Annual Report to the City of Austin Balcones Canyonlands Preserve
Monitoring WTP4 and the JTM
January 2016

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Summary
Activities in 2015 included completing monitoring for startup of the Jollyville Transmission Main and decommissioning a number of wells used in the monitoring program. A report is currently in preparation to summarize all the data collected for the monitoring program including in the Balcones Canyonlands Preserve (BCP). The report should be completed in early 2016 and will be forwarded to BCP staff once it's finalized.

Six wells at two different locations on BCP were plugged and abandoned. Although vegetation damage was minimal, green sprangletop seeds were spread across each site.

Field work on BCP related to this project occurred on March 12, May 26, June 11 and 12, and September 28 of this year.

- Water levels were measured March 12 and troll data loggers removed from the Lanier Spring and Bull Creek at Tributary 7 sites.
- Collected data from vibrating wire piezometers May 26.
- Measured water levels and collected water samples June 11 and 12
- Plugged and Abandoned JTM wells on Franklin tract Sept 28

Project Description
The JVTM is comprised of an approximately 6-mile tunnel reaching from WTP4 to the Jollyville Reservoir at 183/McNeil, and four access shafts (WTP4 shaft, Four Points, Spicewood, and Jollyville Reservoir shaft) ranging from 30-40 feet in diameter. Approximately 2.25 miles of the tunnel is excavated below the Balcones Canyonlands Preserve. All but the Spicewood shaft is excavated through the Edwards formation whereas the tunnel progresses through the Glen Rose formation, and is at least 125' underneath the main stem of Bull Creek at its closest point (usually deeper).

Project Status
As of December 2015, the transmission main is operational and carrying water. No further surface or subsurface activity in BCP related to the project is expected.

Results

Results from the water level e-line measurements in wells (JT107SA, JT077PZA, JT107DA, B8, B9, B10) and continuous trolls are shown in Figures 1, 2 and 3 and Tables 1 and 2. On BCP, water level measurements in September indicate that the wells with water level drops believed caused by construction impacts (JT107DA, JT107PZA, JT108A) have not fully recovered to pre-construction levels. Shallow JT107SA did not have any impacts due to construction.

Water Levels

As of mid-summer, the wells in BCP have recovered to over 50% of their pre-construction water levels. Recovery is slower than in other wells, possibly due to the generally tight, low-permeability rocks with little to no direct connection to surface recharge.

Surface Flows

Lanier Spring discharge was over 0.1 cfs or over 50 gallons per minute (Figure 4). Due to generally wet conditions, Bull Creek flowed well all year (Figures 5 and 6).

Well Plugging

Six wells were plugged on BCP (Table 3). All surface equipment was removed from the well sites and the sites were restored (Photos 1 and 2). Four wells were left open and are available for future monitoring and research.

Conclusions

The Jollyville Transmission Main tunnel running below the BCP and along Bull Creek was completely grouted by April 2014 and shaft backfill was completed by August 2014. Water levels in monitoring wells impacted by shaft and tunnel excavation are recovering and rising water levels in other wells appear to be responding to rain events in 2015. A detailed report on monitoring for the Jollyville Transmission Main will be completed in early 2016.

Six wells in BCP were plugged and abandoned. Four wells, the JT107A cluster, remain open and available for future monitoring and research.

