of this Level A Master Plan. Level B and C plans will provide the specific enforcement language necessary to support all applicable water conservation codes.

Santolina anticipates receiving service from ABCWUA for domestic water service. WALH and the design team have prepared a conceptual-level Water Master Plan for providing water service to Santolina. This conceptual plan does not represent the final, optimized layout ABCWUA water system for the Santolina Plan Area.

Significant excess capacity exists in these College trunk improvements and this additional capacity could be available for Santolina on a temporary basis, as approved by the ABCWUA. This approach is identified in this Master Plan. Ultimately with the future construction of Atrisco and Pajarito trunk water system infrastructure, only when needed, Santolina may be closed off from the College trunk system. This thoughtful and efficient approach to Santolina water service optimizes the College trunk water system financial investment, enhances critical system operational issues (water age, etc.), maximizes the use of existing available infrastructure and eliminates duplicative systems until needed. As stated previously, any such cross-trunk water transfer will be considered only on a temporary basis.

In response to comments from BCPWD, Natural Resources Section, a May 23, 2014 memorandum was submitted to the County and Water Authority that clarified and corrected several elements of the Water Master Plan, including peak day and average water usage estimates, and actual projected usage. This memo is attached to provide the applicable information for future reference.

The Santolina Water Master Plan Technical Report has been developed to support the Level A Master Plan and is available separately from the Master Plan submittal. This technical Water Master Plan report outlines the analysis and data, and provides a concept as to how the proposed water system can provide water service to the Master Plan Area.

The final water master plan, identifying design parameters, phasing and construction details, is subject to future ABCWUA service requirements and development agreements.

V. CONCLUSION

The Santolina Level A Water Master Plan report satisfied the PCC requirements for provision of a conceptual strategy for water utilities to the planned Level A community. As noted by the Water Authority, additional comments, conditions and requirements for the system are forthcoming in the future.

The Master Plan and associated graphics will remain as originally submitted in August 2013, except for the addition of this explanatory Addendum. This approach is justified because the Water Authority has not yet developed final water system plans for the Santolina area, and therefore there is no definitive guidance for master plan revisions at this time. Further, the Master Plan continues to supply a general guideline for water system approaches, especially conceptual-level onsite system layouts. General system usage and demand data are also useful and available in the Plan as written.

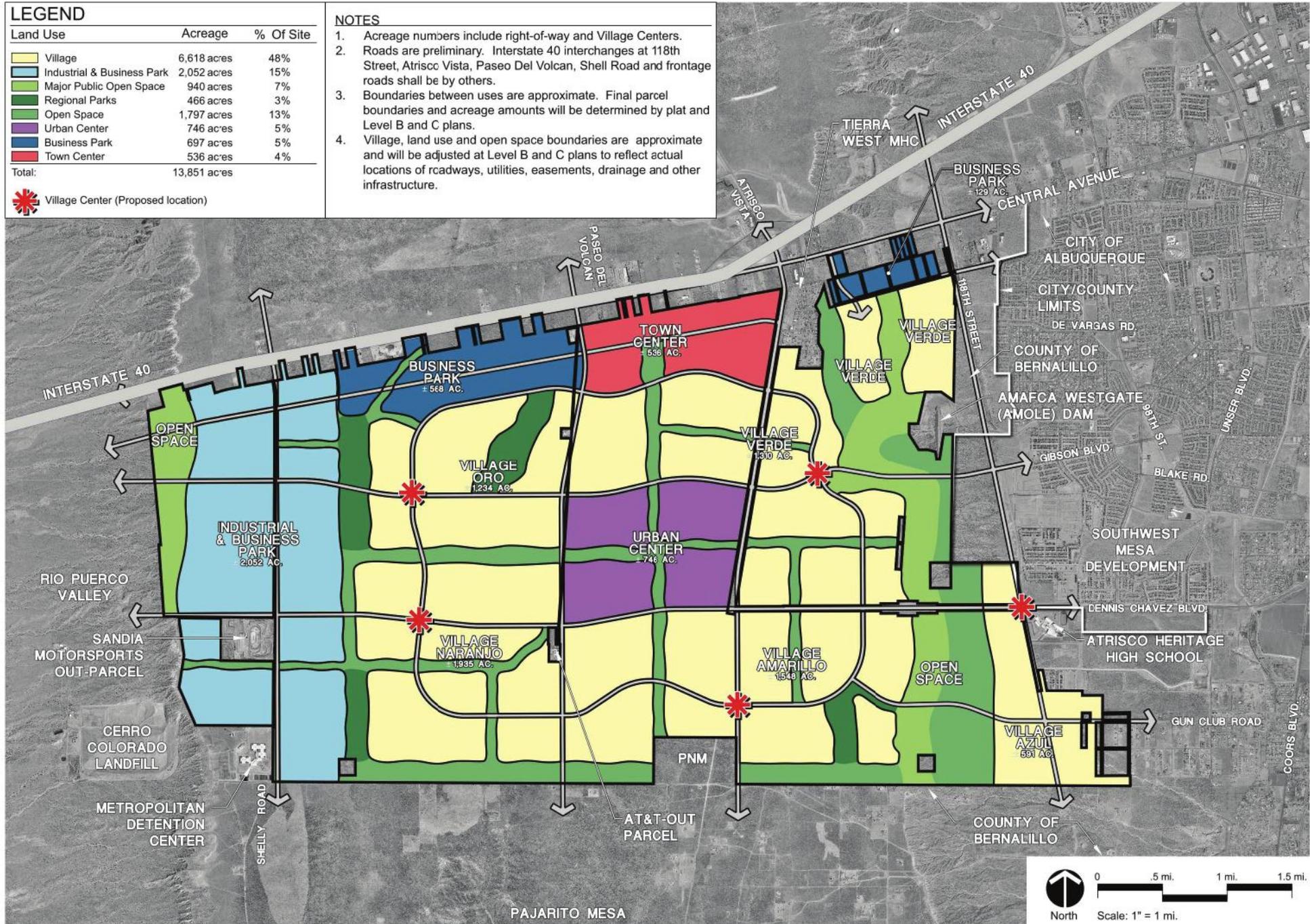
However, where conflicts exist between this Addendum and the original August 2013 Master Plan report, this Addendum shall govern.

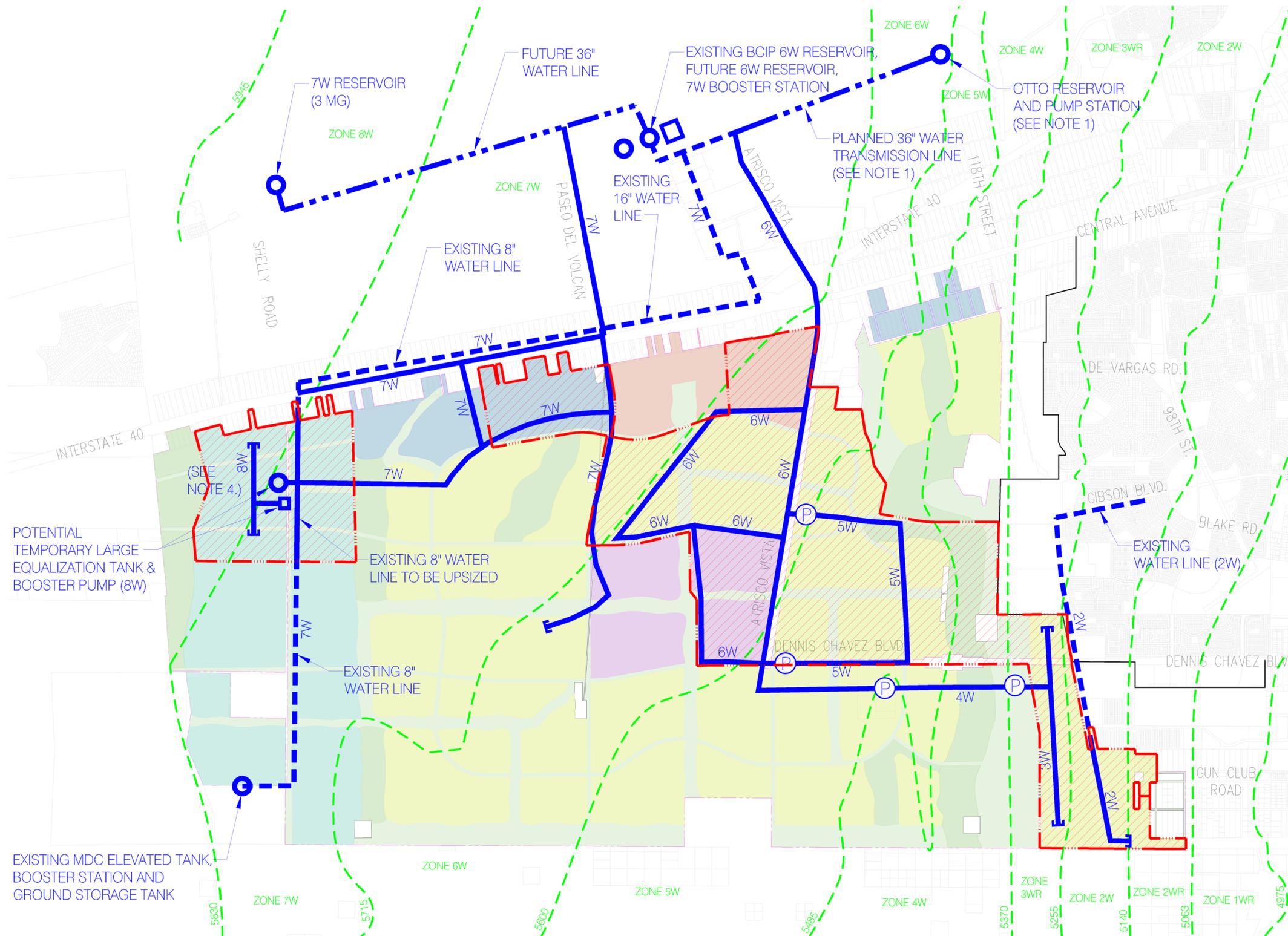
The following plans and information are provided with and made a part of this Addendum:

- Revised Land Use Master Plan.
- Revised Conceptual Water Master Plan- Full Build.
- Revised Conceptual Water Master Plan- 2035 Projected Development.
- Water Authority letter to CPC, dated July 29, 2014.
- BCPWD NRS memorandum, dated May 23, 2014.

This Addendum has provided an update to the Water Master Plan and addressed the conditions and requirements for Santolina development planning to continue in the future.

Exhibit 7: Land Use Plan





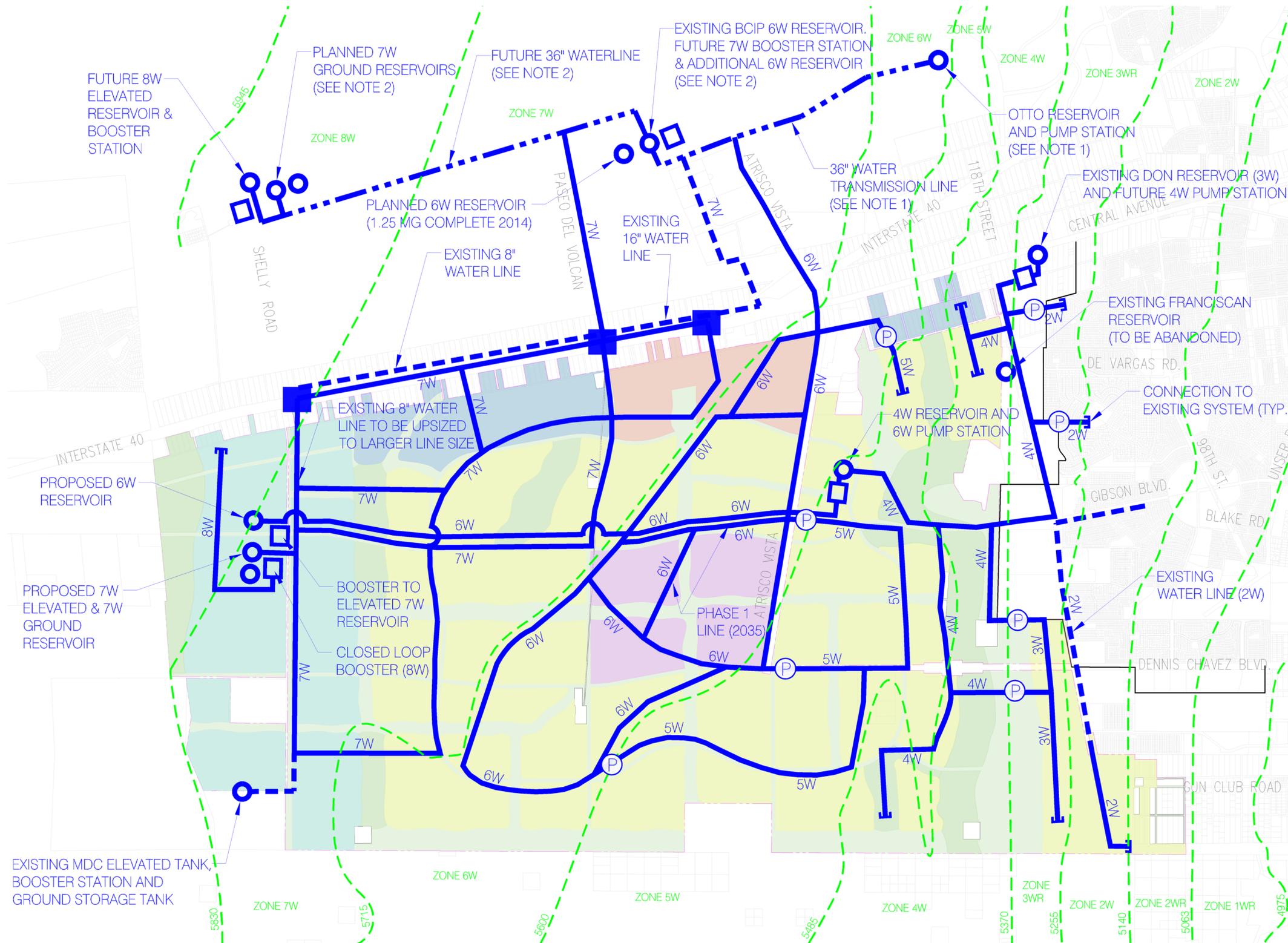
NOTES:

- 2035 PROJECTED DEVELOPMENT PHASE WATER SUPPLY SHALL BE PROVIDED TEMPORARILY FROM PLANNED (2014) WATER FACILITIES IN THE COLLEGE TRUNK (NORTH OF I-40).
- ALL WATER LINE ALIGNMENTS ARE APPROXIMATE AND ILLUSTRATIVE, SUBJECT TO CHANGE.
- THE OTTO PUMP STATION AND 36" TRANSMISSION LINE ARE CURRENTLY UNDER CONSTRUCTION (COUNTY OF BERNALILLO/WALH PROJECT) COMPLETE IN 2014.
- THE WESTERN PORTION OF THE 2035 PROJECTED DEVELOPMENT PHASE INDUSTRIAL & ENERGY PARK LIES ABOVE WATER ZONE 7W. FINAL SERVICE CONFIGURATION SHALL BE BASED ON ACTUAL CIRCUMSTANCES AT THE TIME OF DEVELOPMENT. SERVICE OPTIONS INCLUDE INSTALLATION OF PRIVATE OR PUBLIC BOOSTER STATIONS, SITE GRADING OR LAND USES WITH NO WATER USE.
- FUTURE DETAILED STUDIES MAY BE ABLE TO CO-LOCATE THE TEMPORARY 2035 PROJECTED DEVELOPMENT PLAN PHASE 1 8W WATER FACILITIES WITH THE ULTIMATE 6W/7W/8W FACILITIES (SUCH THAT THE PHASE 1 FACILITIES ARE NOT 'THROW-AWAY' FACILITIES).

LEGEND

	PRESSURE REDUCING VALVE		FUTURE WATER LINE
	PROPOSED WATER LINE		2035 PROJECTED DEVELOPMENT BOUNDARY
	EXISTING WATER LINE		2035 PROJECTED DEVELOPMENT BOUNDARY





NOTES:

1. THE OTTO PUMP STATION AND 36" TRANSMISSION LINE ARE CURRENTLY UNDER CONSTRUCTION (COUNTY OF BERNALILLO /WALH PROJECT).
2. THE 7W RESERVOIR, BCIP PUMP STATION / RESERVOIR AND 36" TRANSMISSION LINE ARE UNDER DESIGN AND PLANNED FOR CONSTRUCTION IN 2014.
3. WITH CONSTRUCTION OF ALL REQUIRED LINES, BOOSTERS & RESERVOIRS IN ATRISCO TRUNK, ALL CONNECTIONS (VALVES) BETWEEN COLLEGE AND ATRISCO TRUNKS SHALL BE CLOSED.
4. ALL WATER INFRASTRUCTURE SHOWN IS ILLUSTRATIVE ONLY AND SUBJECT TO CHANGE.

