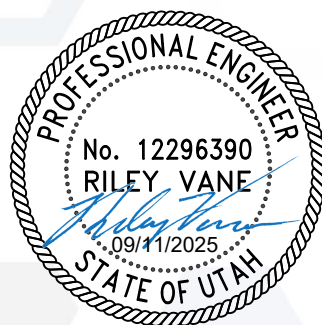


# LEEDS DOMESTIC WATERUSERS ASSOCIATION

## PUBLIC WATER SYSTEM CAPACITY EVALUATION

September 10, 2025

Project #: 2206-014



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## 1. INTRODUCTION

The Leeds Domestic Water Users Association (LDWA) culinary is a Public Water System (PWS) located in Washington County, and largely servicing the area of Leeds Town. This capacity study by Jones & DeMille Engineering (JDE) has been developed to determine existing system deficiencies, if any, and likewise any excess capacity as determined by the Utah Division of Drinking Water (DDW) system sizing standards. Water rights, sources, treatment and storage capacities were analyzed for the existing demands and certain obligations by the LDWA. A water model of the system, with current demands, was used to evaluate the existing system fire flow and pressure capacities. In addition to DDW criteria, LDWA bylaws have additional criteria for determining capacity, and are included for comparison. JDE cannot determine which of the criteria, in event of conflict, is the controlling criteria. However, both DDW state criteria and LDWA bylaws are presented for comparison.

### 1.1. SYSTEM INFORMATION

The following system information was retrieved from the Utah Department of Environmental Quality (DEQ) online database and reflects 2023 reported values.

Table 1. System Information

System Name	Leeds Domestic Water Users Association
PWS ID	UTAH27010
Population	864 (2020 Census)
System Type	Community
Certification	D1
Status	Active
Rating	Approved
IPS Points	0
Annual Operational Days	365

## 2. REFERENCES

- Utah Administrative Code:
  - [Rule R309-105 - Administration: General Responsibility of Public Water Systems](#)
  - [Rule R309-510 - Facility Design and Operation: Minimum Sizing Requirements](#)
  - [Rule R309-511 - Facility Design and Operation: Hydraulic Modeling Requirements](#)
  - [Rule R309-520 - Facility Design and Operation: Disinfection](#)
- Utah State Code:
  - [Utah Code 19-14-114](#)
- DDW Policy Memo:
  - [DDW Detailed Guidance on Water Use Reporting and Setting System-Specific Source and Storage Sizing Requirements](#)
- 2021 International Fire Code (IFC):
  - [Section B105 – Fire Flow Requirements for Buildings](#)
- Utah Division of Water Rights Database

- LDWA Bylaws
  - [Article 2, Section 2 – Membership](#)
  - [Article 9, Section 4 – Seasonal Water Use](#)
- InfoWater Pro V2026.0.2 Hydraulic Model

### 3. METHODOLOGY

Minimum sizing requirements for water sources, storage tanks, and water lines are specified in R309-510. Utah Code 19-4-14 supersedes some of the statewide requirements by directing the Division of Drinking Water to establish system-specific source and storage sizing requirements for public water systems. Until DDW sets system-specific sizing requirements for a water system, the statewide standards of R309-510 apply. The system-specific sizing requirements will be based on water use data that water systems are required to collect and report to the Division of Water Rights.

This capacity assessment is based on system-specific analysis to better plan for LDWA’s obligated water services. This report, though performed under the guidance indicated by state codes described above, is not to be considered the LDWA system-specific sizing as codified. As a community serving a population between 500 and 3,300, the DDW director will set the system specific source and storage sizing requirements at an undetermined date.

