
APPENDIX 4.12-1
UPDATED IMPACT ANALYSIS OF THE PROPOSED
MITCHELL RANCH SHOPPING CENTER ON THE
CITY OF CERES, WATER DISTRIBUTION SYSTEM
WEST YOST ASSOCIATES CONSULTING ENGINEERS,
AUGUST 3, 2009



TECHNICAL MEMORANDUM

DATE: August 3, 2009 Project No: 341-00-08-05

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City of Ceres

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SUBJECT: Updated Impact Analysis of the Proposed Mitchell Ranch Shopping Center
on the City of Ceres' Water Distribution System

SUMMARY

The purpose of this Technical Memorandum (TM) is to summarize the analyses and findings of the impact of the updated demands of the proposed Mitchell Ranch Shopping Center on the City of Ceres' (City) existing water distribution system. The system was evaluated under Maximum Day Demand (MDD), Peak Hour Demand (PHD) and MDD with Fire Flow conditions. The system's supply facilities included the addition of Little Lions Park Well which was recently activated by the City. Model results indicate that the City's existing water distribution system can maintain adequate system pressures during MDD conditions with minimum pressures at about 43 psi, and in the vicinity of the Mitchell Ranch Shopping Center, can also maintain adequate pressures while delivering the required PHD and Fire Flows. This analysis shows the increased demand of the proposed development slightly lowers the minimum pressures during the MDD condition, but the pressures remain above the City's defined minimum pressure of 40 psi.

INTRODUCTION

The City has received a proposal for a new commercial development, the Mitchell Ranch Shopping Center, along Mitchell Road between Don Pedro and Service Roads. The City requested that West Yost Associates (WYA) conduct a hydraulic analysis to evaluate the impact on the existing water distribution system from the increased demands and fire flow requirements to serve the proposed development. The objective of this assignment was to perform a comparative analysis to determine if the proposed development will have an impact on the existing system and if the City's system can provide the additional demands without violating the City's and California Department of Public Health pressure and flow criteria. This TM describes the hydraulic modeling analyses conducted for the City's potable water distribution system using the City's existing water system hydraulic model that was modified as part of the recommended changes as developed in the Smyrna Well Water Blending Analysis, dated April 23, 2008. Key sections of this TM summarizing the analysis include:

- Existing Water System
- New Development Demands
- Hydraulic Analyses and Results
- Conclusions
- Recommendation for Mitigation

EXISTING WATER SYSTEM

Water Supply Facilities

The City currently depends solely on groundwater supplied from 14 online wells located throughout the water service area. The Little Lions Park Well has just been activated by the City to assist in meeting demands in the northern part of the City. There are two additional wells (Hollister and Paramount) that are out of service due to water quality issues. The static depth to water in the wells generally ranges from 50 to 150 feet; the completed well depth varies from 118 to 425 feet below ground surface.

Most of the wells pump directly into the City's distribution system. The Boothe Well; however, pumps to Hatch Road for blending with water from the River Bluff Well before entering the distribution system. The Rockefeller Well currently has well-head treatment for uranium. The Blaker Well has well-head treatment for arsenic and manganese. Water from the Sixth Street and Roeding Heights Wells is now blended with the water from the Smyrna Well to mitigate uranium contamination in the Smyrna Well.

Demands are typically met directly from the active wells. During peak summer demand periods, there is little excess well supply capacity. Therefore, once system demands exceed the nominal supply capacity of the wells and system pressures begin to decline, the booster pumps at Blaker Reservoir turn on. These pumps boost water from the existing storage tanks into the system. They are operated primarily during high demand periods, but can also provide needed supply during emergency conditions, such as during a fire.

Water Distribution System and Storage Facilities

The City's water distribution system is a single pressure zone. The distribution system facilities are described below.

Water Pipelines

The City has approximately 660,000 linear feet of potable water pipelines. These pipelines range from 4 to 24 inches in diameter and are made up of asbestos-cement (ACP), steel, and polyvinyl chloride (PVC) pipes.

Treated Water Storage Facilities and Booster Pump Station

The City has two, adjacent at-grade tanks near the intersection of Blaker Road and Service Road. Reservoir 1 has a capacity of 1.5 million gallons (MG), while Reservoir 2 contains 2.3 MG, for a total storage capacity of 3.8 MG. There is a 10.8 million gallon per day (mgd) booster pump station located adjacent to the tanks.

