

System Servicing Plan Technical Memorandum

TECHNICAL MEMORANDUM

DATE: January 22, 2026

Project No.: 206-60-24-56

SENT VIA: EMAIL

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SUBJECT: City of Lincoln – System Servicing Plan



INTRODUCTION AND PURPOSE

This technical memorandum (TM) summarizes findings from the City of Lincoln’s (City) Water Master Plan Update (WMPU). The purpose of this TM is to document the system servicing strategy, including projected water demands, supply capacity, system evaluation, capital improvement planning, and staffing needs to support buildout of the City’s water system. The TM integrates results from key technical analyses and establishes a framework for the City’s long-range water system planning.

PLANNING FRAMEWORK AND DATA SOURCES

This TM integrates data and findings from the following WMPU chapters:

- Chapter 3 – Water Demand Analysis
- Chapter 4 – Water Supply Analysis
- Chapter 7 – Existing System Evaluation
- Chapter 8 – Future System Evaluation
- Chapter 10 – Capital Improvement Program

The planning horizon extends through full buildout consistent with the City’s General Plan. Land use based projections, service area boundaries, and system hydraulic evaluations provide the foundation for the system servicing plan.

PLANNED DEVELOPMENT

The General Plan 2050 (GP) serves as a long-term policy guide for the City’s growth and is the basis for the future growth projections used for facility planning along with input from the City’s Community Development Department. The GP framework identifies multiple new development areas as shown on Figure 1. In Chapter 3 of the WMPU, the development of the future growth areas was classified in 5-year increments through a 20-year period with any remaining area assumed to be developed at buildout based

on input from the City’s Community Development Department. Growth is expected primarily in Village 1 and Village 5 over the next 20 years. The time frames associated with each Village and Special Use District (SUD) on Figure 1 are as follows:

- Village 1 is anticipated to be substantially completed within 10 years.
- SUD B is anticipated to begin development in the next 5 years and be substantially completed within 15 years.
- Villages 5 and 7 are anticipated to begin development in the next 5 to 10 years and be substantially completed within 15 to 20 years.
- Villages 2, 3, 4, and 6 and SUD-A and -C are assumed to develop in buildout (beyond 20 years).

Each planned growth area’s water service strategy considers:

- Land use and density
- Topography and pressure zones
- Phasing

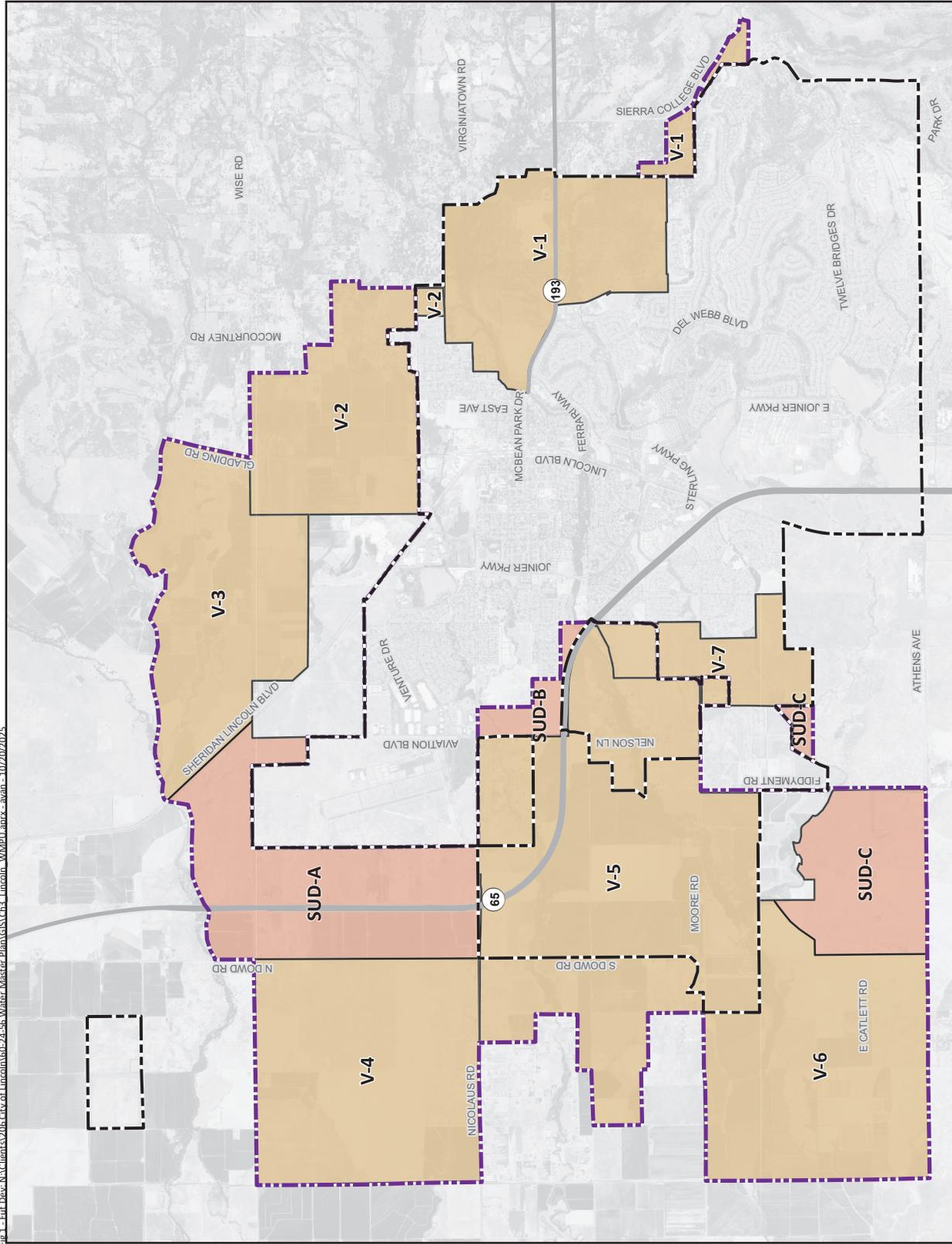
The servicing approach maintains consistency with the City’s long-range growth policies and ensures water infrastructure aligns with planned land use and timing assumptions.

PROJECTED DEMANDS

Chapter 3 of the WMPU establishes the basis for the City’s updated water demand projections. The City’s historical and current water use were evaluated to determine per capita water use and land-use based unit use factors.

Approximately 97 percent of future water connections are expected to be single-family residential, reflecting the City’s anticipated development mix. Peaking factors (i.e., average day to maximum day to peak hour) were established based on historical water consumption data. Demand projections were summarized in five-year increments and provided the basis for system hydraulic model evaluations and supply planning. Table 1 summarizes the total projected demand estimates based on the planned development discussed in the previous section.

Fig. 1 - File: D:\w\A\A\Clients\2016\City of Lincoln\6024-56\Water Master Plan\GIS\Ch3_Lincoln_WM\PLI.aprx - 10/20/2025



Notes:
 1. GIS zoning and land use shapefiles provided by the City of Lincoln in 2025.

Prepared by:



Prepared for:



City of Lincoln
 Water Master Plan Update

Future Development Areas
 Figure 1

Table 1. Projected Water Production Requirements^(a)		
Phase	Average Day Demand, mgd	Maximum Day Demand, mgd^(b)
Existing ^(c)	9.0	16.9
5-Year	10.9	20.5
10-Year	14.0	26.4
15-Year	16.9	31.9
20-Year	18.9	35.7
Buildout	35.3	66.9

(a) Projected demands include non-revenue water of 10 percent.
 (b) Average day to maximum day demand factor equals 1.9.
 (c) Existing demands based on 2023 demands.
 mgd = million gallons per day

The projections indicate that growth in demands is proportional to growth in planned development. The City’s average day demand is projected to approximately quadruple by buildout. These estimates provide the foundation for system capacity evaluation and capital improvement planning.

WATER SUPPLY AND SERVICING STRATEGY

As detailed in Chapter 4 of the WMPU, the City’s water supply portfolio includes both surface water and groundwater resources to ensure a balanced, redundant water supply. The existing surface water and groundwater supplies provide sufficient capacity for existing demands through the 15-year maximum day demand. After the 15-year time frame, the City would need to expand its water supply sources to meet future demands.

