

Comments to Council regarding Dewatering Residential Basement Construction

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The City of Palo Alto has a history of developing policies to protect natural resources, to protect our environment and to encourage sustainability. Water is now recognized as a valuable and limited resource, and groundwater is an important component of the City of Palo Alto's Emergency Water Supply. Climate change is predicted to increase the risks of droughts, [megadroughts](#) and floods, in addition to sea (and Bay) level rise.

- 1) [The Groundwater Supply Feasibility Study](#) performed by Carollo Engineers for the City of Palo Alto in 2003 provides quantitative analysis and measurements of the effects of groundwater pumping in Palo Alto. Data from the pumping in 1988 of groundwater for local domestic water use was deemed to be the most reliable and is the primary basis for the conclusions of the report.

Some main points are summarized below. In this section, quotes indicate verbatim text from the study, *italics* indicate my personal analysis using other information including map data. Text not in quotes is my personal summary of information from the study.

- a. "Utilizing the data from the 1988 pumping, the extraction of 1,000 acre-feet from the Palo Alto area will result in basin-wide water level declines on the order of 15 feet." --- pg. 20

The shallow surface aquifer level, typically a few feet below the ground surface, declines in response to pumping the deeper aquifer as shown by the well level graphs. --- pgs. 5 - 10

- b. The water levels in the Fernando, Middlefield and Matadero wells were lowered by 18, 25 and 37 feet respectively, even though water was not pumped from any of those wells. --- Table 1, pg. 13

An interactive map showing the locations of the wells and 2015 basement dewatering sites is [available online](#).

The Middlefield Well (water level lowered 25 feet) is located about 5 blocks (0.4 miles, straight line) from the Rinconada Well (from which 600 acre-feet of water was produced in 1988) and about 0.7 miles from the Hale Well (produced 400 acre-feet in 1988).

Peers Park (produced 400 acre-feet) is the closest well to the Fernando (water level lowered 18 feet) and Matadero wells (water level lowered 37 feet) and is 1.0 – 1.2

miles away.

- c. “Depending on the method, estimates of average annual recharge to the basin are between 38 and 3,800 acre-feet. “ -- Pg. 20
- d. “The year-to-year 500 AFA* extraction is intended to not lower groundwater levels substantially, which would preserve the natural groundwater flow direction and prevent saltwater intrusion. The periodic 1,500 AFA well use described above would result in transient occurrence of water levels below sea-level. While water level below sea-level will reverse the seaward gradient, the slow travel time of groundwater provides a buffer from seawater intrusion for transient use. “ – Pg. 21

* AFA = Acre-feet annually.

- 2) The total amount of groundwater pumped for residential basement construction in 2015 is estimated to be about 400 acre-feet, based upon an average of 1.2 million cubic feet (28 acre-feet) per basement for the 14 basements dewatered in 2015.
- 3) The Groundwater Supply Feasibility Study estimates that the water table is lowered approximately proportionately to the amount of water pumped. Using the value in the report of 15 feet lowering for 1,000 acre-feet pumped, the estimated lowering of the water table due to dewatering for residential basement construction in 2015 would therefore be about 6 feet, and would extend over large areas of Palo Alto.
- 4) An advisory Measure N, “Emergency Underground Water Storage and Equipment Replacement,” (November 2007) passed with 91.84% of the vote. The Emergency Water Supply Project (EWSP), WS-08002, was approved by Council in 2007 and bonds totaling \$35,015,000 were sold on October 6, 2009. Of this amount, approximately \$5.36 million was used for projects related to using groundwater: groundwater feasibility studies (CMR 124:06 and related), rehabilitation of existing wells (CMR 232:10) and construction of new wells (CMR 371:09). The bonds are being repaid over 25 years through water usage fees.
- 5) As part of the EWSP, [five existing wells have been rehabilitated](#) for use as emergency domestic water supplies. These wells are the Hale Well (999 Palo Alto Avenue), Rinconada Well (1440 Hopkins Avenue), Peer’s Park Well (1899 Park Boulevard), Matadero Well (635 Matadero Avenue) and Fernando Well (410 Fernando Avenue).

Additionally, [two new wells have been constructed](#), one at Eleanor Pardee Park and another at (Rinconada) Library / Community Gardens. Two 2015 dewatering sites are within the triangle formed by the two new wells (Eleanor Pardee Park and Library / Community Gardens) and the Rinconada well.

- 6) Methods exist for residential basement construction that do not require dewatering. Residential basements are built in areas of high groundwater in The Netherlands without dewatering, per personal verbal communication with the mayor of Palo Alto's sister city, Enschede at the Council Meeting on November 2.