### 4. EQUIVALENT RESIDENTIAL CONNECTIONS (ERCS) AND USAGE DATA

#### 4.1.1. ERCS

Currently, there are 385 connections reported to the State with a mix of residential, commercial, industrial, and institutional classified users. Typically, for planning purposes, ERCs are used to define the capacities of system components. The equations below show the conversion from connections to ERCs. Some non-residential connections use more than a typical residential connection and therefore have more ERCs than connections.

$$\text{Water Usage per ERC} = \frac{\text{Total Water Used by Residential Connections}}{\text{Number of Residential Connections}}$$

$$\text{Number of ERCs by Class} = \frac{\text{Water Usage by Type of Connection}}{\text{Water Usage per ERC}}$$

Water usage for the classes of connections was determined based on the most recent 3-years of annual reports submitted by LDWA to DDW. Because the data does not differentiate between indoor and outdoor water usage, the calculation for converting connections to ERCs combines indoor and outdoor use. A summary of contributing connections and their ERC value is shown in Table 2.

Table 2. 2023 Contributing Culinary Water Connections and ERCs

2023 Contributing Connections	Existing Connections	ERCs	Average ERC Value per Connection
Residential	361	361	1.00
Commercial	17	25.74	1.51
Industrial	1	0.27	0.27
Institutional	7	13.64	1.95
<b>Contributing Total</b>	<b>386</b>	<b>401</b>	-

In addition to the total from the connections and DDW criteria described above, LDWA is obligated to provide water for the following parcel groups or classifications:

- Standby Connections – Currently non-contributing to usage. Monthly payments by Shareholder.
- Undeveloped Leeds Parcels – Committed to serve in 2015 by LDWA bylaws.
- SITLA Parcels – Rights deeded to LDWA for future development.
- Silver Point Estates Parcels – Rights deeded to LDWA for future development.
- Silver Eagle Estates Parcels – Rights deeded to LDWA for future development.

Table 3. 2023 Obligated Culinary Water Connections and ERCs

2023 Obligated Connections	Future Connections	ERCs	Average ERC Value per Connection
<b>Contributing Total</b>	<b>386</b>	<b>401</b>	-
Standby	25	25	1
Undeveloped	191	191	1
SITLA	45	45	1
Silver Point Estates	105	105	1
Silver Eagle Estates	13	13	1
<b>Obligated Total</b>	<b>765</b>	<b>780</b>	-

Growth within the LDWA service area is expected to be minimal. Any excess capacity may serve the infill of larger parcels and irrigated acreage within the LDWA service area as capacity allows. Therefore, no additional growth is modeled for this report. The following water system facilities will be therefore analyzed according to the following scenarios: 1) Contributing ERCs, and 2) Obligated ERCs.

#### 4.1.2. USAGE DATA

In accordance with Utah Code 19-14-114, the following source and storage calculations were made from the annual report data submitted to the Division of Water Rights by LDWA. Usage data was analyzed for the most recent three years (2021-2023) and the maximum values were used for the calculations.

- Diversion Limit (Peak Daily Demand or PDD) (2021): Peak Day Amount divided by number of ERCs = 989 gallons/day/ERC = 0.687 gpm/ERC (0.00153 cfs/ERC)
- Annual Diversion Volume (ADD projected for one year) (2021): Total Annual Use divided by number of ERCs = 0.632 ac-ft/yr/ERC (205,727 gallons/year/ERC)
- Equalization Storage: Annual Diversion Volume divided by operating days = 564 gallons/day/ERC

## 5. LEVEL OF SERVICE (LOS)/ CAPACITY ANALYSIS

The State of Utah Division of Drinking Water (DDW) Rule and the current International Fire Code (IFC) outline the minimum LOS that water systems are required to provide to ensure quality and quantity.

### 5.1. WATER RIGHTS

LDWA currently has a total of 733.74 ac-ft per year of water rights as summarized below.

