BLUFFDALE
EST. 1848

Memo

Date: February 28, 2018

From: Trevor Andra

To: Mark Reid, City Manager
Mayor Timothy
City Council

CC:

RE: Drinking Water and Pressure Irrigation Master Plan – Review of amendments to the Bluffdale Water Master Plan I and II.

As development has increased in the eastern part of the City the City Engineering Department has continued to evaluate the Water Master Plan with a focus on refining, pressure zones, source requirements and storage capacity to best fit the needs of the City.

In doing so we have worked to more accurately project the drinking water and pressure irrigation needs within the area. Hansen Allen and Luce has prepared a memorandum specifying the service area, storage size and source requirements that will be used as an amendment to Water Master Plan I and II.

The amendment to the Water Master Plan I and II is for your review and comment. A resolution to adopt the amendment will be requested at the next council meeting.

Trevor Andra, PE – Assistant City Engineer
City of Bluffdale

Att: Amendment to Bluffdale Water Master Plan I and II

MEMORANDUM

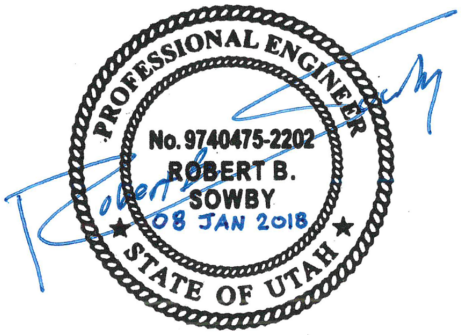
DATE: January 8, 2018

TO: Trevor Andra, P.E.
City of Bluffdale
2222 W. 14400 S.
Bluffdale, UT 84065

FROM: Robert B. Sowby, P.E.
Hansen, Allen & Luce, Inc. (HAL)
859 W. South Jordan Pkwy. Ste. 200
South Jordan, UT 84095

SUBJECT: East Side Water Planning Recommendations

PROJECT NO.: 394.02.100



SUMMARY

This memorandum summarizes assumptions, methods, and results for sizing drinking water (DW) and pressurized irrigation (PI) facilities in Bluffdale's main east side pressure zone (Zone 1E). Based on the analysis, HAL recommends the following:

- **3.0 MG drinking water tank and 16 in. diameter transmission pipeline**
- **1.0 MG pressurized irrigation pond and 12 in. diameter transmission pipeline**

These recommendations supersede those of the City's Water Master Plan (dated February 2017) for the City's east side. Recent insights—namely the difficulty of crossing the Jordan River with multiple pipes, the availability of property for water storage, and a pattern of high-density development—have prompted a reevaluation of water infrastructure in this portion of Bluffdale. This memorandum is intended as an addendum to the existing Water Master Plan.

ASSUMPTIONS AND METHODS

The analysis relied on the following assumptions and methods which HAL discussed with the City in October and November 2017:

1. Zone 1E to be mostly independent of Zone 1W; only east–west DW connection is through 14600 S. No PI connection is planned between Zones 1E and 1W.
2. Water storage to be situated on Geneva Rock property as shown in Figure 1.
3. DW tank to have maximum hydraulic grade line (HGL) of 4703 ft. This will always allow the tank to be filled by gravity from the Jordan Valley Water Treatment Plant (max. HGL = 4724 according to Dave McLean's email on Aug. 8, 2017). Site constraints will not allow the tank to be situated much higher.
4. PI pond to have maximum HGL of 4690 ft based on site constraints (elevation) and sufficient head difference to prevent backflow into the DW system under normal operating conditions.

