Long Term Supplemental Water Supply Alternatives Report

Executive Summary

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EXECUTIVE SUMMARY

Reliable water supply is critical to the economic, social, and environmental values of Santa Barbara County (Region). With California and the Region in its fourth year of an historic drought, there is a new focus on the importance of water supply reliability and sustainability.

Reliability of water supplies is critical to the economic, social and environmental values of the Region.

The Region has a diverse water supply portfolio that calls upon deliveries from a number of sources including; local groundwater, local surface water reservoirs, imported water from the State Water Project (SWP), recycled water, and now the return of the desalinated ocean water. However, over time, the character and availability of supplies can change and shortages can result. The current drought has impacted the availability of all of these supplies for use by the Region's communities and environment. Recent State of California regulations, such as the Sustainable Groundwater Management Act (SGMA), will also have a direct impact on the ways in which supplies can be managed to meet future needs.

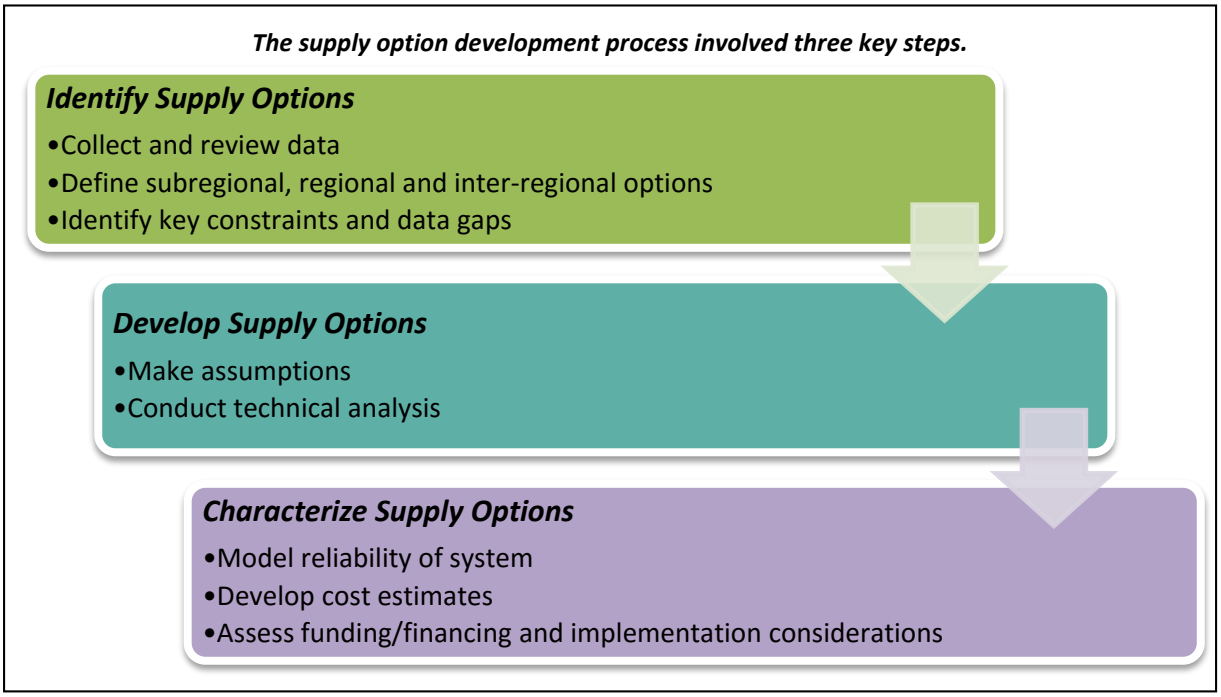
To address the potential for future shortages, emerging regulations and funding sources, the Santa Barbara County Water Agency (Agency) has completed a Long Term Supplemental Water Supply Alternatives Report (Report) focused on identifying and characterizing viable options for increasing overall water supply and water supply reliability to meet longer-term regional needs. The Report development process included input from agencies and representatives (Planning Partners) throughout the Region involved in water supply and who share a collective interest in taking meaningful steps toward enhancing water supply reliability for the Region. In addition, the public was also asked to participate in the process by identifying likely supply alternatives for consideration.