Table 4. Water Rights Summary

Water Right #	Change App	Source	Quantity (cfs)	Quantity (ac-ft)	Use	Status	Link
81-1260	a50541	Well	0.2500	60.00	Municipal	Approved	<a href="#">81-1260</a>
81-1716	a50541	Well	0.3335	80.01	Municipal	Approved	<a href="#">81-1716</a>
81-2185	a50541	Well		31.00	Municipal	Approved	<a href="#">81-2185</a>
81-2638 <sup>1</sup>	a50541	Well	0.1200	39	Municipal	Approved	<a href="#">81-2638</a>
81-3160	a50541	Well	0.1670	40.08	Municipal	Approved	<a href="#">81-3160</a>
81-3166 <sup>1</sup>	a50541	Well	0.0700	8.16	Municipal	Approved	<a href="#">81-3166</a>
81-3720	a50541	Well		10.5	Municipal	Approved	<a href="#">81-3720</a>
81-3821	a50541	Well		0.772	Municipal	Approved	<a href="#">81-3821</a>
81-3853	a50541	Well		5.82	Municipal	Approved	<a href="#">81-3853</a>
81-3959	a50541	Well		10.2	Municipal	Approved	<a href="#">81-3959</a>
81-4113 <sup>1</sup>	a50541	Well		8.00	Municipal	Approved	<a href="#">81-4113</a>
81-4236	a50541	Well		5.65	Municipal	Approved	<a href="#">81-4236</a>
81-4262	a50541	Well		18.00	Municipal	Approved	<a href="#">81-4262</a>
81-4328	a50541	Well		1.70	Municipal	Approved	<a href="#">81-4328</a>
81-4392	a50541	Well		11.00	Municipal	Approved	<a href="#">81-4392</a>
81-4402 <sup>2</sup>	a50775	Well		19.56	Municipal	Approved	<a href="#">81-4402</a>
81-4540	a50541	Well	0.09254	43.15	Municipal	Approved	<a href="#">81-4540</a>
81-4707	a50541	Well		8.78	Municipal	Approved	<a href="#">81-4707</a>
81-4708	a50541	Well		1.00	Municipal	Approved	<a href="#">81-4708</a>
81-4757	a50541	Well		8.00	Municipal	Approved	<a href="#">81-4757</a>
81-4804	a50541	Well		5.00	Municipal	Approved	<a href="#">81-4804</a>
81-5593	a50541	Well		42.00	Municipal	Approved	<a href="#">81-5593</a>
81-5594	a50541	Well	0.4379	84.998	Municipal	Approved	<a href="#">81-5594</a>
81-5595	a50541	Well		13	Municipal	Approved	<a href="#">81-5595</a>
81-787	a50541	Well	0.5	22.5	Municipal	Approved	<a href="#">81-787</a>
81-1121 <sup>3</sup>		Oak Grove Spring	0.0500	4.5	Municipal	Certificated	<a href="#">81-1121</a>
81-1123 <sup>4</sup>	a43925	Oak Grove Spring	0.1727	57.00	Municipal	Approved	<a href="#">81-1123</a>
81-1134		Oak Grove Spring	0.1100	79.64	Municipal	Certificated	<a href="#">81-1134</a>
81-2220 <sup>3</sup>		Oak Grove Spring	0.0500	14.40	Municipal	Certificated	<a href="#">81-2220</a>

<sup>1</sup>Previously a surface water right for Hogan Springs

<sup>2</sup>Wet Sandy, previously a surface water right for Sand Hollow Creek

<sup>3</sup>Official name of POD is Quail Creek Spring

<sup>4</sup>Official name of POD is Quail Creek

Depletion limits are identified on change applications a50541, a50775, and a43925. The allowable depletion for the associated water rights is 289.952 ac-ft, 10.4177 ac-ft, and 30.3582 ac-ft, respectively. A depletion limit for water rights 81-1121, 81-1134, and 81-2220 was not listed. The total allowable depletion of the system is 330.7279 ac-ft. The total water rights diversion limits are summarized below.

Table 5. Water Rights Diversion Limits Summary

Diversion	Rights
Peak Daily Demand	2.3536 cfs (1,056.3 gpm)
Annual Average Demand	733.42 ac-ft
Total Depletion	330.7279 ac-ft

### 5.1.1. LEVEL OF SERVICE

The system-specific level of service will be determined by Code 19-14-114 and the DDW director. According to the methods codified, the existing LOS is as follows:

- Diversion Limit: Provide the Peak Day Demand (PDD) for combined indoor and outdoor use.
  - LDWA PDD = 0.687 gpm per ERC
- Annual Diversion Volume: Provide the Average Annual Demand (AAD) for combined indoor and outdoor use.
  - LDWA ADD = 0.632 ac-ft per ERC (205,860 gallons)
- Depletion: Septic systems allow for 20% depletion of total annual volume
  - LDWA Depletion = 20% of 0.632 ac-ft per ERC = 0.1264 ac-ft per ERC

Table 6. Water Rights Capacity

Diversion	Capacity ERCs
Peak Daily Demand	1,537
Annual Average Demand	1,160
Total Depletion	2,616

### 5.1.2. EXCESS CAPACITY

From the LOS analysis, the limiting component of the system water rights is the average annual diversion. For the purpose of this analysis, only the ADD capacity of 1,160 ERCs will be analyzed to determine excess capacity.

