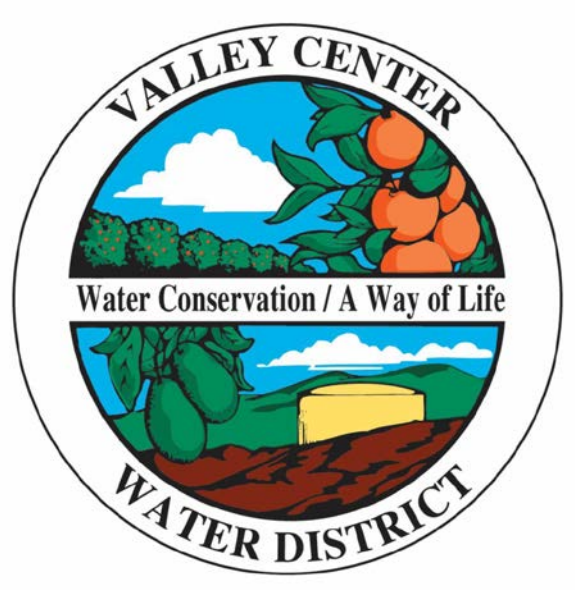

VALLEY CENTER MUNICIPAL WATER DISTRICT

WATER MASTER PLAN

JANUARY 2019

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EXECUTIVE SUMMARY

The Valley Center Municipal Water District now has facilities that provide capacity far in excess of that currently being used. This excess capacity was the result of outside influences beyond the District's control: 1) increases in water pricing which affected the extent of agriculture in the District and significantly reduced water sales and 2) water conservation. Due to these factors, the basis of the Capital Improvement Program (CIP) development process has changed from previous Water Master Plans. The need to add capacity is not present, while at the same time the need to maintain existing aging infrastructure is heightened. To address the current situation, this Master Plan is redirecting its focus from identifying future expansion projects to repairing and replacing existing assets.

The type of projects included in the CIP represent significant construction of facilities. These projects differ from operations and maintenance projects in both magnitude of cost and intent. CIP projects are normally characterized as being an upgrade to or replacement of existing infrastructure: e.g., replacing 1,000 ft. of pipe, recoating a reservoir, or replacement of the main pumps and motors at a booster station. O&M expenses generally represent more minor replacement/upgrade projects: e.g., replacement of an air release valve, replacement of pump bearings, or repair of a portion of site fencing.

Depreciation is being used by the District as a measure of requirements for infrastructure investments to sustain existing capacity. One prudent way for the District to maintain reliable infrastructure, is to identify some percentage of depreciation to invest in either construction or replacement reserves. Over the past 3 years, the annual total depreciation of all water assets at the District has ranged from approximately $6.8 M to $10.5 M. The largest portion of this is related to pipelines whose depreciation has ranged from approximately $5.1 M to $7.8 M. The asset management data supporting the depreciation calculations are constantly being refined and developed to both: 1) account for new assets and 2) identify and categorize existing assets in a more relevant fashion.

Capital Improvement Plan (CIP)

The proposed CIP is presented for yearly ranges of 0 to 5 years, 6 to 10 years, and 11 to 20 years. The projects are currently divided into major asset class categories representing: Pipelines, Reservoirs, Pump Stations, and Miscellaneous. Prioritization criteria for the different classes vary, but generally projects are prioritized based on combination of asset condition, and significance to District water deliveries/operations. Safety is always a key concern of the District and any asset posing a threat to the safety of either District staff or the public moves to the top of the list to be addressed. The certainty of the actual projects to be constructed diminishes as the date of construction moves further into the future, such that the projects in the 0 to 5 year range have the highest certainty of being constructed.

Below is a table presenting a summary of the costs for proposed projects over the next 20 years. The first 5 columns represent costs for projects over the next 5 years, with the following two columns presenting costs from 6 to 10 years from now, and 11 to 20 years from now, respectively.

SUMMARY OF CIP PROJECTS								
	1	2	3	4	5	6-10	11-20	**TOTALS**
PIPELINES	$2,775,000	$3,895,000	$2,250,000	$2,780,000	$3,240,000	$14,697,000	$25,408,000	$55,045,000
RESERVOIRS	$1,257,000	$1,669,000	$1,388,000	$1,946,000	$1,450,000	$4,670,000	$8,693,000	$21,073,000
PUMP STATIONS	$448,000	$130,000	$288,000	$370,000	$340,000			$1,576,000
TOTALS	$4,480,000	$5,694,000	$3,926,000	$5,096,000	$5,030,000	$19,367,000	$34,101,000	**$77,694,000**

Table 1: Summary of CIP Projects[1]

Overviews of project locations are presented in the pipeline, reservoir and pump station maps located in Appendix A. Further details, including figures of the 0 to 5 year pipeline projects, are presented in the various sections of this Master Plan.

Pipelines

The pipeline projects represent replacements of existing pipelines that are of concern due to observed advanced deterioration, breakage rates, and/or material of construction. The rate of average annual spending for pipelines over the next 5 years is approximately $3.0 M. It should be noted that at this current rate of spending it will take approximately 80 years to replace all the pipelines in the District. Over the past 3 years pipeline depreciation has ranged from approximately $5.1 M to $7.8 M. No significant funding of reserve accounts for pipeline replacement is presently occurring.

Reservoirs

Steel reservoirs require recoating approximately every 15 years in order to maintain their viability. Considering information currently available, it appears that an annual investment of approximately $1.5 million is required simply to maintain reservoir coating condition. Prior to the drought the District was maintaining this sustainable reservoir coating cycle. However, due to financial constraints brought on by the drought, reservoir coatings were deferred in favor of more urgent projects. Because of these deferred coating projects, an annual outlay greater than $1.2 M would be required to catch up on the coatings themselves. The fact that coating projects have been deferred is likely going to result in the need to replace an unknown number of rafters and earthquake straps, which would increase the projected costs. We have included a contingency of 10% to account for these expenses, though the actual cost may vary greatly from this.

Pump Stations

The pump station assets have recently completed their major full-station rebuilds, so no significant sustained construction is expected over the next 20 years. Over the next 5 years projects include two small pump station replacement projects, along with a few pump station bypass projects that will allow remote activation of pump station bypass to back feed from one pressure zone into another.

Depreciation associated with pump station assets has recently ranged from $0.9 M to $1.3 M per year[2]. As with the pipelines, spending/funding for pump stations reserves is not significant at this time.

[1] "PIPELINE CRITICAL – RED LINE WRAP STL – FOR 0 TO 10 YEARS 072018_jc deleting rows"; 'PIPELINES' tab
[2] "DEPRECIATION SUMMARY SPREADSHEET"; 'depreciation data' tab

Miscellaneous

Assets included under this category include PRV stations and large scale SCADA/Controls/Monitoring Systems. The PRV stations have all been recently upgraded and no significant expenditures are expected over the next 20 plus years.

SCADA/Controls/Monitoring Systems require continual upgrading to remain current with technology. However, no CIP spending is anticipated on these systems over the next 10 years.

Asset Management Program

District staff is in the process of developing an asset management program. There are distinct advantages to having such a program including enhanced reliability of facilities and a reduction in long range costs.

One of the foundations for this program is the database of assets. This data base represents a description of all District assets, most of which can be associated with one of 4 general asset categories: pipelines, reservoirs, pump stations, and miscellaneous. Information from this database is used in preparing/estimating replacement costs new (RCN) for facilities.

A condition assessment of the District's assets, whether formal or informal, provides the District with information that can be used in assessing the remaining useful lives of facilities. The useful lives are used in calculating asset depreciation, which is a measure of asset deterioration over time.

Depreciation is subtracted from RCN to develop the replacement cost new less depreciation (RCNLD) of that asset. This RCNLD is the basis of the "buy-in" of new customers to the District's water system. Thus, the asset management program provides a tangible, transparent mechanism for developing rates and fees that are tied directly to the assets themselves. In developing the approach creating fees and charges, the District has strived to be fair to both existing and new customers.

Another function of the Asset Management Program is to facilitate development of a replacement plan to fund assets. By doing a Long Range Financial Plan (LRFP), the District will be able to proactively determine what major projects need to occur, how much those projects will cost, and when the project and funding will be needed. This planning will allow the District to minimize the long term cost of capital and construction costs to the District by: identifying windows of time in which projects can be executed which allows taking advantage of low interest rate funding opportunities when they arise; creating replacement reserve accounts that will serve as collateral to lower bond rates when selling bonds is an attractive option, and minimizing reactive emergency repair projects which are constructed at a premium and disrupt District staff in the execution of planned duties.

When creating replacement reserve accounts agencies normally set aside some percentage of asset value or depreciation. This percentage is totally up to the District's policy makers and normally reflects the District's perspective on planning and maintaining assets. As described previously, the District is currently not significantly funding reserves for any of the three major asset categories and may wish to consider this in the future.

SECTION I. INTRODUCTION

Overview of District

The District imports nearly 100 percent of its water from the San Diego County Water Authority. The District is also the largest retail purchaser of agricultural water within SDCWA's service area. As of June 30, 2017, the District serves 10,086 active water meters, including 7,882 domestic meters, 1,071 agricultural meters and 1,133 residential fire protection meters[3].

The Service Area boundary of the District is presented in Figure 1. This figure includes the most recently annexed areas to the northwest, as well as the locations of the First and Second San Diego Aqueducts.

SECTION II. WATER DISTRIBUTION INFRASTRUCTURE

General

Water distribution assets have been assigned 4 major categories: 1) Pipelines, 2) Reservoirs, 3) Pump Stations, and 4) Miscellaneous. The purpose of this Water Master Plan is to determine what Repair & Replacement (R&R) is needed to maintain the system and, per the water model, what upgrades are necessary to improve service.

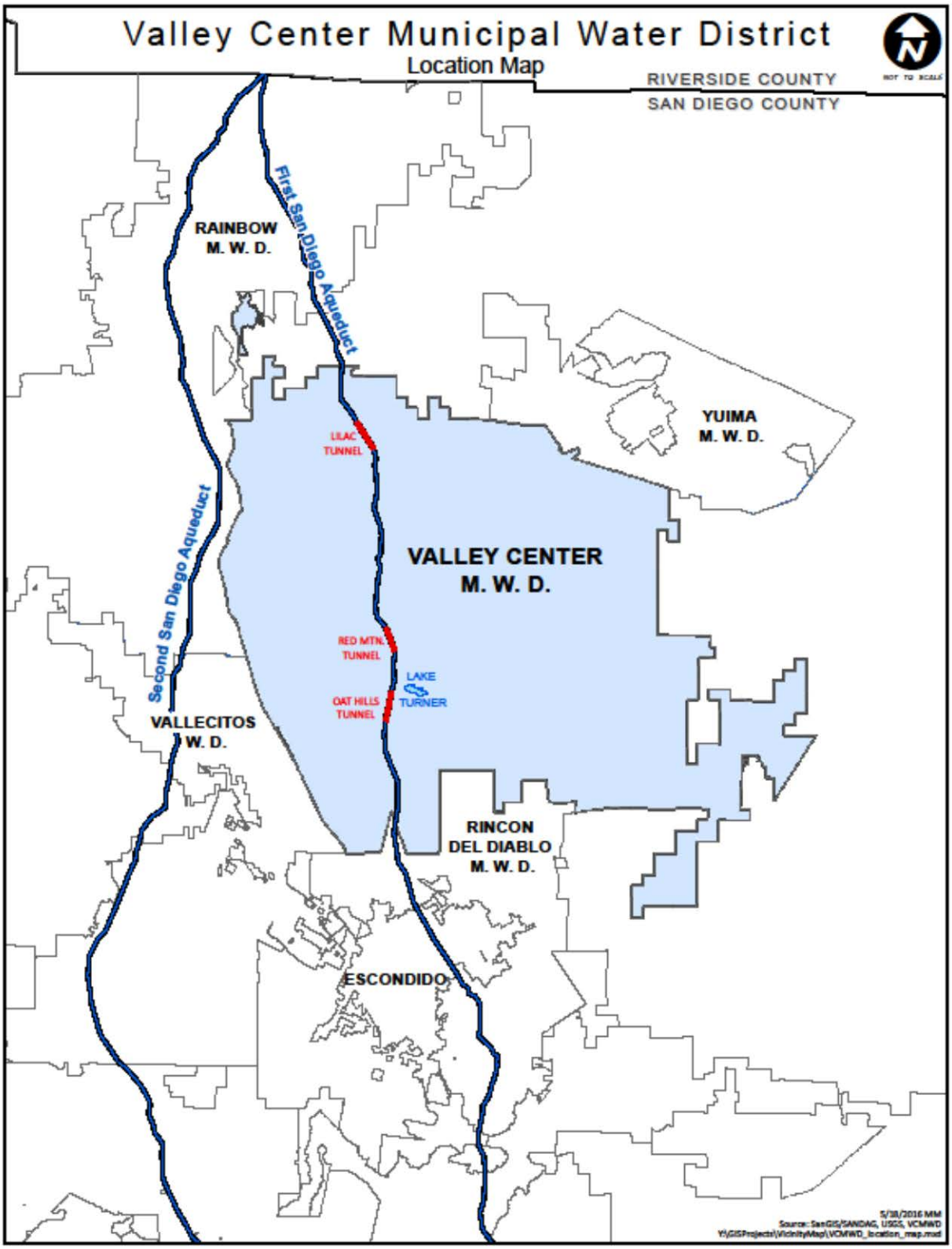
Depreciation

Depreciation on all water distribution assets over the last 3 years has varied between 6.8 M to $10.5 M[4]. In order to maintain the assets into the future and remain a going concern, the District needs to be involved in a combination of efforts including:

- Constructing replacement facilities,
- Investing in maintenance activities that will prolong assets' useful lives, and/or
- Planning the funding to replace the assets.

[3] "Assets_050418_ USE WITH WVR SYST DEVEL CHARGE added assets 16-17 WT95 WPS 60_BW edits", 'FYE2016' tab
[4] "DEPRECIATION SUMMARY SPREADSHEET"; 'depreciation data' tab

Figure 1 SERVICE AREA BOUNDARY



Pipelines

Overview

A pipeline replacement program has been undertaken by the District to respond to aging infrastructure and an increase in pipe breaks. In or about 2008, a tar-wrapped steel pipeline burst in Cole Grade Road shutting down the road temporarily and requiring emergency repair. After much investigation, it was determined that roots grew in between the tar wrapper and the steel pipe causing the wrapper to peel off and expose bare steel which subsequently deteriorated. A check of other aging wrapped steel installations has confirmed the potential for the wrapper to peel off, so the District has identified its aging tar-wrapped coated steel pipes and created a program to systematically replace them.

There was a similar occurrence in Valley Center Road with a longitudinally welded (as opposed to spiral welded) steel pipe which burst and shut down traffic temporarily. The longitudinal weld ripped open along the length of the pipe.

Prioritization of Projects

Pipe break history is a key factor in the prioritization of pipeline projects. Any observed physical pipeline deterioration is also a key factor and weighed depending on the significance of the deterioration. Pipe material and age are also key considerations, with the oldest tar-wrapped steel pipelines having the highest priority. These pipelines merit the highest ranking because they have historically presented the most significant failure issues to the District.

Project Description

Table P-1 presents the proposed pipeline projects for the next 20 years. The first 5 columns represent the costs for projects over the next 5 years, with the following two columns presenting costs for 6 to 10 years and 11 to 20 years, respectively. Project identifiers (e.g. WS015) are tied to the pipeline map presented in Appendix A. The pipe sections on this map are colored to represent the timeframe in which their construction will occur: “red”- the first 5 years, “green”- 6 to 10 years, and “gold” – 11 to 20 years. Further details, including descriptions and figures of the 0 to 5 year pipeline projects, are presented below. The projects currently listed in the 0 to 5 year section have been specifically targeted because of an urgency tied to their pipe break history, field observed poor condition, and/or pipe age and material.

Near Term (0 to 5 year) Projects

This section will describe in more detail the projects planned in the near term. A description accompanied by a schematic of the project will be presented, along with a breakdown of budget level project costs.

