NON-DOMESTIC WATER SYSTEM

7. Existing Non-domestic Water System

The District distinguishes between recycled water and reclaimed by designating treated wastewater as reclaimed and captured runoff as recycled. The tertiary treated water from Robinson Ranch Wastewater Treatment Plant (RRWWTP) is blended with urban runoff from Dove Lake. The term Non-domestic Water (NDW) is used in this report when referring to both reclaimed water and recycled water. The District can also provide supplemental potable water to the Robinson Ranch Recycled Water Reservoir (Robinson Ranch Reservoir) through an air-gap connection. The District's NDW system infrastructure includes reservoirs, pump stations, control valves, and pipelines. This section describes the NDW system components and operation. A facilities map is provided as Exhibit 7-1 and a hydraulic schematic is provided as Exhibit 7-2.

7.1 Non-domestic Water Supply System

All of the current NDW use takes place in the southeastern portion of the District. The District's NDW comes from the two following sources:

- Tertiary treated water from the District's RRWWTP. Tertiary treated water flows into the Robinson Ranch Reservoir by gravity.
- Urban runoff is captured and stored in Dove Lake. Dove Lake captures water from the surrounding communities of Dove Canyon, Robinson Ranch, and Trabuco Canyon Highlands. Local runoff from a section of Trabuco Highlands is captured at the Shadow Rock Detention Basin. Water from Shadow Rock Detention Basin is conveyed in a storm drain that drains to Dove Lake. The District also can convey recycled water from Shadow Rock Detention basin to Sakaida Nursery through a series of valves downstream of Shadow Rock Booster Station. The remaining section of Trabuco Highlands' runoff is captured and stored in Dove Lake. Runoff from Dove Creek and Tick Creek is also conveyed to Dove Lake.

The two non-potable supplies are blended, treated, and pumped into the NDW distribution system. The District provides NDW service to Dove Canyon golf course, Dove Canyon Master Association, the Trabuco Highlands Community Association, Robinson Ranch Homeowners Association, Sakaida Nursery, and TY Nursery. The District's NDW responsibility to the Dove Canyon Master Association ends at the flow meter that records the amount of NDW used. Table 7-1 provides a summary of the NDW supply.

Table 7-1: Non-domestic Water Supply

Supply Source	Volume (AFY)	Volume (MGD)	Volume (cfs)
RRWWTP, Dove Lake	800	0.7	1.08

In the winter, there are times when the RRWWTP effluent production exceeds the system demands. When this occurs, the District discharges the water first to the reclaimed water reservoir at the RRWWTP and through spray irrigation of surrounding landscape areas. If the reclaimed water reservoir fills in the winter, the District bypasses wastewater to the SMWD system.

7.2 Pressure Zones

A pressure zone is a geographical area of a water distribution system controlled by hydraulic boundary conditions, typically targeting a set hydraulic grade line (HGL) elevation such that an acceptable range of pressures is delivered to customers. Typical boundary conditions include gravity storage tank levels, pump stations, and control valves, such as pressure reducing valves (PRVs). Pressure zones are often controlled using a combination of these types of facilities.

The existing NDW distribution system consists of four pressure zones. The NDW is supplied through the Dove Canyon NDW Booster Station (BS) that discharges to the Dove Canyon Golf Club PRV and the Dove Canyon Master Association PRV, and also provides suction to the Robinson Ranch NDW BS. Discharge from Robinson Ranch NDW BS is used to serve the remaining zones through pumps or PRVs.

See Table 7-2 for a summary of the NDW pressure zones. The Dove Canyon Master Association maintains and operates its own reclaimed water system after receiving water from the District. Therefore, the District's responsibility to Dove Canyon ends at the flow meter that records the amount of water used by the Dove Canyon reclaimed water system. As a result, a service elevation range for the Dove Canyon Zone is not shown in Table 7-2.

Table 7-2: Pressure Zones

Pressure Zone	Type	HGL (ft)	Service Elevation Range (ft)
Dove Canyon	Closed	1320	N/A
Robinson Ranch	Closed	1550	1231 - 1436
Plano Trabuco	Closed	1350	1098 - 1220
Shadow Rock	Closed	1420	1329 - 1336

7.3 Storage Facilities

The District's non-domestic water system consists of two earth-fill dams, one detention basin, and two creeks. The reclaimed water from RRWWTP is stored at Robinson Ranch Reservoir, which is adjacent to

RRWWTP. Dove Lake is the second earth-fill dam within the District's non-domestic water system. Dove Lake collects and stores local runoff from the surrounding communities and is used to augment treated wastewater from RRWWTP. Both the District's earth-fill dams are subject to the jurisdiction of the Department of Water Resources Division of Safety of Dams. Local runoff from a section of Trabuco Highlands is captured at the Shadow Rock Detention Basin and conveyed to Dove Lake or used at the adjacent Sakaida Nursery. Runoff from Dove Creek and Tick Creek is also conveyed to Dove Lake. Recycled water from Dove Creek and Tick Creek is owned in partnership by the District and the Santa Margarita Water District (SMWD). The runoff volume owed to SMWD (50% of collected runoff water) is sent to the Portola Reservoir via a PRV located along Plano Trabuco Road during dry season (April 15 to October 15).

The total existing capacity of the District's NDW storage facilities is approximately 595 AF or 194 MG. A summary of these facilities is provided in Table 7-3. Capacities for Shadow Rock Detention Basin, Dove Creek, and Tick Creek are not provided since all the recycled water is conveyed to Dove Lake and pumped into Robinson Ranch Reservoir before it enters the distribution system.

Table 7-3: Existing Storage Facilities

Name	Capacity (AF)	Type	Year Constructed
Robinson Ranch Reservoir	145	Earth-fill dam	1984
Dove Lake	450	Earth-fill dam	1986
Shadow Rock Detention Basin	N/A[1]	Detention Basin	Basin: 1996 Pump Station: 2014
Dove Creek	N/A[1]	Creek	2007
Tick Creek	N/A[1]	Creek	2007
Total Capacity (AF)	**595**		

[1]Capacities not provided since recycled water at storage facility is conveyed to Dove Lake.

7.4 Booster Stations

Booster stations are used to pump water from lower pressure zones to higher pressure zones. The District has two main NDW booster stations: Dove Canyon and Robinson Ranch. These two booster stations take water from Robinson Ranch Reservoir.

There are also four secondary booster stations within the non-domestic water system:

- Dove Lake BS – Conveys water collected in Dove Lake to Robinson Ranch Reservoir (1 pump)
- Dove Creek BS – Pumps runoff collected in Dove Creek to Tick Creek BS (1 pump)
- Tick Creek BS – Transports runoff collected in Dove Creek and Tick Creek to Dove Lake (1 pump)
- Shadow Rock BS – Conveys water collected in Shadow Rock Detention Basin to Dove Lake (2 pumps)

Total capacity represents the total design flow of all pumps at each facility. Firm capacity is defined as the pump station's capacity with the largest pump out of service. Capacities for each pump station were obtained from pumping system performance tests, pump curves, and as-builts. The total firm pumping capacity of the two main booster stations in the system is 3,270 gpm, or 4.7 MGD. See for a summary of all existing NDW pumping facilities.