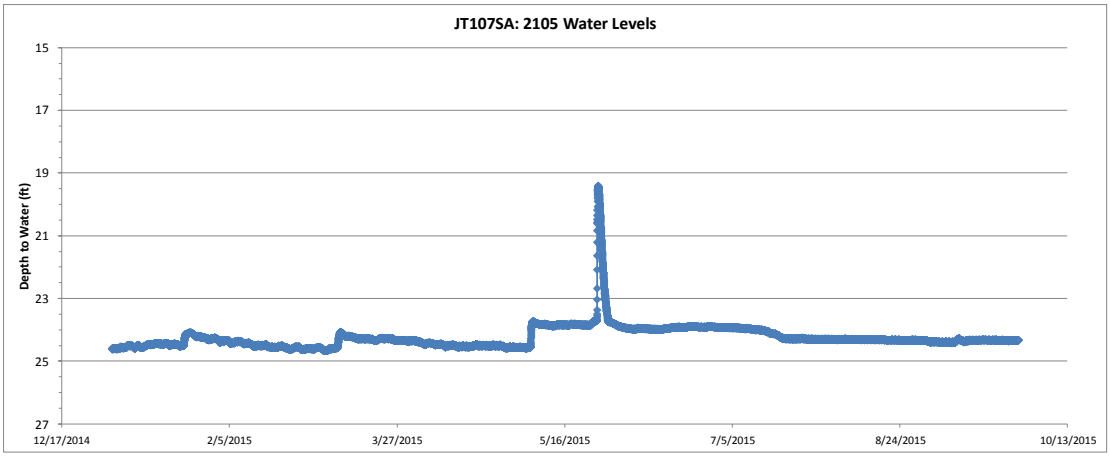

Figure 1. Depth to water in the JT107SA well which monitors shallow water levels in the Glen Rose formation. The pronounced spike corresponds to the heavy rain and flooding over the Memorial Day weekend in 2015. The probe was not in place to monitor during the Halloween floods.

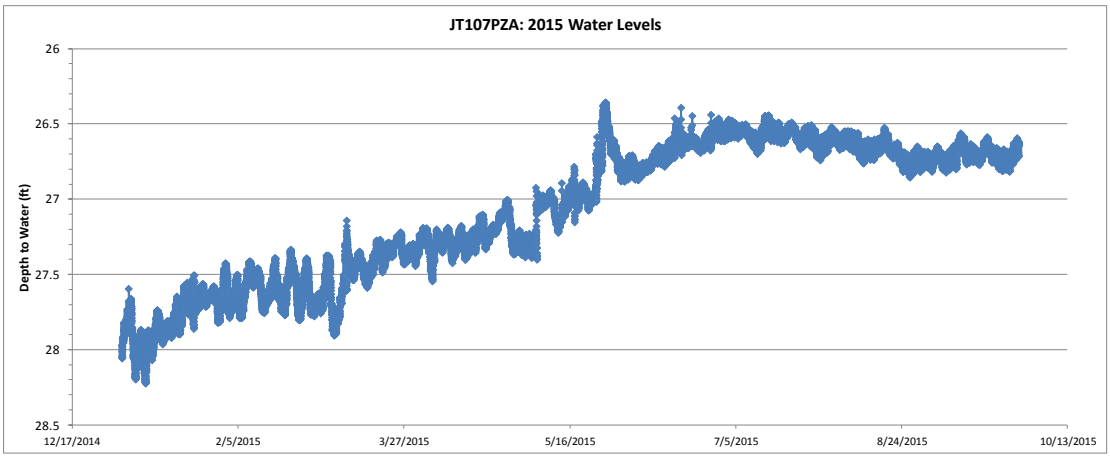

Figure 2. Depth to water in the JT107PZA well which monitors intermediate water levels in the Glen Rose formation. The small spike corresponds to the heavy rain and flooding over the Memorial Day weekend in 2015. The probe was not in place to monitor during the Halloween floods.