WS015a and WS015b – Old Castle Road Pipeline Replacement - Figures 2 and 3

Description (WS015a) – Replace 1,900 LF of 12” pipeline from Old Castle Pump Station to Pamoosa Lane, plus an additional section at the Old Castle/Moosa Creek bridge that is located on the side of the bridge. Due to high pressures in the area, Ductile Iron is the pipe material of choice. Approximate cost - $700,000

Description (WS015b) – Replace of approximately 10,800 LF of 12” pipe between Leisure Lane and the District’s Old Castle PRV. Due to high pressures in the area, Ductile Iron is the pipe material of choice. Approximate cost - $3,240,000.

The pipeline has experienced several major line breaks within the last several years and the pipe is approaching the end of its useful life.

MW015a – Oat Hill Pump Station Discharge Pipeline North - Figure 4

Description – Replace approximately 2,100 LF of 12-inch pipe within unimproved grove road north of the pump station to Faircrest Way including connecting to existing 8-inch and 18-inch pipelines on south and 12-inch connection at Faircrest. One of two sources for the 1793/Meadows Service Zone. Due to high pressures in the area, Ductile Iron is the pipe material of choice. Approximate cost - $575,000.

This relatively short portion of pipeline has a history of leaking issues, having had at least 5 leaks in the past 8 years causing damage to unimproved roadway.

DW001a and DW001b – Gordon Hill Pipeline Replacement - Figure 5

Description (DW001a) – Phase 1 involves relocating 1,500 LF of 12-inch waterline from side lot easements and placing the pipe in improved roadway. Due to high pressures in the area, Ductile Iron is the pipe material of choice. Approximate cost - $500,000.

This is a high-pressure pipeline located within private property. Pipe failure will likely result in significant damage to private assets. Steep terrain and private improvements make it difficult to access and maintain this facility in its current location.

Description (DW001b) – Phase 2 is to remove and replace-in-place 1,200 LF 12-inch which will use PVC as the replacement material.

RC010a –Reidy Canyon Reservoir Outlet Pipelines - Figure 6

Description – Provide a new interior liner or replace pipelines with PVC for two of the 3 outlet pipelines serving the 1094/Reidy Canyon Service Zone, approximately 1,400 LF of 12” pipe. Approximate cost - $300,000.

This pipeline has experienced numerous leaks at the pipe joints within the past several years and is located in steep terrain.

CV018a - Alps Way Culvert Crossing Pipeline Replacement - Figure 7

Description – Replace approximately 330 linear feet (LF) of existing 16-inch diameter waterline below two storm drain culverts within Alps Way west of Cougar Pass Road and realign approximately 100 LF of existing 8-inch waterline within Cougar Pass Road at Alps Way. Due to ease of installation, PVC is the preferred material for this project. Approximate Cost - $225,000.

These modifications will allow the District to fully use the capacity of this pipeline. Operations has been limiting the flow rate through this pipe to avoid another blowout like the one that caused major property damage previously.

SG022 – Lilac Pala Pump Station Discharge Pipeline - Figure 8

Description – Replace approximately 6,500 LF of 12” pipe within unimproved roadways between the Lilac Pala Pump Station and McNally Road. Approximate cost - $1,850,000.

This pipeline has experienced deterioration at the pipe joints resulting in several leaks within the past several years. Due to high pressures in the area, Ductile Iron is the pipe material of choice.

CV011 – Cole Grade Road Pipeline Replacement - Figure 9

Description – Replace approximately 6,600 LF of existing 14-inch pipe within Cole Grade Road between Horse Creek Trail and Pauma Heights Road. The project will be constructed prior to the County's Cole Grade Road widening project. (Approximate Cost - $4,300,000.)

The pipeline has experienced several major leaks in the past several years and is approaching the end of its useful life. Due to high pressures in the area, Ductile Iron is the pipe material of choice.

CV017a – Rock Hill Ranch Road Intertie - Figure 10

Description – Within Roundtree Lane west of Queensbridge, connect the existing 8" steel pipeline to the existing 6" steel pipeline including 50 LF of 8" PVC, valves and appurtenances to connect Rock Hill Ranch to Queensbridge. Due to ease of installation PVC is the preferred pipe material. (Approximate Cost - $125,000.)

This will improve operational redundancy in an area of very old (1958) pipelines. This is connection eliminates a dead end line.

CV012a – Fruitvale Road Valves - Figure 11

Description – Within Fruitvale between Cole Grade Road and Sunset, install 9 - 8" valves and appurtenances at various locations to improve operational redundancy and to minimize customer service interruptions during shutdowns. (Approximate Cost - $100,000.)

This will improve operational redundancy in an area of very old (1958) pipelines.

PD016 – Hell Hole Creek Pipe Joint Repair - Figure 12

Description – Within Hell Creek Road from Santee to terminus, provide a liner for the pipe interior or install steel wrapper plates on all joints in the 5,300 LF of 8" steel line serving north portion of 2333/Paradise Service Zone. (Approximate Cost - $775,000.)

There is no mortar coating remaining on joints leading to joint failure and causing major damage to private roadway.

CV050 – Lilac Road Pipeline Upsize - Figures 13 and 14

Description (CV050a) – Phase 1 is within Lilac Road from Betsworth Rd to 30" connection. Abandon approximately 2,000 LF of 6"AC pipeline and replace with 8" PVC. Install new valves, meters and appurtenances where necessary. (Approximate Cost - $600,000.)

System is experiencing low flow in general when using Valley Center Pump Station.

Description (CV050b) – Phase 2 is within Lilac Road from 30" connection to Hideaway Lake Rd. Abandon approximately 4,200 LF of 6"AC pipeline and replace with 8" PVC. Install new valves, meters and appurtenances where necessary. (Approximate Cost - $1,525,000.)

SG016a – Lilac/McNally Intersection Pipeline Replacement - Figure 15

Description – Replace approximately 80 LF of 12-inch pipe (east/west) and 40 LF of 8-inch and 40 LF of 12-inch pipe (north/south) within the intersection of Lilac and McNally Roads, including removal of abandoned PRV and crossing one culvert within Lilac Road. Approximate cost - $210,000.

This work will finish addressing leakage issues that were occurring in this area approximately 1 year ago.

SG028 – McNally Crossing Pipeline Replacement - Figure 16

Description – relocate approximately 500 LF of 14" pipe from within grove roads west of Lilac Road to within an existing improved roadway and tie into Lilac Road. (Approximate Cost - $110,000.)

This pipe is located within a low-lying area which has led to accelerated corrosion. Relocation will improve access and minimize future corrosion. This project could be constructed as part of SG016a because the pipelines are connected at McNally Road.

Pipeline Projects Beyond the Near-Term

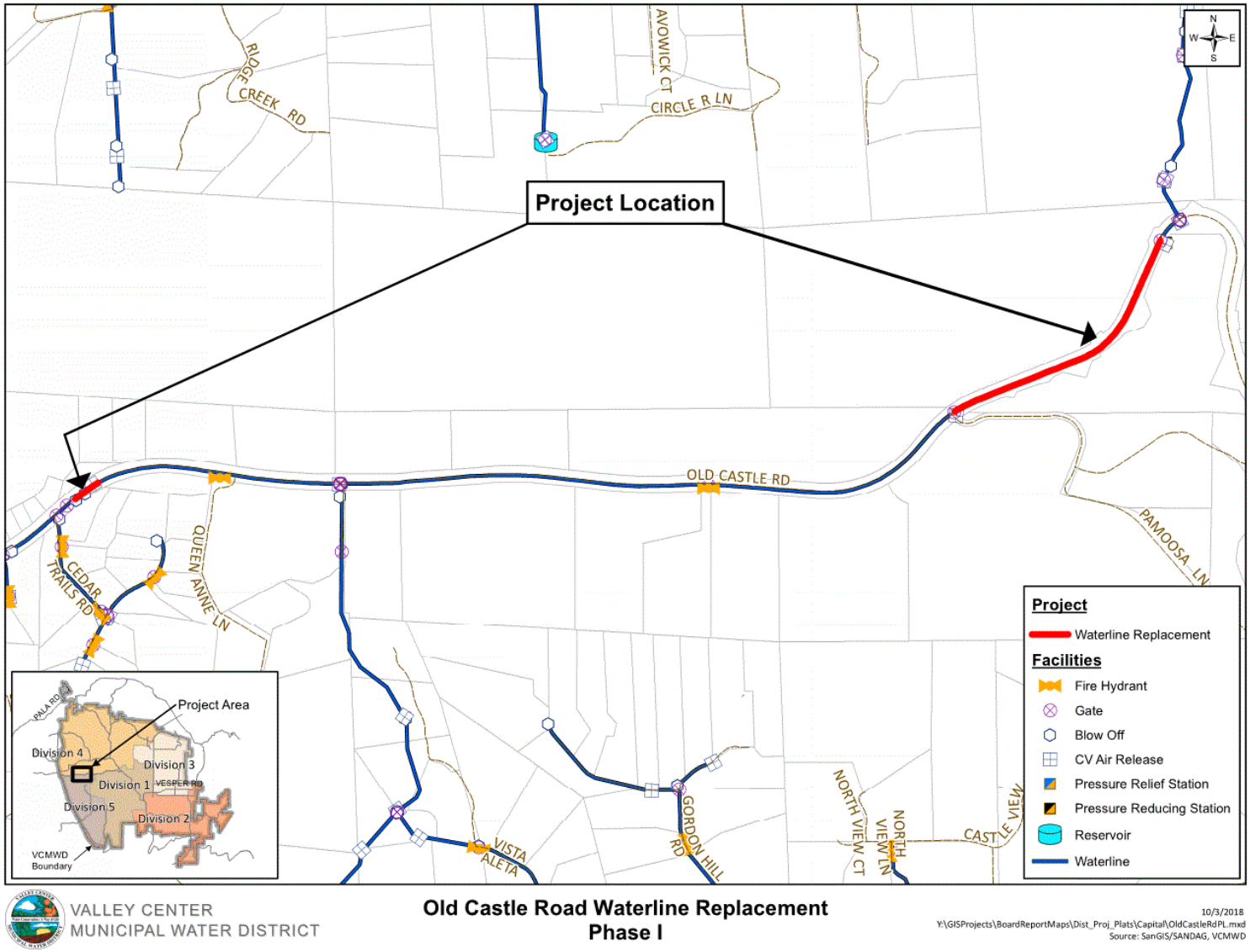
The present schedule of pipelines projects that will be constructed in the timeframes of 6 to 10 years, and 11-20 years from now are presented in the last two columns of Table P-1. The locations of these projects are reflected on the map in Appendix A. Due to the multitude of factors affecting project priority, the order in which these projects are performed is uncertain at this time. It is, in fact, possible that some of these projects may be moved to the near term over the course of the next five years.

These pipelines have been identified as assets requiring replacement due to their potential for failure. Most of the pipelines were constructed of tar-wrapped steel which has posed reliability problems in the past. However, it is entirely possible that a pipeline made of other materials may begin to experience excessive leakage (breakage) or show significant deterioration upon inspection. When this occurs, the extent of breakage or deterioration would be assessed by District Engineering and Operations staff, the criticality of the pipeline to District operations would be weighed and the pipeline would be reprioritized in the pipeline replacement schedule, as appropriate.

The schedule for pipeline replacement can also be impacted by the actions of other agencies. An example of this is County of San Diego road paving projects. When the county decides to repave or re-align a road in our area, there is likely a water pipeline located in that road right-of-way that may need to be relocated or re-constructed in some fashion. When this occurs, the District must respond by either: 1) designing the required pipeline changes, then constructing before or in conjunction with the County, or 2) waiting 3 years after county construction is complete to take any action on the pipeline due to the County's "no cut" policy 3 years after road completion. Either of these scenarios could impact the original timing of the pipeline project as shown on our schedule.

Thus, as discussed above, a pipeline project identified beyond the 5-year timeframe generally represents a work effort that is on the horizon, but the specifics of that work will be become clearer and more defined as that timeframe draws near. The magnitude of replacements annually required are generally determined using industry standards tempered by local knowledge of the District. Over time, as breakage rate history and deterioration monitoring become more refined, improvement in predicting required pipeline replacements are anticipated.

Figure 2 Old Castle Rd Phase 1



VALLEY CENTER MUNICIPAL WATER DISTRICT

Old Castle Road Waterline Replacement Phase I

10/3/2018
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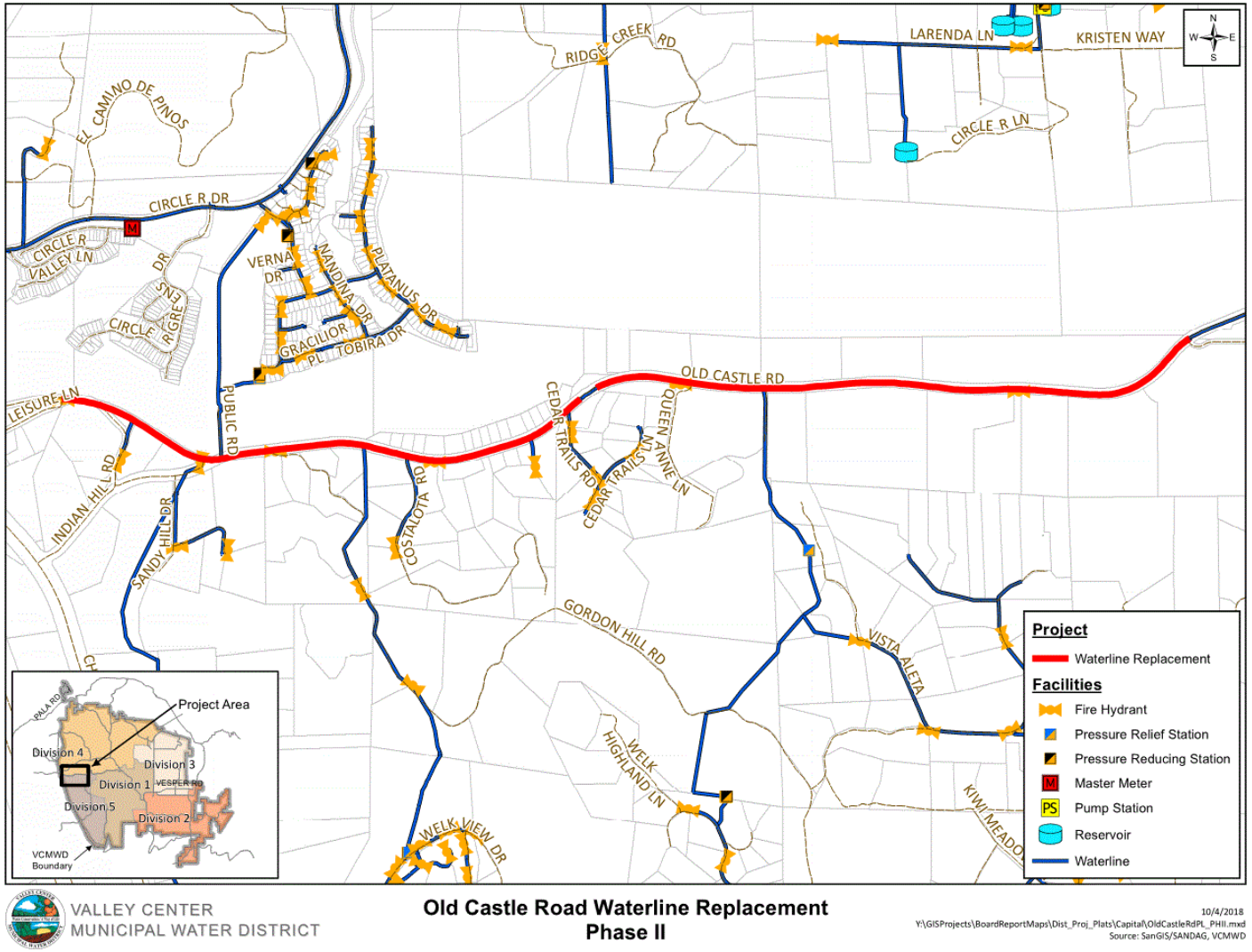
Source: SanGIS/SANDAG, VCMWD