LEGEND

- 

PRESSURE REDUCING VALVE
- 

FUTURE WATER LINE
- 

PROPOSED WATER LINE
- 

CLOSED VALVE (SEE NOTE 3)
- 

EXISTING WATER LINE



July 29, 2014

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Village of Los Ranchos
Board Trustee

Executive Director
Mark S. Sanchez

Website
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Joe Chavez, Chair
Bernalillo County Planning Commission
111 Union Square St. SE Suite 100
Albuquerque, NM 87102

RE: Santolina Master Plan

Dear Mr. Chavez:

Regarding the Planned Communities Level A Master Plan called the Santolina Master Plan, the Albuquerque Bernalillo County Water Utility Authority (Water Authority) has been asked whether it can serve this area as it develops over time. The Water Authority is capable of serving the master planned community. However, that service will be contingent upon the Santolina developer's ability to comply with the Water Authority's current guidelines, policies and ordinances, as amended from time to time.

If the CPC decides to recommend approval of the master plan, the Water Authority recommends that the CPC provide conditional approval which requires that the developer successfully execute a development agreement with the Water Authority for the Santolina Master Plan. Water Authority ordinances require that a land use master plan be approved prior to the Water Authority providing service to a master planned community outside its service area. The development agreement will specify the requirements and conditions of service. It is through this agreement that the planned community criteria will be addressed.

In order for Santolina to be served by the Water Authority, the developer will need to provide significant infrastructure improvements, and the expansion will need to occur at no net expense to the existing rate payers. Therefore, Santolina will need to be a sustainable, self-sufficient development in terms of water and wastewater treatment resources including the utilization of direct or indirect potable reuse and each new connection will be subject to a water supply charge. Moreover, to better manage and protect the Water Authority's water sources, the developer will also need to submit a Phasing Plan which is consistent with Water Authority policy that service expansion must be phased in an orderly manner through adjacent pressure zones. Finally, the developer will be required to incorporate into the Santolina planning documents water conservation guidelines designed so that each user can

Joe Chavez, Chair
Bernalillo County Planning Commission
July 29, 2014
Page 2

achieve water usage of 180 gallons per household for an average day, which is equivalent to 75 gallons per capita per day. Design documents will need to be stamped by a Registered New Mexico Professional Engineer confirming that the proposed methodology will indeed meet the 180 gallons per household per day water usage.

If the Santolina Level A Master Plan is approved by the Bernalillo County Commission, only then will Water Authority staff proceed in negotiating a draft development agreement with the developer. Of course, final approval of any development agreement requires formal action by the Water Authority governing board.

Sincerely,

A handwritten signature in black ink, appearing to read 'Mark S. Sanchez', with a long, sweeping horizontal stroke extending to the right.

Mark S. Sanchez
Executive Director

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MEMORANDUM

DATE: May 23, 2014
TO: Dan McGregor
FROM: James Topmiller, BHI *JmT.*
SUBJECT: Recent Santolina Water Supply/Erosion Comments

We are in receipt of the latest NRS comments that respond to water usage, wind-based soil erosion, etc. In part, NRS was responding to outside public comments. We wished to address your material in the following responses; hopefully it is helpful to this process:

1. Reference to use of 38.7 MGD per day at full build out (or Ultimate), and also by inference the 2035 demand number of 13.6 MGD, refer to total peak demand, which is an engineering design number. It is used for design of infrastructure to meet peak demand days, and should not be misconstrued to represent an average daily use number, which is shown on Table 3 page 12.

The Applicant concurs, and offers the following additional information.

Average Day vs Peak Day. The 38.7 MGD (and 13.6 MGD) references in the Technical Report are "peak day" water demand values, not the "average day" values which are usually referred to in assessing the actual water usage of a proposed development. 'Peak day' is a common and appropriate value for water system infrastructure design (which the Technical Report is primarily supporting), but are not typically used to describe a community's general water usage. 'Average day' demand is generally 1.8 times less than 'peak day'.

The discussion below focuses on 'average day' water usage.

*Water System Design Criteria/Capacity/Parameters – Basis for Design (Technical Report). As required in the Level A criteria, the Water Technical Report (Appendix) provides a preliminary or conceptual water system analysis and design. The term '**water demand**' for that design effort is both used and reported in the Technical Report, but refers to the water system demands/criteria/parameters required for the water system infrastructure design. The system will wisely have capacity for some additional unexpected system impacts over time. The term does not refer to actual water usage estimates.*

Additionally, regarding the current and future water system demand analysis, it is important to note the following factors:

- Design values tend to be conservative in order to ensure an adequately sized system that can accommodate the many variables that might arise in the development and land uses of Santolina over its 50-year life.
- Design values are always being adjusted to fit actual trends. They can be expected to change (downward usually) over time as trends become clearly established.
- The plan/report is only a conceptual system design at the Level A stage. Under Level B Master Plans over a 50-yr timeframe, final water system design and construction plans will incorporate more detailed and up-to-date analysis methodologies to provide the most optimized water systems for the community.

Projected Water Usage. Accordingly, the 'water demand' used for system analysis and design in the Technical Report is not the same as the estimate of Santolina's actual projected water usage, which is usually reported as an 'average day usage'. Santolina's development will adopt all of the ABCWUA's and County Conservation regulations to help meet or exceed all current and applicable water conservation guidelines for 'average day' water use, including those of overall per capita water use and by household.

The table below presents comparisons of the pertinent actual vs system design water demand values for Santolina:

Table A Santolina Water Master Plan Ultimate Buildout (Ultimate): 95,000 Population, 37,930 Homes				
	<u>'Average Day' Use</u>	<u>'Average Day' Use</u>	<u>Per Capita 'Average Day' Use (All Land Uses)</u>	<u>'Average Day' Use ('New' Residential Uses)</u>
Actual Projected Water Usage, by Policy (Ultimate - Buildout):				
At 135 gpcd	12.82 MGD	14,380 Ac-Ft/Yr	135 gpcd	Less than 75 gpcd
Technical Report: <u>Water Demand Basis for Water System Analysis & Conceptual Design (Ultimate Buildout):</u>				
All Land Uses	19.93 MGD	22,340 Ac-Ft/Yr	210 gpcd	---
Residential Uses Only	7.68 MGD	8,610 Ac-Ft/Yr	81 gpcd	203 gpd/DU
Notes:				
<ol style="list-style-type: none"> 1. The 19.93 MGD is a slight correction of the 19.66 MGD of the Technical Report. The 'average day of peak month' are also slightly corrected. 2. At this time, roughly about the time that the 150 gpcd conservation goal is in effect, 180 gpd/DU is the published ABCWUA/County published household water usage resolution for new development. The 180 gpd/DU rule correlates to 75 gpcd. In the future, when 135 gpcd is to be achieved, the corresponding goal for households will diminish but is unknown. 3. One (1) MGD equals 1,120 Ac-Ft/Yr approximately. 4. 135 gpcd value is used above because the ABCWUA has already achieved this value. 5. 'Residential use' includes single family and multi-family uses. 				

The above information shall be added to the Level A Master Plan and Technical Report to address and clarify the projected water usage for Santolina. The Applicant has focused on Full Build development in this short response, however, the Applicant will adjust all 2035 Projected Development figures and any other corrections or additions in the final Technical Report revision submitted with the approved Santolina Level A Master Plan.

2. The average day water use numbers are still design numbers but are more reflective of normative use patterns and are the more appropriate basis for discussion of water use. These represent water diversion – with some significant portion of that water being returned via sewer, so consumed water is actually lower. Regardless, diversion is an appropriate value of comparison when discussing the San Juan Chama comparison. For 2035 the projected water use (diversion) is shown as 6.85 mgd and for ultimate buildout is shown as 19.66mgd. For the ultimate buildout population of 95,000, this equates to 207 gallons per capita day, or 22,022 acre-feet per year or approximately 46% of the

authorized San Juan Chama diversion. The 9% decrease in mean annual flow noted by Anderson should also be duly considered and paper water rights and whatever portion of wet water is available from those paper water rights will most likely be increasingly sold from agricultural holdings and moved to municipal uses.

Please reference the table above. Based on the ABCWUA/County policies in effect today, with which Santolina will comply fully, the projected water use by Santolina will approach only 14,380 ac-ft per year under the 135 gpcd scenario, significantly under the 22,000 ac-ft figure. Given the ABCWUA goals of 135 gpcd by 2024, or earlier, the water usage estimates should decrease significantly over the life of Santolina. At this level of usage, only 30% of the San Juan Chama diversion is accessed which is a reasonable figure given that COG projects that Santolina will hold a significant portion of the projected growth in the region.

Both the County (Water Conservation Plan, implemented 2010) and the ABCWUA (2024 Water Conservation Plan) have aggressive and forward-thinking water conservation plans.

The ABCWUA will require a Development Agreement under which the conditions of service and water supply/rights to Santolina, among other issues, will be addressed.

3. The Ultimate use of 207 gallons per capita day still exceeds the ABCWUA recent use of data of 150 gpcd and significantly exceeds the ABCWUA projected goal of 135 gpcd in 2024. As previously commented by myself, the residential use portion is projected at Ultimate build out is to be about 68 gpcd consistent with existing ABCWUA residential use as of 2012 of about 88 gpcd and consistent with 2024 prediction of 84.3 gpcd (Figures 5 and 6). This leaves a balance of 139 gpcd for non-residential uses at Ultimate build out. This values seems to be excessive in that a recent ABCUWA report 2024 Water Conservation Plan Goal and Program Update (July 2013) indicates that existing non-residential use accounts for only 41 gpcd, compared to the 139 gpcd projected, and is further skewed compared to the 50.8 projected for 2024.

For water usage discussion, all key references and values should refer to 'Average Day', and are shown in Table A above. The Santolina Level A Master Plan requires full compliance with all adopted water conservation and water usage policies of the ABCWUA and County. Accordingly, Santolina's total residential (single family plus multifamily) water usage is anticipated to not exceed the actual/estimated ABCWUA customer residential water usage values shown in Figures 5 and 6 below ie, 88 gpcd actual use in 2012 (69 SF + 19 MF) and 84.3 gpcd (67 SF + 17.4 MF) under the 2024: 135 gpcd scenario). Over time, Santolina will be expected to meet or exceed 135 gpcd, which is the ABCWUA's goal usage prior to 2024. Level B and C plans will provide the specific enforcement language necessary to support all applicable water conservation codes.

This general requirement will be highlighted in the Level A Master Plan.

Figure 5 – GPCD Allocated by Customer Class 2002-2012

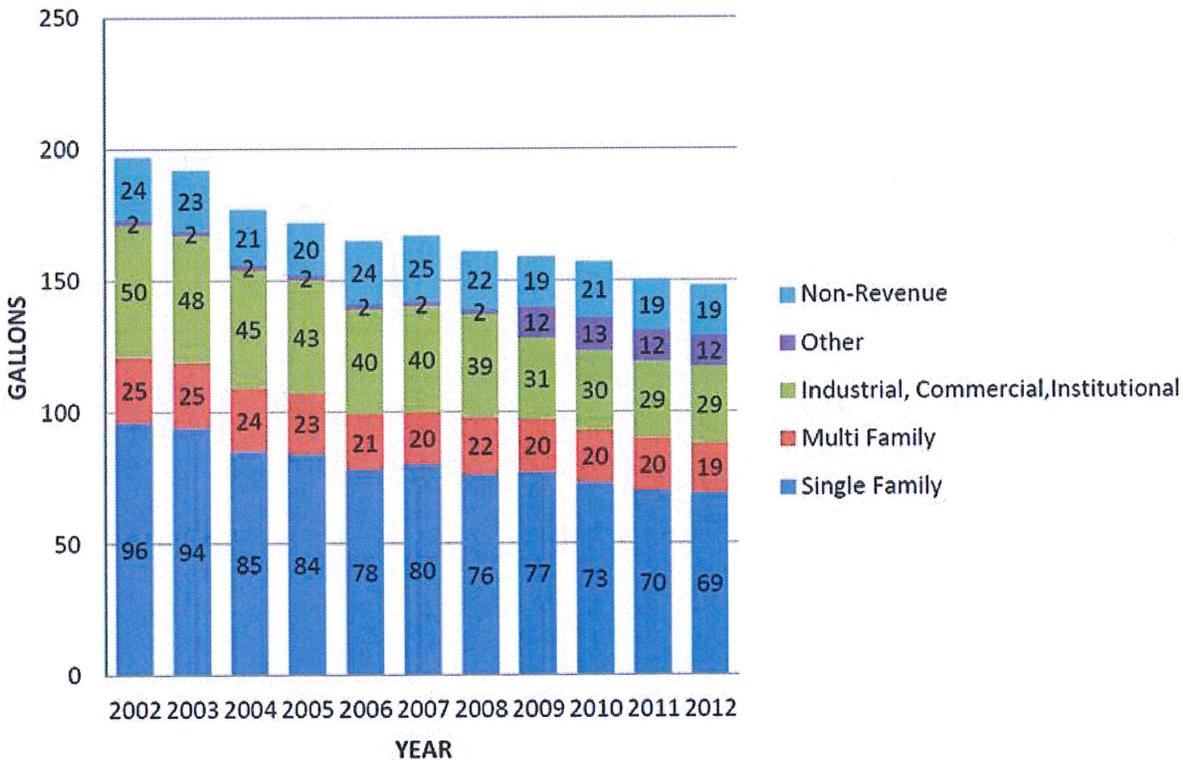
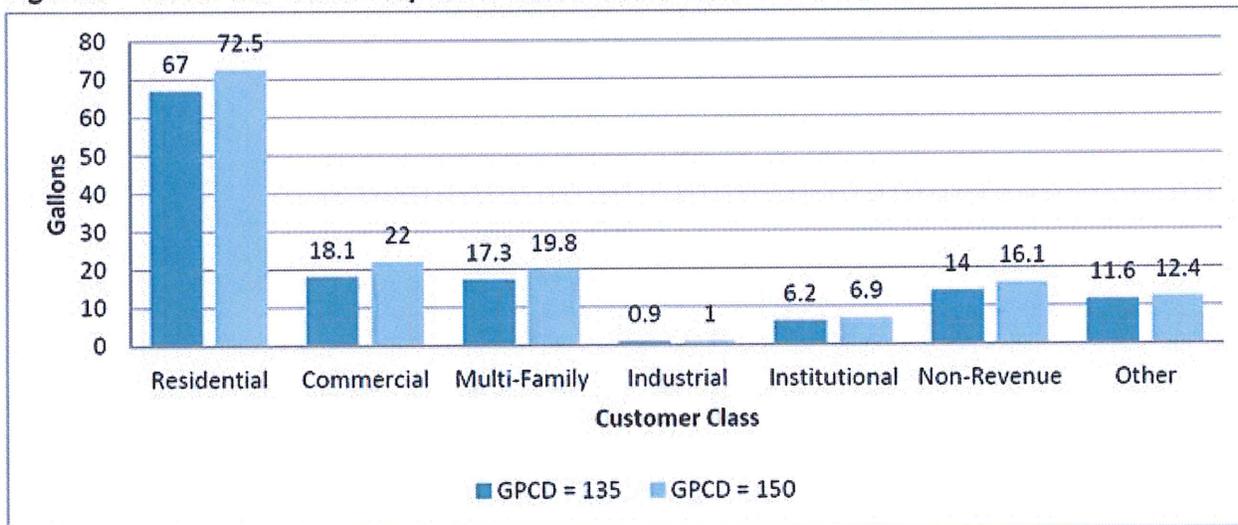


Figure 6 – Water Use in 2024 By Customer Class 135 GPCD vs 150 GPCD



- There appears to be some error in the Ultimate Build-Out Table values in Appendix A, when compared to Table 3 page 14. In particular for zones 4W and 5WR, the in text table show Ultimate Average Day use of 0.68 and 3.17 respectively, while the corresponding values in Tables in Appendix A suggest values of only 0.002MGD and 1.4 MGD.

Table 3 (page 12 in the Technical Report) is correct for 4W and 5WR (ie, 0.68 and 3.17), though Zone 2W needs to be corrected to 0.72 MGD in the Ultimate Buildout scenario (Appendix A Ultimate Demand sheets incorrectly duplicated 2035 Projected Development demand outputs). The Applicant will revise the Appendix pages and Table 3 prior to the completion of the entitlements process, however, the revised table alone is shown below.

