Posted: June 28, 2019

City of Trinidad

NOTICE AND CALL OF A MEETING OF THE

TRINIDAD PLANNING COMMISSION

The Trinidad Planning Commission will hold a specially scheduled meeting on
MONDAY JULY 1ST, 2019, AT 5:00 P.M.
in Town Hall at 409 Trinity Street.

The following items will be discussed:

I. ROLL CALL

II. APPROVAL OF AGENDA

III. ITEMS FROM THE FLOOR

IV. AGENDA ITEMS

Discussion / Decision / Public Hearing / Action

1. General Plan Update: Discussion of status and next steps. Introduction and review of a draft Water Demand Assessment and discussion of water service policies and priorities.

V. STAFF REPORT

VI. ADJOURNMENT

PLEASE DO NOT REMOVE OR COVER UP

MEMORANDUM

TO: Trinidad Planning Commission

FROM: Trever Parker, City Planner

DATE: June 28, 2019

RE: General Plan Update – Water Production Rate Analysis and Demand Assessment

I did not complete the draft Water Demand Assessment in time to write much of a staff report. However, I think between the two reports provided, you will have plenty to think about and discuss. I believe there will also be some public interest in this meeting. I would like to take this meeting to answer any questions about the reports that I can. I would also like to hear requests and suggestions for changes and additional information you would like to see in the demand assessment and/or in a more detailed staff report.

The goal is to kickstart the discussion of water service policies as part of the general plan update. This will lead to the development of more specific policies or regulations for responding to future water service requests. It will also provide the City some additional information and direction for responding to the current request from the Rancheria for water to serve their proposed hotel. It is expected that the hotel will be back on the Coastal Commission agenda for their August hearing in Eureka, and the City Manager is hoping to be able to provide some additional insight as to the City's ability to provide water ahead of that hearing. However, it is recognized that the City will not have all the information or answers by then. The Council may want to provide the Planning Commission with further guidance for addressing specific questions at their regular July 10 meeting. This topic will again be on the Planning Commission's regular July 17 agenda.

In addition to GHD's May 1 Water Treatment Plant Production Rate Test and Analysis Memo and the draft Water Demand Assessment I prepared, I have also provided you with the water service sections from both the existing and draft general plans. The water service policies of the existing general plan were recently amended to accommodate the CAL FIRE connection. And, although the current draft is dated October 2018, the water service section essentially has not been updated since the July 2012 draft in anticipation of these reports.

Draft Water Demand Assessment

Projections for Build-out Within the City and Within the City's Service Area.

City of Trinidad

June 28, 2019

Background

The City has designated water service area (City Service Limit as designated in the certified Local Coastal Program (LCP)) that extends well outside of City limits (Figure 1). Prior to about the year 2000, the City provided water to users outside City limits, but within the service area, when requested, without much oversight or decision-making, in order to benefit from the increased revenue. However, around 2000, the policies of the Humboldt County Local Agency Formation Commission (LAFCo) changed, and they no longer allowed service extensions to properties outside the City without annexation into the City except in cases of emergencies. Therefore, the City stopped connecting users outside City limits. But the dynamics are again changing. During the recent drought, the number of requests for City water from property owners outside of the City increased substantially. In addition, LAFCo has recently relaxed its policy requiring annexation prior to providing water. On the other hand, water supply has also become a more important issue.

Purpose

This report is being funded in part by a Local Coastal Program Update grant from the California Coastal Commission. City staff requested grant funding for this water demand assessment for several reasons. As part of the comprehensive update of the general plan, the City should assess the boundaries of the service area to ensure that they are still reasonable in the current context. In addition, the City may want to consider annexation of some of these areas in the future. Depending on the area, annexation could potentially provide tax additional revenue, or it could also be a revenue drain. But there are other potential benefits such as land use control and increasing the City population and pool of people to serve on councils, commissions and committees. Further, LAFCo is in the process of updating the City's Sphere of Influence, which is also related to the potential for annexation and service provisions.

With the Rancheria's request for City water to serve their proposed hotel, issues of water supply and future demand have become even more critical. The City needs to develop policies by which they will evaluate and prioritize requests for water service from outside City limits and consider when annexation may be required or sought. In order to do that, the City also needs to understand how much water is available, and what the future demand for water may be, both inside the City and within the service area.

These are major, broad-scope issues that City staff are currently working towards addressing. The City Engineer's office recently completed a preliminary assessment of the production capacity of the water plant. In addition, they will also be working on a flow assessment of Luffenholtz Creek with an emphasis on low-flows and the potential risks from future droughts and climate change. Planning staff has prepared this build-out demand assessment that includes potential development within both the City and the service area. Other pieces of this topic that staff will be working on are an analysis of the

storage and distribution characteristics and limitations of the physical water system, a water rights analysis for Luffenholtz Creek and an assessment of potential alternative water sources. All of this information will take time to develop, but this service area demand assessment, along with the water plan production capacity memo should provide a good starting point for some of the policy discussions.

Water Demand Within City Limits

Methods

To start, the City exported monthly water use data for all the accounts in the City for the 12-month period of April 2018 to March 2019. The meters are read monthly, so we cannot ascertain peak hourly or daily usage. However, the data does represent actual rather than assumed water use. I then separated the water accounts by rate code, or inside v. outside City limits. For the accounts within the City, I then merged the data with APNs and zoning data, and separated the water accounts by zoning designation I then calculated the average annual and peak monthly (July) water use per account for each zone. I did not do much "clean-up" or manipulation of the data. When a property changed hands, there would be multiple accounts for the same address; I combined the water usage into one line/account. There were accounts with 0 water use, which are assumedly vacant. And there were accounts with large, noticeable water leaks. However, I figured this represented the most realistic picture of actual, average water use available. There was one exception where a leak was so large (60 to 70 times the normal water use) that it skewed the data and I removed it from calculating the average water use in the SR zone.

Many of the properties that have multiple units or business have separate water accounts for each user, but not all (e.g. the 4-plex at 651 Parker Street). I did not try to divide out those extra units (except when calculating the average water use for ADUs), because I figured it was better to overestimate average water use per parcel for this analysis. But I also did not combine multiple accounts on a single parcel. That situation primarily impacts the C zone, of which there are no vacant parcels to calculate build-out. And for the PD zone, build-out demand was estimated based on the potential number of units, not the number of parcels. The City's water billing and meter reading software present water use in cubic feet, but I converted it to gallons per day (gpd) to compare with the water system capacity information presented in GHD's memo.

Existing Water Use

Water use varies substantially between users. But the vast majority of accounts (89.5% in the City) use less than 300 gpd, which is considered the design flow for sizing a septic system for a two-bedroom house. By far the biggest users in town, using almost twice as much water as the next highest users, are the Harbor property and Hidden Creek RV Park (1798 and 1786 gpd respectively). The next highest users are the Trinidad School (959 gpd), a mostly unoccupied vacation home (not an STR) (956 gpd) and the Eatery (890 gpd).

Murphy's Market (881 gpd) and the Lighthouse Grill (794 gpd) are also high users. After that, the volume of use drops off.

Although requiring conservation or consideration of methods to limit water use are outside the scope of this particular report and discussion, looking at the water data in detail does bring attention to high water users and concerns about that. For example, three of the top 10 water users in town (Eatery, 570 Trinity, 4-plex) are located in the same block just behind the active slide on Edwards Street. In addition, there are several residences located near bluffs that use a significant about of water. This information should be kept in mind when discussing water policies, and the City should also be considering such things as a tiered water rate structure that encourages conservation and requirements for drought tolerant landscaping.

The month of peak metered water use in the City is July. The second highest month is usually September. However, anomalous data, such as a large water leak, can skew the results for some zones or months. Other factors can also affect the results. For example, the highest water user in the PR zone is Trinidad Elementary School. But since school is out in the summer, their water use is lower than average during that time. Therefore, the peak month for usage in the PR zone is September (indicated by ^ in Table 1). The peak usage in July is slightly different than the peak production at the water plant, which occurs in August. July and September tend to be the peak months outside of City limits as well, so I'm not sure why this discrepancy exists. However, for the purpose of this review, it doesn't matter too much.

For this report, we are most interested in water use by land use. The following table shows total and average water use (gpd) by land in the City. The starred answers (*) indicate that removing one anomalous water user would substantially change the average. Note that the average shown for the VS zone divides the total volume by two, because there are two RV parks. However, Trinidad Bay Trailer Courts actually has three accounts, so average water use by account is much lower.

Table 1. Average and peak daily water use (July) by land use zone.

Zone	Total gpd	Ave. gpd	Peak gpd
C	6,047	403	692
VS	2,717	1,358*	1,572
PD	3,361	140*	235
PR	1,490	166	274^
SR	6,045	163*	211
UR	16,665	128	226
Total	**36,325**		

Trends

I also looked at the 2017 and 2013 water data for comparison to see if water use has been changing over time. In 2018, the total metered water use in the City was 1,788,162 cubic feet, or an average of 36,645 gpd. In 2017, the total metered water use in the City was 1,722,263 cu. ft., or 35,295 gpd. And in 2013 the total metered water use in the City was 1,786,244 cu. ft., or an average of 36,606 gpd. So, water use seems to have remained fairly steady. This could be analyzed in more detail if warranted.

Build-out Demand

The City analyzed development potential of vacant lands in its draft Housing Element (December 2013), which was updated for this report. The vacant (developable) lots in the City fall into only three zoning designations – Planned Development (PD), Suburban Residential (SR), and Urban Residential (UR). Except for two Special Environment (SE) parcels, the only other vacant lots are zoned Open Space and SE and are publicly owned or held by the Trinidad Coastal Land Trust, and so are not considered developable. One of the two privately held SE parcels could potentially be developed. There are no vacant Commercial, Public and Religious, or Visitor Service zoned parcels in the City. Trinidad has no industrial or agricultural zoning designations.

In addition, the City also looked at parcels that are large enough to be subdivided. For both vacant and developed parcels, the potential number of new units/parcels was calculated based on the gross parcel area and minimum lot size for the zone (assigning the primary zone to the whole parcel). However, many parcels have limitations such as riparian corridors and steep slopes (most of those portions of the lots are zoned SE). Therefore, staff estimated a conservative "net" development potential based on the approximately developable area. In all likelihood, this net development potential overestimates the potential number of new units, because there will be other, unknown limitations. However, it is better to over-estimate future water demand than to under-estimate it. In addition, Trinidad has averaged less than one new house per year over the last few decades, so this level of development would be expected to occur over a long period of time, wherein changes to the water plant, production capacity and water availability are also likely to change over that time.

Table 2 presents projected build-out demand under the current land use/zoning designations. Although the number of potential units in the PD zone was already reduced from the gross potential of one unit per 8,000 sq. ft., it is now likely substantially less, since the TCLT acquired two of those four parcels. In addition, there is one single-family residence that substantially affects the average water use in the PD zone (140 gpd v. 105 gpd annually and 235 gpd v. 173 gpd in July). Using the lower average would likely be more realistic, but as mentioned above, it is better to be conservative in this instance. It only equates to a difference of about 1,000 gpd for the potential average annual daily demand and 2,000 gpd for the peak demand anyway.

Table 2 – Estimated Maximum Water Use at Build-Out in Trinidad

Zoning	Potential Number of New Units After Build-out	Average Daily Water Use Per Unit (gpd)	Potential Additional Average Daily Water Use (gpd)	Average Peak Daily Water Use Per Unit (gpd)	Potential Additional Peak Daily Water Use (gpd)
UR	20	128	2,560	226	4,520
SR	39	143*	5,577	211	8,229
PD	32	140	4,480	235	7,520
Total			**12,617**		**20,269**

* In general, leaks were not removed from the dataset, because they are part of the normal situation. However, there was one that was so large and obvious (on the order of 60 to 70 times their normal water use) that it significantly skewed the data, and so was not used in calculating the average for the SR zone. The leak did not affect the July average.

