

MEMORANDUM

TO: Karla Nemeth
FROM: The Brattle Group
SUBJ: BDCP versus Alternative Supplies
DATE: May 21, 2014

Implementing the BDCP preserves approximately the current levels of State Water Project (SWP) deliveries to urban contractors. As shown in Chapter 9 of the BDCP, failing to implement the Plan would expose the project's customers to the risk of delivery reductions caused mainly by more restrictive environmental regulations in the Delta to protect listed species. Such regulations could reduce SWP deliveries to urban agencies by 0.5 – 0.7 million acre-feet per year.¹

Urban water demand in California is projected to grow almost 20% by the year 2050, even taking into account water agencies' efforts to reduce water demand through conservation programs.² As a result urban agencies will need to invest in the development of alternative water supplies to meet future demands, even if the BDCP is implemented. In this sense, the BDCP is not an "either/or" proposition with respect to development of alternative water supplies – both approaches are necessary to meet future water demands. However, failing to implement the BDCP and stabilize SWP deliveries at roughly their current levels would require urban agencies to build even more water supply alternatives in the future.

Southern California presents a good case study of this issue. The primary water wholesaler in this area, the Metropolitan Water District of Southern California (MWD), has conducted an extensive analysis of alternative water supplies through its Integrated Resource Planning (IRP) process. MWD has determined that the existing resource mix is not sufficient to meet growing demands and deal with future challenges such as climate change. To address this issue, MWD has developed an adaptive integrated plan of local supply investment called the Core Resource Strategy.

¹ Urban share of delivery reductions are proportional to the urban share of Table A allocations: <http://www.water.ca.gov/swpao/docs/notices/14-02.pdf>

² November 2013 Bay Delta Conservation Plan, Public Draft, Chapter 9, Appendix 9.A, Figure 9.A-8.

The Core Resource Strategy consists of four areas where MWD can pursue additional programs and activities to meet projected levels of demand.³ These resource areas are as follows:

- 1) Colorado River: Develop dry-year programs combined with the continued storage, transfers, and exchanges.
- 2) SWP: Improve reliability through mid- and long-term Delta improvements (including the implementation of BDCP).
- 3) Conservation & Water-Use Efficiency (conservation and recycling): Ensure and encourage retail-level compliance with 20x2020 water-use efficiency goals.
- 4) Local Projects (groundwater recovery and seawater desalination): Enhance options to incentivize and partner in local supply augmentation.

MWD’s Core Resource Strategy assumes that the BDCP is implemented and envisions its member agencies building an additional 482,000 acre-feet of local project water supplies in the form of recycling, conservation and groundwater recovery.⁴ If BDCP is not implemented, then water agencies in Southern California will need to go far beyond the Core Resource Strategy projects to achieve the same level of water supply reliability.

Table 1 below shows the mix of projects envisioned in the Core Resource Strategy. The projects selected for inclusion in this strategy are the ones with the lowest cost, the most advanced planning and highest likelihood of being permitted and built. Still, there is no guarantee that all these projects will ultimately be constructed. About three-quarters of the Core Resource Strategy projects involve some form of water recycling. Table 3 shows the individual projects included in the Core Resource Strategy.

Table 1. Summary of Core Resource Strategy Projects

Supply Type	AF
Conservation	27,398
Recycling	352,636
Groundwater Recovery	102,193
Seawater Desalination	0
Total	482,227

If the BDCP is not implemented and SWP deliveries to Southern California are reduced, water

³ Integrated Water Resources Plan 2010 Update, The Metropolitan Water District of Southern California, p.3-4 at the following url:

<http://www.mwdh2o.com/mwdh2o/pages/yourwater/irp/IRP2010Report.pdf>

⁴ Ibid., p.3-17.

agencies in the region will need to invest in an additional 0.3 – 0.4 million acre-feet of local supplies just to maintain target levels of water supply reliability.⁵ These additional projects are more expensive, more environmentally damaging and more speculative than the ones included in the Core Resource Strategy.

