City of Lincoln – Reclamation Master Plan

FINAL

Prepared for:
City of Lincoln

Prepared by:
Stantec Consulting Services, Inc.

December 20, 2019

Revision	Description	Author		Quality Check		Independent Review	

Stantec

Sign-off Sheet

This document entitled City of Lincoln – Reclamation Master Plan was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of the City of Lincoln (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by _____

(signature)

Breanna Webb

Reviewed by _____

(signature)

Gabe Aronow

REGISTERED PROFESSIONAL ENGINEER
GABRIEL I. ARONOW
No.55307
Exp.12/31/20
CIVIL
STATE OF CALIFORNIA

December 20, 2019

Stantec

Table of Contents

EXECUTIVE SUMMARY ..... **I**

ABBREVIATIONS ..... **XII**

1.0 INTRODUCTION **2.1**
1.1 PURPOSE 2.1
1.2 OBJECTIVES 2.1

2.0 BACKGROUND **2.2**
2.1 PURPOSE 2.2
2.2 STUDY AREA 2.2
2.2.1 General Plan 2.2
2.2.2 Population Projections 2.4
2.3 RELEVANT STUDIES 2.4
2.4 EXISTING CAPITAL IMPROVEMENT PLANS 2.4

3.0 REGULATIONS AND POLICIES **3.6**
3.1 PURPOSE 3.6
3.2 REGULATORY FRAMEWORK 3.6
3.2.1 Title 22 – California Water Recycling Criteria 3.7
3.2.2 Agencies and Responsibilities 3.7
3.3 STATE POLICY FRAMEWORK 3.8
3.4 WATER RIGHTS 3.12

4.0 WATER SUPPLY PLANNING **4.17**
4.1 PURPOSE 4.17
4.2 WATER MASTER PLAN 4.17
4.3 URBAN WATER MANAGEMENT PLAN 4.18
4.4 AMERICAN RIVER BASIN INTEGRATED REGIONAL WATER MANAGEMENT PLAN 4.18
4.5 WATER SUPPLY PLANNING GOALS SUMMARY 4.19

5.0 EXISTING RECLAMATION SYSTEM **5.21**
5.1 PURPOSE 5.21
5.2 TREATMENT – LINCOLN WWTRF 5.21
5.3 STORAGE – TERTIARY STORAGE 5.22
5.4 DISTRIBUTION – RECLAMATION SYSTEM 5.23
5.4.1 Pipelines 5.23
5.4.2 Reclamation Booster Pump Station (RBPS) 5.24
5.4.3 Recycled Water Service Area 5.24
5.5 DISPOSAL – USE AREAS AND DISCHARGES 5.26
5.5.1 Effluent Distribution System (EDS) 5.26
5.5.2 Auburn Ravine Creek Outfall 5.28

5.5.3 Off-site City Use Areas 5.28
5.5.4 Agricultural Use Areas 5.29
5.5.5 On-site Reclamation Areas 5.29

6.0 RECYCLED WATER DEMANDS 6.30
6.1 PURPOSE 6.30
6.2 EXISTING RECYCLED WATER USE 6.30
6.3 RECYCLED WATER DEMAND TYPES AND PEAKING FACTORS 6.32
6.3.1 Average Daily Demand (ADD) 6.32
6.3.2 Irrigation Requirements 6.32
6.3.3 Maximum Month Demand (MMD) 6.34
6.3.4 Peak Hour Demand (PHD) 6.34
6.4 FUTURE RECYCLED WATER DEMAND ESTIMATES 6.35
6.4.1 Existing Users 6.36
6.4.2 Existing Entities to Convert to Recycled Water 6.37
6.4.3 New Recycled Water Users 6.38
6.5 MARKET ASSESSMENT 6.40
6.6 SUMMARY OF RECYCLED WATER DEMANDS 6.41

7.0 RECYCLED WATER SUPPLY CHARACTERISTICS AND FACILITIES 7.45
7.1 PURPOSE 7.45
7.2 RECYCLED WATER SUPPLY NEEDS 7.45
7.3 RECYCLED WATER SUPPLY SOURCES 7.45
7.4 WWTRF EFFLUENT MANAGEMENT 7.47
7.4.1 Ongoing Effluent Management Impacts 7.48
7.4.2 Recycled Water Delivery & WWTRF Operations 7.51
7.5 RECYCLED WATER STORAGE AND DELIVERY 7.57
7.5.1 WWTRF Water Balance and Tertiary Storage 7.57
7.5.2 Daily Storage and Delivery 7.60
7.6 SUPPLY AND STORAGE RECOMMENDATIONS 7.61
7.6.1 Available Supply 7.61
7.6.2 Effluent Management 7.62
7.6.3 Demand Prioritization 7.62
7.6.4 Interim Conditions, System Redundancy, and Reliability 7.63

8.0 PLANNING AND EVALUATION CRITERIA 8.64
8.1 PURPOSE 8.64
8.2 SYSTEM PLANNING APPROACH 8.64
8.3 LEVEL OF SERVICE CRITERIA & KEY PERFORMANCE INDICATORS 8.64
8.3.1 System Pressures 8.65
8.3.2 Pipeline Sizing Criteria 8.65
8.3.3 Pump Station Sizing Criteria 8.66
8.4 SYSTEM SPECIFICATIONS AND CONSIDERATIONS 8.67
8.4.1 Pipelines 8.67
8.4.2 Valves and Surge Protection 8.67

8.4.3 Use Area Considerations 8.68

9.0 HYDRAULIC MODEL DEVELOPMENT 9.70
9.1 PURPOSE 9.70
9.2 MODEL APPROACH 9.70
9.3 MODELING SOFTWARE 9.70
9.4 MODEL INPUT AND COMPONENTS 9.71
9.5 MODEL DEVELOPMENT 9.72
9.6 MODEL CALIBRATION 9.72
9.7 MODELED SCENARIOS 9.72

10.0 RECLAMATION SYSTEM EVALUATION 10.75
10.1 PURPOSE 10.75
10.2 EXISTING SYSTEM EVALUATION 10.75
10.2.1 Existing Scenario 10.75
10.2.2 Near-Term Development Scenario 10.76
10.2.3 Existing and Near-Term System Recommendations 10.77
10.3 FUTURE SYSTEM EVALUATION 10.78
10.3.1 Buildout Development Scenario 10.78
10.3.2 Long-Term Development Scenario 10.82
10.3.3 Future System Recommendations 10.82
10.4 PHASING APPROACH 10.83

11.0 COST ESTIMATES 11.87
11.1 PURPOSE 11.87
11.2 COST BASIS AND ASSUMPTIONS 11.87
11.2.1 Capital Costs 11.87
11.2.2 O&M Costs 11.88
11.2.3 R&R Program Costs 11.88
11.2.4 Additional Cost Considerations 11.89
11.3 FUTURE GROWTH CIP COSTS 11.89
11.3.1 RBPS Improvements 11.89
11.3.2 New Pipelines 11.89
11.3.3 Total Capital Cost Summary 11.90
11.4 RECLAMATION O&M COSTS 11.92
11.5 ON-GOING R&R PROGRAM 11.93
11.6 SUMMARY 11.96

LIST OF TABLES

Table 2-1 City of Lincoln Annual Population Estimates 2.4
Table 2-2 City of Lincoln Population Projections 2.4
Table 4-1 UWMP Recycled Water Supply Projections 4.18
Table 5-1 WWTRF Hydraulic and Treatment Capacities 5.21
Table 5-2 WWTRF Tertiary Storage Capacity 5.23
Table 5-3 RBPS, Existing Equipment Specifications 5.24

Table 5-4 WWTRF On-Site Reclamation Areas 5.29
Table 6-1 Historical Recycled Water Use (2017) 6.30
Table 6-2 Average Annual Landscape Irrigation Requirements 6.33
Table 6-3 Demand Types and Peaking Factors 6.35
Table 6-4 Summary of Existing City Reclamation Demands (within City) 6.37
Table 6-5 Future Reclamation Demands of Existing Entities 6.38
Table 6-6 Summary of SOI Area Demands 6.38
Table 6-7 Excluded Demands Previously Considered (2004 Master Plan) 6.40
Table 6-8 Potential Demands Outside of the Recycled Water Service Area (Included in the 30% Reclamation Master Plan) 6.41
Table 6-9 Summary of Existing and Future MMD 6.42
Table 6-10 Development Scenarios and PHD 6.44
Table 7-1 Wastewater Collection System ADWF and Scaled Reclamation Supply Projections 7.47
Table 7-2 Water Balance Scenarios and Parameters 7.58
Table 8-1 Reclamation System Pipeline Evalation Criteria 8.66
Table 10-1 Existing System Model Results Summary (1) 10.76
Table 10-2 Near-Term System Model Results Summary 10.77
Table 10-3 Future System Pipelines 10.79
Table 10-4 Buildout System Model Results Summary 10.81
Table 10-5 Long-Term System Model Results Summary 10.82
Table 10-6 Phasing Recommendations 10.85
Table 11-1 Opinion of Probable Cost, New Pipelines 11.90
Table 11-2 Total Cost for New Infrastructure 11.90
Table 11-3 Phased Improvement Costs 11.92
Table 11-4 Existing Reclamation System O&M Costs 11.93
Table 11-5 Future Reclamation System O&M Costs 11.93
Table 11-6 Existing Reclaimed Pipeline Replacement Costs 11.94
Table 11-7 On-going R&R Costs Budget 11.95
Table 11-8 Summary of Cost Estimates 11.96

