MEMORANDUM

DATE:	April 4, 2022
TO:	Troy Herold State of Utah School and Institutional Trust Lands Administration 675 E 500 S #500 Salt Lake City, UT 84102
FROM:	Kai Krieger, M.S., P.E. Hansen, Allen & Luce, Inc. (HAL) 859 W. South Jordan Pkwy. Ste. 200 South Jordan, UT 84095
SUBJECT:	Utility Feasibility Study
PROJECT NO.:	452.01.100

PURPOSE

This memorandum documents the initial findings for the Utility Feasibility Report for the State of Utah School and Institutional Trust Lands Administration property located west of Saratoga Springs.

INTRODUCTION

The State of Utah School and Institutional Trust Lands Administration (SITLA) owns approximately 1,200 acres of land west of the existing Saratoga Springs city boundary and south of the Canton Ridge development. SITLA has submitted a concept development plan to the City of Saratoga Springs (City) with the intent that the developable land will be annexed into the City in the near future. A utility analysis of the sanitary sewer, storm drain, drinking water, and secondary water systems has been performed to determine the necessary improvements to the City's existing infrastructure to accommodate the proposed development.

The utility analysis herein includes a feasibility report to assess the impact that the SITLA development will have on each utility and helps to develop infrastructure improvements that address utility deficiencies.

SANITARY SEWER

Existing System

The City's entire sewer production is currently treated at the Timpanogos Wastewater Treatment Plant (WWTP) which is owned and operated by Timpanogos Special Services District (TSSD). Figure 1 shows the existing infrastructure, outlining the location of the main pumps and transmission lines conveying sewage to the WWTP located on the northeast corner of Utah Lake.

