



**DAY ENGINEERING**

BOX 651 • EUREKA, NEVADA 89316 • (775) 237-5395  
5 EAST PARK STREET • FALLON, NEVADA 89406 • (775) 423-9090

September 2, 2016

Mr. Jason Miles, Capital Facilities Director  
City of Valdez, Alaska  
P.O. Box 307  
Valdez, Alaska 99686

RE: City of Valdez, Alaska municipal Town water system  
SUBJ: Comments on Shannon & Wilson's elementary school well feasibility report

Dear Jason:

#### OVERVIEW

The City of Valdez Town water system consists of four wells, two tanks, and thousands of feet of water main ranging in size from twelve inch to six inch in diameter. One water tank is on a hill on the north side of Town, and other tank is on a hill on the south side of Town. 3 wells near Hanagita pump directly to the north tank. 1 well near Egan pumps directly to the south tank. See the schematic of the Town water system enclosed.

The water system was originally designed for residential water use. As the Town water demand has grown, the pipes in Town are not large enough to equate system pressure evenly between the north and south tank during higher demand. The water system in essence has become two systems during higher demand. The north tank serving the north side of town, and the south tank serving the south side of town. The south well near Egan on the west side of Town was installed to feed the south tank to remedy the unequal tank levels during high water demand. The Town continues to grow on the south side, specifically on South Harbor Drive. Silver Bay's recent construction will have major impact on south water demand.

If a pump malfunctions, or there is a problem in the well near Egan, you lose the ability to fill the south tank. Without south tank water, there is a problem supplying South Harbor Drive with adequate water pressure in the summer when Silver Bay and Peter Pan are running. A second well is needed on the south side to pump to the south tank. A new well will ensure municipal water service on the south side during a pump failure or other problem with the existing south well.

The southwest corner of the elementary school property looks like a good location in the water system to have a new well to pump to the south tank. The City of Valdez hired Shannon and Wilson to install monitoring wells and produce a ground water model to analyze whether or not the elementary school site was a good location to drill a well.

## SHANNON & WILSON'S REPORT & OBSERVATIONS

There is a good description of the existing south well on Egan in the report. The existing well is 75 feet deep, and is the well has openings in the 16 inch casing from 38 feet to 58 feet deep, and from 59 feet to 74 feet deep. The well had to be back flushed and pumped hard to get sand out for days. Finally, the well produced about 2,000 gpm when test pumped, but had to have a lot of gravel pack and cement added to the surface to fill the void left by the violent well development. We do not know at what depth the majority of water comes into the well at, and we don't know where the pump is set at. The well currently pumps about 1,700 gpm, but there are times, according to system operator Brad Koch when 1,700 gpm is too much for the well to sustain.

Shannon & Wilson installed 3 piezometers to measure ground water levels. One near the south well on Egan, one at the elementary school site, and one at the end of the Coho Drive cul-de-sac. Soil samples were taken on the elementary school piezometer hole. The elementary school hole had water at 17 feet deep. The soil between 20 feet and 45 feet was clean and appeared to be water bearing. The soil in the hole between 45 feet and 65 feet deep was worse, as it had higher clay content.

A pumping test was conducted in May of 2016 on the south well near Egan, measuring the water levels in all the piezometers as the test was conducted. The south well was pumped for 14 hours straight. The results are tabulated below:

### Valdez aquifer drawdown in feet interpolated from Shannon & Wilson graph

Time	Well 4	Water*	School	Water*	Coho	Water*
0 hr.	0.00	32.5	0.00	32.8	0.00	36.3
1 hr.	0.61	31.9	0.08	32.7	0.00	36.3
2 hr.	1.00	31.5	0.28	32.5	0.00	36.3
3 hr.	1.12	31.4	0.40	32.4	0.00	36.3
4 hr.	1.24	31.3	0.52	32.3	0.00	36.3
5 hr.	1.32	31.2	0.60	32.2	0.02	36.3
6 hr.	1.40	31.1	0.72	32.1	0.04	36.3
7 hr.	1.45	31.1	0.80	32.0	0.07	36.2
8 hr.	1.50	31.0	0.87	31.9	0.10	36.2
9 hr.	1.53	31.0	0.94	31.9	0.12	36.2
10 hr.	1.56	30.9	1.01	31.8	0.14	36.2
11 hr.	1.59	30.9	1.08	31.7	0.16	36.1
12 hr.	1.62	30.9	1.15	31.6	0.18	36.1
13 hr.	1.66	30.8	1.23	31.6	0.21	36.1
14 hr.	1.69	30.8	1.31	31.5	0.24	36.1
15 hr. (off)	1.71	30.8	1.38	31.4	0.27	36.0
16 hr.	0.60	31.9	1.12	31.7	0.26	36.0