Figure 3 Old Castle Rd Phase 2



VALLEY CENTER MUNICIPAL WATER DISTRICT

Old Castle Road Waterline Replacement Phase II

10/4/2018
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Source: SanGIS/SANDAG, VCMWD

Figure 4 Oat Hill PS Discharge North

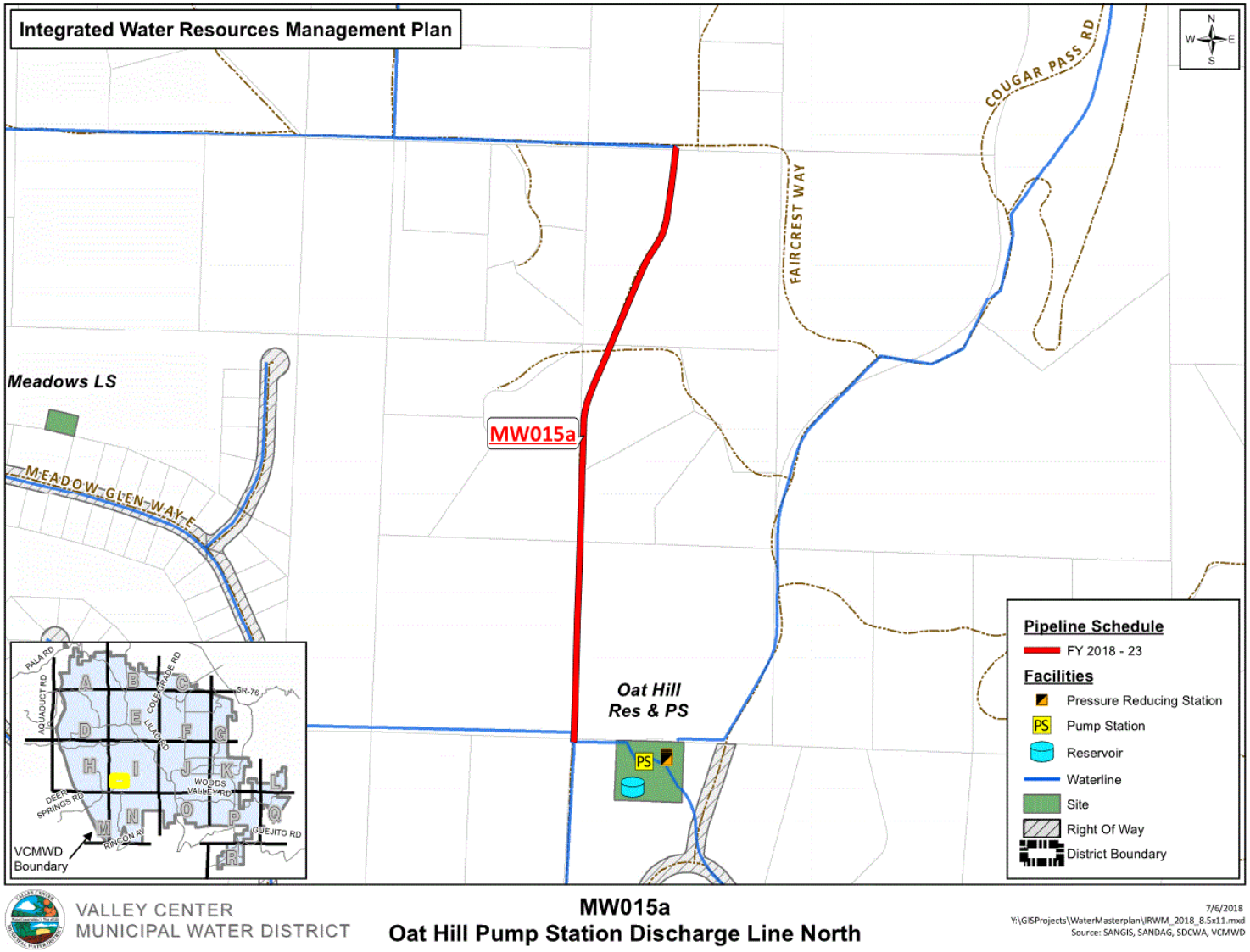


Figure 5 Gordon Hill Phases 1 and 2

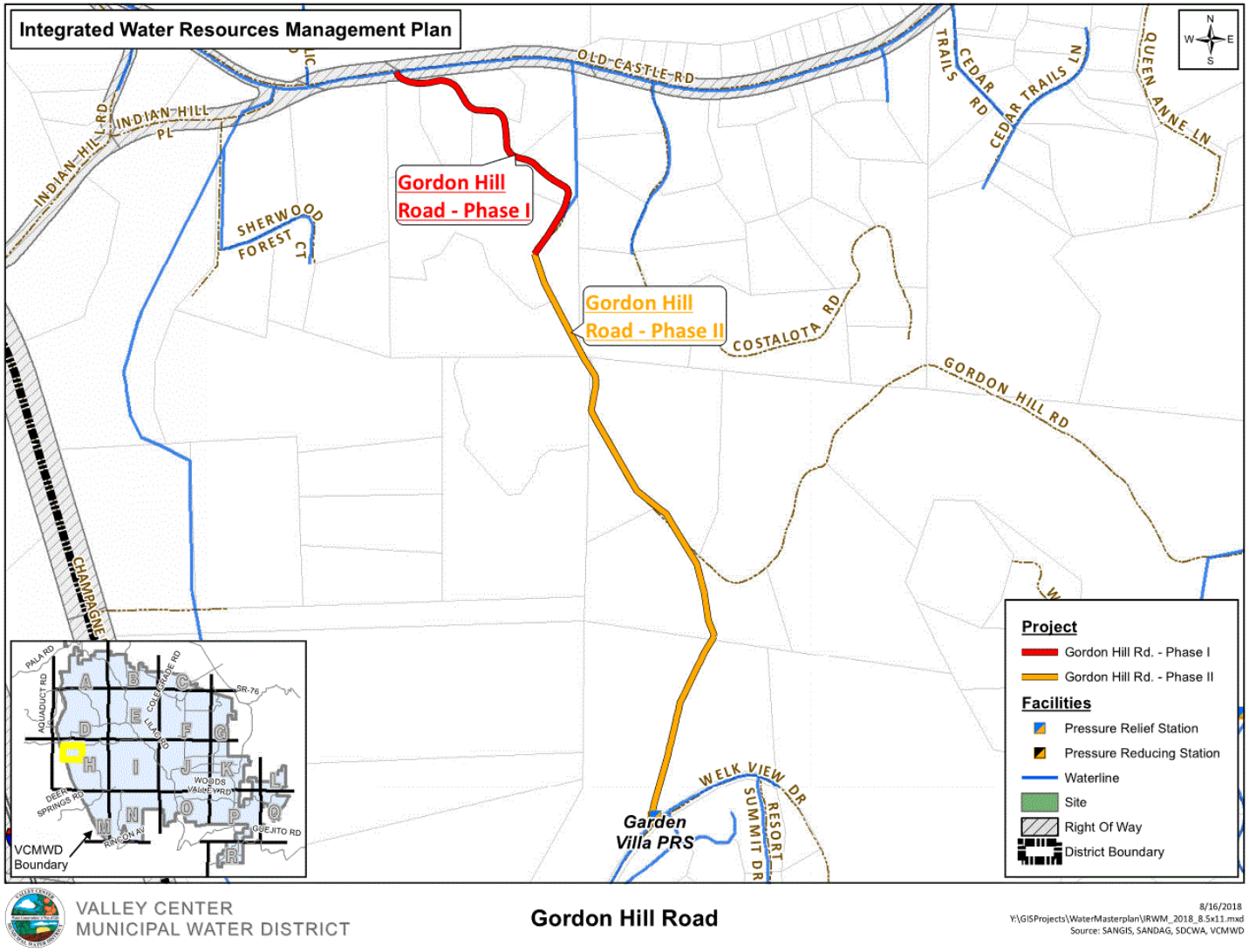


Figure 6 Reidy Canyon Reservoir Outlet Pipes

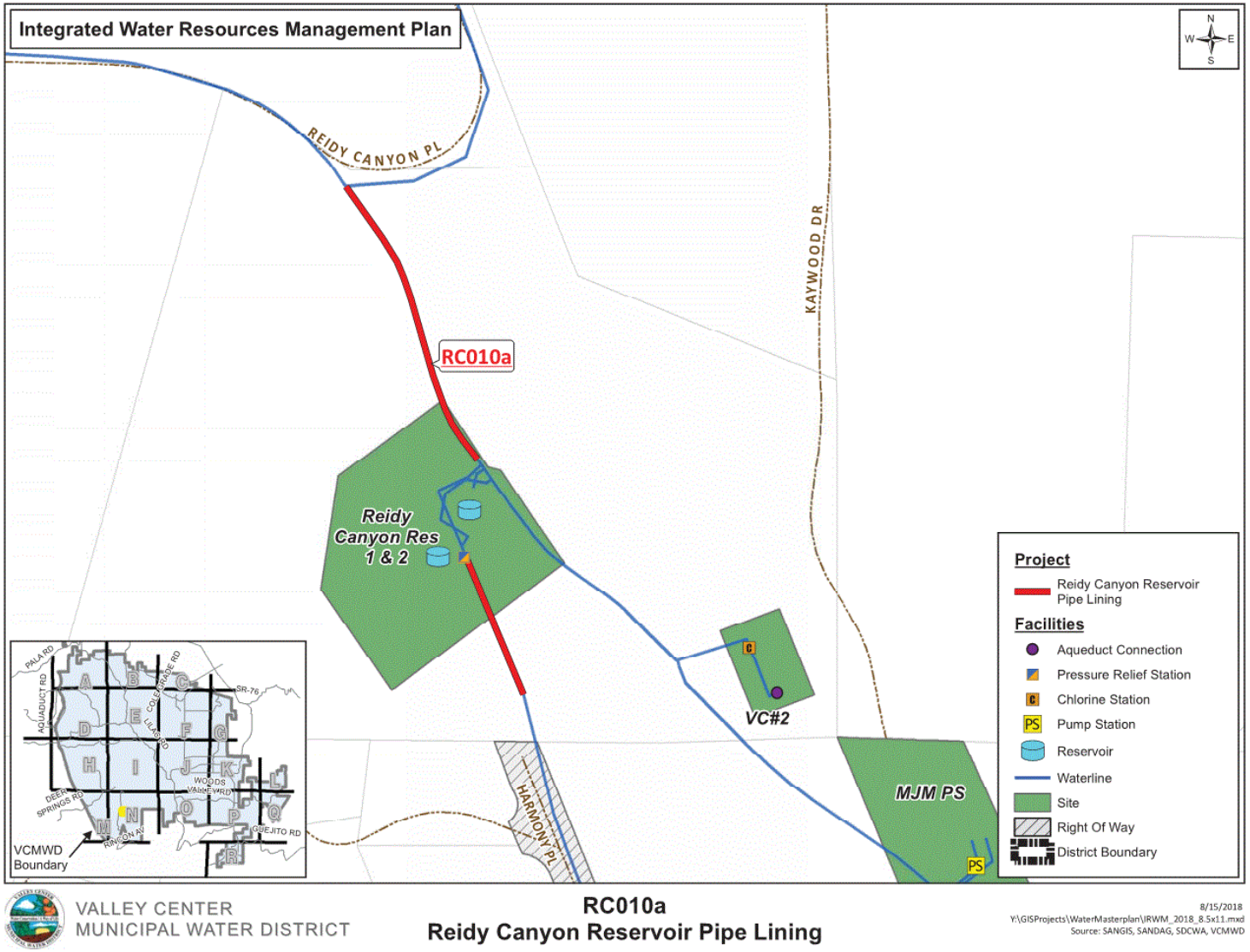