Table 7-4: Non-domestic Water Booster Stations

Name	Pump	Design Flow (gpm)	Total Capacity (gpm)	Firm Capacity (gpm)	From	To
Dove Canyon (NDW)	Pump 1	350	5,100	2,850	Robinson Ranch Reservoir	Dove Canyon Zone
	Pump 2	1,500				
	Pump 3	1,000				
	Pump 4	2,250				
Robinson Ranch (NDW)	Pump 1	750	1,170	420	Dove Canyon Zone	Robinson Ranch Zone
	Pump 2	420				
Dove Lake (NDW)	Pump 1	465	465	465	Dove Lake	Robinson Ranch Reservoir
Shadow Rock (NDW)	Pump 1	80	330	80	Shadow Rock Detention Basin	Shadow Rock Zone
	Pump 2	250				
Dove Creek (NDW)	Pump 1	200	200	200	Dove Creek	Urban Water Recovery Line
Tick Creek (NDW)	Pump 1	300	300	300	Tick Creek	Urban Water Recovery Line

7.5 Pipelines

The NDW system is comprised of approximately 8 miles of piping, 6 miles of reclaimed water lines and 2 miles of recycled water lines. All recycled water is combined with reclaimed water at the Robinson Ranch Reservoir before it is distributed to customers. The District owns pipes with diameters ranging from less than 4" to 20" with 6" as the most predominant pipe diameter. The subsequent tables provide data on pipeline diameter, material, and installation year.

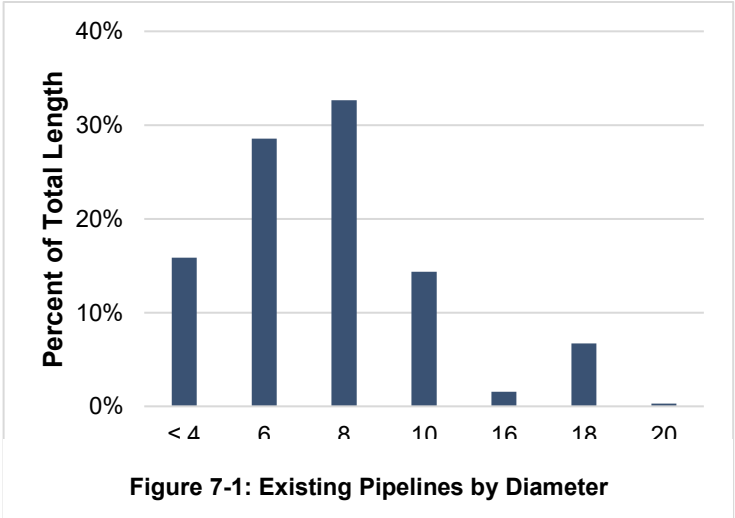


Figure 7-1: Existing Pipelines by Diameter

Table 7-5: Existing Pipelines by Diameter

Pipe Diameter (in)	Length (ft)	Length (mi)	Percentage (%)
≤ 4	6,465	1.22	15.87%
6	11,630	2.20	28.55%
8	13,302	2.52	32.66%
10	5,848	1.11	14.36%
16	635	0.12	1.56%
18	2,734	0.52	6.71%
20	119	0.02	0.29%
TOTAL	**40,732**	**7.7**	**100%**

Table 7-6: Existing Pipelines by Material

Material	Length (ft)	Length (mi)	Percentage (%)
PVC	24,091	4.56	59.1%
HDPE	13,076	2.48	32.1%
Steel	3,523	0.67	8.6%
DIP	41	0.01	0.1%
TOTAL	**40,732**	**7.7**	**100%**

As shown in Table 7-6 and Figure 7-2, polyvinyl chloride (PVC) is the predominant piping material within the non-domestic water system.

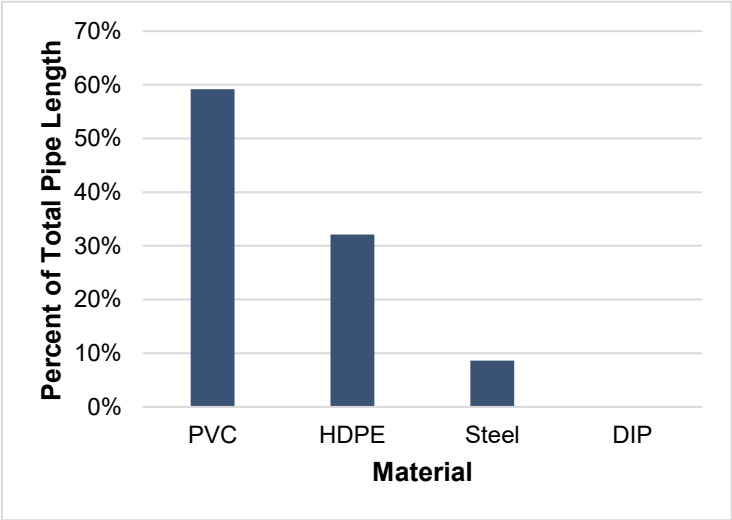


Figure 7-2: Existing Pipelines by Material

Pipe ages were based on year of installation, and as shown in Table 7-7 and Figure 7-3 the system contains pipe installations as early as the 1980s, with the majority of pipes in the 30-40 year age range. There are also about 2.5 miles, or about 30 percent of pipes with an unknown age.

Table 7-7: Existing Pipelines by Age

Install Year	Length (ft)	Length (mi)	Percentage (%)
1980s	16,368	3.10	40.2%
2000s	23,627	4.47	58.0%
2010s	455	0.09	1.1%
Unknown	281	0.05	0.7%
TOTAL	**40,732**	**7.7**	**100%**

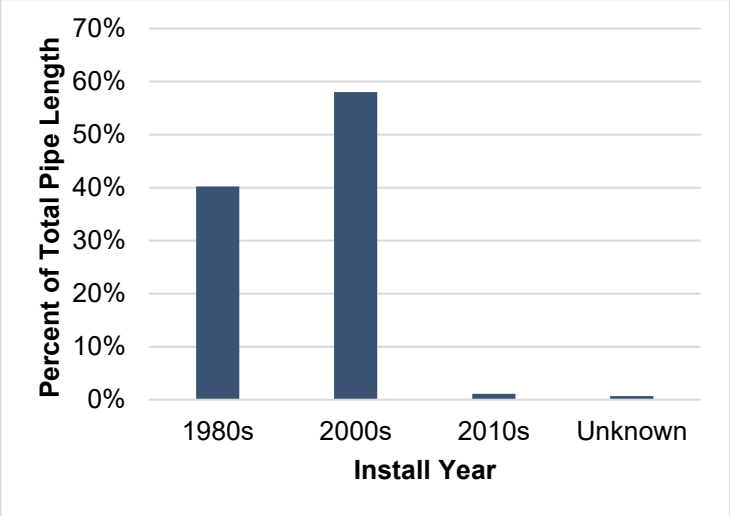


Figure 7-3: Existing Pipe by Install Year

7.6 Meters

The District provides non-domestic water service to 28 active accounts, based on 2021 billing data. The District tracks non-domestic water consumption by "Account Type." Table 7-8 summarizes the count per account type. Reclaimed Account Type is assigned to treated wastewater and Recycled Account Type is assigned to urban and captured runoff.

Table 7-8: Non-domestic Water Meter Summary

Service Account Type	No. of Accounts
Reclaimed/Recycled	28

7.7 System Control Valves

System control valves are used throughout the NDW system to perform various functions. The most common system control valves are pressure reducing valves which are used to transfer water from a higher-pressure zone into a lower pressure zone. The function of pressure reducing valves is to modulate and maintain a set downstream pressure regardless of upstream (upper pressure zone) conditions. Pressure reducing stations provide an important role in the distribution system by allowing storage in higher pressure zones to be utilized in lower pressure zones.