Furthermore, the completion of the Report compliments the existing Santa Barbara County Integrated Regional Water Management (IRWM) Program planning process. The State of California has enhanced access to water supply related grants for projects included in an IRWM Plan. IRWM Plan projects are supported by a collective group of stakeholders in water supply, wastewater management, flood control, habitat and recreation fields who work cooperatively to develop and implement integrated water resource management strategies on a regional level.

Option Development

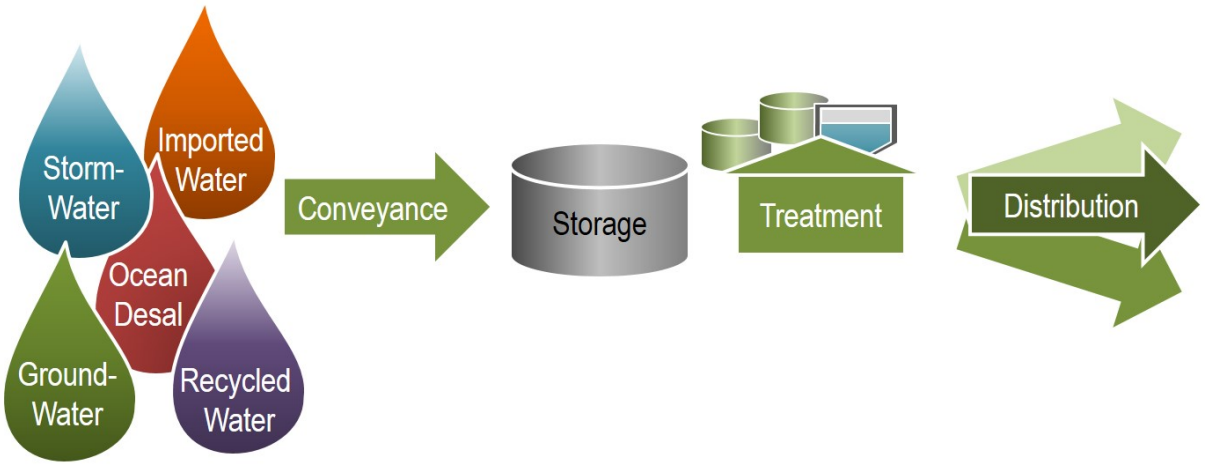
The intent of the Report was to examine a comprehensive list of water supply opportunities to meet Regional needs and highlight those options that show the greatest potential to generate larger, more cost-effective supplies. While the Report focused on supply options, it is understood that increasing future water supply reliability for municipal, agricultural and environmental demands also requires a companion understanding of water use efficiency strategies that can best leverage existing and future supplies.

The Report identified and examined nearly 120 options to develop incremental water supplies for use within the Region. Relevant options were identified through County staff, Planning Partners, and public input. Options were also identified from previous studies such as countywide and local supply analysis reports, recycled water studies, urban water management plans, groundwater studies, imported water delivery and reliability reports, and general water supply studies.



Each of the options in the Report is categorized by the source of supply and includes the major conveyance, treatment, storage and distribution facilities required to serve a targeted end use. For each option, an estimate of supply volumes, associated costs and implementation considerations were developed.

To focus the Region on which options to consider further from a regional perspective, thresholds on volumes of supply potential and unit costs were used. The recommended options are those that can potentially provide a supply of greater than 2,000 acre feet per year (AFY) for less than $3,000 per acre foot ($/AFY). These thresholds were set to be generous since it is understood that the volumes and unit costs estimated for the Report would need to be refined on a project by project basis.



A complete option includes a source of supply and the components necessary to access and use that supply.

Water Supply Options Recommended for Regional Consideration

The Region has potential access to many forms of additional water supplies beyond what are currently used to meet municipal, agricultural and environmental needs. Each source of supply has unique characteristics that impact the reliability of that supply. No one source of supply could or should be used to meet the Region's needs as there are benefits and challenges inherent in all forms of supplies. In addition to these supply sources, the Region should address additional water use efficiency strategies to best leverage existing as well as the future supplies. The water supply options are categorized by source and include:

- Stormwater Capture
- Recycled Water – Direct Reuse and Indirect Reuse
- Desalinated Ocean Water
- Imported Water
- Groundwater

Stormwater Capture

There are fourteen stormwater capture options that could provide between 2,100 and 56,000 AFY of additional supply, with per acre-foot costs ranging from less than $100/AF to $2,800/AF.