Accessory Dwelling Units (ADUs)

The State requires cities to provide their fair share of housing, and generally requires second units to be allowed on residential properties by right. However, because Trinidad is in the Coastal Zone, and its land use ordinances are governed by the Coastal Act and the Coastal Commission, the requirements are more nuanced. In addition, development in Trinidad is limited by the use of septic systems, and potentially water availability. The City has expressed interest in allowing ADUs and even passed an ADU ordinance, but it was never certified by the Coastal Commission. One of the reasons was because Coastal Commission staff wanted more information showing that the City has the water available to serve potential ADUs.

The State does not allow impact fees to be charged for ADUs, which makes it harder to find information related to how much water one would be expected to use. (Impact fees are fees charged to developers to offset the increased costs of serving the new development (e.g. providing water, police, street maintenance, etc.).) And the City doesn't have a complete record of all the existing ADUs in town. However, I looked at water use for those that are known, and water use was generally very low. The highest per unit residential use was the 4-plex at 651 Parker at 140 gpd average per unit (461 Ocean had a higher average water use, but that was due to an obvious leak one month, and 308 Ocean also had a higher water use, but that unit operates as a day care). On average, multi-unit residential properties utilized approximately 80 gpd per unit and 138 gpd in July.

It is difficult to estimate the development potential for ADUs, because the number, size and type vary significantly depending on market conditions and local regulations. Trinidad should carefully regulate the establishment of ADUs in order to minimize wastewater, groundwater and water supply impacts. In the 2019 Groundwater Model Addendum (Trinidad ASBS Stormwater Project) prepared by GHD, they ran the model with assumed build-out of the City. There was an increase in groundwater levels in the

area of the horse pasture, based on the gross potential build-out. GHD also ran the model infiltrating all stormwater onsite. That model indicated saturated conditions and slope instability, showing that there is a limit to the amount of water that can be infiltrated in Trinidad.

At this time, it is unknown how ADUs will be regulated in Trinidad; currently, they would not be allowed on most parcels. The ADU ordinance that was passed by the City in 2010 (but never certified by the Coastal Commission) does not include a minimum parcel size for ADUs, though it does require a code OWTS, which necessarily limits the lot size that can accommodate an ADU. However, with better information regarding water and groundwater and slope stability limitations, it would make sense to limit ADUs based on lot size and/or location (e.g. based on GHDs January 2019 Groundwater Model Addendum for LID Zoning).

As a starting point, staff calculated the number of parcels that are large enough to meet the current minimum lot size for their zone. There are 87 UR zoned parcels that are at least 8,000 sq. ft., 44 SR zoned parcels that are at least 20,000 sq. ft., and 12 PD zoned parcels that are at least 8,000 sq. ft. If one quarter of those parcels constructed ADUs, that would be 36 parcels. As noted above, parcels with ADUs use approximately 80 gpd of water on average, and 138 gpd in July. That equates to an additional 2,880 gpd of water use on average, or 4,968 gpd during the peak month of July. Again, that is a conservative estimate that likely overestimates potential water use, but a conservative approach is appropriate in this case due to uncertainties and the potential for droughts and climate change to reduce the available supply of water in Luffenholtz Creek. Adding the ADU demand to the build out demand would equate to an average of 15,497 gpd and a peak demand of 25,237 gpd within City limits.

Service Area Descriptions and Build-out Demand Potential

Below I have provided a brief summary of the characteristics of each area and subarea within the Service Limit as shown on the attached Figure 1. This information is provided in order to aid in the discussion of which portions of the service area, if any, should be a priority for future service and annexation and which areas should be eliminated from the service area. For example, the more development potential there is in an area, the more financial sense it could make for annexation, because the County keeps some of the tax revenue from existing development.

A few parcels that are within the existing service area were eliminated from the analysis due to several reasons. The parcels east of Area B and north of Area D are owned by the company that operates the quarry and / or are zoned or proposed to be zoned AE or TPZ, which are very restrictive zones that should not be provided community water. A couple of large parcels that stick out from the bulk of Area E were eliminated just because they didn't seem to make a lot of sense and were not adjacent to a main line. In Area F, the

parcels seaward of Scenic Drive were eliminated from the analysis due to the substantial development limitations on those parcels.

Methods

A spreadsheet was created of all the parcels within the existing City Service Limit. Included in the spreadsheet was data from the County Assessor's office and the County GIS. This information includes such things as the existing use, improvement value, size, zoning and general plan designations. Whether the property is currently served by City water was also included in the spreadsheet.

I then divided up the service area into smaller areas, designated by letters, and sometimes broke those into even smaller subareas. These divisions were somewhat arbitrary, but are areas that might make sense as future annexation units if the City wants to expand. In addition, it is not likely that the City will ever provide water service to the entire service area. With this break-down, the characteristics of each area can be reviewed, and the merits of including it in the service area, considered separately.

Staff reviewed both existing zoning and the proposed zoning updates currently being discussed by the County. Those changes will only affect properties outside of the Coastal Zone (CZ). The development potential of each property was estimated based on the minimum lot size according to zoning and subdivision potential. There is minimal subdivision potential on properties within the service area, but there is some. It is likely that there are physical and other factors that would limit the subdivision potential, but once again, this is a conservative estimate that likely overestimates potential demand somewhat. In addition, ADUs are allowed on almost any lot in the service area with approval of a special permit and allowed by right on some parcels.

Water use data for accounts within the service area was treated and analyzed similar to the water use data for properties within City limits. The primary difference is that all the parcels are residential except for some of the Rancheria connections. I separated the Rancheria parcels for the purposes of calculating average water use. This is because some of the connections are for commercial and office use, and because it does not seem like all the connections are all serving individual parcels or homes.

I did not try to match the service area property characteristics spreadsheet with the City's water accounts. This is because we are trying to forecast potential future water use. And because owners, family structures, landscaping, number of bedrooms, etc. can all change in the future, an average water use is a better predictor than actual current water use.

Overall, average water use within the Service Area is substantially lower than residential water use in the City, with an average of only 94 gpd including the three accounts with zero water use (the average in the City also included accounts with zero water use) and 98 gpd excluding them. Average water use per account on the Rancheria is closer to the City

residential averages at 155 gpd annual average and 189 gpd during July (without the casino). Therefore, I went ahead and averaged all the accounts, including the Rancheria parcels, but excluding the casino, to use in the calculations for potential service area demand for residential areas. This equated to an average of 109 gpd with a peak of 166 gpd in July.

For potential ADUs, I used a multiplier of 0.25 to account for up to a quarter of properties constructing ADUs (not including existing ones) for parcels where a special permit is required and 0.5 where they are allowed by right (again, likely an overestimate). I used the same average water demand for both primary residences and ADUs, since the average is already fairly low. Each parcel got a multiplier based on whether they are already served by City water or not, whether the parcel has subdivision potential and whether an ADU is allowed by right or special permit. A potential average and peak water demand were calculated for each parcel and totaled for the subarea. The full potential for subdivision was included in the water demand calculations, though, as mentioned above, approval of all those subdivisions is unlikely.

For Area C, I took a different approach. The potential water demand for this area is difficult to estimate, because different commercial and recreational uses can vary significantly in their water requirements. For example, one parcel contains a mini-storage business, which likely uses very little water. On the other hand, the RV parks use a significant amount of water, particularly in the summer. Restaurants use a lot of water, but a hardware store would not. Therefore, a simple average did not seem to be an adequate approach.

At first, I did apply the average water use from the RV parks in Trinidad to the parcels in Area C, multiplying it based on lot size and subdivision potential. However, the resulting totals seemed unreasonably high. Therefore, I went ahead and called several of the businesses that operate within the area, including all three of the RV parks and Ocean Grove. I was able to speak to the owners or operators of these businesses to get an idea of how much water they actually use. However, they primarily gave me estimates of the highest peak day usage (e.g. 4th of July), which would be substantially more than the daily average over the entire month. Therefore, I did not use the full peak in estimating water demand over the entire month or year. Regardless, it became clear that to serve this entire area would require a significant amount of water (see more below). There is potential for using City water and existing onsite sources of water to serve this area, but that is outside the scope of this report.

<u>A Note About Zoning</u>

Areas A, B, D, E and F include almost exclusively residential zoning designations, whereas Area C is exclusively commercial zoning. The vast majority of parcels within the service area are zoned RA (rural residential agriculture), or are proposed to be RA in the County's update. And many are also zoned RS (residential single-family in the coastal zone). The

number after the zoning designation (e.g. RA-2.5) indicates the minimum lot size, usually in acres, and an X means no additional subdivision is allowed. Although these zoning designations are primarily residential, they do allow a fairly wide variety of uses with approval of a use permit. Such uses include neighborhood commercial, public and private recreation, bed and breakfasts, stables, agriculture and timber production. However, staff is not aware of many of these other types of uses having been established, likely because most of the lots are relatively small and would have septic limitations. There are also a number of combining zones (such as for wetlands, riparian areas, fault hazards, design review requirements, etc.).

Area A

Area A consists of 15 parcels covering an area of 24.1 acres, all within the Coastal Zone (CZ). The average parcel size is 1.61 acres, ranging from 0.44 acres to 6.21 acres. Nine of the parcels are currently served by City water, and 6 parcels are unserved. Four of the parcels are vacant, and one is minimally developed (< $30,000 improvement value). All the parcels are residentially zoned; one parcel has a mobile home and one has multiple units. The parcels are all zoned RS-20 - Residential Single-family, 20,000 sq. ft. minimum lot size. However, the County's minimum lot size when OWTS are used (and community water) is one acre. At that size (one acre), there is potential for 4 parcels to be subdivided into a total of 13 parcels. Second dwelling units are allowed with a Special Permit. This area is estimated to have a potential additional average annual demand of 2,289 gpd and a potential additional peak demand of 3,486 gpd during the month of July.

Area B

Area B consists of 43 parcels covering an area of 59.4 acres. The average parcel size is 1.41 acres, ranging from 0.19 acres (8,276 sq. ft.) to 4.14 acres. Twenty-three of the parcels are outside the CZ, 15 are inside the CZ and 5 are split. Twenty-two of the parcels are served by City water, and 21 are unserved. At least 13 parcels are vacant with five more that have minimal improvement value (< $30,000). All the parcels are zoned residential (RA-2.5 inland and RS/SM or RA-2 and RA-2.5 coastal). Three of the parcels could be subdivided into a total of six parcels. Twenty-four of the parcels can construct an ADU by right, and the other 19 would require a special permit. This area is estimated to have a potential additional average annual demand of 4,524 gpd and a potential additional peak demand of 7,014 gpd during the month of July.

Area B1 contains 28 parcels totaling 30.59 acres, averaging 1.13 acres, and ranging in size from 0.19 acres to 1.27 acres. There is no subdivision potential in this subarea. None of the parcels are in the CZ, but one is split by it. Eleven of the parcels are currently served by City water, and 17 are not. Eight of the parcels are vacant, and three have minimal improvement value. All 28 parcels can construct an ADU by right. This subarea is estimated to have a potential additional average annual demand of 2,698 gpd and a potential additional peak demand of 4,183 gpd in July.

Area B2 contains 15 parcels totaling 28.78 acres, averaging 1.92 acres, and ranging in size from 0.33 (14,375 sq. ft.) acres to 4.14 acres. Three of the parcels could be subdivided into a total of six parcels. Twelve of the parcels are in the CZ, two are outside and one is split by it. Five of the parcels are currently served by City water, and 10 are not. Five of the parcels are vacant, and two have minimal improvement value. Two of parcels can construct an ADU by right and 13 would require a special permit. This subarea is estimated to have a potential additional average annual demand of 1,826 gpd and a potential additional peak demand of 2,831 gpd in July.