Long-term planning includes maintaining redundancy though maximizing available surface water through surface water agreements and continued sustainable groundwater use along with evaluating additional opportunities for future water sources. Future water source opportunities include increased use of recycled water as development occurs on the westside of the City, potential groundwater recharge, and aquifer storage and recovery (ASR) to ensure a sustainable groundwater basin.

The servicing strategy is designed to ensure:

- Adequate supply for projected maximum day demands through buildout.
- Operational flexibility and redundancy.
- Consistency with contractual supply agreements and reliability targets.

SYSTEM CAPACITY AND PHASING PLAN

The hydraulic analyses performed as part of Chapters 7 and 8 of the WMPU evaluated transmission pipelines, pumping facilities, and storage needs to assess system performance under future growth scenarios. The analyses verified that planned facility improvements maintain required pressure and fire flow criteria throughout the service area.

Key elements of the phasing plan are listed below:

- Near-Term (0-5 years): Target reliability improvements and address localized deficiencies.
- Mid-Term (5-15 years): Expand capacity to support development in Village 5 and other developments.
- Long-Term (15+ years): Complete storage, transmission, and booster improvements for buildout of the sphere of influence.

The phasing plan ensures that infrastructure expansion aligns with development pacing and funding availability. Coordination with developers is essential for phasing and cost allocation.

CAPITAL IMPROVEMENT IMPLEMENTATION STRATEGY

The Capital Improvement Program (CIP) outlined in Chapter 10 of the WMPU identifies the projects necessary to address deficiencies, support new development, and maintain service reliability. Key elements include:

- New transmission pipelines to extend service to growth areas
- Additional storage facilities to meet emergency and operational needs
- Booster pump station improvements and inter-zone connections
- Distribution system upgrades to enhance fire flow and reliability

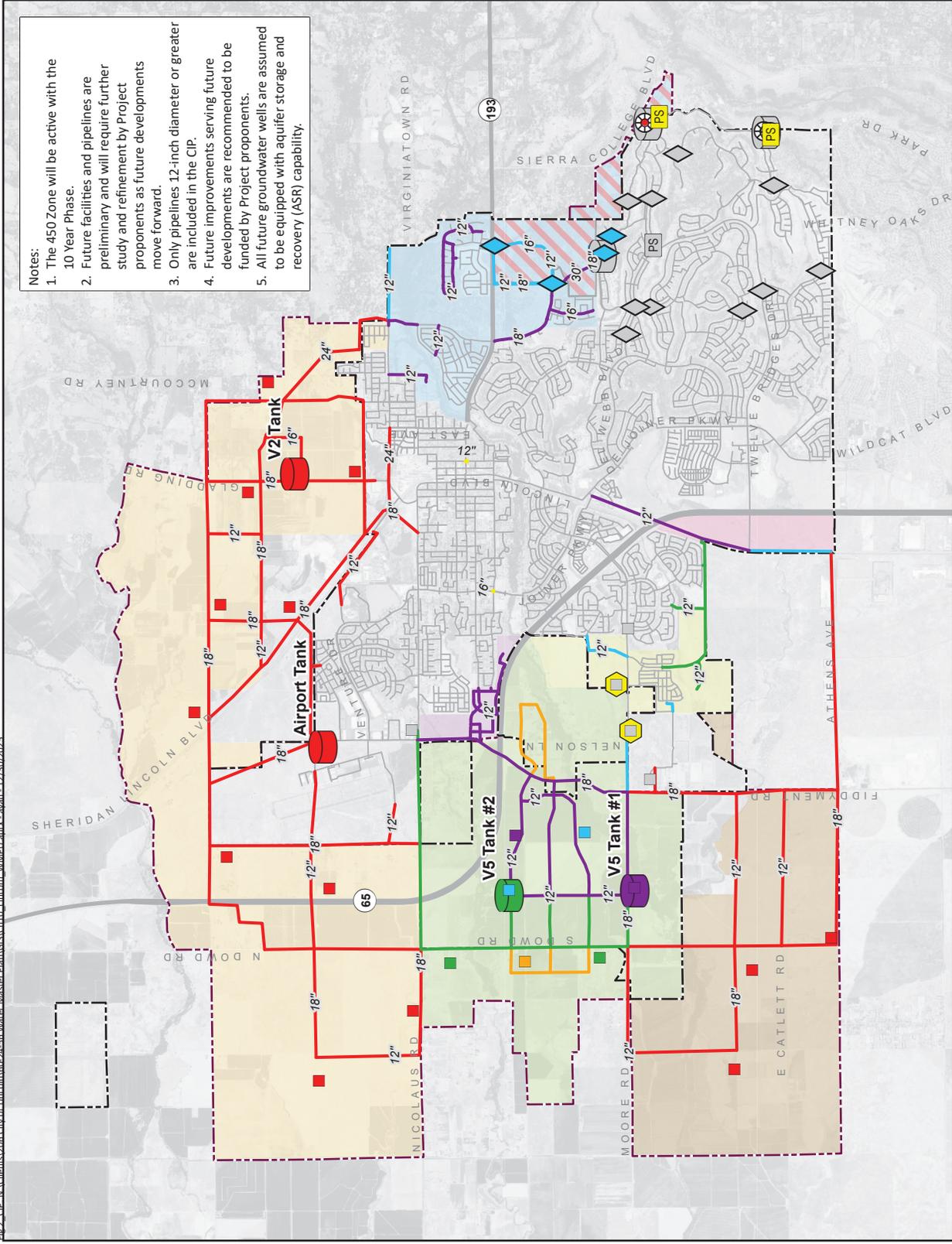
CIP projects were grouped into near-term, mid-term, and long-term implementation phases based on demand triggers and hydraulic priorities as shown on Figure 2. The CIP also provides planning-level cost estimates for guidance on budgeting and rate-setting purposes.

