

From: [Barroso, Sylvia L FLNR:EX](#)
To: [Melnechenko, Cali FLNR:EX](#)
Subject: RE: 20006290 Aq 740 WTN 113477 (ID 43627) Pumping test
Date: Thursday, November 29, 2018 2:01:55 PM
Attachments: [image002.png](#)

Hi Cali,

I have reviewed the materials provided in support of this application 20006290 Aq 740, describing the short-term pumping test of WTN 113477 (ID 43627) completed on October 24, 2018, including:

- a) H2O Environmental Ltd. November 5, 2018. Pumping test preliminary results, Well ID 43627, 3730 Denman Road. Letter report to DCLTA.
- b) DCLTA - Project 2 - Seniors' Affordable Housing - Dug Well Data. November 10, 2018.
- c) Maxxam Laboratories Certificate of Analysis, Job# B893409 (Sample results for WID 43627, 3 hrs after start of pumping)
- d) Maxxam Laboratories Certificate of Analysis, Job#B892915 (Sample results for 100 ft well at 3811 Denman Road)

In general, I concur with the conclusions of the report, and calculations of long-term capacity, and note the following:

- 1) The long-term well capacity was calculated using available drawdown as the difference between the static water level and the top of the pump. Another method would be to use the available drawdown between the static water level and the depth of the primary (or shallowest) water-bearing fracture in the well. The difference in results is shown in Table 1, below:

Table 1: Review of long-term well capacity estimate

	Value	Units	m ³ /d
Water volume required	5152	L/day	5.15
Volume with 40% safety factor (for water treatment)	7212.8	L/day	7.21
Pumping rate	3.8	L/minute	5472
Long-term capacity based on drawdown to top of pump			
Static water level	3.13	mbtoc	
Depth to top of pump	22	mbtoc	
Available drawdown	18.87	m	
Safe available drawdown (30% safety factor)	13.21	m	
Well discharge rate	0.06	L/s	5.47
Drawdown extrapolated to 100 days	1.70	m	
Long-term well capacity	0.49	L/s	42.52
Long-term capacity based on drawdown to water-bearing fracture			
Static water level	3.13	mbtoc	

Casing stickup*	1.00	mbtoc	
Depth to upper water-bearing fracture	14	mbgs	
Available drawdown	12.20	m	
Safe available drawdown (30% safety factor)	8.54	m	
Well discharge rate	0.06	L/s	5.47
Drawdown extrapolated to 100 days	1.70	m	
Long-term well capacity	0.32	L/s	27.48