Table 1: Average Day Demands

Pressure Zone	2035 (MGD)	Ultimate (MGD)
1WR	0.04	0.04
2WR	0.10	0.10
2W	0.45	0.72*
3WR	0.35	0.35
4W	0	0.68
5WR	0.93	3.17
6W	1.53	4.38
7W	2.47	9.2
8W	0.99	1.3
Total	6.85	19.93⁺
Total (gpm)	4,758	13,840

*Value modified from previous value of 0.45 MGD

⁺Value Modified from previous value of 19.66 MGD

- With regard to “sufficient deep wells within each Village and the Community Center”. Existing wells from the West Mesa indicate extreme depths to water (in excess of 1000 feet in most cases) and with high Arsenic concentration, which would likely requiring blending of water from other sources to meet water quality requirements. Stormwater infiltration is regulated by constraining rules of the OSE which limit retention of water to that mimicking “pre development hydrology”. Likewise, infiltration of greywater, while potentially desirable is also of questionable practicability due to the need for treatment and consideration of underground injection regulations.

The Applicant concurs. Wells of any depth in the immediate Santolina vicinity have significant water quality and quantity issues. Santolina’s Development Agreement with the ABCWUA will address finally the community’s water supply approach. Water harvesting/greywater reuse techniques, while a part/potential part of the Santolina Level A Master Plan, will have minor impact to water supply quantity.

6. Soils in the area, are as commented, eolian deposited and are subject to wind erosion if disturbed. The NRCS classifies these soils as being [redominantly of class 2 or 3 for wind erodibility (with Class 1 being the most susceptible, and class 8 being the least). The soils are also rated as moderately to slightly constrained for road/trail development due to slopes and erodibility (scores of 0.5 on a scale of 0 (no concerns) to 1.0 (Highly susceptible). Mass grading and leveling should be avoided and future Level B and Level C plans need specifically to address low impact development plans and practices to protect the existing soil conditions and protection of undisturbed conditions where possible.

The Applicant concurs. While westside development has occurred for years, Santolina development practices will be constrained to minimize wind and stormwater erosion. 'Low impact development' practices will be employed and may include: scheduling grading and earthmoving operations to expose the smallest practical area for the shortest possible time, employ soil erosion prevention and control practices, construction control methods, long-term treatment of disturbed areas through vegetative or other means, physical (fenced) construction limits, balancing cut-and-fill, development clustering, site planning to preserve natural open space opportunities, rain gardens/bio-swales to capture stormwater, minimizing the steepness of slopes, etc. Additionally, these practices will be utilized to maintain and improve stormwater quality in developed areas within Santolina.

The Level A Master Plan will incorporate additional language to reinforce this concept ahead of the Level B and C Plans.

LEVEL 'A' PLANNED COMMUNITY TECHNICAL REPORT

SANTOLINA LEVEL 'A' MASTER PLAN

WATER MASTER PLAN

AUGUST 26, 2013

Prepared For:

**Western Albuquerque Land Holdings, LLC
P.O. Box 56790
Albuquerque, NM 87187**

Prepared By:

Bohannon  Huston

Engineering

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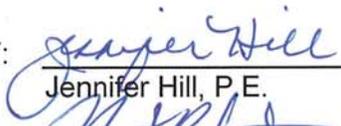
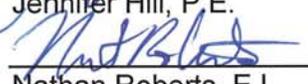
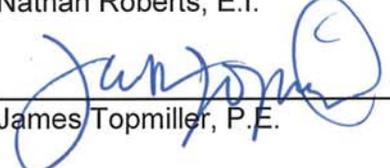
PREPARED BY:		<u>8/21/13</u>
	Jennifer Hill, P.E.	Date
		<u>8/21/13</u>
	Nathan Roberts, E.I.	Date
REVIEWED BY:		<u>8.21.13</u>
	James Topmiller, P.E.	Date

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I. INTRODUCTION

This document supports the overall master plan for the Santolina Level 'A' Master Plan ("Santolina"). It describes the basis of the water use projections and the conceptual water system for Santolina. Santolina lies within the study area for the Albuquerque Bernalillo County Water Utility Authority Integrated Infrastructure Plan but outside of the adopted service area. The conceptual water system described is consistent with the Albuquerque Bernalillo County Water Utility Authority's (WUA) design criteria and operational methodology for the overall water system. This project included meeting with WUA staff for overall concurrence with the concept; however, the WUA will not formally review and approve the water master plan at this time, and thus the final plan for water service may be different than that presented here.

The Santolina Level 'A' Master Plan covers approximately 13,700+ acres of land owned by Western Albuquerque Land Holdings ("WAHL"). Santolina is located on the Southwest Mesa and is generally bounded by I-40 to the north, the Atrisco Terrace open space and the area around 188th Street on the east, the grant boundary separating this property from Pajarito Mesa on the south, and the Ceja Escarpment area separating this property from the Rio Puerco Valley on the west.

The Santolina Plan area has been the subject of planning efforts, but this property has never been covered by an approved master plan. All of the lands in the Santolina Master Plan are located outside the municipal boundaries of the City of Albuquerque within the Southwest Planning Area of Bernalillo County. The existing zoning of the property is primarily County A-1, with some parcels near I-40 and Central Avenue having C-1 and M-1 zoning.

This Level 'A' Master Plan follows the 'Planned Community Criteria' as adopted and amended by the Board of County Commission in 2012.

The Santolina Community is envisioned to have 37,930 residential units at full build-out, a potential population of 95,000, approximately 77,000 jobs, 2.0 jobs per household, and over 3,100 acres of parks and open space.

The master planned area is shown in Figure 1. The proposed Santolina development area spans elevations representing WUA water pressure zones 1WR through 8W. These zones serve customers between elevations of 4,975 and 5,945 feet and are developed to maintain water pressures between 50 and 100 psi. Currently the highest area served by existing infrastructure south of I-40, and excluding MDS (a special case), is Zone 3WR

which has service from WUA via the Franciscan Reservoir. The development is located primarily within the Atrisco trunk zone but also within the northern reaches of the Pajarito trunk zone. The College trunk, located north of I-40, has been evaluated and is being designed to provide service to Zone 7W of the College Trunk.

This report is an update to previous studies done in this area, updating water demand projections for Zones 3WR, 4W, 5WR, 6W, 7W and 8W using current WUA policies on water conservation and unit demands from the WUA's Integrated Infrastructure Plan (IIP) project.

Land development for Santolina has been analyzed in two phases, 2035 Projected Development Plan and Ultimate Buildout, shown on Figures 2 and 3. The 2035 Projected Development Plan Area, comprising approximately a third of the total proposed development area, consists of development in portions of Zones 1WR, 2W, 3WR, 4W, 5WR, 6W, 7W and 8W. The 2035 Projected Development Plan is proposed to receive water service via an inter-trunk connection with the College Trunk facilities as these facilities are expected to be constructed soon with significant excess capacity. Ultimate Buildout, comprising a total area of approximately 13,700 acres, will construct independent infrastructure within the Atrisco Trunk (i.e. closing the inter-trunk connections) and continue new and infill development throughout Santolina. Atrisco Trunk's independence from College Trunk supply will thus be established but can also allow for system redundancy between these two trunks. (See Master Plan, Pressure Zones, and Water System Trunks on following pages.)

II. REFERENCED REPORTS

The following seven reports previously addressed providing water service to the west Albuquerque area and were referenced for this study. Development and land use plans, including land use densities assumed in the following studies, are believed to be current and in place for this study unless otherwise specified.

Proposed Westside Development Area Atrisco Zone 0W through 6W Water System Feasibility Analysis, 2004 BHI

This study analyzed the potential demand associated with Zones 0W through 6W between I-40 and Gun Club Road and the ultimate infrastructure required to service this area if fully developed. This report suggests replacing the existing Franciscan Reservoir with a Zone 4W reservoir which would provide gravity service to Zone 4W and serve Zone 3WR with Pressure Reducing Valves (PRVs). A 5W reservoir was also recommended. This report recommended a closed loop booster station from the 5W reservoir to serve Zone 6W,

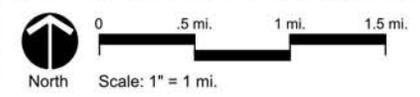
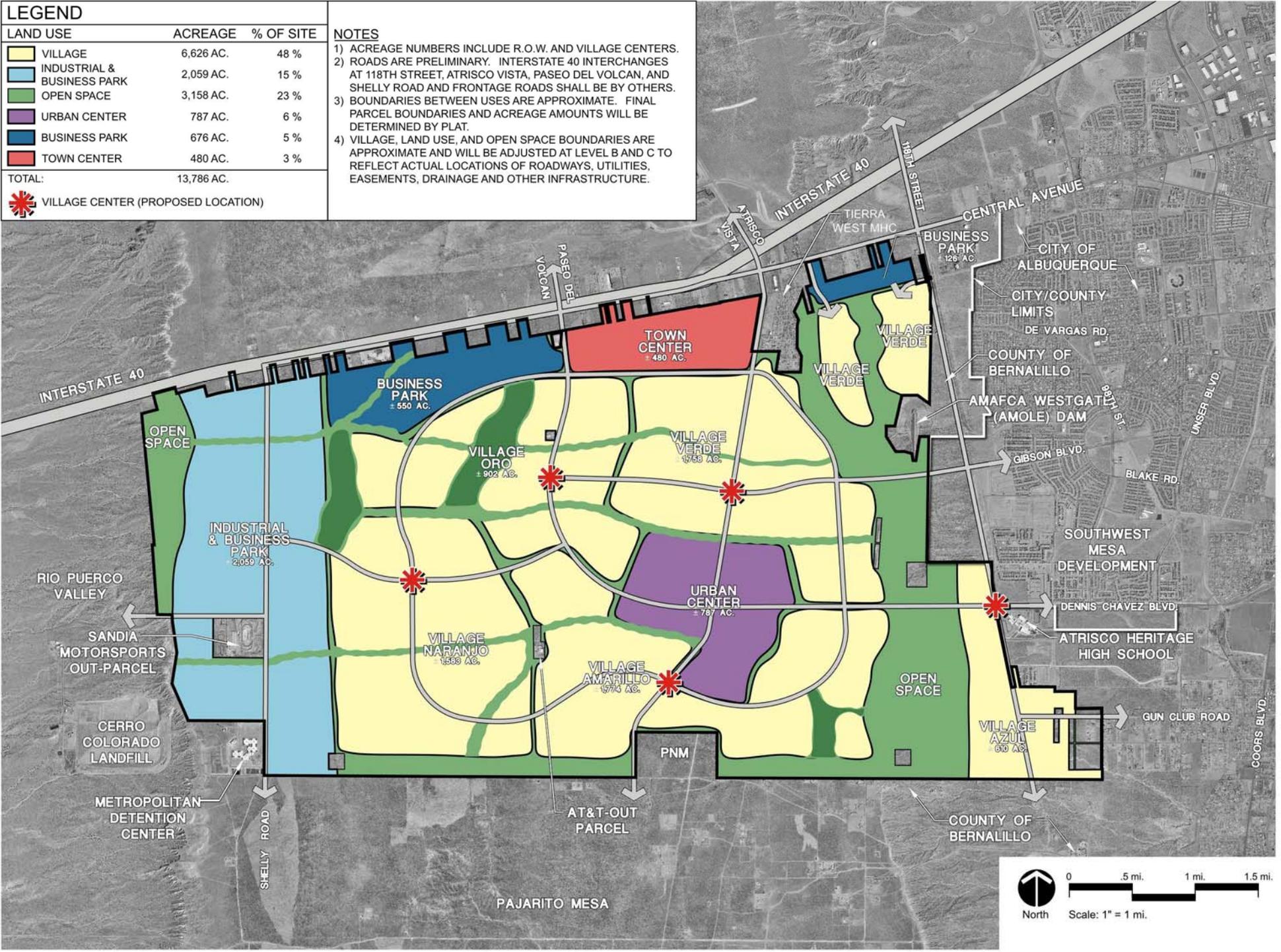
LEGEND

LAND USE	ACREAGE	% OF SITE
VILLAGE	6,626 AC.	48 %
INDUSTRIAL & BUSINESS PARK	2,059 AC.	15 %
OPEN SPACE	3,158 AC.	23 %
URBAN CENTER	787 AC.	6 %
BUSINESS PARK	676 AC.	5 %
TOWN CENTER	480 AC.	3 %
TOTAL:	13,786 AC.	

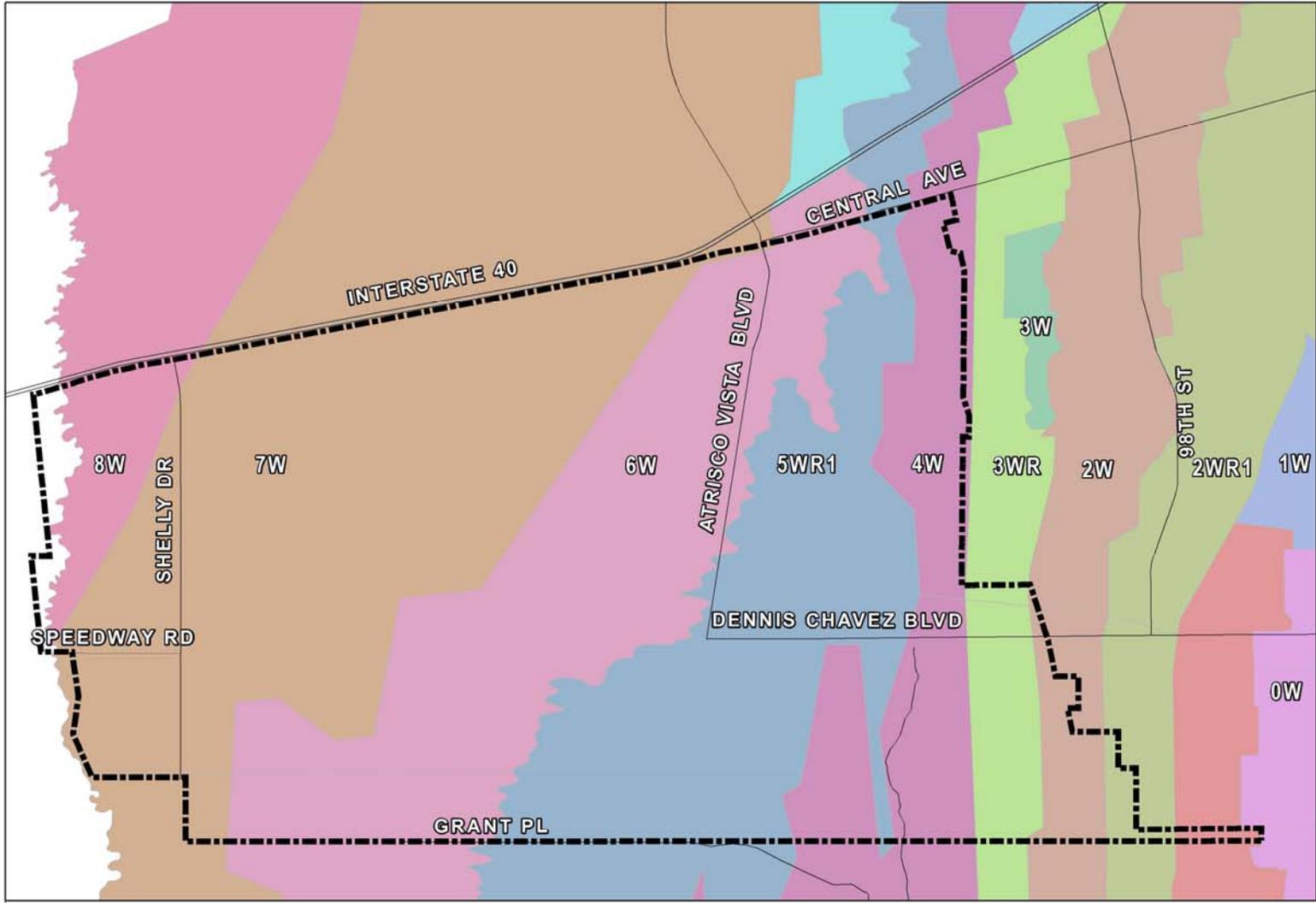
 VILLAGE CENTER (PROPOSED LOCATION)

NOTES

- 1) ACREAGE NUMBERS INCLUDE R.O.W. AND VILLAGE CENTERS.
- 2) ROADS ARE PRELIMINARY. INTERSTATE 40 INTERCHANGES AT 118TH STREET, ATRISCO VISTA, PASEO DEL VOLCAN, AND SHELLY ROAD AND FRONTAGE ROADS SHALL BE BY OTHERS.
- 3) BOUNDARIES BETWEEN USES ARE APPROXIMATE. FINAL PARCEL BOUNDARIES AND ACREAGE AMOUNTS WILL BE DETERMINED BY PLAT.
- 4) VILLAGE, LAND USE, AND OPEN SPACE BOUNDARIES ARE APPROXIMATE AND WILL BE ADJUSTED AT LEVEL B AND C TO REFLECT ACTUAL LOCATIONS OF ROADWAYS, UTILITIES, EASEMENTS, DRAINAGE AND OTHER INFRASTRUCTURE.



