DRAFT – TECHNICAL MEMORANDUM

Date: January 26, 2024

To: Mr. John Ohanian

From: Robert Murphy, PE – PACE

Kyle Smith, PE – PACE

Re: Draft - Silverwood WWTP Relocation Costs #A556

I. Background/Summary

The Silverwood Development (formerly Tapestry Development) is a master-planned community in the City of Hesperia (City). Initial planning documents created in 2014 proposed for all wastewater generated by the development to be conveyed to a wastewater treatment plant (WWTP) within the development. The recycled water produced by the WWTP was planned to serve the irrigation needs for open space land uses (parks, irrigated slopes, canyons, etc.) for the entire development. In addition, homes in later development phases were planned to be dual-plumbed (potable water for indoor use and recycled water for outdoor use). Homes during initial development phases were not planned to be dual-plumbed, as sufficient supply of recycled water was not anticipated to meet all residential irrigation demands.

In 2021, the City conducted a wastewater/recycled water system study and began pursuing the design and construction of its own WWTP, influenced largely by contractual changes with Victor Valley Wastewater Reclamation Authority (VVWRA). The City's desire was to construct a single WWTP which would serve the City's existing sewer flows (currently treated by VVWRA), and to meet Silverwood's sewer capacity and recycled water demands. In lieu of this single WWTP approach, PACE and the Silverwood project team recommended that the City pursue a two WWTP approach. A two plant approach would have allowed the City and Silverwood to independently meet their respective goals without impacting the project's development schedule, and without costly infrastructure needed to convey sewer and reclaimed water between Silverwood and the City WWTP. However, the City ultimately decided to proceed with the single WWTP approach, with the WWTP being located at the north end of the City.

As a result of this change in WWTP location, the Silverwood project team performed revised planning of the on-site sewer and recycled water systems. Accompanying master plans have also been approved by the City, and many of the components required to convey sewage and recycled water into and out of the development have been designed and constructed. Recently, the City has decided they will no longer construct the WWTP. The Silverwood project team must therefore reverse course and re-engineer the on-site sewer and recycled water systems to function with an on-site WWTP.

The numerous infrastructure components that were engineered and constructed to operate with the City's WWTP are no longer useful to Silverwood. The design and construction of these components added costs to Silverwood that would not have been spent if the initial plan to construct an on-site WWTP was agreed upon by the City. The intent of this technical memorandum is to summarize the system infrastructure components that were planned around the City's WWTP, and to identify the associated engineering and construction costs incurred by Silverwood.

II. Sewer System Changes and Costs

The sewer collection systems designed to operate with the City WWTP and Silverwood WWTP are shown for comparison in Figure 1. The individual components which are affected by the WWTP relocation are identified and numbered on each system. The primary difference between the two systems is that with the City WWTP system, all sewage generated for development phases 1-4 were planned to be conveyed north along Silverwood Trail and pumped out of the development via Lift Station 1 (LS1) and Lift Station 2 (LS2). In the Silverwood WWTP system, only sewage generated in the current development phase 1 is to be conveyed along Silverwood Trail to LS1, and LS1 and LS2 must pump the sewage south toward the WWTP. Sewage generated in future development phases will be diverted and conveyed along Kennedy Meadows to the WWTP. Therefore, the gravity sewers leading to each lift station, the lift stations themselves, and the sewer forcemains leaving each lift station are affected by the WWTP relocation.

The engineering and construction costs associated with the changes for each sewer system component are listed in Table 1. The current status of each component for the City WWTP system (e.g., preliminary design, approved plans, constructed) is also listed since it impacts the cost incurred.

In general, the engineering costs listed in the table are the costs to design and prepare plans for the pipelines of the City WWTP system, costs to redesign the lift stations for new hydraulic conditions, and costs to revise plans to remove components that have changed. Engineering costs for components which have not yet been designed are not included, aside from the costs to revise the sewer master plan. In addition, the costs to design and prepare new plans for the pipelines of the Silverwood WWTP system are not included, as these are costs that Silverwood would have spent from the start to design the system based around an on-site WWTP.

The construction costs listed for the Silverwood Gravity Sewer are the additional costs incurred for constructing the 24-inch sewer of the City WWTP system when only a 16-inch sewer is needed for the Silverwood WWTP system.