Area C

Area C consists of 12.5 parcels (one parcel is split by the service area boundary) covering an area of approximately 56 acres. The average parcel size is 4.54 acres, with a range of 0.73 acres to 11.23 acres. Ten of the parcels are within the CZ, and three are split. None of this area is currently served with City water. Only one parcel is wholly vacant, but three other parcels are mostly vacant (either with minimal improvements or unused). All of the parcels have commercial designations; five are zoned Commercial General, and the other 8 are zoned Commercial Recreation. However, three parcels are currently utilized for residential purposes. In addition, one of the three RV parks caters to permanent residents (minimum 30-day stay). As mentioned in the methods section above, estimating demand in this area is difficult, because it can be highly variable. The estimated potential water demand of this area is somewhere on the order of 15,000 to 20,000 gpd average during the low season and an average of 35,000 to 40,000 gpd during the peak season.

Area D

Area D consists of 49 parcels covering an area of 121.4 acres. The average parcel size is 2.48 acres, with parcels ranging from 0.23 acres (10,019 sq. ft.) to 11.74 acres. Thirty-six of the parcels are in the CZ, two are outside the CZ and 11 are split. Sixteen of the parcels are served by City water, and 33 are unserved. At least nine parcels are vacant with six more that have minimal improvement value (< $30,000). All the parcels are zoned residential (generally RA-2.5, RA-2 and RA-X). Six of the parcels could be subdivided into a total of 14 parcels. Only two of the parcels can construct and ADU by right, and the other 47 would require a special permit. This area is estimated to have a potential additional average annual demand of 6,077 gpd and a potential additional peak demand of 9,255 gpd during the month of July.

Area D1 contains 16 parcels totaling 35.19 acres, averaging 2.20 acres, and ranging in size from 0.25 acres to 6.89 acres. There is one parcel that could potentially be split into two parcels within this subarea. All of the parcels are in the CZ. Seven of the parcels are currently served by City water, and nine are not. Four of the parcels are vacant, and three have minimal improvement value. All 16 parcels can construct an ADU with approval of a

special permit. This subarea is estimated to have a potential additional average annual demand of 1,553 gpd and a potential additional peak demand of 2,366 gpd in July.

Area D2 contains 17 parcels totaling 25.51 acres, averaging 1.50 acres, and ranging in size from 0.23 acres to 6.67 acres. There is one parcel that could potentially be split into two parcels within this subarea. Fifteen of the parcels are in the CZ and two are split. Seven of the parcels are currently served by City water, and 10 are not. Three of the parcels are vacant, and one has minimal improvement value. All 16 parcels can construct an ADU with approval of a special permit. This subarea is estimated to have a potential additional average annual demand of 1,690 gpd and a potential additional peak demand of 2,573 gpd in July.

Area D3 contains 16 parcels totaling 60.67 acres, averaging 3.79 acres, and ranging in size from 1.01 acres to 11.74 acres. There are four parcels that could potentially be split into 10 parcels within this subarea. Four of the parcels are in the CZ, three are outside and nine are split. Only two of the parcels are currently served by City water, and 14 are not. Two of the parcels are vacant, and one has minimal improvement value. Two of the parcels can construct an ADU by right, and the other 14 would require approval of a special permit. This subarea is estimated to have a potential additional average annual demand of 2,834 gpd and a potential additional peak demand of 4,316 gpd in July.

<u>Area E</u>

Area E consists of 36 parcels covering an area of 99.54 acres. The average parcel size is 2.77 acres, ranging from 0.14 acres (6,098 sq. ft.) to 6.64 acres. All 36 parcels are in the CZ. Eighteen of the parcels are served by City water, and 22 are unserved. At least five parcels are vacant with three more that have minimal improvement value (< $30,000). All the parcels are zoned residential (the vast majority are RA-2.5, with one RA-X and one RA-5). Six of the parcels could be subdivided into a total of 15 parcels. All of the parcels would require a special permit to construct an ADU. This area is estimated to have a potential additional average annual demand of 3,761 gpd and a potential additional peak demand of 5,727 gpd during the month of July.

<u>Area F</u>

Area F consists of 25 parcels covering 80.78 acres. The average parcel size is 3.51, ranging from 0.47 acres to 15.8 acres. All 25 parcels are in the CZ. This area is not currently served with City water at all. There are only three vacant parcels in this area All the parcels are zoned residential (RA-2.5, with numerous special combining zones). Four of the parcels could be subdivided into a total of 11 parcels. All of the parcels would require a special permit to construct an ADU. This area is estimated to have a potential additional average annual demand of 4,360 gpd and a potential additional peak demand of 6,640 gpd during the month of July. Because this area currently has no water lines, and it would never make

DRAFT

sense for the City to annex this area, staff is proposing that it be eliminated from the City's Service Area, regardless of how much water may be available.

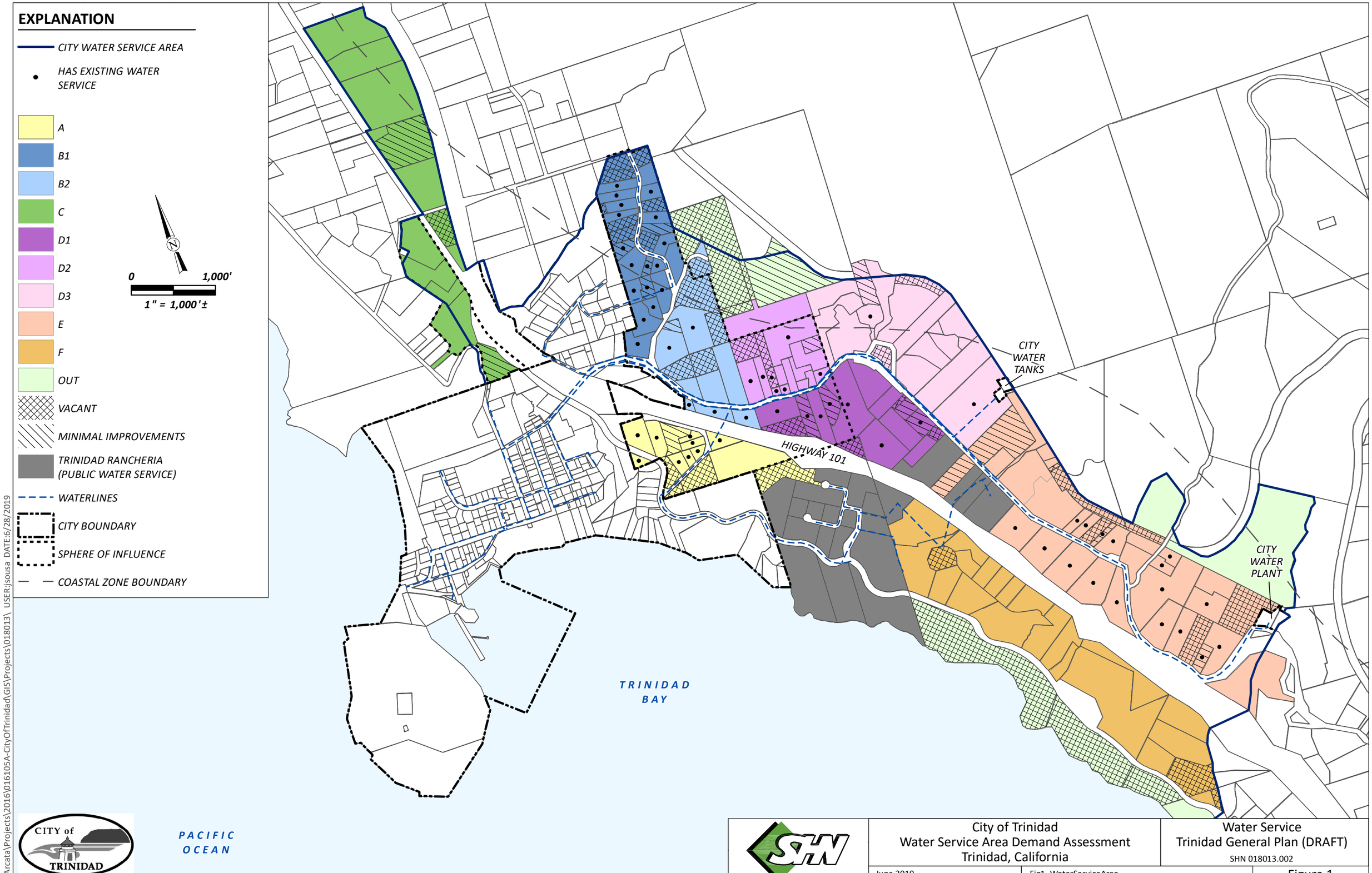
Summary

Table 3 provides a summary of potential build-out demand within City limits and the various parts of the City's service area.

Table 3 – Total Potential Build-out Water Demand within the City and within the City Service Area

Area	Average Demand (gpd)	Peak Demand (gpd)
City build-out	**12,617**	**20,269**
ADUs w/in City	2,880	4,968
Area A	**2,289**	**3,486**
Area B1	2,698	4,183
Area B2	1,826	2,831
Area B	**4,524**	**7,014**
Area C	**20,000**	**35,000**
Area D1	1,553	2,366
Area D2	1,690	2,573
Area D3	2,834	4,316
Area D	**6,077**	**9,255**
Area E	**3,761**	**5,727**
Area F	**4,360**	**6,640**
Total	**56,508**	**92,359**

DRAFT



City of Trinidad
Water Service Area Demand Assessment
Trinidad, California

Water Service
Trinidad General Plan (DRAFT)
SHN 018013.002

June 2019 | Fig1_WaterServiceArea | Figure 1

\\Arcata\Projects\2016\016105A-CityOfTrinidad\GIS\Projects\018013\ USER:jsousa DATE:6/28/2019

Memorandum

May 1, 2019

To: Eli Naffah		Ref. No.:	11185172
From:	Patrick Sullivan	Tel:	(707)267-2238
cc:	Becky Price-Hall, Bryan Buckman, Ryan DeSmet		
Subject:	**Water Treatment Plant Production Rate Test and Analysis**		

1. Purpose

The purpose of this memo is to provide an analysis to determine the theoretical effective maximum water production capacity of Trinidad's drinking water production facility under current conditions.

This analysis does not address policy issues related to providing additional connections or obligating the City to provide additional water. This analysis did not consider or address potential water storage needs, distribution network needs, nor any risk analysis of different system components. It is recommended that the City evaluate their policy for considering new service requests. Additional evaluations are needed before making obligations for additional water to meet additional service requests.

2. Background

The City of Trinidad serves treated water to approximately 1,000 people within the City service area. The City's diversion and water plant is located at 1313 Westhaven Dr. Trinidad CA, adjacent to Luffenholtz Creek. Water for the plant is pumped from a wet well that is filled through an infiltration gallery located approximately 10 feet below the creek bed. The point of diversion is just upstream of the Westhaven Dr. culvert. The City has current water rights limiting the rate of diversion, the annual maximum diversion, and required bypass flow requirements, which is the minimum flow rate that must be allowed to bypass the water intake. In addition to water right limitations, the effective water production rates are currently limited by physical constraints in the processing of the water which include: infiltration gallery limitations, flocculator flow rates, filter fouling rates, backwash periods, and chlorine contact time requirements.

3. Water Rights

The City can extract a maximum of 0.56 cubic feet per second (cfs) (251 gallons per minute) from Luffenholtz Creek through appropriative water rights permit numbers 15984 and 17255, which corresponds to a daily maximum extraction of 361,440 gallons per day. The City's water right permit 17255 stipulates that the City shall bypass 0.25 cfs except when the natural flow in Luffenholtz Creek is lower than 0.86 cfs and then the City must leave at least 0.15 cfs in the creek, including enough flow for the 0.0054 cfs worth of water rights downstream from the City. This results in a total of 0.1554 cfs or approximately 70 gpm that must bypass the City's water intake during low flows below 0.86 cfs.