These projects entail capturing rainfall runoff that currently flows over land and into storm drains, streams and rivers to the ocean. These supplies are highly variable as they are not available during dry years; and represent the additional peak supplies generated during storm events that are not already allocated and used prior to flowing into to the ocean. Although many of the rivers within the Region are well managed, there are additional stormwater flows that reach the ocean during peak storm events that could be captured and used to meet regional demands with the implementation of specialized projects.

Stormwater Capture Supply Options to Consider Further

Option	Supply (AFY)[1]	Unit Cost ($/AF)	Implementation Timeframe
Reservoir Dam Modifications			
Twitchell Operational Modifications: Modify operations at Twitchell Reservoir to allow for higher volumes of water to be captured before they must be released for flood control	0 - 58,000[2] (Average 7,600[3])	$12	<5 years
Cachuma Dam Modifications (Dam Raise): Increase the capacity of Lake Cachuma by raising the height of the dam	0 - 197,000[2] (Average 34,500[3])	$1,000	>10 years
Cachuma Dam Modifications (Flashboard Increase): Increase the capacity of Lake Cachuma by installing flashboards at the dam.	0 - 9,300[2] (Average 3,700[3])	$20	<5 years
New Reservoir			
Round Corral Reservoir: Construct a new reservoir in the upstream reaches of the Sisquoc River	6,700	$2,100	>10 years
Salsipuedes Creek Reservoir: Construct a new reservoir on Salsipuedes Creek (in the Santa Ynez watershed southeast of Lompoc)	2,850	$2,000	>10 years
Groundwater Recharge			
Sisquoc River Diversions to Spreading Basins: Divert unused water from the Sisquoc River to spreading basins to recharge the Santa Maria groundwater basin	2,500	$2,800	<5 years
Sisquoc River Diversions for Ag Spreading: Divert unused water from the Sisquoc River to recharge the Santa Maria groundwater basin by overwatering agricultural fields	2,500	$2,600	<5 years
Carpinteria Creek Diversions to Ag: Divert unused water from Carpinteria Creek to recharge the Carpinteria groundwater basin by overwatering agricultural fields	3,000	$200	<5 years
Santa Ynez Diversions to Spreading Basins: Divert unused water from the Santa Ynez River (specifically, spills from Lake Cachuma) to spreading basins to recharge the Santa Ynez Uplands groundwater basin	2,500	$2,800	<5 years
Santa Ynez Diversions to Ag Spreading: Divert unused water from Carpinteria Creek to recharge the Santa Ynez Uplands groundwater basin by overwatering agricultural fields	2,500	$2,600	<5 years
Cuyama River Diversions for Spreading Basins: Divert unused water from the Santa Ynez River (specifically, spills from Lake Cachuma) to spreading basins to recharge the Santa Ynez Uplands groundwater basin	4,400	$600	<5 years
Cuyama River Diversions for Ag Spreading: Divert unused water from Carpinteria Creek to recharge the Carpinteria groundwater basin by overwatering agricultural fields	4,400	$60	<5 years

1. Supply yields do not represent firm supply.
2. Supply range represents a minimum dry year (0 AFY) and potential maximum wet year.
3. Average annual increased supply is estimated using past reservoir spill records to calculate the frequency of spill events over a 10-year rolling average and the average stormwater supply available for capture for each option, up to the capacity of each facility.

Stormwater supplies can be relatively inexpensive since they are essentially free at the source. However, the ability to capture, convey and treat the peak supplies is challenging and often requires the construction of large-capacity facilities to capture the large volumes of flow that occur only about one to three times in ten years. Additional flows derived from runoff in more urban areas would require extensive networks of decentralized on-site facilities dependent upon extensive and consistent community participation to generate meaningful yields on a regional scale.

