

APPENDIX O

*Preliminary Feasibility of
Connecting Memorandum
(Winzler & Kelly, April 6, 2009)
and Supplemental Evaluation of
Luffenholtz Creek Diversion
Capacity (LACO, May 2010)*



MEMORANDUM

TO: George Williamson, Humboldt LAFCo **Sent Via Email Only**

FROM: Rebecca Crow, P.E.

DATE: April 6, 2009

RE: **Preliminary Feasibility of Connecting**

JOB #: 10951-10-001-11001

Introduction

The purpose of this memo is to evaluate the feasibility of connecting the Cal-Fire Trinidad Station (fire station) to the City of Trinidad's water system. Currently the fire station uses a well to supply drinking water, irrigation water, and fire suppression. The well water is contaminated and the fire station is looking for an alternative potable water supply. This memo evaluates the potential demand from the fire station, available water supply from the City of Trinidad, and the infrastructure necessary to make the connection.

Estimated Fire Station Water Demand

Historic fire station water use is not available, so demand was estimated based on facility use. The facility consists of a 2,500 square foot operations building, a 1,500 square foot foresters building, and a 2,100 square foot engine bay. Altogether there are 2 bathrooms, 1 shower facility, and 1 washing machine (used weekly for linens) located at the site.

Peak summer staffing includes 6 fire staff who are onsite 24 hours per day 7 days per week. There are also 2 foresters that staff the forester building for 8 hrs per day 5 days per week. Visitors to the facility are rare. If potable water can be extended to the site, the station would continue to use the existing onsite well for irrigation, fire suppression, and fire truck tank fill-up and truck maintenance, thus limiting the potable water demand to indoor water use.

Table 1 below shows the estimated water demand of the fire station under average conditions and peak demand conditions expected to occur during the summer months. Water use estimates were taken from published literature as cited below.

The total peak daily water demand is estimated at 800 gallons per day. The water demand varies during the day with peaks in the morning and evening and lows during the middle of the night. For calculating the instantaneous hourly water demand, a peaking factor of 4 was used, which is common for small facilities. This results in a peak hourly demand of 133 gallons per hour or approximately 2.2 gallons per minute (gpm) for a period of one-hour. These figures will be compared to the available Trinidad Water Supply in the last section of this memo to determine if the City can supply the fire station demand. The next section presents the City of Trinidad's available supply.

Description	Number of Persons	Estimated Demand (gpcd ¹)	Estimated Average Daily Demand (gpd ²)	Peaking Factor ³	Daily Peak Demand (gpd ⁴)
Cal-Fire Staff	6	59.8 ⁵	358.8	2	717.6
Forester Staff	2	16.0 ²	32.0	2	64.0
Total	-	-	390.8	-	781.6
TOTAL Rounded			400		800

1) GPCD: Gallon per capita per day
 2) GPD: Gallon per day
 3) Peaking Factor: Accounts for increased daily use during warm dry summer months
 4) Peak Daily demand equals average daily demand time the peaking factor
 5) Average day indoor water demand based on a 1999 study by the American Water Works Association Research Foundation
 6) Indoor water use for office staff estimated from Wastewater Engineering Treatment and Reuse, Metcalf & Eddy Inc., 2003.

City of Trinidad Water Supply System

The City's water system consists of an infiltration gallery located 10 feet below Luffenholtz Creek connected to a wet well. Pumps in the wet well supply pressure to move water through three parallel sets of roughing and polishing filters then after chlorination onto the City's two 150,000 redwood water storage tanks.

The City maintains three wet well pumps capability of delivering 120 gallons per minute individually. The City typically only operates one of the three pumps, however during peak demand periods, the City must run two pumps with a combined flow rate of 220 gpm. The City's pressure filters have a combined filtration area of 59.8 square feet (sqft). When the City has two pumps operating, the flow rate exceeds the California Code of Regulations, Title 22 filtration rate standard of 3.2 gpm/ sqft. In order to stay under the allowed filtration rate when operating two pumps, the pumps must be metered down by partially closing the pump discharge valves until the flow rate drops lower than 176 gpm. At this flow rate the City can produce 253,440 gpd. The practice of closing the discharge valves is not recommended for long term operation as the operating pressure exceeds the design pressures of the pumps. The City also has difficulty treating high turbidity during storm periods, and must shut the plant down and rely on storage during these periods.

The City is currently pursuing funding for an improvement project to construct a new membrane filtration system which would address both the high filter loading rate and turbidity issues. The proposed new system would be capable of filtering up to the maximum flow rate with two pumps running of 220 gpm or the equivalent of 316,000 gpd.

Current City Water Use

The City of Trinidad currently supplies an average of 100,000 gallons of potable water per day to meet the demands of the City's water service area. The peak demand during the summer period reaches approximately 150,000 gpd, corresponding to a peak hourly demand of 25,000 gallons per hour or 416 gpm for a period of one-hour. Peak demand was estimated from July and August 2009 peak day water production records with a small factor of safety.