Table 2 shows the additional water supply alternatives that could be built to restore levels of water supply reliability in Southern California if the BDCP is not implemented. This list was developed by taking the projects that were not selected for inclusion in the Core Resource Strategy and choosing the ones with the lowest cost and highest likelihood of being permitted, financed and built. Compared to the preferred Core Resource Strategy projects, these additional supply alternatives tilt heavily toward seawater desalination. Specific examples of desalination projects included in this list are Huntington Beach, Camp Pendleton and South Orange County and West Basin. Table 4 shows a complete list of these projects.

Table 2. Additional Water Supply Alternative Needed if the BDCP is not Implemented

Supply Type	AF
Recycling	96,000
Groundwater Recovery	61,449
Seawater Desalination	186,000
Total	343,449

There are two major questions raised by this analysis. First, are these additional water supply alternatives feasible? That is, can we be sure that they will be permitted, financed and constructed? The short answer is no. There are significant regulatory barriers to nearly all of these desalination and recycling projects.

To take one example, consider the Huntington Beach desalination project. This project is the most advanced of any of the seawater desalination projects included in Table 2, and therefore the project with the greatest likelihood of being completed. However, it is subject to a number of regulatory challenges. In November 2013, the California Coastal Commission voted unanimously to put off a vote on Poseidon’s application to build the plant. Commission staff requested that Poseidon study the use of subsurface intakes. Shortly thereafter, Poseidon withdrew its application to the Commission. Poseidon is expected to resubmit its application in 2014, at which time the hearing process will begin again. The Huntington Beach desalination project has already been under development for 15 years.

⁵ This is the share of BDCP water deliveries allocated to the MWD urban agencies. MWD share is proportional to the Table A allocations.

The second major issue is the cost of these water supply alternatives relative to the cost of the BDCP. As presented in Chapter 8, the present value cost of the BDCP to the public water agencies is \$13.5 billion. Of this amount, roughly \$3.7 billion would be the responsibility of MWD and its member agencies. The additional water supply alternatives for Southern California listed in Table 2 would cost about \$13.9 billion to implement, or over three times the cost of the BDCP to these same agencies.⁶

Moving beyond Southern California, the other urban State Water Contractors would similarly need to invest in additional local supplies of roughly 0.2 million acre-feet to make up for SWP supplies lost if the BDCP were not implemented. This additional investment is likely to be in the range of \$6 billion assuming most of the projects came in the form of less expensive alternatives such as recycling and groundwater recovery.

Looking across all urban State Water Contractors, therefore, the additional investment needed to make up for lost SWP deliveries comes to a total of roughly \$20 billion. The proportional cost of the BDCP to these same urban contractors is \$5.4 billion.

⁶ This calculation assumes per acre-foot costs for seawater desalination of \$2,250, recycling costs of \$1,300 per acre-foot, and groundwater recovery costs of \$1,100 per acre-foot. It assumes a project completion date of 2025 (the same completion date for CM1 assumed in the BDCP) and a real interest rate of 3 percent.

Table 3. Core Resource Strategy Projects Needed to Satisfy Demand Growth

Project	Yield (AF)	Online Date	Supply Type	Review Phase
Chino Basin Desalter 2 Expansion (Phase 3)	11,760	2016	Groundwater Recovery	Full Design & Appropriated Funds
Lower Sweetwater Desalter, Phase II	5,200	2020	Groundwater Recovery	Full Design & Appropriated Funds
Tujunga Well Treatment	24,000	2014	Groundwater Recovery	Advanced Planning (EIR/EIS Certified)
SJC San Juan Desalter GRP Project Expansion	3,363	2014	Groundwater Recovery	Advanced Planning (EIR/EIS Certified)
Tustin Legacy Well # 1	2,200	2014	Groundwater Recovery	Advanced Planning (EIR/EIS Certified)
Wells 21 & 22	7,900	2014	Groundwater Recovery	Advanced Planning (EIR/EIS Certified)
Oxnard GREAT Program	15,500	2016	Groundwater Recovery	Advanced Planning (EIR/EIS Certified)
Rancho del Rey Well Desalination	500	2016	Groundwater Recovery	Advanced Planning (EIR/EIS Certified)
Middle Sweetwater River Basin Groundwater Well System (Capacity)	1,000	2018	Groundwater Recovery	Advanced Planning (EIR/EIS Certified)
San Dieguito Reservoir Seepage Recovery Feasibility Study	150	2015	Groundwater Recovery	Feasibility
San Pasqual Brackish Groundwater Recovery Project	3,360	2015	Groundwater Recovery	Feasibility
San Vicente & El Capitan Seepage Recovery	1,400	2015	Groundwater Recovery	Feasibility
Mission Valley Brackish Groundwater Recovery Project	1,760	2016	Groundwater Recovery	Feasibility
Oceanside Mission Basin Desalter Expansion/Seawater Recovery and	5,600	2016	Groundwater Recovery	Feasibility

