Supplemental Supply Option: Desalination
DEEP WATER DESAL PROJECT

SOQUEL CREEK WATER DISTRICT

CONCEPT:

The Deep Water Desalination (DWD) Project would consist of a Desalination Facility at the Moss Landing Area and co-located with a data center. The project includes constructing a new intake and a new outfall pipeline sized to meet the full desalination facility capacity 25,000 AFY (22.3 MGD). Potable water would be delivered to the District's potable water distribution system via a new treated water pipeline extending north of Moss Landing.

WHERE ARE WE NOW?

The District has been considering this option since 2013. On May 19, 2015 the District Board of Directors approved entering into a MOI with Deep Water Desal. The MOI is a binding agreement that expresses the District's interest in potentially purchasing 1,500 acre-feet per year (afy) of desalinated water from the Deep Water Desal Project. The MOI does not obligate the District to make a financial commitment at this time.

Participants: Deep Water Desal LLC is private company that is seeking to form a Joint Powers Authority (JPA) to co-own the desalination project in Moss Landing. Monterey County requires that any desalination plant be owned by a public agencies. Current participants who have shown interest in this project include: **Deep Water Desal, Castroville Community Services District, City of Salinas, California Water Service, and Soquel Creek Water District.**

Challenges

- Relies on regional and JPA participation
- Cost savings are dependent on the Deep Water Desal Center
- "Take of Pay" will lock the District in to purchasing water for at least 20 years

Advantages

- Energy savings from co-location
- Cost savings from co-location and project size
- Reliable supply

The proposed Deep Water desalination project would be located on a 110-acre site in Moss Landing that would include a facility capable of producing 25,000 acre feet of desalinated water annually co-located with a 150-megawatt data center campus.

Tank Farm Parcel Layout

Potential Pipeline Alignments

A 12-inch diameter pipeline would need to be built from the Moss Landing Deep Water Desal facility to the District's southern distribution system in La Selva Beach. Two possible pipeline routes are shown (see left) that range from 14 to 15 miles.

Estimated Yield, Availability, and Reliability

Yield: Contractually purchase 1,500 afy of desalinated water

Availability: "Take or Pay" obligation requires District to agree to purchase 1,500 afy for 20 years, whether the water is taken or not.

Reliability: This is a drought-proof supply and is anticipated to be available year-round.

Estimated Conceptual Costs:

District's Share of DWD Desalination Facility:	$14.5 M
Conveyance and Connection to Existing Potable Water System:	$33 M
Annual Operations and Maintenance (O&M) Cost:	$2.3 M
Unit Cost of Water:	**$2,600 to $3,100/af**

Supplemental Supply Option: Desalination
DEEP WATER DESAL PROJECT

What is it? The District would enter into a Joint Powers Agreement (JPA) with Deep Water Desal Project to co-own the proposed desalination project in Moss Landing, CA and pay for 1,500 acre-feet per water from a facility that could produce upwards of 10,000-25,000 acre-feet per year (AFY) desalinated water and be co-located with a 150 megawatt data center.

WHAT DO WE KNOW ABOUT IT?

Water Supply Availability and Quality:

Yield: the potential yield is to contractually purchase 1,500 afy of desalinated water

Availability: ocean water could be available throughout the year in dry and wet years. This project is a "take or pay" arrangement the expected life of the plant, meaning that the District agrees to purchase 1,500 afy for at least 20 years whether they take the water or not. If the agreement is 30 years, and we estimate that 1,500 afy for 20 years will meet our needs, this could leave the District purchasing an additional 15,000 af above our need for basin recovery.

Treatment and Complexity: treatment would produce potable water suitable to meet drinking water standards using a somewhat complex system (including ocean intake, reverse osmosis treatment, and brine discharge) and a conveyance system to bring water from Moss Landing to the District's service area.

Supply Impact, Reliability, and Flexibility

Timeliness and impact: According to DWD, they estimate to have water delivered by 2017; however the project schedule includes several factors (i.e. development process for the data server components, securing partners and buyers of the project, etc.) that could impact the timeline.

Reliability of supply over the long-term: considered to be reliable as ocean water would be accessible and the treatment process is a proven technology. The District would be required to enter into a joint powers authority (JPA) agreement that would result in the District being a "co-owner" of the desalination plant. A major reliability concern is that the JPA would not own the intake or outfall in order to lower capital costs.