Scenario	Demand ERCs	Excess / (Deficit)
<b>Contributing ERCs</b>	401	<b>759</b>
<b>Obligated ERCs</b>	780	<b>380</b>

### 5.1.3. IMPROVEMENTS

The current water rights are sufficient to meet the demand of the existing system. Water rights that are put to full beneficial use should have a proof performed by a licensed engineer or surveyor to protect the water right. If the water rights have not been put to full beneficial use by the time the proof is required, then an extension should be filed with the Water Rights Office.

### 5.2. SOURCES (CODE 19-14-114)

LDWA has two active and existing water sources. There is seasonal variability of the spring; however, the well experiences no season variability.

Table 7. Source Summary

Source ID	Source Name	Reported Rates (3 years)
<b>WS001</b>	Oak Grove Spring	Varies 63.16 - 92.92 gpm. Avg. 80.14 gpm.
<b>WS002</b>	Leeds Well	Pump tested 605 gpm.

#### 5.2.1. EXISTING LEVEL OF SERVICE

The system-specific level of service will be determined by Code 19-14-114 and the DDW director. The updated Utah Code assigns safe yield values to sources and are summarized below. According to the methods codified, the existing LOS is as follows:

- Flow Rate: Provide the Peak Day Demand (PDD) for combined indoor and outdoor use.
  - LDWA PDD = 0.687 gpm per ERC
- Safe Yield of Sources:
  - Springs - 25<sup>th</sup> percentile of historical flow.
  - Wells - Two-thirds (2/3) of the test pumping rate

Table 8. Source Capacity

Source ID	Source Name	Safe Yield (gpm)	Capacity ERCs
<b>WS001</b>	Oak Grove Spring	69.2	100.7
<b>WS002</b>	Leeds Well	403	586.6
<b>Total Source</b>		<b>472.2</b>	<b>687</b>

#### 5.2.2. EXCESS CAPACITY

Comparing the capacity of the existing sources to the demand scenarios described above show the following excesses and deficits.

Table 9. Source Excess Capacity

Scenario	Demand ERCs	Excess / (Deficit)
<b>Contributing ERCs</b>	401	<b>286</b>
<b>Obligated ERCs</b>	780	<b>(90)</b>

### 5.2.3. IMPROVEMENTS

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LDWA has secured funding for the construction of an additional well. The proposed well is expected to add an additional 400 gpm safe yield to the system to supplement existing flows, or 582 ERCs. Accounting for the additional well, the water sources have the following excess capacity.

Table 10. Source Improvements and Excess Capacity

Scenario	Demand ERCs	Excess / (Deficit)
<b>Contributing ERCs</b>	401	<b>868</b>
<b>Obligated ERCs</b>	780	<b>489</b>

### 5.3. TREATMENT (R309-511)

Currently, neither the well source nor the spring source is equipped with treatment equipment.

#### 5.3.1. LEVEL OF SERVICE

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The minimum LOS does not require treatment if the water quality is sufficient, and no contaminants are present in water samples.

- The capacity of chlorine feed equipment shall be sized to provide at least 2 mg/L during peak demand.
  - LDWA PDD = 0.687 gpm per ERC

#### 5.3.2. EXCESS CAPACITY

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As there is no current disinfection requirement there is no excess capacity of deficiency.