GROWTH AREA SERVICING STRATEGY

The growth area servicing strategy extends the existing 375 Pressure Zone, adds a new 450 Pressure Zone, and adds new facilities to efficiently serve planned developments. The servicing approach emphasizes:

- Hydraulic efficiency
- Redundancy and reliability
- Maintainability

Expansion of the system will occur incrementally in advance of development, guided by the hydraulic model and the City's adopted master plan framework.



Phase Color Legend

- Existing (No Improvement)
- Existing (Improvement)
- 5 Year
- 10 Year
- 15 Year
- 20 Year
- Buildout

System Facilities

- Groundwater Well
- Placer County Water Agency Metering Station
- Backup Power
- Pump Station
- Pressure Reducing Station
- Storage Tank
- Pipeline

Future Development

- Lincoln 270
- Village 1
- Villages 2-4 and SUD-A
- Village 5
- Village 7
- SUD-B
- Village 6 and SUD-C

Boundaries

- New 450 Pressure Zone
- Existing City Limit
- City Sphere of Influence

Prepared by:



Prepared for:



Recommended Capital Improvement Projects
Figure 2



STAFFING PLAN AND RECOMMENDATIONS

The staffing evaluation assesses current and future resource needs for the City’s Water Division. Staffing projections are based on the City’s growth in connections and benchmarked against similar sized agencies. The evaluation methodology included the following:

- Evaluation of current staffing structure and responsibilities.
- Review of projected connections and staffing benchmarks.
- Development of a projected staffing plan.

The City’s current Water Division staff is undersized for the existing system and will also require expansion with future growth. The benchmarking performed using peer agencies indicates an optimal range of 0.7 to 1.1 full-time employees (FTE) per 1,000 connections; the City currently operates at 0.4 full-time employees per 1,000 connections. As the City continues to grow, staffing should adjust based on the connections being added. The future staffing should focus on distribution maintenance, water quality, customer service, and management support.

Attachment A provides a detailed review of the staffing evaluation performed.

SUMMARY OF FINDINGS

Table 2 summarizes the key findings of the City’s System Servicing Plan based on the WMPU analyses. The findings confirm that, with implementation of planned infrastructure, supply strategies, and staffing adjustments, the City’s water system can reliability support projected growth through full buildout while maintaining service standards and operational resilience.