The interim Lift Station 1A (LS1A), the LS1A forcemain and the offsite sewer improvements (I Avenue Gravity Sewer and Lift Station Upgrades) within the table are the improvements proposed to temporarily serve the initial 500 units of Silverwood. These improvements were added as an interim solution due to delays caused by the decision process and preliminary design of the City WWTP. If Silverwood was able to proceed with construction of an on-site WWTP, these interim improvements would not have been needed.

III. Recycled Water System Changes and Costs

The recycled water distribution systems designed to operate with the City WWTP and Silverwood WWTP are shown for comparison in Figure 2. The individual components which are affected by the WWTP relocation are identified and numbered on each system. The primary difference between the two systems is that in the City WWTP system, all recycled water had to be conveyed into the development south along Silverwood Trail, and then distributed to the system via a recycled water booster pump station at Silverwood Trail and Kennedy Meadows. In the Silverwood WWTP system, the recycled water is produced at the WWTP located in the eastern area of Phase 1, and distributed to the system via a booster pump station at the WWTP. Therefore, the pipelines along Silverwood Trail and Kennedy Meadows are affected by the WWTP relocation.

In addition, since the City WWTP was planned to produce additional recycled water through the treatment of existing City sewer flows, the City WWTP system included additional in-tract recycled water distribution piping to dual-plumb and provide irrigation for all homes in Phase 1. The Silverwood WWTP will not have enough supply to serve the irrigation demand for homes in Phase 1, so this in-tract piping is no longer needed.

The engineering and construction costs associated with the changes for each recycled water system component are listed in Table 2. The current status of each component for the City WWTP system (e.g., preliminary design, approved plans, constructed) is also listed since it impacts the cost incurred. The engineering costs listed include costs for preparing the recycled water master plan for the City WWTP system, costs for designing the in-tract distribution piping, and costs for revising the Kennedy Meadows and Silverwood Trail improvement plans. The construction cost listed for the Silverwood Trail RW Line were the additional costs incurred for constructing the 16-inch distribution line of the City WWTP system when only 4-inch and 6-inch lines are needed for the Silverwood WWTP system.

IV. Summary

The total cost incurred by Silverwood for the relocation of the WWTP from the City back to within Silverwood is summarized in the table below. These are the engineering and construction costs that Silverwood has spent to design and construct improvements intended to operate with the City's WWTP.

	Engineering Costs	Construction Costs	Total
Sewer System:	$306,352	$5,226,578	**$5,532,930**
Recycled Water System:	$155,780	$1,335,633	**$1,491,413**
Total Cost:	**$462,132**	**$6,562,211**	**$7,024,343**