Otay Mesa Lot 7 Well Desalination	400	2016	Groundwater Recovery	Feasibility
San Diego Formation / Balboa Park Pilot Production Well	1,300	2016	Groundwater Recovery	Feasibility
IRWD Wells 51,52,53, 21& 22 Potable (Non-exempt)	12,700	2018	Groundwater Recovery	Feasibility
San Diego Formation / Diamond BID Pilot Production Well	1,600	2018	Groundwater Recovery	Feasibility
San Marino GWR Project	2,500	2018	Groundwater Recovery	Feasibility
Thousand Oaks Boulevard Extension, Phase 1	176	2010	Recycling	Full Design & Appropriated Funds
Hansen Dam Golf Course Water Recycling Project	500	2011	Recycling	Full Design & Appropriated Funds
Chevron Nitrification Facility Expansion/ ELWRF Phase Va	1,710	2011	Recycling	Full Design & Appropriated Funds
SMWD Canada Gobernadora	725	2013	Recycling	Full Design & Appropriated Funds
IRWD Michelson Reclamation Project Expansion, Phase II	11,200	2011	Recycling	Advanced Planning (EIR/EIS Certified)
Elsinore Valley/Summerly	1,380	2011	Recycling	Advanced Planning (EIR/EIS Certified)
Elsinore Valley/Tuscany, Phase IA	1,225	2011	Recycling	Advanced Planning (EIR/EIS Certified)
San Clemente Water Reclamation Project Expansion	1,400	2012	Recycling	Advanced Planning (EIR/EIS Certified)
Burbank Reclaimed Water System Project Expansion, Phase II	974	2013	Recycling	Advanced Planning (EIR/EIS Certified)
OCWD Groundwater Replenishment System Spreading Project, Phase II	20,000	2013	Recycling	Advanced Planning (EIR/EIS Certified)

SMWD Arroyo Trabuco Sump	270	2013	Recycling	Advanced Planning (EIR/EIS Certified)
Elsinore Valley/Wildomar, Phase I	300	2013	Recycling	Advanced Planning (EIR/EIS Certified)
VCWWD No. 1/Moorpark WWTP Reclaimed Water Distribution System	1,179	2014	Recycling	Advanced Planning (EIR/EIS Certified)
Long Beach Reclamation Project Expansion, Phase II Boeing/Douglas Park	450	2014	Recycling	Advanced Planning (EIR/EIS Certified)
LA-Glendale Storage & Distribution System Water Recycling Project	2,600	2014	Recycling	Advanced Planning (EIR/EIS Certified)
SMWD Chiquita Development of Non-Domestic Water System Expansion I	3,360	2014	Recycling	Advanced Planning (EIR/EIS Certified)
Eastern Regional Reclaimed Water System Expansion	12,900	2015	Recycling	Advanced Planning (EIR/EIS Certified)
Padre Dam MWD Recycled Water System	3,304	2015	Recycling	Advanced Planning (EIR/EIS Certified)
Direct Reuse, Phase IIA Expansion/Rosemead Extension Project	620	2020	Recycling	Advanced Planning (EIR/EIS Certified)
SMWD Chiquita Development of Non-Domestic Water System Expansion II	5,600	2012	Recycling	Feasibility
South Coast WD J.B. Latham AWT Joint project	7,841	2012	Recycling	Feasibility
Carson Regional Water Recycling Facility Phase II Expansion Project	9,300	2012	Recycling	Feasibility
Edward C. Little Water Recycling Facility Treatment Facility Phase V	6,500	2012	Recycling	Feasibility
Joint Water Pollution Control Plant	17,000	2012	Recycling	Feasibility
Elysian Park Tank & Pumping Station Water Recycling Project	500	2014	Recycling	Feasibility
LA Zoo Water Recycling Project	500	2014	Recycling	Feasibility
IRWD Michelson Reclamation Project Expansion, Phase III	5,600	2014	Recycling	Feasibility

