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June 11, 2015

Los Osos Community Services District
P.O. Box 6669
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Golden State Water Co.
1140 Los Olivos Ave.
Los Osos, CA 93402

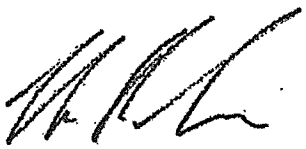
S&T Mutual Water Co.
P.O. Box 6391
Los Osos, CA 93412

Board of Supervisors, County of San Luis Obispo
Room D-430, County Government Center
San Luis Obispo, CA 93408

Dear Sirs,

The Sierra Club and the Los Osos Sustainability Group submit the following comments in the matter of the adjudication and development of the Basin Plan for the Los Osos Groundwater Basin per the Interlocutory Stipulated Judgment in *Los Osos Community Services District vs. Golden State Water Co. et al.*

Respectfully submitted,



Michael Jencks, Chair
Santa Lucia Chapter of the Sierra Club

Comments of the Sierra Club and Los Osos Sustainability Group on development of the Basin Plan for the Los Osos Groundwater Basin

Sierra Club is a California non-profit membership organization concerned with the protection of the environment and public health. Members of the Sierra Club reside throughout the town of Los Osos and the Prohibition Zone, and have a long history of involvement in water quality and treatment issues directly pertaining to the sustainability of the Los Osos Groundwater Basin, a resource vital to the people and economy of the Los Osos community and to the health and sustainability of the Morro Bay National Estuary and the State Marine Reserve. Los Osos Sustainability Group (LOSG) is comprised of homeowners in the Los Osos Basin who assert that the present Basin Plan does not protect their rights to the beneficial use of the Basin, their sole water source, because it does not maximize the seawater intrusion mitigation programs the Basin Plan identifies for stopping and reversing seawater intrusion. Fully maximizing measures to mitigate seawater intrusion is required by the Coastal Development Permit issued for the Los Osos Wastewater Treatment Plant.

On August 11, 2014, the Sierra Club submitted a letter to the Board of Supervisors of the County of San Luis Obispo, Central Coast Regional Water Quality Control Board, Golden State Water Company, Los Osos Community Services District and S & T Mutual Water Co. detailing the need for improvements in the Basin Plan's primary seawater intrusion mitigation programs (conservation, recycled water and infrastructure),among other improvements (see Exhibit 8). The Parties did not respond, nor did they implement any of these recommendations in the final draft of the Plan to be submitted for Court approval in August.

The LOSG asserts that the Basin Plan increases the likelihood that their water and wastewater will become unaffordable insofar as it will likely result in the loss of the Basin to seawater intrusion, requiring the community to fund a large desalination facility. The Basin Plan estimates the cost for such a facility at over $100 million (see Page 3). Given water shortages in the area and throughout the state, imported water is not likely to be available or technically feasible.

The Los Osos Basin is one of the most endangered Basins in the state. It is designated a "high priority" Basin in the Sustainable Groundwater Management Act. It is facing the state's worst drought on record, at a time when the Basin is also about to undergo changes that will bring about major hydrological disruptions with unknown and possibly devastating consequences.

Forty years of severe overdraft due to the absence of management has resulted in

seawater rapidly replacing freshwater in the Basin. In 2014 the advance of seawater intrusion was found to have accelerated to 250 feet per year in the main drinking water aquifer (3-4 times the former rate). In the large, deep aquifer, which has been largely abandoned to seawater intrusion, the estimated rate is about 170 feet per year since 1977 (see Pages 86-90). The Basin Plan estimates that about 90% of the freshwater in the Basin is below the level needed to hold back seawater intrusion (Page 91).

This severe seawater intrusion is occurring at the same time that Basin water levels are being adversely impacted by the worst drought on state record, which has reduced rainfall to about 45% of normal for the past three years (about 8 inches, rather than about 17 inches), with a similar drop in recharge (virtually all Basin recharge is from rain). The Basin is also about to undergo major hydrological disruptions with the implementation of the Los Osos Wastewater Project (LOWWP), which will replace the dispersed return flows from about 4500 septic leach fields (about 750 AFY of water) with 481 AFY of recycled water discharged primarily in one location (450 AFY in Broderson leach field). Basin hydrology will also undergo major impacts from a substantial redistribution of pumping proposed in the Basin Plan, Infrastructure Programs A through D. Programs A and C are recommended for implementation with the current population, and Programs B and D support a build out population.

Agencies and experts have recognized the potential for significant adverse impacts from these projects (especially in combination) on seawater intrusion and sensitive habitat. Agencies and experts also recognize the potential for adverse impacts from drought and climate change. However, the Basin Plan does not address these impacts.

We concur with the Basin Plan's assessment that conservation, recycled water use, and certain infrastructure programs are the quickest and most cost-effective ways to achieve Basin sustainability. However, the evidence we provide clearly shows the Basin Plan does not fully develop their benefits, nor comply with governmental mandates to maximize conservation and the recycled water program to preserve limited water resources. Further, it does not utilize reasonably prudent management strategies and tools to preserve the resource.

We explain herein how the Plan does not maximize its main mitigation programs, comply with governmental mandates, address major adverse impacts and related uncertainties, consider expert opinions, provide enforceable objectives to ensure quick implementation, provide adequate adaptive measures, nor use sufficiently prudent management strategies and tools (including yield estimates) to preserve the Basin.

Finally, we provide improvements to the Basin Plan that will allow it to comply with governmental mandates and to optimize the potential for Basin sustainability, as well as

the sustainability of environmental, human, and economic resources that depend on it.

We consider these changes to be vital to Basin sustainability, and request that they be incorporated into the Basin Plan and that the revised Basin Plan be made available to us before it is submitted to the Court.

Basin conditions—why a strong Basin management plan is urgently needed.

The Basin is the sole source of water for the Community of Los Osos and area farms. It is also a main source of freshwater flows supporting high-value Morro Bay National Estuary habitat in the area. The State has designated it a "high-priority" basin via the Sustainable Groundwater Management Act for its value and the threat it faces. The Basin is being rapidly destroyed by severe seawater intrusion, raising the real possibility of losing the resource. Seawater intrusion into the Basin has gone unabated for 40 years due to the absence of any Basin management and continued severe overdraft (30 to 60% annually, assuming normal rainfall). The Basin Plan reports (based on a 2014 technical memorandum by Cleath-Harris Geologists, Inc.) that the rate of intrusion through the main drinking water aquifer (Zone D) accelerated to 250 feet per year (three to four times its previously assessed rate) since 2005 despite a substantial reduction in pumping since 2000. The seawater front had reached Broderson Avenue in Zone D and the Commercial District in Zone E, the large deep aquifer (see Pages 87-90).

Thus, by early 2014, seawater had contaminated much, possibly most, of the Basin, destroyed much of it, and was accelerating—and the 2014 technical memorandum does not show the full adverse effects of the drought (the most severe on record), which likely will take many years to fully manifest. The Basin Plan does not say how much of the Basin's capacity has been lost, but it indicates that about 90% is below the level needed to hold back seawater intrusion (Page 91). Prior to the recent drought, an expert on the Los Osos Basin called the seawater intrusion problem "extremely urgent," pointing out that seawater intrusion is very difficult to reverse and remediate, also citing the impending potential adverse impacts of the LOWWP. (See Exhibit 1, Pages 4 & 5, and Exhibit 2, Pages 1 & 2).

The Parties recognize the need for "bold, decisive, and immediate action" (see Basin Plan, Page 1). However, the Basin Plan does not provide it. It does not maximize the three main mitigation programs it recommends nor take other reasonable actions to prioritize and maximize Basin sustainability.

The Plan does not maximize the seawater intrusion mitigation programs it proposes nor comply with related governmental mandates.

The Basin Plan makes the conservation program (referred to in the Basin Plan as the "Urban Water Use Efficiency Program") the "highest priority program...for balancing the Basin and preventing further seawater intrusion," yet it does not maximize the program (see Page 142). It adopts the LOWWP conservation program (which applies to 90% of the community) and it proposes that the County extend the program Basin-wide, adding outdoor measures (see Page 198). It also proposes that the County administer the program until 2018 (Page 198).

The LOWWP Coastal Development Permit (CDP) requires the LOWWP program "to help Basin residents to reduce potable water use as much as possible," and it requires the County to spend $5 million "to initiate the program as soon as possible after project approval." It also states that measures shall not be limited to "retrofits and low water use fixtures and grey water systems" (See Exhibit 11, Special Condition 5b). However, the LOWWP program the County implemented over two years ago is basically a limited indoor retrofit program focusing on toilet, showerhead, and faucet aerator retrofits. The program has fallen well short of the targets the County set for these measures in its implementation plan, and the program includes no grey water systems or other outdoor measures.

The LOWWP (Basin Plan) program is based on a plan developed for the Parties by Maddaus Water Management (MWM), which does not maximize indoor measures and has a very limited outdoor program. Like the MWM plan, the Basin Plan recommends against including grey water reuse, rainwater reuse, and turf replacement in the program, although both plans recognize the benefits and encourage individual property owners to implement the measures (see Basin Plan, Page 188 & 189). The Basin Plan program also does not include low water use landscaping although the Pacific Institute points out that the measure can reduce outdoor water use by more than 70% (see Exhibit 10, Page 3). Peter Mayer, a nationally-recognized expert, confirms that the MWM conservation program (the basis for the LOWWP and Basin Plan programs) does not maximize cost-effective indoor and outdoor measures to reduce water use and seawater intrusion as much as possible pursuant to the LOWWP CDP (see Exhibit 5.)

Thus, the Basin Plan program does not comply with the LOWWP Coastal Development Permit (CDP). The CDP requires the program "to help Basin residents to reduce their potable water use as much as possible" (see Exhibit 11). However, a water rate study completed by the LOCSD in December 2014 shows Los Osos residential use is about 75 gpcd indoors and outdoors, and recent State data show several California communities are under 55 gpcd. Santa Cruz and Santa Rosa water use is 46 gpcd and 49 gpcd respectively (see Exhibit 7, Page 4). Therefore, conservation offers much more potential to reduce production and seawater intrusion in the Basin. A 25% reduction in urban use would result in 400 AFY less production, substantially increasing Basin sustainability.

Data indicate that a 30% reduction may be possible with conservation.

Governor Brown's Executive Order B-29-15, designed to maximize conservation in response to the continuing drought, requires a 25% reduction in 2013 urban water use state-wide by February 28, 2016 (see Exhibit 9, e.g., Directive 2.) While the SWRCB is still developing the framework for this regulation, it is clear the Basin Plan is not consistent with this order.

For the Basin Plan to reduce 2013 urban production (1670 AFY) by 25%, it would have to reduce use to about 1250 AFY by next year. The Basin Plan's goal is to reduce urban use to 1450 AFY by 2035 (see Basin Plan, Pages 142). A SWRCB Fact Sheet on the Order states that urban water suppliers serving fewer than 3000 connections (i.e., three of the Parties) will either have to achieve the 25% reduction or restrict outdoor water use to no more than two days per week. In either case, the Basin Plan does not comply with the order because it does not commit the Parties to the 25% reduction or the outdoor restriction (which would likely require an ordinance). The Basin Plan does not propose using ordinances to implement programs and achieve goals (which is another problem with the Plan—see discussion below).