Flexibility for expansion and/or adaption to climate change: considered to be flexible as the proposed plant size is between 10,000-25,000 afy. The District may be able to purchase additional shares of the plant if it isn't completely allocated by contracts. Also, climate change would likely not be an unfavorable factor in terms of affecting yield, availability, or reliability of the source water (ocean).

Environmental Permitting Considerations:

Environmental issue and anticipated support by regulatory agencies: Per the DWD company, they have initiated the environmental review process and have been conducting environmental studies to feed-into their review process. A key feature that DWD has pointed out on this project is that the intake would be below the photic zone where water has lower turbidity and less marine life. DWD also plans to make this a low-carbon project. It is unknown at this time how the regulatory agencies would support a coastal data server using ocean water as once-through cooling.

Potential environmental benefits: project would provide the ability to produce water that allows for groundwater protection by reducing the amount of groundwater extracted by the District and allowing the basin to recover via in-lieu recharge.

Complexity and/or effort for the permitting process: considered to be a somewhat complex permitting process due to the various components for the desalination project and the data servers.

Legal and Implementation Considerations:

Ability of the District to obtain water rights or regulatory approval: this project does not require obtaining surface water rights. Legal issues could arise after the environmental review or permitting process which could add time to resolve and impact the schedule to bringing a project on-line. There would be legal and contractual issues to handle with formation of the JPA.

Complexity of property and right-of way acquisitions for facilities and pipelines: considered to be somewhat complex as property and right-of-way would be needed for the conveyance system (pump stations, 14-15 miles of pipelines, etc.)

Dependency on partners or other agencies: DWD's plan is to own the intake and brine outfall components with the desal plant to be municipally owned under the JPA which will meet the Monterey County requirement that any desal plant must be owned by a public agency. Thus, there could be several partners collaborating on this project. DWD recently held a meeting to seek interest for the JPA creation.

Potential for technical innovation/implementation: this project has numerous technical innovations with respect to the desal components such as the intake and discharge design. Also, renewable energy and greener technology is also being considered.

Customer/Stakeholder Acceptability and Benefit:

Anticipated support by District customers: District customers seem to be in favor of desalination as a supplemental water supply based on the 2014 and 2015 survey. Public outreach and input would still be important related to the project's acceptance as well as component locations and GHG reduction projects (should the District want this project to be net-carbon neutral like the scwd2 project).

Potential to provide a higher level of public safety during disasters: considered to have the added value during a disaster since the water produced is potable for drinking and components would be built to meet earthquake building code standards. There could be some level of threat and reliability of the 14+ miles of pipeline in a natural disaster.

Potential to provide benefits to other local groundwater users or the broader community: considered to provide added value to other basin users because the project would help recover the basin as an in-lieu recharge project since the District would be reducing its groundwater pumping. Because of the "take or pay" requirement, water would be available for wholesaling to other agencies if no longer needed for basin recovery.

Financial and Funding Considerations:

Potential for cost-sharing or grant funding: Developed under a JPA with other partners, this project does have cost-sharing available (assuming other municipalities join the JPA). Grant funding and low-interest loans may also be available. The make-up of the JPA could have impacts on the funding costs for this project since lending will be based on the partners combined credit ratings.

Ability of the District to solely finance: As a JPA project, the District does not have to solely finance. The District's anticipated buy-in cost of the desal project and conveyance is approximately $47.5M which is less than the Mid-County Desalination project and comparable to other back-up options evaluated in this memo. Depending if the District creates a portfolio of projects and programs to meet its long term needs, the District may be able to finance this and other programs.

WHERE ARE WE NOW? The District has been considering the 'DeepWater Desal' Desalination Project in Moss Landing as a potential option for supplemental water supply to meet our groundwater shortage problem since 2013. On May 19, 2015 the District Board of Directors approved entering into a MOI with Deep Water Desal.

The MOI is a binding agreement that expresses the District's interest in potentially purchasing 1,500 acre-foot per year (afy) of desalinated water from the Deep Water Desal Project. This project is still in the planning phase and is scheduled to begin the environmental review this summer. The MOI does not obligate the District to move forward or commit financially at this time.

Cost:

Capital Cost: Estimated to be $47.5 M

Operations and Maintenance (O&M) Cost: ~ $2.3 M

Unit Cost of Water: Estimated to be $2,600—$3,100/af

Schedule:

According to Deep Water Desal reps, it is anticipated to come on-line in late 2017.

Soquel Creek Water District is a not-for-profit local government agency that provides water resource management to deliver a safe and reliable supply of high-quality water to meet present and future needs in an environmentally sensitive and economically responsible way.