Table 2. Summary of Findings	
Topic	Summary of Findings
Planned Growth	Future development is primarily concentrated in Villages 1 and 5 within the next 20 years, with remaining Villages and Special Use Districts assumed to develop at long-term buildout. Growth assumptions are consistent with the City’s General Plan 2050 and Community Development input.
Water Demand Projections	Average day demand is projected to increase from approximately 9.0 mgd under existing conditions to approximately 35.3 mgd at buildout. Maximum day demand is projected to increase from 16.9 mgd to approximately 66.9 mgd. Demand projections include 10 percent non-revenue water and reflect land use-based development assumptions.
Water Supply Adequacy	The City’s existing surface water and groundwater supplies are sufficient to meet current demands. With planned system enhancements and supply management strategies, the City can reliably meet projected demands through buildout while maintaining redundancy and operational flexibility.
Long-Term Supply Strategy	Long-term planning emphasizes maximizing surface water use, sustainable groundwater management, and evaluating supplemental strategies such as recycled water expansion, groundwater recharge, and ASR to enhance supply reliability.
System Capacity	Hydraulic modeling confirms that, with implementation of recommended improvements, the system can maintain required pressure and fire flow criteria under future demand conditions throughout the service area.
Infrastructure Phasing	Capital improvements are phased to align with development timing, address near-term reliability and deficiencies, expand mid-term capacity for planned growth areas, and complete long-term facility improvements required for full buildout of the sphere of influence.
Capital Improvement Program	The recommended CIP identifies transmission, storage, pumping, and distribution improvements necessary to support growth and maintain service reliability. Projects are prioritized based on hydraulic need and demand triggers, with growth-related improvements anticipated to be funded by project proponents where applicable.
Growth Area Servicing	Future development will be served through extension of the existing 375 Pressure Zone and implementation of a new 450 Pressure Zone. The servicing strategy emphasizes hydraulic efficiency, redundancy, and incremental expansion consistent with development phasing.
Staffing Needs	Existing Water Division staffing levels are undersized for the current system and will require incremental increases as connections grow. Benchmarking indicates a target staffing range of approximately 0.7 to 1.1 FTEs per 1,000 connections to maintain reliable operations and regulatory compliance of the water system through buildout.



Attachment A

Detailed Review of the Staffing Evaluation Performed

BACKGROUND

As the City of Lincoln continues to expand toward buildout, the Water Department must plan for a corresponding increase in staffing to maintain reliable operation, maintenance, and regulatory compliance. The City's projected growth will be driven primarily by residential development—approximately 97 percent of future water connections are expected to be single-family residential units.

The number of projected residential water connections was derived from Table A, which summarizes future development by housing type and density. Each dwelling unit in the country estates, low-, and medium density residential categories was assumed to correspond to one water service connection. These projections were aggregated in five-year increments through buildout to estimate total future water service connections.

As new developments are constructed, additional water infrastructure—such as mains, valves, meters, hydrants, and backflow devices—will be added to the system, requiring additional maintenance and operational effort. Accordingly, Lincoln's Water Department must scale staffing levels proportionally with the number of service connections to sustain service quality, maintain system integrity, and meet regulatory requirements.

BENCHMARKING AND COMPARABLE SYSTEMS

To estimate future staffing needs, benchmarking was performed using data from comparable California water utilities, summarized in Table B. The comparable cities include the cities of Roseville, Tracy, Yuba City, and Woodland. These systems were selected for their similar service population, anticipated growth trajectory, and operational structure. Key factors for each of the comparable cities were considered and normalized to the operations of Lincoln in order to provide an apple-to-apples comparison. For example, water treatment staff for the City of Roseville were not contained in the total number of staff, to better represent the fact that Lincoln does not operate a surface water treatment plant.

While there is no universal industry standard for water department staffing, benchmarking studies—including those from the American Water Works Association (AWWA)—indicate that the ratio of water staff per 1,000 water connections is a widely used and reasonable metric for comparing system staffing efficiency. This analysis of comparable systems demonstrated that a correlation exists between the number of staff per 1,000 water connections and overall system size and complexity.

