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TECHNICAL MEMORANDUM

DATE: November 18, 2015

PROJECT: 15-1724.0101

TO: Rob Charles, P.E., City Engineer
City of Washougal

FROM: Brent Gruber, P.E.
Heidi A. Springer, P.E.
Murray, Smith & Associates, Inc.

RE: Water System Plan Amendment
Pressure Zone 3 Storage Capacity Analysis Update

Purpose

The purpose of this technical memorandum is to provide an amendment to the City of Washougal's June 2012 *Water System Plan Update* (2012 WSP). This amendment addresses revisions to the Pressure Zone 3 (Zone 3) storage capacity analysis and other minor updates. The updated Zone 3 storage analysis will reflect Washington State Department of Health Office of Drinking Water (ODW) minimum reservoir storage sizing criteria in order to support current and anticipated near-term new water service connections. Other amendments include the identification of a Pressure Zone 1 water distribution system looping project and future consideration of potential consolidation of the Magna Vista private water system.

Pressure Zone 3 Storage Capacity

In accordance with ODW requirements, the 2012 WSP evaluates reservoir storage capacity for each of the City's water system pressure zones based on sizing criteria established in the ODW's 2009 *Water System Design Manual*. In the 2012 WSP, the City elected to apply more conservative storage sizing criteria which resulted in Zone 3 storage capacity deficit under existing and projected future water demands. Based on this deficiency, storage improvement projects were identified in the Capital Improvement Program (CIP) including the development of additional storage in Zone 3, and the transfer of existing and future lower-elevation Zone 3

customers to a new Zone 6 reservoir. Capital budget constraints have delayed design and construction of the Zone 3 and Zone 6 reservoir projects.

WSP Storage Criteria Update

Finished water distribution storage is provided for four purposes: operational storage, equalizing storage, standby or emergency storage and fire suppression storage. The total storage required is the sum of these four elements. The *2009 Water System Design Manual* provides the basis for determining the volume of each of the four storage elements.

As outlined in the 2012 WSP, Section 3 - Water System Analysis, the City elected to apply more conservative standby storage sizing criteria whereas this updated Zone 3 storage capacity analysis will apply ODW minimum sizing criteria. The two sizing criteria revisions from the 2012 WSP for this update are as follows:

1. Each individual pump in the triplex Pump Station No. 3 (350 gpm each / 1,050 gpm total), which supplies Reservoir No. 3, is evaluated as a separate source consistent with the *2009 Water System Design Manual - Section 9.1.1*. Equipped with a permanent backup emergency power generator and automatic transfer switch, this pump station is considered a reliable source. With this update, Zone 3 standby storage is calculated based on the multiple source equation which results in a reduction of required standby storage versus considering the whole pump station as a single source, in no case less than the 200 gallons/ERU recommended minimum.
2. Standby storage is nested within the larger required fire suppression storage volume as approved by the City Fire Marshal.

Growth Projections

Growth projections presented in the 2012 WSP remain unchanged for the purpose of the updated Zone 3 storage analysis. The Equivalent Residential Unit (ERU) projections from the 2012 WSP remain a realistic, if not conservative estimate of foreseeable growth based on a review of new building permits and available buildable lots, as the slow economy stunted residential construction and did not result in the platting of significant new subdivisions. The review of recent water production records continue to support 2012 WSP average and maximum day water demand criteria.

Updated Pressure Zone 3 Storage Analysis

The updated Zone 3 storage analysis summarized in Table 1 replaces the portion of Table 3-6 Recommended Storage Capacity (2012 WSP, page 3-14) which references Pressure Zone 3. As summarized in Table 1 notes, ERU totals for the proposed Zone 5 and 6 are combined in Zone 3 ERU totals for the 6 and 20-year planning periods.