Supplemental Supply Option: Recycled Water
MID-COUNTY GROUNDWATER REPLENISHMENT PROJECT

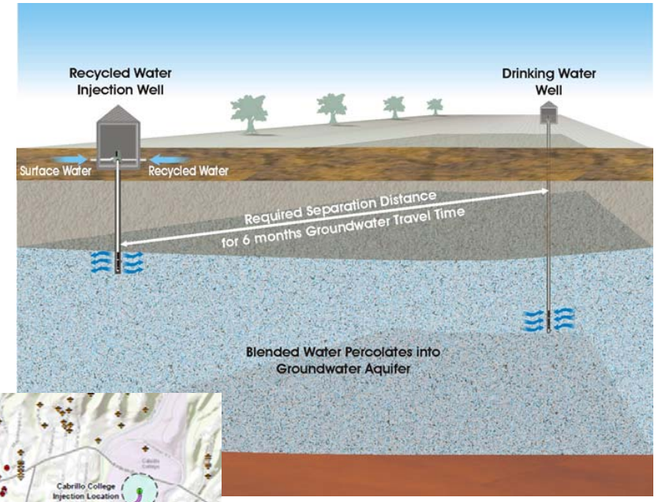
SOQUEL CREEK WATER DISTRICT

CONCEPT:

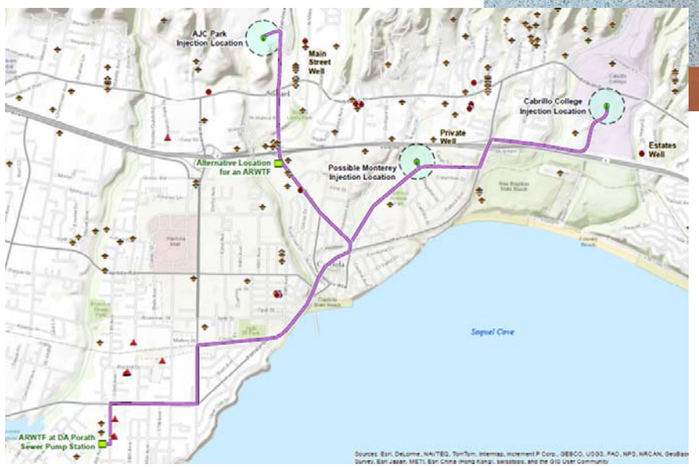
A small advanced recycled water treatment facility would take municipal wastewater from the Santa Cruz County sewer collection system and purify it to produce up to 1.3 million gallons per day (~1,500 acre-feet per year) and then pump to groundwater injection wells to recharge the aquifer, restore water levels, and protect against seawater intrusion.

New regulations passed in 2014 make this option more viable for the District and many agencies throughout California are evaluating similar projects.

This proposed project would take highly purified recycled water and inject it into the groundwater basin to replenish the overdrafted aquifers. New State Regulations permit 2 to 6 month separation distance between neighboring wells.



WHERE ARE WE NOW? The District will kick-off the feasibility study for groundwater replenishment using recycled water in June 2015. The District was recently awarded a $75,000 grant by the State Water Resources Control Board that will support this yearlong study that will address the optimal treatment processes to meet local, state, and federal drinking water standards.



The proposed recycled water facility would be located at the Porath Sewer Pump Station or near Bay Avenue and Highway 1.
The purified recycled water would then be distributed to the injection wells. Three potential injection well locations will be looked at further in the feasibility study.

Participants:

Soquel Creek Water District is working with the County of Santa Cruz Sanitation District on evaluating this project.

Challenges
- Hydro-geologic testing to confirm recharge rates for injection wells
- Public perception on water quality

Advantages
- Reliable supply
- Treatment produces purified water that has better water quality than traditional groundwater and surface water treatment.
- Lower cost than other two supply options: purchasing imported river water or Deep Water Desal Project

Estimated Yield, Availability, and Reliability

Yield: Up to 1,500 afy of purified recycled water

Availability: Year-round

Reliability: This is a drought-proof supply and is anticipated to be available year-round.

Estimated Conceptual Costs:

Capital Cost:	$14.5 M
Annual Operations and Maintenance (O&M) Cost:	$ 1.2 M
Unit Cost of Water:	**$2,700/af**

Supplemental Supply Option: Recycled Water
MID-COUNTY GROUNDWATER REPLENISHMENT PROJECT

SOQUEL CREEK WATER DISTRICT

What is it? The District would develop an advanced water purification facility and injection well system to replenish the overdrafted groundwater basin with an average of 1,500 acre feet per year (afy) of recycled water.