For example:

- The City of Roseville, which serves approximately 52,000 connections, maintains roughly 0.8 water department employees per 1,000 connections.
- The City of Tracy, with approximately 25,000 connections, operates with about 0.9 employees per 1,000 connections.

Of the comparable systems it is important to recognize the relevance and reliability of the Roseville data as a benchmark: Roseville is geographically adjacent to Lincoln and has experienced growth since the 1990's to current buildout very analogous to the projected growth of Lincoln (a doubling of the water system connections to buildout).

These benchmarks provide a credible basis for projecting Lincoln’s staffing needs as the system expands. Using this relationship allows Lincoln to rationalize future staffing levels in proportion to growth in water connections, while considering operational efficiency and budget constraints. The current water operator staffing structure includes staff from the Water Quality Division and staff from the Streets Division with a 15 percent allocation for water distribution system maintenance and leak repair. As shown in Table B, the City of Lincoln is currently at a 0.4 FTEs per 1,000 connections. This is based on a total of 10 FTEs (eight FTEs in the Water Division and the equivalent of two FTEs in the Streets Division based on the previously mentioned 15 percent allocation) and approximately 25,000 existing connections.

Recommendations

The results of the staffing projection analysis are summarized in Table C. The table presents the recommended number of full-time equivalent (FTE) staff additions in five-year increments through buildout, based on projected growth in water service connections. As the City water system expands from roughly 25,000 connections to over 58,000 connections at buildout and applying the benchmark of 0.8 FTEs per 1,000 connections, the City Water Division staff should be increased from 10 FTEs to 47 FTEs.

This projection applies the benchmark ratio derived from comparable utilities (staff per 1,000 water connections) to Lincoln’s projected total connections at each interval. The analysis anticipates a steady increase in staffing over time to align with the pace of development, ensuring adequate operational capacity as new infrastructure is commissioned.

Key recommendations include:

- Incrementally increasing staff levels in five-year intervals to match system growth.
- Targeting a staffing ratio consistent with efficient, full-service utilities such as Roseville and Tracy.
- Reassessing staffing projections periodically to reflect updated growth forecasts, technology improvements, and operational efficiencies.
- Using the projected staffing plan to inform future budget planning and rate-setting efforts, ensuring sustainable operations throughout Lincoln’s expansion period.
- Periodically assess the City Water Division and Streets Division structure as continued growth will require specialized positions that may ultimately need to be managed under one department.

By adopting a data-driven approach tied to projected water connections and validated by peer system benchmarks, the City of Lincoln can responsibly plan and justify future staffing additions that support reliable water service delivery to a growing community.

Attachment A
City of Lincoln Department Staffing Growth Approach



Table A. Excerpt from Table 3.9 as Basis for Operational Staffing Projection					
Residential Connections	2023-2028	2029-2033	2034-2038	2039-2043	2044-2050
Country/Low Density Estates	154	457	955	1,652	3,383
Low Density Residential	2,074	4,374	5,867	6,987	18,372
Medium Density Residential	1,044	3,306	5,543	5,608	13,701
Total	3,272	8,137	12,365	14,247	35,456
Total Per 5 year Increment	3,272	4,865	4,228	1,882	21,209
Total Connections	25,957	30,822	35,050	36,932	58,141

Source: Table 3.9 Water Master Plan Update 2025

Table B. Comparable Water Systems			
System	No. FTEs	No. Connections (1,000s)	FTEs per 1,000 Connections
City of Roseville	42	56	0.8
City of Woodland	17.5	18	1.0
City of Yuba	16	19	0.8
City of Tracy	27	28	1.0
City of Lincoln	10	25	0.4

Sources:
 City of Roseville Environmental Utilities Department, Water Division - 2025
 City of Woodland Public Works Engineering Department - 2025
 City of Yuba City Public Works Engineering Department - 2025
 City of Tracy Public Works Department - 2025
 City of Lincoln Public Works Department - 2025

Table C. City of Lincoln Water and Streets Divisions - Staffing Projection Through City Buildout