The Governor's Order also requires that the State Model Efficient Landscape Ordinance is updated to require districts to meet increased outdoor efficiency standards for existing landscapes—specifically mentioning the use of such measures as grey water reuse, rainwater catchment, and turf replacement. As mentioned, the Basin Plan recommends against including grey water reuse, rainwater catchment, and turf replacement in its conservation program (see Exhibit 9, Directive 8).

There is clearly a good deal of potential to reduce production and increase Basin sustainability with a stronger Basin Plan conservation program. Both the CDP and recent drought regulations require it (see earlier submittals for specific measures the program can implement to increase benefits).

Although the Basin Plan adopts the LOWWP recycled water program (the "Water Reinvestment Program"), it does not include improvements to the program that help preserve the Basin. The LOWWP program currently commits a significant portion of the recycled water for the conversion of dry land farming to irrigated farming, a use that provides no solution to seawater intrusion. It also fails to maximize urban reuse, which provides the greatest seawater intrusion mitigation benefit, according to the LOWWP EIR and *Fine Screening Report,* (see Exhibit 4). The Basin Plan further fails to maximize the "Basin Infrastructure Program." It recommends that Programs A and C be implemented to support the current population, which move more production to the Upper Aquifer and inland. However, it does not recommend Program D, one of the most

cost-effective measures, except to support the build out population. Program D is also needed to support the current population. We do not support implementing Program B without further analysis as to its costs versus risks and benefits. The analysis should consider the potential adverse impacts to the Upper Aquifer we cite below.

The Plan does not address major adverse impacts on the Basin.

The Basin Plan does not discuss nor account for several major impacts on groundwater levels and seawater intrusion, which can severely harm the Basin and possibly destroy it, especially in combination. These must be adequately addressed with mitigation programs and adaptive management.

Drought Impacts: The present California drought is the state's worst on record and has resulted in rainfall levels in Los Osos for the past four years that are about 45% of normal. The average rainfall for the area had been about 17 inches prior to 2005, but seven of the past 10 years have been drought years, and rainfall for the past three years has averaged about 8 inches. The Basin receives virtually all of its recharge from rain, either as direct percolation or seepage from Los Osos Creek. Therefore, the substantial reduction in rainfall reduces recharge similarly, which results in substantially lower water tables, the main cause of seawater intrusion. Less recharge also means a higher rate of overdraft. The Basin Plan estimates the sustainable yield under "current conditions" (without any of the proposed Basin Plan mitigation programs) is 2450 AFY. Current production is about 2500 AFY. With the drought, a reasonable estimate of sustainable yield is half the Basin Plan estimate of 2450 AFY, or 1225 AFY. The drought will clearly have a very serious adverse impact on the Basin, but the Basin Plan does not address it.

Climate Change Impacts: The 2013 climate change evaluation, conducted by the USEPA, Morro Bay National Estuary Program (MBNEP), and Parties to the Basin Plan, found that the triple impacts of climate change (higher temperatures, sea level rise, and less rainfall) would reduce the "sustainable yield" of the Basin under current conditions to 1800 AFY from the current Basin Plan estimate of 2450 AFY, or about 25%. It also found that the yield increase predicted with all Basin Plan programs in place (3400 AFY) would drop to 2325 AFY, or about 32%, negating all the predicted increase. The evaluation concluded that Morro Bay Estuary ecosystems, including Los Osos Creek, could be adversely impacted by LOWWP and Basin Plan programs. The USEPA evaluation applied the same Basin model as used in the Basin Plan, but assumed less yearly rainfall (11.8" rather than 17"), higher temperatures, and sea level rise (see Exhibit 6, Pages 1, 3, 6 & 8). The study states "Climate change and precipitation trends and patterns must be considered when planning for the future". The Basin Plan does not

discuss this evaluation. It recommends adding a 20% margin of safety to account for "climate variability" but the 20% is not nearly enough, as explained below (see Page 113).

LOWWP Impacts: The Los Osos Waste Water Project EIR cites potential adverse impacts from the project on seawater intrusion, which it indicates would be reduced to insignificance by use of Broderson leach fields. The California Coastal Commission found substantial uncertainties in the ability of Broderson leach field and other LOWWP mitigations to avoid/minimize seawater intrusion and other impacts, so it added Special Condition 5 that requires conservation, recycled water reuse, monitoring, and adaptive programs to "maximize" the sustainability of the Basin and related resources (see Exhibit 11). Hydrologist and water resources expert Eugene Yates (hereinafter, "Yates"), one of the foremost authorities on the Los Osos Groundwater Basin and one of the creators of the Basin model, states that elimination of septic system return flows in conjunction with planned increases in pumping from the Upper Aquifer could cause seawater intrusion in that aquifer. He also states that the Project could adversely impact sensitive habitat by reducing groundwater flows (see Exhibit 1, Pages 4 & 5, and Exhibit 2, Pages 1 & 2). The Monterey Bay Watershed Institute also found that the LOWWP could adversely impact seawater intrusion in the Lower and Upper Aquifers and harm habitat (see Exhibit 3). These experts recommend maximizing conservation, recycled water use, and low impact development (LID) recharge measures, and implementing adaptive programs that put specific measures in place to address potential impacts. It is important to note that the Yates and the Monterey Bay Institute's reviews were done in 2010, so did not factor the added impacts of the present drought. The Basin Plan does not mention nor address LOWWP impacts, e.g., it does not provide specific contingency measures, nor does it maximize the conservation and recycled water reuse programs as recommended by experts and required by the LOWWP CDP.

Pumping Redistribution Impacts: The impacts from the redistribution of pumping (Basin Plan Infrastructure Programs A through D), in combination with LOWWP impacts, were not analyzed in the LOWWP EIR. However, Yates indicates additional pumping from the Upper Aquifer in conjunction with removal of septic system return flows can cause seawater intrusion in the Upper Aquifer. He also states that the redistribution of pumping will not increase yield and may not protect against seawater intrusion (see Exhibit 1, Page 4 and Exhibit 2, Pages 1 & 2). The USEPA finds that the LOWWP and Basin Plan programs can harm Morro Bay Estuary habitat, including Los Osos Creek, especially in combination with climate change impacts on groundwater and habitat (see Exhibit 6, e.g., Page 4). Further, the Monterey Watershed Institute cites potential impacts to the Upper Aquifer and habitat due to interruptions in groundwater flows, which will be exacerbated by added pumping in the Upper Aquifer and inland. Stetson Engineers, the firm hired by the Parties to perform a peer review of the Basin model and proposed changes in

pumping, warned that redistribution should be "gradual...with contingency plans in place" to address signs of harm to Basin resources (see Exhibit 3, e.g., Page 65 and Basin Plan, Page 80).

The Plan fails to fulfill the purpose of the Interlocutory Stipulated Judgment.

As a result of its deficiencies, the Basin Plan does not fulfill the stated purpose of the Interlocutory Stipulated Judgment "to establish a process for developing and implementing a BMP (Basin Management Plan) that will serve as a physical solution for the management of the Basin water resources...." It does not include as a main component: "A strategy for maximizing the reasonable and beneficial use of the Basin water resources while ensuring: the long-term integrity and viability of the Basin as a potable water supply for the Parties collectively and each Party individually, including water quantity and water quality: and the sustainability of environmentally sensitive areas within or influenced by the Basin hydrology" (Page 5). The Basin Plan also does not fulfill another stated purpose: to provide a "safe yield" (see ISJ, Component A).

The Plan fails to consider and incorporate the recommendations of experts.

The Basin Plan ignores several expert reviews of the Basin and related recommendations. Yates, concludes in two 2010 reviews that moving wells will not increase Basin yield and may not protect the Basin long-term. He also identifies substantial uncertainties in the model and points out that shifts in pumping to the Upper Aquifer in combination with the LOWWP could cause seawater intrusion in the Upper Aquifer (see Exhibit 1, Pages 1 - 4 & Exhibit 2, Pages 1 & 2). The Monterey Bay Watershed Institute in a 2010 review identifies major uncertainties in the potential of LOWWP mitigation programs to offset seawater intrusion impacts (e.g., Broderson leach field disposal), and it recommends that the past droughts and the "predictions of increased drought" be considered in Basin planning (see Exhibit 3, Page 69). Both Yates and the Monterey Bay Institute stress the need to maximize conservation, recycled water use, and on-site recharge measures (low impact development) to minimize LOWWP impacts, as a first priority. They also recommend having specific contingency measures in place to quickly respond to impacts that may occur despite maximized mitigations to avoid/minimize harm to the Basin (see Exhibit 1, Page 5, Exhibit 2, Pages 3 & 7, & Exhibit 3, Page 33, 56-67). The Basin Plan fails to discuss or implement any of these findings or recommendations.

Peter Pyle of Stetson Engineers, Inc., in a peer review of the model sponsored by the Parties in 2010, cautions that the present Basin model providing for moving wells inland should be implemented slowly and monitored often, having contingency measures in place to avoid impacts. The review also recommends upgrading the model with monthly

"transient" capability, having Cleath-Harris Geologists, Inc. state uncertainty values for the model, and including "climate change variables in modeling scenarios." The Basin Plan does not implement any of the recommendations. Instead, it states that the "Parties will consider making those improvements...particularly if grant funding becomes available from the state or federal governments" (see Page 80).

The Plan fails to apply modeling assumptions and decision making tools that prioritize preserving the Basin.

Modeling Assumptions and Safe Yield Estimates: The Basin Plan bases some of its most important findings and recommendations on modeling. However, Basin modeling does not include climate change factors and reduced rainfall predictions.

Neither does Basin Plan modeling factor potential impacts on Basin yield from the LOWWP and Basin Plan infrastructure programs (pumping redistribution). Yates points out that the combined impacts could cause seawater intrusion in the Upper Aquifer, reducing Basin yield and flows to habitat along the estuary, potentially requiring more production from the Basin to replace groundwater flows. Yates also states that pumping redistribution will not increase yields, and in fact the Basin Plan may be overstating yields by 40%.

The Basin Plan asserts that the overstating of estimates may not be known until harm is impossible to reverse (see Page 137).

Basin modeling has underestimated the rate of seawater intrusion and overestimated the Basin yield several times in the past. This is a key reason the Basin has been over-drafted 700 to 1,100 AFY on average (30-55%) since 1979 (see Basin Plan, Pages 46, 99, & 106). Current Basin Plan modeling continues to show a failure to exercise minimal reasonable caution. Preserving a high-value, threatened, and irreplaceable resource necessitates planning that "errs" on the side of preserving the resource. Monterey Bay Watershed Institute emphasizes the need for this type of management (see Exhibit 3, Pages 41, 56 & 67). Basin Plan modeling errs on the side of maximizing short-term yield to achieve buildout.

