AGENCY:	**City Council**
MEETING DATE:	**August 14, 2017**
DEPARTMENT:	**CDD/Public Works**
PRESENTED BY:	**M Jones/T Varga**
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AGENDA ITEM SUMMARY

TITLE:
RECEIVE REPORT AND PROVIDE DIRECTION REGARDING A REQUEST FOR PROPOSALS FOR PROFESSIONAL SERVICES FOR PREPARATION OF A DESALINATION PLANT FEASIBILITY STUDY

ISSUE:
The City's recent experience with a prolonged drought (from 2013 through 2016) raised questions about the City's ability to serve existing and future customers and what steps the City can and should take to develop new water supply and storage resources. Additionally, the City will soon undertake a process to consider rezoning over 300 acres of industrial land on the former Georgia-Pacific Mill Site to allow for a mix of open space, residential and commercial uses. This rezoning process has the potential to increase water demand by up to 20 percent over the next 30 years.

ANALYSIS:

Current Water Supply & Storage. The City currently has sufficient water supply and storage to meet demand during most years and under most conditions. The challenge for the City is that all of the City's water comes from surface diversions, which are listed in the table below.

Table 1: City of Fort Bragg Water Appropriations

Water Supply Source	Permit or License ID	Water Appropriations	Estimated Reliable Diversion Capacity
1. Noyo River	P11383	1,500 AF (488.777 MG)	3.0 cfs
2. Newman Gulch	S009340	300 AF (97.755 MG)	0.5 cfs
3. Waterfall Gulch	012171	475 AF (154.779 MG)	0.668 cfs
Total	n/a	2,275 AF (741.312 MG)	4.168 cfs

In 2016, the City constructed a 14.6 million gallon water storage facility on Summers Lane, which increased the City's total water storage to 18 million gallons. During the fall of 2015 drought conditions, the City needed to replace 200,000 to 300,000 gallons per day when salt water intrusion took the Noyo River source temporarily off-line during double high tides. Had the Summers Lane Reservoir been at full capacity, it would have provided approximately 48 to 72 days of additional water. If used continuously, this represents at least seven weeks of water. If this water was only used during double high tide episodes lasting seven to ten days per month, at least five months of additional water would have been available. Thus, the Summers Lane Reservoir would

have been sufficient to meet the City's current water supply and storage challenges given the 2015 drought conditions.

However, the City's water supply and storage options continue to be in flux.

Future Water Storage and Supply Issues. Over the long term, a number of factors may further constrain the City's water supply and storage options or increase water demand, including:

1. Future development on the Mill Site may increase water demand by up to an additional 200,000 gallons per day. The desalination feasibility study should evaluate a facility that is appropriately sized to serve this potential future need.
2. Climate change may result in a long-term changes to the quality and quantity of our annual rainfall. On the northern California coast, climate change is anticipated to increase winter temperatures by a projected 3 degrees and summer temperatures by a projected 4.5 degrees by 2050.[1] Climate models provide uncertainty about the impact of climate change in California on rainfall patterns. One climate model predicts an overall 7 degree temperature rise by century's end. Under this scenario, the state's climate would become significantly drier.[2] However another model predicts a 2 degree temperature increase, which would not have a noticeable impact on precipitation patterns. There is little information about the specific impacts of climate change on future precipitation patterns for the northern California coast. However, in general, rising temperatures increase the rate at which plants pull water from the soil in the summer to keep cool, which reduces waters that would otherwise flow into creeks and streams.[3]
3. Climate change may result in sea level rise of up to 2.5 feet by 2050[4], which could lead to more salt water intrusion into the City's water collector on the Noyo River during periods of high tide and low river water flow. The City is currently unable to process brackish water, so this would further constrain the City's ability to use water from its Noyo diversion during high tide and low flow conditions. This issue should be further analyzed by the consultant.
4. Regulatory changes may further reduce our diversion rates or pumping periods on one or more of our current surface water sources. This issue should be further analyzed by the consultant.

In order to identify a long-term solution to the City's water supply issues, the City is seeking to explore the feasibility of a small scale desalination plant. The Request for Proposals (RFP) would enable the City to obtain the services of a professional consultant with the necessary expertise to complete a Feasibility Study for a desalination plant in Fort Bragg.