Given that many of the Region's rivers are home to sensitive species, the need to balance environmental and human needs will be a consideration in refining specific project sites and yields to access this supply. In addition, while there are regional opportunities for stormwater capture, the ultimate implementation of any stormwater capture project is highly variable at the local level given the availability of stormwater, geology / soils in the area, and environmental constraints. Therefore, any specific stormwater capture program will most likely fall to an individual purveyor.

Recycled Water

There are 15 recycled water options that could provide between 2,900 and 7,600 AFY of additional supply, with per acre-foot costs ranging from $300/AF to $2,200/AF.

Recycled water is wastewater that has been treated at a wastewater treatment plant (WWTP) to a quality where it can be used as a water supply served to meet demand. The Region currently uses recycled water in a number of locations for non-potable reuse (NPR) demands such as irrigation, industrial/commercial air conditioning and processes, flushing toilets and urinals, or dust control, among other uses. There are, however, WWTP flows that remain unused and are discharged as effluent to local creeks, rivers, and the ocean. These additional flows could be treated and used for further NPR, recharged into groundwater basins and recovered through indirect potable reuse (IPR) and/or treated to drinking water standards and served as direct potable reuse (DPR) supply.

Also included under recycled water supply is graywater, which is wastewater generated from washing machines, showers and bathroom sinks that can be retained and used on-site without further treatment to meet non-potable demands. It should be noted that if supplies are used on site as graywater, they no longer reach local sewer systems nor contribute to WWTP flows.

Recycled water is widely considered to be a highly reliable source of supply. Though some seasonal variability may occur, there is very little annual variability of recycled water supply as it is generally a function of indoor water usage within a service area and not as sensitive to outdoor water use reductions in drought years.

Recycled Water Supply Options to Consider Further

Option	Supply (AFY)	Unit Cost ($/AF)	Implementation Timeframe
Non-Potable Reuse			
Laguna San NPR (M&I): Use recycled water for non-potable municipal and industrial demands in and around the Laguna Sanitation District	2,900	$300	<5 years
Laguna San NPR (Ag): Use recycled water for non-potable agricultural demands in and around the Laguna Sanitation District	5,000	$300	<5 years
Lompoc NPR (Ag): Use recycled water for non-potable agricultural demands in and around Lompoc	4,400	$1,200	<5 years

Option	Supply (AFY)	Unit Cost ($/AF)	Implementation Timeframe
Direct Potable Reuse			
Laguna San DPR: Use recycled water for direct potable use to meet municipal and industrial demands in and around the Laguna Sanitation District	4,700	$1,400	5-10 years
Lompoc DPR: Use recycled water for direct potable use to meet municipal and industrial demands in Lompoc	3,700	$1,550	5-10 years
Goleta DPR: Use recycled water for direct potable use to meet municipal and industrial demands in Goleta	6,500	$1,300	5-10 years
Santa Barbara DPR: Use recycled water for direct potable use to meet municipal and industrial demands in Santa Barbara	6,600	$1,800	5-10 years
Indirect Potable Reuse[1]			
Laguna San IPR (injection): Use injection wells to recharge the Santa Maria groundwater basin with recycled water	4,700	$1,300	<5 years
Laguna San IPR (surface): Use spreading basins to recharge the Santa Maria groundwater basin with recycled water	5,540	$700	<5 years
Lompoc IPR (injection): Use injection wells to recharge the Lompoc groundwater basin with recycled water	3,700	$1,500	<5 years
Lompoc IPR (surface): Use spreading basins to recharge the Lompoc groundwater basin with recycled water	4,400	$500	<5 years
Goleta IPR (injection): Use injection wells to recharge the Goleta groundwater basin with recycled water	6,500	$1,300	<5 years
Goleta IPR (surface): Use spreading basins to recharge the Goleta groundwater basin with recycled water	7,600	$1,400	<5 years
Santa Barbara IPR (injection): Use injection wells to recharge the Santa Barbara groundwater basin with recycled water	6,600	$1,200	<5 years
Santa Barbara IPR (surface): Use spreading basins to recharge the Santa Barbara groundwater basin with recycled water	7,500	$2,200	<5 years

1. Costs do not include additional groundwater wells or treatment.

Desalinated Ocean Water

There are five desalinated ocean water options that could provide between 2,800 and 26,000 AFY of additional supply, with per acre-foot costs ranging from $1,900/AF to $2,900/AF. Ocean desalination is the treatment of ocean water for use as potable water supply. Ocean water is conceivably an unlimited source of water, and therefore supply is only limited by a project's infrastructure capacity. Once operational, desalinated ocean water is a highly reliable supply as there is almost no variability in availability. Various implementation considerations may, however, limit the potential supply generated at a particular ocean desalination plant site.