WHAT DO WE KNOW ABOUT IT?

Water Supply Availability and Quality:

Yield: the potential yield is estimated to be ~ 1,120 to 1,500 afy.

Availability: County of Santa Cruz staff has confirmed that there is sufficient wastewater available at (at least) three potential sewer pump stations to divert (or scalp), treat, and produce at least 1 million gallons per day (1,120 afy) of advanced-treated recycled water. This volume is expected to be available year-round.

Treatment and Complexity: process is fairly complex with advanced treatment of wastewater would require screening, biological treatment, membrane filtration, ozone, RO treatment and advanced oxidation with UV light to meet CA Department of Public Health requirements for groundwater injection.

Supply Impact, Reliability, and Flexibility

Timeliness and impact: project could require at least ~2-4 years to be further evaluated and ~2-4 years to be constructed, depending on permitting, financing, etc.

Reliability of supply over the long-term: considered to be reliable as wastewater would be accessible and the treatment process is a proven technology.

Flexibility for expansion and/or adaption to climate change: considered to be flexible, treatment components such as additional RO skids or UV treatment could be added should the plant be expanded and the site footprint is large enough. Also, climate change would likely not be an unfavorable factor in terms of affecting yield, availability, or reliability of the source water (wastewater); however, water conservation does have an impact since it typically reduces the wastewater generated.

Environmental Permitting Considerations:

Environmental issue and anticipated support by regulatory agencies: its anticipated that a full EIR would need to be developed to address the environmental impacts.

Potential environmental benefits: project would provide groundwater protection by replenishment via injection wells. This would also reduce the amount of wastewater needed to be treated at the City's wastewater treatment plant and discharged into the ocean.

Complexity and/or effort for the permitting process: considered to be a somewhat complex permitting and environmental review process. Kennedy/Jenks and HydroMetrics have conceptually evaluated the potential groundwater recharge locations to meet state requirements. A minimum of two-months travel time separation is required between an advance-treated recycled water injection well and a potable well and initial distance has been determined to be approximately 500 feet to achieve a 6-month to one year travel time separation. A test well(s) should be installed to further evaluate.

Legal and Implementation Considerations:

Ability of the District to obtain water rights or regulatory approval: this project does not require obtaining surface water rights but it does require agreements with the County of Santa Cruz for source water (wastewater). Regulatory and environmental approvals seem straightforward for the treatment process with more scrutiny expected for the injection wells in terms of well interference, injection retention time requirements, and long-term monitoring.

Complexity of property and right-of way acquisitions for facilities and pipelines: A parallel pipe system would be required to convey recycled water since, unlike desalination or surface water which are considered potable water, it cannot be co-mingled in the same distribution pipelines. Another issue that would need to be further evaluated with a test injection well is the proximity of private wells or other District wells near potential injection wells to ensure that the underground residence time requirements could be met. Conceptual separation distance has been calculated by HydroMetrics and K/J to be approx. 500 feet.

Dependency on partners or other agencies: this project is dependent on agreements with the County of Santa Cruz as a willing partner that would allow diversion of wastewater to the recycled water treatment facility. Agreements would also need to be made at the locations of the groundwater injection points.

Potential for technical innovation/implementation: the regulations for recycled water are advancing towards potable reuse sometime in the near future (~5 years) which provides for the potential ease in implementation and other uses for recycled water.

Customer/Stakeholder Acceptability and Benefit:

Anticipated support by District customers: District customers, in the 2015 survey, were as favorable to recycled water as desalination and the survey illustrateed that with education about what recycled water is – the more supportive they became. Should a recycled water project be pursued, public outreach and input will be very important related to people's understanding of what recycled water is, the project's benefits, and GHG reduction projects (should the District want this project to be net-carbon neutral like the **scwd²** project).

Potential to provide a higher level of public safety during disasters: considered to have the a lesser value during a disaster since the water produced is not approved by the CADPH as potable should drinking water for health and safety be needed.

Potential to provide benefits to other local groundwater users or the broader community: considered to provide added value to other basin users since the project would replenish and recover the basin by direct injection into the groundwater basin.

Financial and Funding Considerations:

Potential for cost-sharing or grant funding: Project could be financed by the District alone, through the Basin Implementation Group, or through collected replenishment fees from other basin users. The District and the City of SC jointly went into the apply for a SWRCB grant to conduct a feasibility study that, if awarded, could look more closely at this option or other recycled water options.