LIST OF FIGURES

Figure 2-1 General Plan Land Use 2.3
Figure 5-1 Existing Recycled Water Distribution System 5.25
Figure 5-2 Existing Effluent Distribution System Schematic 5.27
Figure 6-1 2017 Seasonal Demand Distribution for Existing Users 6.31
Figure 6-2 Net Irrigation Requirement (City of Lincoln) 6.33
Figure 6-3 Recycled Water Demand Locations 6.39
Figure 7-1 Existing Effluent Management 7.52
Figure 7-2 Reclamation Demands 7.55
Figure 7-3 Future Effluent Management Need 7.56
Figure 8-1 Swivel-Ell Air Gap Connection Detail 8.69
Figure 9-1 Model Demand Distribution 9.74
Figure 10-1 Future Recycled Water Distribution System 10.80
Figure 10-2 Future Reclamation System Phasing Approach 10.84

LIST OF APPENDICES

APPENDIX A RULES AND REGULATIONS FOR RECYCLED WATER USE AND DISTRIBUTION A.1

APPENDIX B DEMAND DETAILS B.2

Executive Summary

Purpose and Background

The City of Lincoln's wastewater treatment and reclamation facility (WWTRF) produces disinfected tertiary recycled water which is suitable for the uses described in Article 3, Section 60304 (a) of Title 22 of the California Code of Regulations, commonly referred to as "unrestricted reuse". This Reclamation Master Plan (Master Plan) evaluates the City's existing reclamation system and projects future system needs to guide in the continued development of the recycled water distribution system.

The purpose of this Master Plan is to determine preferred system expansions and develop a capital improvement program (CIP) with a phased implementation approach. This Master Plan serves as an update to the City's existing Reclamation Master Plan prepared by Stantec (formerly ECO:LOGIC), in 2004. The preliminary 30% Reclamation Master Plan (Stantec, 2016), was expanded upon for the development of this Master Plan update.

Regulations and Water Supply Planning

The production, distribution and use of recycled water in California is regulated by the State Water Resources Control Board (SWRCB), Regional Water Quality Control Boards (RWQCB), SWRCB Division of Drinking Water (DDW), the Clean Water Act, the California Code of Regulations, the Health and Safety Code, and the California Water Code.

The City's WWTRF holds a Master Reclamation Permit (Order No. R5-2005-0040-01) issued by the Central Valley RWQCB. WWTRF operators are responsible for monitoring recycled water quality to ensure compliance with the Master Reclamation Permit. In accordance with the provisions of the Master Reclamation Permit, the City has established rules, regulations, and administrative procedures for recycled water users that govern the design and construction of recycled water facilities and the use of reclaimed water within the City. The City's document titled *Rules and Regulations – Recycled Water Use and Distribution* is included as **Appendix A**.

In addition to its Master Reclamation Permit, the operation of the WWTRF is also governed by Order No. R5-2018-0081 (NPDES No. CA0084476), Waste Discharge Requirements (WDR) issued by the Central Valley RWQCB. This WDR order was adopted on December 7th, 2018, revising the previous order.

Drivers to expand the use of recycled water in California including drought, legal and environmental constraints, climate change, and regional water supply planning. Expanding the future use of recycled water is a component of the City's long-term Urban Water Management Plan (UWMP). Expanding the use of recycled water within the City advances regional water planning goals

Existing Reclamation System

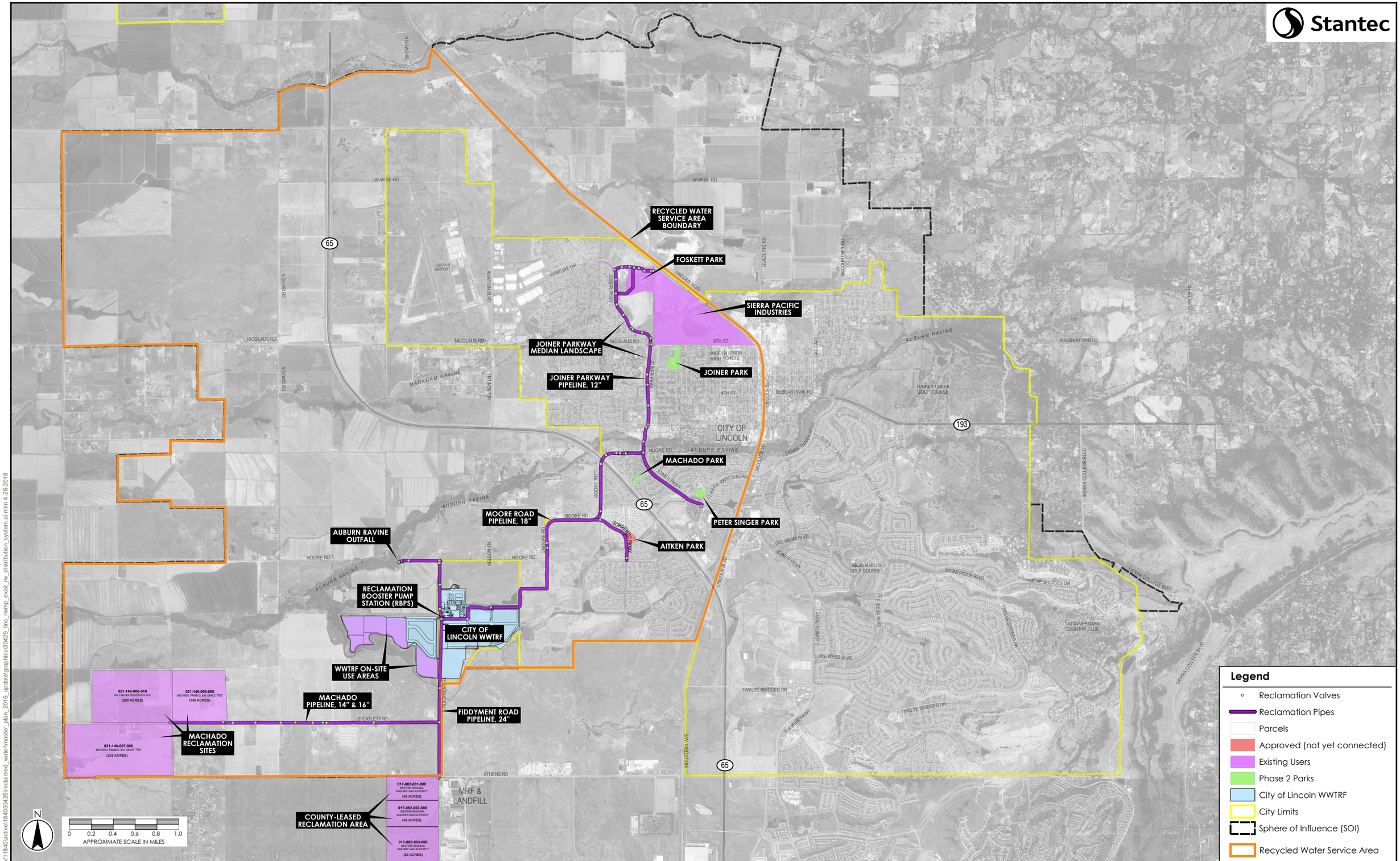
The existing reclamation system consists of treatment, storage, distribution, and disposal facilities. Final effluent from the WWTRF is used to supply the City's reclamation system. Water that isn't used as it is produced is sent to tertiary storage facilities or discharged to Auburn Ravine Creek. The Tertiary Storage Basins (TSBs) provide seasonal storage of tertiary treated and disinfected wastewater until disposal is feasible or reclaimed water demand exists. The existing TSBs have a combined capacity of 190 MG, and the on-going WWTRF Expansion Project will provide an additional 142 MG of on-site storage capacity to accommodate the WWTRF Expansion Project for a total storage volume of approximately 332 MG. Recycled water can be pulled from the TSBs during times of high irrigation demand and low effluent production flow.

Discharges to the creek are limited in accordance with the WWTRF wastewater discharge permit (Order No. R5-2018-0081). The most recent update imposed more stringent receiving water temperature limitations, which may require that the WWTRF store more effluent as opposed to discharging it to Auburn Ravine. A time schedule order was issued by the RWQCB which provides regulatory coverage and an interim solution to wastewater storage and disposal issues while the City develops a long-term solution. The City intends to conduct a site-specific temperature study before moving forward with costly storage improvements.

The reclaimed water distribution system delivers recycled water from the WWTRF to the City's recycled water use areas. The distribution system consists of approximately twelve miles of transmission pipelines and the Reclamation Booster Pump Station (RBPS) located at the WWTRF. The maximum pumping capacity of the existing RBPS is approximately 7.9 MGD, and the reliable capacity is approximately 6.3 MGD. The reliable capacity is determined under the assumption that one of the five pumps is out of service and the remaining pumps operate in parallel. A 10,000-gallon pneumatic tank is used to regulate pressure and minimize surges in the distribution system.