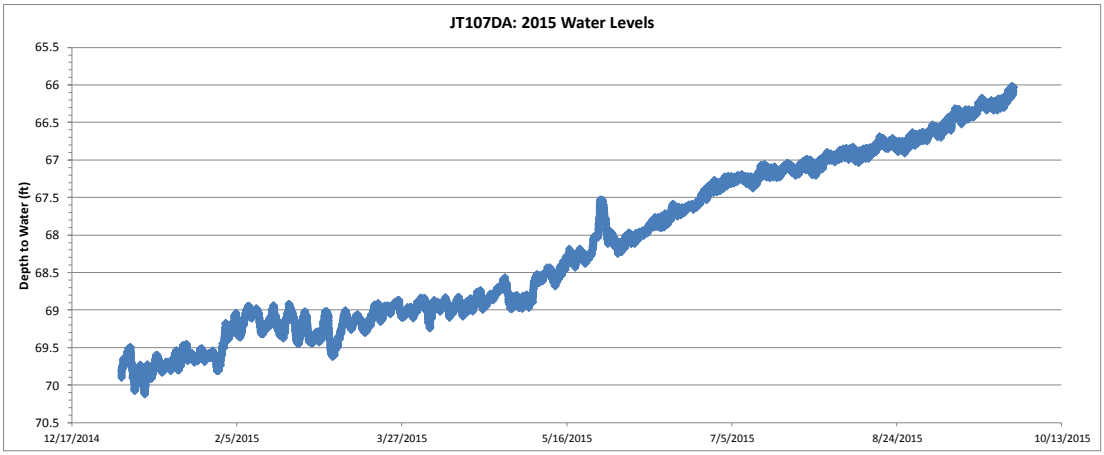

Figure 3. Depth to water in the JT107DA well which monitors relatively deep water levels in the Glen Rose formation. The small spike corresponds to the heavy rain and flooding over the Memorial Day weekend in 2015. The probe was not in place to monitor during the Halloween floods.

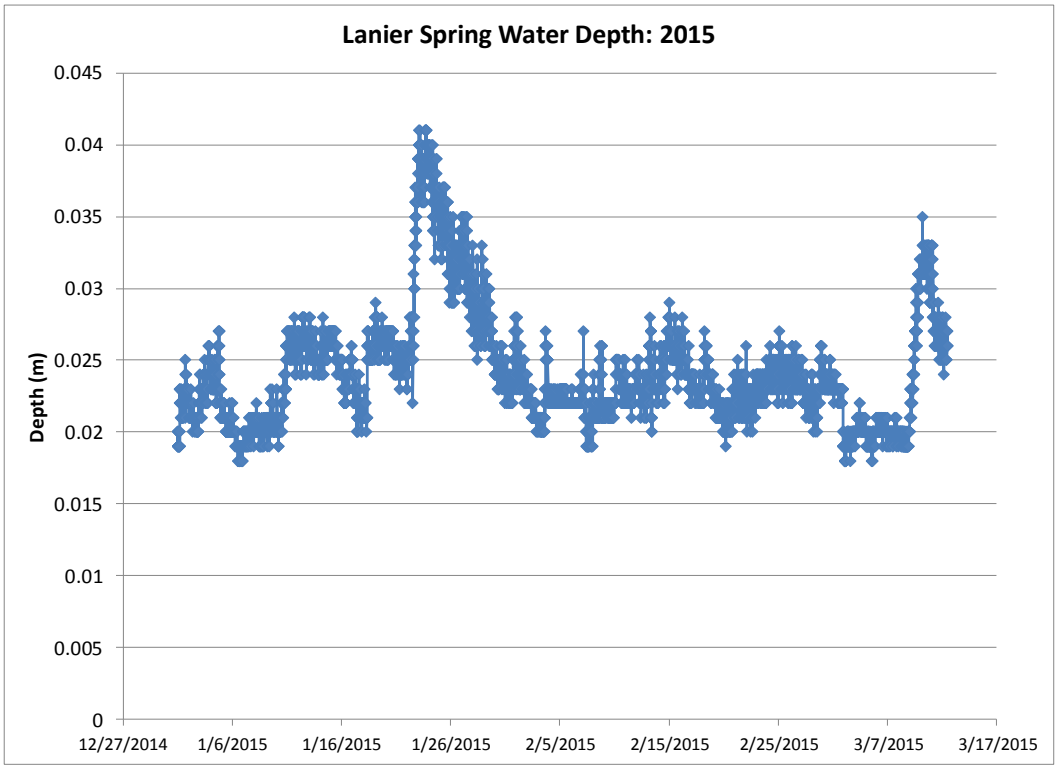

Figure 4. Water depths in the spring run exiting Lanier Spring. The probe was removed in March.