4. Water System Process

The raw water from Luffenholtz Creek is extracted through an infiltration gallery that feeds a wet well. The infiltration gallery is made up of three perforated pipe buried approximately ten feet below the surface of Luffenholtz Creek and flows into a wet well with intake pumps. When the intake pumps are not running, the water surface elevation in the wet well matches the water surface elevation in the creek. When the pumps operate, the level in the wet well drops and the difference in hydraulic head between the water surface elevation in the creek and the elevation in the wet well provides the force to drive the water through the gravels in the creek bed and into the wet well. As gravels become clogged with sediments, the rate at which water can travel through the gravel for a given head is reduced. The dry season elevation of water in the creek is lower than in the wet season and hence reduces the static elevation in the wet well.

Water is pumped from the wet well to a flocculator where polymer is added to aid in particulate clumping and settling, which reduces turbidity. The water is then pumped through a series of mixed media filters with additional polymer and then through a chlorine contact pipe prior to entering the water delivery system.

One of the factors limiting the capacity of the system is the turbidity of the raw water that flows into the wet well from the infiltration gallery. The turbidity in the creek varies seasonally and with rain events the turbidity is generally higher. The water entering the wet well is naturally pre-filtered through the creek bed to some degree, but raw water turbidity in the wet well typically increases with higher creek flow rates. Higher turbidity rates require more polymer and a slower feed rate to the flocculator and also results in more frequent backwashing of the mixed media filters. During a backwash cycle, clean water from the distribution system flows backwards through the filters to flush out sediment. The backwash water is routed to a holding tank where the sediment is allowed to settle to the bottom of the tank. Backwash water is decanted of the top of the holding and routed back into the water processing filter train.

5. Evaluation Approach

Production of potable water from the treatment plant is a function of three factors: legal water right conditions including bypass flow requirements, infiltration gallery intake limits, and treatment plant component limits. This evaluation focuses on the infiltration gallery intake limits and treatment plant component limits.

The approach to evaluating the maximum potable water production rate under current conditions is to operate the treatment plant at various discrete flow rates for a period of time and monitor, record and evaluate performance measurements to determine the limiting factors to water rate production. The highest sustainable flow rate is the rate that does not violate the water right constraints or system limitations. The parameters monitored to evaluate the system capacity include: flow rate, wetwell water levels, chemical addition, and pressure drop across the filter trains, and turbidity of the raw and processed water.

The capacity tests consisted of operating the system at a specified pumping rate to meet the existing daily water demand. The tests were performed and data recorded by the City staff. To perform each test City staff performed the following steps:

- Back wash the system,

- Set the pump speed to produce the desired flow rate,
- Run the test for 7 days or until failure to meet normal performance criteria,
- Monitor the pressure across the filter trains multiple times daily,
- Monitor plant parameter for normal system compliance: chlorine residual, turbidity, bypass flow, filter train pressure, wet well water level,
- Compile data and measurements.

5.1 Evaluated Flow Rates

The flow rate of water through the treatment plant is instantaneous flow through the system typically considered in gallons per minute (gpm). How much water can be made in a day depends on how long the system can run and how much finished water must be used for backwashing. The flow rate through the system dictates the velocity or speed at which water moves through the flocculator, filters and chlorine contact basin. The length of time that the plant runs in any given day determines the daily volume of water produced. The amount of time that the plant typically runs varies with the daily fluctuations in demand and the ability to operate the system during high turbidity in the creek.

The flow rates evaluated in this analysis were determined based upon interviews and consultation with City treatment plant operators. The City can extract a maximum of 251 gpm from Luffenholtz Creek based on water rights; however, the existing pumps can only achieve a maximum flow rate of 175 gallons per minute. However, the operators report that when the plant runs at flow rates greater than 120 gpm the raw water increases and the wetwell level drops significantly. Therefore, 120 gpm was established as the maximum test flow rate and the following eight flow tests were performed:

- Test #1 - 120 gpm
- Test #2 - 115 gpm
- Test #3 - 110 gpm
- Test #4 - 105 gpm
- Test #5 - 100 gpm
- Test #6 - 95 gpm
- Test #7 - 90 gpm
- Test #8 - 85 gpm

The highest flow rate test was performed first, when the flows in Luffenholtz Creek were the lowest and draw down in the wetwell would be greatest.

6. Flow Test Results and Analysis

The flow rate tests were performed over a period of several months starting in mid-November and ending in February. The runtimes of each test was determined by the time between filter backwash cycles. Each test started directly after a filter backwash cycle and was ended when the next backwash was required or 7 days, which ever was less. The first test was performed prior to the first rains of the season and at the highest

pumping rate when the bypass flows would be most critical. A summary of all the test run rates and dates is shown in Table 1 below.

Table 1. Treatment Plant Flow Rate Tests and Dates.

Test	Flow Rate (gpm)	Start Date	End Date
Test # 1	120	11/13/2018	11/19/2018
Test # 2	115	11/20/2018	11/21/2018
Test # 3	110	11/26/2018	12/2/2018
Test # 4	105	12/4/2018	12/6/2018
Test # 5	100	1/28/2019	2/3/2019
Test # 6	95	2/4/2019	2/9/2019
Test # 7	90	2/12/2019	2/18/2019
Test # 8	85	2/19/2019	2/25/2019

Table 2. Summary of Flow Study Data.

Test Number	Flow Rate (gpm)	# of Days Testing	Total Water Volume Produced (gallons)	Amount of Flocculants Added (gallons)	Amount of Chlorine Added (gallons)	# of Backwashes Required
Test # 1	120	5	411,614	2.50	7.89	1
Test # 2	115	2	96,830	1.25	1.93	1
Test # 3	110	5	269,970	5.75	7.37	1
Test # 4	105	3	141,540	3.50	4.05	1
Test # 5	100	5	292,077	3.25	4.67	1
Test # 6	95	5	241,303	2.75	4.06	1
Test # 7	90	4	218,055	2.25	3.87	1
Test # 8	85	6	324,755	2.50	5.73	1

6.1 Water Rights Compliance Assessment

The existing water right provides a substantial source of water when there is ample water in the creek. It is low flow conditions and the requirements for bypass flows that can significantly restrict the amount of water the City is allowed to extract. As discussed above, the City's water right permit stipulates that the City shall bypass a total of 0.1554 cfs or approximately 70 gpm.

Based on previous analyses, there is no known documentation indicating that the creek flow has previously decreased to the point that the City's intake rate needed to be reduced. However, periods of drought, long term changes in the climate, and increased extractions in the upstream watershed could result in restrictions in the future. It is important for the City to remain mindful of these future potential changes in creek flow, and not over commit the water supply, which could become restricted due to low flow in the creek at some point.

To demonstrate compliance with water right requirements, the City measures the flows in Luffenholtz Creek with a stream gauge located directly below the City's point of diversion, below the Luffenholtz Creek culvert on Westhaven Drive.

The first significant rains of the season started on November 20th, 2018. The average flow below the City's diversion was 1.2 cfs. The lowest bypass flow observed was 0.81 cfs and occurred November 13th, 2018, during Test #1. The bypass flow is therefore greater than the required 0.25 or 0.1554 cfs. The Luffenholtz Creek flows are presented in Figure 1 along with an indication of when each pumping rate test was performed. Note that the stream flow data was not reported during Test # 8, however, the creek flows were observed to be "significantly higher than normal" for that time of year. This indicates that the bypass requirements are not the limiting factor for diversion during normal water years.

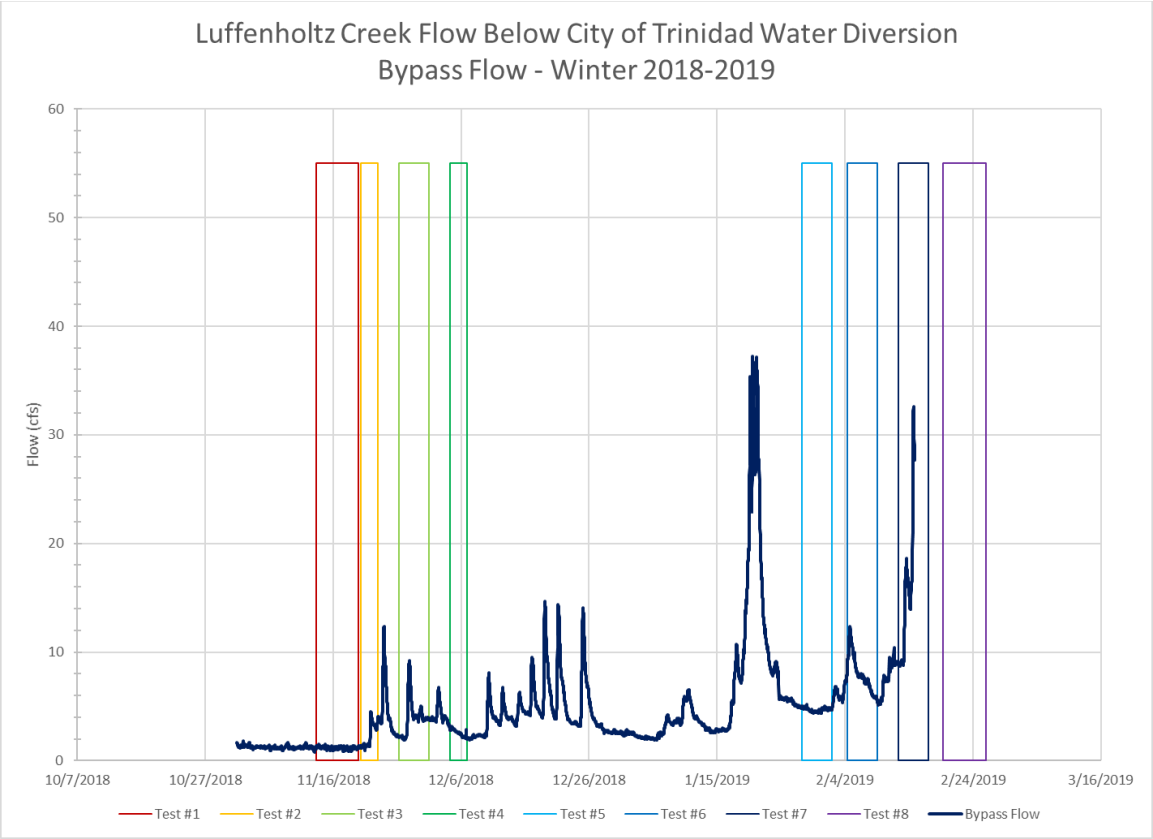


Figure 1. Luffenholtz Creek Bypass Flows below City of Trinidad Water Diversion, Winter 2018-2019

6.2 Wetwell Water Level Assessment

The wetwell for the water treatment plant is located adjacent to Luffenholtz Creek, just east of the Westhaven Drive culvert. Water for the treatment plant is pumped from the wetwell into the treatment plant. Water flows from Luffenholtz Creek and into the infiltration gallery made up of a series of perforated pipes and flows into the wetwell. The top of the wetwell is located above the bank full elevation of the creek at that location. There is depth gauge in the wetwell that records the water level and it is reported as a percent of the total wetwell height. Typically, the wetwell is recorded at roughly 47% to 50% capacity prior to starting the pumps for a production run after a period without pumping. The level of the wetwell is expected to typically decrease with increasing pumping rates and length of time that water is pumped into the treatment plant. The operators typically stop pumping when the water in the wet well decreases to 18% to 20%.