*Approximate

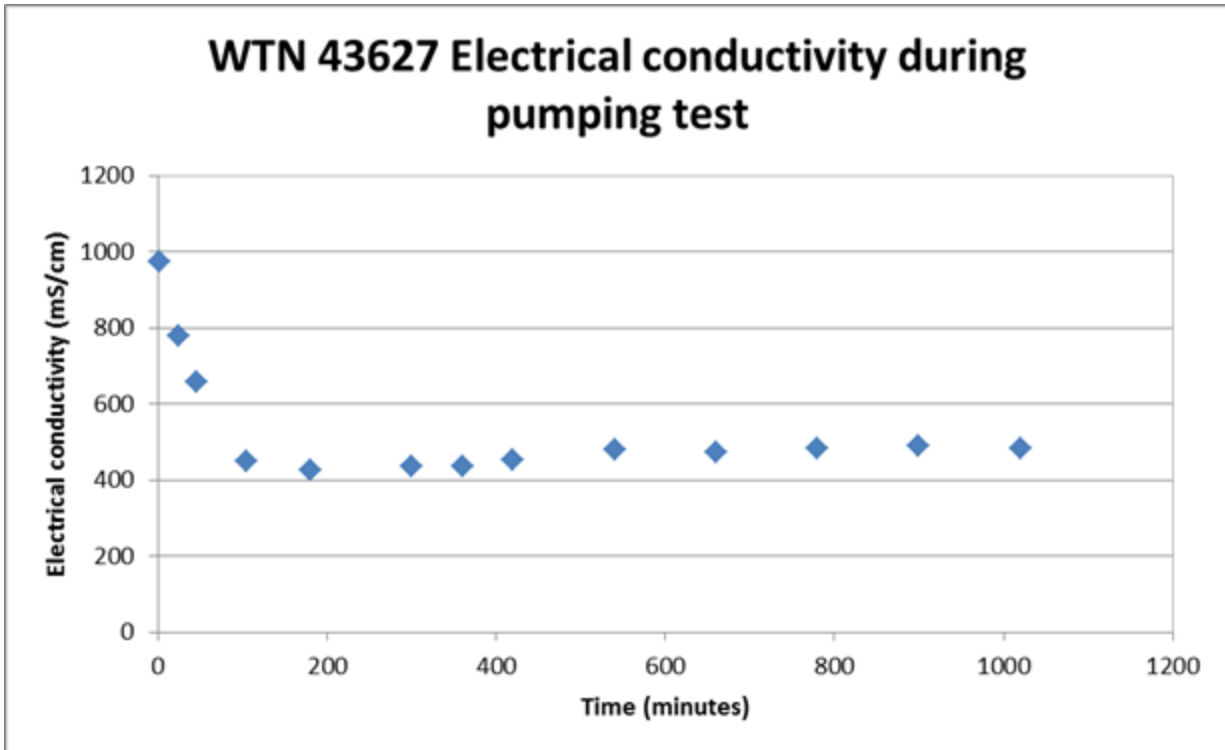
Due to an unfortunate power outage during the test, the test stopped at 17 hours, rather than the 72 hour period that was originally intended. The groundwater level was beginning to stabilize during the pumping period, and due to the low quantity of water being licenced, it would not be considered warranted to ask for additional capacity testing at this time. Despite calculations that suggest the productivity of the well may be higher, the long-term well capacity cannot be rated at higher than the well was pumped during the test, and therefore the well should be rated at 5.47 m³/d.

- 2) The data from observation wells monitored during the test were inconclusive. The assumption may be made that the well at 3811 Denman Rd may not be hydraulically connected to the same fracture network as WTN 113477, that interference effects are not measurable due to the low pumping rate and distance from the pumping well, or that recharge was occurring during the test. Ideally an additional well closer to the pumping well could have been chosen. The data sheet records rainfall on October 27, but it was not noted if rainfall occurred during the test on October 24-25. Ideally, water levels within the onsite dug well, and within the observation well, would have been measured using a pressure transducer, so that smaller variations in water level would have been noted, and the effects of potential recharge or tidal influence could have been observed.

- 3) Results of water quality sample collected from the pumping well after 3 hours of pumping, and from the observation well during the test indicate that the groundwater quality was below the operational threshold indicating impacts from saltwater intrusion. Chloride concentration was 55 mg/L in WTN 113477 and 29 mg/L in WTN respectively, compared to a threshold of 150 mg/L. Results of continuous measurements of electrical conductivity during the pumping test indicated that the water quality freshened rapidly over the first 200 minutes of pumping, and stabilized over the remaining pumping period. As shown in Figure 1, the electrical conductivity was below the operational threshold of 1000 mS/cm throughout the test. Based on the new data provided in this assessment, the risk of saltwater intrusion is less than previously determined based on the initial sample results (chloride 290 mg/L on July 7, 2017). As previously identified, due to the saltwater intrusion risk factors due to physiography (low hydraulic gradient, proximity to the sea), historical water quality data indicating potential saline groundwater encountered near this site, and potential cumulative impacts of pumping from a high density of wells in the Denman Island village area, it is recommended that monitoring and reporting be included in the water licence. For example, metered use (already proposed by the applicant), monitoring of indicator parameters during the dry season either by field measurement or a water quality sample

collected annually, and notification of FLNRO if the water quality thresholds are exceeded (i.e. EC >1000 mS/cm, chloride >150 mg/L). Best practices for prevention of saltwater intrusion can also be provided in the cover-letter to the applicant.

Figure 1: Groundwater quality monitoring during testing of WTN 113477



Closure

Based on the information previously submitted by the applicant, and the results of recent testing, I do not have additional concerns regarding this application. Please let me know if this satisfies your documentation needs for the file, or if there are further questions.

If possible, the well construction record and coordinates for the observation well used during the test could be obtained from the applicant and added to the GWELLS database.

Kind regards,

Sylvia Barroso, MSc, PGeo

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