#### 5.3.3. IMPROVEMENTS

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While the water quality of the system is not currently deficient, LDWA has proposed the addition of chlorination facilities to both the spring source and the combined well sources. The selected chlorinator is a liquid chlorine type injector for 12.5% concentrated sodium hypochlorite. The peristaltic pumps are rated up to 1.35 gph delivered solution. For a maximum delivery of 2 mg/L, the capacity of each proposed chlorinator is 1,406 gpm source water, or 2,046 ERCs.

Table 11. Treatment Improvements and Excess Capacity

Scenario	Demand ERCs	Excess / (Deficit)
<b>Contributing ERCs</b>	401	<b>1,645</b>
<b>Obligated ERCs</b>	780	<b>1,269</b>

#### 5.4. STORAGE (CODE 19-14-114)

LDWA currently has 5 active storage tanks. The capacity of each tank and total is summarized in Table 12.

Table 12. Storage Summary

Storage ID	Storage Name	Storage Type	Effective Volume (gal)
<b>ST001</b>	060-1	Above Ground Steel	60,000
<b>ST002</b>	030-2	Above Ground Steel	30,000
<b>ST003</b>	450-3	Above Ground Steel	450,000
<b>ST004</b>	125-4	Buried Concrete	125,000
<b>ST005</b>	350-5	Above Ground Steel	350,000
<b>Total Storage</b>			<b>1,015,000</b>

##### 5.4.1. EXISTING LEVEL OF SERVICE

The system-specific level of service will be determined by Code 19-14-114 and the DDW director. According to the methods codified, the existing LOS is as follows:

- Equalization Storage: Provide the daily equivalent of the Average Annual Demand (AAD) per ERC for combined indoor and outdoor use.
  - LDWA AAD = 564 gal. per ERC
- Fire Suppression: Provide the most IFC demand per the most restrictive structure in the system.
  - LDWA Restrictive Building = LDS Church (7,000 sf, Type V-B)
  - IFC Demand = 2,250 gpm for 2 hours = 270,000 gal.
- Chlorination Volume: Required volume for contact time is excluded from storage calculations.

Table 13. Storage Capacity

Total Storage (gal)	Less (gal)	Effective Storage (gal)	Capacity ERCs
1,015,000	270,000	<b>745,000</b>	<b>1,320</b>

##### 5.4.2. EXCESS CAPACITY

Comparing the capacity of the existing storage to the demand scenarios described above show the following excesses and deficits.

Table 14. Excess Storage Capacity

Scenario	Demand ERCs	Excess / (Deficit)
<b>Contributing ERCs</b>	401	<b>919</b>
<b>Obligated ERCs</b>	780	<b>540</b>

##### 5.4.3. IMPROVEMENTS

No improvements are needed to meet the contributing or obligated demands.

## 6. LDWA BYLAWS

In addition to the state requirements, the LDWA Bylaws also contain requirements for the minimum LOS that must be met. Each shareholder has a minimum volume of water that they are obligated to for the peak flow months. The total number of connections is also governed based on average usage of the system.

### 6.1. ALTERNATE WATER RIGHTS CAPACITY - CONNECTIONS

#### 6.1.1. LEVEL OF SERVICE

Per the LDWA Bylaws, the total number of connections that LDWA can supply is based on the rolling average water use per connection for the past 5 years, or no less than 0.85 ac-ft. per connection. The total water rights for the system are divided by the rolling average to determine the maximum number of connections as follows.

Table 15: Annual Usage per Connection

Year	Connections	Total annual use (ac-ft)	Usage per connection (ac-ft)
<b>2023</b>	385	201.74	0.524
<b>2022</b>	384	233	0.605
<b>2021</b>	382	247	0.648
<b>2020</b>	377	244.5	0.649
<b>2019</b>	377	259.89	0.689
<b>Average</b>			<b>0.623</b>

Using the minimum value of 0.85 ac-ft, the total number of connections allowed is summarized below.

Table 16. Alternate Connection Capacity

Rights Capacity (ac-ft)	Capacity Connections
<b>733.74</b>	<b>863</b>

#### 6.1.2. EXCESS CAPACITY

Comparing the capacity of the existing water rights to the demand scenarios described above show the following excesses and deficits.