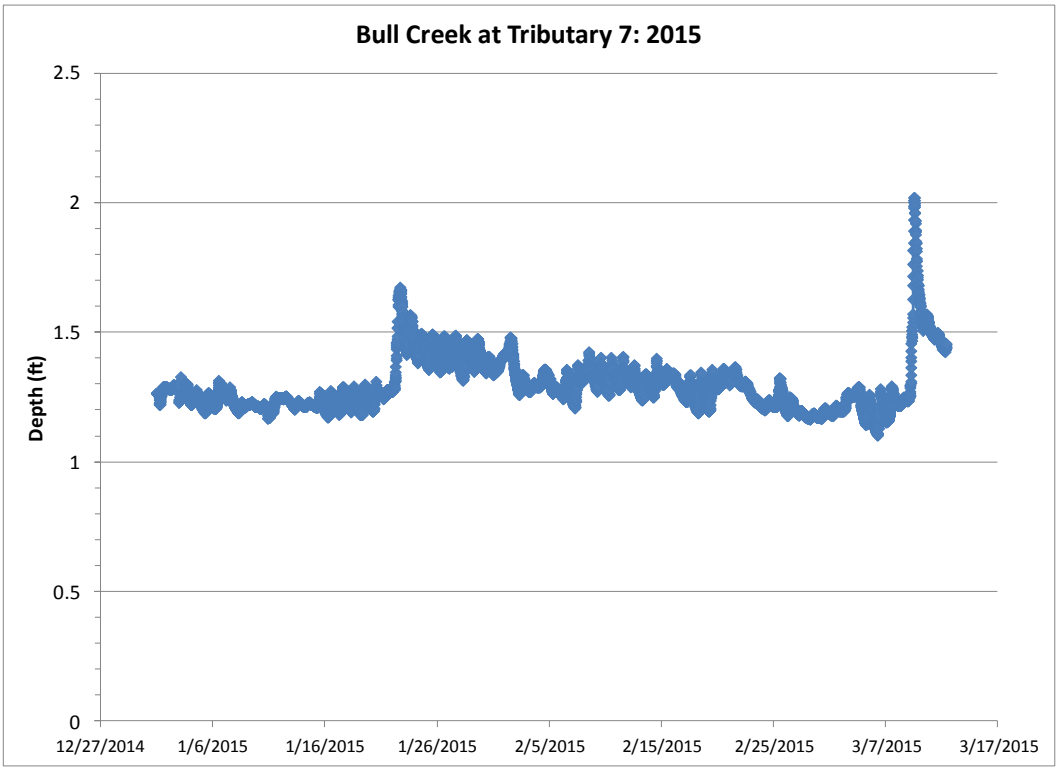

Figure 5. Water depth in Bull Creek at Tributary 7. The probe was removed in March.