Ability of the District to solely finance: This project is comparable to the District's portion ($56M) of the shared **scwd²** regional desalination project with the City of SC and one of the less expensive projects contained in this memo when compared to the other back-up options. It is also much less expensive than the initial recycled water options looked at in February 2014. Depending if the District creates a portfolio of projects and programs to meet its long term needs, the District may be able to finance this and other options.

WHERE ARE WE NOW? The District will kick-off the feasibility study for groundwater replenishment using recycled water in June 2015. This type of project, with an estimated yield of 1,120 -1,500 afy, involves purifying wastewater and injecting it back into the groundwater basin to restore water levels and protect against seawater intrusion. New regulations passed in 2014 make this option more viable for the District and many agencies throughout California are evaluating similar projects. The District was recently awarded a $75,000 grant by the State Water Resources Control Board that will support this yearlong study that will address the optimal treatment processes to meet local, state, and federal drinking water standards.

Cost:

Capital Cost: Estimated to be $56 M

Operations and Maintenance (O&M) Cost: Estimated to be $1.2M

Unit Cost of Water: Estimated to be $2,700af

Schedule: Based on the evaluation that still needs to be conducted, it is estimated the earliest the project could be operational is 2022.

Soquel Creek Water District is a not-for-profit local government agency that provides water resource management to deliver a safe and reliable supply of high-quality water to meet present and future needs in an environmentally sensitive and economically responsible way.

Supplemental Supply Option: Import Water
RIVER WATER TRANSFER from CITY OF SANTA CRUZ

SOQUEL CREEK WATER DISTRICT

CONCEPT:

The District would take excess treated river water from the City of Santa Cruz in the wintertime which would allow the District to reduce its groundwater pumping. Excess wintertime river water is not guaranteed every year (drought conditions, fishflow requirements, turbidity of the water, water rights, and other conditions will impact availability). There are three options currently being considered: (1) purchase "Pre-1914" water, (2) develop river water transfer using existing infrastructure, (3) develop river water transfer with infrastructure upgrades.

WHERE ARE WE NOW? The District is currently exploring the option of purchasing "Pre-1914" excess winter water from the City of Santa Cruz if favorable conditions exist, such as: City customers not being under drought-related water restrictions, enough water in rivers and streams for fish, the Loch Lomond reservoir being full, and excess water is available to sell. The amount of excess river water available to the District is limited (estimated to be between 0 -300 afy) and would not be guaranteed every year. The District will soon begin discussing purchase conditions and pricing with the City.

At this time, the District is not looking into a short or long term water transfer as that would require acquisition of water rights.

Participants:

Soquel Creek Water District and City of Santa Cruz

Challenges

- Available water to purchase or transfer (based on conditions listed above being met)
- Not available year-round; only in the wintertime.
- Need to acquire water rights (for the two transfer options)
- Can be costly on a unit cost per water basis

Advantages

- "Pre-1914" water doesn't have the limitations with water rights for the purchase option

Option 1: Purchase "Pre-1914" Excess Winter Water

Currently, Option #1 is being considered by the District.

Estimated Yield, Availability, and Reliability

Yield: 0—300 acre feet per year (afy)
Availability: Wintertime, not year-round (City and weather restrictions apply)
Reliability: This is not a drought-proof supply and not guaranteed every year.

Estimated Conceptual Costs:

Unit Cost to Purchase Water (per City) :	**$2,700/af**

Option 2: Water Transfer with Existing Infrastructure

Estimated Yield, Availability, and Reliability

Yield: 0—445 acre feet per year (afy)
Availability: Wintertime, not year-round (City and weather restrictions apply)
Reliability: This is not a drought-proof supply and not guaranteed every year.

Estimated Conceptual Costs:

Capital Cost:	$5.8 M
Annual Operations and Maintenance (O&M) Cost:	$ 0.1 M
Unit Cost of Water:	**$1,020/af**

Option 3: Water Transfer with Infrastructure Upgrades

Estimated Yield, Availability, and Reliability

Yield: 0—1,500 acre feet per year (afy)
Availability: Wintertime, not year-round (City and weather restrictions apply)
Reliability: This is not a drought-proof supply and not guaranteed every year.