A summary of the system control valves is shown in Table 7-9. System control valve locations are shown in Exhibit 7-1.

Table 7-9: System Control Valves

Location	Valve Size (inches)	Zone	Function
Dove Canyon Dr	8	Dove Canyon	Pressure Reducing
Dove Canyon Dr	10	Dove Canyon	Pressure Reducing
Dove Canyon Dr	2	Dove Canyon Golf Club	Pressure Reducing
Dove Canyon Dr	8	Dove Canyon Golf Club	Pressure Reducing
Robinson Ranch Rd	8	Plano Trabuco	Pressure Reducing
Cimmaron Ln	6	Shadow Rock	Pressure Reducing
Plano Trabuco Rd	2, 8	Santa Margarita Water District (Portola Reservoir)	Pressure Reducing

Trabuco Elementary
T-Y Nursery
Shadow Rock BS (NDW)
Robinson Ranch Rd
High Country Dr
Robinson Elementary
Trabuco Marketplace
Antonio Pkwy
Dove Canyon Dr
Coto de Caza Dr
Dove Canyon BS (NDW)
WWTP
Robinson Ranch
Dove Lake BS (NDW)
Robinson Ranch BS (NDW)
Dove Lake
Dove Canyon Golf Course
Cleveland National Forest
Dove Creek BS (NDW)
Tick Creek BS (NDW)

Legend

Pressure Zones
- Dove Canyon
- Plano Trabuco
- Robinson Ranch
- Shadow Rock
- Urban Recovery Main
- Local Parks
- Reservoir
- Non-Domestic PRV
- Pump Station
- WWTP Waste Water Treatment Plant
- TCWD Boundary
- National Forest

0 0.13 0.25 Miles

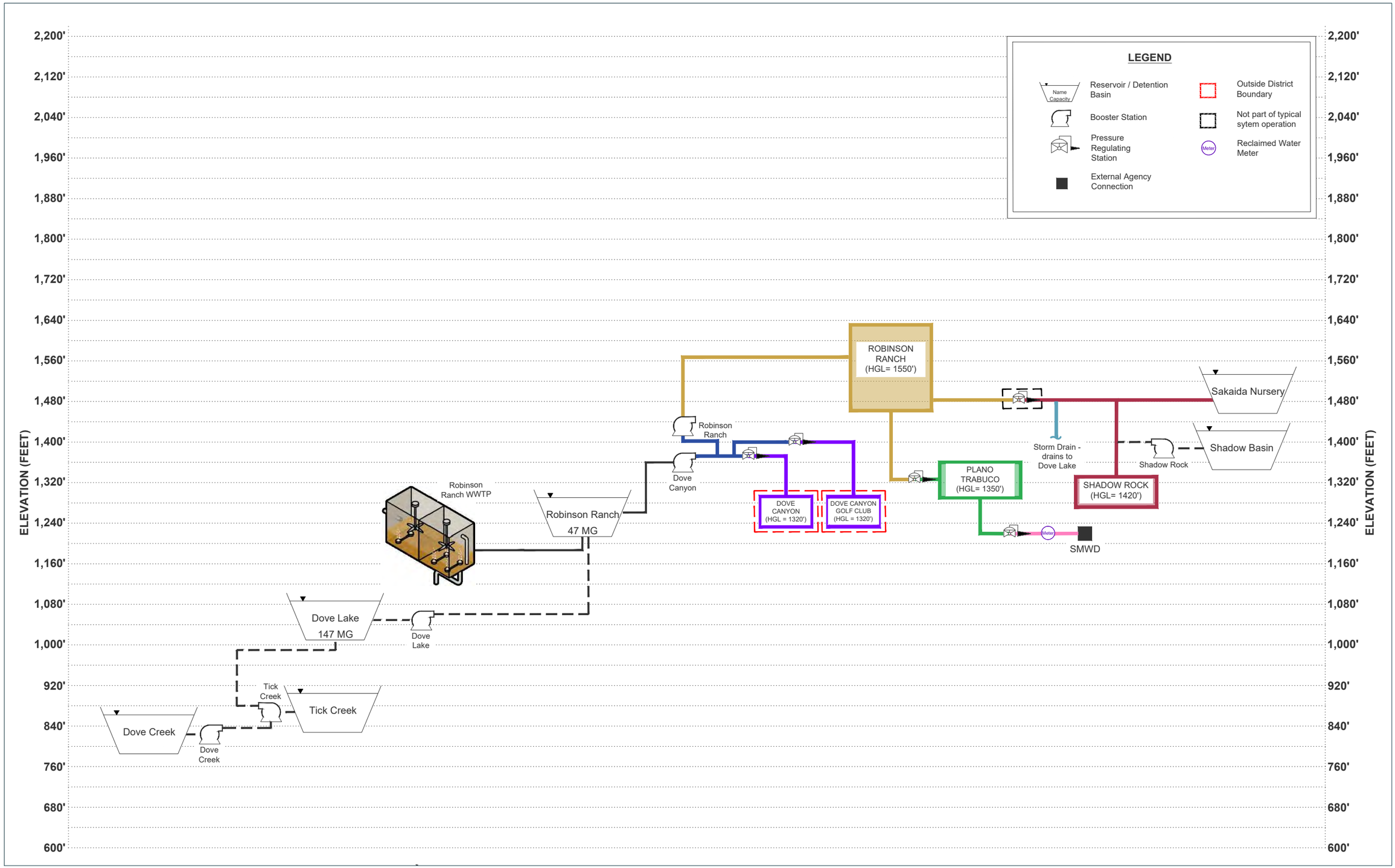
N

Existing Non-Domestic Water System Facilities

Exhibit 7-1

Hazen

Trabuco Canyon Water District
Master Plan



Hazen

EXHIBIT 7-2
EXISTING HYDRAULIC SCHEMATIC
NON-DOMESTIC WATER SYSTEM

8. Non-Domestic Water System Evaluation

Non-domestic water demand is primarily landscape irrigation including golf courses, parks and greenbelts in the Robinson Ranch, Trabuco Highlands, and Dove Canyon Communities. This section addresses existing NDW demands, demand projections, the diurnal curve, peaking factors, and demand factors.

8.1 Existing Demands

8.1.1 Production and Consumption

Production and consumption data was obtained and analyzed for the system. For the NDW system, "production" means reclaimed water from RRWWTP, recycled water from Dove Lake, and domestic water occasionally used to augment demands. Non-domestic water records are reported by month and amount purchased. Billing records are reported by month and monthly usage. Available production data included calendar years 2014 to 2019. Available billing records also included calendar years 2014 to 2019. Refer to Figure 8-1 for a comparison of production and consumption. Average yearly consumption is shown in Figure 8-2.