Attachments

Figure 1 – Sewer Collection System Comparison

Figure 2 – Recycled Water Distribution System Comparison

Tables 1 and 2 – Silverwood Costs Incurred for WWTP Relocation

LS SEWER LIFT STATION

COLLECTION AREA BOUNDARY

SEWER FORCEMAIN

8" PVC (SDR-35) SEWER

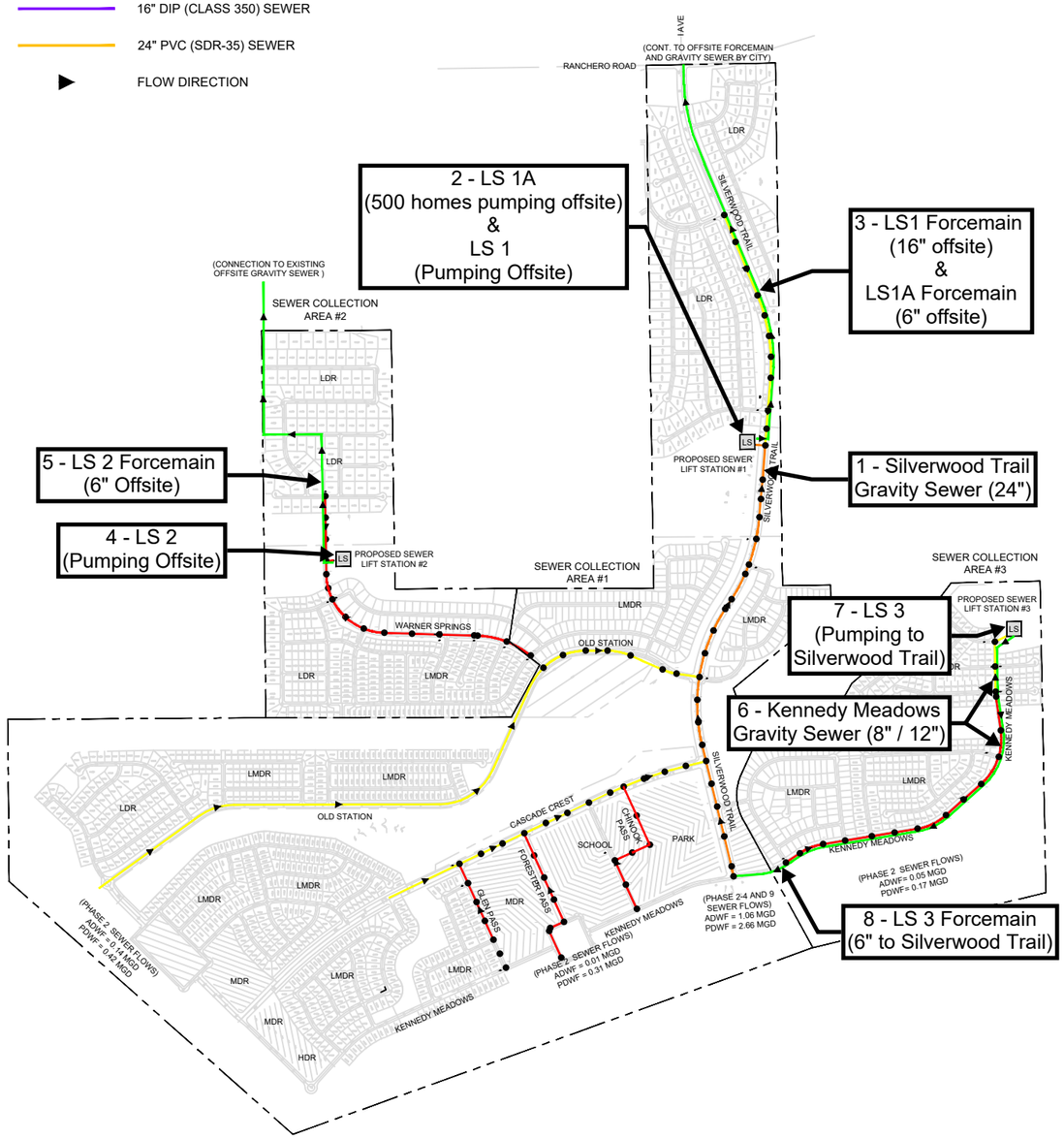
12" PVC (SDR-35) SEWER

16" DIP (CLASS 350) SEWER

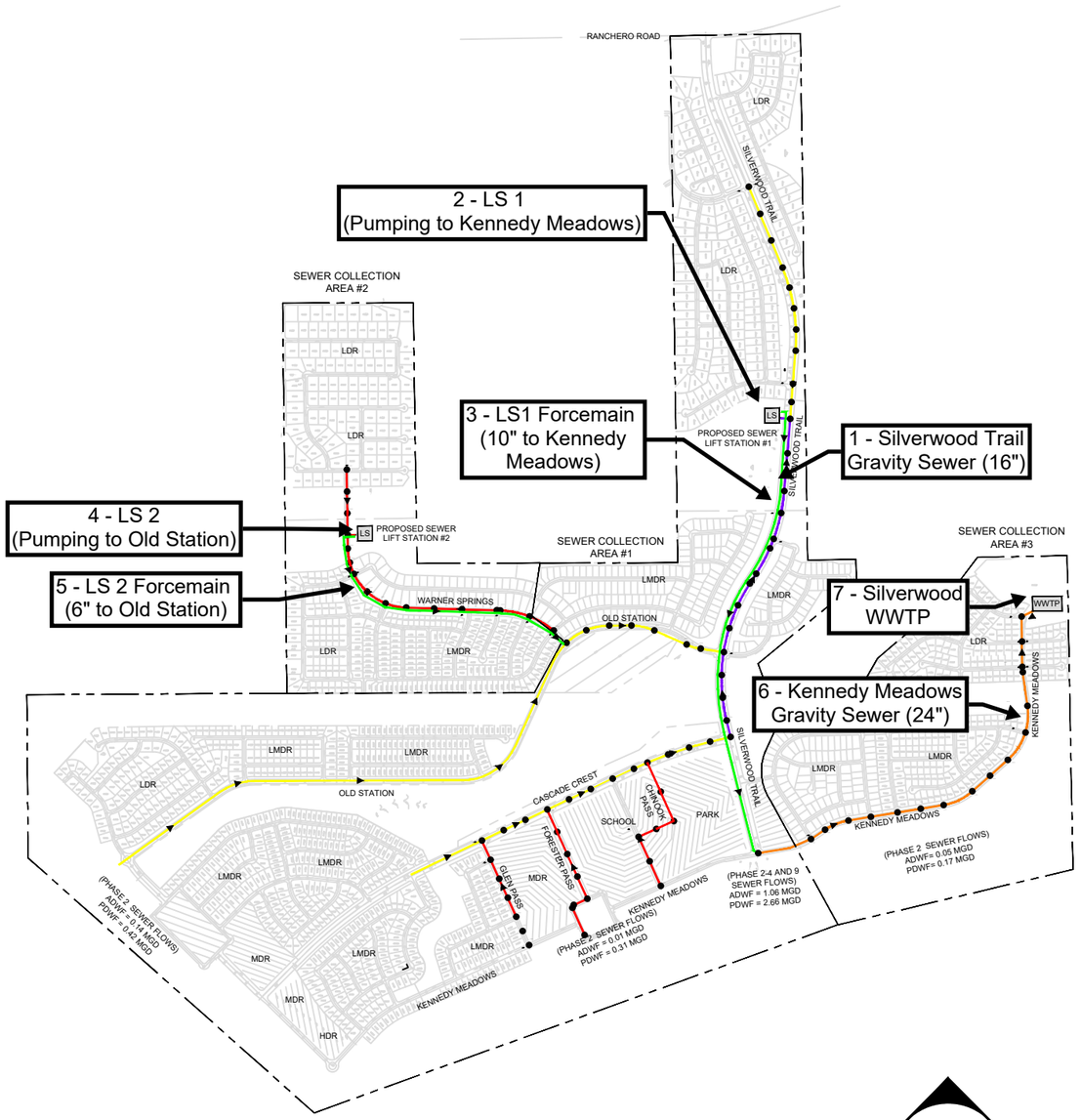
24" PVC (SDR-35) SEWER