Estimated Conceptual Costs:

Capital Cost:	$90 M
Annual Operations and Maintenance (O&M) Cost:	$0.7 M
Unit Cost of Water:	**$3,580/af**

Supplemental Supply Option: Import Water
RIVER WATER TRANSFER from CITY OF SANTA CRUZ

SOQUEL CREEK WATER DISTRICT

What is it? The District would take excess treated river water from the City of Santa Cruz in the wintertime which would allow the District to reduce its groundwater pumping. Excess wintertime river water is not guaranteed every year (drought conditions, fishflow requirements, turbidity of the water, water rights, and other conditions will impact availability). There are three options currently being considered: (1) purchase "Pre-1914" water, (2) develop river water transfer using existing infrastructure, (3) develop river water transfer with infrastructure upgrades.

WHAT DO WE KNOW ABOUT IT?

Water Supply Availability and Quality:

Yield: Depending on the option and the different conditions, the yield could between 100-1,500 acre feet per year (afy)

Availability: Excess water is not likely every year and also would typically only be in the wintertime. T City of Santa Cruz has stipulated that "Pre-1914" water (not as strict as after 1914 water rights) would also have a set of criteria that would need to be met.

Treatment and Complexity: treatment would produce potable water suitable to meet drinking water standards using a common, existing surface water treatment system at Graham Hill.

Supply Impact, Reliability, and Flexibility

Timeliness and impact: Depending on the option, a purchase agreement could occur rather quickly, pending resolution if a Full EIR was necessary. An actual transfer of water (not purchase) will be dependent on acquiring water rights.

Reliability of supply over the long-term: considered to be less reliable as excess winter water for the District may not always be available due to weather conditions and turbidity levels.

Flexibility for expansion and/or adaption to climate change: If just a purchase, there is not much flexibility. If a transfer, there is flexibility depending on if the water is available or if upgrades are necessary at Graham Hill Treatment Plant. Climate change would likely be a factor in terms of affecting yield, availability, or reliability of the excess winter water in San Lorenzo River.

Environmental Permitting Considerations:

Environmental issue and anticipated support by regulatory agencies: Its anticipated that a full EIR would need to be developed to address the environmental impacts for all three options.

Potential environmental benefits: project would provide some groundwater protection by reducing the amount of groundwater extracted and providing aid to the basin's recovery via in-lieu recharge.

Complexity and/or effort for the permitting process: A purchase of water shouldn't be too complex. For a water transfer, this could be considered to be a somewhat complex permitting and water rights process in both the short and long term.

Legal and Implementation Considerations:

Ability of the District to obtain water rights or regulatory approval: A water purchase does not require obtaining surface water rights (since it's "pre-1914" water); however, a water transfer does require water rights and regulatory approval. Permanent water rights could take years and may also trigger legal issues.

Dependency on partners or other agencies: this project is dependent on agreements with the City of Santa Cruz as a willing partner.

Customer/Stakeholder Acceptability and Benefit:

Anticipated support by District customers: District customers, in the 2014 survey, were very favorable to the idea of the District receiving excess winter water. Water quality could be an issue (winter water is turbid and septic issues in/around the San Lorenzo River. Public outreach and input would still be important related to the project's acceptance as well as GHG reduction projects (should the District want this project to be net-carbon neutral like the scwd2 project).

Financial and Funding Considerations:

Potential for cost-sharing or grant funding: not likely to have a cost-sharing potential with the City of Santa Cruz since this project doesn't necessarily provide them any benefits or incentives. Grant funding and low-interest loans may be available. A potential agreement could be discussed if water is sent back to the City during droughts.

Ability of the District to solely finance: For some options (water purchase or river transfer with existing infrastructure) the District should be able to finance; for upgrading Graham Hill Treatment Plant, this would be very expensive to do alone.

WHERE ARE WE NOW? The District is currently exploring the option of purchasing "Pre-1914" excess winter water from the City of Santa Cruz if favorable conditions exist, such as City customers are not under drought-related water restrictions, there is enough water in rivers and streams for fish, the Loch Lomond reservoir is full, and there is actually excess water to sell. The amount of excess river water available to the District is limited (estimated to be between 0 -300 afy) and would not be guaranteed every year. The District will soon begin discussing purchase conditions and pricing with the City.

At this time, the District is not looking into a short or long term water transfer as that would require acquisition of water rights.

Cost for the Purchase of Excess "Pre-1914" Winter Water

Capital Cost:	None
Operations and Maintenance (O&M) Cost:	None
Purchase Price per City of Santa Cruz:	$2,700af

Schedule: Dependent on environmental review required. Could possibly, if available, try to take winter water as early Winter 2016.

Soquel Creek Water District is a not-for-profit local government agency that provides water resource management to deliver a safe and reliable supply of high-quality water to meet present and future needs in an environmentally sensitive and economically responsible way.