Given the Region's valuable coastal resources, siting and permitting of an ocean desalination plant requires feasibility studies to evaluate water quality, impacts of the various brine disposal and intake options, and impacts to existing water distribution facilities.

Desalinated Ocean Water Supply Options to Consider Further

Option	Supply (AFY)	Unit Cost ($/AF)	Implementation Timeframe
Southern SLO Plant Regional Desal Supply: Construct a new ocean desalination plant in southern San Luis Obispo County to help meet regional demands	26,000	$1,900-$2,000	5-10 years
Southern SLO Plant Local Desal Supply: Construct a new ocean desalination plant in southern San Luis Obispo County to meet local demands in the Santa Maria area	6,300	$2,700-$2,800	5-10 years
San Antonio Regional Desal: Construct a new ocean desalination plant on Vandenberg AFB property and convey using the VAFB distribution system and SWP Coastal Branch.	14,400	$2,200-$2,300	5-10 years
Montecito Plant Desal: Construct a new ocean desalination plant in the Montecito area	2,800	$2,700-$2,900	5-10 years
Santa Barbara Local Plant Desal Supply: Reactivate the existing ocean desalination plant in the City of Santa Barbara	3,100	$2,400	5-10 years

Imported Water

There are nine imported water options that could provide between 3,400 and 8,000 AFY of additional supply, with per acre-foot costs ranging from an additional $400/AF to $2,800/AF.

Imported water is water supply that is delivered from outside the Region. Currently, the only imported water used in the Region is delivered through the SWP's Coastal Branch which enters the Region in the north near the City of Santa Maria, and ends at Lake Cachuma. In some years, the Coastal Branch contractors do not request full delivery of their SWP allocation; so there is potential for additional supplies to be brought into the Region by negotiating with fellow contractors or making modifications to existing infrastructure to provide additional long-term storage. In addition to SWP supplies, it is possible to use SWP conveyance facilities to wheel other supplies from within and outside of California.

Imported water is moderately reliable. While it is susceptible to precipitation variability, the larger scale of supply and storage potential, as well as the ability for transfers and exchanges, improves the overall supply reliability. Even if the source supply is reliable, the longer the conveyance to the area of use, the greater the overall supply risk and implementation considerations.

Imported Water Supply Options to Consider Further

Option	Supply (AFY)	Unit Cost ($/AF)	Implementation Timeframe
Direct Use			
SB Undelivered SWP for Direct Use: Use SWP imported water, which Santa Barbara County is entitled to and that typically goes undelivered, for direct use	7,500	$1,700	<5 years
SLO Undelivered SWP: Purchase SWP imported water that typically goes unused by San Luis Obispo County to for direct use	3,400	$650	<5 years

Option	Supply (AFY)	Unit Cost ($/AF)	Implementation Timeframe
SB Suspended Table A: Access Table A imported water allocations contracted to the Santa Barbara County Flood Control District, but never used, or paid for, since the beginning of the contract	8,000	$600	<5 years
SWP Article 21: Purchase carry-over water available through the SWP Article 21 that provides for the sale of available surplus water	5,000	$400	<5 years
Undelivered CA Imports, Short-Term Agreement: Lease water rights from elsewhere in California on a short-term basis, and wheel the water through the SWP system	6,300	$1,800	<5 years
Undelivered CA Imports, High Cost Long-Term Agreement: Lease water rights from elsewhere in California on a long-term basis, and wheel the water through the SWP system	6,300	$1,600	<5 years
Undelivered CA Imports, Low Cost Long-Term Agreement: Lease water rights from elsewhere in California on a long-term basis, and wheel the water through the SWP system	6,300	$1,000	<5 years
Groundwater Recharge			
SB Undelivered SWP for Spreading Basins: Recharge undelivered imported water from the State Water Project using spreading basins	6,300	$2,800	<5 years
SB Undelivered SWP for Injection Wells: Recharge undelivered imported water from the State Water Project using injection wells	6,300	$1,900	<5 years

Groundwater

There are two groundwater options that could provide between 9,800 and 12,000 AFY of additional supply, with per acre-foot costs ranging from $900/AF to $1,400/AF.