FLOW DIRECTION

COLLECTION SYSTEM w/ CITY WWTP



COLLECTION SYSTEM w/ SILVERWOOD WWTP



NORTH

PHASE 1 SEWER COLLECTION SYSTEM COMPARISON

JOB SILVERWOOD - PHASE 1 SEWER COLLECTION SYSTEM MODEL CA

HESPERIA

SCALE	DESIGNED	DRAWN	CHECKED	DATE	JOB NO.
1" = 1500'		KS	RRM	1/2024	A556

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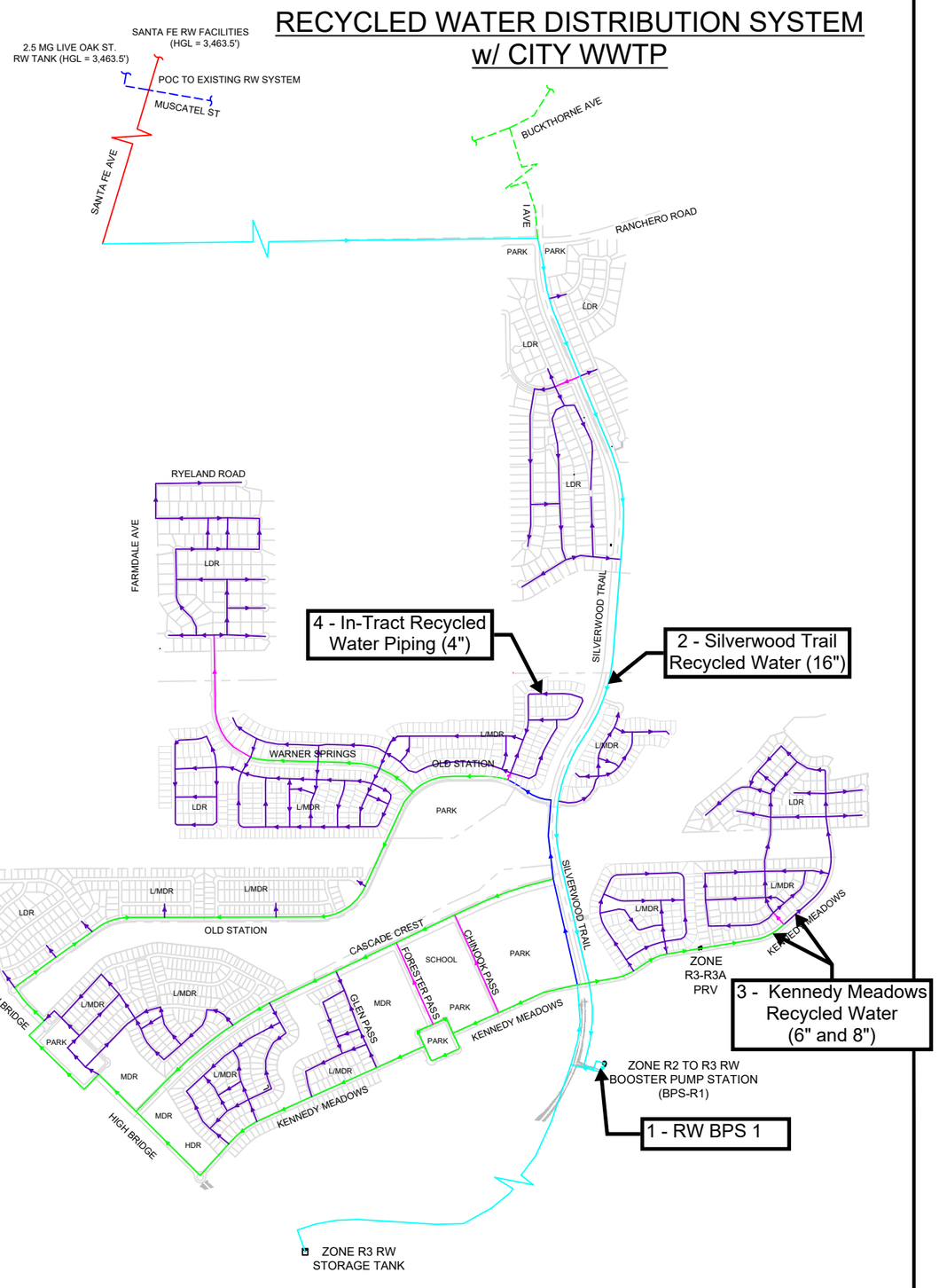
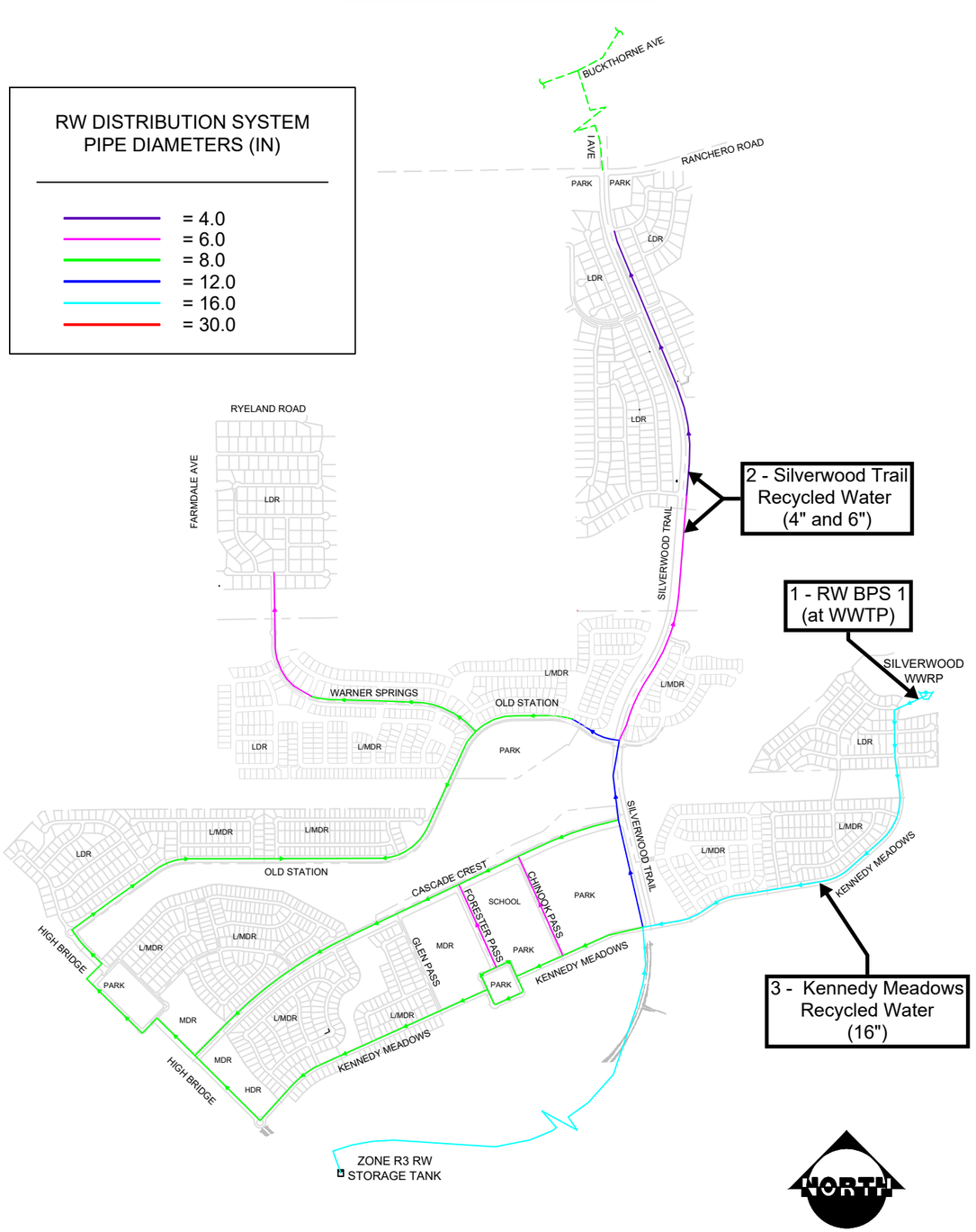
FIGURE 1