Metrics/Success Criteria: The Basin Plan applies three "metrics" to assess program success in stopping and reversing seawater intrusion:

The Yield Metric is a factor based on modeling, using predicted "sustainable yields" with different program options, divided by the Basin production.

The Basin Water Level Metric is determined by sampling water levels in a few Zone D wells, setting the target of 8 feet above mean sea level on average. Zone D is currently the main drinking water aquifer.

The Basin Chloride Metric sets an average of 100 mg/l of chlorides in a few Zone D wells, and is also determined by sampling.

The Yield Metric relies on Basin Plan modeling and does not provide a reasonably cautious tool for decision making. The other metrics rely on actual physical evidence and provide much more reliable results. However, they do not assess the programs' effects on Zone E, the large, deep aquifer which is a vital part of the Basin's structure that is more seriously impacted by seawater intrusion than Zone D.

Metrics do not assess Zone C, the Upper Aquifer where the Basin Plan proposes to shift a lot more pumping. Zone C was reported to be only "relatively stable" in the 2005 *Seawater Intrusion Assessment,* subject to seawater intrusion during droughts. Another problem with the Water Level and Chloride Metric is that they rely on a relatively small number of wells, which may result in skewed results andy high levels of seawater intrusion in some parts of the Basin). The Basin Plan also does not include a metric to measure Basin storage capacity, which the Basin Plan states is an important measure of Basin resilience (ability to weather droughts) (see Page 91).

The Plan fails to implement an effective adaptive management program and contingency measures.

The Basin Plan fails to identify and plan specific contingency measures to address impacts to the Basin that may occur despite mitigation programs. Instead, the Basin Plan includes what it calls an "Adaptive Management Plan" that is little more than a yearly review of monitoring data, which does not commit the Parties to take any action—nor does it ensure effective action is even feasible. According to the experts cited (Yates, Monterey Bay Watershed Institute), an effective adaptive/contingency program must include specific plans to address the most likely impacts, with the measures in place to ensure effective responses within a timeframe that minimizes harm to the Basin (see Exhibit 1, Page 5 and Exhibit 3, Pages 56-66).

The Plan fails to set time-specific objectives or use the authority needed to ensure effective program implementation as early as possible.

The Basin Plan states that "bold, decisive, and immediate" action is needed to preserve the Basin, but it does not set time-specific objectives and benchmarks for program implementation and achieving objectives—nor does it say the Parties will use the rights

and authorities granted to water management agencies/entities to ensure objectives are met within a timeframe that protects resources. The ISJ Agreement provides for the County to implement a Basin-management ordinance, and the Basin Plan indicates that the County has the authority to implement an ordinance to mandate private well monitoring (see ISJ, Page 8, and Basin Plan, Page 138). But the Basin Plan does not recommend mandatory well monitoring, despite stating that the current lack of accurate well data can result in permanent harm to the Basin (see Pages 103, 112, 137). The Basin Plan also does not recommend mandatory conservation outside the wastewater service area, pumping restrictions, or production limits (see Pages 15 & 188).

Improvements Critical to Basin Sustainability.

Given the protracted amount of time the Basin has been without management and protracted negotiations since the Court allowed the Parties to resolve issues via a voluntary Basin Planning process--and in light of the severe seawater intrusion problem made worse by an ongoing severe drought, as well as impending significant adverse impacts--we urge the Parties to immediately incorporate and implement the changes listed below as critical to Basin sustainability.

Maximize the conservation program and comply with the Governor's Executive Order B-29-15. The Basin Plan adopts the LOWWP program. The Coastal Development Permit (CDP) for the LOWWP requires the program to "help Basin residents to reduce their potable water use as much as possible," and the County to spend $5 million to "initiate" the program as soon as possible after permit approval in 2010. The CDP also says the program "shall not be limited to retrofit and low water-use fixtures, and grey water systems." So it includes outdoor measures, like grey water systems (see Exhibit 11 and Basin Plan, Pages 146 & 147). Currently, about $3.7 million of the $5 million remains unspent, although the program is well below implementation targets for indoor measures and has no outdoor component.

The Basin Plan must require the County-run program to maximize use of the remaining $3.7 million to improve the indoor program and to implement a comprehensive outdoor program. The outdoor program should include rebates and other incentives for grey water systems, rainwater harvesting, turf replacement, and conversion to low water-use landscaping. The Basin Plan should also set residential indoor-outdoor water use targets at less than 50 gpcd, consistent with the Governor's Executive Order and with other coastal communities (see Exhibit 7, Page 4, and Exhibit 9, Directives 1, 5 & 11).

Current residential water use in Los Osos is 70 to 75 gpcd, so targeting 50 gpcd for residential water use and a similar reduction in commercial and institutional use (as

required by the Governor's Order) should meet the Governor's mandated reduction, bringing 2013 urban water use (1670 AFY) down 25% to about 1250 AFY (see Basin Plan, Page 48 for 2013 water use. Urban water use includes purveyor and domestic production).

Maximize recycled water use. For the Basin Plan to maximize seawater intrusion mitigation, as required by the LOWWP CDP, more purple pipe connections and infrastructure should be installed west of Los Osos Creek, so that more recycled water can be used for "urban reuse" to offset pumping in that part of the Basin. Several studies, including the LOWWP *Fine Screening Report,* point out that urban reuse provides the greatest seawater intrusion mitigation in the Los Osos Basin, over twice as much mitigation as ground discharge into Broderson leach field and over five times as much as agricultural reuse east of Los Osos Creek (see Exhibit 4, Page 2-6). State law provides for mandating recycled water use if it is available, and the Parties should do so.

Maximize infrastructure programs. The Basin Plan recommends Programs A and C under the "current population scenario" (which shift some pumping to the Upper Aquifer and much more inland). Program A is already implemented and Program C should be implemented, with contingency plans in place to address impacts as experts recommend. The Basin Plan recommends one of the most cost-effective programs, Program D (use of wells east of Los Osos Creek to supply water west of Los Osos Creek) only for a "buildout population scenario." Program D should be implemented as soon as possible (at least by LOWWP start up) to maximize seawater intrusion mitigation and provide management flexibility. It is needed to support the current population. It maximizes Basin sustainability by allowing for flexibility where water is pumped and by helping to maintain Basin balance west and east of Los Osos Creek when the LOWWP is implemented. Program B (larger shifts in pumping to the Upper Aquifer) should be re-evaluated for its cost versus its risks and benefits, given the multiple impacts of the drought, climate change, LOWWP, and shifts in pumping, especially on the Upper Aquifer.

Apply modeling assumptions and decision making tools that prioritize preserving the Basin and clarify the criteria for sustainable buildout.

Modeling Assumptions and Safe Yield Estimates: Basin Plan modeling should factor the on-going drought and climate change variables, potential impacts from the LOWWP and Basin Plan infrastructure programs, and all other potential impacts and uncertainties affecting sustainable yield and seawater intrusion rate estimates. A thorough sensitivity analysis should be included in the Basin Plan that provides the specific basis for modeling assumptions used, along with a generous margin of error (one that "errs" on side of caution). Based on the modeling (and the revised definition of "sustainable yield"

below) new, more cautious and realistic sustainable yield targets should be established. The USEPA climate change evaluation provides a good place to start. The evaluation estimates "sustainable yields" at 1800 AFY without Basin Plan programs in place and 2325 AFY with all programs in place. However, the evaluation uses the current Basin Plan definition of "sustainable yield," which allows seawater intrusion to advance. The Basin Plan recommends subtracting 20% to reverse seawater intrusion. Therefore, we recommend a targeted Basin yield of under 2000 AFY for the current population with Infrastructure Programs A, C, and D in place. This provides a reasonably cautious target given present conditions that can be changed in the future based on conclusive evidence (i.e., well monitoring over time).

"Sustainable Yield Definition: "Sustainable yield" should be defined as a yield that reduces seawater intrusion and restores the Basin's freshwater storage capacity and resilience.

Metrics/Success Criteria: The Yield Metric would change with the revised modeling and refined sustainable yield above. However, the Basin Plan should clearly state the uncertainties inherent in prediction results from a measure based on modeling, also the potential adverse impacts of some measures modeled, such as shifts in pumping to the Upper Aquifer and inland.

The Basin Water Level and Basin Chloride Metrics should be based on the data from all production and test wells, and should be extended to Zones C and E. This would better ensure the overall health of the Basin and reduce the potential for anomalies or biases in data. Metric criteria should also include minimum acceptable water levels and maximum chlorides concentrations at any one well in the groups measured. Especially if/when all wells are used for metrics, average chloride levels should be set substantially lower than 100 mg/l. The Basin Plan should also include a metric to measure Basin storage capacity.

Consistent with reasonably cautious planning, the Basin Plan should only allow additional building based on conclusive evidence (water level and chloride data over time) showing that the Basin will support the current population and there is enough additional water to support a larger population. Revising yield estimates and the sustainable yield definition should help make this clear.

Seawater intrusion has shown no sign of slowing in 35 years, and has instead accelerated since 2000 despite substantial cut backs in pumping. Given current Basin conditions, applying the current "sustainable yield" predictions will only lead to unsustainable growth.

Achieving a sustainable Basin requires all current property owners to maximize water use

efficiency (conservation and recycled water use). It also requires the Basin Plan to include programs that will do this, as well as the most effective infrastructure programs. Additional development dependent on the Basin will harden demand at a higher level of water use, raising overall demand and making it more difficult to reduce use with efficiency measures.

Develop specific contingency plans to avoid or minimize impacts that could occur despite maximized mitigation programs and revised yield targets.

The impacts we discuss above (e.g., drought, climate change, LOWWP and infrastructure programs), especially in combination, should be analyzed and modeled. Based on the analysis and modeling, specific contingency measures should be planned with criteria or triggers indicating when these measures should be implemented. These are necessary because the impacts can cause severe harm to the Basin, even with the improved programs and the lower yield estimates and production targets we request. Contingency measures might include additional outdoor watering restrictions, water budgets, and changes in where water is pumped via cooperative pumping arrangements. The LOCSD, one of the Parties (supplier for about one-half of the urban area), recently implemented a Water Shortage Contingency Plan with five stages of emergency that has both climate triggers (based on rainfall) and seawater intrusion triggers (based on chloride levels at supply wells). The District declared a Stage III emergency on April 2, 2015, based on low rainfall (43 inches of rain for three years). It set water allocations at 50 gallons gpcd with penalties for exceeding the allocation. (The plan with penalties is consistent with Directive 8 of the Governor's Executive Order B-29-15—see Exhibit 9). If the drought continues or chloride levels reach the triggers for identified wells, the District will go to a Stage IV or V, reducing allocations to 45 and 42 gpcd gallons respectively, with additional restrictions. On April 2, the District also added a provision to Stage III that no "intent to serve" notices (notices of intent to provide service for new development) would be issued. This restriction had been only for Levels IV & V previously. The Basin Plan should include similar plans with triggers to address the drought and other threats to the Basin. The Monterey Bay Watershed Institute identifies several areas of uncertainty (potential impacts from the LOWWP) that should have contingency plans and it recommends specific measures and a method for developing the plan (see Exhibit 3, Pages 56-66).