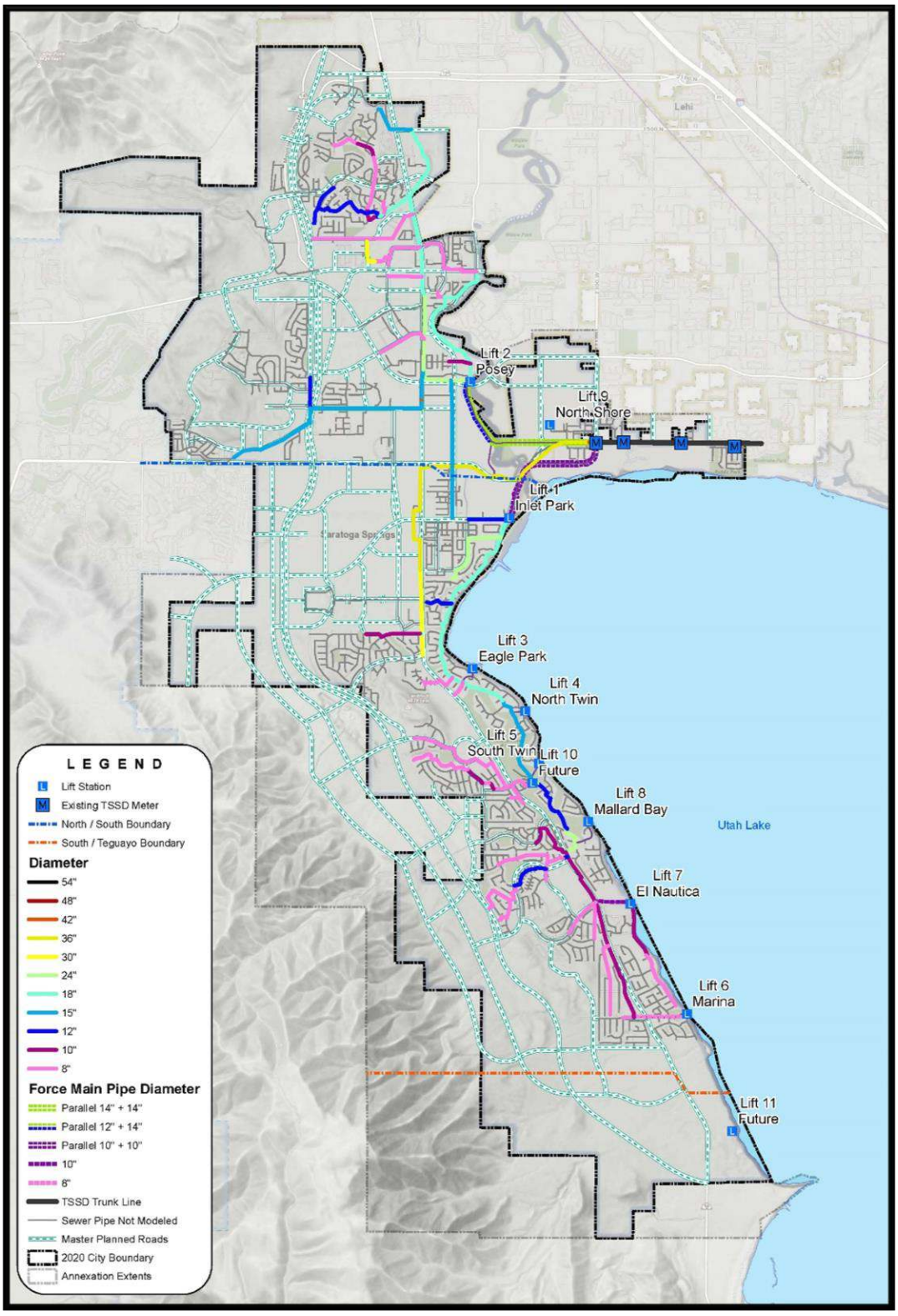


Figure 1. Existing Saratoga Springs Sewer System (Source BCA, 2020) [1]

[1] *Sewer Capital Facilities Plan*, Bowen Collins and Associates, 2020. Saratoga Springs, Utah.

A large portion of the flow throughout the City needs to be pumped because the sewage cannot flow to the main outfall and WWTP by gravity. Sewage in the remaining portion of the service area is conveyed by gravity.

Sewer Improvements

The Saratoga Springs Wastewater Master Plan included the SITLA property as part of their overall assumptions for future growth. The master plan proposes a 24-inch gravity sewer main that would service the SITLA land as well as a number of other areas of the City. The general alignment of this pipeline is shown in Figure 2 and includes project S3, portions of project S5, and potentially portions of project S1.4.

The current wastewater level of service in Saratoga Springs is 239 gpd/ERC. The master planned mainline sizes were estimated based on this assumption coupled with planning level densities. A preliminary review of SITLA's plans appear to be consistent with the assumptions in the master plan and therefore the proposed piping would be adequate to serve the needs of SITLA as well as future growth to the south.

The challenge for serving the SITLA property is the significant distance to an acceptable connection point into the existing sewer system. A new sewer pipeline would need to go through the Canton Ridge development and property owned by the Church of Jesus Christ of Latter-day Saints whose developments are managed by Suburban Land Reserve (SLR). Coordination between SLR and the Canton Ridge development will be critical to locating this master planned pipeline in such a way that it will best serve everyone's needs. The pipeline will best serve the SITLA property if it is located at an elevation that is low enough to collect as much of the total sewer flows from future development as possible, but also keep the pipe flowing downhill to avoid the need for pumping. In addition to coordinating with SLR and Canton Ridge, UDOT should also be contacted to verify the planned location and alignment of the future Mountain View Corridor that will go through this area.

It should be noted that a portion of the SITLA property will be too low in elevation to utilize the master planned pipeline. These areas will need to flow to existing or planned lift stations (depending on existing capacities) and will therefore require SITLA to pay a proportional share for the costs of the lift station to gain access to whatever capacity is required from the planned development. The capacity required will be determined based on the City's level of service (239 gpd/ERC).

We recommend a preliminary design of the master planned 24-inch pipeline be completed (this design should be coordinated with all the major stakeholders). The preliminary design would provide additional details concerning potential constraints as well as possibilities for future development and help refine estimated capacity needs for the master planned pipeline and lift station capacity SITLA property will require. This 24-inch pipeline is the most significant off-site utility project that will be required for the development to proceed.