Table 1
Pressure Zone 3 Updated Storage Analysis Summary

Timeframe	ERUs	Pump Capacity (gpm)		PHD (gpm)	Largest Fire Flow ⁴		Required Storage Volume (MG)				Storage Required (MG) ³	Existing Storage (MG)	Storage Needed (MG)
		Existing Pump Sta 3	Largest Existing Pump		Flow Rate (gpm)	Duration (hours)	Operational	Equalizing	Standby ³	Fire Suppression ³			
Existing	967	1,050	350	637	2,000	2	0.06	0.00	0.19	0.24	0.30	0.423	0.00
6-Year	1,118	1,050	350	721	2,000	2	0.06	0.00	0.22	0.24	0.30	0.423	0.00
20-Year	2,328	1,050	350	1,398	2,000	2	0.06	0.05	0.47	0.24	0.58	0.423	0.16

- Note:**
1. 6-Year ERUs include projections for future Zone 6 from the 2012 WSP.
 2. 20-Year ERUs include projections for future Zones 6 and 5 from the 2012 WSP.
 3. Standby and fire suppression storage are nested. Only the larger of either standby or fire suppression is included in total storage required.
 4. Zone 3 development is primarily single family residential. This larger 2,000 gpm fire flow is required for the Columbia Ridge Senior Living facility, served by Zone 3.

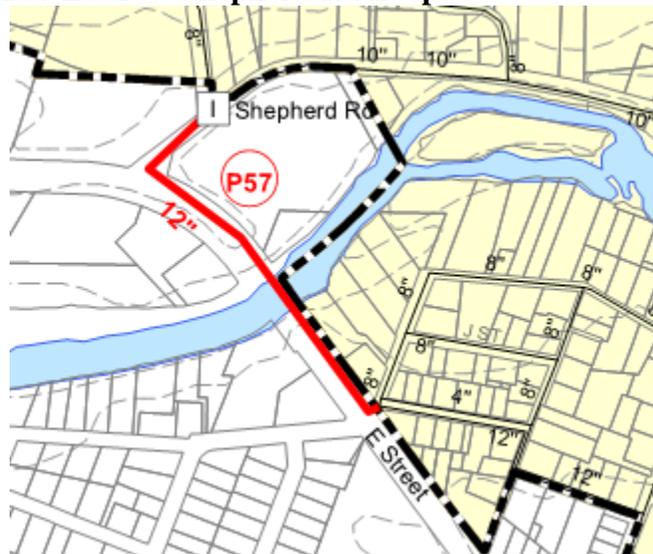
Pressure Zone 3 Capacity Summary

Based on growth projections presented in the 2012 WSP and updated storage sizing criteria, the existing Reservoir No. 3 has adequate capacity to supply an estimated 1,785 ERUs. Based on 2012 WSP growth projections, reservoir capacity is sufficient beyond the year 2020. Storage capacity will be re-evaluated with the next WSP update.

Short Term Piping Improvements

Preliminary design of the proposed Zone 6 Reservoir has identified the extension of a 12-inch waterline from existing 12-inch piping at E Street and 4th Street northwest to a connection with the existing 10-inch waterline on Shepherd Rd at LeBrun Blvd as shown in Figure 1 below. This improvement will complete a second Pressure Zone 1 Washougal River crossing. The project will be identified as P57 for the purpose of amending the 2012 WSP Table 3-9 Short Term Piping Improvements (page 3-24), Table 3-11 Capital Improvement Program (page 3-30) and Plate 1 in Appendix A. Total project construction includes approximately 1,470 LF of 12-inch diameter main including a bridge crossing, with an estimated project cost of \$900,000.

Figure 1
P57 E Street/Shepherd Rd Loop



Magna Vista Private Water System Consolidation

Creation of the proposed Pressure Zone 4-4 would allow service to higher elevation areas east of 49th Street and north of P Street above the upper service limits of the existing Zone 4-3. The *Proposed Pressure Zone 4-4* discussion on page 3-6 is amended as follows:

“The City may explore funding to further investigate the possible consolidation of the Magna Vista private water system located east of the intersection of 49th Street and U Street. Magna Vista currently serves approximately 18 connections located in Zone 4-3 and 4-4. This investigation would determine the need to complete the proposed Zone 4-4 improvements to serve the upper elevation customers in the Magna Vista system, as well as overall distribution system improvements and abandonment of existing facilities to facilitate a consolidation with the City water system.”