The observed drawdown in water level of the wetwell varied for each test. During the limited test runs, the drawdown does not appear to be correlated with pumping rates. The lowest wetwell water level observed was not coincident with the highest pumping rate. The water levels did not appear to decrease with the increase in duration of the pumping test either. The lower pumping rates required a longer pump run time to generate the daily water demand and resulted in lower wetwell level. The variability in wetwell drawdown is

likely due to the cumulative effect of pumping at higher rates from previous tests. Test #4 had the lowest recorded percent wetwell level and was recorded during a pump run lasting 14 hours. However, previous pumping test were performed at higher pumping rates. The previous tests coincided with storm events when turbidity in the stream (raw water) was elevated and pumping at the higher rates may have introduced additional fine sediments into the subsurface gravels, reducing subsurface flow in the creek bed to the wetwell. When the creek sediments become clogged or fouled with creek sediments the system may be back flushed with water and air to flush the fine sediments out of the gravels. The creek gravels are backwashed only when needed. Typically, backwashing is needed more frequently during the winter wet period when the turbidity in the creek is naturally higher. In future analysis a flushing of the creek sediments should occur prior to each test.

A summary of the average decrease in percent of wetwell volume and the minimum percent of wetwell volume is presented in Table 3.

Table 3. Percentage of Wetwell Drawdown per Pumping Rate Test.

Test #	Flow Rate (gpm)	Average Decrease (% of Total Wetwell Volume)	Minimum % of Wetwell Level
Test #1	120	4.94	41.31
Test #2	115	4.80	41.7
Test #3	110	6.34	26.26
Test #4	105	13.15	19.9
Test #5	100	5.65	40.15
Test #6	95	9.13	34.11
Test #7	90	5.60	32.92
Test #8	85	11.37	24.75

The apparent lack of correlation between the pumping rate and wet well level suggests there may be an instrumentation problem resulting in faulty elevation readings. There may also be other factors affecting headloss in the creek bed, but such headloss is not expected to change in such a sporadic way to result in the wet well readings recorded during the tests. The cause of these apparent characteristics should be investigated further by the City.

6.3 Flocculent and Chlorine Assessment

One of the factors to consider when evaluating the capacity of the system is how flow rate affects the need for dosing of treatment chemicals to achieve the required finished water standards. This is primarily chlorine for disinfection and polymer added as a flocculants for turbidity reduction.

The chlorine contact time is defined by the amount of time it takes for a volume of water to pass through the chlorine contact pipe. The higher the pumping rate the lower the chlorine contact time. The existing chlorine contact pipe was designed to provide 30 minutes of contact time at flow of 175 gpm. The maximum testing

rate of 120 gpm is much less than the 175 gpm maximum design, therefore, chlorine contact time is not a limiting factor for any of the evaluated pumping rates.

The amount of chlorine and polymer required is dependent on the quality of the raw water and flow rate. These conditions will vary based on weather patterns and flow conditions in the creek. In general, the higher the flow, the more organic matter and particulates contributing to the raw water turbidity. This requires more polymer and chlorine during treatment. It is also possible that higher pumping rates could increase the water velocity of the water entering the wetwell. Higher velocities could mobilize sediments in the gravels and increase turbidity in the raw water, thus increasing the chemical demand.

To assess the potential effects on chemical demand, the amount of chlorine and polymer used per 1,000 gallons of water produced was calculated for each test. The resulting rate of chemical usage varies by test run, but there does not appear to be a correlation with production rates. The usage is more likely affected by the turbidity of the raw water from the conditions in the creek. The results are graphically depicted in Figure 2.

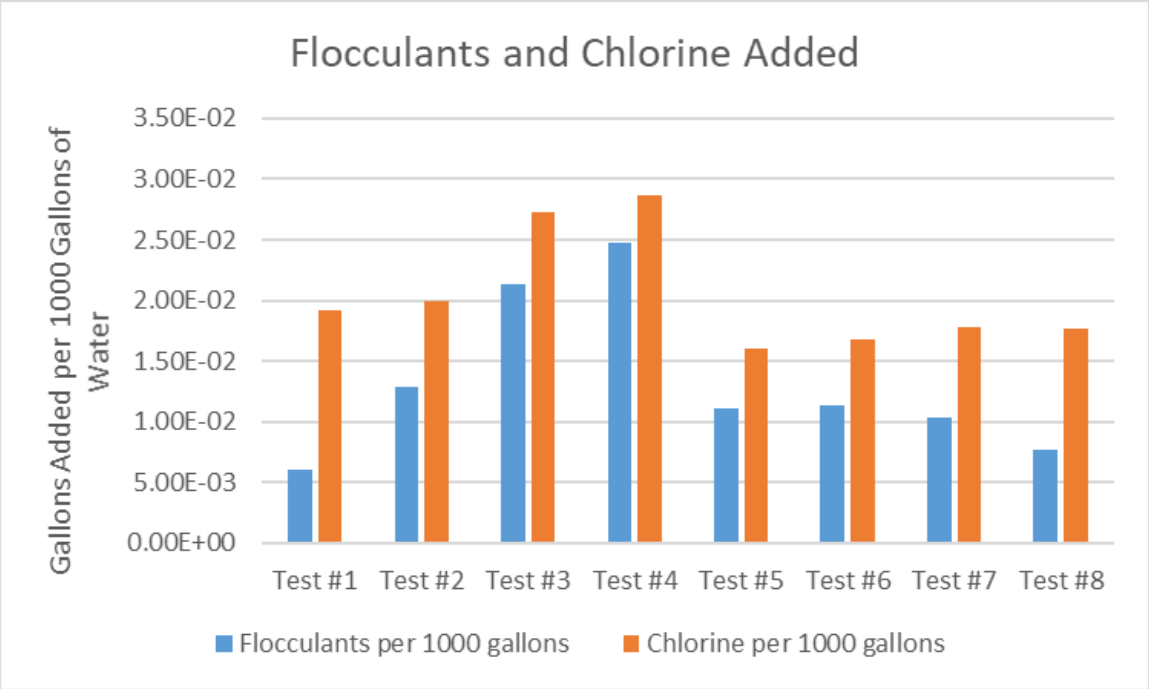


Figure 2. Flocculent and Chlorine Usage per Volume of Water Produced.

6.4 Pressure Drop

As stated above, during the processing of potable water, the raw water is pumped through mixed media filters. The filters are container vessels that are filled with sand, gravel and anthracitic carbon. Particulates are trapped in the filter as the water passes through the filter. The more particulates in the water (measured as higher turbidity), the faster the filters will become clogged. As the filters become clogged the pressure

drop across the filter will increase. A filter train is comprised of two filter vessels aligned in series. The treatment plant has three filter trains that are run in parallel. The pressure on the inlet and outlet of each filter train was periodically recorded for each filter train during each pumping rate test.

If the pressure drop across a filter train is too great, the filter will not function correctly and will need to be backwashed to remove the accumulated sediment in the filter. The maximum pressure drop per 1,000 gallons of water produced was calculated and the results are graphically presented in Figure 3.

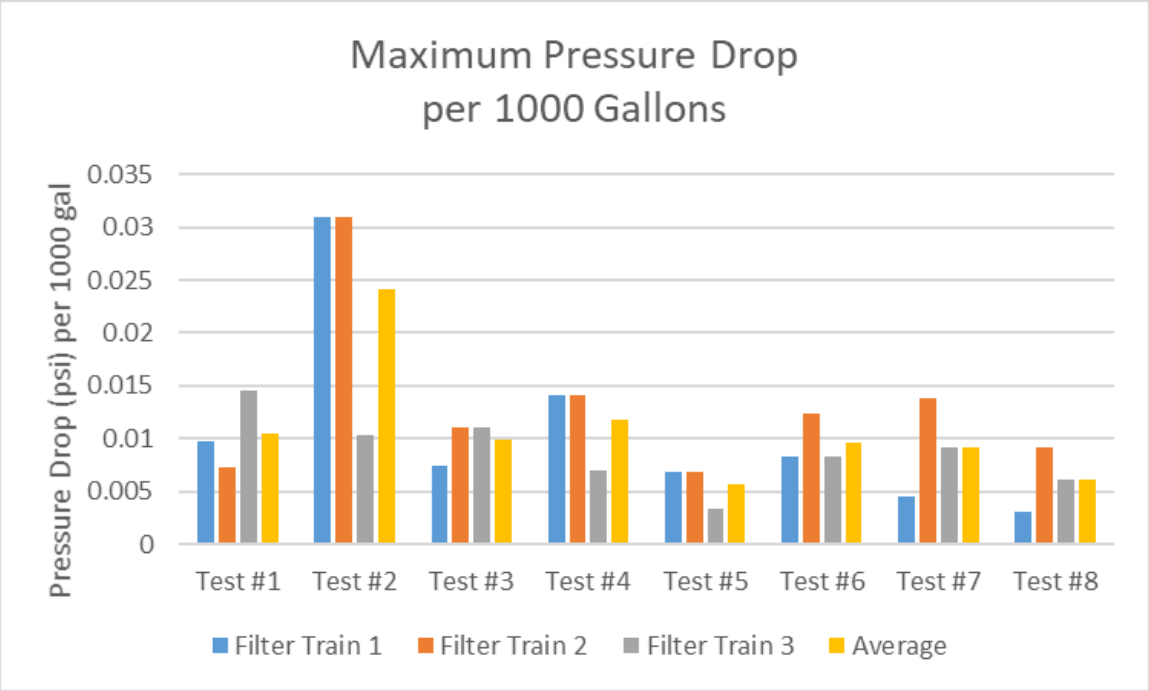


Figure 3. Maximum Pressure Drop across the Filter Trains.

6.5 Turbidity Assessment

The turbidity of water is a measure of the amount of suspended particles or sediment and is reported in Nephelometric Turbidity Unit (NTU). An NTU is a measure of light scattered through a liquid. At the City's treatment plant, the turbidity is measured at various location throughout the treatment process, but of primary concern is the raw water turbidity and the finished water turbidity. The City is required to produce water that is less than 0.3 NTU. The more turbidity in the raw water the faster the filters either clog or fail to produce water that meets their requirements.

The raw water turbidity observed during the pumping rate tests ranged from 0.38 NTU to 50 NTU. The highest turbidity measurements coincided with storm events where runoff into the creek increases the amount of suspended solids in the water. The turbidity of the processed water is also monitored. When the turbidity of the processed water is greater than 0.3 NTU the processing of potable water is stopped and the filter trains are back washed and flushed prior to restarting potable water production. Each of the pumping rate tests were ended due to processed water turbidity being greater than 0.3 NTU.

The observed turbidity during the test period is shown in Figure 4. The raw water turbidity is represented with the green dots and references the scale on the left. The finished water turbidity is represented with the blue dots and references the scale on the right.

The filter run time is determined by the amount of water filtered between a backwash of the filters and when the turbidity of the finished (filtered) water reaches 0.3 NTU, which triggers another backwash cycle. The turbidity of the finished water gradually increases as the volume of water filtered increases during a filter run. There was variability in the filter run times during the tests. Two trends were observed during the tests: the higher the turbidity of the raw water the shorter the run times, and the higher pump rates the shorter the run times.