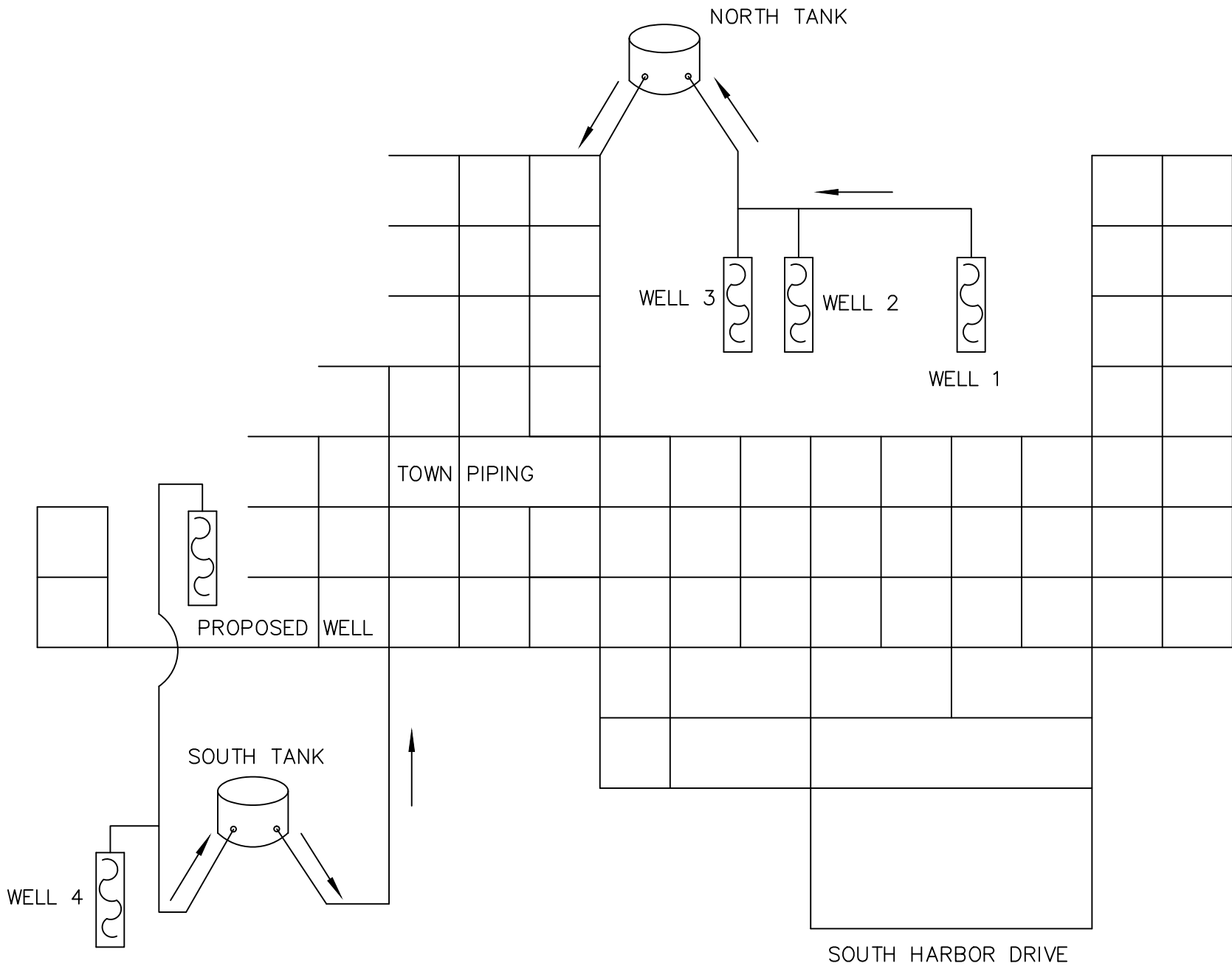
- Valdez 2 feet contour LIDAR and Google Earth: Well 4 at 43 feet elevation (10.5 feet to water), School at 50 feet elevation (17.2 feet to water), Coho at 55 feet elevation (18.7 feet to water). Elevations are somewhat unreliable, but it's fun to look at.

## COMMENTS & RECOMMENDATIONS

1. Shannon & Wilson's report indicates that there is change in the groundwater level due to circumstances other than well pumping, and there will be a need to prove that a new well is not under the direct influence of groundwater. Variable water levels would explain why the well has a hard time keeping up at 1,700 gpm at certain times in the summer while it can pump 14 hours straight at other times. Recommend continuing to monitor the water levels for a better idea of the variations. As we proceed, we will likely have a lively discussion with the DNR and DEC proving that the new well (and our existing south well) is not under direct influence of surface water.
2. The proposed well at the elementary school will be hydraulically influenced by the south well near Egan. The water bearing gravel and aquifer we are after is shallow, and is not thick. The model showed a possible scenario of pumping the existing well and a new proposed elementary school well at 1,800 gpm for 1 hour on and 4 hours off. Based on the water system operator's observations over time, 1,800 gpm will likely be too high of a pumping rate for the new well. We won't know for sure until we drill a well and test pump. I'm guessing the new well will pump about 1,000 gpm to be safe, and we should probably re-equip the existing south well with a smaller pump.
3. The advantages of the location of the elementary school well (power is there, we own the property, the south tank is nearby, etc.) out way negatives (south well influence, surface water influence, etc.) encountered so far. We recommend that drilling the well at the school, but before the new well is drilled, get rid of the large underground fuel storage tank at the elementary school. The groundwater is shallow (less than 20 feet deep), and a leaking fuel tank that close would get to the well considering the shallow water table and large radius of influence.

Very truly yours,

Dean Day, P.E.  
Project Engineer



TOWN OF VALDEZ WATER SYSTEM SCHEMATIC