5. Zone 1E is defined as being within City limits east of the Jordan River where pressure can meet minimum specified by R309-510. In other words, western boundary is Jordan River and eastern boundary is elevation that satisfies minimum pressure, corresponding approximately with Porter Rockwell Boulevard.
6. Existing Bluffdale Heights Zone supplied by Pony Express meter station (DW) to remain since proposed DW storage cannot sufficiently pressurize the zone. The zone covers all areas east of Porter Rockwell Boulevard and north of Freedom Point Way.
7. PI in Bluffdale Heights Zone to include Marketplace Park and other nearby PI users. Level of service in Bluffdale Heights will be monitored following activation of proposed pond to determine whether it can be integrated with Zone 1E or stand alone.
8. Development density to follow 2014 General Plan and Water Master Plan.
9. Allocation of outdoor water demands to PI or DW systems to follow City input provided during October and November 2017, including tabulation of planned irrigated areas attached hereto provided on Nov. 9, 2017, as well as delineation of approximate areas where DW system will provide irrigation (Figure 1). Additional irrigated areas south of Porter Rockwell Boulevard, if any, will be served separately and are excluded from this analysis.
10. Reclaimed water from a proposed splash pad may supplement irrigation supplies. Since its timing and quantity are unknown, it is not yet counted as a source but may be in the future.
11. Proposed storage facilities and pipelines to be sized for build-out of Zone 1E following design criteria of Water Master Plan (DW Tables 1-1 and 1-2, PI Table 1-1).
12. Fire suppression allocated to Zone 1E DW system to be 2,500 gpm × 2 hr (300,000 gal) per recommendation of the Bluffdale Fire Chief on Nov. 8, 2017. Supply coming through JVWCD connections may reduce the volume requirement, but until this can be modeled, the full volume is allocated to the City's tank.
13. Emergency storage to supply average demand for 8 hr at build-out.
14. Recommended DW transmission pipeline diameter to be sized to maintain 20 psi residual during "peak day plus fire flow" per R309-510, using hydraulic model.
15. Recommended PI transmission pipeline diameter to be sized to limit pressure fluctuation (from static pressure to peak instantaneous demand) to 20 psi, using hydraulic model.

HAL compiled GIS datasets of land use, pressure zone boundaries, PI and DW service areas, and topography. Following the assumptions above, HAL intersected the datasets and computed equivalent residential connections (ERCs) and irrigated acres (irr-ac) for both DW and PI systems, respectively, in Zone 1E. These calculations were spatially sensitive to land uses, housing densities, and planned irrigated areas throughout the pressure zone. The results were multiplied by the corresponding design criteria to obtain water rights, source, distribution, and storage requirements.

Since high-density and mixed-use developments will constitute a significant portion of developable land in Zone 1E (Figure 1) and will not have PI service, their indoor and outdoor demands were evaluated from historical drinking water billing data. The data were provided on Nov. 8, 2017, and contain monthly records for 359 connections. Average demand is 324 gpd/conn. Peak-month demand is 611 gpd/conn, of which HAL attributed 148 gpd/conn to indoor demands (based on wintertime use) and the remaining 463 gpd/conn to outdoor use. Since the observed average and peak-month demands for these smaller housing units are less than required for a typical ERC even when considering outdoor demands, each such connection is assumed to be 1 ERC for planning purposes and no additional outdoor demand is assumed.

RESULTS

Drinking Water

The drinking water system in Zone 1E is expected to serve **5,022 ERC** at buildout. The corresponding design points are:

- Average yearly demand (water right capacity): 2,260 ac-ft
- Peak day demand (source capacity): 2,790 gpm
- Peak instantaneous demand (distribution capacity): 4,660 gpm
- Total storage: 3.0 MG
    - Equalization storage: 2.0 MG
    - Fire suppression storage: 0.3 MG
    - Emergency storage: 0.7 MG
- Transmission pipeline: 16 in.

Pressurized Irrigation

Current estimates of expected irrigated area in Zone 1E to be served by the pressurized irrigation system are 71 irr-ac. Since actual development patterns are unknown, a safety factor of 1.5 is applied, so planning is for **107 irr-ac** at build-out. The corresponding design points are:

- Average yearly demand (water right capacity): 335 ac-ft
- Peak day demand (source capacity): 800 gpm
- Peak instantaneous demand (distribution capacity): 1,600 gpm
- Equalization storage: 1.0 MG (3.1 ac-ft)
- Transmission pipeline: 12 in.

Previous discussions had assumed more irrigated area and a larger storage facility that would have required a tank to meet the site constraints. With the smaller volume, the City may reconsider an irrigation pond, perhaps with a cover or floating lid to protect it from evaporation, wind, and dust.

RECOMMENDATIONS

Based on the foregoing results, HAL recommends that the City begin financial planning and preliminary engineering for a 3.0 MG drinking water tank and 16 in. diameter transmission pipeline, and a 1.0 MG (3.1 ac-ft) pressurized irrigation pond and 12 in. diameter transmission pipeline. These facilities will serve Zone 1E through buildout.