Effluent from the WWTRF is of sufficient quality to allow unrestricted reuse. The existing permit narrative requires that priority is given to reclamation before discharging effluent to surface waters. There are currently three ways to reuse effluent produced from the WWTRF, on-site irrigation, agricultural irrigation, or off-site City reclamation (demands within the City). Uses of recycled water within the City include irrigation of parks, median landscapes, agriculture, and industrial cooling and process water. During times of minimal recycled water use, recycled water is discharged to Auburn Ravine Creek in accordance with the WWTRF's waste discharge permit.

The City identified the need to limit the bounds of the recycled water service area and prioritize demands that exist at lower elevations on the east side of the City as part of this Master Plan update. This planning decision considers the relative availability of other non-potable water sources in the eastern portion of the City, and that the elevation and greater distances between potential use sites would make serving these areas cost prohibitive. The City's existing recycled water distribution system and service area are shown in **Figure ES-1**.



V:\1840\active\184030429\reclaimed_water\master_plan_2016_update\graphics\30429_linc_rwmp_exist_rw_distribution_system.ai mlm 4-26-2018

City of Lincoln
Reclamation Master Plan

Figure ES-1
Existing Recycled Water Distribution System

Recycled Water Demands

The City's recycled water distribution system will supply the demand of off-site reclamation demands within its recycled water service area. The system will support existing users, future users and new users. Existing users include those that are currently connected to the system and using reclaimed water and those that have been approved to connect and are entitled to use recycled water. Future users include those that will convert to use recycled water to meet their non-potable demands in the future. New users are those that will use recycled water but have not yet been developed. A summary of future system user types and the source of the associated demand estimate is provided in **Table ES-1**.

Table ES-1 Recycled Water Users

User Type	Description	Demand Estimate Source	Example
Existing Users	Users that currently use, or are entitled to use recycled water	Actual supply data or use area reports.	Sierra Pacific Industries
Future Users	Users that will convert to recycled water to meet non-potable demands	Historical potable water meter records from 2013 and 2015. (MMD = Highest month of use) or projected demands from prior planning.	Schools and Parks within the City
New Users	Users that will use recycled water, but have not yet been developed	Developed as part of the 30% Master Plan and confirmed with the City.	General Plan Village Developments

The water demand factors and peaking factors used to approximate future recycled water demands and operating conditions within the distribution system are summarized in **Table ES-2**.

Table ES-2 Demand Types and Peaking Factors

Demand Type	Abbreviation	Peaking Factor	Calculation Method
Average Day Demand	ADD	NA	Annual Demand Volume/ 365 days
Maximum Month Demand	MMD	PF = 2.5	MMD = ADD x 2.5
Maximum Day Demand	MDD	PF = 2.5	MDD = ADD x 2.5 MMD = MDD
Peak Hour Demand [1] 8-hour supply cycle 12-hour supply cycle 24-hour supply cycle	PHD	 PF = 3.0 PF = 2.0 PF = 1.0	 PHD = MMD x 3.0 or ADD x 7.5 PHD = MMD x 2.0 or ADD x 5.0 PHD = MMD x 1.0 or ADD x 2.5

1. 8-hour supply cycle assumed for irrigation demands and 24-hour supply cycle assumed for agricultural demands.

A summary of existing and future demand estimates is provided in **Table ES-3**.

Table ES-3 Summary of Existing and Future MMD

Recycled Water Demand	Use Type	PF	Existing Demand MMD (gpm)	Future Demand MMD (gpm)
Sierra Pacific Industries (SPI)	Industrial	1	130	280
Joiner Parkway Irrigation	City Irrigation	3	20	20
Foskett Regional Park	City Irrigation	3	190	280
Aitken Park	City Irrigation	3	10	10
Phase II Parks	City Irrigation	3	0	125
Lincoln Crossing	City Irrigation	3	0	350
Lincoln High School	City Irrigation	3	0	110
Cemeteries	City Irrigation	3	0	50
Schools	City Irrigation	3	0	50
Parks	City Irrigation	3	0	60
Facilities	City Irrigation	3	0	10
Streetscape	City Irrigation	3	0	60
Other Depts.	City Irrigation	3	0	40
Village 4	City Irrigation	3	0	405
Village 5/SUD-B	City Irrigation	3	0	1,140
Village 6	City Irrigation	3	0	605
Village 7	City Irrigation	3	0	700
SUD-A	City Irrigation	3	0	205
County Leased Reclamation Area	Agriculture	1	1,600	0
Machado Properties	Agriculture	1	2,800	0
Total			**4,750** (1)	**4,500**

Recycled Water Supply and Management

The recycled water supply required to meet existing user demands is approximately 2.7 MGD for ADD and 6.8 MGD for MMD, including agricultural users. This results in approximately 3,065 acre-feet (AF) of recycled water required annually to meet demands under existing conditions.

The future recycled water supply rate needed at buildout of the recycled water service area is estimated as 2.68 MGD for ADD and 6.5 MGD for MMD. Future supply needs include the potential future demands that were identified in Chapter 6.0. This results in approximately 2,900 AF of recycled water needed annually at buildout.

The City's future reclamation demands are projected to account for only a portion of the WWTRF's total effluent volume at buildout. The City should pursue additional planning to ensure that effluent can be properly managed as additional development occurs.

The City should consider additional disposal methods and/or increase the capacity of existing disposal methods. The City should pursue improvements that allow a larger volume of discharge to Auburn Ravine, the installation of effluent cooling facilities to mitigate temperature impacts depending on the results of the ongoing Temperature Impact Study, and/or identify additional reclamation demands outside of the City SOI. The City should prioritize additional users based on the associated cost per acre-foot served ($/AF), total reclaimed water demand, and demand usage pattern. Potential uses with low cost to provide service, high usage, and consistent demand usage patterns should be priorities for the City.

The following is recommended to the City to ensure that effluent is properly managed as further growth occurs:

- The development of an Effluent Management Master Plan
- Encourage Placer County to retrieve their portion of effluent (COJA)
- Increase the allowable discharge to Auburn Ravine.
- Add industrial customers providing a larger baseload demand during times low irrigation.
- Expand reclamation demands (through Village 1, 2, and 3, or outside the SOI)

Reclamation System Planning and Evaluation

A hydraulic model was used to plan and evaluate the existing and future recycled water distribution system. Planning and evaluation criteria were used to identify capacity deficiencies within the existing reclamation system. The evaluation criteria are also used to determine the layout and capacity needs of the future system and estimate buildout infrastructure requirements which are used to develop planning level opinions of probable cost. The system improvements and capital improvement projects (CIPs) presented in this Master Plan have been developed on the basis of providing sufficient system capacity and infrastructure performance to meet level of service (LOS) criteria. The LOS criteria are summarized in **Table ES-4**.

Table ES-4 Reclamation System Pipeline Evalation Criteria

Criteria	Existing Pipelines	Proposed Pipelines
Maximum Design Velocity	6 fps	4 fps (pipelines 8-inches and larger)
Delivery Pressure	60 (50 off existing system) – 100 ± psi	
Head Loss	< 0.005 (ft/ft)	
C (Hazen-Williams Friction Factor)	150 (PVC)	

The approach to reclamation system planning is to supply the reclamation system without any remote storage or pumping facilities for future developments or pressure zones within the distribution system. This Master Plan assumes the distribution system will be supplied entirely by the RBPS and on-site storage and/or production at the WWTRF. Limiting storage and pumping to the WWTRF site provides economy of scale in operation and maintenance costs associated with the facilities.

The City's existing reclamation system model was updated with information provided by the City (as-built infrastructure and service area geography). After reviewing the information provided by City staff, the hydraulic model was updated to represent actual parameters associated with each system asset. The hydraulic model was used to consider existing, near-term, long-term, and build-out levels of development scenarios. No deficiencies were identified within the existing system. The future system layout was carried through from that presented in the 30% Reclamation Master Plan, excluding portions of the system outside of the revised recycled water service area. The future recycled water distribution system is presented in **Figure ES-2**.