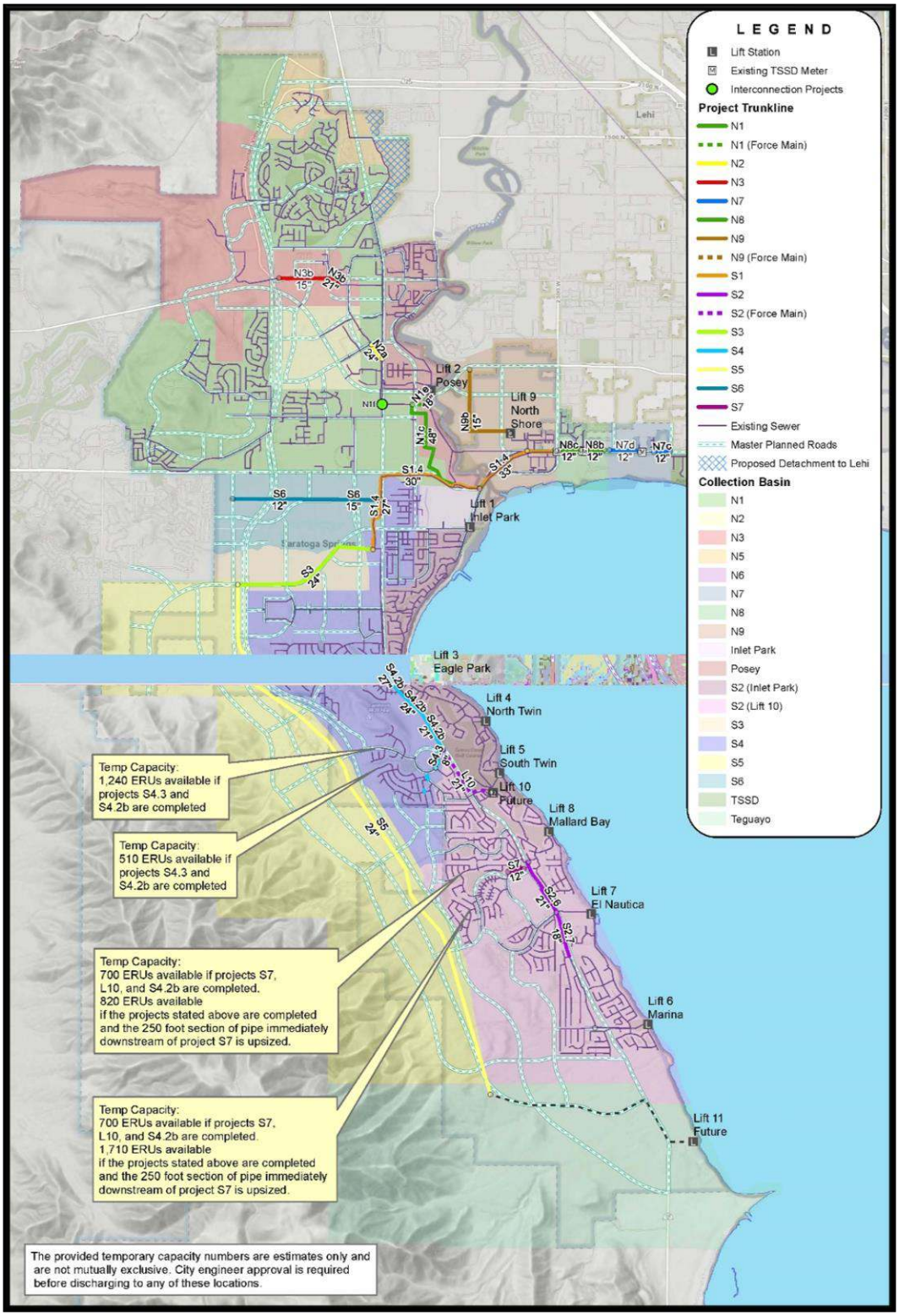


Figure 2. Proposed Buildout Sewer System Saratoga Springs (Source BCA, 2020) [2]

[2] *Sewer Capital Facilities Plan*, Bowen Collins and Associates, 2020. Saratoga Springs, Utah.