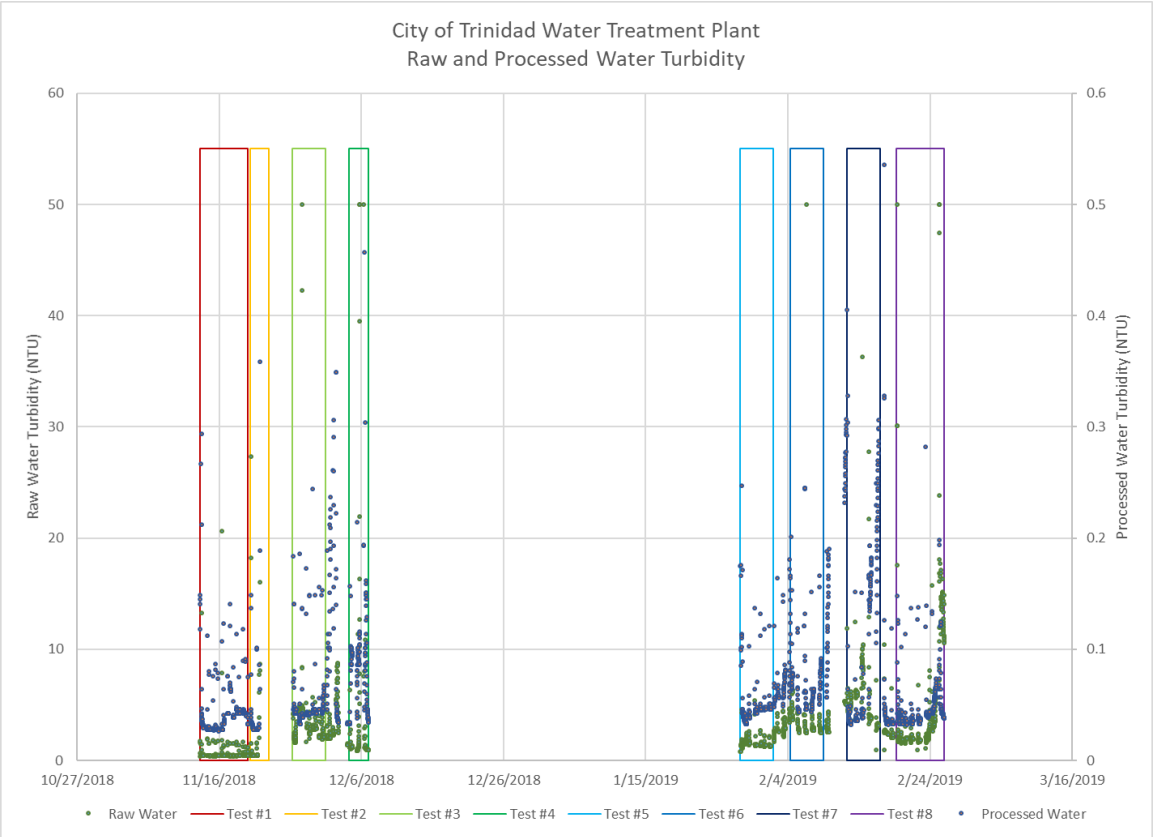


Figure 4. Raw Water and Processed Water Turbidity at the City of Trinidad Water Treatment Plant.

6.6 Filter Train Backwash

When processed water fails to meet the required levels of turbidity or the pressure drop across the filters is too great, the filter trains need to be backwashed to remove the trapped suspended solids and flocculants. This process requires the treatment plant to stop producing water. Potable water that is already in the distribution system is fed back through the filters at a rate of 300 gpm. Each filter is back flushed for 15

minutes (4500 gallons) with the backwash water routed to a 20,000 gallon backwash holding tank. After the backwash, raw water is then processed until it meets the 0.3 NTU requirement. This process water is also discharged to the backwash holding tank. The backwashing of all three filter trains produces between 15,000 and 18,000 gallons of backwash water. This water is allowed to settle and is then decanted off the top of the tank. The decanted water is then re-introduced into the raw water filter process or appropriately land applied. Alternatively, the decanted backwash water may be disposed of on the surface and allowed to infiltrate. The surface disposal is not allowed to cause erosion or runoff from the disposal area which prohibits surface disposal during the wet season when the ground is saturated. The backwash tank can be discharged at maximum rate of approximately 10 gpm. At this rate, the disposal of the backwash water requires between 25 and 30 hours of water plant operation.

With the treatment plant operating for 16 hours per day it would require approximately two days of operations to dispose of the backwash water between filter backwash processes.

Another factor to consider with the backwash process is the accumulation of sediments, or sludge, in the backwash tank. Periodically the sediment needs to be removed from the backwash tank, which is completed by washing down with a hose and pumping the solids to a truck and hauling off for drying.

7. Maximum Production Rate Estimate

In determining the current maximum water treatment plant production rate, the factors presented and discussed in Section 6 need to be considered. Based upon the eight pumping rate tests the limiting factors are daily pumping times and the turbidity of the processed water.

The City currently produces enough water to meet the daily demand for existing customers. The demand fluctuates from day to day and is typically higher in the summer and fall months. The staff at the treatment plant adjust water production to meet the demand by lengthening or shortening the time when the pumps are running. Staff have found that the overall treatment process operates most effectively when operated at the lowest flow rate that meets the overall system demand. Therefore, the operators pump at the lowest rate possible and adjust the pumping time to meet the demand. They typically will produce water for the longest period possible that allows time for backwashing the filters and infiltration gallery in creek bed. The required time for backwashing the filters and the infiltration gallery varies with the raw water quality, and more time is required when the turbidity in the raw water is higher (i.e. during the winter storms). When the turbidity in the creek is higher the operators need to backwash more frequently. Based on operational experience, City staff have found that the plant can produce water for approximately up to 18 hours per day November through April, up to 20 hours per day May through June, and up to 22 hours per day July through October.

The turbidity is the primary limiting factor and it is associated with the required time to perform filter train backwashes and then process the backwash water. The results of Test #4, at a pumping rate of 105 gpm, and when the turbidity of the raw water was the highest, allowed for over 30 hours of pumping (which occurred over 3 consecutive days of operation) between filter train backwashes. At this rate there is adequate capacity to process and dispose of backwash water during the normal process runs.

With a pumping rate of 105 gpm and the pumping hours as specified above the maximum daily water production is: 113,400 gallons per day November through April, 126,000 gallons per day May through June, and 138,600 gallons per day July through October.

The average daily production between 2013 and 2018 is estimated at 68,600 gallons per day. However, it is important to consider that this is averaged for the whole year and water demand varies through the year. The highest average water demand by month is 85,300 gallons per day and occurs in August. A summary of production by month is presented in Figure 5.

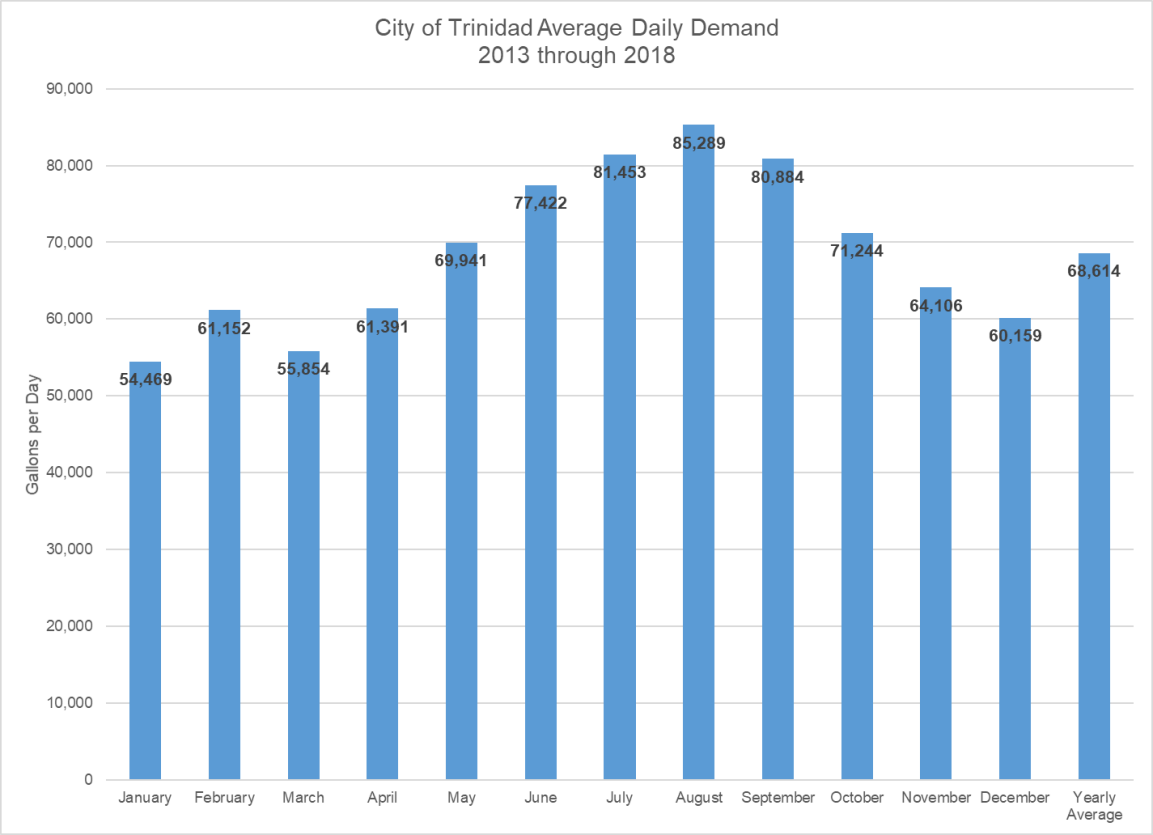


Figure 5. Average Daily Water Production 2013 through 2018.

The surplus water supply may be estimated by subtracting average daily water production from the maximum daily water production rate. The surplus water amount will vary by month based upon the expected demand and daily pumping run time. A summary of the theoretical water production surplus by month is shown in Figure 6. The smallest surplus daily production was estimated to be 48,578 gallons per day and occurred in June. The largest surplus daily production was estimated to be 67,356 gallons per day and occurred in October.

8

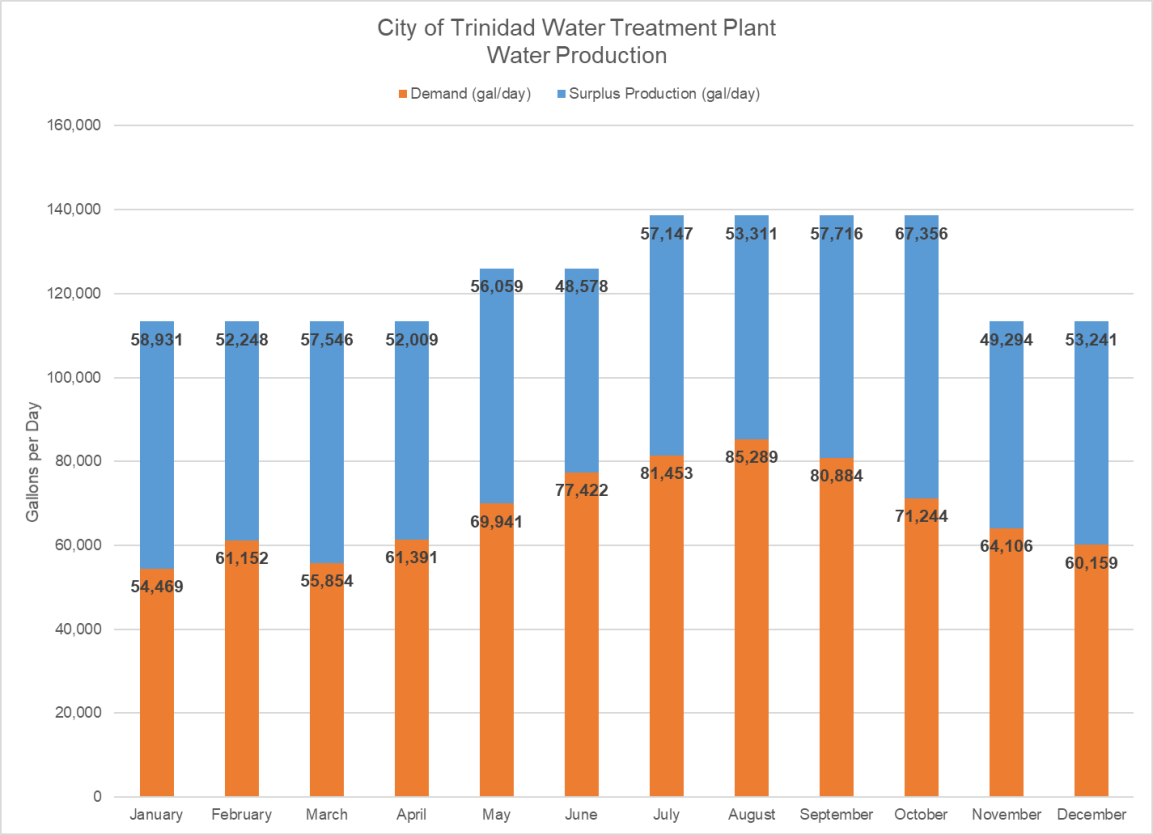


Figure 6. Theoretical Daily Production Surplus by Month.