Desalination Focus. Desalination, a process that extracts minerals from saline or brackish water, is generally more costly than fresh water from rivers or groundwater, water recycling and water conservation. Reverse Osmosis (RO): RO is now the fasted growing segment of the desalination market. About 50% of the newly installed seawater desalination capacity is based on reverse osmosis technology. The remarkable growth in this technology is due

[1] June 2015: *California Climate Science Data for Water Resources Management, California Department of Water Resources*; page 13.
[2] November 2, 2011: *Scientific American*, "Climate Change May Transform California's Bay Area." Ann Mulkuren.
[3] August 2016: *What Climate Change means for California*, EPA.
[4] June 2015: *California Climate Science Data for Water Resources Management*, California Department of Water Resources; page 8.

to the lower energy consumption, lower specific investment cost, shorter plant construction time and easy capacity extension of membrane systems compared with distillation systems. The Feasibility Study may find RO as the most likley technique for success in Fort Bragg as RO systems are scalable and relatively less expensive to build and operate than other systems. The basis of any RO system is a semi-permeable membrane that allows the water that is being purified to pass through it, while rejecting a high percentage of unwanted constituents (salts). A typical RO desalination plant includes the following processes:

1. Pretreatment: 1) chlorination; 2) coagulation; 3) deep media filtration; 4) treatment with antiscalant solution; and 5) fine filtration.
2. The reverse osmosis process.
3. An energy recovery process.
4. Post-treatment and/or polishing steps to condition the water and make it suitable for domestic consumption.
5. Brine disposal through discharge via a dedicated brine outfall pipe or other shared outfall to dilute the brine.

Costs and Feasibility. Factors that determine the costs for desalination include capacity, location, feed water, labor, energy, financing, and concentrate disposal. Desalination plants are most efficient when they are built big and located near a cheap source of power, thereby reaping economies of scale. The installed cost of desalination plants is approximately $1 million to $2 million for every 100,000 gallons per day of installed capacity. Costs are higher for smaller plants. The City would likely require a plant that could produce 200,000 to 500,000 gallons of water per day to meet current and future needs.

The operating cost for desalinated water is roughly estimated to be $700 per day per 100,000 gallons. This consists of energy costs which are estimated at about $400 per day and other operational costs (chemicals, maintenance, etc.) for another $300 per day per 100,000 gallons. Assuming the desalination of 200,000 gallons per day of brackish water with a plant operating at 50% to 100% of capacity, the daily operational cost for desalination plant might be around $1,400 per day.

Environmental and Regulatory. Desalination processes produce large quantities of brine, possibly at above ambient temperature, and contain residues of pretreatment and cleaning chemicals, their reaction byproducts and heavy metals due to corrosion. To limit the environmental impact of returning the brine to the ocean, it can be diluted with another stream of water entering the ocean, such as the outfall of the Waste Water Treatment Facility (WWTF). Permitting of proposed desalination facilities up and down the California coast has been an enormous challenge. Identifying the steps, timeframes and costs would be an important part of the Feasibility Study.

Summary of Request for Proposals (RFPs). In addition to issues noted above, the consultant will be required to consider a number of other facets of desalination. The source water will likely be brackish, but for context, ocean water will also be examined. Both intakes and discharge points can be in surface water or subsurface and all combinations will be analyzed. There is a large variety of desalination technologies, and a summary of

what is available will be required. Osmotic technologies, especially reverse osmosis, have been the most successful to date. The various types of osmotic water treatment will be carefully evaluated. A conceptual level desalination facility design will be developed. The potential for co-location near the WWTF will be analyzed. The conceptual plan will include considerations for an energy source, an appropriate plant location, connection(s) to existing water/wastewater infrastructure and economic factors.

PROPOSED ACTION:

Provide Direction Regarding a Request for Proposals for Professional Services for Preparation of a Desalination Plant Feasibility Study.

Staff recommends that the Council direct that the RFP be distributed to qualified consultants and, once proposals are received and evaluated, that a recommendation be brought forward for a professional services agreement for a Desalination Feasibility Study.

ALTERNATIVE ACTION(S):

1. Table the RFP for now.

FISCAL IMPACT:

This Desalination Feasibility Study would be funded from the Water Enterprise and has been included in the FY 2017/18 Adopted Budget.

IMPLEMENTATION/TIMEFRAMES:

If the RFP is circulated immediately, a consultant could be selected by the end of October and a final Desalination Feasibility Study would be completed in 2018.

ATTACHMENTS:

1. RFP & Scope of Work.

NOTIFICATION:

None.