STORM DRAIN

The City has topography that slopes west to east towards the Jordan River and Utah Lake as Lake Mountain lies to the west. It is assumed that all the runoff is drained to both the Utah Lake and Jordan River given the proximity.

The most recent Saratoga Springs Stormwater Master Plan was completed in 2018. As part of that process, drainage basins were delineated and hydrologic parameters were assigned so that runoff flowrates could be estimated. The conveyance facilities were evaluated based on the calculated runoff flowrates to determine if there is adequate capacity to convey the stormwater safely to either Utah Lake or the Jordan River.

The capacity of the conveyances throughout the City was used to develop an allowable release rate map (see Figure 3 on the following page), the basic premise being that if runoff from the drainage basins is controlled to what is presented on the allowable release rate map the downstream conveyance facilities will not be overwhelmed.

In regard to SITLA lands, the allowable release rate map will play a vital role in determining detention requirements and conveyance facility sizes. Depending on where the development occurs the detention requirements will vary. Smaller release rates require larger detention volumes as compared to higher release rates. Site specific studies to define detention volumes will likely be required as development occurs.

It should be noted that one of the regional detention facilities shown on Figure 3 is on SITLA land. It is recommended that SITLA and the City discuss the location and size of this facility and evaluate its feasibility. If found to be feasible, SITLA should include this facility in their overall plans. Other than this regional detention facility, no other off-site projects are anticipated other than participating in the storm drain impact fee.