Set time-specific objectives and benchmarks for maximizing Basin Plan programs and reversing seawater intrusion as soon as possible, and use all the rights and authorities available to water management agencies/entities to ensure objectives are met.

The Basin Plan must set time-specific objectives and benchmarks for maximizing mitigation programs Basin-wide and achieving conservation and production targets as

soon as possible. Basin-wide conservation should be maximized this year consistent with LOWWP and Governor's Executive Order. Recycled water use should be maximized by LOWWP startup, and infrastructure programs to redistribute pumping should be maximized within one year. The County and Parties should use all powers granted to them by law to ensure programs are maximized and management objectives are met. These powers should include ordinances mandating the monitoring of private wells, Basin-wide conservation (including outdoor conservation), and the use of recycled water (where it has the greatest benefits). A management ordinance or ordinances should also include the options of mandated pumping restrictions or allocations to meet objectives and avoid harm to the Basin. Additional funding, if needed, should be developed through all means available to the Parties. The Governor's Executive Order prioritizes grant funding for local agencies with efficient landscaping ordinances in place, and requires the State Water Board to direct suppliers to use "pricing mechanisms, including but not limited to surcharges, fees, and penalties, to maximize water conservation..." (see Exhibit 9, Directives 8 & 11). These measures should be applied first, with grant funding emphasized consistent with the ISJ agreement (Component E, Page 5). Other laws allow the Parties to assess property owners for administration and other program costs based on water use, which should be used if needed.

(See Exhibit 8, comments and recommendations previously submitted to the Parties, for further detail, explanation, and support of the above requests).

Requested modifications are consistent with state policy the LOWWP CDP, Basin Plan, and ISJ.

The improvements/modifications we request are supported by State agencies and authorities and experts who recommend maximizing conservation and recycled water use to address threatened groundwater resources and seawater intrusion, especially in the current drought. The improvements are also consistent with the LOWWP Coastal Development Permit, which requires project conservation and recycled water use programs to maximize the sustainability of the Basin and related resources. Requested improvements are also consistent with the Basin Plan itself as they will increase the benefits of the three primary mitigation programs proposed in the Plan and potential to reverse seawater intrusion and provide a sustainable water supply for the existing population (see Page 21). These improvements are also consistent with the ISJ.

For all of the foregoing reasons, Sierra Club and LOSG urge the Parties to implement the above recommendations prior to submitting the Basin Plan to the court for approval. We do not support the Basin Plan without these improvements.

TABLE OF EXHIBITS

1. Eugene Yates review of the Los Osos Basin Model (January 2010)
2. Eugene Yates review of the Los Osos seawater intrusion and Los Osos Wastewater Project (LOWWP) impacts and mitigations (August 2010)
3. Monterey Bay Watershed Institute review of Los Osos seawater intrusion and LOWWP impacts and mitigations. (January 2010)
4. LOWWP Fine Screening Analysis (August 2007)
5. Peter Mayer review of the Maddaus Water Management (MSM) conservation plan used for LOWWP and Basin Plan (October 10, 2011)
6. USEPA evaluation of climate change impacts on the Los Osos Basin, in cooperation with the Los Osos water purveyors and the National Estuary Program (June 2013)
7. Water Boards article on State-mandated conservation with water use data for California communities (March 2015)
8. Comments and recommendations on the Basin Plan submitted to the ISJ Parties (December 2013 to December 2014)

Exhibit 1

Engene Yates' review of the LO Basin Model (January 2010)

HYDROFOCUS INC.
Solutions for Land and Water Resources

January 13, 2010

Mr. Keith Wimer
Los Osos Sustainability Group
1101 14th Street
Los Osos, CA 93402

Subject: Review of Cleath-Harris Geologists' July 2009 Memorandum "Flow Model Conversion and Urban Area Yield Update" (Corrected Version February 4, 2010)

Dear Mr. Wimer:

I reviewed the subject report and compared the development and results of the SEAWAT model with the results of previous studies that characterized seawater intrusion and basin yield (Cleath & Associates 2003, 2005, 2006 and Michael Brandman Associates 2008). I also contacted Spencer Harris by telephone, and he was able to provide additional information and responses to our key questions and areas of concern.

Actions are urgently needed to prevent further seawater intrusion, and they should be accompanied with monitoring and contingency measures. Because basin yield is uncertain, an adaptive management approach is needed that recognizes this uncertainty and incorporates appropriate margins of safety to prevent further intrusion in the event the expected effectiveness of the initial actions prove incorrect.

The SEAWAT model represents a step forward in more than two decades of effort towards developing models and quantitative tools to evaluate groundwater yield and quality in the Los Osos basin. The SEAWAT model flow components retain the same basic inputs (recharge and pumping rates) as the earlier "equivalent freshwater head model" that was completed in 2008 and employed for the wastewater project environmental impact report (Michael Brandman Associates, 2008). Although the reports present calibration statistics comparing simulated and measured historical water levels and salinity concentrations, they do not indicate how those statistics translate into uncertainty (i.e., potential errors) in simulated future scenarios. In all scenarios considered, groundwater use is nearly equal to the estimated basin yield. Therefore, this uncertainty in simulation results translates into a direct risk of continued overdraft and further need to reduce demand, augment supplies, or both.

In the recent SEAWAT modeling, some of the sources of uncertainty affecting safe yield estimates include the following:

1. The projected safe yield conditions are substantially different from the historical conditions used to calibrate the model in terms of the spatial distribution of groundwater extraction and recharge. Whenever a model is used to simulate conditions that deviate substantially from the calibration period, there is inherent uncertainty in the results. In this case, the "current conditions" safe yield scenario assumes that nearly two thirds of the existing groundwater pumping from the lower aquifer (1,062 AF/Y) would be shifted to the upper aquifer. This change in annual upper and lower pumping rates represent a substantial redistribution of pumping stresses in the basin. While the model predicts that this increase in upper aquifer pumping can be implemented without incurring seawater intrusion, this upper aquifer pumping level has never been experienced in the basin historically nor have any of its effects been measured. Simulated pumping increases in the upper aquifer above the estimated safe yield resulted in simulated sea water intrusion at some wells (Spencer Harris, personal communication, January 5, 2010). Hence, little to no margin of error exists to accommodate the uncertainty in upper aquifer yield relative to the proposed pumping rate.

2. Recent salinity measurements in deep wells show that the model underestimates the rate of movement of the saltwater front. The chloride concentration in the Palisades well reached 250 mg/L in early 2009, indicating the seawater front advanced approximately 4,500 feet in 8 years since it first arrived at the Pecho well in 2001. In contrast, the SEAWAT model projected that the seawater front would move only about 2,000 feet over the next 50 years—less than half the distance in more than six times the period of time—as shown by Figures A-7 and A-5 of the subject memorandum. The main cause for this error is probably the assumption that the saltwater front advances uniformly through the entire cross-sectional area of the model. However in reality—as was described in the 2005 seawater intrusion report (Cleath and Associates 2005)—almost all groundwater flow is through sand lenses with relatively small cross-sectional area. For example, if permeable sand deposits comprise 10% of the basin deposits, the saltwater interface would advance approximately 10 times faster than the rate simulated by the model. Hence, fundamental uncertainty exists in the hydraulic connection between saltwater and individual wells, which translates into uncertainty in the rate of seawater advance and sustainable distribution of pumping between the shallow and deep zones. If monitoring data indicate that additional pumping shifts between the lower and upper aquifers are necessary to prevent seawater intrusion in the lower aquifer, it could exceed the ability of the upper aquifer to support production without inducing intrusion into the upper aquifer.

3. There is uncertainty in the estimates of recharge (inflows) and pumping rates (outflows) specified as input to the model. The subject memorandum does not present the sensitivity of the yield estimate to the relative uncertainties in these flows. Specific flows that typically have relatively large uncertainty and could substantially influence the yield estimate for the Los Osos basin include:

a. Some previous studies estimated that private domestic wells extract 180-200 AFY, with little to no increase in private pumping since 1985 (Yates and Wiese 1988; Woodward-Clyde Consultants 1997; San Luis Obispo County 2007; Cleath-Harris Geologists 2009). Other studies estimated substantially lower private pumping rates, in the range of 71-88 AFY (URS Corporation 2000; Cleath and Associates 2002; Yates and Williams 2003; Michael Brandman & Associates 2008). There was no systematic chronological shift from one estimate to the other, and details supporting these estimates were presented only minimally if at all. Therefore, it appears there is uncertainty of at least 100 AFY in the amount of private domestic pumping used in the SEAWAT model. Because private domestic pumpers compete with municipal purveyors for yield, a larger estimate of private domestic pumping would result in a reduction in the expected yield that is available to the water purveyors.

b. The soil moisture budget method used to estimate rainfall recharge includes a number of parameters that are not well quantified. Two parameters that can substantially affect the average annual recharge estimate are the rainfall runoff coefficient and the depth of the root zone for various types of vegetation. In similar water balance studies, the range of uncertainty in these parameters has been shown to correspond to a +/- 40 % variation in estimated recharge (Yates and Wiese 1988; Yates, Feeney and Rosenberg 2005). This can translate directly into a similar uncertainty in estimated aquifer yield.

c. My understanding is that Willow Creek flows are not gauged, and the ET estimate for riparian vegetation is uncertain due to coastal fog effects and unknown "crop coefficients" for natural plant species. Uncertainty in creek flow and riparian ET estimates translate directly into uncertainty in the simulated leakage from the perched aquifer to the upper aquifer and, hence, similar uncertainties in estimated aquifer yield.

d. Streambed permeability influences the simulated quantity of flow between the stream and aquifer. For example, a low permeability can decrease the amount of percolation from high winter flows while having little effect on total groundwater discharge into the lower reaches of the creek. This would shift the simulated average annual net recharge from the creek, which contributes directly to the estimated aquifer yield. This source of uncertainty is further obscured by the use of steady-state simulations.

e. The model simulates a steady-state flow regime, which can underestimate seawater intrusion impacts. During droughts, water levels typically decline as a result of the reduction in rainfall recharge and corresponding increase

in groundwater pumping, causing a relatively rapid advance of the saltwater interface. This could potentially contaminate key production wells and require that they be removed from service for a period of months or perhaps years. Even a temporary loss of pumping capacity could jeopardize the reliability of the community water supply system. Furthermore, the subsequent retreat of the saltwater interface when water levels rise during a sequence of wet years can be slower than the advance during droughts, because the rate of movement is driven more by the density difference between freshwater and seawater. So the average interface location under transient analysis might be farther inland than under steady-state analysis, possibly requiring a reduction in the estimate of basin yield.