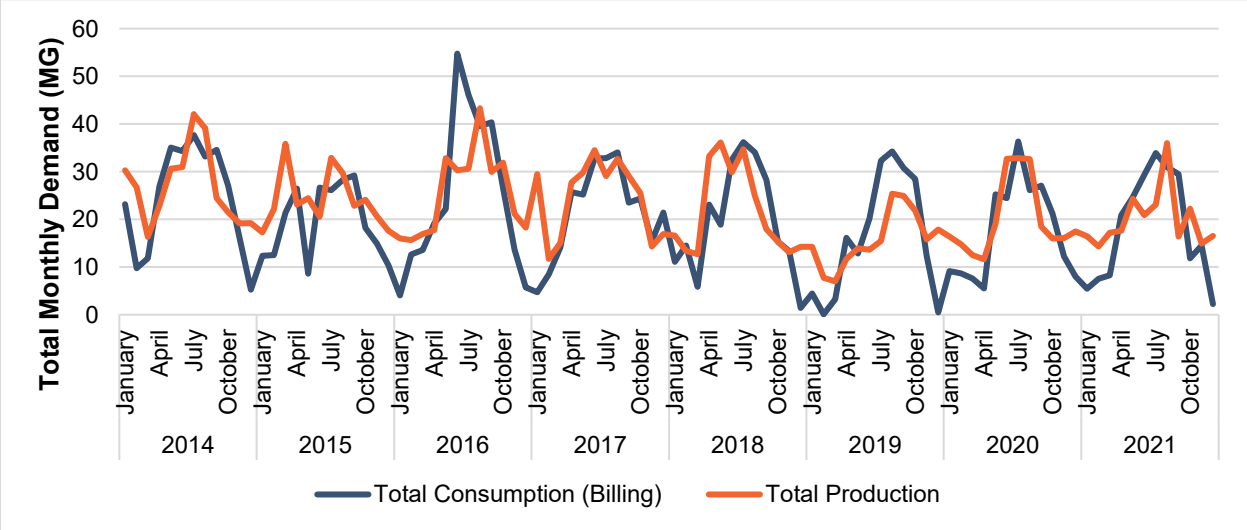


Figure 8-1: Non-domestic Water Production vs Consumption

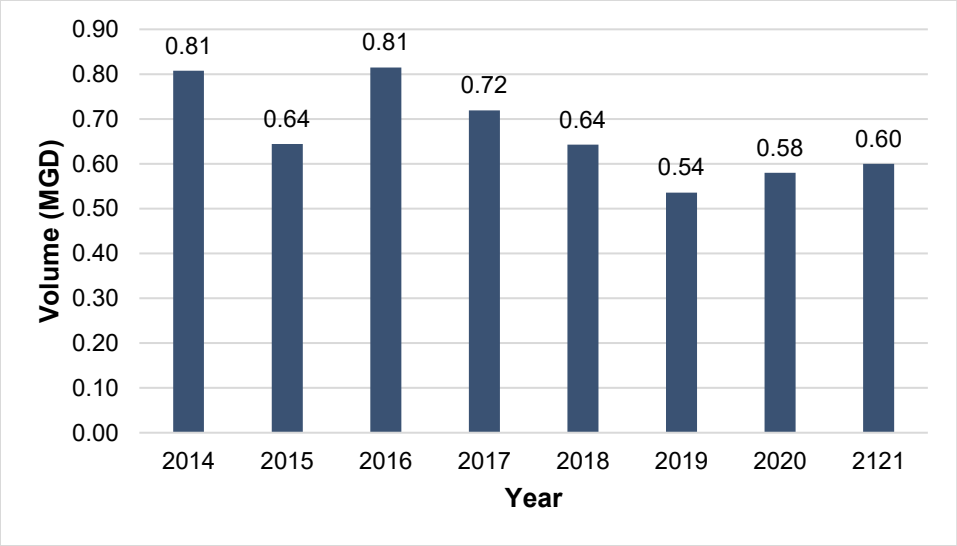


Figure 8-2: Non-domestic Water Average Yearly Demand

8.1.2 Non-revenue Water

The difference between production and billing records, referred to as non-revenue water, may be attributed to a variety of factors. Non-revenue water can be a result of metering inaccuracies, data errors, leakage, overflows, and other discharges such as flushing or pressure relief. Non-revenue water can be defined as unbilled authorized consumption plus water losses. As shown in Figure 8-3, the District had an average non-revenue water loss of 9% for the NDW system. The negative value in Figure 8-3 suggests there might be data errors or metering inaccuracies.

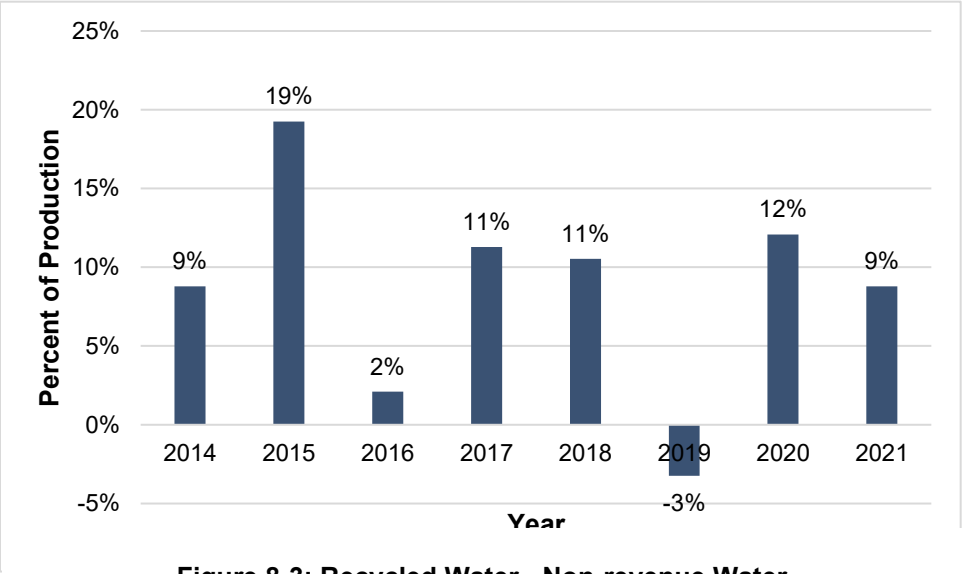


Figure 8-3: Recycled Water - Non-revenue Water

8.2 Demand Projections

Demand projections were obtained from the District's 2020 Urban Water Management Plan. Table 8-1 is a projection of the District's NDW demand from 2025 to 2045. Demands are assumed to stay constant from 2030 to 2045.

Table 8-1: Projected Non-Domestic Water Use*

Use Type	2025 (AF)	2030 (AF)	2035 (AF)	2040 (AF)	2045 (AF)
All Types	672	701	701	701	701

*Data from District's 2020 Urban Water Management Plan

8.3 Diurnal Curve

A diurnal curve was developed for the NDW system using SCADA data obtained in March 2022 for the Dove Canyon BS (NDW).

Non-domestic water demands vary throughout the day and throughout the year. Non-domestic water demand is primarily landscape irrigation, and as a result, peak demands are observed during the summer months and minimum demands are seen during the winter months. Hourly system demands were determined in order to establish a diurnal curve. To determine total system demands at each hour, the following data were obtained at each hour:

- Volume of flow into the system (i.e., pumped flow) (Volume IN)
- Volume of flow out of the system (Volume OUT)
- Change in water levels at the storage tanks/reservoirs (Δ Reservoir Volume)

The volume of flow out of the system is zero since the District does not supply areas outside of its service area during normal operation. Furthermore, the change in reservoir volume was assumed zero since the District's NDW reservoirs are all earthen channels or creeks. Essentially, all the water received by the District is used by the District.