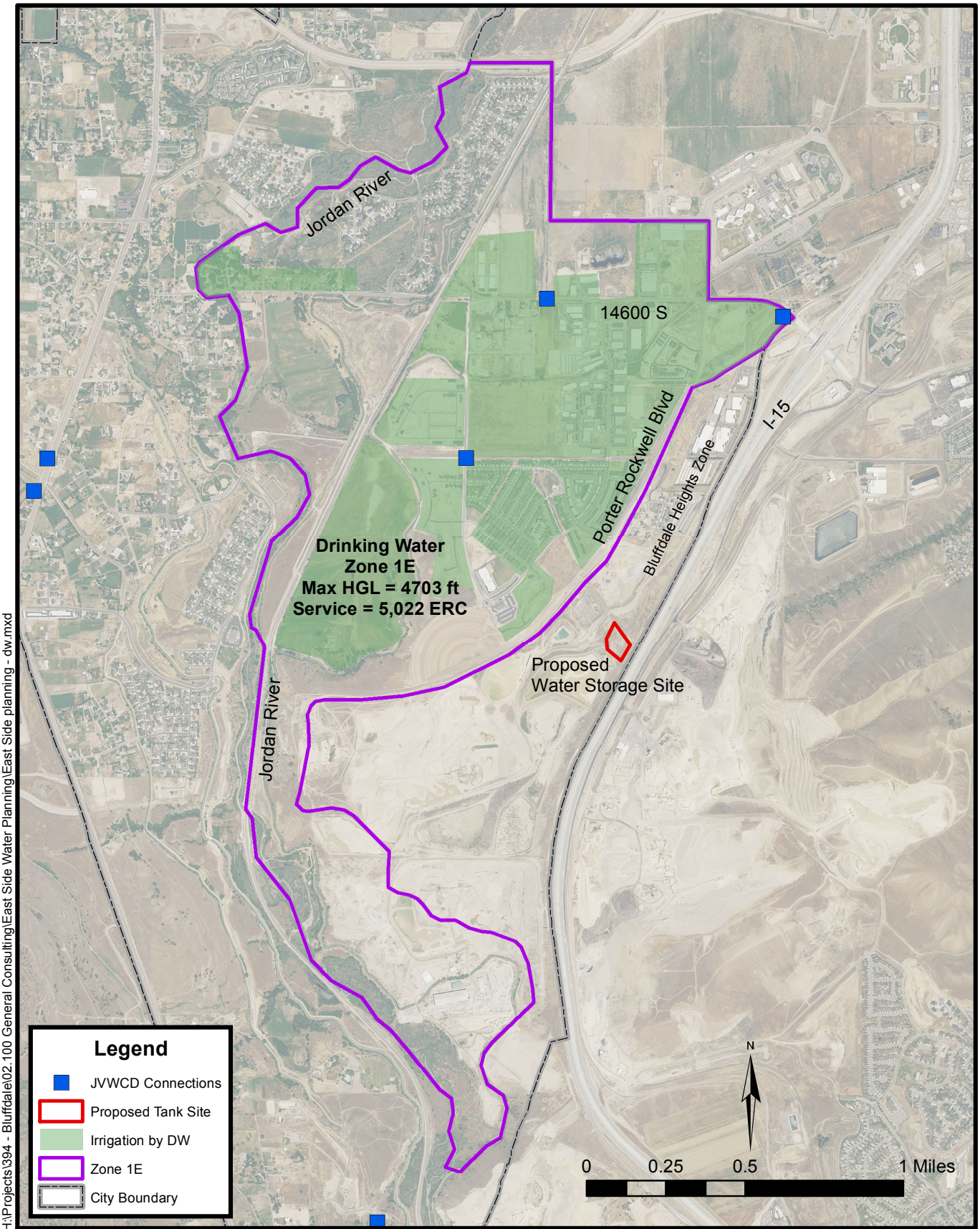
These new facilities will require the following modifications:

- **Isolate DW zones with check valve.** DW is supplied to Bluffdale Heights from the north via JVWCD's Pony Express meter station, located on the southwest side of 14600 South and Pony Express Road. The connection is pressurized from the Point of the Mountain Water Treatment Plant (max. HGL = 4748 ft), which is higher than the other JVWCD connections (max. HGL = 4724 ft). The only known DW path from Bluffdale Heights to Zone 1E is through Regent Garden Lane at Porter Rockwell Boulevard. HAL recommends installing a check valve at this location (prohibiting east–west flow and allowing west–east flow) to provide a backup water supply to Bluffdale Heights in case of maintenance or failure of the Pony Express meter station or connecting pipelines.