Figure 7 Alps Way Culvert Crossing Pipeline Replacement

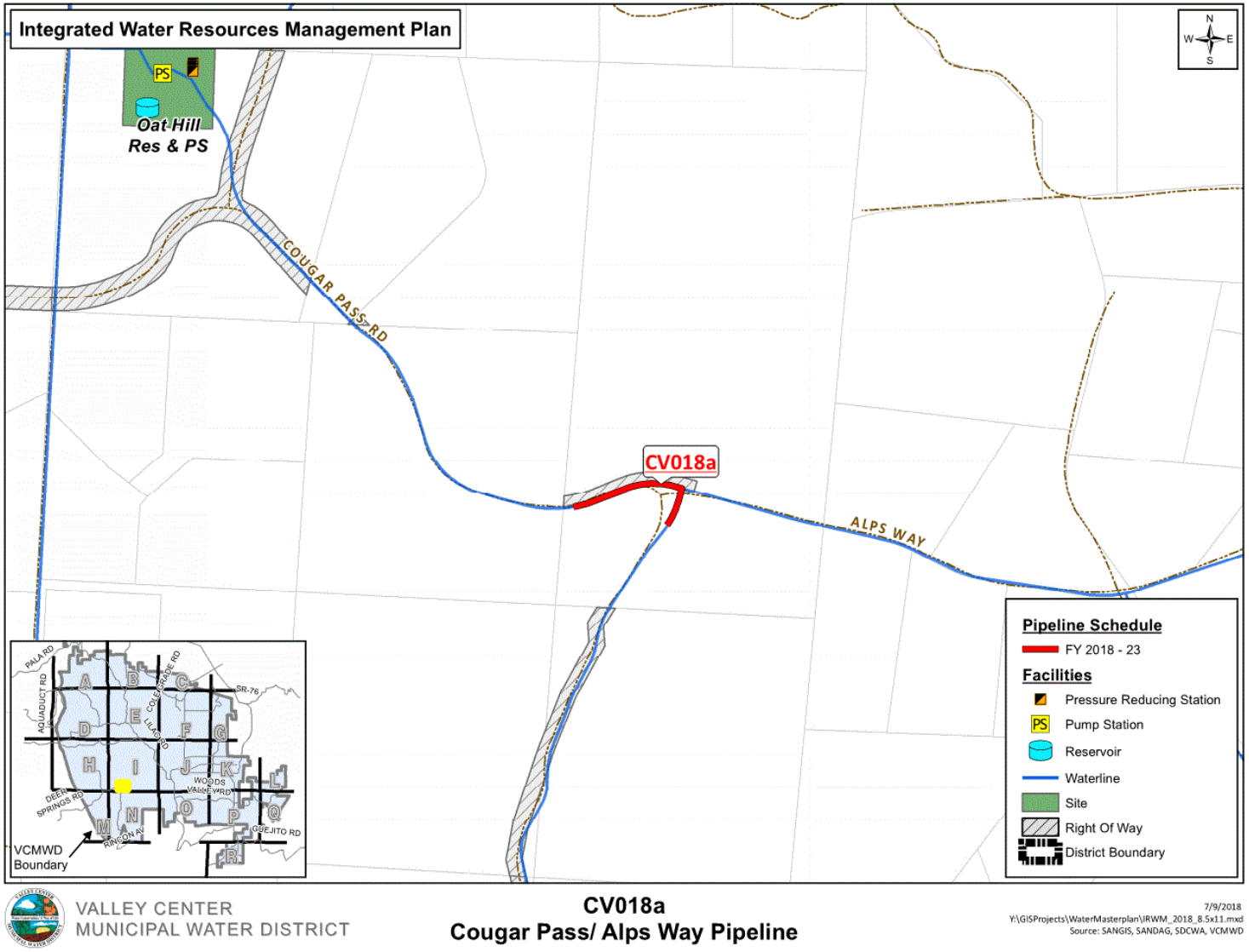


Figure 8 Lilac Pala PS Discharge Pipeline

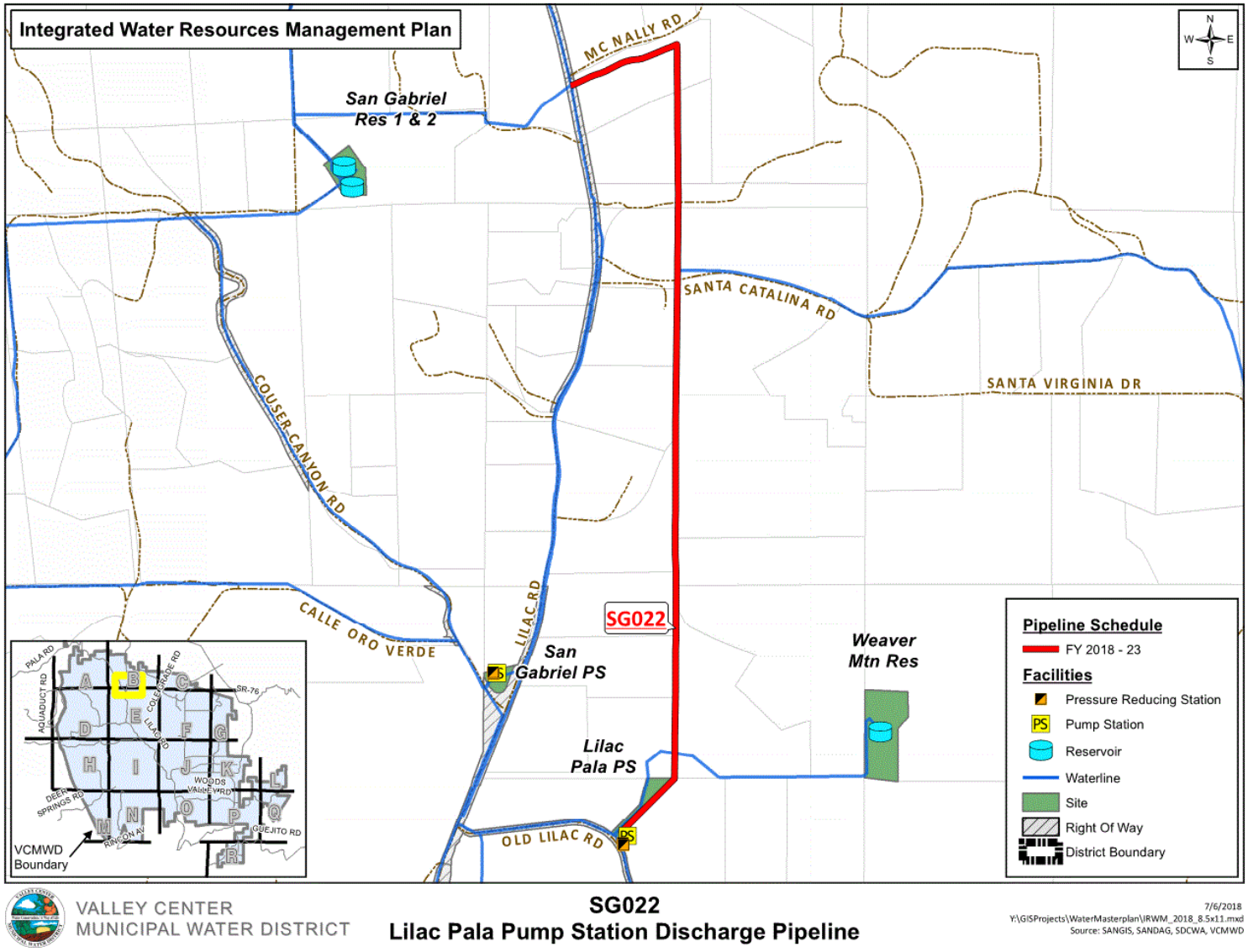


Figure 9 Cole Grade Rd Pipeline Replacement

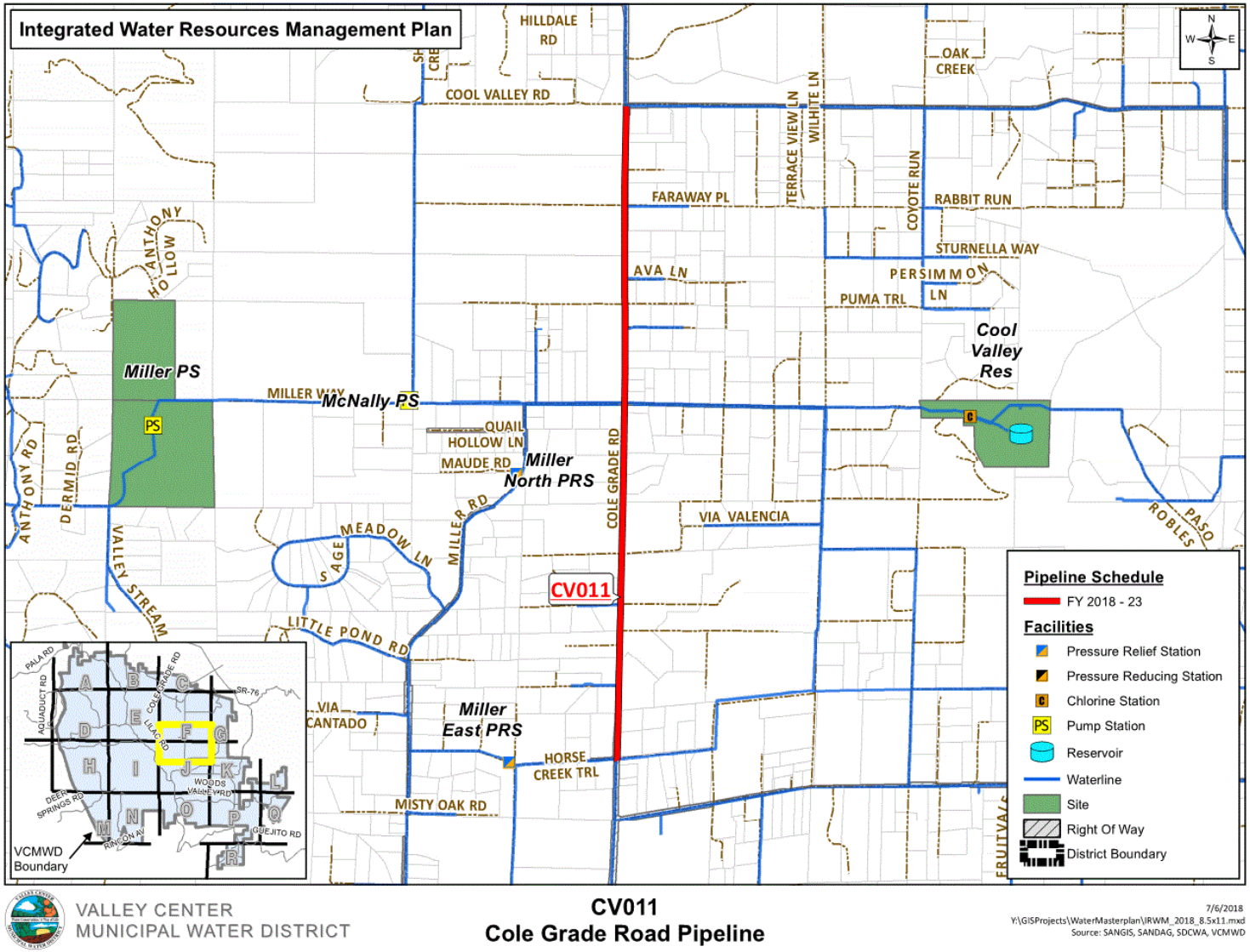


Figure 10 Rock Hill Ranch Rd Intertie

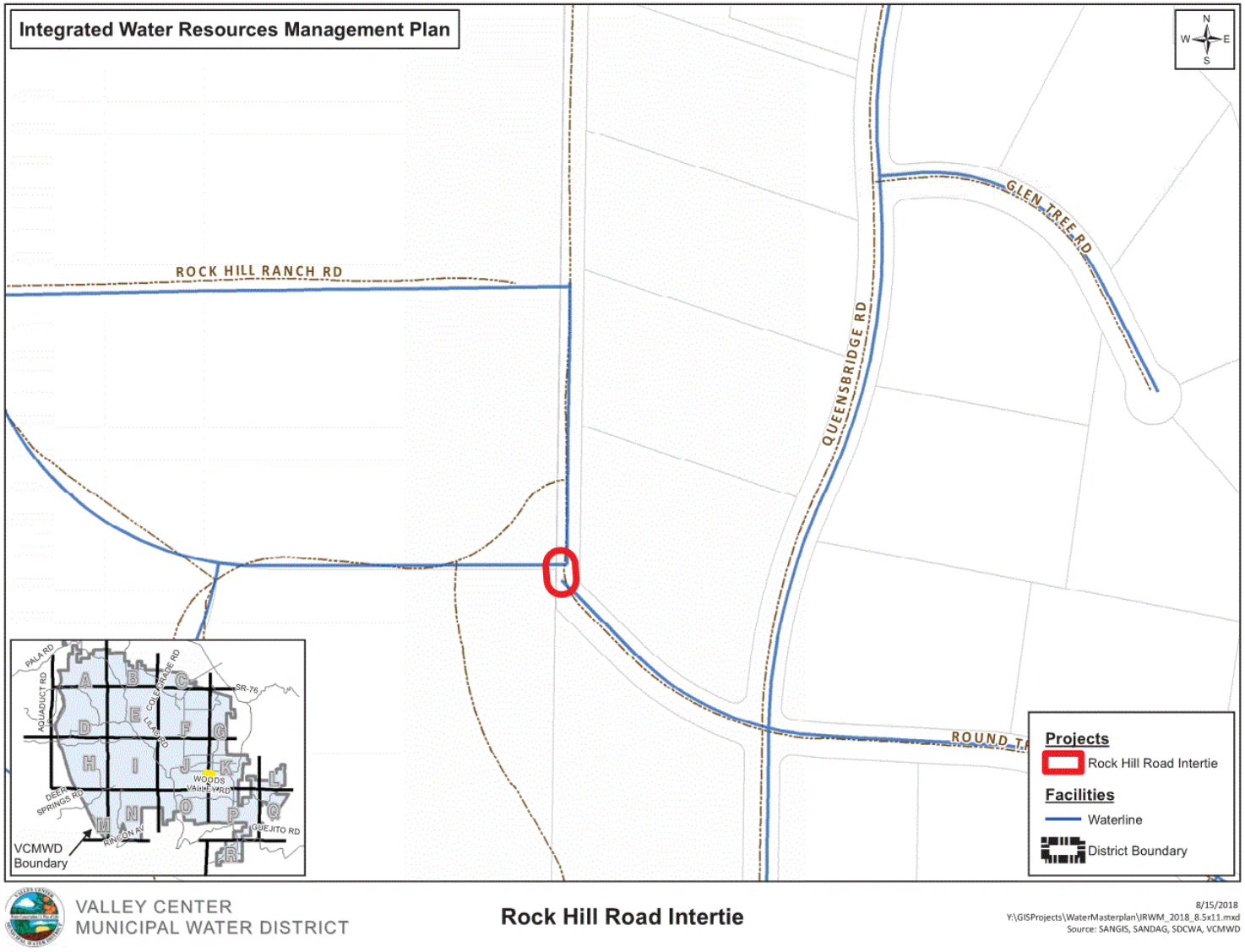


Figure 11 Fruitvale Rd Valves

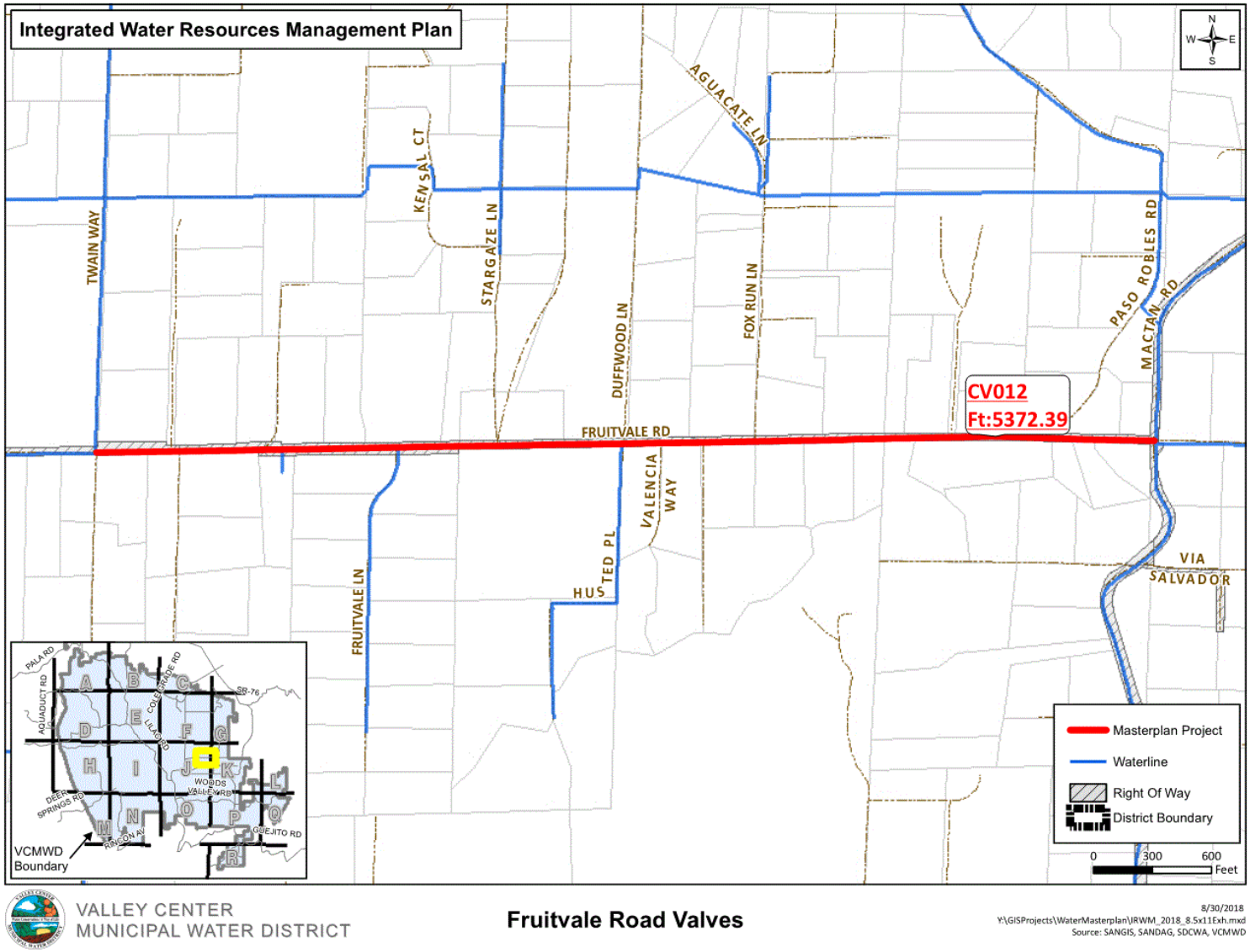


Figure 12 Hell Hole Creek Joint Repair

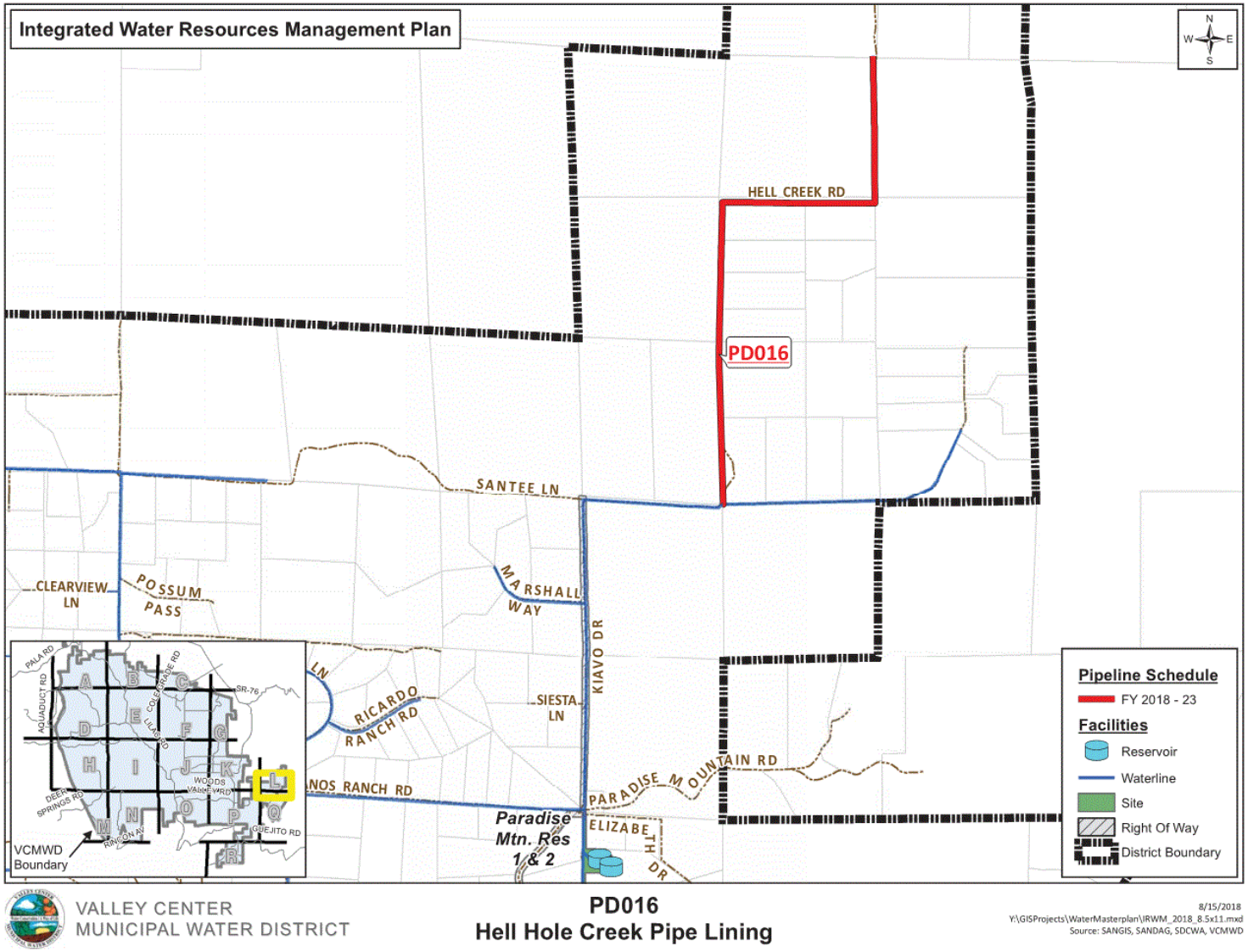