Therefore, the total hourly demand of the system is:

- Demand = Volume pumped INTO system

A system-wide diurnal curve was created using hourly SCADA data collected from March 2022 for Dove Canyon BS (NDW) since all NDW water used within the system is directly pumped by this pump station from the Robinson Ranch Reservoir. It was also assumed that the amount of water pumped from Dove Canyon BS (NDW) equaled the system demand for any given time period. Diurnal curves for the Dove Canyon BS (NDW) for March 2022 are shown in Figure 8-4. March 25, 2022 was chosen as the representative diurnal curve for entire NDW system since it was the date with the most demand within March 2022. The demand observed was 1.0 MGD.

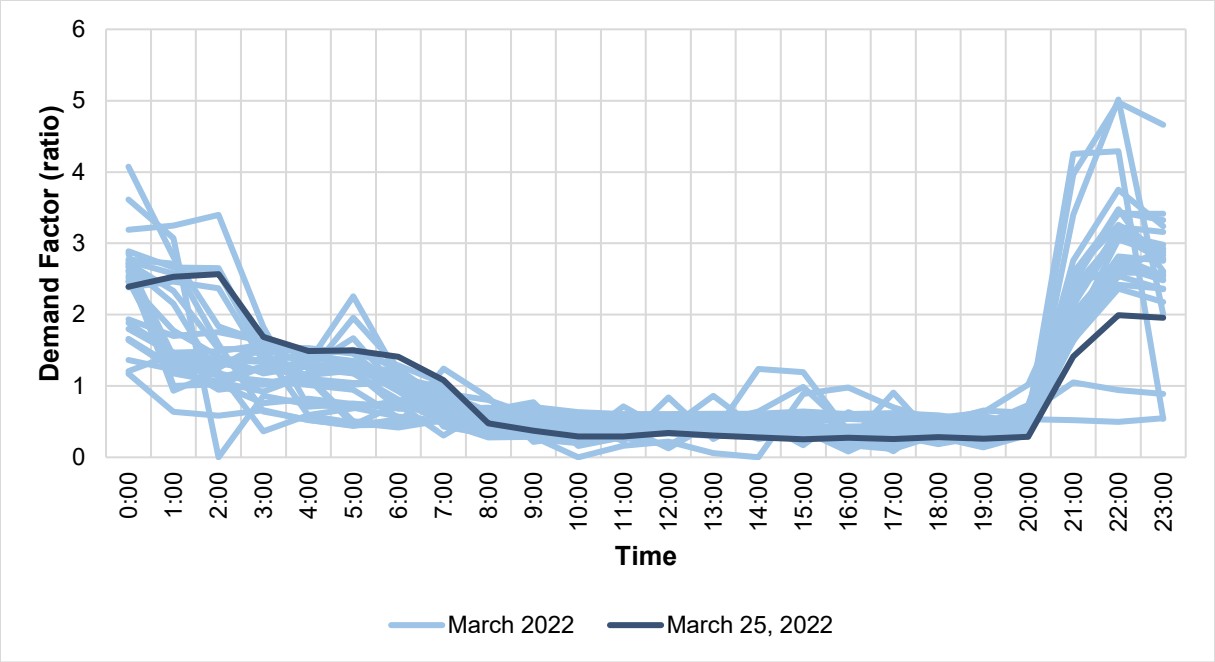


Figure 8-4: Non-Domestic Water Diurnal Curve

8.4 Peaking Factors

Non-domestic water (NDW) demands vary throughout the year due to seasonal changes. Peaking factors are used to capture the high and low demand conditions for analysis purposes. Maximum day demand represents the day with the highest total demand during the year, which typically occurs in the summer months. Minimum day demand represents the day with the lowest total demand during the year, which typically occurs in the winter months. The total monthly demand for calendar years 2014 to 2021 is presented in Figure 8-5. As expected, most years see NDW demand reduced during the winter months of December through February.

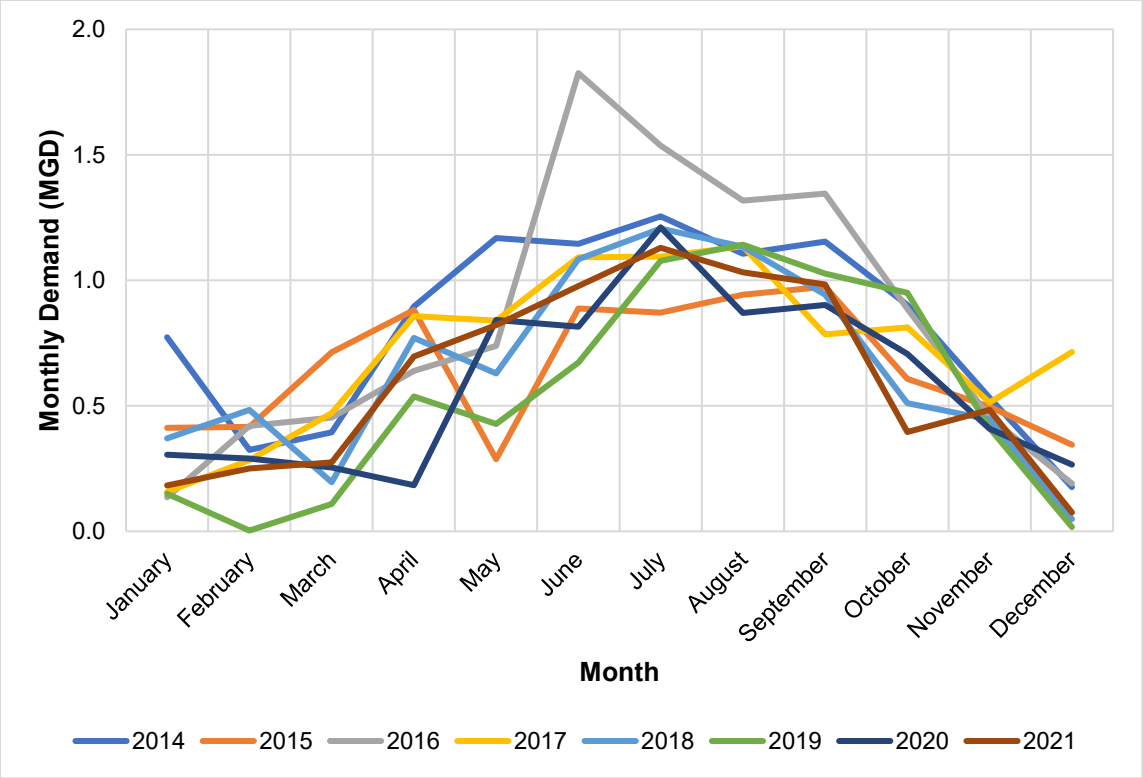


Figure 8-5: Non-Domestic Water Monthly Demand

Peaking factors used for this analysis were established based on the most current system data. Average day demand was established based on monthly consumption data for calendar year 2021. Minimum monthly and maximum monthly demand were also established based on monthly consumption data from the same period. Maximum day demand was determined based on typical maximum day demand observed within the system. An assumption of 0 demand was assumed for the minimum day. A summary of the demands and peaking factors is shown in Table 8-2.

Table 8-2: Non-Domestic Water Peaking Factors

Demand Condition	Peaking Factor	Demand (MGD)	Demand (gpm)	Demand (AFY)
Minimum Day	0.0	0.0	0	0
Minimum Monthly	0.12	0.08	55	88
Average Day	1.00	0.65	451	727
Maximum Monthly	1.83	1.19	825	1,329
Maximum Day	2.66	1.73	1,200	1,932

Note:
1. All peaking factors are applied to Average Day Demand.
2. Minimum Monthly Demand, Average Day Demand, and Maximum Monthly Demand were determined using consumption data from 2021.
3. Maximum Day Demand was established based on typical maximum day demand observed within the system.