LEVEL 'A' MASTER PLAN
(as submitted to County)



Legend

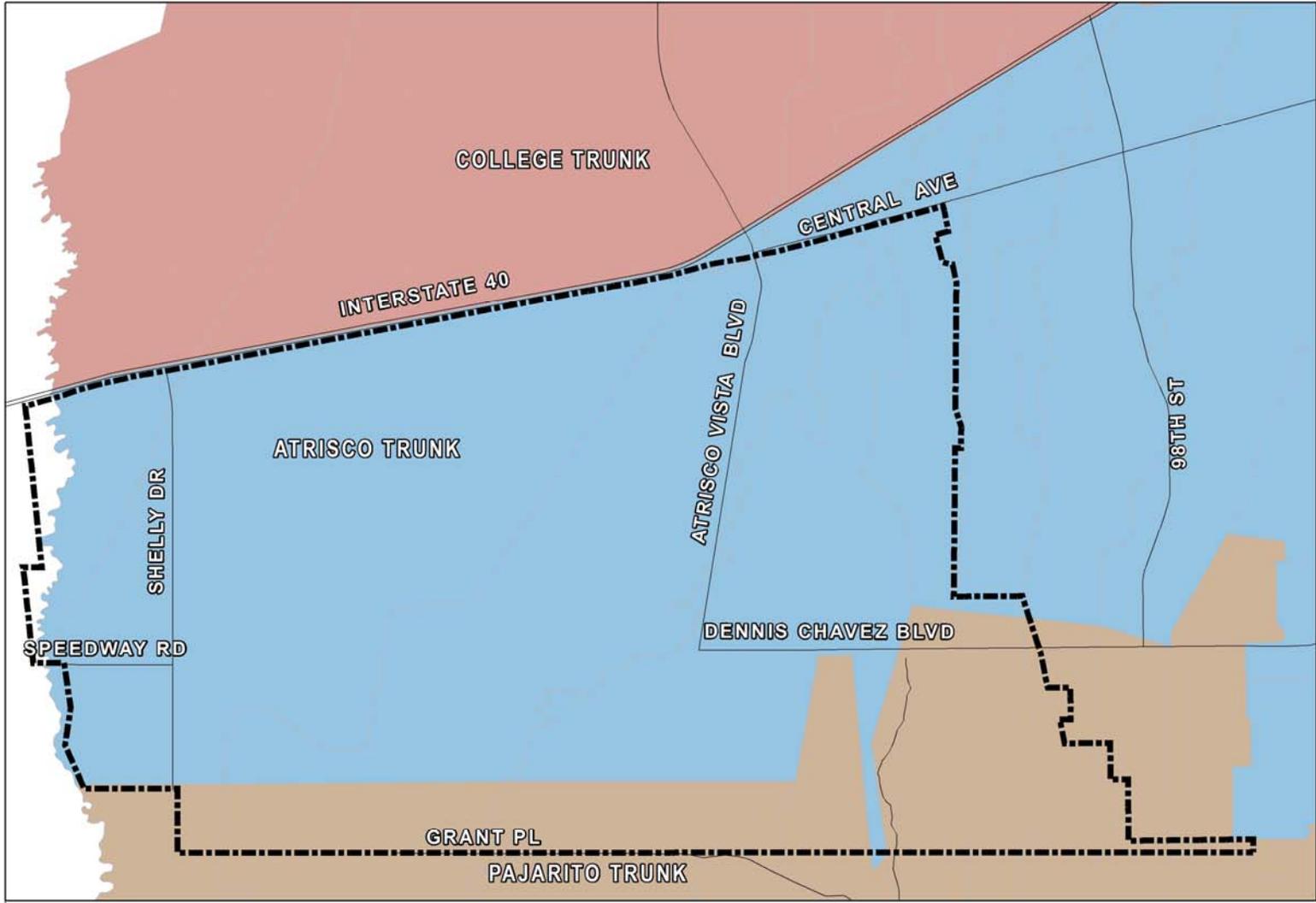
- ROADS
- ⬜ SANTOLINA BOUNDARY
- PRESSURE ZONE BOUNDARY
- 0W
- 1W
- 1WR2
- 2W
- 2WR1
- 3W
- 3WR
- 3WR1
- 4W
- 5WR1
- 6W
- 6WR1
- 7W
- 8W



NORTH



**ABCWUA WESTSIDE WATER SYSTEM
PRESSURE ZONES**



Legend

- ROADS
- TRUNK BOUNDARY
- ATRISCO
- COLLEGE
- PAJARITO
- SANTOLINA BOUNDARY



NORTH



**ABCWUA WESTSIDE WATER SYSTEM
TRUNK ZONES**

with gravity service to Zone 5W and PRVs to serve Zone 4WR. The WUA currently prefers not to provide service via closed loop booster stations.

The configuration put forth in this study was recommended because the service area evaluated had Paseo del Volcan (now Atrisco Vista Blvd.) as its western boundary. Because Atrisco Vista was the western boundary of the study, there was very little land area to be served in Zone 6W and the location for a Zone 6W reservoir would be approximately 12,000 feet west of the then study area. This configuration is no longer the preferred alternative as it would not be consistent with infrastructure being designed to serve customers in the College Trunk. Rather in keeping with the WUA west side pressure zone configuration, Zone 5W should be served via PRVs from Zone 6W and classified as a reduced pressure zone.

All land use densities for the *Proposed Westside Development area Atrisco Zone 0W through 6W Water System Feasibility Analysis* were taken from the *Westland South Master Plan* and the *Southwest Area Plan*.

Proposed Westside Development Area Atrisco Trunk 0W through 6W Phasing Study,
2004 BHI

This study was conducted as an addendum to the feasibility study mentioned above. The study developed a phasing plan for serving the planning area as well as addressing other questions raised by the original feasibility study. Proposed development was divided into three phases; Phase 1 development in Zone 1W and 2WR between Dennis Chavez Blvd. and Gun Club Road, Phase 2 development in Zone 2W and 3WR, and Phase 3 development in Zones 4W, 5W, and 6W up to what is now Atrisco Vista Blvd. Proposed infrastructure for the 2004 phasing study was taken from the previous feasibility study.

Water System Evaluation: Pajarito Trunk Zone 2W Service from Atrisco Zone 2W,
2006 BHI

This study evaluated the water system providing service to Zone 2W for a potential development. The assumed southern boundary of the Atrisco Trunk under ultimate development conditions was Dennis Chavez Blvd. The proposed development was south of Dennis Chavez Blvd., and therefore within the undeveloped Pajarito Trunk line. Because this trunk is not yet extended to this area, the analysis investigated providing service from the Atrisco Trunk instead.

This analysis evaluated the available water service in Zones 2W and 2WR and showed it was adequate to provide service from Don Reservoir after a number of piping improvements were completed. Because this report assessed service to Zones 2W and 2WR which do not affect the analysis for higher zones, Zones 2W and lower were not included in the current study.

Water System Master Plan for Petroglyphs Master Planned Community and 7W Lands West of Petroglyphs MPC, 2007 BHI

This report addresses water service options for SunCal's Petroglyphs Master Plan area to the north of I-40. This report was the basis of later studies regarding the master planned lands in College Trunk (north of I-40) and Atrisco Trunk (south of I-40).

Atrisco Zone 4W/3WR Feasibility Study, 2008 BHI

This report focused mainly on Zones 3WR and 4W and addressed the feasibility of constructing a Zone 4W Reservoir in the Atrisco Trunk. The report includes demand projections, reservoir location and sizing, transmission line sizing and identifies needed improvements at Don Booster Station. This report also addresses the improvements necessary to replace the Franciscan Tank with one that provides service to Zone 3WR and 4W according to the WUA's standards.

Ultimate Facility Analysis Technical Memo, Otto Pump Station to BCIP Water System Improvements, May 10, 2012 BHI

This memorandum includes the latest demand projections for the build out of College Trunk. It should be noted that these projections vary some from the 2007 Petroglyphs Master Planned Community document mentioned above. Total trunk demand is estimated to be 35 MGD with 25 MGD located in Zones 5WR through 9W. Recommendations in this document include a 36-inch transmission line between Otto and BCIP sites and a phasing plan for Otto pump station with a recommended ultimate firm capacity of 17,394 gpm.

A water age analysis is also included in this document, which shows that water age may be a concern in the higher pressure zones of the College Trunk as the infrastructure is built. However, for this analysis, as the College Trunk is built out and more demand is placed on the system, the water age improves.

Bernalillo County Industrial Park Facilities to Proposed 7W Reservoir Draft DAR,2013 BHI

and

College Trunk Water Facility Improvements from Otto Pump Station to BCIP Facility,2013 BHI

These two Design Analysis Reports (DARs) describe the expansion of the College Trunk to serve the Pressure Zone 7W. Facilities associated with Pressure Zones 8W/9W were also discussed on conceptual basis within the DARs. Proposed infrastructure components include:

- Construct new pump station at Otto Reservoir
- Install 36-inch transmission line from Otto to BCIP
- Pump station improvements at BCIP including additional pump station capacity, surge tank and flow meter
- Construct an additional 1.25 MG storage reservoir at BCIP
- Install 36-inch transmission line from BCIP to a proposed 7W facility
- Construct 3 MG 7W Reservoir and allow for a future 3 MG 7W Reservoir
- (2) Future 3.25MG 8W/9W Elevated Storage reservoirs
- Future booster station for service to 8W

These reports also discuss the improvements needed to serve the Metropolitan Detention Center (MDC) which is now currently being served from the BCIP Booster Station. However, these reports are still being completed and therefore the final DAR recommendations may vary from those listed above.

III. EXISTING CONDITIONS

The existing Atrisco Trunk water system infrastructure extends into Zone 3W which is served from Franciscan Reservoir, located east of 118th Street. Franciscan Reservoir was built in the 1960's by the developer of Westgate Heights to serve the subdivision and is 1.5 million gallons. The overflow elevation (OFE) of Franciscan is 5,420.67 feet (NAVD 29 Datum) which provides service to Westgate Heights, Timarron and Sunrise Terrace. The OFE of Franciscan is 65 feet below the designated hydraulic grade line of the WUA for Zone 3W (Elevation 5,485, NAVD 29). Consequently, under current conditions the highest pad elevation Franciscan Reservoir can serve in 5,305 feet (50 psi) rather than 5,370 feet – which is consistent with WUA pressure zone boundaries. Due to these limitations, the

Franciscan Reservoir is not considered in the ultimate water system configuration, and there are no plans to provide additional supply to or storage at Franciscan Reservoir. Rather, in the future, to keep with the WUA pressure zone configuration for the west side, Franciscan Reservoir will be retired and Zone 3W will be designated as Zone 3WR, a pressure zone supplied with a pressure reducing valve from Zone 4W reservoir through a series of PRVs.

The Don Reservoir (Zone 2W) is located on Central Avenue, just east of 118th Street. This reservoir provides a large portion of the water supply to the development between I-40 and Dennis Chavez Boulevard. Don Reservoir receives surface water from the WUA San Juan Chama Drinking water plant in addition to groundwater supply, which is delivered via pump stations from the lower pressure zones. A second reservoir is planned at the Don Reservoir site and was designed in 2008 by BHI. The design calls for a 6 MG at the Don Reservoir site in addition to the existing 4.03 MG reservoir.

The Metropolitan Detention Center, located south of I-40 and west of Shelly Road, is currently being served from the College Trunk via the BCIP booster station and transmission line extensions and has an on-site ground water well. There is currently an agreement between the WUA and Bernalillo County regarding the 8-inch transmission line within Central Avenue / I-40 Frontage Road right-of-way along I-40 and Shelly Road to the Metropolitan Detention Center, which prohibits this line from being used prior to approved master plans of the adjacent lands (such as Santolina).

IV. DESIGN CRITERIA

The design criteria for water infrastructure used to size facilities for Santolina proceed from the IIP. Under the IIP, historic design criteria for Albuquerque were examined, along with published standards from similar southwest cities, to develop recommendations which were then presented and discussed at a workshop with WUA staff. The design criteria are detailed in Subtask 2.10 Summary Report, "*Standard Design Criteria for Hydraulic Modeling, Sizing and Evaluation of Water, Wastewater and Water Reuse Infrastructure,*" dated November 2012. The water facility criteria are summarized below in Table 1.

Table 1: Water System Design Criteria

Item	Recommended Criteria from ABCWUA IIP	Criteria used for Santolina
System Pressure	50 psi minimum 100 psi maximum	20 psi minimum under all conditions.
Pressure Zones	Delineated by ground contour intervals of 115 feet	ABCWUA standard pressure zones
Pipe Sizes/Velocities	6" minimum size for residential; 8" minimum size for industrial/commercial/multi-family 5 fps maximum velocity for transmission lines (16 inches and larger) 10 fps for distribution lines (under 16-inches)	5 fps for major backbone piping network, 12" in size and larger.
Booster Station Capacity	Peak hour demands to be met by booster pumps and stored reservoir water. Design must consider zone demand, in-zone production, and transfer pumping needs. New system design adequate for fire storage recovery in 12 hours. Standby capacity based on firm capacity with largest pump out of service while meeting peak day pumping requirements. Under transfer conditions, replenish upstream reservoir storage at night during reduced system demand and maximum pumping head. System head curve defines upper and lower flow pressure limits under which the system operates.	Firm capacity representing peak day demand.
Storage Capacity	Fire Storage – largest anticipated fire demand in the zone Equalizing Storage – 27% of peak day; 36% of peak day if equal electric and natural gas production are provided. Equalizing storage volume to be verified or refined with water model. Control Storage – 0.5 vertical feet per pump in the controlling reservoir Primary Storage – provide opportunity for settling of sediments produced from wells	Fire storage of 5,000 gpm for 5 hours + 27% peak day demand + 0.5 vertical feet per pump
Fire Flow	1 and 2 family dwellings < 3,600 SF – 1,000 gpm minimum All other buildings – minimum 1,500 gpm for 2 hours, maximum 4,000 gpm for 4 hrs based on square footage, construction type, and internal sprinkler systems.	5,000 gpm for 5 hours for areas of mixed use, based on previous studies for WALH 1,000 gpm minimum for areas with existing development and exclusively residential use.

V. PROPOSED WATER SYSTEM

A. PROJECTED DEMANDS (SANTOLINA)

The demands in this area were projected using the Demand Forecaster (DF). The DF is a tool developed by BHI for the IIP and has been used for this project with the permission of the WUA. The DF uses geocoded meter points with existing billing data to summarize water use for existing development, and water duty factors for land use polygons to project water use for the future. Table 2 shows the unit demand factors for each of the land use types used in the DF. The demand factors represent the average day of the peak month. In order to convert the demand into average day, BHI divided the demand by a factor of 1.5, which was based on further analysis of the billing data. Table 3 summarizes the demands in Santolina by pressure zone for the 2035 Projected Development Plan and Ultimate scenarios for average day. The 2035 Projected Development Plan of Santolina is expected to be built out by 2035. Ultimate Buildout is expected by approximately 2060. Appendix A includes the DF tables for each zone and shows the land use by category and associated demand for the 2035 Projected Development Plan and Ultimate Buildout.

Since the start of the demand analysis on the Santolina water system, the development characteristics and land uses have changed very slightly between the analysis and final master plan projections. However, they have changed in a downward direction (ie, less development). For instance, single family dwelling unit projections have decreased approximately 3%. However, the analysis retains and uses the original (higher values). Given the volatility of unit projections over a possibly 50 year timeframe, and the fact that Santolina may see other changes from the County review process itself, this approach seems appropriate and reasonable. Accordingly, the results of this demand analysis can be considered slightly conservative.