Item	Current	Planned	Division	Other Resources Needed	Notes	Position to Add	Year Range/Connections Added/Total Connections ^(a)				
							2023-2028/3,272	2029-2033/4,865	2034-2038/4,228	2039-2043/1,882	2044-2050/21,209
							25,957	30,822	35,050	36,932	58,141
Full-Time Equivalents (FTEs) to Add Per 5-Year Increment											
Supervisory Control and Data Acquisition System (SCADA)	TESCO	Water Division dedicated staff	Water/Streets	Cyber training	-	Instrument Tech	1	-	2	1	-
Residential Meter Testing & Meter Repair	City of Sac	Water Division dedicated staff	Water/Streets	Meter Test Bench	-	Meter Tech/Certified Distribution Operator	1	1	1	-	1
Development Support (Warranty Inspections, New Meter Installations, System Tie-Ins and Shutdowns)	Ad Hoc from Water or Streets based on availability	Water Division dedicated staff	Water/Streets	-	In response to robust development in the City	Certified Distribution Operator	1	-	1	-	2
Administrative Support	Shared	Water Division dedicated staff	Water/Streets	-	Admin can be assigned to Metering Program Support (AMI)	Administrative Assistant	-	1	-	1	1
Bacteriological Sampling	Third party lab	Water Division dedicated staff	Water/Streets	Field sampling stations	Distribution sampling stations added as City grows per DDW water system permit. This will include water quality reporting.	Certified Distribution Operator	-	1	-	-	1
Backflow Testing	Water Division	Water Division dedicated staff	Water/Streets	-	Backflow quantity increases as City grows	Certified Backflow Tester	-	-	2	-	1
Metering Program Support (AMI)	None	Water Division dedicated staff	Water/Streets	-	This support can be done by adding admin staff	See Administrative Support	-	-	1	1	-
Recycled Water Program	None	Water Division dedicated staff	Water/Streets	Consultant support	City expansion of RW system and desire for groundwater recharge	Certified Backflow Tester/Cross Connection Specialist	1	-	-	-	1
Water Conservation and Regulatory-Driven Community Outreach	None	Water Division dedicated staff	Water/Streets	-	-	Analyst	1	-	-	-	1
Groundwater Program (Operations, Maintenance, ASR)	Water Division dedicated staff	Water Division dedicated staff	Water/Streets	-	Project 10 more wells and two storage tanks added to system through buildout	Certified Treatment and Distribution Operator	-	1	-	1	2
Inventory Control (Warehousing)	None	Water Division dedicated staff (or shared staff)	Water/Streets	Warehousing software integrated into Computerized Maintenance Management System (CMMS). Training.	-	Analyst who understands water infrastructure	1	-	-	1	-
CMMS and Asset Management	None	Water Division dedicated staff	Water/Streets	-	Work orders supported via scheduling and job-kitting	Maintenance Coordinator	1	-	1	-	-
Pressure Reducing Valves (PRVs), Control Valves	None	Water Division dedicated staff	Water/Streets	-	Increased system complexity from City growth requires specialized skills to balance potential new pressure zones	Certified Distribution Operator	-	1	-	-	1

Table C. City of Lincoln Water and Streets Divisions - Staffing Projection Through City Buildout											
Item	Current	Planned	Division	Other Resources Needed	Notes	Position to Add	Year Range/Connections Added/Total Connections (a)				
							2023-2028/3,272	2029-2033/4,865	2034-2038/4,228	2039-2043/1,882	
							25,957	30,822	35,050	36,932	
							Full-Time Equivalents (FTEs) to Add Per 5-Year Increment				
Distribution System Maintenance (Leak Repairs, Main Flushing, Valve Exercising, Hydrant Maintenance)	Behind schedule, no formal program in place	Water Division dedicated staff	Water/Streets	Portable or truck-mounted, electric or hydraulic valve operators	Worker safety	Certified Distribution Operator	2	1	1	-	2
Large Meter Testing	None	Water Division dedicated staff	Water/Streets	Contract with large meter test bench	-	Certified Distribution Operator	-	1	-	1	-
Groundwater Program Management (Includes All GW Quality and Engineering Needs)	None	Engineering	Water/Streets	Consultant support	Studies and approach needed	Engineer	-	-	1	-	2
Total FTEs Projected Per 5-Year Increment							9	7	10	6	15

(a) Total water connections projections shown in Table B.