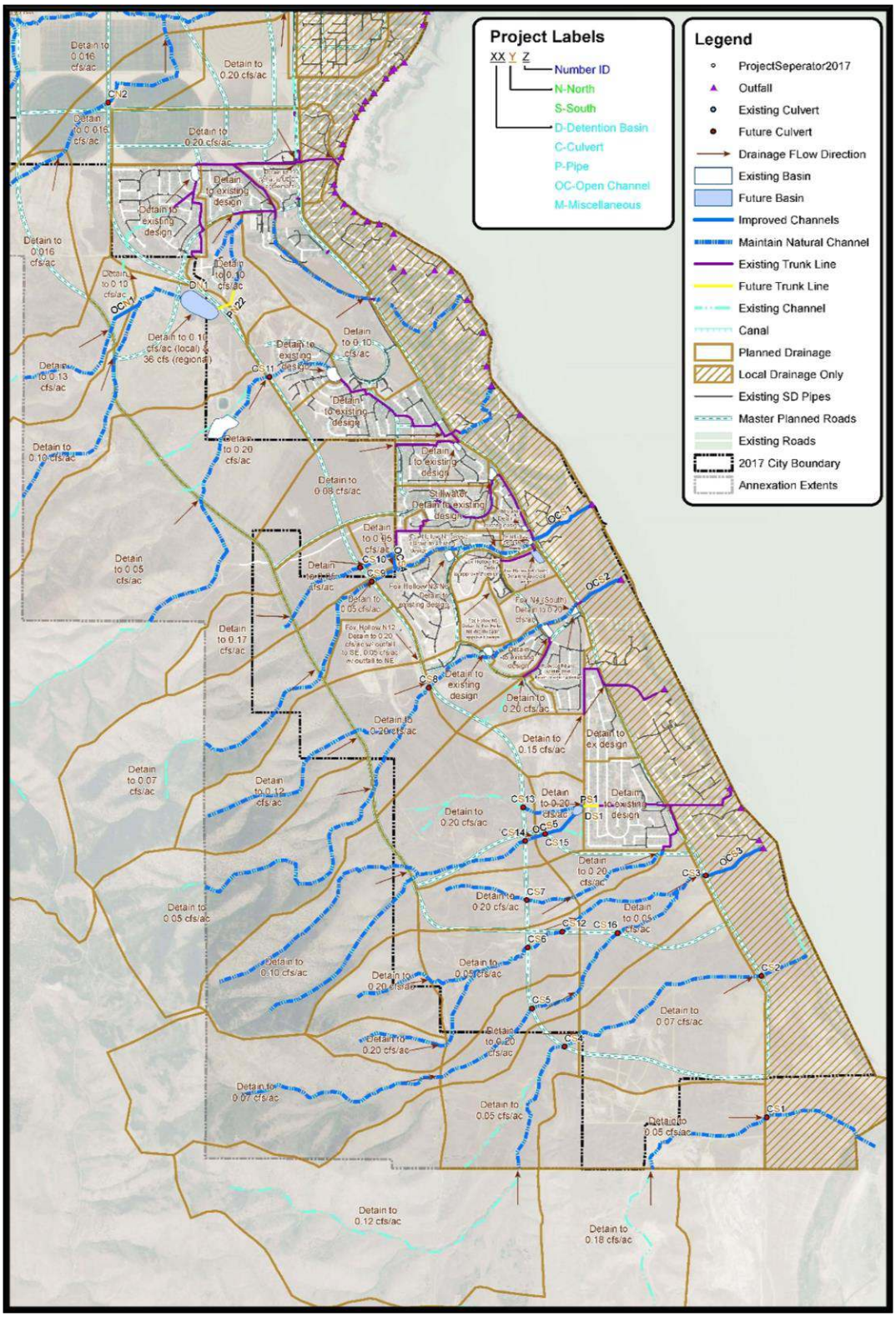


Figure 3. Allowable Release Rate Map (BCA, 2018)[3]

[3] *Storm Drain Capital Facilities Plan*, Bowen Collins and Associates, 2018. Saratoga Springs, Utah.

DRINKING WATER

Existing System

The Saratoga Springs existing drinking water system is comprised of a network of pipes, storage tanks, pump stations, wells, and connections to Central Utah Water Conservancy District that provides water to approximately 10,000 equivalent residential connections (ERCs). The City has established a level of service that serves as a basis for the infrastructure required for both existing and future demands. As new developments enter the City, infrastructure is sized and built based on the established level of service. Table 1 below summarizes the level of service for the City of Saratoga Springs regarding its drinking water system. Development of the SITLA property will require additional drinking water source, storage and transmission projects based on previous master planning efforts and the established level of service adopted by the City.

Table 1. Saratoga Springs Drinking Water System Level of Service

Level of Service Criteria	Saratoga Springs Requirement
Well Source Capacity	375 gpd per ERC plus 375 gpd per ERC for redundancy
Pump Station Source Capacity	375 gpd per ERC plus 375 gpd per ERC for redundancy
Wholesale Indoor Water Source Capacity	375 gpd per ERC
Indoor Water Storage Capacity	267 gal per ERC
Emergency Storage Capacity	100 gal per ERC
Pipe Capacity	40 psi minimum during peak day demand conditions and 30 psi minimum during peak instantaneous conditions
Yearly Volume	267 gpd per ERC (0.3 ac-ft per ERC)

Source

Drinking water source for the SITLA property will come from existing and future City connections to Central Utah Water Conservancy District. Drinking water from these connections will be delivered to Zone 2 via the Grandview Pump Station and a future Zone 2 pump station located at the intersection of Pony Express Parkway and the future Mountain View Corridor. The future Zone 2 pump station and future pipeline to convey the water south is currently being designed (see Figure 4). From Zone 2, new pump stations will be needed to provide source for

development in Zones 3, 4 and 5 (see Figure 4). A Zone 3 pump station is anticipated just northeast of the SITLA property to pump to a Zone 3 storage tank that will serve Zone 3 on SITLA, SLR and Canton Ridge property (see Figure 4). This Zone 3 pump station would need to be built before development on SITLA property in Zone 3 and above and would need to be sized for the Zone 3 area on SLR and Canton Ridge property and sized for the Zone 3 area on SITLA property that would be served by the pump station. The pump stations for the remaining area of Zone 3 and higher pressure zones on SITLA property can be phased and planned to best meet the needs of the development. The source required for the development and for each pump station on the SITLA property will be calculated based on the number of ERCs that need to be served and the level of service shown in Table 1.