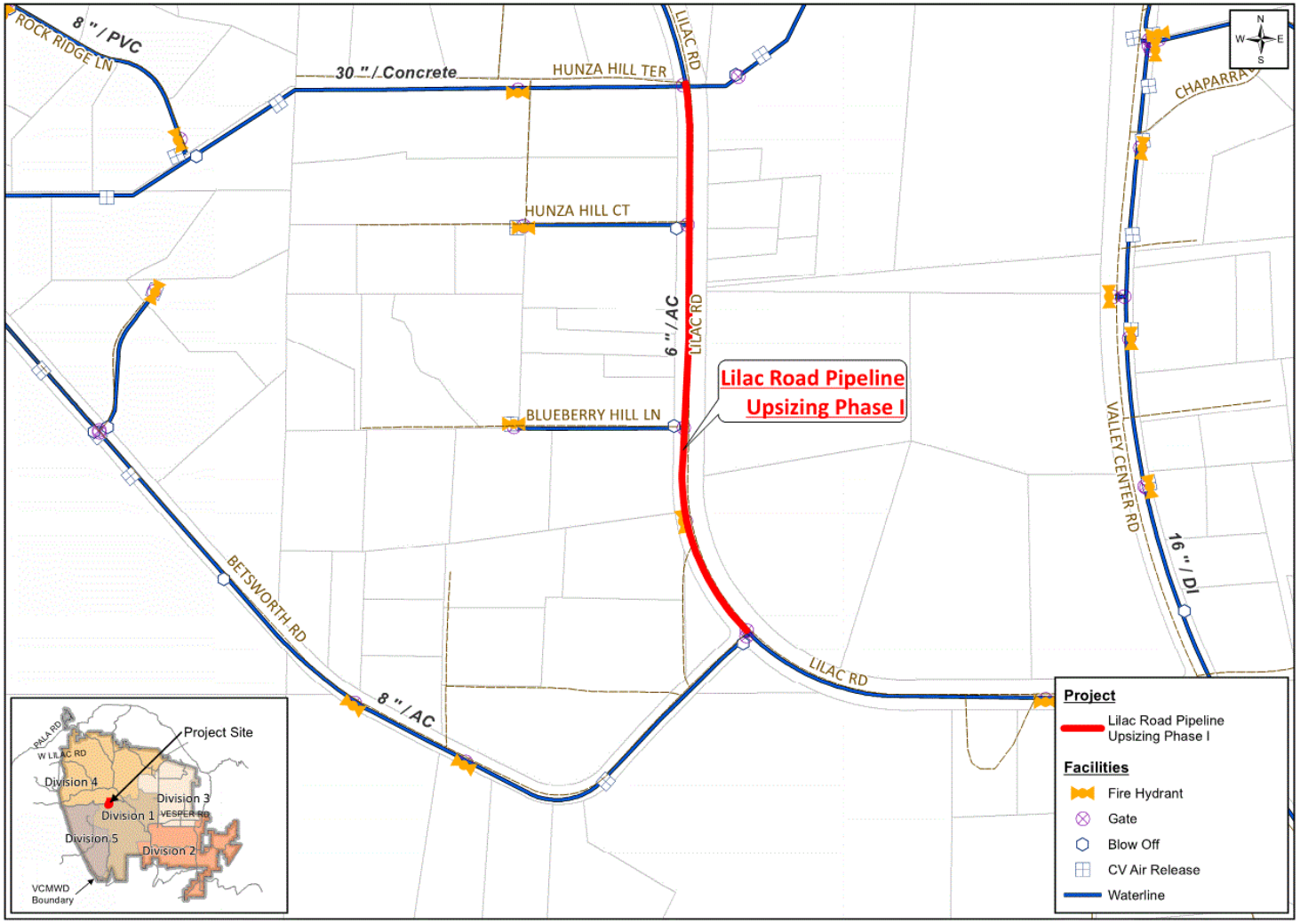


Figure 13 Lilac Rd Pipeline Upsize Phase 1



VALLEY CENTER
MUNICIPAL WATER DISTRICT

Lilac Road Pipe Upsizing Phase I

9/14/2018
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Source: SanGIS/SANDAG, VCMWD

Figure 14 Lilac Rd Pipeline Upsize Phase 2

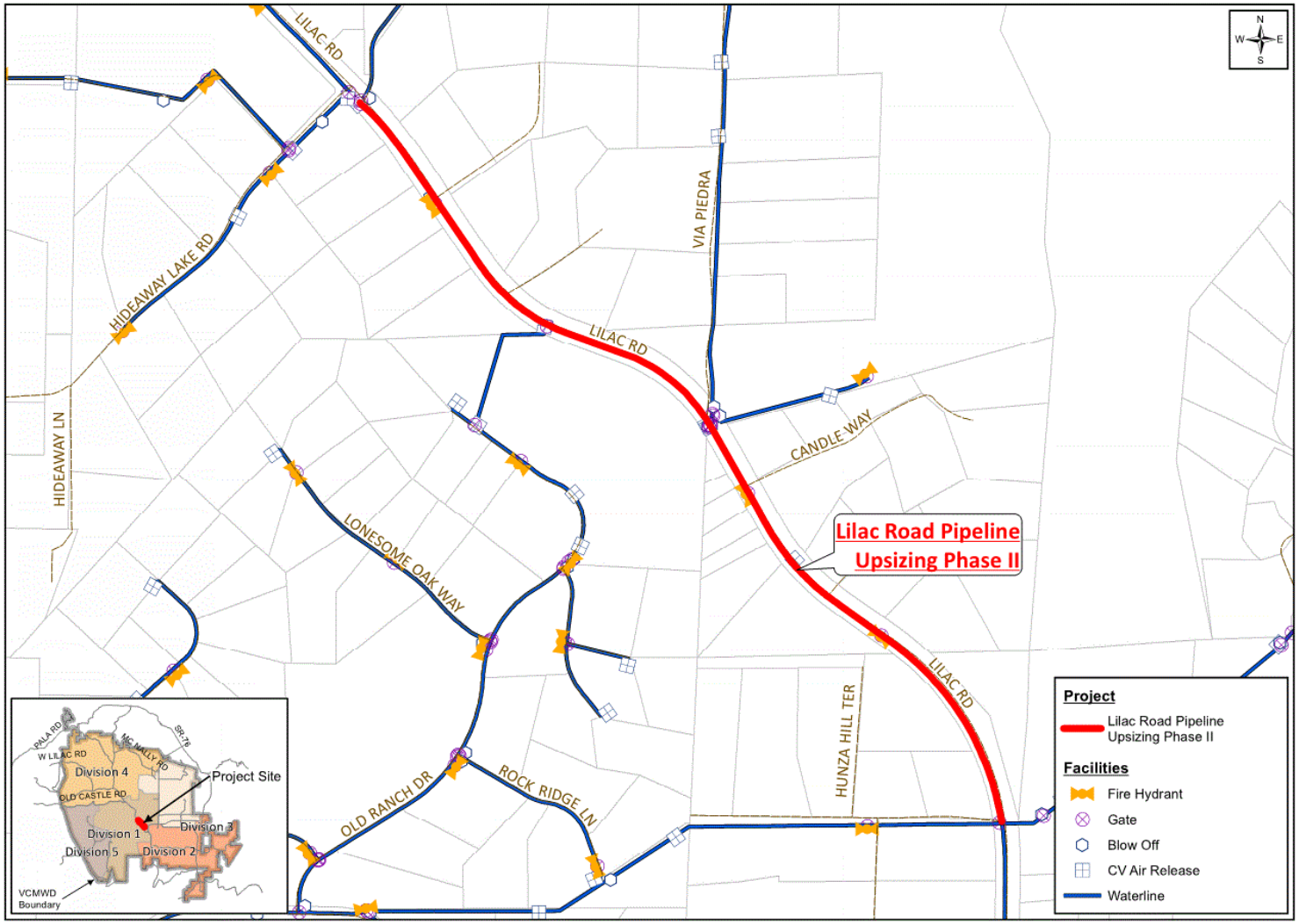


Figure 15 Lilac McNally Intersection Replacement

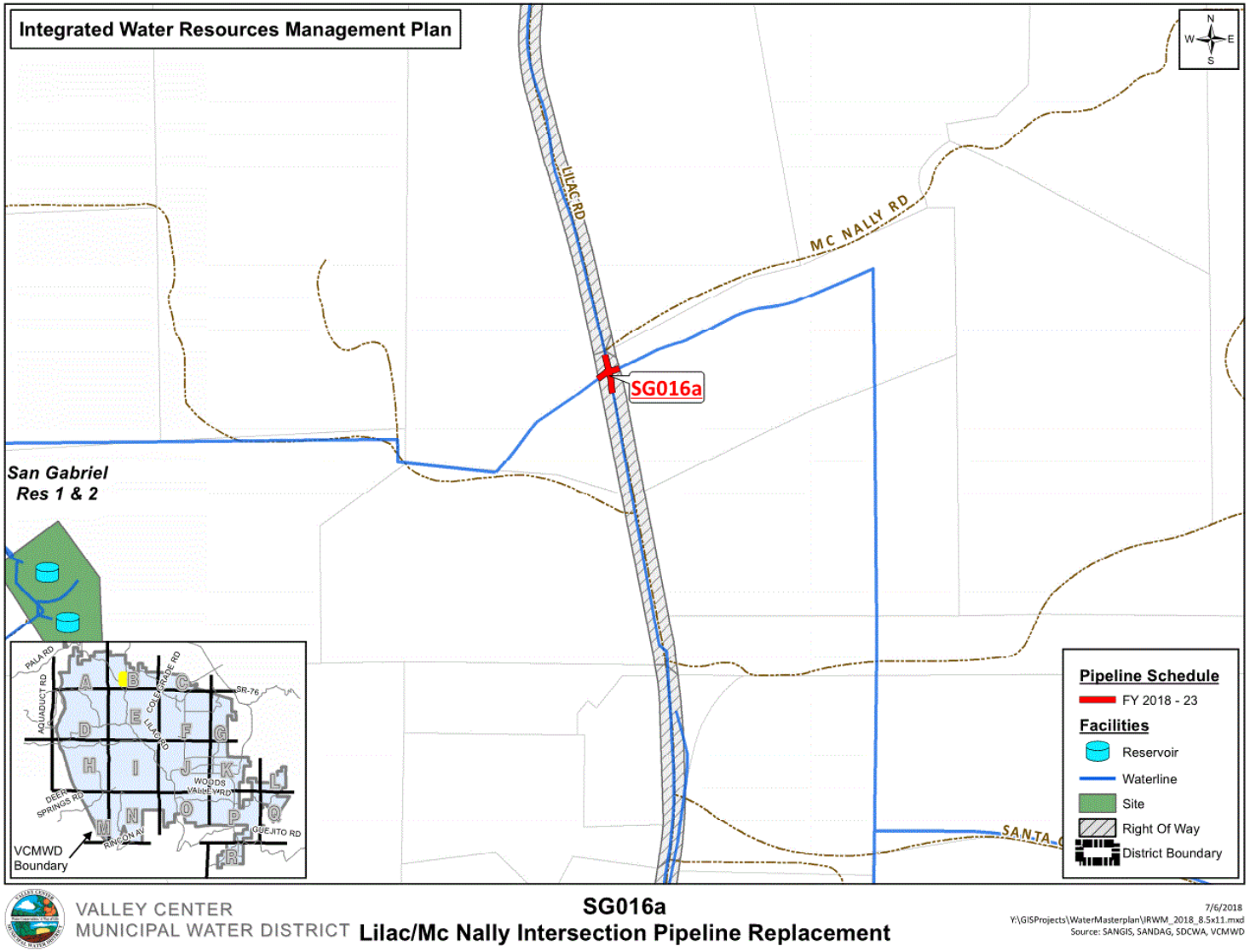
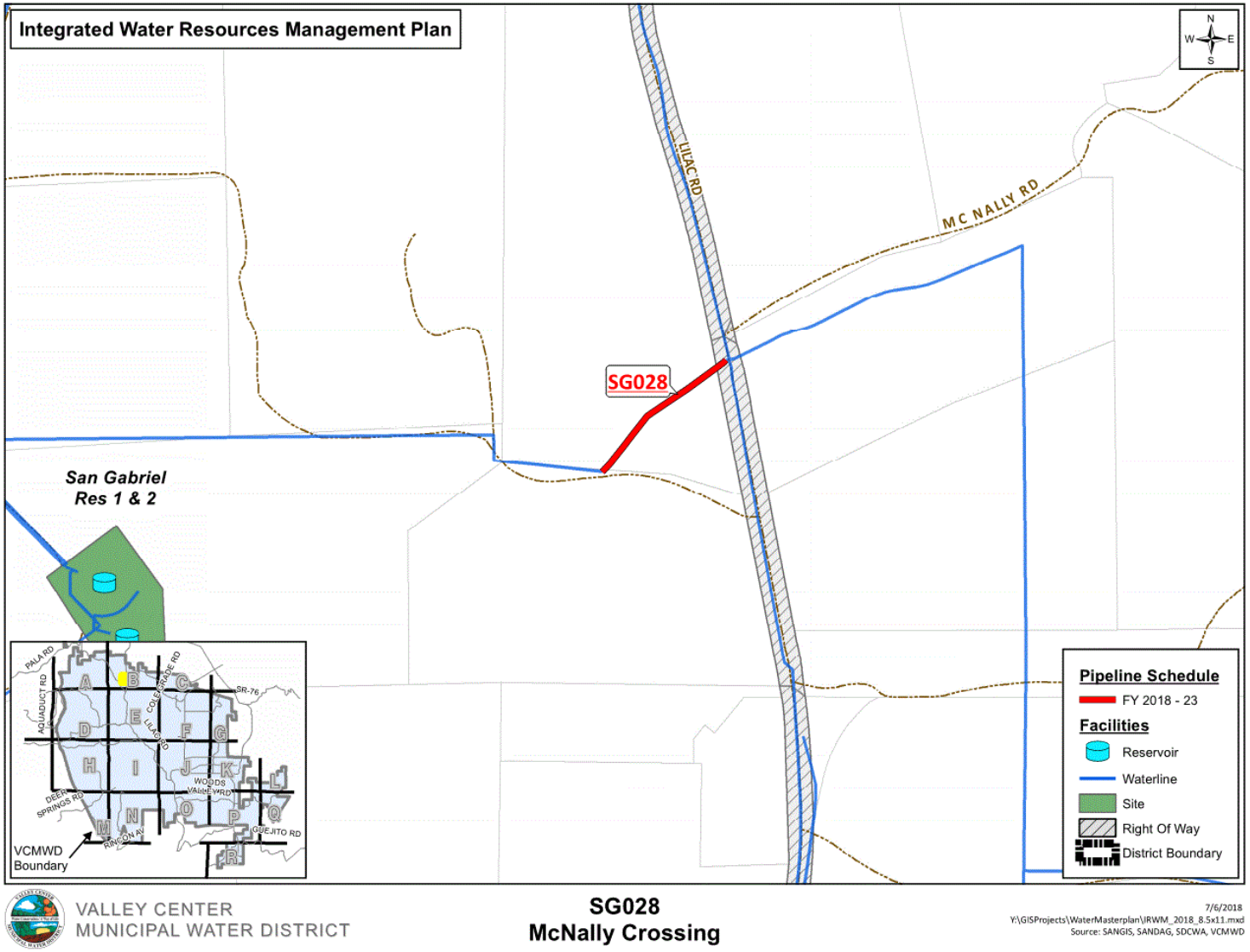