Water Storage

The City currently operates two 150,000 gallon storage tanks, for a total of 300,000 gallons of storage. Out of the total storage, approximately 180,000 gallons is reserves for fire flows (estimated as 2 hours of supply at 1500 gpm). Ideally, this volume would be kept in storage for availability during a fire.

During peak water use in the summer, demands are higher than the maximum feed rate supplied by the pumps. Additional water to meet peak demands is supplied from storage. This results in decreased stored water availability. However, the peak summer demand is less than the available system pumping capacity. And thus storage used during the day can be replenished during the night, and it is not anticipated that storage would be a limited factor to connection of the fire station to the City’s system.

Luffenholtz Creek Supply

The City sole raw water supply is Luffenholtz Creek. The City is allowed to extract a maximum of 0.56 cubic feet per second (cfs) (251 gallons per minute) from Luffenholtz Creek. The City’s water right permit stipulates that when the flow in Luffenholtz Creek is lower than 0.86 cfs, the City must leave at least 0.15 cubic feet per second in the creek, including enough for the 0.0054 cfs worth of water rights downstream from the City, resulting in a total of 0.1554 cfs or approximately 70 gpm that must bypass the City’s water intake.

During the drought period of 1977, the flow in Luffenholtz Creek was recorded to drop to 0.62 cfs (278 gpm). This is considered the lowest recorded flow conditions for Luffenholtz Creek. At this flow the City could still divert up to 208 gpm or 299,520 gpd, which is significantly less than the City’s current peak day demand.

Trinidad Water Supply Summary

Table 2 below presents a summary of the City of Trinidad’s water system capacity and estimate of available capacity beyond existing demands.

Table 2: Summary of City Water Demands		
Conditions	Flows	Comments
Current City Treatment System Capacity	253,440 gpd	Current Maximum Production Capacity
Proposed City Treatment System Capacity (After Improvement Project)	316,000 gpd	Proposed Future Production Capacity
Raw Water Available (worst case drought conditions)	299,520 gpd	Maximum Diversion under Existing Water Rights
2009 City Peak Day Demand	150,000 gpd	Current Peak City Demand
Available System Capacity (Today) ¹	103,440 gpd	
Available System Capacity (Future) ²	149,520 gpd	
1) Available capacity today equals treatment capacity minus peak day demand 2) Available capacity in the future equals raw water available minus the peak demand.		



Potential for Trinidad Cal Fire Station to Connect to the City of Trinidad Water System

A comparison of the fire station water demand (Table 1) to the available Trinidad water system capacity (Table 2) shows that the fire stations’ estimated demand is less than 1% of the available capacity. Thus, the City has the capacity to provide potable water to the fire station.

A preliminary evaluation of the infrastructure needed to provide water was also conducted. The closest tie-in location for the fire station to the City’s distribution system is an existing 12-inch water main located at the intersection of Patrick’s Point Drive and Main Street approximately 1.05 miles from the fire station. The water system pressure at this point was estimated by the system operator to be 80 psi. To serve the fire station, a pipeline would likely be installed along Patrick’s Point Drive. Several pipe sizes were evaluated to determine the potential water pressure at the fire station. The minimum connection pressure is 20 psi per California Code of Regulations Title 22, Article 6, Section 64602(A). Table 3 summarizes the pressure for the three different pipe sized considered, including both friction losses and elevation losses. As can be seen in Table 3, all pipe sizes considered could provide the required pressure.

Table 3: Fire Station Connection Pressures for Several Pipe Sizes			
	1-inch	2-inch	4-inch
Estimated Connection Pressure	44.7 psi	56.5 psi	57.2 psi
Pressure losses estimated using Hazen- Williams equation with a 5,544 foot pipe, caring a maximum flow rate of 2.2 gpm, and a pipe roughness coefficient of 130			

Conclusions

Based on the preliminary analysis, it is currently feasible for the City of Trinidad to supply the Cal-Fire station with potable water. The peak fire station demand estimated at 800 gallons per day is approximately 1% percent of the available City supply. A 1-inch diameter supply line connected to the City’s main line at Patrick’s Point Drive and Main Street provides adequate service pressure. The pressure at the connection point should be verified before a project is pursued. Additionally, other factors such as environmental compliance for pipeline routing and water connection agreements should be addressed for impacts to project feasibility.

References

American Water Works Association Research Foundation (1999) *Residential End Uses of Water Study*, American Water Works Association Research Foundation, Denver, CO.

Metcalf and Eddy, Inc. (2003) *Wastewater Engineering: Treatment and Reuse*, 4th ed., McGraw-Hill, New York.