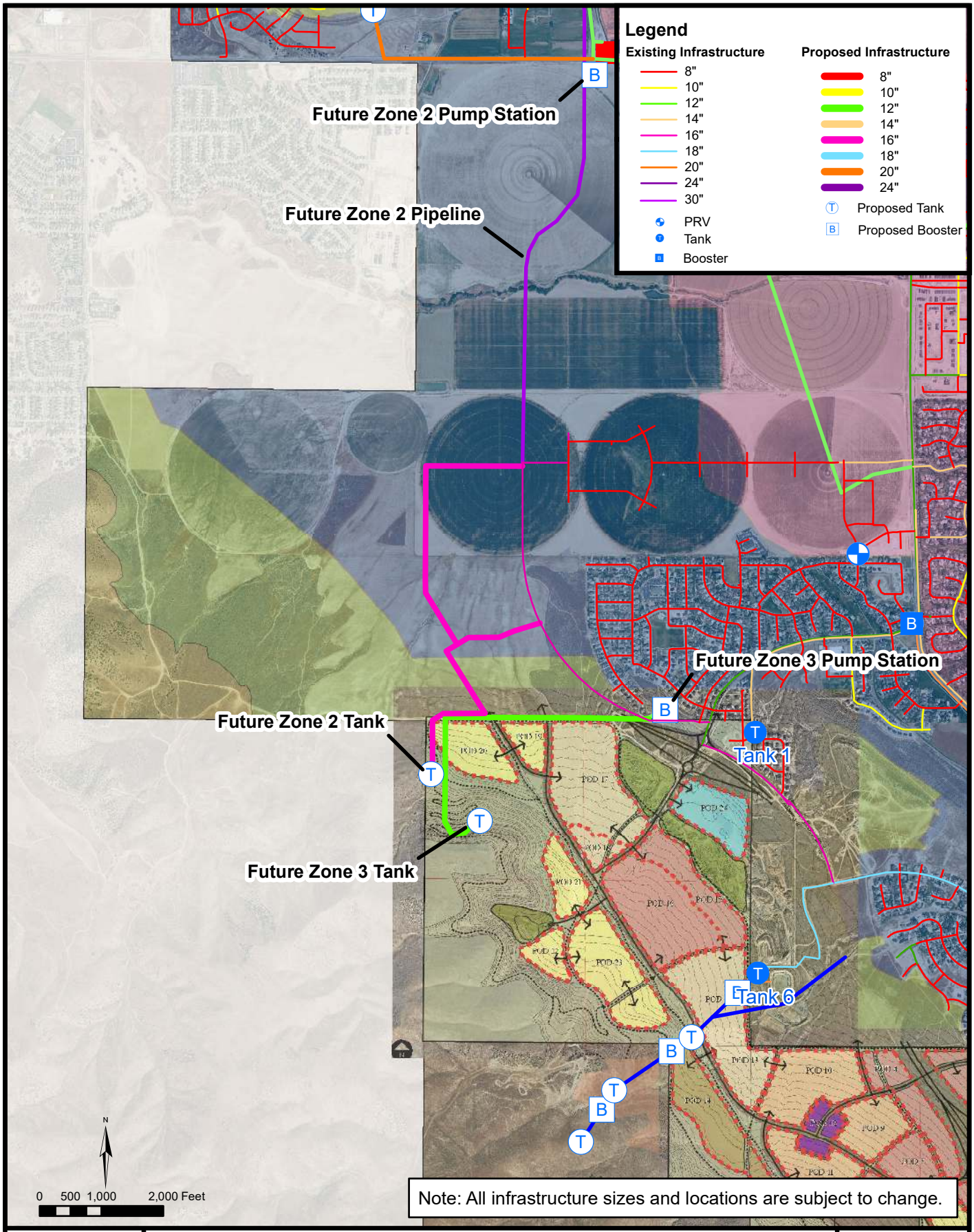
Storage

Drinking water storage for the SITLA property will be provided by the existing storage tanks in Zones 2 and 3, as well as new storage tanks constructed in Zones 2, 3, 4 and 5 (see Figure 4). A Zone 2 Tank is anticipated to be needed on the northwest corner of the SITLA property. This storage facility will not serve the SITLA property directly except for source flow-through capacity; however, the elevation required dictates that it needs to be on SITLA property. It would not need to be built for the SITLA property to develop, but land would need to be reserved. The Zone 3 storage tank would need to be built before development on SITLA property in Zone 3 and above. A Zone 3 tank in the northwest corner of the SITLA property would need to be sized for the Zone 3 area on SLR and Canton Ridge property and sized for the Zone 3 area on SITLA property that would be served by this tank. The storage for the remaining area of Zone 3 and higher zones on SITLA property can be phased and planned to best meet the needs of the development.