Table 2: Water Use Duty Factors

Land Use Type	Summer Use (GPAD)
No Use	0
Light Residential	1760
Medium Residential	3000
Heavy Residential	6000
Light Commercial	2500
Heavy Commercial	5000
Light Industrial	5000
Heavy Industrial	10000
Light Institutional	1000
Heavy Institutional	4000
Other Irrigated Landscape	3600
Park	3600
Golf Course	3600

Table 3: Average Day Water Use by Zone

Pressure Zone	2035 Projected Development Plan (MGD)	Ultimate (MGD)
1WR	0.04	0.04
2WR	0.10	0.10
2W	0.45	0.45
3WR	0.35	0.35
4W	0	0.68
5WR	0.93	3.17
6W	1.53	4.38
7W	2.47	9.2
8W	0.99	1.3
Total	6.85	19.66
Total (gpm)	4,758	13,655

B. PROJECTED STORAGE

Under Ultimate Buildout, system storage is proposed at two locations (three pressure zones): within Zone 5W to serve customers in Zone 4W and below, and also within Zone 7W to serve customers in Zones 6W and 5W by gravity, with an elevated tank to serve customers in Zone 7W by gravity and potentially customers in Zone 8W via a closed loop pump station. The total required water storage volume for each of these locations was calculated based on fire flows and durations and projected demands for Ultimate Buildout,

as shown in Table 4 below. The required storage volume was calculated as the fire storage, based on 5,000 gpm for five hours, equalizing storage at 27% of peak day demand and control storage of 0.5 vertical feet per pump. BHI used an AD to PD factor of 1.8 which is consistent with previous studies.

Table 4: Required Water Storage Volumes

Reservoir	Serves	Peak Day Demand (MGD)	Fire Storage (MGD)	Equalizing Storage (MGD)	Control Storage (MGD)	Required Storage (MG)
4W Res	4W and 3WR	2.59	1.5	0.7	0.15	2.35
6W Res	6W and 5WR	13.59	1.5	3.67	0.34	5.51
7W Res (ground)	7W	16.56	Allocated to Elevated Res	4.47	0.22	4.69
7W Res (elevated)	8W	2.34	1.5	0.63	0.15	2.28

C. PROPOSED BOOSTER PUMP STATIONS

The locations that will require booster pump stations (BPS) are:

- Don Reservoir BPS pumping to Zone 4W Reservoir
- 4W Reservoir BPS pumping to Zone 6W Reservoir
- 6W Reservoir BPS pumping to 7W Elevated Reservoir
- Possible closed loop BPS from 7W Elevated Reservoir to 8W customers

No future wells are proposed within Santolina. The source of water supply under the 2035 Projected Development Plan will be San Juan Chama water delivered to the College reservoirs, augmented by well supply delivered to College and treated for arsenic at that site (included College and Gonzales wells). The source of water for Ultimate Buildout will be San Juan Chama water delivered to Don Reservoir, augmented by groundwater from the lower zones transferred via booster station to Don Reservoir. Don Reservoir has a capacity of 4.03 MG; a second reservoir with 6.0 MG capacity has been designed for this site; no date is currently scheduled for its construction. Water will therefore need to be transferred through multiple booster pump stations to the upper most zones. Therefore, the required pumping capacity is as illustrated in Table 5, below.

Table 5: Required Booster Pump Station Capacities

BPS	Zone Demands	Total PD Demand (gpm)
Don to Zone 4W	3WR, 3WR1, 4W, 5W, 6W, 7W, 8W	24,363
4W to 6W	5W, 6W, 7W	23,411
6W to 7W	7W, 8W	13,128
7W to 8W	8W	1,626

D. COLLEGE TRUNK (LOCATED NORTH OF I-40) WATER SYSTEM CAPACITY

The proposed initial pumping capacities of Otto and BCIP Pump Stations are 12,000 gpm (17.28 MGD) and 12,000 gpm (17.28 MGD) respectively. The future demand in Zones 6W and 5WR is not expected to exceed 375 gpm in the College Trunk, due to the majority of these areas being designated Open Space. The future demand in College Zone 7W is projected to be only 8,389 gpm but only in its fully developed condition (which may be decades in the future). Accordingly, the design pumping capacities of College Trunk facilities significantly exceed the anticipated future demand in the area, especially in the near term. This scenario may cause water age problems in this trunk until additional demand is placed on the system. College Pump Station is currently equipped to produce a firm capacity of 6,000 gpm (with a design capacity of 13,200 gpm) for Zones 3WR/4W. Additional pumping capacity to College Facility site will be necessary as demand in the upper zones of the College Trunk (or other areas tied into the College Trunk) increases.

The 2035 Projected Development Plan of Santolina has a projected peak day demand of 13.6 MGD, with 6.4 MGD of that demand in Zones 7W and 8W, and the remaining 7.2 MGD of demand occurring in Zones 6W and lower. By using supply from the College Trunk for the Atrisco Trunk, a greater demand would be imposed on the College Trunk and improve water age for this trunk. This would be a temporary solution which would benefit both College Trunk Facilities and Atrisco Trunk development. As land within the area of the College Trunk develops, the demand will increase, requiring the College Trunk to become independent (from Atrisco Trunk development) and the inter-trunk connection closed. At that time, Atrisco Trunk facilities will need to be built in order to supply water from Don Reservoir to meet the demand in the higher zones and establish Astrico Trunk as an independent trunk zone in the WUA water system.

Under the Ultimate scenario Santolina will have a total demand of 38.7 MGD. Don Reservoir is one of three Westside sites that receive San Juan Chama water. This water will

be the main source for development above Zone 2W as it is anticipated that no additional wells will be drilled due to poor water quality and high arsenic levels in the trunk.

E. WATER SYSTEM DESCRIPTION FOR SANTOLINA 2035 PROJECTED DEVELOPMENT PLAN

Figure 4 shows the proposed Santolina 2035 Projected Development Plan water system improvements. The 2035 Projected Development Plan assumes that the 2014 construction of WUA's College Trunk transmission system through the 7W Reservoir has been completed. Under this assumption, there will be an excess of capacity in the College Trunk facilities during the 2035 Projected Development Plan period. The proposed plan will utilize an inter-trunk connection to serve Santolina development in Pressure Zones 8W, 7W, 6W, 5WR, 4W, and 3WR of the Atrisco Trunk. This efficient approach to Santolina 2035 Projected Development Plan water service:

- Optimizes the College Trunk water system financial investment (north of I-40)
- Enhances critical system operational issues (water age, etc.)
- Maximizes the use of existing available infrastructure
- Eliminates duplicative systems until needed
- Utilizes the excess capacity in that system while development occurs within the College Trunk
- Reduces capital and operating costs associated with having two underutilized trunks
- Postpones the need to construct improvements at Don Reservoir and other new infrastructure (including reservoirs and transmission lines) extending west in the Atrisco Trunk from Zone 2W

The Santolina 2W, 2WR and 1WR service area technically falls within the Pajarito Trunk of the WUA. However, the only existing reservoir in the Pajarito Trunk is the Pajarito Reservoir which serves only Zone 1W. An option to serving these areas would be to construct a booster station at Pajarito Reservoir and create a closed looped system to serve this area; however, the WUA prefers to avoid closed loop systems. Accordingly, Figure 4 shows service to Santolina 2W via gravity from the Don Reservoir. Existing infrastructure can be extended from Pavo St. and 118th St. to serve the 2W portion of Santolina. A PRV would then be installed off the Grant Rd. for service into Zone 2WR.

The Atrisco Trunk Zone 6W will be supplied via the recently constructed 36-inch transmission line from Otto to BCIP. The 36-inch transmission line between Otto and BCIP

has been designed with a stub-out where the pipeline intersects Atrisco Vista Blvd. A 24-inch waterline will connect to the 36-inch stub-out which will extend south to Dennis Chavez Blvd. A Zone 6W loop is shown which is supplied from the 24-inch transmission line in Atrisco. The proposed pipe sizes shown on Figure 4 were selected based on the ability to deliver fire flow and maximum velocities under peak day demand conditions.

Pressure reducing valves (PRVs) will be installed along Atrisco Vista Blvd. at the intersections of Dennis Chavez Blvd. and Gibson Blvd. for service to Zone 5WR. The majority of the backbone pipes in Zones 5WR and below in the 2035 Projected Development Plan are anticipated to be 12-inch as approximately only 30% of Santolina peak day demand is in Zone 5WR and below.

The 2035 Projected Development Plan includes a portion of Zones 4W and 3WR east of Atrisco Vista between Dennis Chavez Blvd. and Gun Club Rd. This area will be supplied from the 6W transmission line in Atrisco Vista Blvd. and will be reduced directly to Zone 4W via a PRV. Zone 3WR will also be supplied via a PRV from Zone 4 creating a series of PRVs. To eliminate “daisy chain” PRVs, for ultimate condition, the 6W to 4W PRV will be taken out of service once service is available.

To serve Zone 7W of Santolina, a new pipe crossing of I-40 will be made at approximately the future location of PDV interchange. A new 30-inch transmission will extend from the proposed College Trunk BCIP to 7W Reservoir transmission line, currently under design, and connect to the 16-inch transmission line to MDC on the I-40W frontage road. This transmission main will decrease in size to 24-inches under the interstate and then further decrease to 18-inch and 16-inch as the transmission line extends south near the limits of the 2035 Projected Development Plan. Looping is provided as shown on Figure 4 to provide fire flow. Much of the 2035 Projected Development Plan development is business and industrial parks, as well as village centers, which have the highest fire flow requirements (i.e. 5,000 gpm).

A portion of Zone 8W is planned for development as part of the 2035 Projected Development Plan. The proposed water system has been modeled with a small closed loop booster station serving Zone 8W, supplied from an equalization tank that is filled from the Zone 7W system. Another alternative would be to construct a larger reservoir further south, closer to the future 6W Reservoir site for ultimate conditions; the reservoir could then be converted to 6W ground storage under ultimate conditions. However, another more economical solution may be to require individual boosters to the 2035 Projected Development Plan customers in this area with private water storage tanks for a stated level

of fire protection. The final water system solution for 8W may depend on actual system needs known only at the time of imminent development.

F. WATER SYSTEM DESCRIPTION FOR SANTOLINA ULTIMATE BUILDOUT

Figure 5 shows the proposed water system to serve the Ultimate Buildout of Santolina. For Ultimate Buildout, Atrisco Trunk will operate independently of College Trunk. The hydraulic profile of the existing system with the proposed improvements is provided as Figure 6. The 24-inch and 30-inch waterlines crossing I-40 under the 2035 Projected Development Plan will be isolated (closed) under the ultimate water system configuration to close the inter-trunk connection. Water supply under ultimate conditions is provided from the Atrisco Trunk, from Don Reservoir (2W), which is fed from the San Juan Chama Drinking Water Plant.

A new booster pump station will be constructed at Don Reservoir to transfer water to new Zone 4W storage facilities. A 48-inch transmission line is proposed from the booster station to the storage tanks. As the 4W Reservoir(s) will provide gravity service to 4W and 3WR, Franciscan Reservoir will be retired for the reasons mentioned previously. Looped infrastructure is proposed to the extent possible to provide redundancy in the system. As a result of added storage, the PRV from Zone 5WR to 4W will be eliminated. The majority of the proposed waterlines for this phase are 12-inch, although a 16-inch pipeline extends from the Don Reservoir to 4W Reservoir transmission line to the 2035 Projected Development Plan pipeline in Dennis Chavez Blvd.

Reservoirs serving Zone 6W will be provided and will serve the reduced Zone 5WR in addition to demand in Zone 6W. A 48-inch transmission line is proposed from Reservoir 4W to Reservoir 6W via a proposed booster station at the 4W site. A portion of the proposed 48-inch transmission line will parallel the 2035 Projected Development Plan, Zone 6, piping. An alternative solution to the piping configuration shown in Figure 4 is to upsize the 2035 Projected Development Plan piping that would be paralleled under Ultimate scenario. This would eliminate the parallel Zone 6W pipes but increase the 2035 Projected Development Plan capital costs and increase water age as the piping would be oversized for the 2035 Projected Development Plan demand.

At the 6W Reservoir site there will be ground and elevated storage for Zone 7W. A booster station will pump from the 6W Reservoir(s) to these facilities. In the event that the 30-inch transmission main crossing I-40 at Paseo del Volcan is closed, a tie-in is provided to the 8-inch waterline to MDC as it will no longer be served from BCIP under ultimate

conditions. Additional 10-inch piping will be looped south of the 2035 Projected Development Plan infrastructure.

A new closed looped booster station on the 6W/7W reservoir site is shown to serve Zone 8W. This station will be fed from the Zone 7W storage. Alternatively, Zone 8W in Atrisco Trunk could be fed by a gravity line, crossing I-40 from the future planned 8W storage in College Trunk. In summary, the proposed facilities for Ultimate Buildout include:

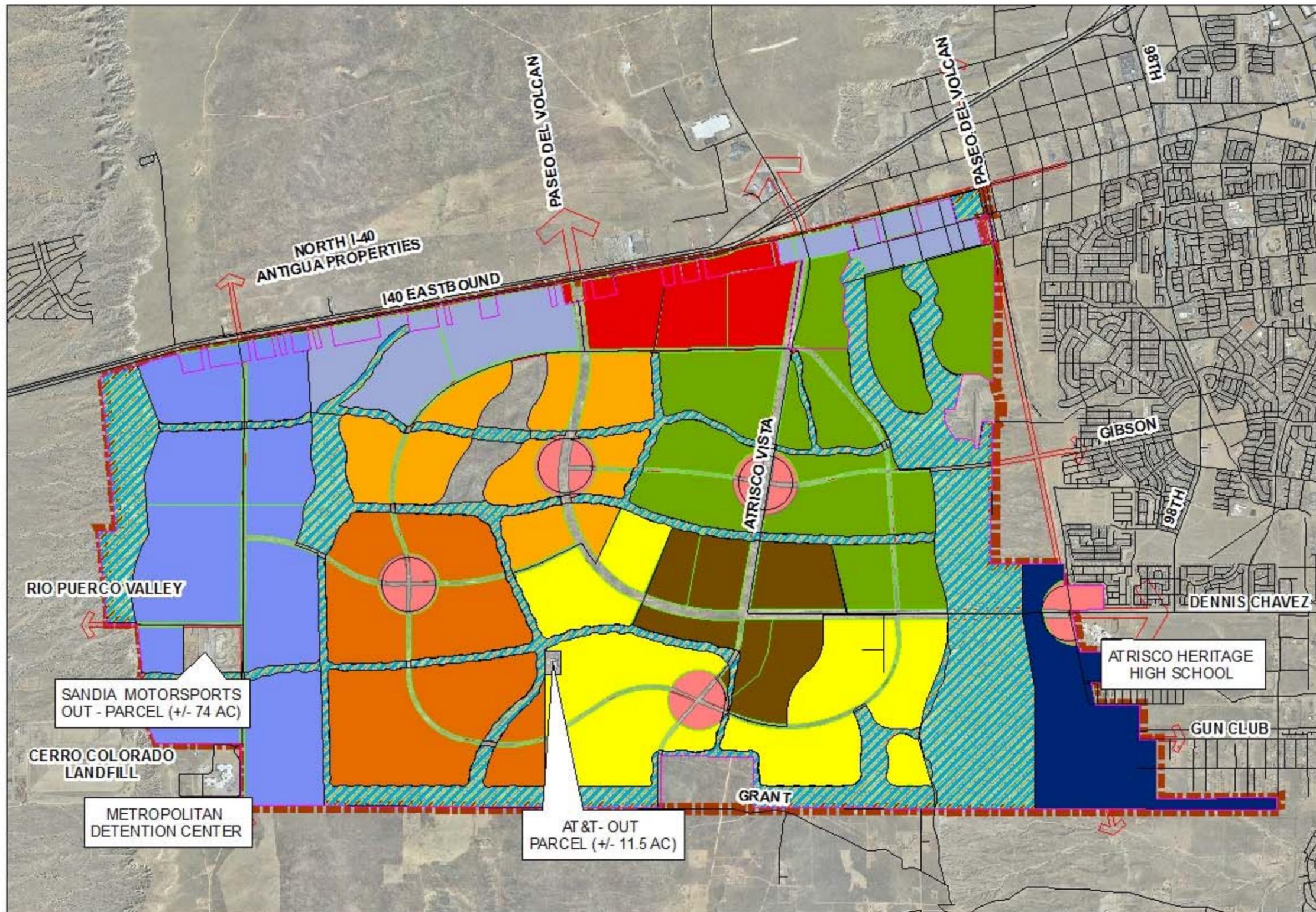
- Booster station at Don Reservoir (26,231 gpm Firm Capacity)
- (2) 4W Reservoirs (2MG each)
- Booster station at 4W Reservoir (25,506 gpm Firm Capacity)
- 48-inch transmission line to Atrisco 6W Reservoir
- (2) 6W Reservoirs (3MG each)
- Booster station at 6W Reservoir (13,625 gpm Firm Capacity)
- Ground storage 7W Reservoir (5MG) at same site as the 6W Reservoirs
- Elevated 7W Reservoir (2.3MG) at the same site as the 6W Reservoirs
- Closed loop booster station for 8W customers (1,200 gpm Firm Capacity plus fire pump)
- 16-inch transmission line to Atrisco 8W customers

These facilities generally mirror the location of the infrastructure within the College Trunk providing consistency and redundancy within the WUA water system.