Personnel Communication Trinidad Water Plant Operator, Bryan Buckman, March and April 2010.

Winzler & Kelly (2009) *City of Trinidad Preliminary Engineering Report Membrane Treatment System Analysis Addendum*, Winzler & Kelly, Eureka, CA.

Winzler & Kelly (2003) *City of Trinidad Proposition 204 Water Supply Feasibility Study*, Winzler & Kelly, Eureka, CA.

- c: Stephen Albright, Trinidad City Manager
- Alisha Oloughlin, Humboldt LAFCo



June 9, 2010

7076.00

County of Humboldt
Community Development Services
Planning Division
3015 "H" Street
Eureka, California 95501

Attention: Michael E. Wheeler

Subject: Evaluation of Preliminary Feasibility Study – Trinidad Water System
Proposed Service Extension and Impacts to the Luffenholtz Creek Diversion
Capacity Report

Dear Mr. Wheeler:

At your request LACO Associates (LACO) has reviewed the Preliminary Feasibility of Connecting memorandum prepared by Winzler & Kelly (W&K), April 6, 2009. This memorandum evaluates the City of Trinidad water system's available capacity to serve the existing CalFire Trinidad Station. LACO was tasked with this review in order to determine how this most recent assessment of the City of Trinidad's water production capacity and use compares with the results of LACO's Evaluation of Luffenholtz Creek Diversion Capacity – Trinidad Water System and Proposed Moss Minor Subdivision Project letter prepared for incorporation in the Supplemental EIR for that project.

Overall, the Preliminary Feasibility of Connecting memorandum reinforces LACO's determination that the available creek flows in Luffenholtz Creek exceed the average and maximum day demands of the Trinidad water system. The memorandum establishes an average daily water demand for Trinidad at 100,000 gallons per day (gpd) and a maximum (referred to as "peak" in the W&K memorandum) daily demand of 150,000 gpd based on 2009 system records. The available dry weather creek flow used by W&K was 208 gpm (299,520 gpd) calculated from the dry weather flow rate of 290 gpm less the dry weather minimum flow for fish passage of 67 gpm; and less 3 gpm for water rights below the City's water intake. Based on the W&K feasibility study, the City of Trinidad uses less than 51 percent of the water available from Luffenholtz Creek during dry weather flows.


LACO's 2009 report used slightly more conservative estimates of the City's water demand and the amount of water available from Luffenholtz Creek during dry weather flows. LACO estimated the City's average day and maximum day water demand based on water production and distribution data over the 11 year period from 1997 to 2008, resulting in an estimated average daily demand of 73 gpm (104,613 gpd) and a maximum day demand of 131 gpm (188,352 gpd). LACO's estimate of flows in Luffenholtz Creek used a dry


weather creek flow of 290 gpm (417,600 gpd), taken from the W&K “Evaluation of Supply and Demand of Trinidad Water System,” dated January 24, 1995. Both the 1995 and the 2009 W&K studies note that 1977 was a particularly dry year, however, the 1995 study cites measured flows in 1977 for Luffenholtz Creek of 310 gpm (446,400 gpd), while the 2009 study cites a rate of 278 gpm (400,320 gpd). No data is supplied in either study to account for the difference. In part to account for the inherent uncertainty in predicting dry-weather flows, the 2009 LACO Study assumes that the “normal year” minimum fish passage flow of 112 gpm (161280 gpd) will be maintained in dry years. Each of the studies reports an additional minimum pass through for downstream water users of 3 gpm (4,320 gpd). Based on the estimated dry year flows and pass through requirements, the LACO study estimated dry weather available creek flow to be of 175 gpm, or 252,000 gpd. LACO estimated the City’s water use at less than 75 percent of the water available from Luffenholtz creek during dry weather flows.

The W&K feasibility memorandum estimates the additional CalFire Service Station connection’s maximum daily water use at 0.6 gpm (800 gpd), or 1 percent of the available City supply. Similarly, the 2009 LACO Study estimates the water demand for the Moss Minor Subdivision to be 1.2 gpm (1,766 gpd), which was determined to be less than 1 percent of available creek flows. The LACO Study calculated the anticipated City of Trinidad Maximum Day demand as future development occurs to be 160 gpm (230,299 gpd). The proposed 0.6 gpm (800 gpd) service to CalFire would account for approximately 2 percent of the growth anticipated by the LACO study. This additional water use does not impact LACO’s assessment, and is considered normal growth accounted for in the Projected Future Demand section of the LACO report.

In summary, the W&K feasibility memorandum reinforces LACO’s determination that dry weather flows in Luffenholtz Creek exceed the existing and anticipated water needs of the City of Trinidad and the Moss Minor Subdivision.

Sincerely,
LACO Associates


Benjamin W. Dolf, E.I.T.
Staff Engineer


Leonard M. Osborne, P.E.
Principal