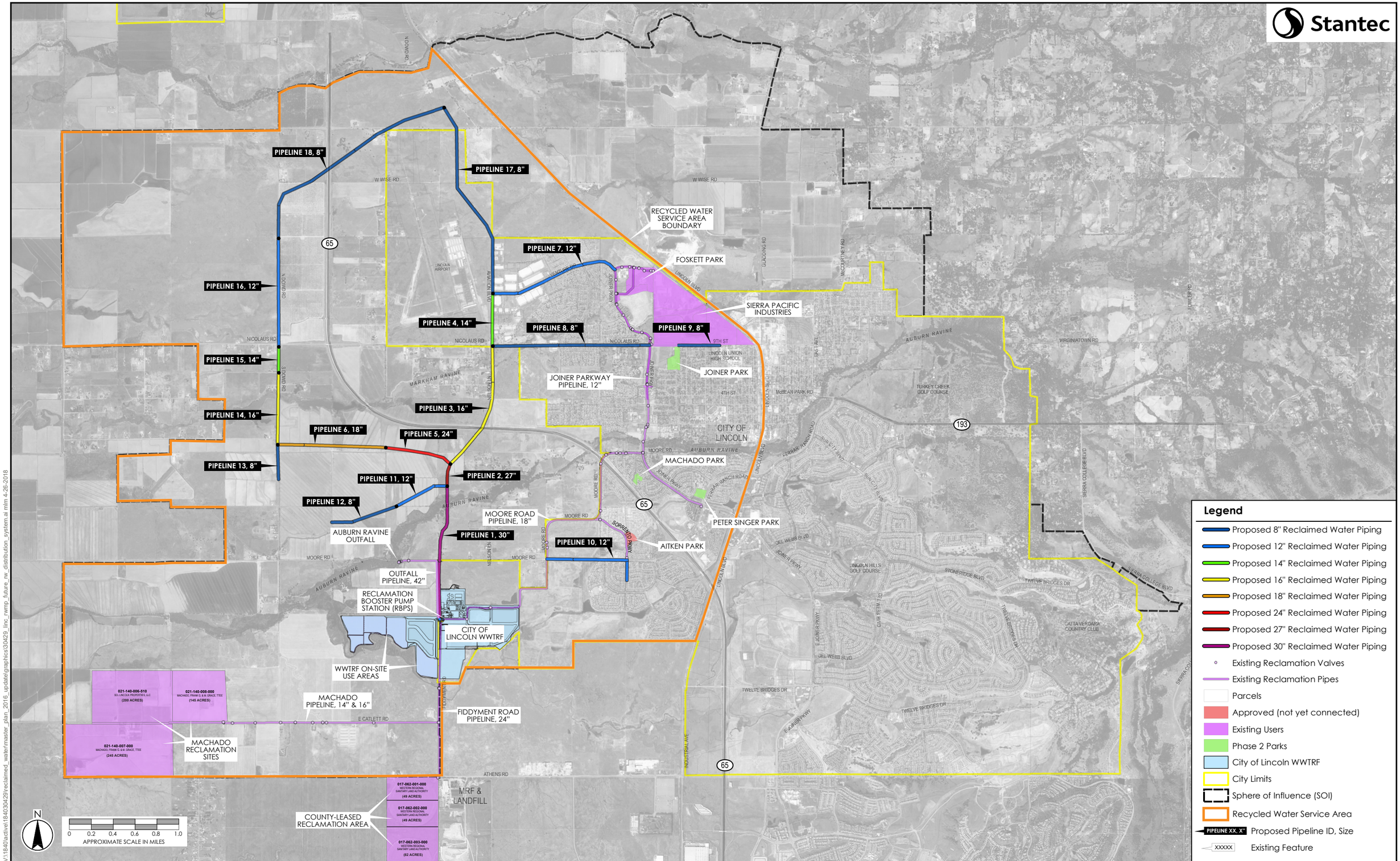
Future System Phasing and Opinion of Probable Costs

The following phasing strategy has been developed considering areas of the City that are currently in development and/or planning and the projected order in which SUDs and Villages may develop. The phasing strategy is subject to change as development occurs and plans become more refined. The actual layout and phasing of the future distribution system will likely be driven by the locations of high demand customers and planned transportation corridors, and the timing of recycled water use commitments. Partnering with users beyond the City's planning area could also influence the layout and stages of construction, although not considered in this Master Plan.

Reclamation phases are numbered in the order in which they are assumed to occur, lettering indicates that phases could occur in either order depending on actual development conditions. The anticipated phases and the corresponding level of development, recommended improvements, demands served, and other recommendations are summarized in **Table ES-5**.

Planning level opinions of probable costs have been developed for repair and replacement (R&R) of existing pipelines, proposed Capital Improvement Projects (CIPs) needed to supply recycled water to future users under buildout development conditions, and reclamation system operation and maintenance (O&M) costs.

The cost estimates presented in this Master Plan should be considered order-of-magnitude estimates and have been prepared as Class 4 estimates in accordance with AACE guidelines. As Class 5 estimates, the accuracy ranges from -30 to +50 percent. These costs have been estimated in December 2019 dollars consistent with the Engineering News Record construction cost index (ENRCCI, 20-Cities Average) of 11,381. Future adjustments of cost estimates can be projected by increasing the estimated capital cost by the ratio of the future ENR to 11,381.



V:\1840\active\184030429\reclaimed_water\master_plan_2016_update\graphics\30429_linc_rwmp_future_rw_distribution_system.ai mlm 4-26-2018

City of Lincoln
Reclamation Master Plan

Figure ES-2
Future Recycled Water Distribution System

Table ES-5 Phasing Recommendations

Development Condition	Phase [1]	Improvements	Demands	Additional Items & Recommendations
Existing	1	Existing Pipelines	City Demands	• Continue to connect users along existing pipelines (potential of 684 AF)
Near-Term	2	Phase II Park branches	City Demands	• Phase out County Leased Reclamation Area or increase RBPS capacity with second wet-well • Add 6th RBPS pump to existing wet-well • Effluent Management Planning • Condition Assessment
	3A	Pipelines 1 & 2	Village 5/SUD-B (1st phase of development)	
	3B	Pipeline 10	Village 7, Lincoln Crossing	
Long-Term	4	Pipelines 3, 5, 6, 11, 12 & 13	Village 5/SUD-B (2nd phase of development)	• The RBPS expansion should be completed with one of the long-term phases depending on demand conditions • Phase out or limit the PHD of the Machado Farm.
	5A	Pipelines 8 & 9	Loop City System	
	5B	Pipelines 4 & 7	Loop City System	
		RBPS Expansion	PHD – Long-Term	
Buildout	6	14, 15	V4/SUD-A (1st phase of development)	• Connect V-6 to Machado Pipeline • Add additional pumps to RBPS to meeting PHD as they are added.
	7	16, 18	V4/SUD-A (2nd phase of development)	
	8	17	SUD-A/ Expand system	

1. Phases are numbered in the order in which they are anticipated occur; lettering indicates that the project could be done in either order depending on actual development conditions

Costs associated with phased system improvements are presented in **Table ES-6**.

Table ES-6 Phased Improvement Costs

Development Condition	Phase	Improvements	Capital Cost Estimate	$/AF Supplied (1)
Existing	1	Existing Pipelines	-	-
Near-Term	2	Phase II Park Branches	$900,000	$14,800
	3A	Pipelines 1 & 2	$7,200,000	$4,200
	3B	Pipeline 10	$1,800,000	$5,400
		Subtotal Near-Term:	**$9,900,000**	**$4,700**
Long-Term	4	Pipelines 3, 5, 6, 11, 12 & 13	$10,600,000	$12,700
	5A	Pipelines 8 & 9	$2,400,000	$17,800
	5B	Pipelines 4 & 7	$3,500,000	$7,700
		RBPS Expansion (2)	$11,000,000	$3,500
		Subtotal Long-Term:	**$27,500,000**	**$11,600 (3)**
Buildout	6	14, 15	$2,300,000	$5,600
	7	16, 18	$4,500,000	$21,700
	8	17	$2,400,000	$71,200
		Subtotal Buildout:	**$9,200,000**	**$14,200 (4)**
		Total:	**$46,600,000**	**$14,700**

2. $/AF supplied represents the total project cost divided by the approximate volume of recycled water supplied through the pipelines annually, under buildout conditions.
3. Pump Station costs may be spread over multiple improvement projects to Long-Term buildout.
4. $/AF excludes RBPS expansion costs, representing pipeline improvements only.
5. The additional value of system reliability and redundancy provided by looping the distribution system is not represented in the $/AF of improvements associated with buildout phases.

The existing system R&R costs, capital improvement costs, and O&M cost estimates developed as part of this Master Plan are summarized in **Table ES-7**.

Table ES-7 Summary of Cost Estimates

Cost Estimate Type	Improvements	Cost Estimate	Recommendations
Existing System R&R	Existing Pipelines	$28,200,000	• Continue to connect users along existing pipelines. • Monitor pump station performance add sixth pump to existing RBPS to meet demands and pressure requirements.
	Existing Pumps	$280,000	
	Subtotal Existing System R&R:	**$28,480,000**	
Capital Impartments Project Cost	Near-Term	$9,900,000	• Phase out of County Leased Reclamation Area and/or increase RBPS capacity to meet demands. • Effluent Management Planning • Perform condition assessment on existing infrastructure. • Continue discussion with Placer County regarding their portion of effluent, per COJA.
	Long-Term	$27,500,000	• RBPS expansion project should occur with one of the long-term phases depending on demand conditions, pumps can be added as demand increases. • Phase out or limit the PHD of the Machado Farm.
	Buildout	$9,200,000	• Add pumps to the RBPS to meet PHD as they increase. • Utilize the existing Machado Pipeline to serve Village 6.
	Subtotal CIP Costs:	**$46,600,000**	
O&M Costs (WWTRF)	Existing System	$256,000	
	Buildout System	$524,000	

Abbreviations

AACE	American Association of Cost Engineers
AAD	Average Annual Demand
ADD	Average Day Demand
ADWF	Average Dry Weather Flow (observed during the dry season)
AF	acre-feet
AF/yr	acre-feet per year
ARB	American River Basin
BMP	Best Management Practice
C	Hazen-Williams Friction Factor
CDPH	California Department of Public Health
CDWR	California Department of Water Resources
cfs	cubic feet per second
CIMIS	California Irrigation Management Information System
CIP	Capital Improvement Plans or Projects
COJA	Construction, Operations, and Joint Exercise of Powers Agreement