The existing well system can serve the City's water demands during normal demand periods. During these periods, the altitude valves at the tanks open to fill the tanks. During high-demand periods, the altitude valves close and water is pumped from the tanks into the distribution system to supplement the primary supply provided by the wells. The tanks are generally operated between the levels of 12 feet to 16 feet, and can only fill when overall system pressures are above 45 pounds per square inch (psi).

NEW DEVELOPMENT DEMANDS

In addition to the demands associated with the proposed Mitchell Ranch Shopping Center, the City has recently approved the Ceres Gateway development project, which is located just south of the Mitchell Ranch Shopping Center site. The updated demands associated with the Ceres Gateway development were added to the existing system model to establish an assumed base case system for comparison purposes to assess the impacts of the Mitchell Ranch development. This analysis included model runs for the base case and then with the addition of anticipated demands for the Mitchell Ranch development. The impacts on the water system during MDD, and PHD were then identified. The MDD plus fire protection flow condition was also analyzed. The water supply to meet the MDD needs to be provided from only the City's wells. The PHD and emergency or fire protection flows can be met by additional supply from wells and/or from water stored in storage reservoirs.

Mitchell Ranch Shopping Center demands

Updated estimated average day demands (ADD) of the Mitchell Ranch Shopping Center were provided by the developer's engineer. MDD and PHD were estimated based on the updated information provided in Table 1. Typical multipliers of 1.8 and 2.75 were used to estimate MDD and PHD, respectively. It is assumed the development's irrigation demands will be served at night and not during the peak hour demand period of the rest of the system. These demands were allocated to several nodes in the model along Don Pedro, Mitchell, and Service Roads according to their proximity to the planned buildings in the development.

Table 1. Estimated Water Demands for the Mitchell Ranch Shopping Center

Building	ADD, gpd	ADD, gpm	MDD, gpm	PHD, gpm
Major 1	5,093	3.5	6.4	9.7
Remaining Buildings	16,850	11.7	21.1	32.2
Subtotal	21,943	15.2	27.5	41.9
Irrigation	4,652	3.2	5.8	—
Totals	26,595	18	33	42

Ceres Gateway Demands

Updated estimated demands for the Ceres Gateway development were provided by the developer's engineer as average daily demands and were converted to gallons per minute by averaging these demands over a 24-hour period. As with the Mitchell Ranch Shopping Center, typical multipliers of 1.8 and 2.75 were used to estimate MDD and PHD, respectively. It is assumed the development's irrigation demands will be served at night and not during the peak hour demand period of the rest of the system. The resulting demands, which are about 1.5 times more than the Mitchell Ranch development demands, are summarized in the Table 2. The demands from the Ceres Gateway project were allocated to three nodes in the existing system model along Don Pedro Road.

Table 2. Estimated Water Demands for the Ceres Gateway Project

Unit	ADD, gpd	ADD, gpm	MDD, gpm	PHD, gpm
All Buildings	32,916	22.9	41.1	62.9
Irrigation	4,800	3.3	6.0	—
Totals	37,716	26	47	63

Fire Protection Flows for Mitchell Ranch Shopping Center

Fire protection flow requirements are established according to building size, fire suppression system installation, and distance from property lines and other buildings. The Mitchell Ranch Shopping Center project's largest planned building footprint will occupy more than 200,000 square feet. Based on the City's Department of Public Safety Emergency Services Division, "Guidelines for Determining Required Fire Flows," p. 4, the minimum required fire flow would be 5,000 gpm. The guidelines also allow reduction of this requirement after review of the proposed building construction and incorporation of fire suppression measures.

Because the development has not undergone City Department of Public Safety review, the fireflow requirements have not been finalized. At this time it is assumed that all buildings in the shopping center will have an automatic fire suppression sprinkling system installed. This assumption will need to be confirmed at the time of the review of the building plans by the Fire Department.

For this analysis, a fireflow of 2,500 gpm was assumed to be required during maximum-day demand conditions. This flow can be supplied from a combination of well and storage reservoir sources per industry standards. The system needs to provide this flow while maintaining a minimum pressure of 20 psi.

HYDRAULIC ANALYSES AND RESULTS

Demand analyses were conducted using the City's H₂O_{Net} hydraulic water model modified per the recommended blending scheme in the TM entitled, "Smyrna Well Water Blending Analysis," updated April 23, 2008.