Figure 16 McNally Crossing Replacement



SUMMARY OF PIPELINE PROJECTS								
ID #	NAME	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	**FY 2023-28**	**FY 2028-38**
WS015a	Old Castle Road Pipeline - Pamoosa Lane and	$ 700,000	$ -	$ -	$ -	$ -	$ -	$ -
WS015b	Old Castle Road Pipeline - Leisure Lane	$ -	$ -	$ -	$ -	$ 3,240,000	$ -	$ -
MW015a	Oat Hill Discharge Pipeline North	$ 575,000	$ -	$ -	$ -	$ -	$ -	$ -
SG016a	Lilac/McNally Intersection Pipe Replacement	$ -	$ 210,000	$ -	$ -	$ -	$ -	$ -
SG022	Lilac Pala PS Discharge Pipeline	$ -	$ -	$ 1,000,000	$ 850,000	$ -	$ -	$ -
SG028	McNally Crossing	$ -	$ 110,000	$ -	$ -	$ -	$ -	$ -
CV011	Cole Grade Road Pipeline	$ 750,000	$ 2,800,000	$ 750,000	$ -	$ -	$ -	$ -
CV018a	Alps Way Culvert Crossing Pipe Replacement	$ 225,000	$ -	$ -	$ -	$ -	$ -	$ -
CV017a	Rock Hill Ranch Road Intertie	$ 125,000	$ -	$ -	$ -	$ -	$ -	$ -
CV012a	Fruitvale Road Valves	$ -	$ -	$ 100,000	$ -	$ -	$ -	$ -
PD016	HellHole Creek Joint Repair	$ -	$ 375,000	$ 400,000	$ -	$ -	$ -	$ -
CV050a	Lilac Rd Upsize - Phase 1	$ -	$ -	$ -	$ -	$ -	$ 600,000	$ -
CV050b	Lilac Rd Upsize - Phase 2	$ -	$ -	$ -	$ -	$ -	$ 1,525,000	$ -
DW003	Cool Valley Rd Upsize	$ -	$ -	$ -	$ -	$ -	$ 2,200,000	$ -
CH002	Rodriguez Road Pipeline	$ -	$ -	$ -	$ -	$ -	$ 2,730,000	$ -
DW001a	Gordon Hill Rd	$ 100,000	$ 400,000	$ -	$ -	$ -	$ -	$ -
DW001b	Gordon Hill Rd?	$ -	$ -	$ -	$ 1,930,000	$ -	$ -	$ -
WS010	Nelson Way Pipeline	$ -	$ -	$ -	$ -	$ -	$ 623,000	$ -
RC016	Reidy Canyon Creek Crossing	$ -	$ -	$ -	$ -	$ -	$ 81,000	$ -
RC010a	Reidy Canyon Reservoir Outlet Pipelines	$ 300,000	$ -	$ -	$ -	$ -	$ -	$ -
RC011	Broadway/Ryan Pipeline	$ -	$ -	$ -	$ -	$ -	$ 248,000	$ -
RC013	Laurashawn Area Piping	$ -	$ -	$ -	$ -	$ -	$ 2,768,000	$ -
CV025	Cobb Discharge Pipeline	$ -	$ -	$ -	$ -	$ -	$ 3,922,000	$ -
JD010	Protea Gardens North Pipeline	$ -	$ -	$ -	$ -	$ -	$ -	$ 317,000
JD011	Jesmond Dene North Pipeline	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,990,000
LL010	Lilac PS Feeder	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,576,000
CV012b	Fruitvale Road Pipeline	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,230,000
CV013	Banbury Area Pipelines	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,115,000
CV014	Banbury/VC Road Pipeline	$ -	$ -	$ -	$ -	$ -	$ -	$ 548,000
CV015	Valley Center Road Pipeline	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,912,000
CV016	Sunset Road Pipeline	$ -	$ -	$ -	$ -	$ -	$ -	$ 952,000
CV017b	Rock Hill Ranch Road Area Pipelines	$ -	$ -	$ -	$ -	$ -	$ -	$ 923,000
CV019	Mirar de Valle Pipeline - West	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,845,000
TOTALS		$ 2,775,000	$ 3,895,000	$ 2,250,000	$ 2,780,000	$ 3,240,000	$ 14,697,000	$ 25,408,000
Annual Average Expenditure		$ 2,988,000	$ 2,988,000	$ 2,988,000	$ 2,988,000	$ 2,988,000	$ 2,939,400	$ 2,540,800

Table P-1; Summary of Pipeline Projects[5]

[5] "PIPELINE CRITICAL – RED LINE WRAP STL – FOR 0 TO 10 YEARS 072018_jc deleting rows"; 'PIPELINES' tab

Depreciation

Depreciation represents a theoretical estimate of an asset's rate of deterioration and is calculated using an assumed useful life. Because of a myriad of factors, the actual useful life can significantly vary from location to location, even within the same pipeline alignment! Thus, useful life, and its implied rate of deterioration and depreciation is an imperfect estimate based on experience and judgement.

Understanding the limitations of useful life estimates, one still acknowledges the fact that assets deteriorate and will eventually require replacement. With that in mind, it is prudent for an agency to actively set aside funds representing some percentage of asset depreciation to be used either to pay directly for asset replacement projects or to serve as a reserve fund that enables the District to obtain lower bond rates when choosing to finance projects. If the District chooses to set aside funds for this purpose, the determination of this percentage lies in the hands of the Board of Directors. Additionally, the District can choose to invest in maintenance activities that will prolong an assets useful life, which would serve to decrease the estimated rate of asset depreciation.

Based on current information, which is still being refined, the total replacement cost new for all pipelines is estimated at $235 M. It is also estimated that District pipeline assets have expended over 60% of their useful lives. Given current reserve funds for the entire water fund at approximately $6.5 M. there is currently approximately 4.6% of pipeline depreciation in these reserve funds.

Depreciation on pipeline assets over the last 3 years has varied between $5.1 M to $7.8 M. The present CIP plan represents spending at an annual rate of approximately $3.0 M. which represents approximately 40% to 60% of depreciation depending on the year. Note that at this rate of spending, it will take approximately 80 years to replace all the pipelines in the District[6].

[6] "DEPRECIATION SUMMARY SPREADSHEET"; 'depreciation data' tab

Reservoirs

Overview

Valley Center MWD has 42 covered reservoirs, and one open reservoir, Turner Dam. Thirty-seven of these reservoirs are steel and 5 of them are floating cover with geotextile liners. Please refer to map in Appendix A which presents the location of these reservoirs. District experience has been that coatings begin to fail in the 12 to 14 year range. When coatings deteriorate, the steel underneath can be affected, and corrosion can set in accompanied by loss of steel rafter/wall/roof thickness. This loss of steel can result in the reservoir eventually losing its structural integrity which leads to the need to replace the roof, or even the entire reservoir. Maintaining the coating is an excellent method of protecting the asset value of reservoirs and extending their useful lives. The maximum useful life of a reservoir has been tied to the type and frequency of tank maintenance. Given the proper maintenance, expected useful life of steel tank reservoirs could extend beyond 100 years.

Steel reservoirs require recoating approximately every 15 years in order to maintain their viability. Considering information currently available, it appears that an annual investment of approximately $1.5 million is required simply to maintain reservoir coating condition. Prior to the drought the District was maintaining such a sustainable reservoir coating cycle. However, due to financial constraints brought on by the drought, reservoir coatings were deferred in favor of more urgent projects. Because of these deferred coating projects, an annual outlay greater than $1.5 M would be required to catch up on the coatings themselves. The fact that coating projects have been deferred is likely going to result in the need to replace an unknown number of rafters and earthquake straps, which would increase the projected costs. We have included a contingency of 10% to account for these expenses, though the actual cost may vary greatly from this.

Floating cover reservoirs present a different approach to providing water storage. The covers and liners of these reservoirs have low initial costs compared to steel tanks but are also somewhat limited in their useful life expectancy. Generally, 20 to 25 years is expected for the life of a floating cover and liner, with some estimates ranging to 30 years for new materials. All of the District's floating covers have recently been replaced, and thus are beyond the 20 year window of this Master Plan. Somewhat minor maintenance is required to attain the projected useful life. No major maintenance is expected between the time one installs the cover and liner and the time that the cover and liner are replaced.

Table R-1 presents a list of reservoirs and their characteristics. The size and tank age are shown, along with a column labeled "R&R age". The latter refers to the number of years it has been since the tank received a major Rehabilitation/Repair (R&R).

TABLE R-1 RESERVOIR CHARACTERISTICS			June 12, 2018	
NAME OR DESIGNATION	TYPE/MATERIAL	CAPACITY (mg)	Facility AGE	R&R AGE
Betsworth	Steel Tank	1	52	3
Betsworth Forebay 1	Steel Tank	0.5	52	18
Betsworth Forebay 2	Steel Tank	1.97	32	18
Burnt Mt.	Steel Tank	1	51	15
Circle R	Steel Tank	0.1	52	21
Cobb	Floating Cover/Hypalon	8.8	52	5
Cool Valley	Floating Cover/Hypalon	55.9	43	1
Country Club, East	Floating Cover/Hypalon	5.1	3	3
Country Club, West	Floating Cover/Hypalon	5.1	3	3
Couser	Steel Tank	1.5	52	28
Hauck Mesa	Steel Tank	0.65	55	13
Jesmond Dene	Steel Tank	0.42	47	20
Kornblum	Steel Tank	2.4	28	28
Lilac	Floating Cover/Hypalon	4.7	62	29
Mactan	Steel Tank	1.5	52	23
McNally	Steel Tank	2	62	11
Meadows #1	Steel Tank	2	52	12
Meadows #2	Steel Tank	2	12	12
Mizpha	Steel Tank	1	51	11
MJM	Steel Tank	0.5	20	20
Montanya	Steel Tank	5	40	17
Oak Glen	Steel Tank	0.42	53	21
Oat Hills	Steel Tank	0.45	45	45
Old Castle 1	Steel Tank	0.5	52	17
Old Castle 2	Steel Tank	1.4	33	33
Old Country Club	Steel Tank	0.5	52	21
Paradise 1	Steel Tank	1	49	12
Paradise 2	Steel Tank	2.5	36	9
Pauma Heights	Steel Tank	5	30	30
Red Mt.	Steel Tank	0.3	51	32
Reid Hill	Steel Tank	1	39	11
Reidy Canyon 1	Steel Tank	0.5	62	31
Reidy Canyon 2	Steel Tank	1	51	28
Ridge Ranch Interim	Steel Tank	0.1	26	26
Rincon	Steel Tank	1	50	1
San Gabriel 1	Steel Tank	5	46	24
San Gabriel 2	Steel Tank	1.5	24	24
Turner Lake	Open Reservoir - Dam	520	46	
Tyler	Steel Tank	0.8	51	3
Via Cantamar	Steel Tank	3	18	18
Weaver	Steel Tank	5.1	36	16
West 1	Steel Tank	1	55	8
West 2	Steel Tank	2.4	34	9
West Bear Ridge	Steel Tank	4.3	33	33

Table R-1; Reservoir Characteristics[7]

[7] "WG Reservoir Maintenance Planning 032818JC", 'Reservoir Info and Cost Tables' tab

Prioritization of Projects

Due to decreased revenues during the drought, there was significant deferral of reservoir R&R projects. Because of this deferral, the method of prioritization needed to respond to current needs is not the method desired over the long term. Both approaches to prioritization will be described below.

Currently, on steel tanks coating failure is occurring which is defined as coating deterioration to the point of exposure of bare steel. Normally, the District wants to avoid this condition through proactive measures. Under present conditions, the District's order of priority is to address: 1) coating failure on the edges of the rafters; 2) coating failure on the flat surfaces of the rafters; 3) failure on the flat plates of the walls or roof. Experience has shown the rafter coatings to be the most critical to maintaining reservoir integrity.