LBCWD Laguna Canyon Blended Recycled Water	100	2014	Recycling	Feasibility
MNWD Phase V Recycled Water Distribution Expansion	600	2014	Recycling	Feasibility
Harbor Refineries Pipelines Water Recycling Project	15,500	2015	Recycling	Feasibility
Carlsbad MWD - Mahr Reservoir	151	2015	Recycling	Feasibility
Olivenhain Northwest Quadrant Recycled Water Project (Meadowlark WRF)	1,000	2015	Recycling	Feasibility
Otay Recycled Water System (Non-LRP)	1,200	2015	Recycling	Feasibility
VCWWD No. 8 Reclaimed Water Distribution System Expansion	50	2018	Recycling	Feasibility
Eastern MWD Indirect Potable Reuse	15,000	2018	Recycling	Feasibility
Alamitos Barrier Reclaimed Water Project, Phase II	5,000	2018	Recycling	Feasibility
LAX Cooling Towers	240	2018	Recycling	Feasibility
El Toro AWT Joint project (MNWD, ETWD & IRWD)	400	2018	Recycling	Feasibility
OCWD Groundwater Replenishment System Seawater Barrier Project, Phase	15,000	2018	Recycling	Feasibility
OCWD Groundwater Replenishment System Spreading Project, Phase III	15,000	2018	Recycling	Feasibility
Direct Reuse, Phase III	7,000	2018	Recycling	Feasibility
Rancho California Reclamation Expansion/demineralization Western AG	13,800	2018	Recycling	Feasibility
Terminal Island AWTF and Distribution System Expansion Water Recycling	10,000	2019	Recycling	Feasibility
Tillman Groundwater Replenishment System	15,000	2019	Recycling	Feasibility
Otay WD - North District Recycled Water System	1,100	2020	Recycling	Feasibility
Ramona MWD - Santa Maria Water Reclamation Project	430	2020	Recycling	Feasibility
Shadowridge Reclaimed Water System	1,100	2020	Recycling	Feasibility
Valley Center MWD - Lilac Ranch WRF	60	2020	Recycling	Feasibility

Valley Center MWD - Welk WRF	140	2020	Recycling	Feasibility
Santa Fe ID Evaluating Multiple Options	500	2015	Recycling	Conceptual
Lower Moosa Canyon WRF - AWT Upgrade	672	2015	Recycling	Conceptual
El Segundo Power Plant	1,008	2015	Recycling	Conceptual
City of Riverside Recycled Water Program	41,400	2015	Recycling	Conceptual
Valley Center MWD - North Village WRF	150	2016	Recycling	Conceptual
San Fernando Valley/Central City Water Recycling and Reliability Project	1,500	2019	Recycling	Conceptual
Satellite Plant & Distribution System	4,500	2019	Recycling	Conceptual
Westside Tier 2A Expansion Water Recycling Project	5,000	2019	Recycling	Conceptual
Anaheim Water Recycling Demonstration Project	110	2020	Recycling	Conceptual
Thousand Oaks-Camrosa Interconnect	314	2020	Recycling	Conceptual
Joint Water Pollution Control Plant	45,000	2020	Recycling	Conceptual
Hemet Citrus In Lieu Project	5,000	2020	Recycling	Conceptual
Arroyo Seco - Flint Wash Project	2,000	2020	Recycling	Conceptual
Pickens Canyon Project	500	2020	Recycling	Conceptual
Recycled Water Scalping Plant	2,000	2020	Recycling	Conceptual
Hidden Hills Outdoor Residential Pilot Project	273	2020	Recycling	Conceptual
Thousand Oaks Boulevard Extension, Phase 2	250	2020	Recycling	Conceptual
Woodland Hills Golf Course Extension	316	2020	Recycling	Conceptual
MWDOC West OC Recycling	3,000	2020	Recycling	Conceptual
Carlsbad MWD Encina Basin Water Reclamation Program - Phases I and II	3,658	2020	Recycling	Conceptual
Olivenhain Joint RW Transmission Project with SFID and OMWD	500	2020	Recycling	Conceptual

Source: *Integrated Water Resources Plan 2010 Update: Appendix*. Metropolitan Water District of Southern California. pgs. A.6-2 – A.6-10.