It is important to keep in mind that these projected surplus capacities are approximate averages over typical months. Actual available surplus on any given day will depend on the actual characteristics at the time. The other factors evaluated (water right allocation, pump theoretical maximum rates, bypass flow rates, chlorine contact time, additive requirements, and pressure drop across the filter trains) do not appear to be limiting factors to water production rates.

8. Conclusions

The Trinidad Water Treatment Plant and treatment process was evaluated under multiple production rates to identify factors limiting production and to determine the theoretical effective maximum water production capacity of Trinidad's drinking water production facility under current conditions. Of all the factors evaluated, turbidity breakthrough in the filters (and associated filter backwash) and decreases in the wetwell water elevations were limiting factors. Turbidity breakthrough on the filters stops the production of water and necessitates the backwashing of the filters. This condition is most noticible during the winter storm period when the turbidity of the raw water from the creek is higher. Faster pumping rates cause the filter trains to foul quicker and shorten the runtimes of the filters before they need to be backwashed. The flow rate of 105

gpm allowed for sufficient runtime on the filter trains and allowed enough time between backwash cycles to process and discard the backwash water.

When turbid water from the creek is drawn into the creek bed the suspended sediments clog the void spaces between the gravels and causes a restriction to subsurface flow. The restriction of creek water migrating through the creek bed gravels and subsequently flowing into the wetwell leads to the lower water levels in the wetwell. This condition is exacerbated during the higher pumping rates. Restrictions on the flow into the wetwell is exacerbated by higher raw water turbidity from the creek, especially during storm events.

With a treatment plant production rate of 105 gpm and a maximum daily production run time that varied from 18 to 22 hours per day the daily maximum treatment plant production is between 48,578 and 67,356 gallons per day. This is much less than the City's annual allocation of water under the two appropriative permits of 337 acre-feet per year (just under 110 million gallons per year). Based upon a demand and production analysis, there is a theoretical surplus of up to approximately 48,000 gallons per day of supply to meet future service requests. How many and what type of service request can be accommodated will depend on how many and what type of requests there are as well as long term raw water supply characteristics, City water facilities characteristics, and operational practices.

It should be noted that current water demand are met with the existing water treatment plant staff and facilities. Increasing the pumping rates and total amounts of water produced will certainly require additional efforts in treatment plant staff time, pumping electrical costs, maintenance costs, monitoring costs, and chemical costs. While the increased water production rates are possible the increased costs associated with the increase should be considered. These impacts were not evaluated in this analysis.

The current City water system includes two water tanks. These tanks provide storage that allow the plant to be operated with minimal staffing and does not require multiple daily or night shifts to meet the daily demand. In the event of a break down at the plant or a break in a water line, there is typically capacity in the tanks to meet the existing daily demand while the problem is resolved. The existing surplus capacity may then be used to "catch up" and refill the storage tanks. This ability to handle emergency situations is decreased when the surplus supply is allocated to other customers and may make recovery difficult or limit service until the problem is resolved.

Future supply allocations should also consider the need for firefighting demand. The existing water tanks and supply lines currently serve the City's fire demand needs. It is not known if the existing system meets today's standards for fire protection flows. Any future supply allocations should include an analysis of storage and pipe system capacity to meet the fire demands of the new allocation.

Increased supply and demand through the existing system may impact the disinfection process of the water supply system. While the chlorine contact basin will certainly meet the chlorine contact time requirements, this evaluation did not consider the potential impacts on the chlorine residual or chlorine byproducts throughout the entire water delivery system. The operation of the water delivery system is very dynamic and City staff quite artfully operate the system to ensure a safe chlorine residual throughout the delivery system while minimizing the formation of chlorine byproducts. Any changes to the production, storage, and delivery of new water services should include an evaluation of the delivery and storage system with regards to disinfection and disinfection byproducts.

9. Recommendations

During the process of performing the pumping tests and evaluating the results there were a couple of performance items that should be evaluated.

The fluctuations in the wetwell water levels does not appear to be consistent with our understanding of how water enters the wetwell. This may indicate that subsurface conditions in the creek may vary with stream flow or the water level transducer or volume calculation are not functioning as expected. Erroneous reading from the wetwell level can cause the treatment plant to shut down prematurely. It is recommended that an evaluation of the wetwell water level transducer and volume calculation be verified.

It is also recommended that the flocculator be evaluated. In discussions with City staff it is clear that the flocculator does reduce sediment in the raw water as designed but it is not clear that it is functioning as indicated in the manufacturer's equipment specifications. Therefore an evaluation of how the flocculator is functioning should be performed to see if there are any modifications that could be made to increase its performance. Increased performance from the flocculator should decrease the turbidity of the raw water entering the filter trains. Less sediment entering the filters will allow longer runtimes between filter backwash cycles. Making changes to increase the performance of the flocculator could decrease operation costs and may increase production rates.

The findings and operational issues presented in this memorandum should be discussed and confirmed with the operators and engineers. This analysis and recommendations were limited to considering the theoretical effective maximum water production capacity of Trinidad's drinking water production facility under current conditions. This memo does not address policy issues related to providing additional connections or obligating the City to provide additional water. This analysis did not consider or address potential water storage needs, distribution network needs, nor any risk analysis of different system components. It is recommended that the City evaluate their policy for considering additional service requests. Additional evaluations are needed before making obligations for additional water supply to meet future service requests.

CHAPTER III

DEVELOPMENT OPTIONS & PREFERENCES

…

WATER SERVICE

The City withdraws all municipal water entirely from Luffenholtz Creek. A large trunk line, located along Westhaven Drive, carries the water into the City. All development in the City is connected to the system. Because some of the residences along Westhaven Drive had inadequate wells, the City allowed them to connect to the system.

Prior to improvements in 1987, the Trinidad water system had a storage capacity of 150,000 gallons in a single storage tank. Average monthly raw water production in 1985 was 2,279,000 gallons, with higher demands in the summer months and lower demands during the winter. The total City population in 1985 was 430. At that time, the water system served 268 connections; 176 were within the city limits and 92 were outside the City.

Following system improvements in 1987 under the California Safe Drinking Water Bond Law Program of 1984, the City water system was upgraded in terms of pumping, treatment and storage capacities. With the addition of a second storage tank, storage capacity is currently 300,000 gallons. Production capacity at the pumping station is 150,000 gallons per day, averaged. Maximum "peak period" capacity is 288,000 gallons per day or 200 gallons per minute.

Capacity of the City water system to adequately serve the existing and projected needs of the community has historically been a concern of the City. With the improved system, the City now has the ability to adequately serve existing users.

The California Safe Drinking Water Bond Law Program provided funding for bringing local water systems into compliance with state waterworks standards, but did not provide funding for future capacity. Consequently, the system is designed to adequately service the City, with only a slight capacity margin.

The relationship between the number of new services that can be connected and the

capacity of the system is complex and can only be evaluated relative to specific hookup requests. Any proposals for significant increase in water usage should be viewed with caution.

An additional limitation of the system is the available quantity of water from Luffenholtz Creek. Available water is less than total stream flow due to water rights issues, downstream users and environmental considerations. The 1980 Citizen's Committee found that the theoretical capacity of the Creek is approximately 650 service connections. The Committee recommended that the City allow no more than 400-450 service connections without performing specific watershed studies to verify additional capacity.

Water quality of the finished water within the system is currently tested on a regular basis by the City staff, including tests for coliform and turbidity. Results of water testing indicate that City water is in full compliance for bacteriological standards and marginally acceptable for turbidity.

The water system was also substantially upgraded in 1976. However, portions of the system existing before that time are still in use, well beyond their useful life. This points up a problem for the City of Trinidad - the upkeep and timely replacement of water system components. The value of Trinidad's water system is so great that, on an annual replacement system, the annual cost is greater than the City's financial capability.

To begin to resolve this problem, the City must 1) efficiently manage the system; 2) provide efficient operation and maintenance; and 3) have a well-conceived annual repair-replacement program.

Repair and replacement will contribute to water conservation now hampered by leakages from the system. Water conservation can be further promoted by educating users in water conservation practices.

Service Options

Among the options for the City in providing water services to the community are the following: 1) the City could choose to limit the number of new water service

connections; 2) not limit the number of new water connections; or 3) selectively allow new connections based on specified guidelines.

For any service option, the City should consider: how and where the development is to occur; the physical operation of the water system and ultimate capacity of the watershed; the effect of the City's Sphere of Influence; and whether prospective users are within the city limits or outside the limits.

Service Preference

The City chooses to allow connections on a selective basis with preference given first to users within city limits. The City desires to maintain and upgrade its water system as necessary to provide domestic water and fire flows for routine as well as peak demands. Major expansions of trunk lines should be carefully reviewed.

Recommended Policies

22. The City should promote an active, on-going water conservation program to help keep user charges as low as possible. The City conservation program should extend to upgrading outdated portions of the system to eliminate leakage.

23. The City shall continue to monitor water consumption. In addition, the City should pursue a program to monitor water quality and quantity both within the City system and in Luffenholtz Creek. The City shall implement well-defined, quality programs of operation and maintenance.

23a. Users within city limits should be given preference for service connections.

23b. The City shall plan on regular maintenance and occasional upgrading of the water system, as feasible. The City shall develop a program to periodically upgrade existing distribution lines to current standards. To keep the City up to date on the condition of the water system, need for improvements and level of uses, an annual water report shall be prepared and presented to the City Council.

24. In the event of a proposal to expand the City water system, prospective customers shall provide by agreement with the City the necessary funds in whole or in part

to defer the cost of system improvements. This policy shall be implemented by provisions of the City Water Ordinance.

24a. The City should monitor land use activities and development projects within the Luffenholtz Creek watershed and oppose those activities and projects which may have adverse impacts on creek water quality. The City should develop and maintain an on-going and open relationship with landowners within the watershed.

25. The area of the east and southeast of the City on either side of the freeway, where some properties are already connected to the system, should be included in the City service area to allow for additional connections as the system allows consistent with policies 23a and 27a.

25a. The City should, from time to time, revise its Sphere of Influence to be consistent with the City's water service connections.

In North Trinidad, the unincorporated area north of the City, several commercial developments, visitor accommodations, and residences could benefit from connecting to the City water system. Visitor accommodations have not been able to meet the growing demand because of limited water supplies. If the water system is expanded and a trunk line extended to the north, this development constraint would be altered or removed.

Many residential property owners in North Trinidad recognize that insufficient water supply has preserved the low density rural residential character of the area and they prefer it that way. They see the extension of the City water service into the area as an action that would trigger commercial and residential expansion and destroy the rural character of the area.

There is also concern that additional water would overburden septic tanks and increase ground and surface water pollution. Proposals to form a water district to pay for a water service extension have been defeated by a sizeable majority on several occasions.

<u>Service Options</u>

If the water system is expanded, the City could: 1) allow the extension of a major truck line into the North Trinidad area; 2) not allow any extension of water service into North Trinidad; or 3) allow a limited extension.