RECYCLED WATER DISTRIBUTION SYSTEM w/ CITY WWTP



RECYCLED WATER DISTRIBUTION SYSTEM w/ SILVERWOOD WWTP



PHASE 1 RECYCLED WATER DISTRIBUTION SYSTEM COMPARISON

SILVERWOOD - PHASE 1 RECYCLED WATER DISTRIBUTION MODEL

CA

JOB
SILVERWOOD - PHASE 1
RECYCLED WATER
DISTRIBUTION MODEL
HESPERIA

SCALE	1" = 1500'
DESIGNED	
DRAWN	KS
CHECKED	RRM
DATE	12/2023
JOB NO.	A556

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FIGURE
2

Silverwood Costs Incurred for WWTP Relocation

Table 1 - SEWER COLLECTION SYSTEM CHANGES							
COMPONENT		COLLECTION SYSTEM w/ CITY WWTP		COLLECTION SYSTEM w/ SILVERWOOD WWTP	PROPOSED PROJECT DELTA		
		DESCRIPTION	STATUS	DESCRIPTION	ENGINEERING COSTS	CONSTRUCTION COSTS	TOTAL
1	Silverwood Trail Gravity Sewer	24" from Kennedy Meadows to LS 1 (4,500 LF)	Approved Plans / Partially Constructed	16" from Cascade Crest to LS1 (3,300 LF)	$ 10,600.00	$ 239,482.00	$ 250,082.00
2	LS 1A	Interim Silverwood Trail Lift Station planned to convey sewage from first 500 homes to the City (250 GPM)	Approved Plans	N/A	$ 148,960.00	$ 2,499,997.00	$ 2,648,957.00
	LS 1	Silverwood Trail Lift Station planned to convey all sewage from Phases 1-4 to the City (3000 GPM)	Master Planned / Preliminary Design	Silverwood Trail Lift Station planned to convey portion of sewage from Phase 1 to Kennedy Meadows (1200 GPM)	(See Sewer Master Plan)	$ -	$ -
3	LS 1A Forcemain	6" FM from LS 1 to Silverwood Trail / Ranchero (at connection to City FM, 4,200 LF)	Constructed	N/A	$ 27,750.00	$ 381,604.60	$ 409,354.60
	LS 1 Forcemain	16" FM from LS 1 to Silverwood Trail / Ranchero (at connection to City FM, 4,200 LF)	Approved Plans	10" FM from LS 1 to Kennedy Meadows (4,500 LF)	$ 15,910.00	$ -	$ 15,910.00
4	LS 2	Warner Springs Lift Station planned to convey flows to offsite City sewer (300 GPM)	100% Design	Warner Springs Lift Station planned to convey flows to offsite City sewer	$ 11,172.00	$ -	$ 11,172.00
5	LS 2 Forcemain	6" FM from LS 2 to Farmdale Gravity Sewer offsite (3,600 LF)	Approved Plans	6" FM from LS 2 to Old Station (2,900 LF)	$ 30,200.00	$ -	$ 30,200.00
6	Kennedy Meadows Gravity Sewer	8" / 12" from Silverwood Trail to LS 3 (4,600 LF)	Master Planned / Preliminary Design	24" from Silverwood Trail to WWTP (4,600 LF)	(See Sewer Master Plan)	$ -	$ -
7	LS 3	Kennedy Meadows Lift Station Pumping to Silverwood Trail (300 GPM)	Master Planned / Preliminary Design	N/A (Included in WWTP)	(See Sewer Master Plan)	$ -	$ -
8	LS 3 Forcemain	6" FM on Kennedy Meadows from LS 3 to Silverwood Trail (4,500 LF)	Master Planned / Preliminary Design	N/A	(See Sewer Master Plan)	$ -	$ -
9	I Ave LS Upgrades	Upgrade existing City sewer lift station to pump sewage from first 500 homes	In Construction	N/A	$ 41,800.00	$ 1,189,601.81	$ 1,231,401.81
10	I Ave Gravity Sewer Upgrades	Upgrade existing City gravity sewer to convey sewage from first 500 homes	Constructed	N/A	$ 8,200.00	$ 915,892.50	$ 924,092.50
11	Sewer Master Plan	Master Plan for components to convey sewage to City WWTP	Approved Plan	Master Plan for components to convey sewage to Silverwood WWTP	$ 11,760.00	$ -	$ 11,760.00
				Total:	**$ 306,352.00**	**$ 5,226,577.91**	**$ 5,532,929.91**

Table 2 - RECYCLED WATER DISTRIBUTION SYSTEM CHANGES							
COMPONENT		DISTRIBUTION SYSTEM w/ CITY WWTP		DISTRIBUTION SYSTEM w/ SILVERWOOD WWTP	PROPOSED PROJECT DELTA		
		DESCRIPTION	STATUS	DESCRIPTION	ENGINEERING COSTS	CONSTRUCTION COSTS	TOTAL
1	RW BPS #1	Recycled Water Booster Pump Station at Silverwood Trail and Kennedy Meadows (1800 GPM)	Master Planned / Preliminary Design	Recycled Water Booster Pump Station at WWTP	(See RW Master Plan)	$ -	$ -
2	Silverwood Trail RW Line	16" RW line from Ranchero and Silverwood Trail (at connection point to City RW) to RW BPS #1	Constructed	4" / 6" RW line north of Old Station	$ 21,060.00	$ 1,335,633.00	$ 1,356,693.00
3	Kennedy Meadows RW Line	4" / 8" RW Line on east of Silverwood Trail	Approved Plans	16" RW Line from Silverwood Trail to WWTP	$ 3,000.00	$ -	$ 3,000.00
4	RW In-Tract Piping	4" RW Distribution Piping to serve residential homes in Phase 1	Approved Plans	N/A	$ 123,000.00	$ -	$ 123,000.00
5	RW Master Plan	Master Plan for components to convey recycled water from City WWTP	Approved Plan	Master Plan for components to convey recycled water from Silverwood WWTP	$ 8,720.00	$ -	$ 8,720.00
				Total:	**$ 155,780.00**	**$ 1,335,633.00**	**$ 1,491,413.00**