Groundwater is water that is held underground in pores in the gravel/sand or crevices in rock. Groundwater basins are filled or "recharged" when surface water filters through the soil down to an aquifer, where it is stored. While there are some areas in the Region that have unused groundwater available to pump, typically increasing groundwater production will require additional engineered recharge groundwater facilities and supplies. Since this water is not recharged naturally, these types of options are listed as "Groundwater Recharge" options characterized by their source of supply such as stormwater, recycled water or imported water

Groundwater has a moderate level of reliability due to a groundwater basins' abilities to store large volumes of water. However, since groundwater supply is dependent upon the recharge of local surface water/stormwater, it can also be diminished after periods of sustained drought.

Groundwater Supply Options to Consider Further

Option	Supply (AFY)	Unit Cost ($/AF)	Implementation Timeframe
Santa Ynez Uplands Basin Chrom-6 Treatment	9,800	$900	<5 years
Santa Maria Basin TDS Treatment	12,000	$1,400	<5 years

Water Supply Options not Identified for Regional Consideration

It is evident that the Region has numerous supply options available, each with its own unique benefits and considerations. Some of the main options that were considered but did not fall within the thresholds and therefore did not make the list of featured options are briefly discussed here.

- **Large scale reservoir dredging:** Large scale reservoir dredging for Lake Cachuma and Gibraltar Reservoir is incredibly expensive given the cost of physically removing the sediment. Flushing of sediment may be more cost effective, but considered infeasible.
- **New in-stream and off stream reservoirs/storage:** New in-stream and off-stream reservoirs/storage options, though feasible, fell outside of the unit cost threshold due to the high cost of land and extensive excavation needed.
- **Decentralized stormwater capture, graywater use and some NPR**: These options produce relatively low volumes of water relative to the cost of facilities needed. These options do, however, provide valuable community, water quality and potentially flood control benefits that may make them desirable for implementation on a local level.
- **Out-of-state imported water:** Importing water from outside of California will require significant infrastructure as well as permitting and regulatory requirements that vary from state to state. The acquisition of out-of-state supplies is only cost-effective if very large quantities are imported so that capital costs can be shared among a number of project partners. There would also be significant reliability challenges given the distance from source to end use. These options would require involvement of multiple State and Federal government agencies to coordinate and help pay for these options. Also, out-of-state water may require state to state compacts for delivery of water between states.

Types of Water Supply Options by Subregion

Given the nearly 120 water supply options explored in the Report, it's helpful to consider them in a subregional context. The following matrix provides a correlation between the types of supply options by subregion, to the potential for regional consideration. This matrix shows black circles for those subregions where it is recommended that certain options are considered on a regional level. The white circles indicate options not recommended for regional consideration, with an understanding that some could be useful, however, if considered on a more local level.

As seen in the matrix, the Santa Maria and Santa Ynez subregions (which are comprised of the Santa Maria River and Santa Ynez River watersheds, respectively) have the greatest opportunity for implementation of numerous types of supplies, including stormwater/surface water capture, recycled water use, imported water use, ocean water desalination and groundwater cleanup. The San Antonio Subregion (which is comprised of the San Antonio River watershed) has greater potential for imported water use and regional ocean water desalination options over others. The South Coast Subregion (comprised of the watersheds bordering the County's south coast) has some opportunity for stormwater/surface water capture and recycled water use, along with a greater number of opportunities to take advantage of imported water and ocean water desalination. Finally, the Cuyama Subregion (comprised of the Cuyama River watershed) has limited recommended opportunities beyond increasing stormwater recharge in the groundwater basin.