4. Mitigation of impacts to riparian, marsh and aquatic habitats could require an allocation of basin yield that is currently not considered. The wastewater project's Draft Environmental Impact Report presented a biological analysis that overlooked one of the largest potential impacts, which is a substantial reduction in groundwater discharge to Willow Creek and wetlands in the Los Osos Creek estuary and along the Morro Bay shoreline (Michael Brandman Associates 2008). This impact results from the planned decrease in septic system percolation, not the increase in upper aquifer pumping. For example, current estimates indicate septic percolation recharge to the perched aquifer is presently about 631 AFY and groundwater outflow from the perched aquifer to streamflow and riparian ET along Willow Creek is 552 AFY. As a result of the proposed sewering, the septic system percolation decreases to 36 AFY and outflow to streamflow and riparian ET decreases to 35 AFY (a 93% reduction). Sewering would similarly decrease upper aquifer outflow to marshes around the perimeter of the urban area. If this impact is eventually evaluated and deemed to significantly impact Morro Bay shoulderband snail, steelhead trout or other sensitive species or habitats, some form of mitigation will be necessary. If mitigation includes replacement flows, that allocation of water could compete for basin yield with other water users. Thus, this issue is a source of uncertainty in the amount of yield available to water users.

The proposed management actions to address the saltwater intrusion problem do not increase basin yield, but shift the location of groundwater extraction. For example, pairing shallow and deep wells at major pumping locations provides the opportunity to adjust the proportion of water pumped from the upper and lower aquifers but it does not increase yield. Furthermore, there are limits to this strategy because of uncertainty in the capacity of the upper aquifer to support additional extractions and the possibility of seawater intrusion occurring in the upper aquifer.

Saltwater intrusion can severely affect Los Osos basin water quality, which presently is the sole source of potable water in the basin. Intrusion requires years to decades to reverse and remediate. Therefore, any prudent water management plan must include margins of safety that consider the uncertainty in estimated basin yield, monitoring,

and an adaptive management strategy that includes contingency actions that can be implemented should the proposed plan not work.

Monitoring actions need to focus on the movement of the freshwater-saltwater interface in the upper and lower aquifers. Monitoring wells located between active upper aquifer production wells and Morro Bay, and lower aquifer production wells and the present interface location can detect the continued inland migration of saltwater before impacting production wells. Monitoring wells will be particularly important in the upper aquifer, where large changes in the water balance (decreased septic recharge and increased pumping) create an increased saltwater intrusion risk. Potential impacts of sewering on riparian, marshland and aquatic organisms along Willow Creek and bay fringe marshes should also be monitored with appropriate mitigation measures ready for implementation. Contingency measures can include any actions that decrease demand, increase overall basin yield, or decrease seawater intrusion.

In summary, there is substantial uncertainty in the basin yield. Because the consequences of saltwater intrusion are severe and difficult to reverse, I conclude that a responsible water management plan must incorporate margins of safety that consider the uncertainty in estimated basin yield. This can include proactive measures to prevent intrusion (such as water conservation) and should include a monitoring program to detect any continued saltwater intrusion and contingency actions to ensure Los Osos maintains a reliable water supply.

Sincerely,

Eugene B. (Gus) Yates, PG, CHg
Senior Hydrologist
HydroFocus, Inc.

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Exhibit 2

Engene Yates' review of the Los Osos seawater intrusion and LOWWP impacts and mitigations (August 2010)

HYDROFOCUS INC
Solutions for Land and Water Resources

3 August 2010

Mr. Keith Wimer
Los Osos Sustainability Group
1101 14th Street
Los Osos, CA 93402

SUBJECT: Review of Los Osos Basin Update and Current Wastewater Project Description--Revised

After reviewing San Luis Obispo County's update on groundwater conditions in the Los Osos basin and the current description of the wastewater project, I would like to offer the following observations.

- **The seawater intrusion problem is extremely urgent.** Seawater intrusion moved over a half mile in four years and has reached the center of municipal pumping from the lower aquifer. As I stated in my previous review (February 4) seawater intrusion is very difficult to reverse and renders water unusable for drinking when it exceeds only 1.5% of the inflow to a well. The most recent intrusion data indicate seawater intrusion is accelerating and threatens to shut down (or is already shutting down) the community's largest production wells.

- **Two immediate actions are needed to protect the water supply and prevent further intrusion.** Both actions can be implemented quickly (1-2 years), and both actions are mutually compatible:

  - **Shift most of the municipal pumping up from the lower to the upper aquifer system, and/or shift some of the municipal pumping farther inland.** This requires drilling new wells and laying more pipeline.
    - This action may not be sufficient to provide long-term protection against seawater intrusion because the basin has never experienced that much upper-zone pumping, particularly in the absence of septic system recharge.

  - **Decrease average per-capita water residential use from 104 gallons per capita per day (gpcd) to 74 gpcd or lower.** This latter level is reasonable since it is the current average for the City of San Luis Obispo.
    - This action provides more reliable long-term protection against seawater intrusion because it addresses the fundamental problem which is an overall imbalance in the water budget (i.e., more water is consumed in the basin than is being replenished). This would reduce total water production in the basin by about 500 AFY, which provides a reasonable

margin of safety given the uncertainty in previous studies (simulated intrusion rates) and uncertainties in the effects of currently proposed projects (shifting large amounts of pumping from the lower to upper aquifer; the percolation capacity of the Broderson leach fields).

- **Seawater intrusion and nitrates must be managed with an integrated basin-wide plan—they are interconnected problems within a single hydrologic system.** Examples of the interconnectedness between issues include:
  - Sewering will greatly decrease recharge to the upper aquifer at the same time municipal pumping from the upper aquifer will be increasing to minimize seawater intrusion. These two major changes are a huge shift in the upper aquifer water balance and could cause seawater intrusion in that aquifer.
  - Indoor water conservation tends to increase the salinity of wastewater (same quantity of salts will be dissolved into a smaller volume of water). Conservation is urgently needed, but its effect on recycled water salinity needs to be considered when planning for irrigation reuse. The Fine Screening Analysis estimates domestic water use adds 200 mg/l of total dissolved solids (TDS) from salts to the wastewater stream.
  - A small amount of saltwater intrusion can also increase the salinity of the municipal water supply to the point that resulting reclaimed wastewater will be unacceptable for irrigation reuse. A small amount of intrusion could easily push the TDS concentration of the municipal supply to near the short-term drinking water MCL of 1,000 mg/L, if intrusion outpaces the upward shift in pumping. Adding 200 mg/L of TDS from normal urban use would result in a wastewater TDS approaching 1,200 mg/L. The reuse technical memorandum (Carollo Engineers 2008) indicated that this level of salts could decrease yields of lettuce and peppers to less than 90% of normal yields, although other crops would remain above 90%. Nevertheless, this constraint on crop selection could diminish the appeal of recycled water to local growers
  - Outdoor conservation measures, especially xeriscape, can also have a beneficial effect on the amount of nitrates and other contaminants entering the groundwater. As water tables drop, nitrates are treated to a greater extent in the vadose (dry) zone of the soil, and use of native plants with xeriscape requires fewer fertilizers reducing nitrates entering the soil.
  - Stormwater recharge, along with conservation, benefit the water balance equation. Stormwater recharge will also control flooding in problem locations, reduce pollution of surface water, and dilute contaminants in the groundwater by promoting more efficient percolation of clean stormwater (infiltrated before it picks up pollutants).

- **The conservation target of 160 AFY in the project description is too small. Greater conservation is feasible and needed.**

  - The conservation element focuses only on residential indoor water use within the prohibition zone. This scope is unnecessarily narrow. Expanding to a larger footprint (the Urban Reserve Line) and to all types of water use (residential outdoor and commercial) greatly increases the conservation potential, as the following bullets demonstrate.
  - Current per-capita water use within the Urban Reserve Line is about 104 gpcd (1,722 AFY residential water use/14,800 residents, per LOSG data sheets).
    - Residential water use in San Luis Obispo is 74 gpcd. If Los Osos decreases its water use to the same level, the annual savings would be 497 AFY. This exceeds the proposed percolation rate at the Broderson leach fields, and it does not include potential reductions in commercial and institutional use.
    - The recent County update on the project commits to a target of 50 gpcd for residential indoor use within the prohibition zone (12, 450 population). This goal is less effective than meeting the San Luis Obispo target. If indoor residential use in this zone is 66 gpcd (per the Fine Screening Analysis), then a decrease to 50 gpcd would save only 228 AFY. If the 74 gpcd target were used in the prohibition zone, 418 gpcd would be saved. The target for overall use (74 gpcd) is preferable (especially if used within the URL) to the target for indoor use (50 gpcd) because it encompasses a broader range of conservation opportunities.
    - Conservation has many co–benefits, such as reduced energy consumption for pumping and heating water for domestic and commercial uses. Conservation is doubly important in conjunction with the wastewater project, because it decreases the amount of water that is exported from the western half of the basin in the first place, thereby decreasing the volume of recycled water that needs to be piped back to the west side. This decreases energy and operating costs for water treatment, wastewater treatment, and conveyance in both directions.
    - Conservation measures that decrease indoor water use or reuse water on-site have the dual benefit of decreasing municipal pumping and decreasing wastewater generation. These measures include low-flow plumbing fixtures and graywater systems. The previous, onerous regulations governing residential graywater systems were largely eliminated in the 2010 update to the California Plumbing Code. Graywater systems are now much more feasible from a permitting and cost standpoint.
    - Other conservation and water management measures have no effect on wastewater generation but are needed to bring the water budget in the Western Compartment back into balance. Some of these are mentioned in the Basin Update and previous project design studies but are not included in the current project description. Measures in this category include agricultural exchange

(using irrigation wells in the Los Osos Creek area for municipal supply in exchange for recycled water delivered for crop irrigation), stormwater management to increase percolation of runoff, and rainwater harvesting. These should all be included as part of a comprehensive program to address wastewater management and seawater intrusion.

- **Previous studies should be updated to reflect the current project description and current status of seawater intrusion.**
  The current project description reportedly does not include sprayfields. The recently documented arrival of seawater intrusion at the center of pumping in the lower aquifer will undoubtedly alter pumping patterns. Some of the cost and feasibility analyses in previous studies (for example, the Fine Screening Analysis and reuse technical memorandum) should be updated to reflect current conditions and opportunities.
  - The arrival of seawater intrusion at the center of pumping in the lower aquifer will force purveyors to shift a large percentage of municipal pumping from the lower aquifer to the upper aquifer. This would move the seawater intrusion problem from the lower aquifer to the upper aquifer. It also means that the "mitigation factors" used to evaluate the effect of wastewater alternatives on lower aquifer intrusion are not as relevant. The water balance and intrusion risk in the upper aquifer will be as important as in the lower aquifer, if not more so. For example, the effectiveness of percolation from the Broderson leach fields for mitigating upper aquifer intrusion is greater than for the lower aquifer, but new problems arise because the localized nature of Broderson recharge and increased upper aquifer pumping could result in seawater intrusion. As I mentioned in the previous review, Broderson recharge will not supply water to bay fringe marshes in the Baywood Park area.
  - The Fine Screening Analysis, the reuse technical memorandum (Carollo Engineers, 2008) and the Basin Update all assumed that water conservation would decrease water use and wastewater generation by only 160 AFY. The current project description assumes a 16 gpcd decrease in indoor water use (from 66 to 50 gpcd), which would decrease wastewater generation by 223 AFY for the initial population in the sewer service area (12,450 people) and by 330 AFY at buildout (18,428 people).
  - The previous studies rejected water conservation, urban reuse, graywater systems, low impact development (LID) and stormwater percolation as elements of the project because they would require purveyor participation. I disagree. All of those measures can be implemented by dealing directly with homeowners and public works agencies, bypassing the purveyors.
  - The current project description includes urban reuse, in spite of the previous conclusion that they would be infeasible because they require purveyor participation.