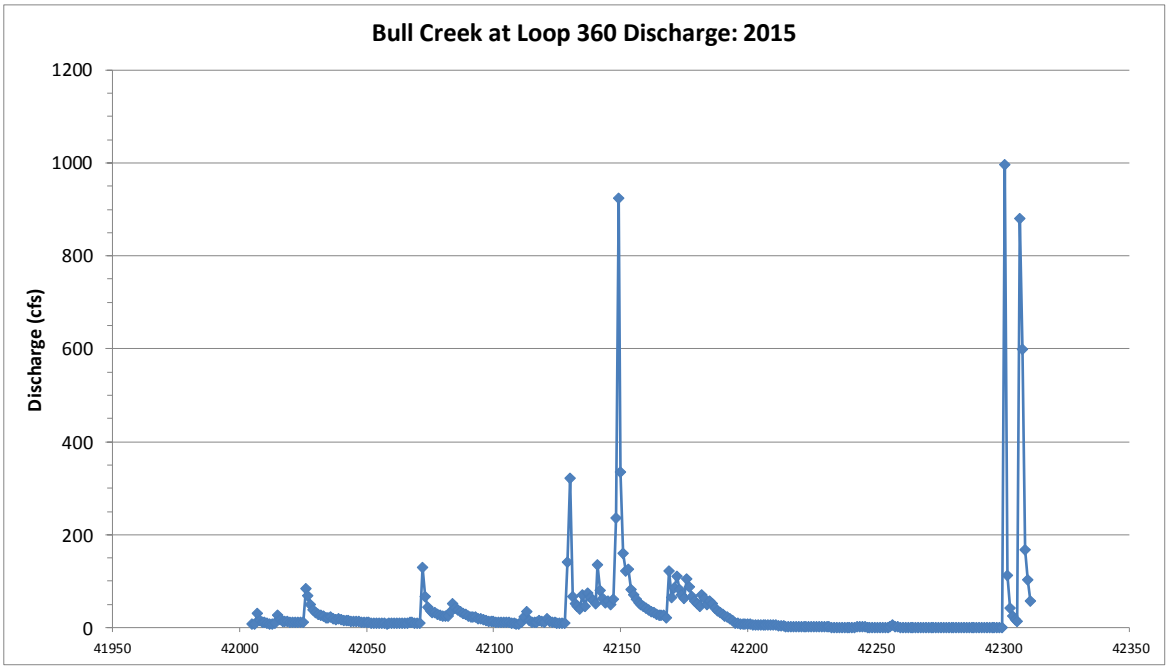

Figure 6. Discharge of Bull Creek measured at Loop 360 for 2015. The increases in flow indicate rain events from a wet late spring and early summer and early fall.

Fugro Boring ID	Sensor Designation	Sensor Serial #	Piezometer Elevation (ft MSL)	Collection Date	Average Measured Transducer Frequency (Hz)	Average Measured Temperature (deg C)	Calculated GW Elevation (ft MSL)
B-8	**A**	07-774	929.70	5/26/2015	2918.9325	19.661265	939.8
	B	07-119	699.70	5/26/2015	2947.7355	21.37076	715.0
	C	07-124	479.70	5/26/2015	2824.7035	23.18678	605.6
B-9	**A**	07-775	930.05	5/26/2015	2827.695	19.96831	945.7
	B	06-7445	662.05	5/26/2015	2929.1455	20.277705	682.3
	C	07-375	600.05	5/26/2015	2837.789	22.40714	672.3
	D	07-773	475.05	5/26/2015	NR	NR	NR
B-10	**A**	07-776	916.54	5/26/2015	2792.793	20.04958	945.0
	B	07-771	636.54	5/26/2015	2750.404	22.14117	686.8
	C	07-772	461.54	5/26/2015	NR	NR	NR

*Note: Data disqualified due to erroneous reading from temperature sensor. Temperature is not used in calculation of groundwater elevation.

NR - measurement for sensor not recorded

See spreadsheet 'VW piezometers_processing_052615.xlsx' for GW elevation calculation.

Table 1. Summary of data collected in May 2015 from the vibrating wire piezometers located on the Sam Hamilton Preserve.

Well	Date and Time	Water Level (ft below Top of Casing)	Comments
JT107SA	9/28/2015 10:11	24.11	Troll logger removed from well
JT077PZA	9/28/2015 10:19	26.77	Troll logger removed from well
JY107DA	9/28/2015 10:13	66.97	Troll logger removed from well
JT107TWA	9/28/2015 10:17	26.1	
JT108A	3/12/2015 11:30	21.45	
	6/11/2015 10:03	20.61	
	9/28/2015 12:03	21.36	

Table 2. Summary of eline measurements taken from wells in BCP during 2015.

Well	Date and Time	Well Plugged	Comments
JT107S	9/28/15 11:00-11:50	Yes	Removed concrete, leveled soil, seeded with green sprangletop
JT107PZ	9/28/15 11:00-11:50	Yes	Removed concrete, leveled soil, seeded with green sprangletop
JT107D	9/28/15 11:00-11:50	Yes	Removed concrete, leveled soil, seeded with green sprangletop
JT107TW	9/28/15 11:00-11:50	Yes	Removed about 10 ft of surface casing. Removed concrete, leveled soil, seeded with green sprangletop
JT108	9/28/15 12:05-12:25	Yes	Removed concrete, leveled soil, seeded with green sprangletop
JT108A	9/28/15 12:05-12:25	Yes	Removed concrete, leveled soil, seeded with green sprangletop

Table 3. A summary of wells plugged in The Balcones Canyonlands Preserve during 2015.

Photo 1. JT107 area after plugging wells and removing the solar panel and telemetry box. Four wells are still in place but difficult to see due to high grass.

Photo 2. JT108 area after plugging and abandoning the two wells.