VI. COSTS

Preliminary planning level costs for the 2035 Projected Development Plan and Ultimate improvements are provided in Appendix B. The estimated cost for the 2035 Projected Development Plan water system improvements is \$20.5 million. The estimated cost for the ultimate water system improvements is \$75.9 million. These costs include design, construction, survey and staking, construction observation and 20% construction contingency.

FIGURES



Legend

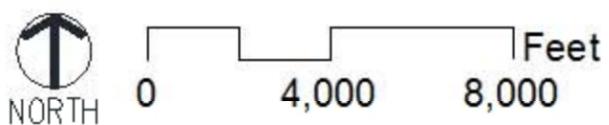
- SANTOLINA BOUNDARY
- ROADS
- PROPOSED ROW

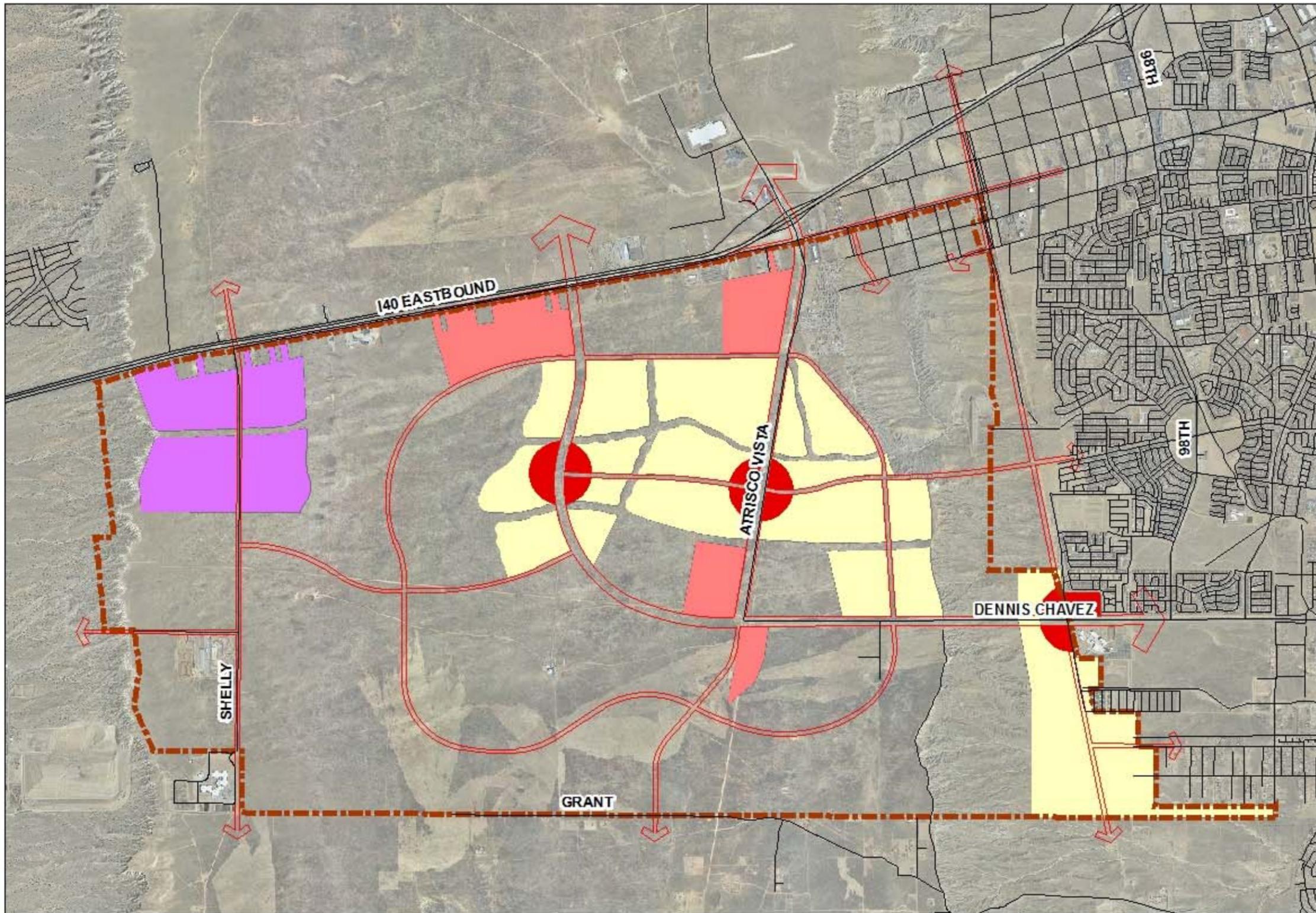
SANTOLINA DEVELOPMENT AREAS

- AMARILLO
- AZUL
- BUSINESS PARK
- INDUSTRIAL & ENERGY PARK
- NARANJO
- OPEN SPACE
- ORO
- TOWN CENTER
- URBAN CENTER
- VERDE
- VILLAGE CENTER

**FIGURE 1
SANTOLINA
MASTERPLAN
DEVELOPMENT**

AUGUST 2013





Legend

SANTOLINA BOUNDARY

ROADS

PROPOSED ROW

Land Use 2035 Projected Development Plan

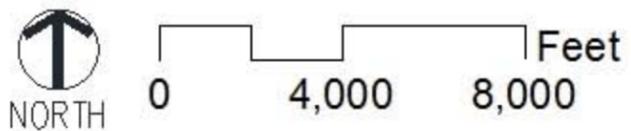
Light Industrial

Light Commercial

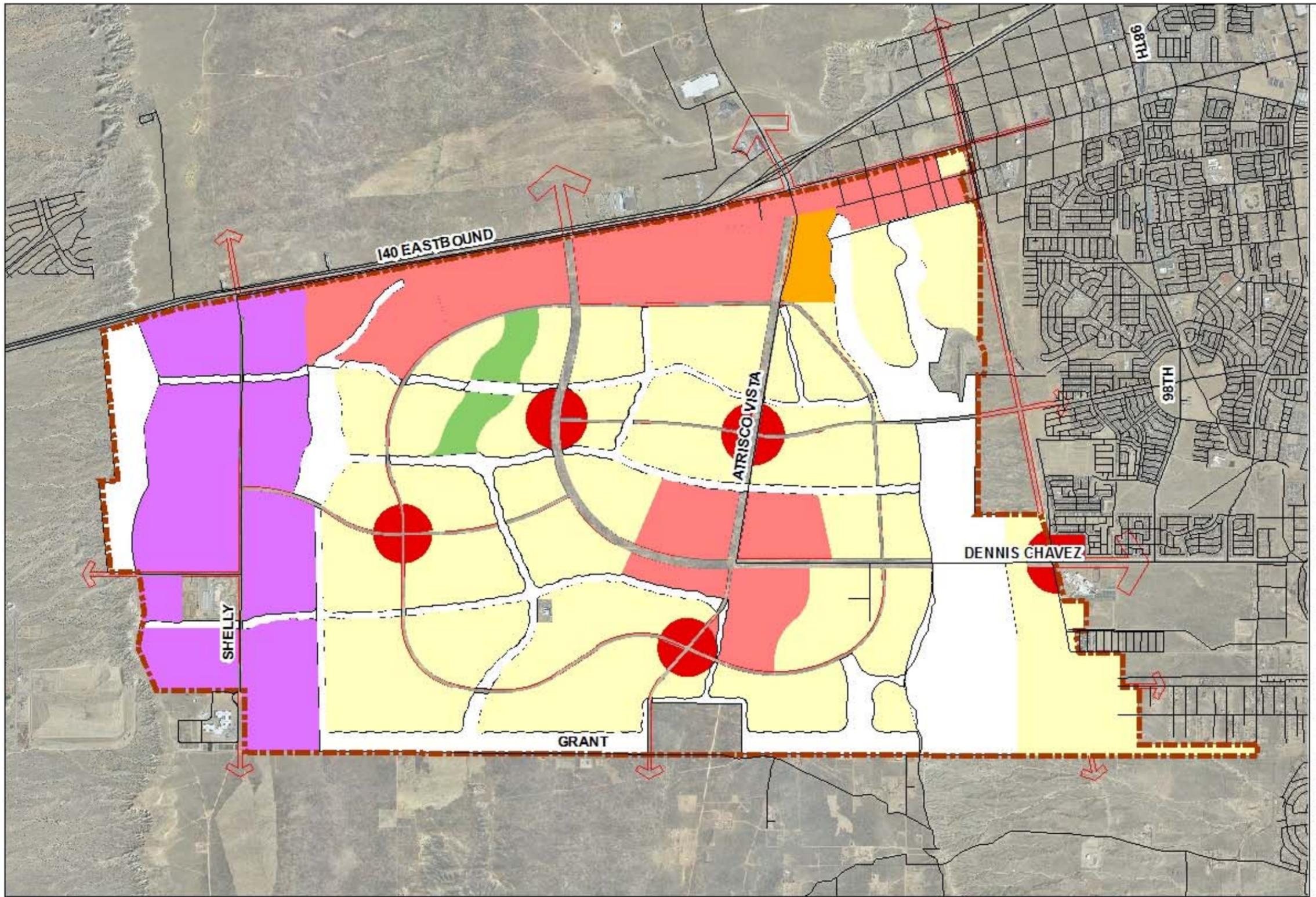
Light Residential

Heavy Commercial

FIGURE 2
SANTOLINA 2035
PROJECTED
DEVELOPMENT PLAN
LAND USE



AUGUST 2013



Legend

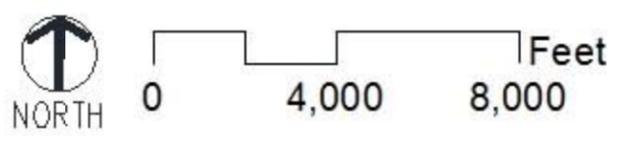
-  SANTOLINA BOUNDARY
-  ROADS
-  PROPOSED ROW

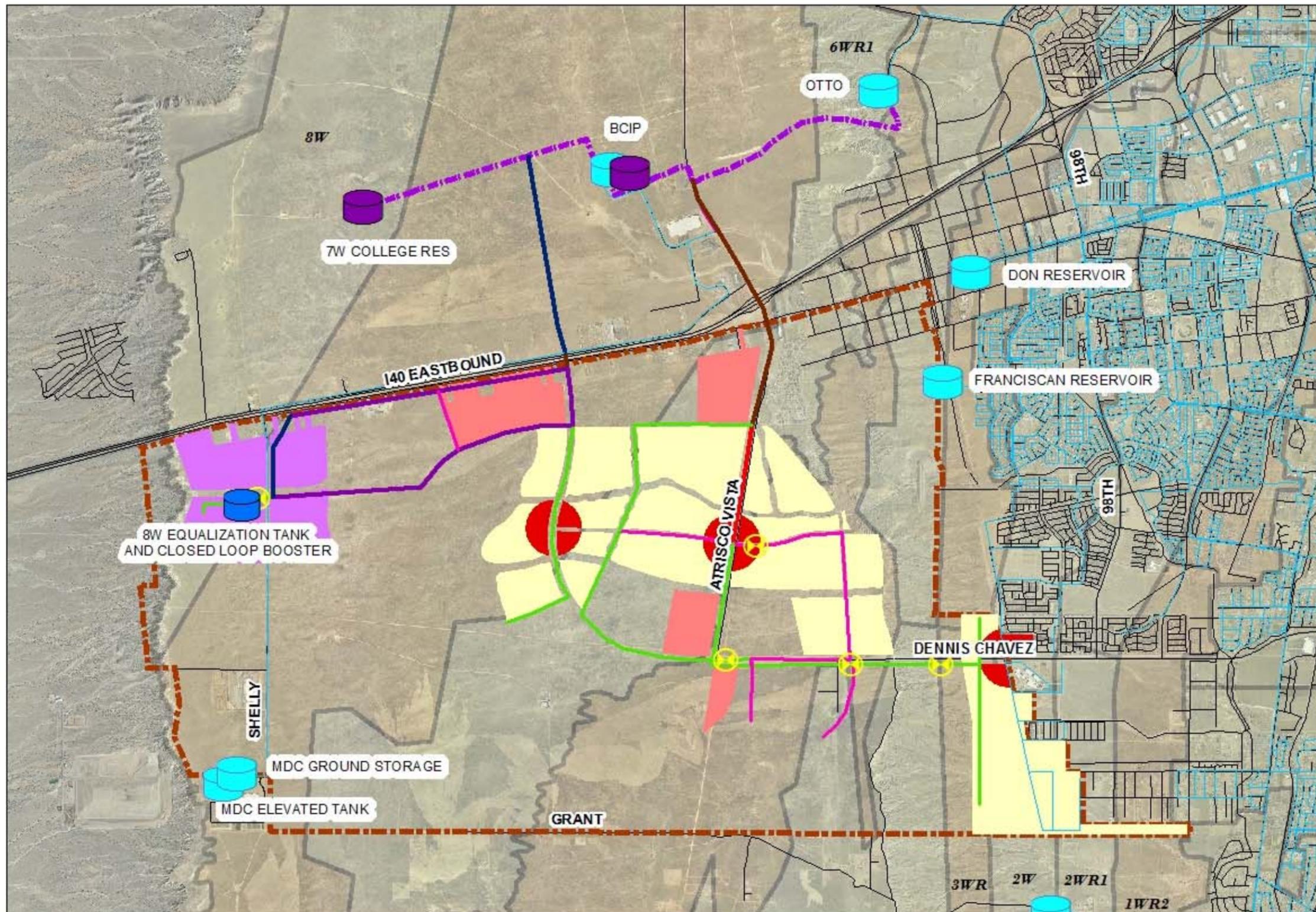
Land Use Ultimate

-  No Use
-  Park
-  Light Residential
-  Medium Residential
-  Light Industrial
-  Light Commercial
-  Heavy Commercial

