

Installing a Water Supply Well in the Central and West Coast Basins – Issues and Costs

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As the title of this Technical Bulletin suggests, there are considerable issues that must be addressed before drilling and installing a water supply well in the Central and West Coast groundwater basins (CWCB). This Bulletin serves as a general overview of those issues and also provides some typical costs for installing a drinking water well (potable well).

Water Rights and Other Permitting Issues

Like many other groundwater basins in southern California, the CWCB are adjudicated. This means that you must own or lease the rights to pump water from a well. The California Department of Water Resources – Southern District office serves as the Watermaster for the CWCB, and should be contacted to provide guidance in obtaining water rights:

DWR — Southern District, Glendale (818-500-1645)
www.dpla.water.ca.gov/sd/watermaster/watermaster.html

In addition, the Water Replenishment District of Southern California (WRD) replaces the pumping overdraft through the purchase of replenishment water, and levies an assessment on anyone pumping a well to help pay for the replacement water. The Replenishment Assessment is currently \$134.66 per acre foot (af) of groundwater pumped. The WRD should be contacted for additional information:

WRD — (562) 921-5521; www.wrd.org

At least two key permits are required to drill a well. A Well Construction Permit must be obtained from the Los Angeles County Department of Health Services - Environmental Health Program (or from the City of Long Beach Department of Health and Human Services or from the City of Vernon if the well will be constructed in those cities). These departments determine the construction requirements for the well and are responsible for the inspection of the well construction. The permits can cost about \$200 to \$300. Second, a National Pollutant Discharge Elimination System (NPDES) permit must be obtained from the California Regional Water Quality Control Board (RWQCB), Los Angeles Region. This permit covers liquid discharges during drilling and well installation. The NPDES Permit may take a couple of months or more to obtain, so it should be initiated early in the process. The base fee for the permit is currently \$200, but the sampling and compliance costs can be considerably higher.

Some cities within the CWCB have their own additional policies regarding well installations. A potential well owner should contact the appropriate city's Public Works or Engineering Departments to determine their specific requirements, if any, and specify the type of well to be constructed (potable versus other).

The selected contractor who installs the water supply well must have an active C-57 Water Well Contractor's License, which is issued by the California Contractor's State License Board. However, it is ultimately the well owner's responsibility to en-

sure that the well construction conforms to state regulations, as outlined in the California Department of Water Resources (DWR) California Well Standards, Bulletins 74-81 and 74-90. These regulations are available from the DWR web site:

www.publicaffairs.water.ca.gov/information/pubs.cfm

Following well installation, a Well Completion Report must be filed with the DWR within 60 days. The DWR then issues a State Well Number to the well owner. The Well Completion Report form and instructions for completing the form are available at no charge from the DWR web site.

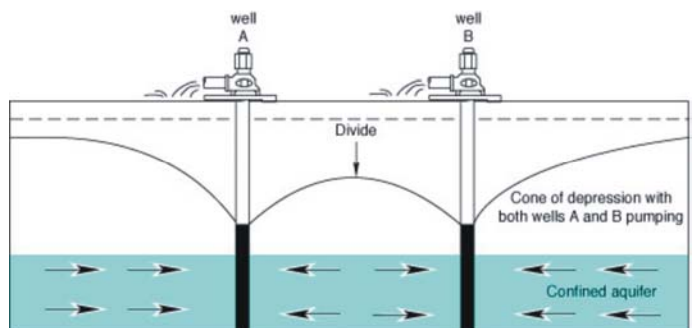
The DWR forwards a copy of the final Well Completion Report to WRD, so that WRD may identify and track the well's pumping for Replenishment Assessment purposes, in accordance with the California Water Code. WRD issues a Recordation Number to the well owner as part of tracking the well's pumping.