The modeling performed for this analysis is based on the 2006_SWQ_S (Smyrna well blended with Sixth Street Well and a booster pump station) scenario in the hydraulic model. The model was also modified and updated in the following ways:

- Assignment of pump curves to the five pumps in the Blaker Reservoir Pump Station
- Incorporation of a new well at Crows Landing and Hackett Roads
- Incorporation of a new well at Lions Park
- Incorporation of Little Lions Park Well
- Incorporation of the rehabilitated Hatch and Mitchell Well
- Incorporation of the rehabilitated Firestines Well
- Increased MDD to 16.0 mgd to be consistent with California Department of Public Health (DPH) Max Day scenario

Results of the Maximum Day Demand Condition Analysis

The operational criteria used to evaluate the MDD analysis were based on the conditions noted in the March 2, 2009 letter from the DPH that summarized their Annual Inspection of Domestic Water System for the City. In this letter, DPH stated that the system's supply capacity should be capable of providing a minimum pressure of 40 psi while meeting the MDD with the City's largest producing well not in operation. In addition, the MDD should take into consideration all existing connected customers that may have been unoccupied in the summer of 2008. Adding the demand for these houses to the recent maximum day well production recorded increased the system demand to 16.0 mgd. Also, it was assumed that during the MDD, the Blaker Well would not be operating but all other capable wells would be operating. As Table 3 indicates, the increased demand of the proposed Mitchell Ranch development under a MDD condition slightly decreased pressures at the lowest-pressure junction in the water distribution model by about 0.2 psi to 42.9 psi. This decrease in pressures in the system is considered acceptable. The development will be subject to the City's standard connection fees that will be used to pay for having available capacity to serve new development. The pressure at the Mitchell Ranch site was well above 40 psi at 45.9 psi. Note that the existing water distribution system meets the criteria of maintaining a minimum of 40 psi during the MDD condition.

Table 3. Minimum System Pressures During a Maximum Day Demand Condition

	Minimum Pressure, psi (J-158)
Existing System Demands*	43.1
With Mitchell Ranch Demands Added	42.9
Reduction in Pressure	0.2

*Includes the demands of the Ceres Gateway development for a total of 16.0 mgd.

Results of the Peak Hour Demand Condition Analysis

The existing PHD was estimated to be about 1.53 times the MDD. For the existing system, the PHD would be about 17,000 gpm. The demand would be met by having all wells operating and the booster pump station at Blaker Reservoir pumping up to 5,000 gpm. The results of the model runs with and without the Mitchell Ranch PHD demands are summarized in Table 4. The pressure at the Mitchell Ranch site during the PHD condition was 42 psi, while the minimum pressure in the system was at node J-158 and was 29 psi. The pressure was just slightly lower with the addition of Mitchell Ranch demands. The reason the pressures remain nearly the same with the addition of Mitchell Ranch’s peak hour demand is that the proposed development is relatively close to the Blaker Reservoir and Booster Pump Station and a 24-inch diameter pipeline extends from the pump station to the intersection of Service Road and Mitchell Road.

Table 4. Minimum System Pressures During a Peak Hour Demand Condition

	Minimum Pressure, psi (J-158)
Existing System Demands*	29.0
With Mitchell Ranch Demands Added	29.0
Reduction in Pressure	0.0

*Includes the demands of the Ceres Gateway development for a total of 17,060 gpm

Results of Maximum Day Demand and Fire Flow Condition Analysis

The City’s existing water distribution system was analyzed during MDD conditions with a 2,500 gpm fire protection flow within the Proposed Mitchell Ranch development, the largest anticipated flow requirement. The minimum system pressure at the assumed location of the fire flow drops to 23 psi. This exceeds the 20 psi minimum required by the City and California Department of Public Health.

CONCLUSIONS

These analyses indicate the City's existing water distribution system with the Mitchell Ranch development demands can provide adequate supply and pressure throughout the entire system under the MDD condition. The pressures were reduced by about 0.2 psi in parts of the City, but pressures remained above 40 psi. The results also showed that in the vicinity of the proposed Mitchell Ranch Shopping Center commercial development, the system maintained adequate supply and pressure under PHD and fire protection flow conditions. The system is able to meet the peak hour and fire flow demands in the vicinity of the proposed development because of the proximity of the Blaker Reservoir and Booster Pump Station and the 24-inch diameter pipeline that extends from the pump station to the intersection of Service Road and Mitchell Road.

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