- The current, rapid advance of the intrusion front could change purveyor willingness to participate in conservation measures and alternative supply options such as agricultural exchange.
- Collectively, these several changes in basic project parameters (increased conservation, shifting pumping from the lower to upper aquifer, elimination of sprayfields) warrant an updated evaluation of project design and operation with an eye toward minimizing overall costs and impacts.

- **Eliminating the Broderson recharge facility appears feasible and should be considered.**
  The current project description proposes to percolate 448 AFY at the Broderson leach fields to meet two objectives: preventing seawater intrusion and disposing of wastewater in winter. A decrease in municipal pumping of 448 AFY would be at least as effective for preventing intrusion and is achievable through water conservation, agricultural exchange and urban reuse (see above discussion). Winter wastewater handling could be achieved through additional seasonal storage. In the absence of sprayfields and the Broderson facility winter storage for 4 months of recycled water is needed in an average year, and 5 months in a wet year. Also, approximately 28 inches of additional reservoir depth is needed to store excess rainfall during an exceptionally wet winter. With an initial wastewater generation rate of 700 AFY and 83 AFY of inflow and infiltration during the wet season, then 5 months of seasonal storage would require reservoir capacity totaling 375 AF. The reuse technical memorandum indicated that reservoirs with a depth of 15 feet "should be possible in any location east of Los Osos Creek" (Carollo Engineers, 2008). On a gross area basis, this translated to 12 AF of storage per acre of reservoir. Because approximately 2 feet of reservoir depth must be reserved for storing rain that falls directly on the reservoir during an exceptionally wet year, recycled water storage would be approximately 10 AF per acre of reservoir. The Giacomazzi site has at least 12 acres available for a reservoir. The remaining 255 AF of storage (requiring about 26 acres) would need to be constructed off-site, possibly on property owned by the end users.

  The cost of the additional reservoir capacity would be substantially offset by eliminating the cost of the Broderson leach fields and possibly eliminating nitrate removal from the treatment process. Nitrate removal is necessary for recharge but not for irrigation. The storage facility (ies) would be on land not suitable for farming and without sensitive habitat, avoiding impacts to both. Since project construction will take several years, time is available to locate and plan these sites as reuse contracts are being developed.

  This alternative would recycle as much as 100% of the wastewater for irrigation (783 AFY, including winter inflow and infiltration). Current irrigation in the Los Osos Creek area is approximately 800 AFY (Cleath-Harris Geologists, Inc., 2008), and urban reuse

opportunities totaling 133 AFY have been identified (Carollo Engineers, 2008). Thus, sufficient demand already exists to absorb the annual recycled water supply.

- **Wellhead treatment to meet primary drinking water standards is inevitable.** Seawater intrusion is forcing municipal production into the upper aquifer, where nitrate concentrations exceed the maximum contaminant level for drinking water in some locations. Wellhead treatment to remove nitrates using exchange resins is an approved technology, and is less costly and energy intensive than using reverse osmosis to desalinate seawater. Well-head treatment has been approved by the CPUC for Golden State Water Company in Los Osos.

- **The discrepancy between measured and simulated rates of seawater intrusion is not surprising.** The measured rate of advance of the saltwater/freshwater interface has been much greater than the simulated rate. The discrepancy likely stems from aquifer heterogeneity (water moves through the aquifer along preferred flow paths within sand lenses) that is not represented at the scale of the model. Heterogeneity does not have much effect on simulated water levels and basin yield, but it has a large effect on simulating the advance of the saltwater front.

- **If onshore water levels are above sea level, there will probably be no intrusion.** The rapid rate of seawater intrusion is caused by unsustainably low onshore groundwater levels. Although the greater density of seawater can theoretically cause intrusion even while onshore water levels are above sea level, I am unaware of a single instance when this occurred. In every case, seawater intrusion has occurred when onshore water levels fell below sea level. Water levels in the pumping trough in the center of Los Osos have been 5-10 feet below sea level for years. Seawater will tend to move into this trough until water levels are brought up, which is why pumping must be reduced drastically in the lower aquifers (by approximately 1000 AFY according to model simulations [Cleath-Harris Geologists, 2009]) as soon as possible. Reduced pumping from conservation provides a rapid and direct way to address this issue, with long-term benefits.

- **Use monitoring data to track the saltwater interface and the model to track the water balance.** Models have trouble simultaneously simulating both detailed constituent transport and volumetric water budget components due to numerical instability. A transient groundwater flow model with monthly or shorter time steps will provide reasonable estimates of the water balance, particularly recharge and discharge along Los Osos Creek. The flows from that model can be inserted into the steady-state SEAWAT model to estimate the long-term interface location. Margins of safety should be applied to all modeling results to account for the uncertainties in modeling (see my January 13 comment memorandum) and the difficulty of reversing seawater intrusion.

Given the rapid advance of the saltwater front, additional monitoring wells are probably warranted to monitor the status of intrusion and the effect of pumping reductions on the rate of intrusion.

- In summary, the wastewater project must be designed to help solve the seawater intrusion problem as part of an integrated water management plan for the Los Osos basin. Water conservation and wastewater recycling are the key links between the wastewater project and seawater intrusion, and the present level of commitment to those project components is inadequate. The project should include water conservation, wastewater recycling, agricultural exchange and stormwater management measures that were considered but prematurely dismissed in previous studies but that continue to be advocated by the Los Osos Sustainability Group. The reasons for dismissing them were based primarily on assumptions regarding institutional and public mindset rather than technical or financial infeasibility. Those assumptions are out of date, given the harsh reality of the intrusion situation and the opportunity to concurrently solve the intrusion and wastewater problems at minimum cost.

Please do not hesitate to contact me if you have any further questions.

Sincerely,

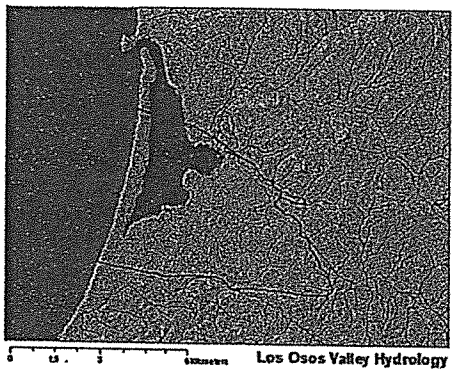
Gus Yates, PG, CHg
Senior Hydrogeologist

Exhibit 3

Monterey Bay Watershed Institute review of Los Osos seawater intrusion and LOWWP impacts and mitigations (January 2010)

Central Coast Watershed Studies | *CCoWS*

Can Los Osos Valley Groundwater Basin Provide a Sustainable Water Supply?



CSUMB Class ENVS 660

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over the long term. On some scales such as the average ages of water in the main aquifers from 870 to 7300 years, there is no feasible way of monitoring the true effects of recent actions so far in the future. However, setting up monitoring on the timescale of movement between and within the aquifers is possible.

According to our groundwater velocity results, the Impacts of changes in water-use practices in Zone A such as LID or recycled water (e.g., in percolation ponds or wetlands) could manifest as changes in Willow Creek hydrology in as few as 2 years (Table 5), or sooner depending on how close measures are to the site. The effects of changing recharge regimes on many parts of Zone C would take much longer, about 20 years (Table 5). If a drought were to reduce recharge from Los Osos Creek, the attendant reduced recharge of the current water table depression below downtown in Zone C might not be realized for 18 years. In Zones D and E the same drought could take more than 100 years to impact water tables (and seawater intrusion), depending on the evolving hydraulic gradients (Table 5). This lag time is important in terms of understanding how nitrate levels in the aquifers may change with the project. The reduction in nitrates from the project will take thirty years in the upper aquifer according to the models and about 268 years in the lower if assumptions about aquitard permeability are correct (Yates and Williams 2003). The effect of current actions designed to reduce nitrate concentrations will not be testable for many years, and nitrate levels will continue to rise in the near term (Yates and Williams 2003).

Vertical percolation rates down to the water table are rapid compared to lateral water movement, except where the flow is impeded by aquitards. This may have implications for management. At the proposed Broderson site, percolation to the water table is estimated to be three months but then travel time to downtown takes twenty years (Table 5), so there will be lag time between current geographically dispersed septic recharge and planned point recharge in the system. The transition period, when the recharge system is equilibrating may be a time of saltwater intrusion in the upper aquifer.

The primary impediment to vertical movement in the Los Osos basin is the AT2 aquitard. The time of 171 years for water to move vertically through the aquitard implies that any post-development recharge moving between the upper and lower aquifers is from well leakage between these zones, or natural holes in the clay layer although studies characterize the aquitard as continuous. The Late Quaternary Los Osos fault zone (Fig. 1) cuts through the layers in the groundwater basin, raising the possibility that the AT2 aquiclude is not a continuous barrier. Further, the "hydraulic parameters of the clay have not been measured directly" (Cleath 2005, pg 8). Testing should be done to resolve this question as the permeability of the aquitard is key to estimating recharge potential and safe yields for the lower aquifer. It is worth noting that conservation and

3.9 Los Osos Wastewater Project Contingency Plan

3.9.1 Mitigation

A contingency plan for the wastewater project should address three key elements:

- Uncertainty in plan elements
- Essential monitoring that can determine if the basin plan is working
- Mitigation activities that will bring the project back in line with desired goals.

Money should be budgeted to perform the required monitoring, periodic assessment of the monitoring data, and appropriate mitigation activities.

Although each contingency plan is unique to a project and a region, there are common elements that are often included in a ground water contingency plan. An example of the outline of a contingency plan is shown in Figure 22 (Taraszki et al. 1997). The purpose of an LOWWP contingency plan is to describe actions that should be taken to monitor effects from the implementation of the LOWWP, and to determine actions that could be [illegible] intrusion or the implementation of the LOWWP (DRC2003-00102). [illegible] The stated primary purpose of the Los Osos Wastewater Project is to comply with the CRWQCB's directive to reduce groundwater contamination (primarily of nitrate) caused by ineffective septic treatment systems. The secondary objective is to address current water resource issues in Los Osos and the problem of salt water intrusion into the lower aquifer. Because there is likely to be a time delay between project implementation and its potential impacts to some basin groundwater systems and [illegible]

a) Be conservative in mitigation plans and [illegible] such as increased seawater intrusion,
b) Set up monitoring protocols for early detection, and
c) Develop a range of options that provide [illegible] by salt water or other project / management plan impacts.

et al.