9. Hydraulic Model Update

The hydraulic model is a computerized representation of the water distribution system. It consists of elements that represent the actual physical facilities of the distribution system including the network of supply points, pipelines, pump stations, and storage reservoirs. A hydraulic model is a tool used for analysis and planning to predict system performance, identify deficiencies, optimize operations, and size new facilities. The existing hydraulic model was developed by Psomas and completed in 2020.

An updated hydraulic model was developed as part of this Master Plan using the latest GIS geodatabase of the system. The model development process described in the subsequent sections include:

- GIS Update
- Facilities Update
- Additional Model Building Tasks
- Demand Allocation
- Model Calibration
- Scenarios

The District employs iWater Inc. to regularly update and maintain the water system GIS geodatabase using as-built records, operations staff input, field verification, and routine maintenance and data cleanup.

9.1 Facilities Update

System facilities include reservoirs, pump stations, and control valves. The model development process included digitizing and assigning attributes to system facilities to accurately simulate their function in the model.

9.1.1 Reservoirs

The District provided a GIS feature class titled rwNetworkSite that contained a point for each facility within the system. The NDW system includes earth-fill reservoirs, detention basins, and creeks. These were imported into the model as fixed head “reservoirs” which is how InfoWater models supply points. The same naming convention was maintained (Dove Lake, Robinson Ranch, etc.) in the model.

Tick Creek and Dove Creek are not included in the model since all the water from these creeks is conveyed to Dove Lake. Water from Dove Lake is then pumped into Robinson Ranch Reservoir where it is then pumped by Dove Canyon BS into the distribution system.

9.1.2 Booster Stations

The rwPumpStation GIS feature class contained a point for each pump at each of the pump stations. This layer was used to update any missing pump stations/pumps. As-builts were used to accurately digitize the pump station piping.

9.1.3 Control Valves and Isolation Valves

The primary control valves used in the model include pressure reducing valves (PRV) and flow control valves. System PRVs were modeled where they exist in the system to allow upper pressure zones to supply lower pressure zones at a fixed downstream pressure. Flow control valves are used at system supply points and pump stations where a set flow condition needs to be simulated.

9.2 Additional Model Building Steps

A similar process to the water system model was used to conduct steps to ensure the model was complete – checking connectivity, elevation assignment, Hazen-Williams coefficient assignments, and controls and queries.

9.3 Demands

9.3.1 Demand Allocation

Average day demands were allocated within the model using the InfoWater Demand Allocator Extension. The Demand Allocator Extension compares meter locations and demand nodes' coordinates in the model and uses an algorithm to assign proportionate demands from meter data to the demand nodes. Demand nodes are differentiated from other nodes in the model so demands are only assigned at service locations, and not to nodes at system facilities or other locations that do not have service connections.

9.3.2 Diurnal Patterns

Diurnal demand patterns are defined in the model to generate hour-by-hour demand variations in the distribution system. The patterns are critical for accurately simulating parameters such as pipe velocities, travel times, and tank level changes in extended-period simulations (EPSs). As described in Section 8.3 a diurnal curve was established based on hourly SCADA data collected in March 2022. March 25, 2022 was chosen as the representative diurnal curve for the entire non-domestic water system since it was the date with the most demand within March 2022.

9.3.3 Demands for Calibration and Additional Scenarios

The NDW model was calibrated to March 25, 2022 demand. This demand set utilized the average day demand allocation and was adjusted based on a system-wide demand multiplier to match the specific

system demand observed on that day, which was approximately 1.0 MGD (694 gpm). In this example the demand multiplier would be 1.54 (694 gpm/451 gpm).

Additional scenarios were created based on the calibrated March 25, 2022 scenario. The primary difference in the additional scenarios were demands, which were globally adjusted to simulate current average day and future scenarios.

9.4 Model Calibration

Reservoir calibration was not applicable since the NDW system consists of earthen reservoirs with water levels that have minimal variation. However, the model was calibrated sufficiently to ensure that discharge pressures at Dove Canyon BS (NDW) matched SCADA data. The model was also calibrated to match March 25, 2022 demand. Figure 9-1 is a comparison of the Dove Canyon BS (NDW) SCADA discharge pressure to model results.

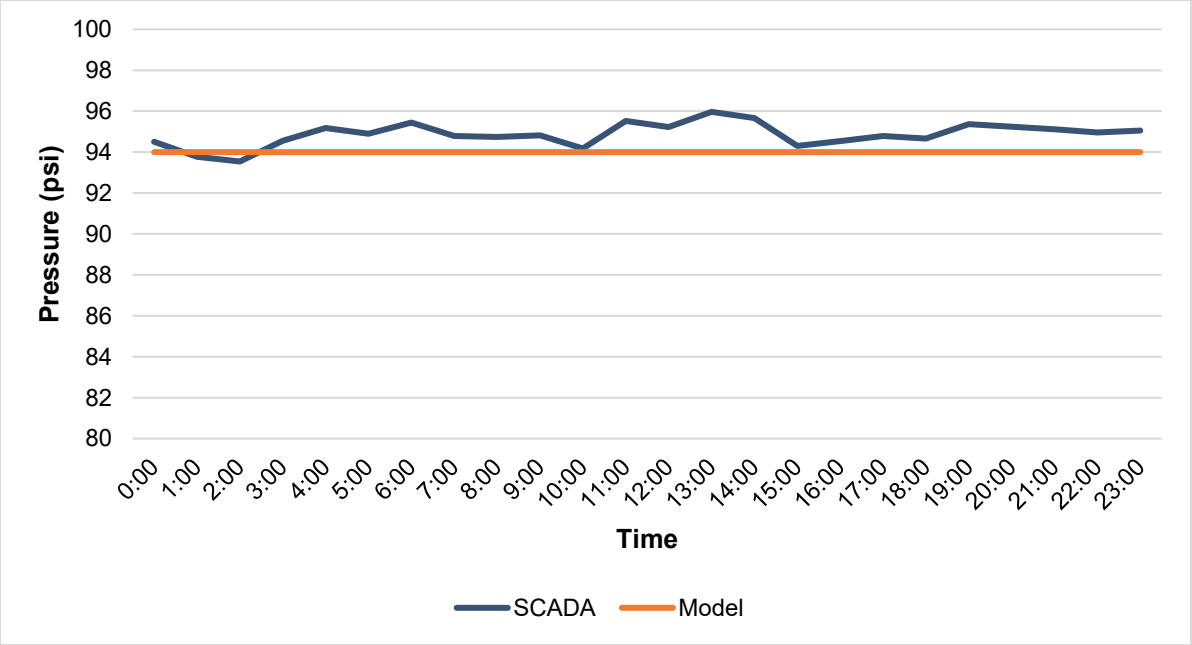


Figure 9-1: Dove Canyon BS (NDW) Discharge Pressures

9.5 Scenarios

Once the calibrated March 2022 scenario was completed, additional scenarios were created for different demand conditions. The hydraulic model can perform steady state and extended period simulation (EPS) scenarios. A steady state simulation is a single snapshot in time and does not include any changes in the model over time. Extended period simulations are performed over a finite period of time and incorporate system controls and changes in the system over time, such as hourly demand variations, tanks emptying and pumps activating based on level control. The scenarios developed in the hydraulic model and used in analyses are the following:

- March 25, 2022 (EPS) – 1 .0 MGD MGD (694 gpm)
- Existing Maximum Day Demand (EPS) – 1.73 MGD (1,200 gpm)

10. System Evaluation

A combination of methods was used to evaluate the NDW system, including hydraulic model analyses, tabular calculations, and review of operational data. Using the hydraulic model, scenarios were used for simulating different demand conditions to evaluate the existing system, and future scenarios were used when sizing and making recommendations.