CPUC	California Public Utilities Commission
DAFT	Dissolved Air Floatation Tank
DDW	SWRCB Division of Drinking Water
DFG	Department of Fish and Game
DWF	Dry Weather Flow (Observed during the flow monitoring period, used in model simulations)
EDS	Effluent Distribution System
EDU	Equivalent Dwelling Unit
ENR	Engineering News Record
ENRCCI	ENR Construction Cost Index
EPS	Effluent Pump Station
ET	evapotranspiration
ET_0	Reference Evapotranspiration (inches)
ET_L	Evapotranspiration of Landscaped Areas (inches)
fps	feet per second
GIS	Geographic Information System
GPD	gallons per day
gpm	gallons-per minute

I/I	Inflow and Infiltration
IRWMP	Integrated Regional Water Management Plan
K_L	Crop Coefficient (landscaping/turf grass/etc.)
kWh	Kilowatt-hour
LOS	Level of Service
Master Plan	Reclamation Master Plan
MDD	Maximum Day Demand
MMD	Maximum Month Demand
MG	Million Gallons
MRF	Material Recovery Facility
NCDC	National Climatic Data Center
NID	Nevada Irrigation District
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
PCWA	Placer County Water Agency
PHD	Peak Hour Demand
PS	Pump Station
psi	pounds-per square inch

R&R	Rehabilitation and Replacement
RBPS	Reclamation Booster Pump Station
RDII	Rainfall Dependent Inflow and Infiltration
RSB	Regional Stormwater Basin
RWQCB	Regional Water Quality Control Boards
SMD1	Placer County's Sewer Maintenance District No. 1
SOI	Sphere of Influence
SPI	Sierra Pacific Industries
SUD	Special Use District
SWRCB	State Water Resources Control Board
TDH	total dynamic head
TSB	Tertiary Storage Basins
UWMP	Urban Water Management Plan
UWMPA	Urban Water Management Planning Act
WFA	Water Forum Agreement
WMP	Water Master Plan
WWTRF	Wastewater Treatment and Reclamation Facility

1.0 INTRODUCTION

1.1 PURPOSE

The City of Lincoln (City) provides water and sewer services to residents, businesses, and other customers within its city limits. In addition to these services, the City provides reclaimed water to users for agricultural uses, public landscape irrigation, and industrial processes. The City's wastewater treatment and reclamation facility (WWTRF) produces disinfected tertiary recycled water which is suitable for the uses described in Article 3, Section 60304 (a) of Title 22 of the California Code of Regulations, commonly referred to as "unrestricted reuse". This Reclamation Master Plan (Master Plan) evaluates the City's existing reclamation system and projects future system needs to guide in the continued development of the recycled water distribution system.

The purpose of this Master Plan is to determine preferred system expansions and develop a capital improvement program (CIP) with a phased implementation approach. Drivers to expand the use of recycled water in California including drought, legal and environmental constraints, climate change, and regional water supply planning. Expanding the future use of recycled water is a component of the City's long-term Urban Water Management Plan (UWMP). The UWMP addresses the current and future state of City water supply and demand to assess availability and the ability to meet future demands during normal, single-dry and multiple dry years. Expanding the use of recycled water within the City advances regional water planning goals and aids in California 20 by 2020 water conservation requirements.

1.2 OBJECTIVES

The objectives of this Master Plan are as follow:

- Identify and plan for recycled water uses to offset potable water demand within the City, consistent with the City's water supply planning goals.
- Quantify demand for recycled water in conjunction with effluent storage capacity and allowable discharge to Auburn Ravine and address the WWTRF water balance requirements and effluent management as the City grows in compliance with waste discharge permitting.
- Provide a plan for the management and expansion of the City's existing reclaimed water system in accordance with current and anticipated regulations for production, storage, and use of recycled water.
- Develop a strategy to maximize the beneficial use of recycled water where feasible and efficient, limiting dependence on potable water and the impacts of potable water supply limitations that may be associated with drought conditions.
- Establish an infrastructure plan such that individual improvement or development projects within the City and General Plan area include reclamation facilities in keeping with a coordinated overall reclamation utility.
- Establish budgets for projects within the infrastructure plan for use in the establishment of appropriate fees, such that the City can collect funds and provide the infrastructure directly, or appropriately credit developers who provides the infrastructure as part of their development projects.

2.0 BACKGROUND

2.1 PURPOSE

The purpose of this chapter is to present background information that was considered in the development of this Master Plan. This chapter includes descriptions of the project study area, the City's General Plan, population data, relevant studies, and existing or on-going capital improvement projects.

This chapter is divided into the following sections:

- Study Area
- Relevant Studies
- Existing Capital Improvement Plans

2.2 STUDY AREA

The City of Lincoln is in Placer County, California, approximately twenty-five miles outside of downtown Sacramento. Land use designations and population projections for the study area are defined by the City's General Plan and other City planning documents.

2.2.1 General Plan

Land uses within city limits and within the City's sphere of influence (SOI) are established within the existing General Plan. The city limit encompasses approximately 13,800 acres including Village 1 and Village 7, which were annexed into the City in 2017. Land use designations defined within city limits consist of low, medium, and high-density residential, in addition to neighborhood commercial, business professional, employment center, commercial, industrial, parks and recreation, public facilities, medical center, open space, and agriculture designations. Recycled water demand projections are estimated in this Master Plan using historical potable water meter records from specific locations identified as having the potential for recycled water use by the City. This approach was used to estimate demands as opposed to deriving them from land area and land-use based demand factors (i.e., 200 gpm/acre).

Outside of city limits, the General Plan applies two land use designations, Village and Special Use District (SUD) for larger undeveloped portions of the General Plan SOI. These general land use categories provide flexibility while ensuring new developments meet the quality and mix of land uses desired by the City. These two designations do not geographically dictate land use patterns on the areas to which they are applied but do require the development and approval of a detailed specific plan that ensure a mixed-use concept consistent with General Plan guidelines. There are seven Villages (identified as V-1 through V-7), three SUDs (identified as SUD-A, SUD-B, and SUD-C). Demand projections for these areas were provided by the City.

The City's General Plan Land Use map is shown as **Figure 2-1**.

LEGEND

LAND USE DESIGNATIONS

- Rural Residential (RR)
- Country Estates (CE)
- Low Density Residential (LDR)
- Medium Density Residential (MDR)
- High Density Residential (HDR)
- Special Use District (SUD)
- Village (V)
- Mixed Use (MU)
- Neighborhood Commercial (NC)
- Community Commercial (CC)
- Regional Commercial (RC)
- Business and Professional (BP)
- Employment Center (EC)
- Industrial Planned Development (IPD)
- Light Industrial (LI)
- Industrial (I)
- Open Space (OS)
- Agriculture (AG)
- Parks and Recreation (PR)
- Public Facilities (PF)
- Medical Center (MC)