Contingency Plan Outline

I. Introduction
   a. Purpose and Objectives
II. Background
   a. Project Description
   b. Regulatory and EIR Framework
   c. Regional Geological and Hydrological Conditions
III. Monitoring Well Network
   a. Rational for needed well network
   b. Review of Wells and Site Selection Process
   c. Well Installation Recommendations
IV. Groundwater Sampling Program and Data Analysis
   a. Sampling Program
   b. Procedures
   c. Data Management and Analysis
   d. Hydrologic Balance Evaluation
V. Remedial Contingency Plan
   a. Priority Zone A
      i. Performance Criteria
      ii. Benchmarks

Figure 22: Example of a contingency plan outline extracted from plans developed by Taraszki et al. 1997 and 2007.

A contingency plan identifies areas where there are significant uncertainties and defines remedial plans for responding to outcomes that might occur. In the case of the LOWWP, the primary uncertainties of this project relate to the [redacted]. A contingency plan is [redacted] for each of these [redacted] (called Priority Zones in the outline) as well as any other arenas where there is a substantial risk that might arise due to uncertain outcomes. The purpose of this paper is to recommend that contingency plans are developed for these arenas, so that Los Osos can be well prepared to respond if necessary, to a reasonable range of outcomes. Other objectives are to stress the need for preventative measures and to highlight some of the questions that should be addressed in regard to each of the four arenas where we believe contingency plans should be developed. As the LOWWP contingency plans are further defined and clarified, someone or some group with understanding of the final plans and the required hydrological expertise to develop a contingency plan should be

assigned to develop such a plan. It is also advisable the plan is an integrated plan detailing integrated and coordinated responses to potential impacts, with the appropriate administration and funding spelled out in a basin management program or plan.

3.9.2 Priority Zone 1: The Broderson Leachfield Disposal Capacity

Approximately 1130 AFY (1.4 million m3/yr) of septic effluent that is currently dispersed throughout the Los Osos basin will be reduced in stages. Thus, the water that previously leached into the upper aquifer from these septic systems will be redirected to a treatment plant (Hopkins Groundwater Consultants 2008 EIR p. 30). The Broderson leach fields will discharge 448 AFY (550,000 m3/yr) of treated effluent to a single [illegible] (Hopkins Groundwater Consultants EIR p. 31). Note that this level of discharge to Broderson leach field is half that assumed by Yates in the 2003 modeling effort, but the previous project used "harvest wells to keep water from daylighting downhill" (Yates and Williams 2003). The EIR speaks to setting up a monitoring program for the Broderson leach field [illegible]

Below is a list of questions that might reveal where uncertainties exist:

1) Broderson Site: [illegible]
2) Can the [illegible] (upper and lower aquifers, and to wetlands, etc.)

Monitoring Requirements:

The EIR discusses the use of a series of [illegible]

Are these impacts likely to be seasonal or weather dependent and is this accounted for in the monitoring plan?

Are there sufficient monitoring wells.

Benchmarks:

How will current conditions be adequately measure and monitor?

21.

Can performance assessment occur at stages through the timeline of septic system removal so that if adverse impacts are detected, the remainder can be delayed until contingency plans are implemented?

Contingency Measures:

Are there other disposal locations that could supplement the Broderson site if it is unable to handle the load requirements?

What are the best alternative locations and why are these preferred?

Could more recycled water be directed to urban reuse, agricultural reuse, and wetlands to reduce the need to dispose of recycled water at the Broderson site?

How much conservation should be in place prior to project start up to allow reduced pumping of the upper aquifer if Broderson fails to recharge the upper aquifer? (This would be designed to prevent/reduce the need for a response.)

Contingency Decision Making Process and Reporting:

Who will be responsible for developing, approving, implementing, and maintaining plans/program initially and over time?

How will plans be funded initially and over time.?

Who should be informed of the results of the monitoring and assessment?

Who should be involved in decision making regarding the need to resort to a contingency plan?

Figure 23 depicts the beginning draft of a decision tree regarding the Broderson site contingency plan. As the contingency plan is further developed and questions like those outlined above are addressed, this decision tree can be added to, refined, and modified.

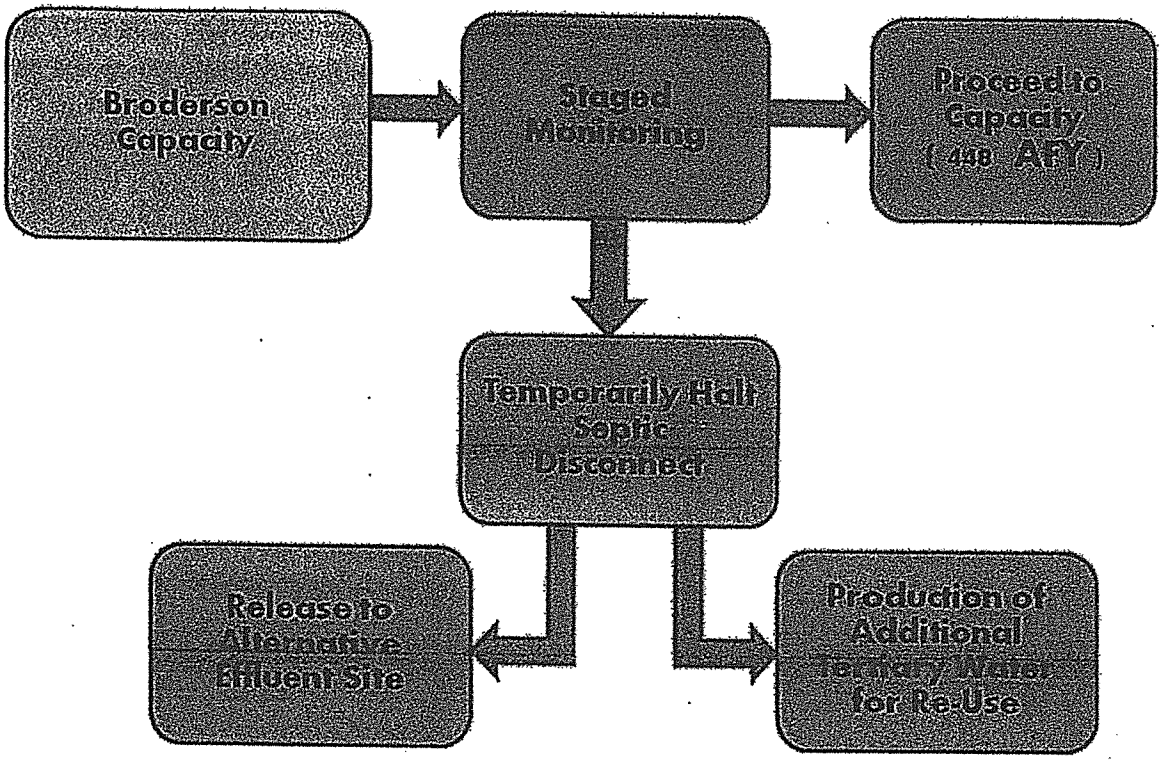


Figure 23:The draft of a decision tree for the contingency plan needed to address the uncertainty of the Broderson site capacity to infiltrate 448 AFY (550,000 m3/yr) without adverse impact.

3.9.3 Priority Zone 2: Capacity of the Upper Aquifer to Resist Salt Water Intrusion

The capacity of the upper aquifer to resist sea water intrusion across the face of the sea water [redacted] the upper aquifer will be impacted when it receives a greater portion of water from a single location (the Broderson site) rather than from dispersed sites (septic systems). It is feasible that a [redacted] could cause more outflow along part of the [redacted] thereby increasing the pressure against salt water intrusion.

Safe yield of the upper aquifer is unknown and is estimated in the Resource Capacity Study to be 1150 AFY (1.4 million m³/yr) (SLOCDPBD 2007). Current production from the upper aquifer is 800 AFY (985,000 m³/yr) and safe yield estimates go as high as 1670 AFY (2 million m³/yr) according to purveyors (Heath Harris 2009). The accuracy

56

[redacted] Under average rainfall conditions, it is currently assumed that the Los Osos upper aquifer discharges approximately 1300 AFY to the bay with a portion of that supplied by septic return flows (based on basin balance charts in the EIR; Cleath & Associates, 2008). [redacted]

[redacted]

- Condition 97 specifies the need to return treated effluent to the groundwater basin, to use reserved capacity to satisfy environmental and agricultural needs in Los Osos Valley and to avoid using water to satisfy non-agricultural development outside the community.
- Condition 99 outlines a plan for a household conservation effort and specifies a dollar amount of funding to go toward this water conservation program.
- Condition 86 prevents growth until there is evidence for available water to support development without harm to wetlands and habitats.
- Condition 88 agrees the County will assist property owners in the implementation of using existing septic systems for percolating storm water runoff where appropriate.

[redacted] (Fig.

24). [redacted] A hydrologist should be consulted to determine whether further wells will be required to make this determination. Budgeted money and a contract with the hydrologist for developing a monitoring plan, for needed additional wells and for implementing the monitoring and assessment should be a condition of approval of the LOWWP

Questions regarding the upper aquifer's Safe Yield and capacity to resist salt water intrusion:

Monitoring Wells:

Is there a sufficient set of monitoring wells to detect salt water intrusion that might result from the LOWWP?

Are additional wells needed as an early indicator so that appropriate response can be taken and responsiveness can be as timely as possible?

Sampling Program:

How frequently should samples be taken at each well?

How should this data be managed and analyzed?

How will the hydrologic balance and current models for this balance be updated and refined based on findings from monitoring?

Contingency Plan:

[redacted] How much water can be collected water from hillside runoff, roof tops or impervious surfaces? [redacted]

Decision Making and Reporting:

Who will pay for the ongoing monitoring and assessment of the condition of the upper aquifer?

Who will receive information and reports from monitoring, assessment and the hydrological balance developed from these studies?
What decision making process will be used to decide on the appropriateness of implementing contingency measures?