If the well is to serve as a public water supply, the California Department of Health Services (DHS) has several requirements for the potential well owner. First, an Application for Domestic Water Supply Permit must be completed. This Application must include a Technical Report, similar to a set of construction blueprints, that is the basis for construction of the new water system. The permit fee varies depending on the county in which the proposed system is located as well as the size of the system. It is recommended that the potential well owner meet with the DHS prior to completing the permit application, as the agency can provide valuable information and advice in designing the optimum water system. Furthermore, a qualified engineer should prepare the Technical Report, in order to minimize the possibility of rejection of the application for lack of adequate technical information. Once the well is completed, water samples must be regularly collected from the well and analyzed by a lab certified by the DHS. The analytical results must then be submitted to the DHS in accordance with Title 22 of the California Code of Regulations. Further information on these and other system operation requirements is available from the DHS:

DHS — L.A. Metropolitan District (213-580-5723)
www.dhs.ca.gov/ps/ddwem/technical/dwp/dwpindex.htm

Siting the Well

A water supply well should be located so that the water supply from the well is maximized and the potential for groundwater contamination through the well is minimized. With this in mind, the well should be a sufficient distance from other water supply wells so as not to cause well interference, as shown in the diagram below (*from Kansas Geological Survey web site*):



To avoid surface contamination from entering the well, the casing should extend above ground surface, the well should be located on the highest ground possible, and the ground surface at the wellhead should drain away from the well.

Before siting a new well, research should be done to determine the regional groundwater quality. Areas with known or suspected soil or groundwater contamination should be noted to ensure adequate separation from such sources. Various state and local agencies can provide insights into local water quality issues. For example, WRD's annual Regional Groundwater Monitoring Report provides water quality data for basin-wide production wells and from WRD's network of aquifer-specific nested monitoring wells. The Regional Groundwater Monitoring Report may be downloaded from WRD's web site:

www.wrd.org/Downloads.htm

Per DWR California Well Standards, Bulletins 74-81 and 74-90, the following are *minimum* horizontal separation distances between the well and Potential Pollution or Contamination Source(s):

- Any sewer lines (sanitary, industrial, storm) – 50'
- Animal enclosure – 100'
- Septic tank, subsurface leaching field – 100'
- Cesspool or seepage pit – 150'

Designing the Well

Designing a water well involves specifying the physical materials and dimensions for the well. Principal design objectives should include the following:

- Desired yield (gallons per minute) with minimum draw-down consistent with aquifer capability
- Good quality water with protection from contamination
- Sand-free pumping
- Long well life (minimum 25 years)
- Compliance with state and local regulations
- Reasonable short-term and long-term costs

Standard well designs include selections for:

- Drilling method and borehole diameter
- Casing diameter and material
- Well depth
- Screen length, slot size, and material
- Filter pack type
- Well completion method.

A qualified geologist or engineer should design the well taking the above factors into account and should study the hydro-geologic characteristics of the desired well location as well as the design, construction and maintenance of nearby wells to

achieve an optimum well design. A typical well design is shown on the following figure (from Roscoe Moss Co, Handbook of Ground Water Development, 1990).

Costs

The costs for drilling a new well can vary widely depending on many factors, such as depth, diameter, well use (potable vs. irrigation), construction materials, and whether or not a consultant is used for the design and construction monitoring. Competitive bidding is recommended to get a range in prices for any well project.

However, the typical costs for a potable well in the CWCB having the following design criteria are presented below:

- Borehole diameter: 26"
- Casing diameter: 16"
- Casing material: stainless steel
- Well depth: 1,000'
- Screen: 400', stainless steel, louvered
- Filter pack: silica sand
- Well completion: cement grout
- Includes well development and test pumping.

Total cost for this well would be about \$750,000 to \$800,000, and includes the drilling contractor's labor, equipment, and materials, and well design and construction monitoring by a consultant. Additional costs will be incurred after well completion for the pump, motor, and piping, and any water storage or treatment facilities. Therefore, WRD often uses a ballpark number of a million dollars when considering the full cost of installing a new potable supply well. A shallower, non-potable well such as for agriculture could cost a quarter of this amount.

Please contact the authors if there are any questions or comments related to this Technical Bulletin. Additional copies of this or previous bulletins can be found at www.wrd.org. WRD sincerely appreciates the help of Mr. Bob Turnbull of the Roscoe Moss Co. (Los Angeles), Mr. Tom Nanchy of Layne Christensen Co. (Fontana), and Mr. Jim Thurber of Geotechnical Consultants Inc. (Santa Ana) on this Technical Bulletin.