ROADWAY CLASSIFICATIONS

Existing / Proposed

- Freeway
- Major Arterial
- Minor Arterial
- Collector

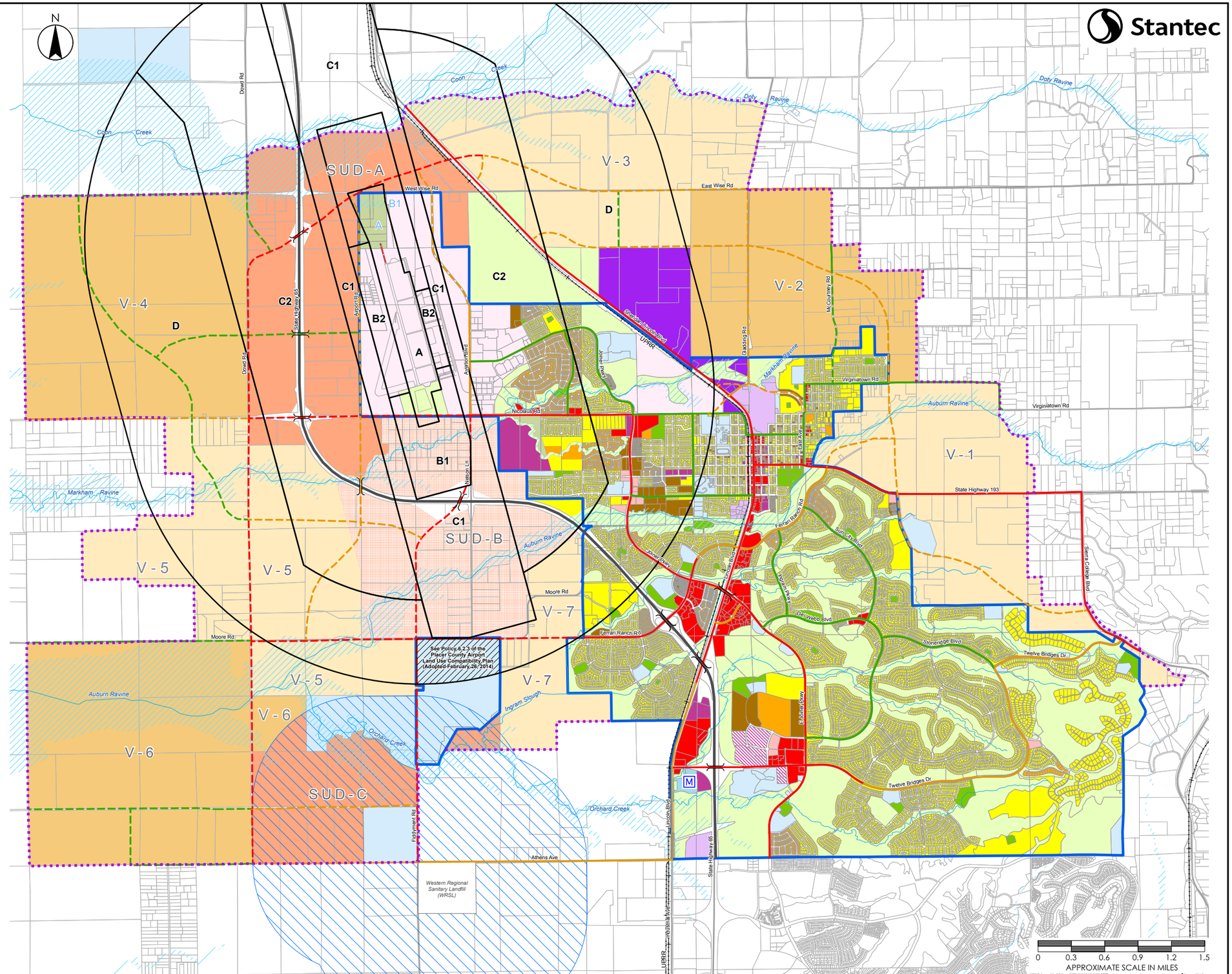
BOUNDARIES

- City Limits
- Sphere of Influence
- C1 ALUCP Compatibility Zones
- ALUCP Special Conditions Policy 6.2.3

OTHER

- Airport Runway Expansion
- Railroad
- Landfill, 1-Mile Buffer
- 100 Year Flood Zone
- Waterways

Source:
Adapted from City of Lincoln General Plan, Land Use and Circulation Diagram dated June 2014



V:\1840\active\184030429\reclaimed_water\master_plan_2016_update\graphics\30429_linc_rwmp_general_plan_land_use.ai mlm 3-9-2018

Figure 2-1
City of Lincoln General Plan Land Use

2.2.2 Population Projections

The City of Lincoln's population grew 282 percent between 2000 and 2010. The population grew from 11,205 to 42,819, making it the fastest growing place in the United States during this time period. Annual residential population data, estimated by the United States Census Bureau from 2010 to 2016 is presented in **Table 2-1**.

Table 2-1 City of Lincoln Annual Population Estimates

Year	Population
2010	42,819
2011	43,684
2012	44,191
2013	45,006
2014	45,747
2015	46,344
2016	47,030

Growth has slowed since the early 2000's, but the City is still expected to see significant growth in the future. The *City of Lincoln Housing Element Background Report* projects a population of 92,350 by 2035. Population projections are presented in **Table 2-2**.

Table 2-2 City of Lincoln Population Projections

Year	Population Projection (1)	Data Source
2016	47,030	United States Census Bureau (2016)
2035	92,350	SACOG 2035 Projections (2007)
2050	132,000	General Plan/ Municipal Service Review, City of Lincoln, Placer County, CA (2010)

2.3 RELEVANT STUDIES

This Reclamation Master Plan serves as an update to the City's existing Reclamation Master Plan prepared by Stantec (formerly ECO:LOGIC), in 2004. The preliminary 30% Reclamation Master Plan (Stantec, 2016), was expanded upon for the development of this Master Plan update.

2.4 EXISTING CAPITAL IMPROVEMENT PLANS

The City's Financial Year 2017-2018 Budget describes capital improvement plans and projects included within the City's annual budget. Capital Improvements Projects (CIPs) that impact the City's reclamation system are considered Wastewater Projects.

The following CIPs have been included in the City's 2017-2018 Annual Budget:

CIP 300 – Phase II Reclamation

The City's Phase II Reclamation Project extends the existing reclaimed water distribution system to allow the connection of irrigation systems at Joiner Park, Machado Park, and Peter Singer Park. The project includes the construction of 510 LF of 6-inch reclaimed water main on Groveland Lane, approximately 500 LF of 4-inch reclaimed water main on Downing Circle, and approximately 1,280 LF of 8-inch reclaimed water main on Nicolaus Road. This project will offset the approximately 20 MG/year (61 AF/yr) of potable water that is currently used to irrigate these parks.

CIP 411 – WWTRF Expansion Phase I

The City's WWTRF Expansion Project will provide additional treatment capacity at the WWTRF that is needed to facilitate continued development. Capacity will be expanded by 1.2 MGD with the addition of an oxidation ditch and related components. The second phase (Phase II) of the expansion will include the addition of a clarifier and related components further expanding capacity by 0.9 MGD (Phase II is not anticipated to be required for up to five years after Phase I). The WWTRF is nearing facility capacity and additional capacity is needed to facilitate future development. Operation of the WWTRF is funded through monthly utility bills of rate payers. The capital cost of this project will be funded through payment of connection fees from builders and developers as a requirement of building permits and final maps (or via agreement with regional entities).

CIP 426 – WWTRF Reclaimed Water Storage

This project proposes to increase the existing reclaimed water storage volume on the WWTRF site by approximately 142 MG. The increase is needed to accommodate increased wastewater flows from regionalization. The WWTRF NPDES permit includes temperature limitations for the Auburn Ravine, which limits the ability to discharge effluent to the ravine during specific times of the year. During periods when the effluent is too warm to discharge, the facility is required to either transmit reclaimed water to a permitted user or store the reclaimed water on site for use or discharge at another time. This project is required to maximize the sale of reclaimed water and improve operation of the WWTRF. The current plan is to implement this storage project with Phase I of the WWTRF Expansion Project.

3.0 REGULATIONS AND POLICIES

3.1 PURPOSE

The purpose of this chapter is to present an overview of regulations and policies related to recycled water use, distribution, and water rights. This chapter includes descriptions of "Title 22", governing entities and their responsibilities, state and local policies, and the City's right to recycled water.

This chapter is divided into the following sections:

- Regulatory Framework
- State Policy Framework
- Water Rights

3.2 REGULATORY FRAMEWORK

The production, distribution and use of recycled water in California is regulated by the State Water Resources Control Board (SWRCB), Regional Water Quality Control Boards (RWQCB), SWRCB Division of Drinking Water (DDW)[1], the Clean Water Act, the California Code of Regulations, the Health and Safety Code, and the California Water Code.

There are nine Regional Water Quality Control Boards that are tasked with permitting and enforcement responsibilities for recycled water projects in California, while the SWRCB DDW is tasked with developing technical standards and recycled water criteria that are protective of public health and advising on water reclamation permit requirements.

Recycled water projects generally require the following elements prior to implementation:

- Notice of intent to reuse treated municipal wastewater meeting regulatory requirements for allowed uses,
- Preparation and submission of an Engineering Report documenting the proposed production, distribution, and use of recycled water, monitoring components, and compliance with recycled water regulations,
- Contractual agreements between the recycled water users and/or purveyors and the producer that establish conditions for recycled water service and use, and
- Issuance of an Individual Reclamation Permit, Master Reclamation Permit, or coverage under the Statewide General Reclamation Permit.

The City's WWTRF holds a Master Reclamation Permit (Order No. R5-2005-0040-01) issued by the Central Valley RWQCB. WWTRF operators are responsible for monitoring recycled water quality to ensure compliance with the Master Reclamation Permit. In accordance with the provisions of the Master Reclamation Permit, the City has established rules, regulations, and administrative

[1] Responsibilities of the SWRCB Division of Drinking Water (DDW) were formerly held by the California Department of Public Health (CDPH).

procedures for recycled water users that govern the design and construction of recycled water facilities and the use of reclaimed water within the City. The City's document titled *Rules and Regulations – Recycled Water Use and Distribution* is included as **Appendix A**.

In addition to its Master Reclamation Permit, the operation of the WWTRF is also governed by Order No. R5-2018-0081 (NPDES No. CA0084476), Waste Discharge Requirements (WDR) issued by the Central Valley RWQCB. This WDR order was adopted on December 7th, 2018, revising the previous order.

Revisions to the WDR order include:

1. An increase in the permitted average dry weather flow (ADWF) to accommodate the anticipated wastewater flow into the facility and WWTRF Expansion Project.

2. Adjustments to the regulatory permit defining the WWTRF effluent discharge capacity, increasing the allowable discharge rate but further restricting temperature impact limitations.

3.2.1 Title 22 – California Water Recycling Criteria

Regulatory requirements and criteria for the production, distribution, and use of recycled water have been established by the California Department of Public Health in Title 22, Division 4, Chapter 3 of the California Code of Regulations. These regulations are commonly referred to as "Tittle 22" or the "California Water Recycling Criteria" and outline treatment and recycled water quality requirements for the allowed uses for recycled water. Title 22 also regulates the reliability features for treatment facilities producing recycled water and use area requirements.