The NDW system analysis included an evaluation of pressure zone interconnections and overall operations. Each analysis includes an introduction to what was being analyzed, a description of the design criteria, and recommended projects or actions.

10.1 Non-domestic Water Supply Facilities

The District's main source of NDW water is the RRWWTP. If there is not enough water in the reclaimed reservoir, then water is pumped into the Robinson Ranch Reservoir from Dove Lake. The District can also provide supplemental potable water to the NDW system through an air-gapped connection.

The existing NDW supply is sufficient to meet existing demand, average day demand of 0.65 MGD or approximately 729 acre-feet/year. The 2020 District Urban Water Management estimates that future demands for the NDW system will remain stable.

10.2 Pressure Zone Supply

Providing multiple supply points to a pressure zone increases service reliability to the recycled water service area. Supply points to a pressure zone can be a reservoir, pump station, pressure reducing station, imported water connection, or treatment plant supply. An analysis was conducted to verify supply points to each pressure zone, with the criteria that each pressure zone maintains a minimum of two (2) supply points for redundancy as stated in Table 10-1.

For pressure zones where multiple supply points are not feasible such as smaller or isolated sections of the service area, we recommend ensuring the single supply point is made as reliable and redundant as feasible.

10.2.1 Criteria

Table 10-1: Pressure Zone Supply Criteria

Criteria Type	Criteria
Pressure Zone Supply	Pressure zone should have a minimum of two (2) supply points

10.2.2 Analysis

Table 10-2 lists each pressure zone and up to two supply points for the zone. The criteria is met if the zone has two supply points. If a pressure zone has more than two supply points, only two are listed for the purpose of this analysis.

Table 10-2: Pressure Zone and Supply Points Summary

Pressure Zone	Supply Point #1	Supply Point #2	Meets Criteria?
Dove Canyon	Dove Canyon BS (NDW)	None	**No**
Robinson Ranch	Robinson Ranch BS (NDW)	None	**No**
Plano Trabuco	PRV (Robinson Ranch Rd)	None	**No**
Shadow Rock	Shadow Rock BS (NDW)	PRV (Cimmaron Ln) Not part of normal operation	**No**

Dove Canyon, Robinson Ranch, Plano Trabuco, and Shadow Rock pressure zones do not meet the pressure zone supply criteria. There is a PRV along Cimmaron Ln that can be used to supply Shadow Rock Ln. However, this PRV is not part of normal operation and therefore it is not considered a second supply point. Since all four zones are relatively small zones, it is understood that providing secondary supply points may not be feasible. Additionally, losing irrigation water for a short period while power is restored, or repairs are made is not as critical for the NDW since it is not a matter of public health and safety.

10.3 Distribution System Pressure

The pressure analysis evaluated the model's predictions for pressures at service nodes per the criteria in Table 10-3. Service nodes are defined as those nodes where customer service occurs and excludes areas such as inside plant facilities and transmission mains to storage reservoirs. Areas of low and high pressure were evaluated.

10.3.1 Criteria

Table 10-3: Pressure Criteria for Distribution System

Demand Condition	Minimum Service Pressure (psi)
Static Pressure (No Demands)	60 psi
Dynamic Pressure (Operating)	40 psi

10.3.2 Analysis

Low pressure areas (areas with pressure less than 40 psi) were not identified in the system. Refer to Exhibit 10-1 for model observed minimum pressures. This is consistent with the *2019 Engineering Study for Dove Canyon and Robinson Ranch Recycled Water Pump Station Rehabilitation – Phase 1 report* conducted by JIG. The report states that the typical pressures within the NDW system range from 43 to 138 psi.

Pressures in excess of 125 psi were considered high pressure areas. High pressure areas were observed along Heritage Dr and Robinson Ranch Rd. Refer to Exhibit 10-2 for high pressure areas.

10.3.3 Recommendations

Most of the service locations within the system are within acceptable pressure ranges. Low- and high-pressure areas in the system are primarily attributed to elevation, and not facility controls or operation. It is also typically not preferred in operations to change pressures for certain areas because the pipelines and services are accustomed to those pressures and raising pressures could result in leaks or breaks. As a result, large scale projects due to system pressures are not needed.

10.4 System Performance and Operations

10.4.1 Dove Canyon and Robinson Ranch NDW Booster Stations

The Dove Canyon NDW BS discharge provides suction to the Robinson Ranch NDW BS. If either pump station is out of service, customers downstream of the Robison Ranch NDW BS are left without water. The current configuration of these pump stations is not ideal for delivering recycled water to customers throughout the District's service area. Dove Canyon customers are at the lower elevation compared to the rest of the NDW customers and use the most water. The same pump station that serves Dove Canyon customers cannot be used to serve Robinson Ranch customers. Robinson Ranch Zone is at a higher elevation than Dove Canyon Zone and makes up a small fraction of the non-domestic water demands. The *2019 Dove Canyon and Robinson Ranch Recycled Water Pump Station Rehabilitation – Phase 1 report* by JIG Consultants recommended the following modifications for more efficient distribution and operating conditions.