Table 17. Alt. Excess Connection Capacity

Scenario	Demand Connections	Excess / (Deficit)
<b>Contributing ERCs</b>	401	<b>462</b>
<b>Obligated ERCs</b>	780	<b>83</b>

## 6.2. ALTERNATE SOURCE CAPACITY – PEAK MONTHS

### 6.2.1. LEVEL OF SERVICE

Per the LDWA Bylaws, a volume of 40,000 gallons per month (0.913 gpm) must be unimpaired to each shareholder for peak flow months (June, July, and August).

Table 18. Alternate Source Capacity

Source Capacity (gpm)	Capacity Shareholders
<b>472.2</b>	<b>517</b>

### 6.2.2. EXCESS CAPACITY

LDWA is reported to have 411 shareholders (active connections plus standby connections). Comparing the capacity of the existing sources to the demand scenarios described above show the following excesses and deficits.

Table 19. Alt. Source Excess Capacity

Scenario	Demand Shareholders	Excess / (Deficit)
<b>Contributing ERCs</b>	411	<b>106</b>
<b>Obligated ERCs</b>	780	<b>(263)</b>

### 6.2.3. IMPROVEMENTS

As detailed in section 5.2.3., LDWA has proposed the construction of an additional well source which will increase the source capacity by 400 gpm, or 438 shareholders. The excess shareholder capacity including the additional source is shown below.

Table 20: Alt. Source Improvements and Excess Capacity

Scenario	Demand Shareholders	Excess / (Deficit)
<b>Contributing ERCs</b>	411	<b>544</b>
<b>Obligated ERCs</b>	780	<b>175</b>

## 7. HYDRAULIC MODEL

InfoWater Pro 2026.0.2 was used to model the system. Lidar data was used to determine the elevations of junctions in the system. Design criteria for the hydraulic model was obtained from the Division of Drinking Water requirements cited in Section 3. The minimum pressure requirements are as follows:

- 20 psi during Peak Day Demand (PDD) and fire flow
- 30 psi during Peak Instantaneous Demand (PID)
- 40 psi during PDD

A summary of flows per ERC for each scenario is shown in Table 21.

Table 21. Water Model Flow Factors

ADD Flow per ERC	PDD Flow per ERC	PID Flow Capacity per ERC
0.392 gpm	0.687 gpm	1.030 gpm

## 7.1. MODEL RESULTS

The model results show that all minimum pressures can be met for each scenario and that the minimum of 1,500 gpm can be provided throughout the system. However, the model shows that there are pressures up to 150 psi (immediately above PRVs). High pressures like this can cause older pipe to break and leak. LDWA should monitor these high-pressure areas for leaks or breaks.

## 8. SUMMARY

The capacity evaluation of the existing LDWA system is summarized below according to the identified contributing connections and the additional obligated connections that LDWA has identified. The values are reported in Equivalent Residential Connections, ERCs as previously described. The final column indicated excess ERCs with the described improvements included. Improvements include:

- A new well source of 400 gpm safe yield capacity.
- New chlorinators for each source group capable of treating up to 1,400 gpm of source water.

Table 22. System ERC Excess Capacity Summary with Improvements

System Component	Current Capacity ERC	Contributing ERC Excess/(Deficit)	Obligated ERC Excess/(Deficit)	Obligated with Improvements Excess/(Deficit)
<b>State Minimum Sizing Criteria</b>				
<b>Water Rights</b>	1,160	759	380	380
<b>Source</b>	687	286	(90)	489
<b>Treatment</b>	-	-	-	1,269
<b>Storage</b>	1,320	920	540	540
<b>LDWA Bylaw Min. Sizing Criteria</b>				
<b>Alt. Water Rights</b>	863	463	83	83
<b>Alt. Source</b>	517 (shareholders)	106	(263)	175

## 9. STATEMENT OF COMPLIANCE

This analysis and report have been prepared in accordance with applicable State minimum level of service criteria. The analysis results show that the LDWA water system is capable of providing service above the minimum requirements as currently presented. Additional iterations or changes of the

development plan should be modeled to verify that the proposed system is adequately sized to provide the pressure and flow requirements required by the applicable state codes, rules, and guidelines.