At the point in time that the coating failure scenarios are all addressed, the District is planning to revert to a proactive R&R approach. Prioritization of projects at that time would involve the following considerations or possibly a modified version of the following, based on the institutional knowledge of reservoir rehabilitation gained over the course of time. The weighting of these criteria in making a prioritized list for any given year should be up to the judgement of staff at that time to accommodate potentially different conditions present at that time:

- Coating condition
- Age of the coating
- Criticality of reservoir to the water storage function for the District as a whole
- Criticality of reservoir to the water storage function for the zone(s) served
- Funds Available in a given year for repair/replacement activities
- Availability of District staff to execute the project

NAME OR DESIGNATION	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	**2023-2027**	**2028-2037**
Betsworth	-	-	-	-	-	-	$239,436
Betsworth Forebay 1	-	-	-	-	-	-	$221,480
Betsworth Forebay 2	-	-	-	-	$598,000	-	-
Burnt Mt.	-	-	-	$301,000	-	-	$301,000
Circle R	-	$93,000	-	-	-	-	$93,000
Cobb	-	-	-	-	-	-	-
Cool Valley	-	-	-	-	-	-	-
Country Club, East	-	-	-	-	-	-	-
Country Club, West	-	-	-	-	-	-	-
Couser	-	-	$413,000	-	-	-	$413,000
Hauck Mesa	-	-	-	-	-	-	-
Jesmond Dene	$258,000	-	-	-	-	-	$258,000
Kornblum	-	-	-	-	-	-	OFF LINE
Lilac	-	-	-	-	-	-	-
Mactan	-	-	-	$413,000	-	-	$413,000
McNally	-	-	-	-	-	$468,000	-
Meadows #1	-	-	-	$475,000	-	-	$475,000
Meadows #2	-	-	-	-	-	$475,000	-
Mizpha	-	-	-	-	-	$293,000	-
MJM	-	-	-	-	-	$204,530	-
Montanya	-	-	-	-	-	$834,000	-
Oak Glen	-	-	-	-	-	-	OFF LINE
Oat Hills	-	-	-	-	-	-	OFF LINE
Old Castle 1	-	$197,750	-	-	-	-	$197,750
Old Castle 2	-	-	-	-	-	$350,000	-
Old Country Club	-	-	-	-	-	-	$204,530
Paradise 1	-	$301,000	-	-	-	-	$301,000
Paradise 2	-	-	-	-	-	$480,250	-
Pauma Heights	-	-	-	-	-	$737,250	-
Red Mt.	-	-	-	-	-	-	$199,500
Reid Hill	-	-	-	$287,000	-	-	$287,000
Reidy Canyon 1	$201,140	-	-	-	-	-	$201,140
Reidy Canyon 2	-	-	-	$293,000	-	-	$293,000
Ridge Ranch Interim	$103,500	-	-	-	-	-	$103,500
Rincon	-	-	-	-	-	-	$203,139
San Gabriel 1	-	-	-	-	$720,000	-	-
San Gabriel 2	-	-	-	-	-	$403,000	-
Turner Lake	-	-	-	-	-	-	-
Tyler	-	-	-	-	-	-	$241,813
Via Cantamar	$579,700	-	-	-	-	-	$579,700
Weaver	-	-	$848,250	-	-	-	$848,250
West 1	-	-	-	-	-	-	$301,000
West 2	-	-	-	-	-	-	$602,000
West Bear Ridge	-	$924,800	-	-	-	-	$924,800
10% to Replace Rafters and Earthquake Straps	$114,234	$151,655	$126,125	$176,900	$131,800	$424,503	$790,204
TOTALS	**$1,257,000**	**$1,669,000**	**$1,388,000**	**$1,946,000**	**$1,450,000**	**$4,670,000**	**$8,693,000**

Table R-2; Reservoir Recoating Projects[8]

[8] WG Reservoir Maintenance Planning 032818JC", 'Reservoir Info and Cost Tables' tab

Opinion of Probable Cost

Table R-2 lists the opinions of the costs for refurbishing the reservoirs and the expected timeframe in which this will occur. For the steel tank reservoirs, the refurbishment includes recoating the interior and exterior of the tanks. As stated earlier, coating projects have been deferred due to financial constraints imposed on the District by the drought. This fact is likely going to result in the need to replace an unknown number of rafters and earthquake straps. Because of these unknowns, the final costs of the identified upgrade projects are likely to be moderately to significantly higher than the recoating costs. Thus, we have included a 10% contingency for rafter and earthquake strap repair.

The numbers in column 2018-2022 identify reservoirs that require refurbishment over the next 5 years. This amount is an average expenditure of approximately $1.5 M. Refer to the map located in Appendix A for the location of these reservoirs.

Depreciation

Based on current information, which is still being refined, the total replacement cost new for all reservoirs is estimated at $43 M. Depreciation on reservoir assets over the last 3 years has varied between $0.82 M to $1.4 M. The present CIP plan represents spending at an annual rate of approximately $1.5 M, which essentially matches the annual depreciation. Presently, there is no significant spending/funding for reservoir replacement reserves.

Pump Stations

Overview

A map presenting the locations of the pump stations with CIP activity is presented in Appendix A. A listing of all the pump stations along with an estimate of the total Replacement Value of each pump station is presented in Table PS-1.

Prioritization of Projects

Two primary criteria are weighed in determining the priority of pump station repair/ replacement projects with a third criterion also considered. In order of importance, these criteria are:

1. Total cost savings that would be realized by the District through the modifications
2. Age of the pump station
3. Operational flexibility to maintain water quality

These criteria are used at the current time in consideration of current conditions at the District such as the fact that: flows have been drastically reduced over recent years; and the District pump stations are generally reliable and in good working order because the full station re-builds have been completed. Should current conditions change, these criteria could be amended to reflect the need to respond to those changes.

Total cost savings, which considers both horsepower and efficiency, take precedence over simple pump efficiency improvement when prioritizing pump station modifications. For example, a relatively small improvement in efficiency at a very large pump station, such as Betsworth, could be a higher priority (greater cost savings) than a larger improvement in efficiency at a smaller pump station, such as Jesmond Dene. If the larger pump station is already optimized, then the improvements at the smaller pump station may be warranted. In either case, the improvements themselves would need to

be cost effective with a reasonable payback time in order to be listed in the repair/replacement program.

The age of the pump station relates to maintaining on-going system reliability and viability. Pump station age is used to flag potential issues in terms of needed rehabilitations or replacements but is considered in conjunction with facility condition. In some cases, operations may choose to replace based on age due to past failure rates or even industry standards. In other cases, facility condition or criticality of the pump station to current transmission and distribution requirements may be deemed more important than age alone.

Pump Station	Total Replacement Value
Betsworth	$13,945,000
Bingham Mesa	$288,000
Cantrell Corners	$821,000
Couser	$3,358,000
Hauck Mesa	$1,956,000
Jesmond Dene	$635,000
Lilac	$3,906,000
Lilac - Pala	$967,000
McNally	$1,017,000
Miller	$8,891,000
MJM	$1,151,000
Montanya Booster	$215,000
Oat Hill	$4,359,000
Old Country Club (circle "R" pumps)	$831,000
pala loma hydro total (last cell)	$448,000
Paradise Mtn	$2,639,000
Pfau	$1,422,000
Rainbow	$1,381,000
Red Iron Bark	$603,000
Red Mtn	$1,323,000
Ridge Ranch int.	$682,000
Rincon	$1,388,000
San Gabriel	$1,716,000
Tyler	$786,000
Valley Center	$5,227,000
Via Cantamar	$502,000
West	$975,000
TOTAL	**$61,432,000**

Table PS - 1 – Pump Station Replacement Costs[9]

[9] "VCMWD master water plan pump station characteristics 081418", 'Cost Estimates' tab

The third criteria, operational flexibility to maintain water quality, has become important as a criterion in ranking projects at pump stations due to the reduced flows experienced over the last several years. In consideration of operational flexibility, projects to automate the pump station by-pass function have been initiated at several pump stations. These projects allow water to be transferred from one zone to another without the need for operators to travel to the site to manually adjust the valves. This can help in maintaining water quality on a day-to-day basis, as well as allowing fast response during emergency situations when quick response times are needed, and manpower may be at a premium.

Table PS-2 presents a summary of pump station construction planned over the next 5 years. This planned construction is described below.

Pala Loma Hydropneumatic System Replacement

This pump station is a small hydro-pneumatic system that is over 40 years old. It serves 6 homes and has become a maintenance issue. The plan is to replace the pressurized tank, control panel and pumps of this system to provide a reliable installation that will require a significantly reduced number of operator site visits.

Bingham Mesa Pump Station Replacement

This project involves replacement of a horizontal split case pump installation that has exceeded its useful life with a new vertical turbine pump with new controls.

Pump Station Remote Bypass Improvements

Projects to automate the pump station by-pass function have been initiated at several pump stations including Oat Hill, Miller, and Cantrell Corners. As of now, the mechanical construction on these bypass projects is completed and SCADA is present at all locations. Remaining work at these pump stations includes providing the input/output connections and any required SCADA upgrades (possibly a new I/O card in the on-site PLCs) and the programming for new signals and control screen creation to enable the mechanical improvements to function remotely.

Three more remote bypass improvement projects are anticipated in the next 5 years at Rainbow, Valley Center, and Hauck Mesa Pump Stations. These projects will entail both the mechanical construction (valve installation with connection piping) and the work required to enable remote operation, similar to the Oat Hill, Miller, and Cantrell Corners pump stations. Cost opinions are shown below for those projects.

Opinion of Probable Cost

Pump Stations	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	TOTAL
Pala Loma Hydro	$448,000					$448,000
Bingham Mesa			$288,000			$288,000
Bypass Improvements						
Oat Hill, Miller, Cantrell Corners ($55K ea.)					$165,000	$165,000
Rainbow PS		$130,000				$130,000
Valley Center PS				$370,000		$370,000
Hauck Mesa PS					$175,000	$175,000
TOTAL	**$448,000**	**$130,000**	**$288,000**	**$370,000**	**$340,000**	**$1,576,000**

Table PS-2 - Pump Station Construction (next 5 years)[10]

Depreciation

Depreciation of pump station assets over the last 3 years has varied between $0.9 M to $1.3 M[11]. Thus, to maintain the assets into the future the District needs to be actively setting aside funds to replace the assets and/or investing in maintenance activities that will prolong the asset's useful life. As with the pipelines, spending/funding for pump stations reserves is not significant at this time.

Miscellaneous

Pressure Reducing Valve (PRV) Stations

Overview

PRV Stations are small installations located throughout the District. There is an existing Repair/ Replacement Program such that repair is handled under normal maintenance and is not included in CIP work.

Prioritization of Projects

The main concern with respect to PRVs is the replacement of the Valve body which lasts approximately 50 years. Scheduled replacement of valve bodies is a long-term item which would be addressed in a CIP program.

Project Description

Currently, all of the PRV stations have been addressed and no replacements are foreseen in the next 10 years.

Monitoring of these stations would be beneficial. However, power would be required for monitoring, and currently none of the PRV stations have power to its site. As of now, it does not appear that the cost of providing power and monitoring is worth the benefits that would be realized. This status could

[10] "VCMWD master water plan pump station characteristics 081418"; 'Cost Estimate' tab
[11] "DEPRECIATION SUMMARY SPREADSHEET"; 'depreciation data' tab

change if technologies for SCADA, battery power storage, micro-hydroelectric generation or several other factors change.

Cost Estimates

Costs were not developed because no modifications are foreseen in the next 10 years.

SCADA/Controls/Monitoring Systems

Overview

Use of SCADA at the District has expanded dramatically in the past decade. Most major facilities now have at least some aspect of their operation monitored or controlled by SCADA. Renewal of the present SCADA equipment is an on-going investment which may be covered in either the O&M budget or the CIP.

Prioritization of Projects

The priorities for funding SCADA/Control/Monitoring Systems are directly related to the expected benefit of the project to the operation of the water distribution system. Many aspects are weighed in determining project priority including: the criticality of the asset being monitored, the need or benefit of instant information, the need or benefit of having an on-going record of the data, staff time saved from not having to visit the site, etc.

One project that is being considered is monitoring of PRV stations. The investment in actual SCADA equipment for PRV stations is minimal (radio, switch, camera, position indicator, etc.) and are all approximately $100 to $200 a piece. More sophisticated equipment, such as pressure cells and cameras are more costly. Currently, the cost of providing electrical power to those sites is the major deterrent to these projects. In the future, it is anticipated that solar will become the preferred approach over SDG&E power due to the expense that would be associated with the required electrical meter.

Opinion of Cost

Costs were not developed because no modifications are foreseen in the next 10 years. However, as the cost of providing solar power drops, these projects may become cost effective.

Water Model

The District maintains a hydraulic model of its system and uses this model to identify system deficiencies or, more often, identify upgrade projects that will provide enhanced reliability and service to our customers. The model software is “Innovyze InfoWater”.

Due to the reduction in water use over recent years, flow rates are much lower and there are very few capacity issues. The few that have been identified are the result of both modeling efforts and consultation with operations staff. Identified capacity issues are as follows:

Lake Wohlford Rd. between Woods Valley Rd. and Valley Center Rd. - 6” pipe

Miller Lane

Lilac Rd. between Hideaway Lake and Betsworth Rd. - 6” pipe

Cool Valley Rd. - 6” pipe.

SECTION III. ASSET MANAGEMENT

This Master Plan serves as one of the starting points in developing the Asset Management Plan. In this Master Plan, the District is redirecting its focus from that of identifying future expansion projects to a focus on repairing and replacing existing assets. The basis for this change lies in the fact that the District now has facilities that provide capacity far in excess of that being used. Thus, the need to add capacity is not present, while at the same time the need to maintain existing capacity remains.

District staff is in the process of developing an asset management program. A few agencies have such programs in place, but most agencies are either in the early stages of developing a program or do not have a program.

Advantages

The benefits of an Asset Management Program become more apparent when one considers an aging water utility, and the alternative to an asset management plan which is a run-to-failure approach requiring reactive repair/replacement. Using an Asset Management program, conditions of assets are monitored, there are scheduled refurbishments of major equipment/assets to prolong their useful life, and replacement is planned to occur on a scheduled basis prior to failure. Realizing that unscheduled pipe breaks will still occur, this approach at least allows the District to perform refurbishments and replacements on a bid basis during normal business hours, while maintaining water service to its customers. Using a run-to-fail approach all repair/replacements occur on an emergency basis which is very expensive because: there is no bidding of services; the time of day during which construction occurs may significantly add to the cost of labor; and specifically for pipelines dewatering will always be required which not only is an added expense in itself, but also extends the period of time emergency crews are waiting to perform their repairs. Add to this the likelihood that customers will also have unplanned disruptions of service. By comparison the advantages of an Asset Management program become apparent.

Database

An asset management program relies on a data base of information on district assets including general descriptions, the category of asset, installation date, original cost, and relevant detailed information which varies according to each asset category. For the VCMWD water system general asset categories could include: pipelines, reservoirs, pump stations, and miscellaneous. Some Districts could have additional categories such as: treatment, source of supply, etc. Currently, VCMWD's sole source of supply is SDCWA. The VCMWD Asset Management program also contains links to facility drawings which allows ready access to more detailed information.

Condition Assessment

Asset Management includes some level of condition assessment. As with most agencies, the District levels of assessment varies with the category of asset. For pipelines the District has performed condition assessments as input to determining expected useful lives for pipes made of certain materials. Pipe breakage rates are also useful in determining pipeline useful life. For reservoirs visual inspection and sometimes more detailed coatings analysis is used. For pump stations, pumps, themselves, are reviewed for their overall efficiency. Most other pump station facilities are given visual inspections by operations staff.

Replacement Costs (RCN)

One of the key components in an asset management plan is the replacement cost of facilities. The replacement cost is generally defined as the cost to replace the asset as a new facility in today's dollars, referred to as Replacement Cost New (RCN). At this time the District's RCN of for an asset in most cases is based on the original cost of the asset, as tracked in District financial tables. The original cost is multiplied by a ratio of economic indicators (Engineering News Record Construction Cost Index, or ENR, for Los Angeles): "ENR Current Value" divided by "ENR Value when the asset was placed into service". This is performed for each asset and each asset category. The totals for all District assets represents the total RCN for the District.

Depreciation

Depreciation is discussed in several places in this master plan. Depreciation represents a theoretical estimate of an asset's rate of deterioration and is calculated using an assumed useful life. Because of a myriad of factors, the actual useful life can significantly vary from location to location. Thus, useful life and its implied rate of deterioration and depreciation is an imperfect estimate based on experience.

Even though useful life estimates have limited accuracy, one still acknowledges the fact that assets deteriorate, will eventually require replacement, and that planning for replacement has distinct advantages, as previously stated. The useful lives used by the District for various assets are presented in Appendix B. Based on on-going District experience with various assets, these useful lives may be updated from time to time to reflect new understanding of District assets.

A straight-line method of depreciation is used by the District. Depreciation is calculated by multiplying the RCN of an asset by the ratio: "asset date in service" divided by "asset useful life".

Replacement Cost New Less Depreciation (RCNLD)

The RCNLD is calculated by subtracting asset depreciation from RCN. The RCNLD is a measure of the remaining value of an asset, and when all asset RCNLDs are added together, is a measure of the current value of the District. RCNLD serves as the basis of the "buy-in" of new customers to the District's water system. Thus, the asset management program provides a tangible, transparent mechanism for developing rates and fees that are tied directly to the assets themselves. In developing this approach creating fees and charges the District has strived to be fair to both existing and new customers. The asset management data base provides the foundation for many of the Districts rates, fees and charges. The Water Capacity Charges and Annexation Fees, for instance, are based in large part on the analyses performed on the asset data base.