Table 4. Additional Local Projects Needed in Southern California Due to a Failure to Implement the BDCP

Project	Yield (AF)	Online Date	Supply Type	Review Phase
Mesa Colored Water Treatment Facility Project, Phase II	5,650	2018	Groundwater Recovery	Feasibility
West Basin C. Marvin Brewer Desalter Expansion	156	2018	Groundwater Recovery	Feasibility
Chino Basin Desalter 3	10,000	2018	Groundwater Recovery	Feasibility
Sweetwater Authority/Otay WD San Diego Formation Recovery	3,900	2020	Groundwater Recovery	Feasibility
San Dieguito River Basin Brackish GW Recovery and Treatment	500	2015	Groundwater Recovery	Conceptual
Shallow Groundwater Development	500	2020	Groundwater Recovery	Conceptual
Camarillo (City of) Groundwater Treatment Facility	4,000	2020	Groundwater Recovery	Conceptual
Camrosa Brackish Water Reclamation Project	1,050	2020	Groundwater Recovery	Conceptual
Camrosa Santa Rosa Basin Desalter	5,040	2020	Groundwater Recovery	Conceptual
Golden State Desalter	1,668	2020	Groundwater Recovery	Conceptual
Somis Desalter (District 19)	2,800	2020	Groundwater Recovery	Conceptual
South Las Posas Desalter	5,000	2020	Groundwater Recovery	Conceptual
West Simi Desalter (District 8)	2,800	2020	Groundwater Recovery	Conceptual
Perris Desalter II	5,585	2020	Groundwater Recovery	Conceptual
South Coast WD Capistrano Beach Desalter Expansion	700	2020	Groundwater Recovery	Conceptual
Sunset Reservoir Well Treatment, IX	1,500	2020	Groundwater Recovery	Conceptual
Madrona Desalter (Goldsworthy) Expansion	2,600	2020	Groundwater Recovery	Conceptual
Arlington Basin Groundwater Desalter Project	8,000	2020	Groundwater Recovery	Conceptual
Joint Water Pollution Control Plant	15,000	2020	Recycling	Conceptual

Escondido Regional Reclaimed Water Project	1,200	2020	Recycling	Conceptual
Oceanside Water Reclamation Project	1,300	2020	Recycling	Conceptual
Olivenhain Northwest Quadrant Recycled Water Project, Phase B	300	2020	Recycling	Conceptual
Olivenhain Wanket Reservoir RW Conversion	300	2020	Recycling	Conceptual
Thompson Creek	3,000	2020	Recycling	Conceptual
Joint Water Pollution Control Plant	5,000	2020	Recycling	Conceptual
Direct Reuse	4,900	2020	Recycling	Conceptual
Groundwater Reliability Improvement Project	25,000	2020	Recycling	Conceptual
Joint Water Pollution Control Plant	35,000	2020	Recycling	Conceptual
Eaton Canyon Project	5,000	2025	Recycling	Conceptual
Huntington Beach Seawater Desalination Project	56,000	2012	Seawater Desalination	Advanced Planning (EIR/EIS Certified)
Camp Pendleton Seawater Desalination Project	56,000	2018	Seawater Desalination	Feasibility
Rosarito Beach Seawater Desalination Feasibility Study	28,000	2020	Seawater Desalination	Feasibility
West Basin Seawater Desalination Project	20,000	2025	Seawater Desalination	Feasibility
South Orange Coastal Ocean Desalination Project	16,000	2015	Seawater Desalination	Conceptual
Long Beach Seawater Desalination Project	10,000	2025	Seawater Desalination	Conceptual

Source: *Integrated Water Resources Plan 2010 Update: Appendix*. Metropolitan Water District of Southern California. pgs. A.6-2 – A.6-10.