One potential option is the tank chain seen on Figure 4. The tank sizes required for the development on the SITLA property will be calculated based on the number of ERCs that need to be served and the level of service shown in Table 1 plus fire suppression storage.

Transmission

The only master planned transmission pipelines that would be installed on SITLA property for other developments would be the transmission lines headed north from the Zone 2 and Zone 3 tanks in the northwest corner of the SITLA property. It is anticipated that all other transmission pipelines would be for the development. Typically, Saratoga Springs prefers that master planned transmission lines are installed as development occurs. Minimum pipe size in Saratoga Springs is 8-inch diameter. If the development does not require the master planned pipe size for their own purposes, then the City will typically ask the master planned size pipe be installed and they will reimburse the developer the upsize cost (i.e. the difference in installation cost between the size the development needs and the master planned size). Drinking water transmission pipelines required for the proposed SITLA development should be sized and located with the proposed pressure zones, pump stations, and storage tanks when roads and development within the SITLA property is planned out.



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SITLA Property
Drinking Water Master Plan

FIGURE
4

SECONDARY WATER

Existing System

The Saratoga Springs existing secondary water system is comprised of a network of pipes, storage ponds, pump stations, and wells that provide irrigation water to approximately 2,400 irrigated acres (IAs). The City has established a level of service that serves as a basis for the infrastructure required for both existing and future demands. As new developments enter the City, infrastructure is sized and built based on the established level of service. Table 2 below summarizes the level of service for the City of Saratoga Springs regarding its secondary water system. New development on the SITLA property will required additional secondary water infrastructure based on previous master planning efforts and the established level of service adopted by the City.

Table 2. Saratoga Springs Secondary Water System Level of Service (per irrigated acre)

Level of Service Criteria	Saratoga Springs Requirement
Average Yearly Demand (Source Volume)	3.13 (ac-ft/yr per irrigated acre)
Peak Day Demand (Source Flow)	7.5 (gpm/irrigated acre)
Peak Instantaneous Demand (Transmission)	15.0 (gpm/irrigated acre)
Storage	9,216 (gal/irrigated acre)