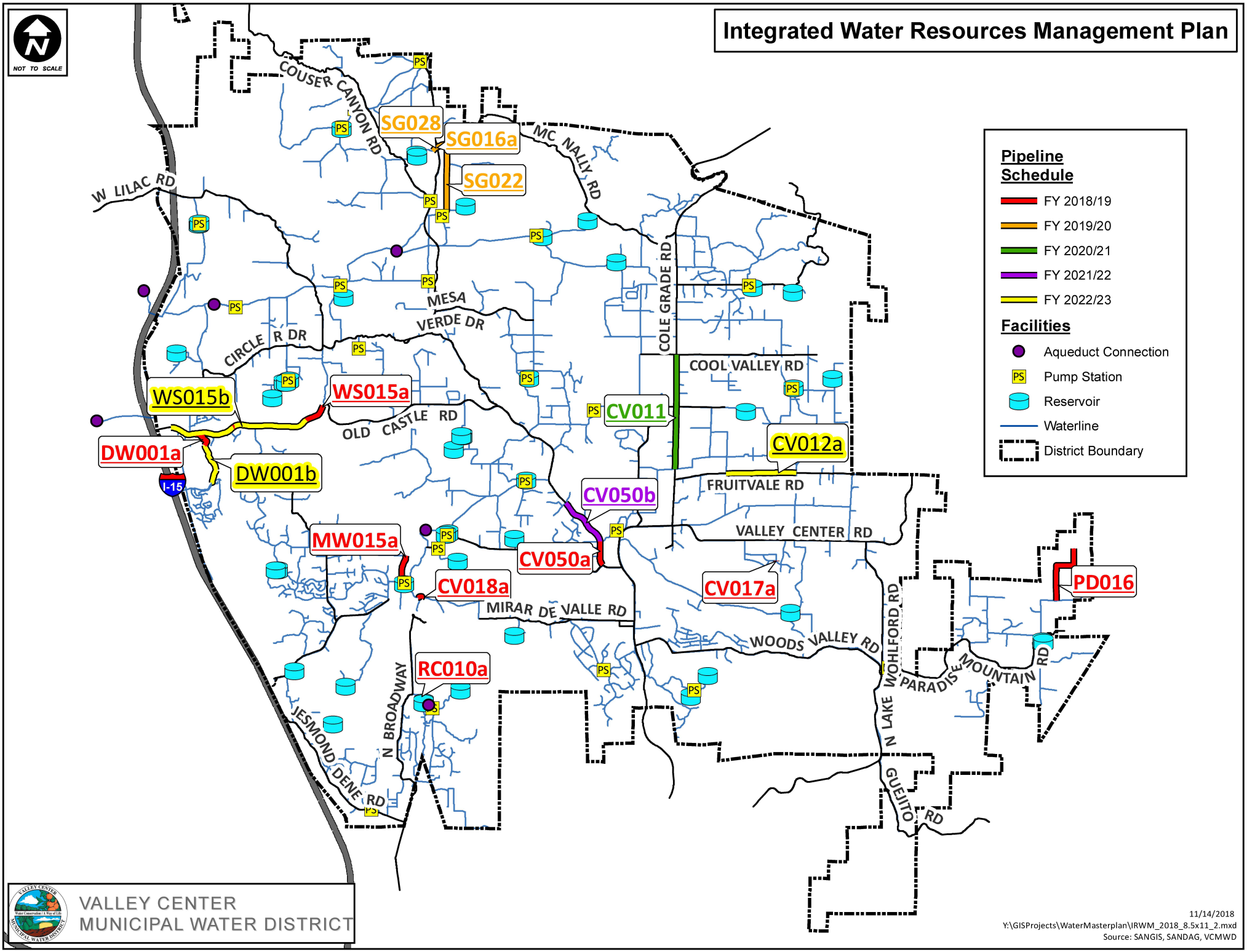
Financial Rehabilitation and Replacement Plan

Another function of the Asset Management Program is to facilitate development of a replacement plan to fund assets. By doing a Long Range Financial Plan (LRFP), the District will be able to proactively determine: 1) what major projects need to occur to either extend the life of high value assets or replace assets at the end of their useful life; 2) how much those projects will cost; and 3) when the project and funding will be needed. This planning will allow the District to minimize the long term cost of capital and construction costs to the District by: identifying windows of time in which projects can be executed which allows taking advantage of low interest rate funding opportunities when they arise; creating replacement reserve accounts that will serve as collateral to lower bond rates at a time when selling bonds is an attractive option; and minimizing reactive emergency repair projects which are constructed at a premium and disrupt District staff in the execution of planned duties.

When creating replacement reserve accounts agencies normally set aside some percentage of asset value or depreciation. This percentage is totally up to the District's policy makers and normally reflects the District's perspective on planning and maintaining assets. As described previously, the District is currently not significantly funding reserves for any of the three major asset categories, and may wish to consider this in the future.

APPENDICES

Appendix A - Maps


Integrated Water Resources Management Plan
NOT TO SCALE
Pipeline Schedule
FY 2018/19
FY 2019/20
FY 2020/21
FY 2021/22
FY 2022/23
Facilities
Aqueduct Connection
Pump Station
Reservoir
Waterline
District Boundary
SG028
SG016a
SG022
WS015b
WS015a
DW001a
DW001b
CV011
CV012a
CV050b
CV050a
MW015a
CV018a
CV017a
RC010a
PD016
COUSER CANYON RD
MC NALLY RD
W LILAC RD
MESA VERDE DR
CIRCLE R DR
COLE GRADE RD
COOL VALLEY RD
OLD CASTLE RD
FRUITVALE RD
VALLEY CENTER RD
MIRAR DE VALLE RD
WOODS VALLEY RD
WOHLFORD RD
PARADISE MOUNTAIN RD
N LAKE WOHLFORD RD
GUEJITO RD
N BROADWAY
JESMOND DENE RD
I-15
PS
VALLEY CENTER MUNICIPAL WATER DISTRICT
11/14/2018
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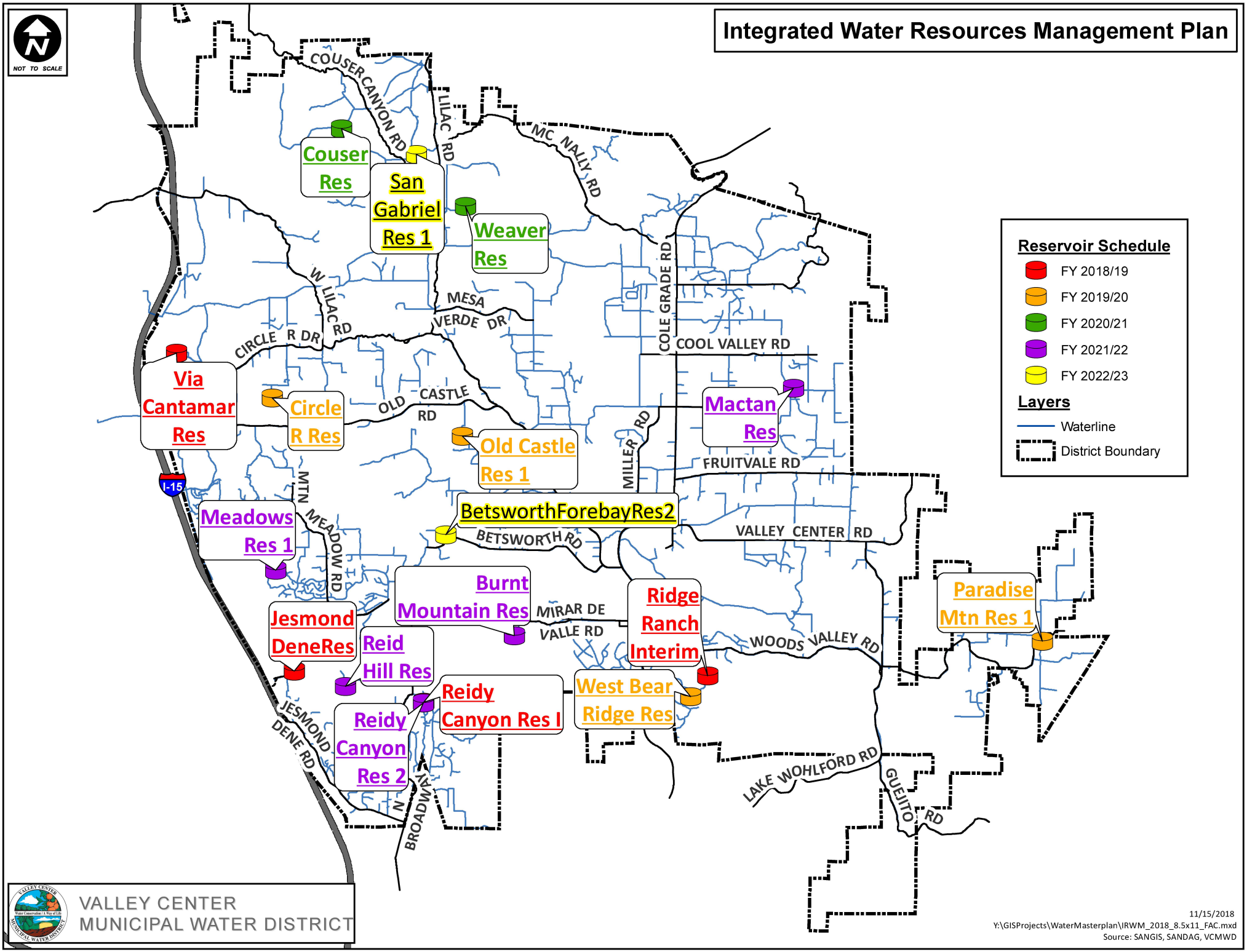
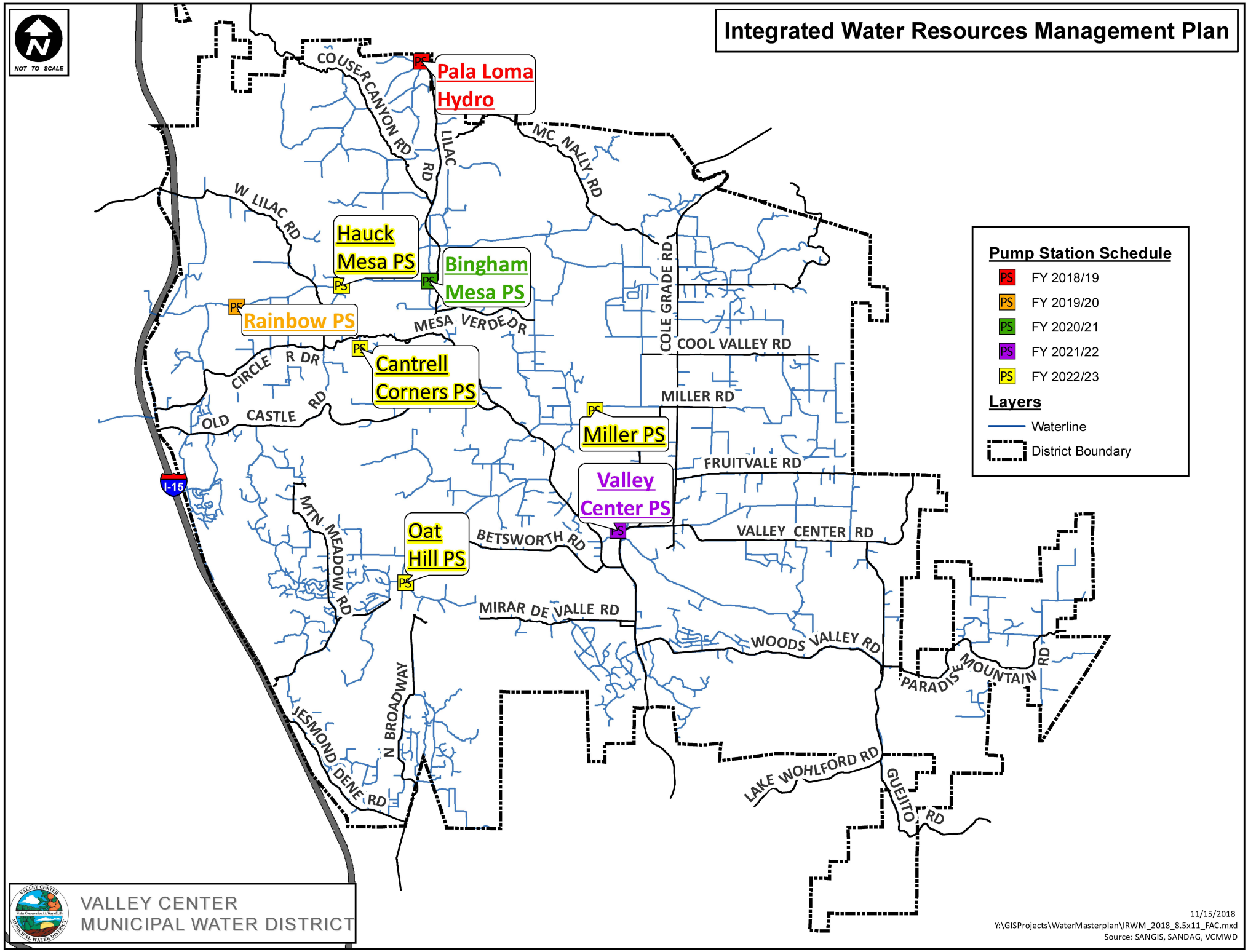
Source: SANGIS, SANDAG, VCMWD


Integrated Water Resources Management Plan
NOT TO SCALE
COUSER CANYON RD
LILAC RD
MC NALLY RD
Couser Res
San Gabriel Res 1
Weaver Res
W LILAC RD
MESA VERDE DR
CIRCLE R DR
COLE GRADE RD
COOL VALLEY RD
Via Cantamar Res
Circle R Res
OLD CASTLE RD
Old Castle Res 1
MILLER RD
Mactan Res
FRUITVALE RD
I-15
MTN MEADOW RD
Meadows Res 1
BetsworthForebayRes2
BETSWORTH RD
VALLEY CENTER RD
Burnt Mountain Res
MIRAR DE VALLE RD
Ridge Ranch Interim
Paradise Mtn Res 1
WOODS VALLEY RD
Jesmond DeneRes
Reid Hill Res
Reidy Canyon Res I
West Bear Ridge Res
Reidy Canyon Res 2
JESMOND DENE RD
N BROADWAY
LAKE WOHLFORD RD
GUEJITO RD
Reservoir Schedule
FY 2018/19
FY 2019/20
FY 2020/21
FY 2021/22
FY 2022/23
Layers
Waterline
District Boundary
VALLEY CENTER MUNICIPAL WATER DISTRICT
11/15/2018
Y:\GISProjects\WaterMasterplan\IRWM_2018_8.5x11_FAC.mxd
Source: SANGIS, SANDAG, VCMWD

Integrated Water Resources Management Plan



VALLEY CENTER
MUNICIPAL WATER DISTRICT

11/15/2018
Y:\GISProjects\WaterMasterplan\IRWM_2018_8.5x11_FAC.mxd
Source: SANGIS, SANDAG, VCMWD

Appendix B - Useful Lives

USEFUL SERVICE LIVES	
WATER DESCRIPTION	LIFE (YEARS)
Dam	100
Water Transmission	95
Water Distribution	1
General Structure	50
Concrete Reservoir / Forebay	100
Steel Reservoir	80
Water Pump Station	60
Any Electronic Sensor (AMR)	10
Electrical (General)	40
Mechanical Equipment - Pumps/Engines/Valves	20
Mechanical Equipment (Corrosive Environ)	15
Meter	20
Paint	15
Piping Wastewater/Odor Control	40
Solar Equipment	10
Instrumentation	10
Standby Generator	20
Paving	25
Fencing	20
CMU/Block Walls and Masonry	50
Water Piping at sites (Exposed or Submerged)	50
SCADA and Software	10
Reservoir Floating Cover/Liner	20
Interest on Debt (item 3501)	10
Office Furniture + Trucks + Hvy Equip and Appurt.	10
Admin Cost for creating a "district" - OR Right of Way	100
UWMP Update - every 5 years	5