Types of Water Supply Options by Subregion

	Santa Maria	San Antonio	Santa Ynez	Cuyama	South Coast
Stormwater/Surface Water					
Reservoir Sediment Removal	○	○	○	○	○
Dam Modifications	●	○	●	○	●
Off-Stream Storage or New Dam	●	○	●	○	○
Stormwater Recharge	●	○	●	●	●
Decentralized Stormwater Capture	○	○	○	○	○
Recycled Water					
Non-Potable Direct Use	●	○	●	○	○
Potable Direct Use	●	○	●	○	●
Indirect Potable Use	●	○	●	○	●
Graywater	○	○	○	○	○
Imported Water					
Santa Barbara Undelivered SWP Direct	●	●	●	○	●
Suspended Table A	●	●	●	○	●
San Luis Obispo Undelivered SWP	●	●	●	○	●
SWP Article 21	●	●	●	○	●
Undelivered CA Imported Water	●	●	●	○	●
Undelivered Non-CA Imported Water	○	○	○	○	○
Out of State Imported Water	○	○	○	○	○
Imported Water for Recharge	●	●	●	○	●
Ocean Water Desalination					
Local Ocean Water Desalination	●	○	○	○	●
Regional Ocean Water Desalination	●	●	●	○	●
Groundwater					
Groundwater Cleanup	●	○	●	○	○

● Options identified for regional consideration

○ No options identified for regional consideration

Opportunities for Regional Collaboration

Some of the individual supply options can either be increased in size or joined together to form larger, more cost-effective and potentially more reliable regional supply programs benefiting multiple stakeholders. Although the institutional arrangements necessary to develop these types of regional supply programs can be challenging, the significant potential benefits, including increased funding potential, may help to further implement these concepts.

- **Regional Desalination:** Given the considerable cost and permitting hurdles of bringing an ocean desalination plant on-line, implementation of a larger-scale regional ocean

desalination plant over multiple smaller-scale plants may be desirable. Larger site production would provide opportunities for transfers and exchanges with imported water facilitated by a potentially complete offset of local demands, and potentially even conveyance of desalinated water through the Coastal Branch.

- **Regional Recycled Water:** Locally produced recycled water can be used in-lieu of imported water allocations, thereby freeing up imported water for other imported water users in the Region or State. Given that use of recycled water is already occurring in the Region, a new regional project would likely expand on existing recycled water distribution systems for non-potable reuse or increase supply through recharge or direct use. Though these latter increments of recycled water may not be cost-feasible at a local scale, they could be implemented through the help of regional partnerships.
- **Regional Storage:** Regional storage options that increase surface reservoir or groundwater basin storage would increase the potential to benefit from excess imported and stormwater supplies available in wet years. Increasing Twitchell or Cachuma reservoir capacity to store more local supply (either for direct use or recharge), would increase imported water supplies available for regional transfers or exchanges. Implementing a regional conjunctive use project would allow for recharge of unused imported water supplies in wet years to be available for dry years.

Next Steps

The options and regional concepts identified for further regional consideration are in various stages of development, with some options already being implemented and others developing in concept. Continuing participation from regional stakeholders and completing more site specific, detailed planning efforts will help to further implementation of supply options and improve regional water reliability.

The Santa Barbara County IRWM Program offers a unique platform for furthering the development of the more conceptual and/or regional options. Specifically, the IRWM Program has an existing mechanism for bringing key stakeholders together from across the Region, a focus on regional planning and integrated project development, and a significant vehicle for funding project planning and implementation.

The Region may also benefit from completing demand assessments to project future water resource needs and identify potential water use efficiency options to complement the supply options developed here. Completion of a demand assessment and identification of water use efficiency options would allow the Region to facilitate a comprehensive integrated resources planning exercise whereby portfolios of supply and demand options can be evaluated to meet the Region's needs over time. Such a full scale long-range Planning exercise would also include a targeted implementation plan for use by regional stakeholders.

Finally, it's recommended that the Region track and apply for funding and financing opportunities available for implementing the various options identified here, including local partnership matching and State and Federal grant and loan programs. Based on recent programs, project options that show the use of alternative forms of supply, are regional or collaborative in nature, provide integrated and multiple benefits, increase cost effectiveness, increase local water reliance, and reduce energy consumption will be the most competitive for state and federal funding.