Title 22 defines four recycled water treatment level standards described as 1.) non-disinfected secondary, 2.) disinfected secondary-23, 3.) disinfected secondary-2.2, and 4.) disinfected tertiary. The City's WWTRF produces recycled water at a disinfected tertiary treatment level. From a regulatory perspective, disinfected tertiary recycled water is suitable for the potential uses proposed in this Master Plan, commonly referred to as being suitable for "non-potable unrestricted reuse".

3.2.2 Agencies and Responsibilities

The agencies that provide oversight, regulations, and management of recycled water projects and their responsibilities are outlined below.

State Water Resources Control Board (SWRCB)

- Establishing general policies governing the permitting of recycled water projects
- Protecting water quality and sustaining water supplies
- General oversight over recycled water projects
- Review of Regional Water Board permitting practices
- Leading the effort to meet recycled water use goals, set forth in the Recycled Water Policy
- The development of a general permit for irrigation uses of recycled water

SWRCB – Division of Drinking Water (DDW)

- The protection of public health and drinking water supplies
- The development of uniform water recycling criteria appropriate for particular uses of recycled water
- Regional Water Boards rely on the expertise of DDW for the establishment of permit conditions needed to protect public health

Regional Water Quality Control Board (RWQCB)

- The protection of surface and groundwater resources with the issuance of permits that implement DDW's recommendations, the Recycled Water Policy, and applicable law
- The enforcement of permit requirements
- Use their authority to encourage use of recycled water

City of Lincoln (City)

- Operates the WWTRF and the use of recycled water under Master Reclamation Permit (R5-2005-0040-01)
- Discharges effluent Auburn Ravine Creek under a separate Waste Discharge Requirements Order No. R5-2018-0081 (National Pollutant Discharge Elimination System (NPDES) No. CA0084476)
- May authorize specific reclamation projects (recycled water services) on a case-by-case basis
- Enforces rules and regulations for users governing the design and construction of recycled water use facilities and the use of recycled water in accordance with Title 22, and the Master Reclamation Permit
- The development of and use of administrative procedures and User Agreements
- Adoption and enforcement a City recycled water ordinance

California Department of Water Resources (CDWR)

- Reviewing and updating the California Water Plan
- Evaluating the quantity of recycled water use and planning for the potential future uses
- Relies on the State Water Board and RWQCBs for data
- Shares the authority to allocate and distribute funding with the State Water Board

California Public Utilities Commission (CPUC)

- Approving rates and terms of service for the use of recycled water by investor-owned utilities

3.3 STATE POLICY FRAMEWORK

Recycled water use is widely recognized as a critical component for supplementing California's existing surface and groundwater supplies. Recycled water use is mandated in California under the State's applicable statutory and constitutional requirements, commonly known as the "Recycled Water Policy". State policies have been designed to promote and facilitate water recycling projects to the "maximum extent feasible". The California Constitution requires that

the waters of the State be put to beneficial use. Actions required to produce recycled water are not mandated under law but are strongly encouraged and incentivized.

California's Water Recycling Law encourages recycled water use and mandates use under certain conditions.

California Water Code Section 13510:

> *It is hereby declared that the people of the State have a primary interest in the development of facilities to recycle water containing waste to supplement existing surface and underground water supplies to assist in meeting future water requirements of the State.*

State regulatory agencies provide funding to develop water recycling infrastructure and facilities in support of this policy, from which the City has participated and received funding to support development of water recycling infrastructure and associated facilities. State legislature has enacted policies, that encourage the construction of these types of facilities, as well as statues that mandate the use of recycled water under certain conditions. This mandate stems from the State's beneficial, reasonable use policy outlined in California Water Law.

Other policies and mandates impacting the use of recycled water include those associated with land use planning. One of which declares the use of potable domestic water for landscaped areas "a waste or unreasonable use of water if recycled water meeting the applicable standards is available". Another policy example is the State issued mandate for the installation of recycled water delivery systems or "purple pipe" contained within the California Government Code as a component of the specific land use planning process.

If recycled water is available within the City, Government Code Section 65605 requires that the City adopt and enforce a recycled water ordinance, including the following provisions.

1. State that it is the policy of the local agency that:
   "Recycled water determined to be available pursuant to Section 13550 of the Water Code shall be used for non-potable uses within the designated recycled water use area set forth by the local agency when the local agency determines that there is not an alternative higher or better use for the recycled water, its use is economically justified, and its use is financially and technically feasible for projects under consideration by the local agency."
2. Designate the areas within the boundaries of the local agency that can or may in the future use recycled water, including, but not limited to, existing urban areas in lieu of potable water.
3. Establish general rules and regulations governing the use and distribution of recycled water in accordance with applicable laws and regulations.
4. Establish that the use of the recycled water is determined to be available pursuant to Section 13550 of the Water Code in new industrial, commercial, or residential subdivisions located within the designated recycled water use areas for which a tentative map or parcel map is required pursuant to Section 66426. These provisions shall require a separate plumbing system to serve non-potable uses in the common areas of the subdivision,

including, but not limited to, golf courses, parks, greenbelts, landscaped streets, and landscaped medians. The separate plumbing system to serve non-potable uses shall be independent of the plumbing system provided to serve domestic, residential, and other potable water uses in the subdivision.

5. Require that recycled water service shall not commence within the designated recycled water use area in any service area of a private utility, as defined in Section 1502 of the Public Utilities Code, or to any service area of a public agency retail water supplier that is not a local agency, as defined in subdivision (b) of Section 65603, except in accordance with a written agreement between the recycled water producer and the private utility or public agency retail water supplier that shall be made available in a timely manner by the recycled water producer to the local agency adopting the ordinance pursuant to this article.

The City of Lincoln adopted the following recycled water ordnance in 2018:

City of Lincoln Code Section: 13.05.030 – Protection Required

The type of protection required shall be commensurate with the degree of hazard. In determining the degree of hazard and the type of protection required, the following criteria shall be issued:

(1) At each service connection to any premises where there exists an auxiliary water system with no known cross-connections, the city water system shall be protected by an approved double check valve backflow prevention assembly or an approved reduced pressure principle backflow prevention assembly.

(2) At each service connection to any premises on which there is an auxiliary water system where cross-connections are known to exist, the city water system shall be protected by an approved reduced pressure principle backflow prevention assembly.

(3) At each service connection to any premises on which an objectionable but nonhazardous substance is, or may be, handled in such a manner as to permit entry into a city water system, the city water system shall be protected by an approved double check valve backflow prevention assembly or an approved reduced pressure principle backflow prevention assembly.

(4) At each service connection to any premises on which any hazardous substance is or may be handled in such a manner as to permit entry into the city water system, the city water system shall be protected by an approved air-gap separation. The air-gap shall be located as close as practicable to the service cock and all piping between the service cock and any receiving vessel shall be visible. If these conditions cannot reasonably be met, the city water system shall be protected by an approved reduced pressure principal backflow prevention assembly, provided that this alternative is in compliance with the provisions of this chapter and the rules and regulations adopted per Section 13.05.200 of this chapter.

(5) At each service connection to any sewage treatment plant or sewage pumping station, the city water system shall be protected by an approved air-gap separation. The air-gap

shall be located as close as practicable to the service cock and all piping between the service cock and any receiving vessel shall be visible. If these conditions cannot reasonably be met, the city water system shall be protected by an approved reduced pressure principle backflow prevention assembly, provided that this alternative is in compliance with the provisions of this chapter and the rules and regulations adopted per Section 13.05.200 of this chapter.

(6) A swivel-ell connection is authorized cross-connection control for non-dual plumbed systems. Swivel-ell connections shall not be used on dual plumbed systems. A dual plumbed system is a system that utilizes separate piping systems for reclaimed water and potable water within a facility and where the reclaimed water is used for either of the following purposes: to serve plumbing outlets (excluding fire suppression systems) within a building, or outdoor landscape irrigation at individual residences.

A swivel-ell connection shall be designed to preclude the simultaneous use of both potable and reclaimed water sources to supply a distribution system at the same time. The swivel-ell may be manually switched between the reclaimed water source connection and the potable water source connection to supply the use area's distribution system. In no case shall it be acceptable for the potable water supply to be directly connected to a reclaimed water supply. The public services department shall document that all site-specific conditions have been satisfied prior to the use and connection of a swivel-ell connection. The public services department may at any time require installation of a permanent air-gap separation between the potable water supply and the reclaimed water distribution system.