Source

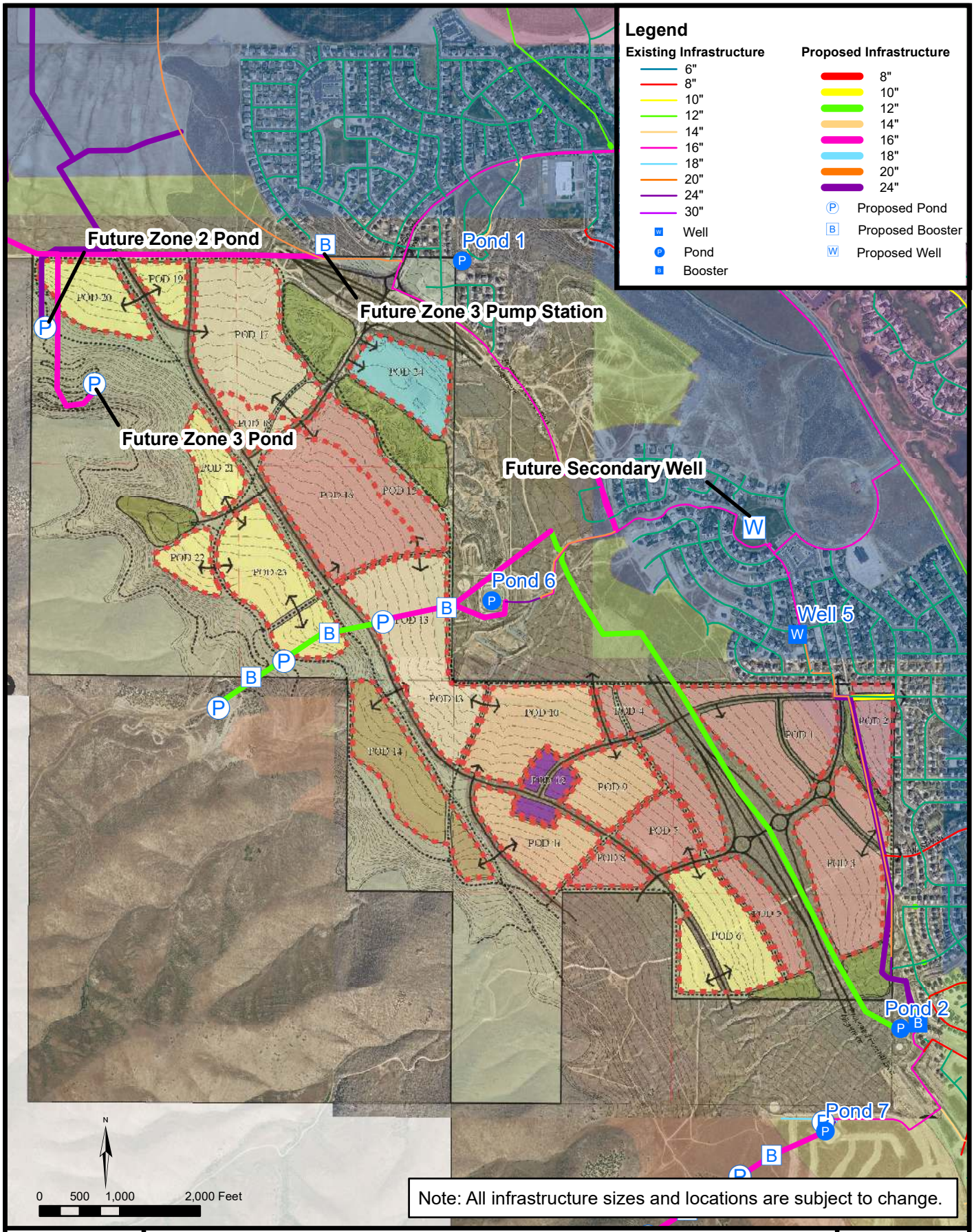
Secondary water source for the SITLA property will initially come from the existing Well #5. A new well will also be required to serve the development. These two wells will provide water to Zone 2. From Zone 2, new pump stations will be needed to provide source for development in Zones 3, 4 and 5 (see Figure 5). The source required for development on the SITLA property will be calculated based on the number of IA's that come into the system and the level of service shown in Table 2.

Storage

The storage for the SITLA property will be provided by existing storage ponds in Zones 2 and 3, as well as new storage ponds constructed in Zones 2, 3, 4 and 5 (see Figure 5). It is anticipated that storage ponds would be built adjacent to the drinking water storage tanks and serve the same areas. See the storage section in the drinking water section above for a discussion of required storage. The storage required for development on the SITLA property will be calculated based on the amount of IA's and the level of service shown in Table 2.

Transmission

The only master planned transmission pipelines that would be installed on SITLA property for other developments would be the transmission lines headed east from the Zone 2 and Zone 3 ponds in the northwest corner of the SITLA property. It is anticipated that all other transmission pipelines would be for the development. Typically, Saratoga Springs prefers that master planned transmission lines are installed as development occurs. Minimum pipe size in Saratoga Springs for the secondary system is 6-inch diameter. If the development does not require the master planned pipe size for their own purposes, then the City will typically ask the master planned size pipe be installed and they will reimburse the developer the upsize cost (i.e. the difference in installation cost between the size the development needs and the master planned size). Secondary water transmission pipelines required for the proposed SITLA development should be sized and located with the proposed pressure zones, pump stations, and storage ponds when roads and development within the SITLA property is planned out. It is anticipated that storage ponds and pump stations would be built adjacent to the drinking water facilities and serve the same areas. The secondary pipelines will parallel the drinking water pipelines and serve the same areas.



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SITLA Property
Secondary Water Master Plan

FIGURE 5