**FIGURE 3
SANTOLINA ULTIMATE
LAND USE**

AUGUST 2013



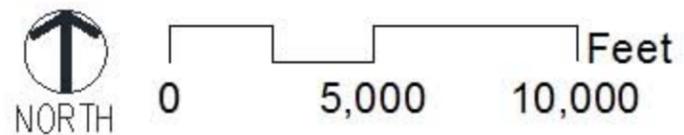


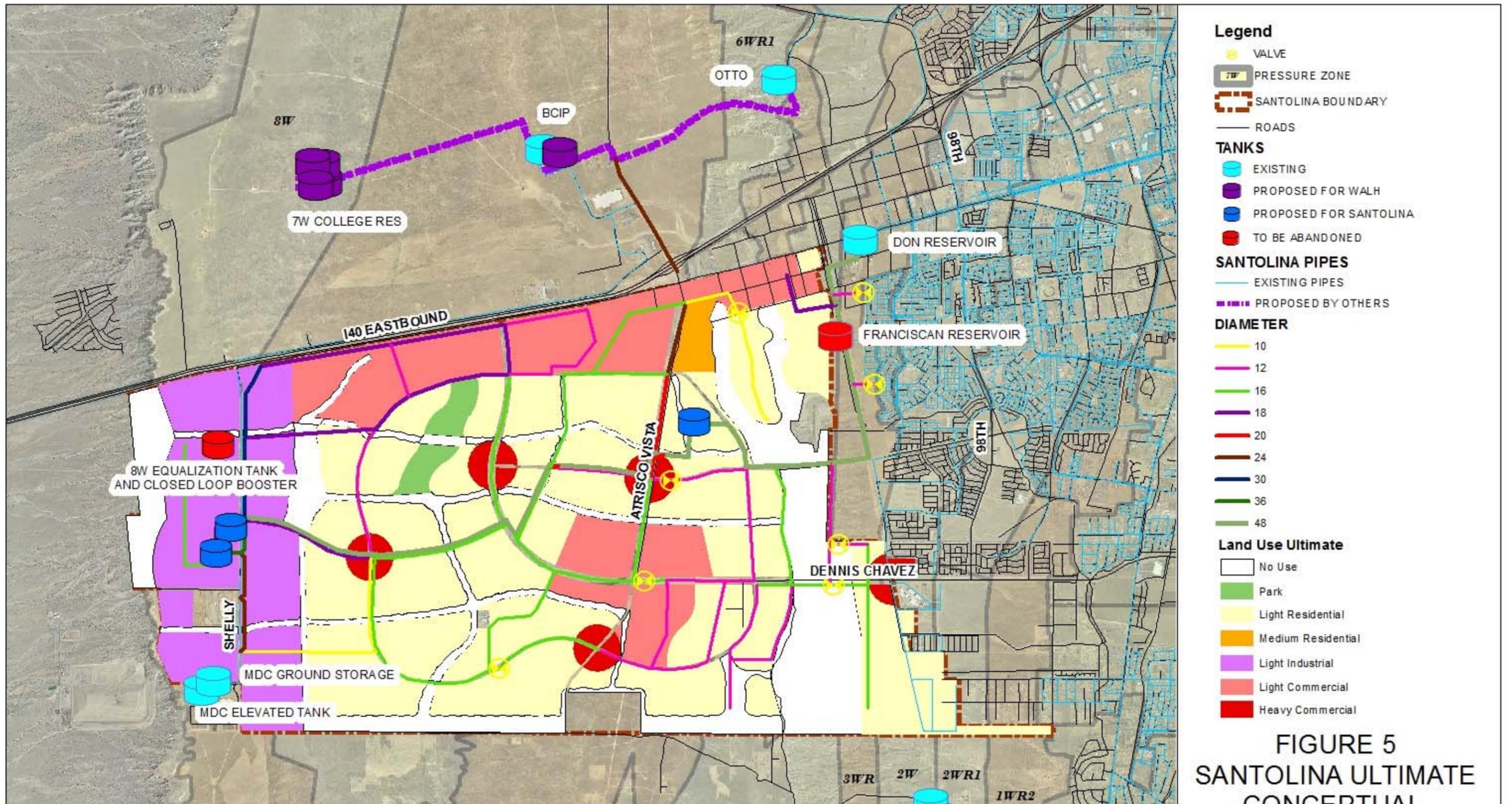
Legend

- VALVE
- PRESSURE ZONE
- SANTOLINA BOUNDARY
- ROADS
- TANKS**
- EXISTING
- PROPOSED FOR WALH
- PROPOSED FOR SANTOLINA
- SANTOLINA PIPES**
- EXISTING PIPES
- PROPOSED BY OTHERS
- DIAMETER**
- 12
- 20
- 16
- 24
- 18
- 30
- Land Use 2035 Projected Development Plan**
- Light Industrial
- Light Commercial
- Light Residential
- Heavy Commercial

FIGURE 4
SANTOLINA 2035
PROJECTED
DEVELOPMENT PLAN
CONCEPTUAL
WATER PLAN

AUGUST 2013

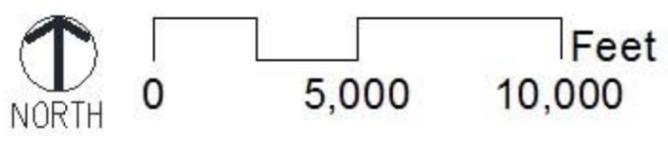




- Legend**
- VALVE
 - PRESSURE ZONE
 - SANTOLINA BOUNDARY
 - ROADS
- TANKS**
- EXISTING
 - PROPOSED FOR WALH
 - PROPOSED FOR SANTOLINA
 - TO BE ABANDONED
- SANTOLINA PIPES**
- EXISTING PIPES
 - PROPOSED BY OTHERS
- DIAMETER**
- 10
 - 12
 - 16
 - 18
 - 20
 - 24
 - 30
 - 36
 - 48
- Land Use Ultimate**
- No Use
 - Park
 - Light Residential
 - Medium Residential
 - Light Industrial
 - Light Commercial
 - Heavy Commercial

**FIGURE 5
SANTOLINA ULTIMATE
CONCEPTUAL
WATER PLAN**

AUGUST 2013



Atrisco Trunk

College Trunk

6060

5945

5830

5715

5600

5485

5370

5255

5140

5063

4975

Zone 8W

8W DEMAND
GPM: 1625.54
MGD: 2.34

Zone 7W

7W DEMAND
GPM: 11999.66
MGD: 17.28

Zone 6W

6W DEMAND
GPM: 6254.94
MGD: 9.01

Zone 5WR

5WR DEMAND
GPM: 4594.53
MGD: 6.62

Zone 4W

4W/3WR DEMAND
GPM: 1755.59
MGD: 2.53

Zone 3WR

Zone 2W

Zone 2WR

Zone 1W

Zone 0W

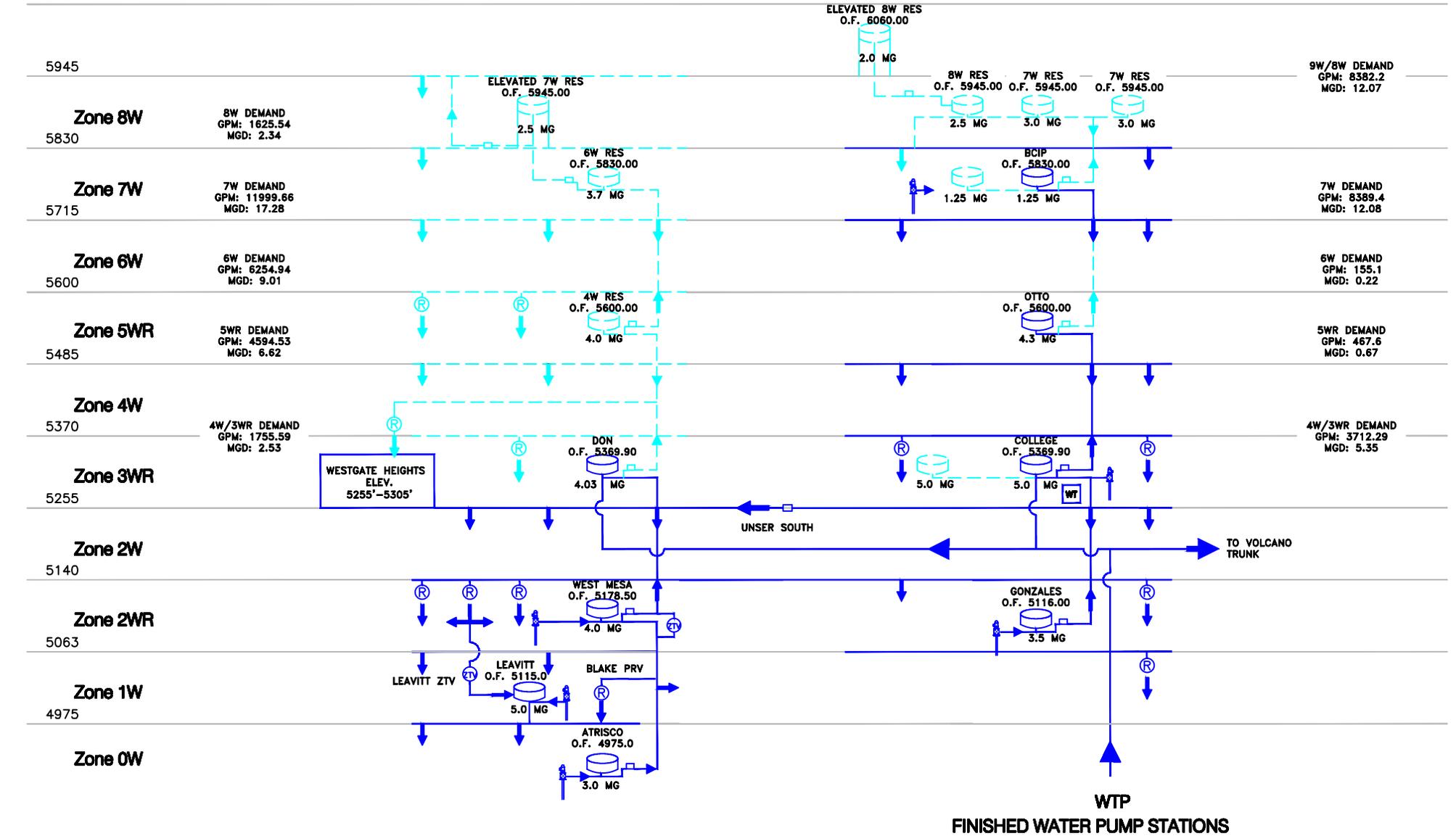
9W/8W DEMAND
GPM: 8382.2
MGD: 12.07

7W DEMAND
GPM: 8389.4
MGD: 12.08

6W DEMAND
GPM: 155.1
MGD: 0.22

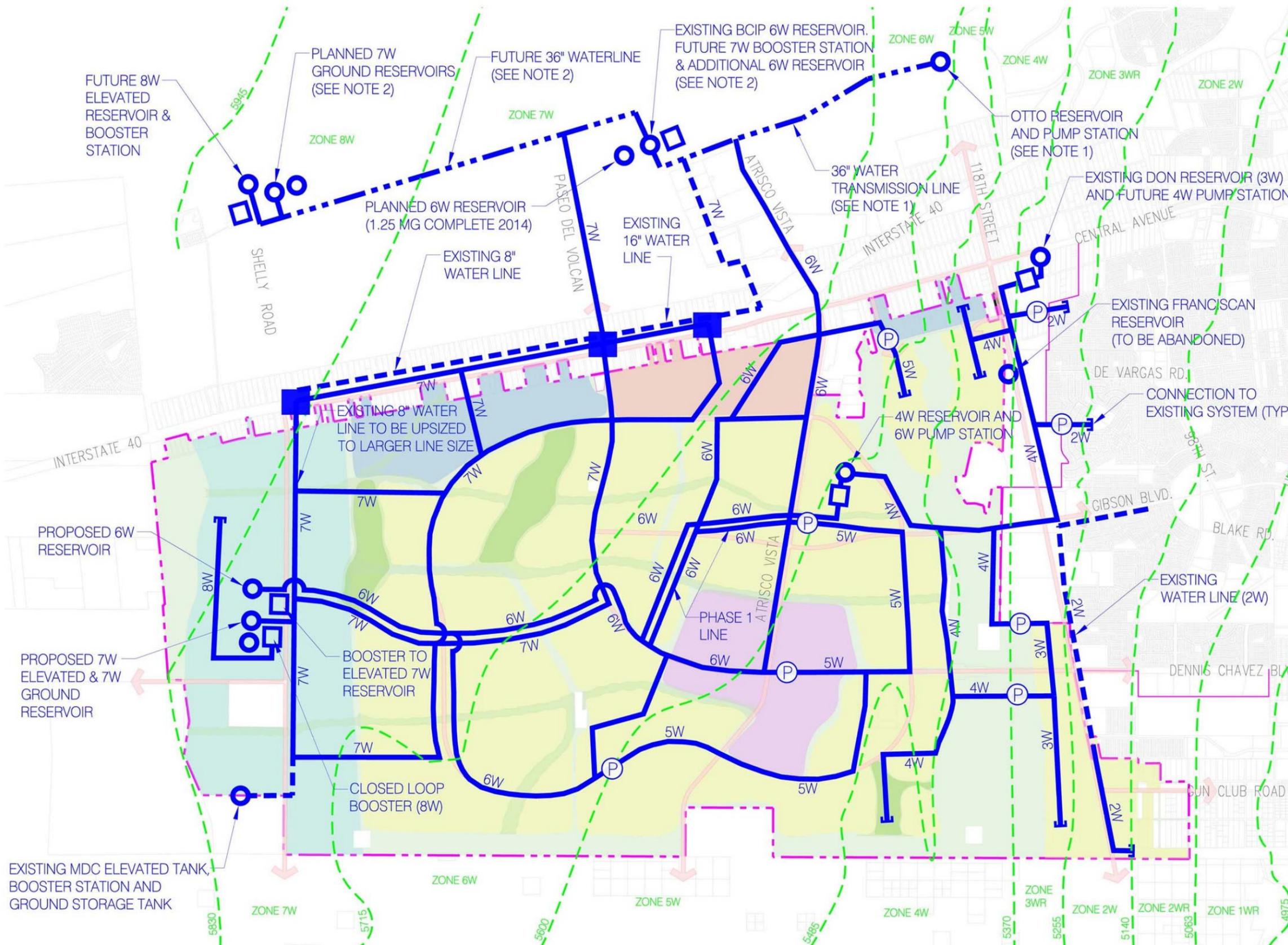
5WR DEMAND
GPM: 467.6
MGD: 0.67

4W/3WR DEMAND
GPM: 3712.29
MGD: 5.35



- Existing Waterline
- Drinking Water Project Transmission Lines
- Existing Reservoir
- Existing Well Field
- Existing Pump Station
- Existing Pressure Reducing Valve
- Existing Zone Transfer Valve
- Existing Arsenic Treatment Facility
- Proposed Waterline
- Proposed Pump Station
- Proposed Reservoir

FIGURE 6
ABCWUA WESTSIDE HYDRAULIC PROFILE
SANTOLINA ULTIMATE BUILDOUT
MARCH 2013



NOTES:

1. THE OTTO PUMP STATION AND 36" TRANSMISSION LINE ARE CURRENTLY UNDER CONSTRUCTION (COUNTY OF BERNALILLO /WALH PROJECT).
2. THE 7W RESERVOIR, BCIP PUMP STATION / RESERVOIR AND 36" TRANSMISSION LINE ARE UNDER DESIGN AND PLANNED FOR CONSTRUCTION IN 2014.
3. WITH CONSTRUCTION OF ALL REQUIRED LINES, BOOSTERS & RESERVOIRS IN ATRISCO TRUNK, ALL CONNECTIONS (VALVES) BETWEEN COLLEGE AND ATRISCO TRUNKS SHALL BE CLOSED.
4. ALL WATER INFRASTRUCTURE SHOWN IS ILLUSTRATIVE ONLY AND SUBJECT TO CHANGE.

LEGEND

- 

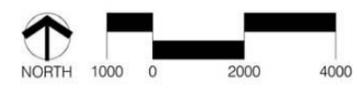
PRESSURE REDUCING VALVE
- 

FUTURE WATER LINE
- 

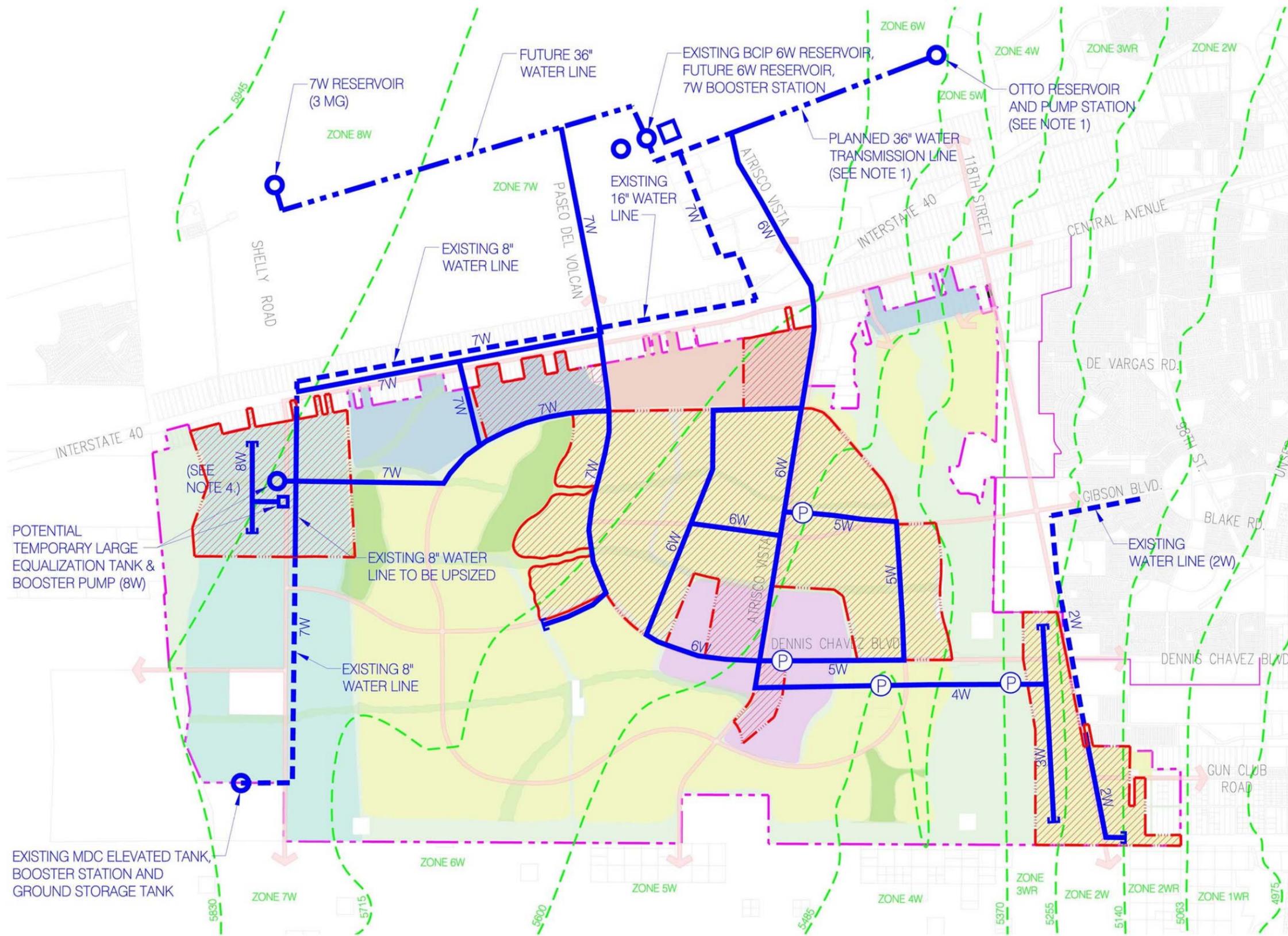
PROPOSED WATER LINE
- 

CLOSED VALVE (SEE NOTE 3)
- 

EXISTING WATER LINE



**FIGURE 7
LEVEL 'A' ULTIMATE BUILDOUT
WATER SYSTEM
(as submitted to County)**



NOTES:

1. 2035 PROJECTED DEVELOPMENT PHASE WATER SUPPLY SHALL BE PROVIDED TEMPORARILY FROM PLANNED (2014) WATER FACILITIES IN THE COLLEGE TRUNK (NORTH OF I-40).
2. ALL WATER LINE ALIGNMENTS ARE APPROXIMATE AND ILLUSTRATIVE, SUBJECT TO CHANGE.
3. THE OTTO PUMP STATION AND 36" TRANSMISSION LINE ARE CURRENTLY UNDER CONSTRUCTION (COUNTY OF BERNALILLO/WALH PROJECT) COMPLETE IN 2014.
4. THE WESTERN PORTION OF THE 2035 PROJECTED DEVELOPMENT PHASE INDUSTRIAL & ENERGY PARK LIES ABOVE WATER ZONE 7W. FINAL SERVICE CONFIGURATION SHALL BE BASED ON ACTUAL CIRCUMSTANCES AT THE TIME OF DEVELOPMENT. SERVICE OPTIONS INCLUDE INSTALLATION OF PRIVATE OR PUBLIC BOOSTER STATIONS, SITE GRADING OR LAND USES WITH NO WATER USE.
5. FUTURE DETAILED STUDIES MAY BE ABLE TO CO-LOCATE THE TEMPORARY 2035 PROJECTED DEVELOPMENT PLAN PHASE 1 8W WATER FACILITIES WITH THE ULTIMATE 6W/7W/8W FACILITIES (SUCH THAT THE PHASE 1 FACILITIES ARE NOT 'THROW-AWAY' FACILITIES).

LEGEND

- | | | | |
|--|-------------------------|--|-------------------------------------|
| | PRESSURE REDUCING VALVE | | FUTURE WATER LINE |
| | PROPOSED WATER LINE | | 2035 PROJECTED DEVELOPMENT BOUNDARY |
| | EXISTING WATER LINE | | 2035 PROJECTED DEVELOPMENT BOUNDARY |



FIGURE 8
LEVEL 'A' 2035 PROJECTED
DEVELOPMENT PLAN
WATER SYSTEM
(as submitted to County)

APPENDIX A
DEMAND FORECASTER OUTPUT TABLES

Zone 1WR - 2035 Projected Development Plan

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	30.06	52905.6	1104
2	Medium Res	0	0	0
3	Heavy Res	0	0	0
4	Light Com	0	0	0
5	Heavy Com	0	0	0
6	Light Ind	0	0	0
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	0	0	0
13	Golf Course	0	0	0
	Computed ROW	1885.92	0	0
Total		1885.98	52905.6	1104

Zone 2W- 2035 Projected Development Plan

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	260.43	458356.8	82896
2	Medium Res	0	0	0
3	Heavy Res	0	0	0
4	Light Com	0	0	0
5	Heavy Com	44.01	220050	6725
6	Light Ind	0	0	0
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	0	0	0
13	Golf Course	0	0	0
	Computed ROW	1314.05	0	0
Total		1618.49	678406.8	89621

Zone 2WR- 2035 Projected Development Plan

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	86.24	151782.4	9090
2	Medium Res	0	0	0
3	Heavy Res	0	0	0
4	Light Com	0	0	0
5	Heavy Com	0	0	0
6	Light Ind	0	0	0
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	0	0	0
13	Golf Course	0	0	0
	Computed ROW	1163.34	0	0
Total		1249.58	151782.4	9090

Zone 3WR- 2035 Projected Development Plan

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	240.18	422716.8	70506
2	Medium Res	0	0	0
3	Heavy Res	0	0	0
4	Light Com	0	0	0
5	Heavy Com	19.09	95450	1265
6	Light Ind	0	0	0
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	0	0	0
13	Golf Course	0	0	0
	Computed ROW	2650.15	0	0
Total		2909.42	518166.8	71771

Zone 4W- 2035 Projected Development Plan

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	1.01	1777.6	1.25
2	Medium Res	0	0	0
3	Heavy Res	0	0	0
4	Light Com	0	0	0
5	Heavy Com	0	0	0
6	Light Ind	0	0	0
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	0	0	0
13	Golf Course	0	0	0
	Computed ROW	5779.7	0	0
Total		5780.71	1777.6	1.25

Zone 5WR- 2035 Projected Development Plan

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	650.46	1144809.6	517120
2	Medium Res	0	0	0
3	Heavy Res	0	0	0
4	Light Com	63.88	159700	7084
5	Heavy Com	17.7	88500	1088
6	Light Ind	0	0	0
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	0	0	0
13	Golf Course	0	0	0
	Computed ROW	5495.26	0	0
Total		6227.3	1393009.6	525292

Zone 6W- 2035 Projected Development Plan

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	753.41	1326001.6	693766
2	Medium Res	0	0	0
3	Heavy Res	0	0	0
4	Light Com	264.75	661875	121688
5	Heavy Com	60.53	302650	12722
6	Light Ind	0	0	0
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	0	0	0
13	Golf Course	0	0	0
	Computed ROW	6357.15	0	0
Total		7435.84	2290526.6	828176

Zone 7W- 2035 Projected Development Plan

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	410.12	721811.2	205576
2	Medium Res	0	0	0
3	Heavy Res	0	0	0
4	Light Com	252.7	631750	110863
5	Heavy Com	72.48	362400	18241
6	Light Ind	398.65	1993250	551812
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	0	0	0
13	Golf Course	0	0	0
	Computed ROW	4687.03	0	0
Total		5820.98	3709211.2	886492

Zone 8W- 2035 Projected Development Plan

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	0	0	0
2	Medium Res	0	0	0
3	Heavy Res	0	0	0
4	Light Com	0	0	0
5	Heavy Com	0	0	0
6	Light Ind	296.22	1481100	304675
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	0	0	0
13	Golf Course	0	0	0
	Computed ROW	226.08	0	0
Total		522.3	1481100	304675

Zone 1WR - Ultimate

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	30.06	52905.6	1104
2	Medium Res	0	0	0
3	Heavy Res	0	0	0
4	Light Com	0	0	0
5	Heavy Com	0	0	0
6	Light Ind	0	0	0
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	0	0	0
13	Golf Course	0	0	0
	Computed ROW	1885.92	0	0
Total		1885.98	52905.6	1104

Zone 2W- Ultimate

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	260.43	458356.8	82896
2	Medium Res	0	0	0
3	Heavy Res	0	0	0
4	Light Com	0	0	0
5	Heavy Com	44.01	220050	6725
6	Light Ind	0	0	0
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	0	0	0
13	Golf Course	0	0	0
	Computed ROW	1314.05	0	0
Total		1618.49	678406.8	89621

Zone 2WR- Ultimate

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	86.24	151782.4	9090
2	Medium Res	0	0	0
3	Heavy Res	0	0	0
4	Light Com	0	0	0
5	Heavy Com	0	0	0
6	Light Ind	0	0	0
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	0	0	0
13	Golf Course	0	0	0
	Computed ROW	1163.34	0	0
Total		1249.58	151782.4	9090

Zone 3WR- Ultimate

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	240.18	422716.8	70506
2	Medium Res	0	0	0
3	Heavy Res	0	0	0
4	Light Com	0	0	0
5	Heavy Com	19.09	95450	1265
6	Light Ind	0	0	0
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	0	0	0
13	Golf Course	0	0	0
	Computed ROW	2650.15	0	0
Total		2909.42	518166.8	71771

Zone 4W- Ultimate

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	1.01	1777.6	1.25
2	Medium Res	0	0	0
3	Heavy Res	0	0	0
4	Light Com	0	0	0
5	Heavy Com	0	0	0
6	Light Ind	0	0	0
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	0	0	0
13	Golf Course	0	0	0
	Computed ROW	5779.7	0	0
Total		5780.71	1777.6	1.25

Zone 5WR- Ultimate

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	650.46	1144809.6	517120
2	Medium Res	0	0	0
3	Heavy Res	0	0	0
4	Light Com	63.88	159700	7084
5	Heavy Com	17.7	88500	1088
6	Light Ind	0	0	0
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	0	0	0
13	Golf Course	0	0	0
	Computed ROW	5495.26	0	0
Total		6227.3	1393009.6	525292

Zone 6W- Ultimate

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	2132.82	3753763.2	5559793
2	Medium Res	129.54	388620	34960
3	Heavy Res	0	0	0
4	Light Com	586.15	1465375	596479
5	Heavy Com	60.53	302650	12722
6	Light Ind	131.42	657100	59970
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	0	0	0
13	Golf Course	0	0	0
	Computed ROW	4395.38	0	0
Total		7435.84	6567508.2	6263922

Zone 7W- Ultimate

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	1355.29	2385310.4	2244991
2	Medium Res	0	0	0
3	Heavy Res	0	0	0
4	Light Com	965.09	2412725	1617012
5	Heavy Com	147.59	737950	75635
6	Light Ind	1526.19	7630950	8087694
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	176.75	636300	78101
13	Golf Course	0	0	0
	Computed ROW	1650.07	0	0
Total		5820.98	13803235.4	12103433

Zone 8W- Ultimate

Usage Type	Description	Acres	Peak Day Demand Allocated (Gal/Day)	Peak Day Demand Allocated (Gal/Min)
0	No Use	0	0	0
1	Light Res	0	0	0
2	Medium Res	0	0	0
3	Heavy Res	0	0	0
4	Light Com	0	0	0
5	Heavy Com	0	0	0
6	Light Ind	390.13	1950650	528477
8	Heavy Ind	0	0	0
9	Light Inst	0	0	0
10	Heavy Inst	0	0	0
11	Other Irrigated Landscape	0	0	0
12	Park	0	0	0
13	Golf Course	0	0	0
	Computed ROW	132.18	0	0
Total		522.31	1950650	528477

APPENDIX B
COST ESTIMATES

SANTOLINA
WATER MASTER PLAN

Conceptual Value of Proposed Infrastructure					
Santolina 2035 Projected Development Plan Water System					
18-Mar-13					
Prepared By: Jennifer Hill and Nathan Roberts					
Item #	Description	Quantity	Unit	Estimated Unit Price	Estimated Cost
1	8W Steel, at-grade equalization tank, including site preparation, grading, tank appurtenances, cip.	750,000	GAL	\$1	\$750,000
2	Zone 8W closed loop booster station	150	hp	\$1,500	\$225,000
3	Pressure reducing valve station, including concrete vault	4	EA	\$50,000	\$200,000
4	Jack and bore across I-40	1,000	LF	\$200	\$200,000
5	12" Waterline Pipe to 6' depth, cip.	27,400	LF	\$60	\$1,644,000
6	16" Waterline Pipe to 6' depth, cip.	56,300	LF	\$80	\$4,504,000
7	18" Waterline Pipe to 6' depth, cip.	28,500	LF	\$90	\$2,565,000
8	20" Waterline Pipe to 6' depth, cip.	5,000	LF	\$100	\$500,000
9	24" Waterline Pipe to 6' depth, cip.	11,100	LF	\$120	\$1,332,000
10	30" Waterline Pipe to 6' depth, cip.	12,600	LF	\$150	\$1,890,000
Subtotal					\$13,810,000
11	Construction Staking and Survey	2.00%	%		\$277,000
12	Construction Mob/Demob	6.00%	%		\$829,000
13	Construction Testing	2.00%	%		\$277,000
14	Construction Contingency	20.00%	%		\$2,762,000
Subtotal					\$4,145,000
Construction Subtotal					\$17,955,000
15	Engineering	8.00%	%		\$1,437,000
16	Design Survey	1.00%	%		\$180,000
17	Construction Inspection	5.00%	%		\$898,000
Soft Costs Subtotal					\$2,515,000
TOTAL					\$20,470,000

Note: This estimate of construction cost is only an opinion.
BHI cannot and does not guarantee that proposals, bids, or actual Construction Costs will not vary from this opinion.

SANTOLINA
WATER MASTER PLAN

Conceptual Value of Proposed Infrastructure

Santolina Ultimate Water System

18-Mar-13

Prepared By: Jennifer Hill and Nathan Roberts

Item #	Description	Quantity	Unit	Estimated Unit Price	Estimated Cost
1	4 W Steel, at-grade water tank, including site preparation, grading, tank appurtenances, cip.	2,500,000	GAL	\$1	\$ 2,500,000
2	6 W Steel, at-grade water tank, including site preparation, grading, tank appurtenances, cip.	6,000,000	GAL	\$1	\$6,000,000
3	7W Steel, at-grade water tank, including site preparation, grading, tank appurtenances, cip.	5,000,000	GAL	\$1	\$5,000,000
4	7 W steel, elevated water tank, including site preparation, grading, tank appurtenances, cip.	2,300,000	GAL	\$3	\$6,900,000
5	Booster station upgrade at Don Reservoir	2,200	hp	\$1,500	\$3,300,000
6	Zone 4W to Zone 6W booster station	2,200	hp	\$1,500	\$3,300,000
7	Zone 6W to 7W booster station	600	hp	\$1,500	\$900,000
8	Zone 8W closed loop booster station	150	hp	\$1,500	\$225,000
9	Pressure reducing valve station, including concrete vault	5	EA	\$50,000	\$250,000
10	10" Waterline Pipe to 6' depth, cip.	19,500	LF	\$50	\$975,000
11	12" Waterline Pipe to 6' depth, cip.	46,300	LF	\$60	\$2,778,000
12	16" Waterline Pipe to 6' depth, cip.	46,900	LF	\$80	\$3,752,000
13	18" Waterline Pipe to 6' depth, cip.	11,600	LF	\$90	\$1,044,000
14	20" Waterline Pipe to 6' depth, cip.	1,500	LF	\$100	\$150,000
15	24" Waterline Pipe to 6' depth, cip.	6,800	LF	\$120	\$816,000
16	30" Waterline Pipe to 6' depth, cip.	4,600	LF	\$150	\$690,000
17	36" Waterline Pipe to 6' depth, cip.	5,000	LF	\$175	\$875,000
18	48" Waterline Pipe to 6' depth, cip.	49,100	LF	\$240	\$11,784,000
Subtotal					\$51,239,000
19	Construction Staking and Survey	2.00%	%		\$1,025,000
20	Construction Mob/Demob	6.00%	%		\$3,075,000
21	Construction Testing	2.00%	%		\$1,025,000
22	Construction Contingency	20.00%	%		\$10,248,000
Subtotal					\$15,373,000
Construction Subtotal					\$66,612,000
23	Engineering	8.00%	%		\$5,329,000
24	Design Survey	1.00%	%		\$667,000
25	Construction Inspection	5.00%	%		\$3,331,000
Soft Costs Subtotal					\$9,327,000
TOTAL					\$75,939,000

Note: This estimate of construction cost is only an opinion.

BHI cannot and does not guarantee that proposals, bids, or actual Construction Costs will not vary from this opinion.