The following is required for all reclaimed water projects, including those that have a swivel-ell connection:

a. No simultaneous use of the potable water supply and the reclaimed water supply shall be allowed in the same distribution system.

b. Prior to construction of any facilities, written approval shall be obtained from the public services department.

c. Only disinfected tertiary reclaimed water is used.

d. Each reclaimed water distribution system may only be supplied from a single reclaimed water feed line. There shall be no other inter-connections between the reclaimed water distribution system and potable water system within the use area or facility.

e. The swivel-ell connection (which includes the reclaimed water service, potable water service, and the service riser to the facility or use area) must be located above ground, color coded in accordance with the Health and Safety Code Section 116815 and have appropriate signs. Security precautions must be provided (e.g. locked gate valves, warning signs, etc.) to prevent interconnections, vandalism, and unauthorized use. The city shall inspect each location on a minimum annual basis to verify that a switchover

has not occurred without the purveyor's approval. Meters must be provided on both connections and records of water use maintained.

f. The potable water service connection must be protected by an approved reduced pressure principle backflow prevention assembly (RP). The swivel-ell connection must be located downstream of the RP assembly. The need for on-site backflow protection must also be evaluated.

g. To avoid simultaneously using both sources, swivel-ell connections must be designed such that a tee connection, or other prefabricated mechanical appurtenances, cannot readily be substituted for the swivel-ell. The reclaimed water and potable water service connections should not approach the use area service riser at an angle of 180°.

h. The RP on the potable water supply line must be tested in accordance with Title 17, Section 7605 immediately prior to a switchover from the reclaimed water supply to the potable water supply. The completed test report must be sent to the Regional Board prior to activation.

i. The public services department and regional board must be notified within 24 hours of each switchover.

j. The city shall supervise the switchover and activation of the potable water service; and subsequent deactivation.

In summary, the State has mandated reclaimed water be used to the fullest extent feasible as part of the effort to reduce domestic potable water demands. By requiring and incentivizing the installation of infrastructure, the State aims to ensure the use of recycled water in the years to come.

3.4 WATER RIGHTS

Rights to recycled water or to "water foregone" can be secured through four primary mechanisms related to the following:

- Foreign Water,
- Salvaged and Developed Water,
- Water Code Section 1211 petition process, and
- Water Code Section 1212 instream dedication process

On December 23, 2011, the City filed a Wastewater Change Petition with the State Water Resources Control Board, Division of Water Rights, pursuant to section 1211 of the Water Code. The petition sought to change the purpose of use, and place of use, of 4.1 cubic feet per second (cfs) of treated wastewater discharged to Auburn Ravine. The treated water discharge would be discontinued, and wastewater could be used in accordance with the City's Master Reclamation Permit. The Order WW0066 accepting the change was issued on January 2, 2013 under the following discharge limitations.

The City is authorized to discontinue discharge to Auburn Ravine, subject to the following limitations:

1. During the periods of October 1 through November 30 and March 1 through April 15, the City shall maximize the discharge of treated wastewater (termed "reclaimed water") from the Lincoln WWTRF under the following conditions:

    a. Reclaimed water discharges to Auburn Ravine will only be made when Lincoln can meet all regulatory requirements association with the discharge.

    b. Reclaimed water discharges to Auburn Ravine may be reduced during the above time period when conditions beyond the control of the City necessitate cessation or reduction of the discharge from that which would otherwise be possible. Examples of such conditions include interruptions in other water supplies such as canal breakage, sudden and unusual hot temperatures, and downstream flooding.

        i. If cessation or reduction of discharge is necessary due to an emergency, then the City shall notify the Department of Fish and Game (DFG) within 24 hours. DFG may respond with requests based on the specific needs of the fish in Auburn Ravine. The City will work with DFG to address the specific needs of the fish

        ii. If cessation or reduction of discharge is necessary due to an anticipated event, the City shall notify DFG 48 hours prior to cessation or reduction of discharge. DFG may respond within this 48-hour period with requests based on the specific needs of the fish in Auburn Ravine. The City will work with DFG to address the specific needs of the fish.

    c. The City shall coordinate with other interested parties, including but not limited to: Pacific Gas & Electric Company, Nevada Irrigation District, Placer County Water Agency and South Sutter Water District in the management of Auburn Ravine. In the City's coordination, it must take into account the regulatory constraints on its releases of effluent from the WWTRF. In this context, "coordinate" means discussing and conferring with interested parties; provided, however that pursuant to state law, the City retains its discretion and is not obligated to implement any particular measure.

    d. The authorized place of use is the areas shown in the Master Reclamation Permit, within Sections 1-12 of T11N, R5E and R6E, Sections 5-8 of T11N, R7E, Sections 1-36 of T12N, R5E, Sections 13-36 of T12N, R6E, Sections 18, 19 and 29-32 of T12N, R7E, all within MDB&M.

    e. Treated wastewater may be used for the proposed project from January 1 to December 31 of each year.

f. Treated wastewater may be used for irrigation and industrial purposes.

g. No water shall be used under this wastewater change petition until petitioner has filed a report of waste discharge with the Regional Board, pursuant to Water Code Section 13260, and the Regional Board or State Water Board has prescribed waste discharge requirements or has indicated that waste discharge requirements are not required. Thereafter, water may be diverted only during such times as all requirements prescribed by the Regional Board or State Water Board are being met. No point source discharges of waste to surface water shall be made unless waste discharge requirements are issued by a Regional Board or the State Water Board. A discharge to ground water without issuance of a waste discharge requirement may be allowed if, after filing the report pursuant to Section 13260:

   i. The Regional Board issues a waiver pursuant to Section 13269, or

   ii. the Regional Board fails to act within 120 days of the filing of the report.

   No petitioner shall be required to file a report of waste discharge pursuant to Section 13260 of the Water Code for percolation to ground water of water resulting from the irrigation of crops.

The City's existing rights to reclaimed and recycled water generated at the WWTRF is contingent on compliance with Water Code Section 1210.

Water Code section 1210 states:

> *The owner of a wastewater treatment plant operated for the purpose of treating wastes from a sanitary sewer system shall hold the exclusive right to the treated waste water as against anyone who has supplied the water discharged into the wastewater collection and treatment system, including a person using water under a water service contract, unless otherwise provided by agreement.*

If no agreement exists between the provider and the recycled water producer expressly retaining the water provided for the provider's use, then the water belongs exclusively to the owner of the wastewater treatment plant.

The City of Lincoln has a potable water supply contract with Placer County Water Agency (PCWA), under which PCWA makes no claims to reclaimed water derived from potable water sold to the City of Lincoln. The City is also involved in a temporary potable water sales contract with Nevada County Irrigation District (NID), in which NID makes no claim to reserve rights to water supplied to the City of Lincoln.

The City's Wastewater Treatment and Reclamation Facility (WWTRF) accepts and treats raw wastewater from Placer County's Sewer Maintenance District No. 1 (SMD1) subject to a Joint Exercise of Powers Agreement established for this purpose. Section 5.3.17 Reclaimed Water,

establishes Placer County's rights to reclaimed water. The following provisions are included within Section 5.3.17 of the Construction, Operations, and Joint Exercise of Powers Agreement (COJA) agreement between Placer County and City of Lincoln.

Section 5.3.17 Reclaimed Water

A. Each Party is allocated a share of the Reclaimed Water equal to its Proportionate Flow in that quarter.

B. Each Party has the right to dispose of its share of Reclaimed Water in accordance with applicable law as it sees fit.

C. During the Operations Period[2], Lincoln will dispose of all Reclaimed Water at this own expense (covered by the Operations Charge) in accordance with applicable law, unless the County elects to make alternative arrangements for disposing of its share of Reclaimed Water by written notice to Lincoln. If the County does not make alternative arrangements and Lincoln is able to sell any part of the County's share of Reclaimed Water, Lincoln will keep all the revenue.

D. Lincoln will report total volume of Reclaimed Water generated by the Regional Facilities to the County on a monthly basis. The actual volume of Reclaimed Water will be used for calculating revenues under this Section 5.3.17, provided that the County may challenge the accuracy of the flow data being reported by Lincoln if it has proof that the reported data is not accurate or if the Independent Monitor's report shows a discrepancy in the volume of Reclaimed Water reported by Lincoln. The County has the right, upon advance notice and during normal business hours, to inspect and copy the relevant records of Lincoln relating to Reclaimed Water.

E. If the County elects to build one or more pipelines to dispose of this share of Reclaimed Water, Lincoln will reasonably cooperate with the County to allow the construction of the required pipelines and connection to the Lincoln WWTRF. The County will pay all costs required for that construction and connection and will promptly cause to be repaired any damage to the Lincoln WWTRF to the extent caused by such construction work. The County will also defend, indemnify and hold Lincoln harmless from and against any and all third-party claims, losses, damages, liabilities and expenses to the extent cause by or resulting from such construction, except to the extent of the active negligence or willful misconduct of Lincoln or those for whom it is responsible. Prior to building one or more such pipelines, the County will meet and confer with the City regarding the location and construction. If Lincoln reasonably objects to the proposed route of such pipeline(s), the Parties will resolve the matter per Article 7.

[2] Operations Period means, initially, the period between Treatment Substantial Completion (May 23, 2016) and the fifth-year anniversary of that date, but will be extended to cover the period until Parties execute a separate agreement governing future operations and maintenance of Regional Facilities or the County elects by written notice to end the Operations Period.

F. For information only, each Party will notify the other of any arrangements it makes to sell Reclaimed Water. Provided that a Party may not enter a transaction with the notifying Party's buyer at a unit price lower than the unit price charged by the notifying Party to that buyer, the other Party may enter further transaction with that buyer to sell its share of Reclaimed Water if that buyer desires additional water beyond what the notifying Party has agreed to provide.

G. Revenue earned by the County for its share of Reclaimed Water has no impact on the Operations Charge or any other amounts that the County is obligated to pay Lincoln.