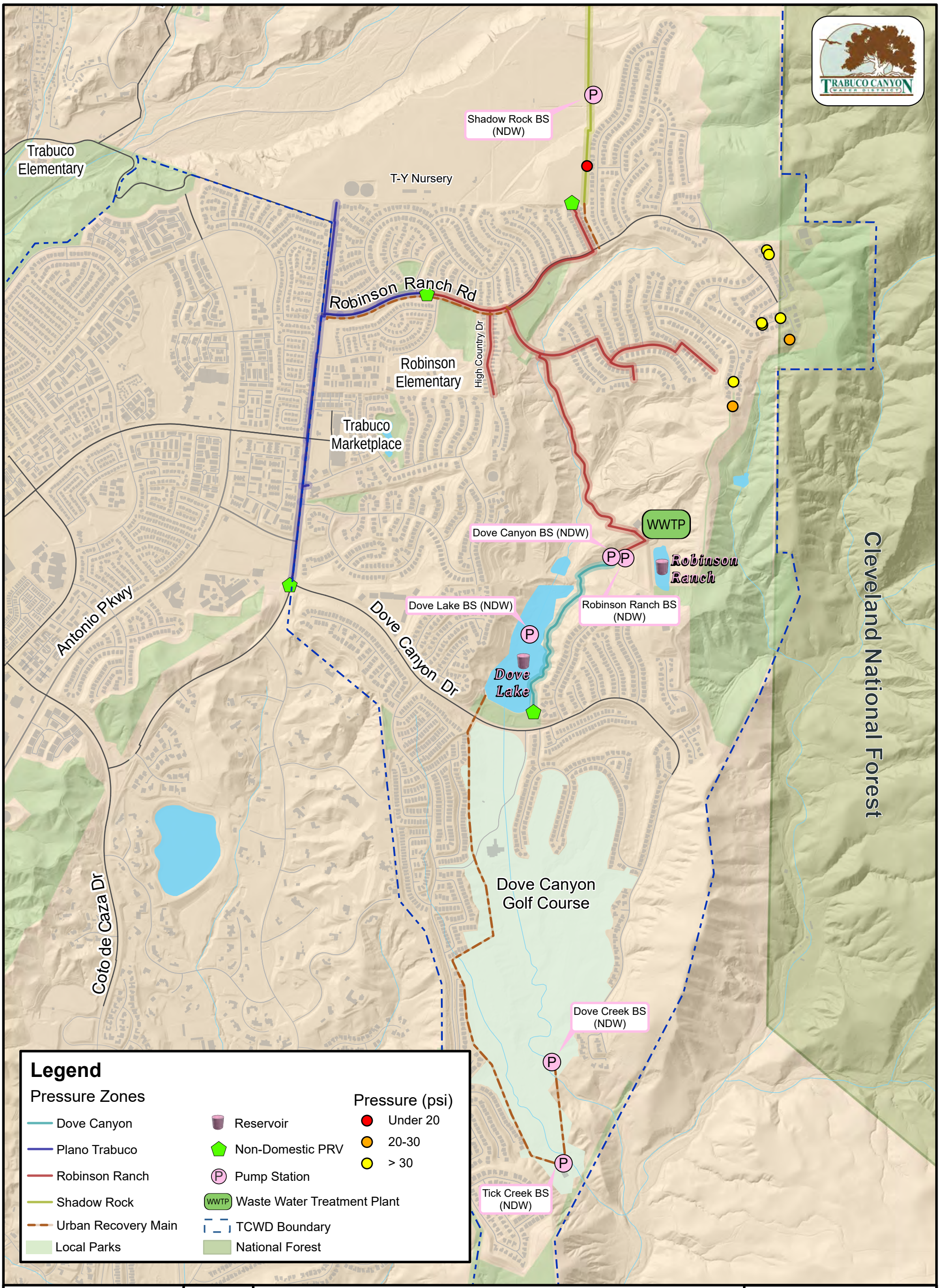
- Dove Canyon NDW BS
    - Replacement of existing pumps with high-flow low head pumps
    - Pump station will continue to take suction from the existing 20-inch steel pipe but will only serve Dove Canyon customers
- Robinson Ranch NDW BS
    - Replacement of existing pumps with low flow-high head pumps

- Pump station will take suction from the existing 20-inch steel pipe instead of Dove Canyon NDW BS

A project has been developed for the above modifications and will be included as part of the Capital Improvement Program in Section 17.

10.4.2 Dove Lake and Robinson Ranch Reservoir Slide Gate Replacement

Both Dove Lake and Robinson Ranch Reservoir have slide gates that are inoperable. The Dove Lake slide gate is stuck in a closed position. The Robison Ranch Reservoir slide gate is stuck in an open position. The Department of Water Resources Division of Safety of Dams Water Code states that outlet valves must be cycled once a year, and every 3 years in the Division's presence. These slide gates must be repaired in order to meet code. It is recommended that the District conduct specialized dive inspections at both reservoirs to determine the most appropriate, cost-effective method to repair these slide gates with the least impact to aquatic life.



0 0.13 0.25 Miles

3

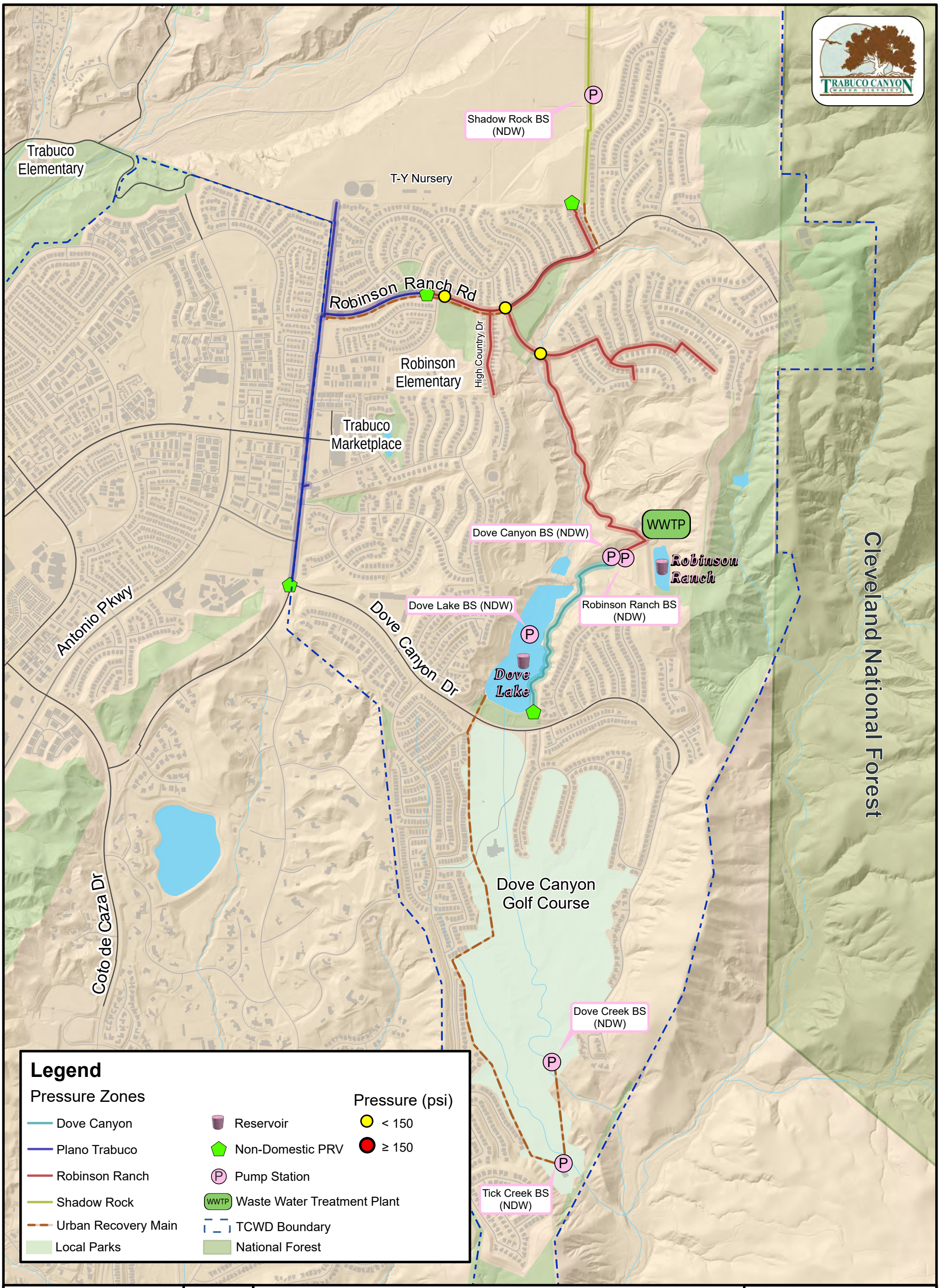
Non-Domestic Water Low Pressure Areas

Exhibit 10-1

Hazen

Trabuco Canyon Water District
Master Plan

February 2023



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3

Non-Domestic Water High Pressure Area

Exhibit 10-2

Hazen

Trabuco Canyon Water District
Master Plan

February 2023