Service Preference

The continuation, modernization and expansion of visitor services are important to the economy of the area. The City supports the preference of the residents of North Trinidad that the area west of Patrick's Point Drive north of Anderson Lane remain rural residential in character. Therefore, if water service is extended into North Trinidad it should be confined to: (1) the visitor service area east of Patrick's Point Drive; (2) the CAL FIRE Trinidad Fire Station located at 923 Patrick's Point Drive; and (3) the commercial area on the west side of Patrick's Point Drive south of Anderson Lane.

Recommended Policies

26. The existing commercial area on the west side of Patrick's Point Drive south of Anderson Lane and the area on the east side of Patrick's Point Drive south of the Division of Forestry property should be included in the City service limits to allow for future consideration of water service, consistent with policies 23a and 27a.

26a. Water service should not be provided within the North Trinidad service area until the City system has sufficient capacity to serve all existing and planned development within the city limits consistent with Policy 23a. The size of the trunk line into the North Trinidad service area should only be large enough to serve the projected needs of development in the North Trinidad service area.

26b. Water service may be extended to the CAL FIRE Trinidad Fire Station located at 923 Patrick's Point Drive if the service line extension (i) is sized so as not to exceed provision of the minimum amount of water needed to serve the fire station for domestic water use; (ii) will not remove capacity necessary to serve future development within the City; (iii) will not impair fire protection services in the City; (iv) is designed and conditioned in such a way that it will not service additional parcels/be growth inducing; and (v) is found to be in conformance with the resource protection policies of this plan.

The City must also consider the conditions under which is will provide water service to areas outside the City. Section 30254 of the Coastal Act states in part that where existing or planned public works facilities can accommodate only a limited amount of new development, services to coastal dependent land use, essential public services and basic industries vital to the economic health of the region, state, or nation, public recreation, commercial recreation, and visitor-serving land uses shall not be precluded by other development.

Most cities require that those wishing to connect to City services annex their property. Annexation of residential areas increases property tax revenue and State subventions (such as gas taxes). Annexation of commercial establishments, in addition to high property tax revenue, also entitles the City to a share of the State sales tax revenues generated by the annexed businesses.

The City has allowed the connection of about ninety residences outside the City along the main trunk line. These customers are charged a higher rate than in-city customers. In very low density residential areas the extra revenue from water service is approximately equivalent to the net City revenue that would be realized if the property were annexed and the City provided police protection, street maintenance and other services. Therefore, annexation in this situation is not of net revenue benefit to the City.

As residential density and the value of housing increases, and particularly when commercial enterprises are included, annexation could be of net revenue benefit to the City.

Service Options

If the water system is expanded the City could: 1) change the existing policy and require that all property to be provided water service be annexed to the City; or 2) allow water service without annexation in low density residential areas but require annexation where water service is desired for commercial property and residential subdivisions that will represent a net benefit to the City; or 3) provide service to adjacent areas without requiring annexation.

Service Preference

Making annexation a prerequisite could limit interest in connecting to the City water system since the level of services provided by the City is, except for water, essentially the same as those available from the County as less cost. If the water system is expanded, the policy 27 should be used to determine whether annexation should be a prerequisite to water service.

Recommended Policies

27. Applications for water service for property outside the City should be reviewed to determine whether annexation would be advantageous to the City. If there is reasonable doubt as to the economic advantages, the hookup should be allowed without annexation so that the City can benefit from the extra water revenue, provided that there is substantial compliance with all other policies in this plan and with the City Water Ordinance.

27a. Water service extensions shall not remove water system capacity needed to serve Coastal Act priority uses within the North Trinidad Service Area described in policy 26.

OWTS. Encourage Humboldt County to participate to the maximum extent possible, though projects within the City boundaries are the first priority. Project goals include determining what areas and which onsite wastewater treatment systems are contributing the most pollution and offering financial incentives or other assistance to help landowners fix problems. Consider the feasibility and desirability of forming a Septic Maintenance District with the County that encompasses the area from Trinidad to Moonstone. (LU-9.6.1)

CIRC-11.3 Ensure that development in the City does not exceed the treatment capacity of the soils and does not contribute to ground or surface water pollution.

5. Water Service

The City of Trinidad operates a municipal water supply system that services the occupied parcels within the City and a number of properties outside City limits. Potable water for the City system is currently supplied from Luffenholtz Creek. The water system includes an infiltration gallery, water treatment plant and several storage tanks. The City also has some unused water rights on Mill Creek.

The Trinidad water system is now serving near its maximum number of metered connections at 323 (as of 2011) both inside and outside of City limits, including Trinidad Rancheria. The flow rate and quality of water is highly dependent on the weather. In the winter the water can be difficult to treat at times due to the high turbidity; the current filtration treatment system cannot meet the water quality requirements and occasionally shuts down, resulting in a significant drop in the storage tank levels. Several water treatment issues, including, bacterial contamination, water turbidity and chlorine contact time are important issues that the City needs to address in the near future.

To address current water system needs, the City's engineering firm completed a comprehensive water supply feasibility report in 2003 ("City of Trinidad Proposition 204 Water Supply Feasibility Study" by Winzler and Kelly – September 2003). The City continues to monitor and upgrade the water plant as feasible. Some current characteristics of the City's water plant are as follows:

- There is a limited available water supply based on the flow in Luffenholtz Creek
- Constant monitoring and adjustment of the current filtration system requires the oversight of an operator at all times (little automation.)
- The treatment plant is not able to treat all water at all times due to turbidity. The plant is shut down when treatment requirements cannot be met and storage reserves may not be enough to handle additional hookups or emergency services.
- The treatment system is currently limited by pump capacity. While there are 3 pumps each with a capacity of 120 gpm, only two are meant to be run at a time and the efficiency with two pumps running is less than one plus one. So the maximum capacity is 200 gpm with 2 pumps running.

- The filtration unit is limited to an over-all flow rate of 175 gpm based on state regulations.

The City is currently working on developing plans and obtaining funding to improve the existing water system to address the concerns noted above, particularly because turbidity standards have increased. The City has received a grant to add new turbidity meters and other monitoring equipment along with system controls to meet these new turbidity requirements along with cryptosporidium standards. Other planned improvements will include additional storage, which will provide water for fire suppression in the summer and allow additional settling time in the winter which will decrease the turbidity.

Demand for water is expected to increase due to new development in the Trinidad area in the upcoming years; hence, a plan needs to be developed for this increase in demand. There are several water supply concerns:

- If they have riparian water rights, many property owners in the area outside the City use coastal streams as a water source. However, California Department of Fish and Game is already concerned about shortages in Mill Creek and Luffenholtz.
- Expanding the current water supply at Luffenholtz Creek may be an option, though the watershed is located entirely outside of City limits. The City needs to coordinate with the County to ensure the creek is protected from development.
- In several areas, groundwater supply is highly variable. Wells in the area do not produce enough volume of water to meet the demand. Other concerns include contamination of wells from failed septic systems and use of pesticides and other chemicals.
- Additional water use in the Planning Area may overburden soil capacity septic tanks and increase ground and surface water pollution.
- The Trinidad Rancheria has proposed development plans for a substantial project; they anticipate using the Luffenholtz water supply.

The lack of water has acted as a development constraint along with the use of septic systems. The City previously lost a large amount of its water, approximately 40%, through leaks or unmetered users. A large leak was recently found along the main line in Scenic Drive, which gives the City somewhat more leeway for future water service.

In the past, the City had the ability to hook-up users outside the City along the main water lines, with 101 properties being served outside City limits. However, more recent Local Agency Formation Commission (LAFCO) regulations, the agency in charge of boundary changes, prohibit expansion of services outside jurisdictional lines without requiring annexation. Exceptions may be made in the case of polluted wells or other emergency situations, and/or if the property owner is adjacent to the City and agrees to annexation. Additionally, because Luffenholtz Creek is near capacity, the City must retain water for additional connections and future uses inside the City

Goal CIRC-12: Ensure that the City's water system, supply, and demand are managed for sustainability and the health and needs of users.

Water Service Policies

CIRC-12.1 Periodically assess the capacity of Luffenholtz Creek to provide domestic water; include variables such as existing and potential riparian rights, groundwater wells, proposed developments, and impacts to water supply due to climactic change. (LU-8.1)

Program CIRC-12.1.1: Prepare an annual water report to be presented to the City Council to keep the City up to date on the condition of the water system, need for improvements, level of use and capacity of the system.

CIRC-12.2 Upgrade the City's water plant to improve efficiency, water quality and storage capacity as funding becomes available. (LU-8.2)

Program CIRC-12.2.1: Develop a program for periodically upgrading existing distribution lines, including fire hydrants to current standards. Top priorities are repairing leaking lines and improving storage capacity at the treatment plant and installing meters at currently unmetered public or other buildings.

CIRC-12.3 Promote an effective water conservation program to minimize water consumption. Extend the City's conservation program to properties outside the City that are hooked up to the City's water system. Encourage the County and/or Watershed Council to provide water education. Encourage the County to implement a similar program in the Trinidad-Westhaven area. (CONS-4.1)

Program CIRC-12.3.1: Pursue implementation of a progressive water rate structure to encourage water conservation. Periodically review and amend the water rate structure to ensure that it promotes water conservation. (CONS-1d.1.1)

Program CIRC-12.3.2: Adopt a water efficiency landscape ordinance in accordance with AB 1881 and Department of Water Resources (DWR) requirements. (CONS-1d.1.2)

Program CIRC-12.3.3: Promote the use of rainwater collection and greywater systems. Encourage the County to update their regulations to improve opportunities for greywater reuse (CIRC-11.3)

CIRC-12.4 If capacity and / or storage is adequate, study the feasibility of forming a Water District that includes the area to the east and southeast of the City on either side of the freeway, where some properties are already connected to the system, to allow for additional connections outside the City, as the system allows. Eventual annexation should be considered. An 'annexation agreement' (agreeing not to object to future annexation) with the City is a minimum requirement for providing any new connections

outside of City limits. Areas to the north of the City should be part of such a district if services are to be provided there in the future. (LU-8.2)

CIRC-12.5 The existing commercial area on the west side of Patrick's Point Drive south of Anderson Lane and the area on the east side of Patrick's Point Drive north to the CalFire (CDF) station, should be included in the City service area / water district to allow for future consideration of water service. Annexation, or an annexation agreement, is a requirement for water service expansion, unless it is already part of a services district. (LU-8.3)

CIRC-12.6 Depending on service capacity, the City's Sphere of Influence should be defined to include the City's water service connections, as well as all properties adjacent to the City's trunk line and those properties that are not zoned for timber production within the Luffenholtz and Mill Creek watersheds (refer to Fig. 4). The watersheds are to be included to provide directions and oversight on land use decisions that affect the City's Water Supply, including OWTS management. (LU-7.1)

CIRC-12.7 Consider expanding City services to areas outside City limits only if it can be done without significantly increasing the costs to residents within City limits, or if it is a public health emergency; annexation is a prerequisite for any service expansions. (LU-7.2)

> *Program CIRC-12.7.1:* In the event of a proposal to expand the City water system, prospective customers shall provide the necessary funds in whole or in part to defer the cost of system improvements through an agreement with the City. This policy shall be implemented by provisions of the City Water System Service Ordinance.

CIRC-12.8 Do not allow connection to Humboldt Bay Municipal Water District unless there is a compelling public necessity and only when enforceable measures are included to assure that the general small-town community characteristic of the service area around the City does not adversely change.

CIRC-12.9 Assess the effects of proposed development, such as the Trinidad Rancheria plans and subdivisions, on the reduction flow in Luffenholtz Creek. Address negative impacts or threats to the City's water supply as soon as possible. (LU-9.2.4)

CIRC-12.10 Monitor land use activities and development projects within the Luffenholtz Creek watershed and oppose those activities and projects that may have adverse impacts on creek water quality and quantity (LU-9.2.3).