- **Isolate PI service from WaterPro.** PI is currently supplied via a WaterPro connection located on the southeast side of 14600 South and Pony Express Road (approx. HGL = 4780 ft). The proposed PI pond will be lower (max. HGL = 4690 ft) and cannot provide the same pressure. The WaterPro connection must be hydraulically isolated (by closure or PRV) once the Independence Well and proposed PI pond are ready for service, otherwise WaterPro will overpower Zone 1E. HAL recommends monitoring the irrigation systems in the Bluffdale Heights Zone for level of service after the new facilities are operating. If the proposed PI pond cannot maintain a satisfactory level of service, the City may consider a small booster pump for the Bluffdale Heights Zone or install a PRV on the main PI pipeline in Porter Rockwell Boulevard between Regent Garden Lane and Freedom Point Way. Since PI pressure in Zone 1E will be significantly lower with the proposed pond than users are accustomed to, HAL recommends a public relations effort to inform PI users and prepare them for the change

- **Equip JVWCD meter stations with flow control.** With the addition of a Zone 1E tank, inflows from JVWCD to will need to be controlled based on water level so as not to pressurize the tank, as well as to avoid peaking charges and maximize use of equalization storage. HAL recommends that the City install flow-control valves and associated SCADA capabilities in its active Zone 1E meter stations. (JVWCD allows modifications downstream of the meter, even in the same vault.) An altitude valve, a level sensor, and SCADA are also recommended for the tank. SCADA should be programmed to monitor water levels in the tank and activate the flow-control valves accordingly, increasing flow when the water level reaches a minimum value and decreasing or stopping flow when the water level reaches a maximum value. The altitude valve would prevent the tank from overfilling. Exact valve equipment and SCADA setpoints will be recommended later.

If the City proceeds with these recommendations, it will need to monitor water use and development plans to ensure that no increase in level of service (e.g., more ERCs, per-connection water use, irrigated area, fire flow, etc.) occurs without reevaluating the impacts on the proposed infrastructure.



Date: 11/28/2017
Document Path: H:\Projects\394 - Bluffdale\02.100 General Consulting\East Side Water Planning\East Side planning - dw.mxd

HANSEN ALLEN & LUCE INC ENGINEERS

CITY OF BLUFFDALE
ZONE 1E WATER PLANNING
DRINKING WATER SYSTEM

FIGURE
1

City of Bluffdale
Planned East Side Irrigated Areas

Parks	Area (ac)	Sod (sq. ft.)	Irrigated Area (irr-ac)	Status
Phillip Gates Memorial Park	4.54	82,000	1.88	Existing
Bluffdale Heights Park	0.46	20,000	0.46	Existing
Bluffdale Heights Detention Park	0.72	30,995	0.71	Existing
Marketplace Park	1.47	63,918	1.47	Existing
Mount Jordan Park - IND	3.69	160,736	3.69	Existing
Pocket Park 1 - IND East	0.30	13,068	0.30	Existing
Pocket Park 2 - IND West	0.30	13,068	0.30	Existing
IND Detention Pond Park - Plat K	4.02	797,950	18.32	Existing
Independence Trail	2.58	13,069	0.30	Existing
Porter Rockwell - Park Strip Marketplace	0.25	2,670	0.06	Existing
Westgate - Harmon Day Northside	0.41	9,640	0.22	Existing
Westgate Park - Parcel A/E Westside	1.26	54,903	1.26	Proposed
Westgate Park - Parcel B Eastside	2.41	105,055	2.41	Proposed
Independence Main Park	5.75	150,282	3.45	Proposed
Day Ranch Park	25.00	653,400	15.00	Proposed
	TOTAL	2,170,754	49.83	

Other	Area (ac)	Sod (sq. ft.)	Irrigated Area (irr-ac)	Status
Independence School	7.16	115,000	2.64	Existing
Day Ranch Middle	24.00	559,746	12.85	Proposed
Day Ranch Elementary	10.00	250,470	5.75	Proposed

Existing (2017)	30.35	irr-ac sod
Proposed	40.72	irr-ac sod
Total	**71.07**	**irr-ac sod**