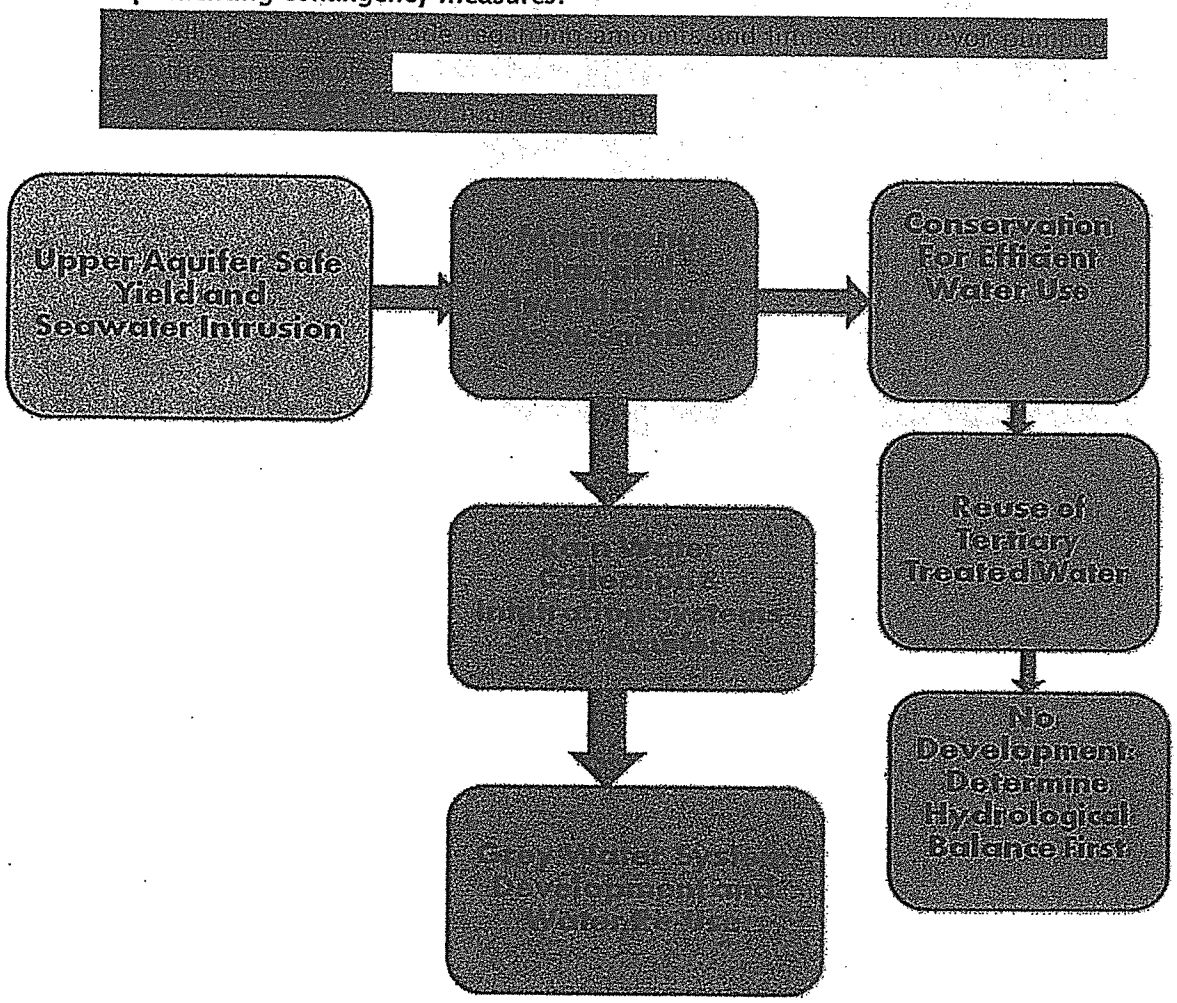
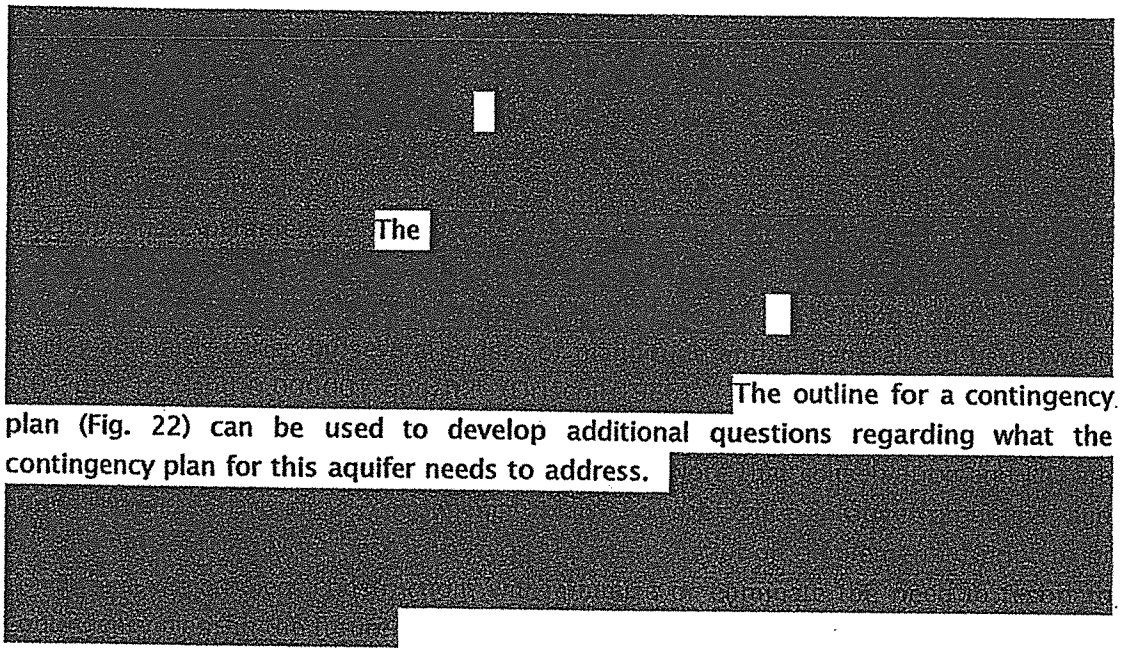


Figure 24. The beginning draft of a decision tree regarding the upper aquifer safe yield and saltwater intrusion contingency plan. As the contingency plan is further developed and questions like those outlined above are addressed, this decision tree can be added to, refined, and modified.

3.9.4 Priority Zone 3: Reversing Salt Water Intrusion in the Lower Aquifer

There

The SWI report (Hopkins Groundwater Consultants 2005) states that the



The outline for a contingency plan (Fig. 22) can be used to develop additional questions regarding what the contingency plan for this aquifer needs to address.

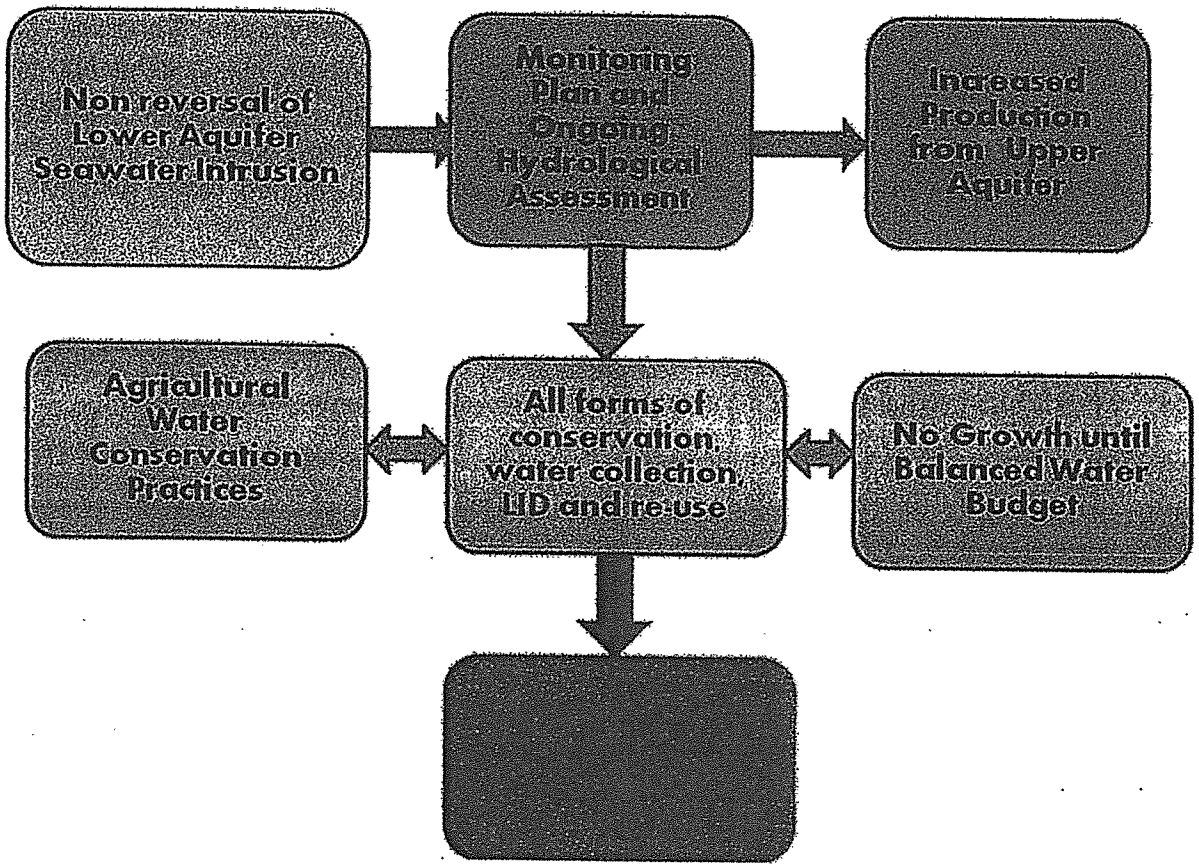


Figure 25. The beginning draft of a decision tree regarding the lower aquifer Safe Yield and the need for a contingency plan if salt water intrusion is not reversed.

3.9.5 *Priority Zone 4: Environmental Conditions – Willow Creek, Los Osos Valley Creek, Los Osos Valley Creek Estuary, and Morro Bay National Estuary and State Marine*

All creeks and wetlands that might be affected by changes in the water regime should be monitored and surveyed prior to the project, then during and after project implementation for changing hydrological conditions affecting plant and animal species. It is very important to maintain stream flows in Los Osos Valley Creek because it is a protected watershed for steelhead. When the LOWWP is implemented, water that is currently going to wetlands will be reduced by several hundred acre feet. (Harris at a Planning Commission hearing on 6/30/09). Project Condition 97 specifies that no less than 10% of the effluent will be reserved for the environment. Appeal Condition 20 from the Coastal Commission hearing, (Los Osos Wastewater Treatment Facility Groundwater Level Monitoring and Management Plan Coastal Development Permit condition 20) lays out a monitoring and contingency plan to protect these resources. The detail of this plan should be revisited as a condition of approval. A more abbreviated condition of

approval from the 8/13/09 meeting of the Planning Commission (Condition 87) specified the need for monitoring groundwater levels, surveying wetlands plants and animals, monitoring wetland hydrology and water quality. This same condition provides for general plan components, i.e. annual reporting and an education program encouraging property owners to direct rain gutters to abandoned septic systems to recharge groundwater.

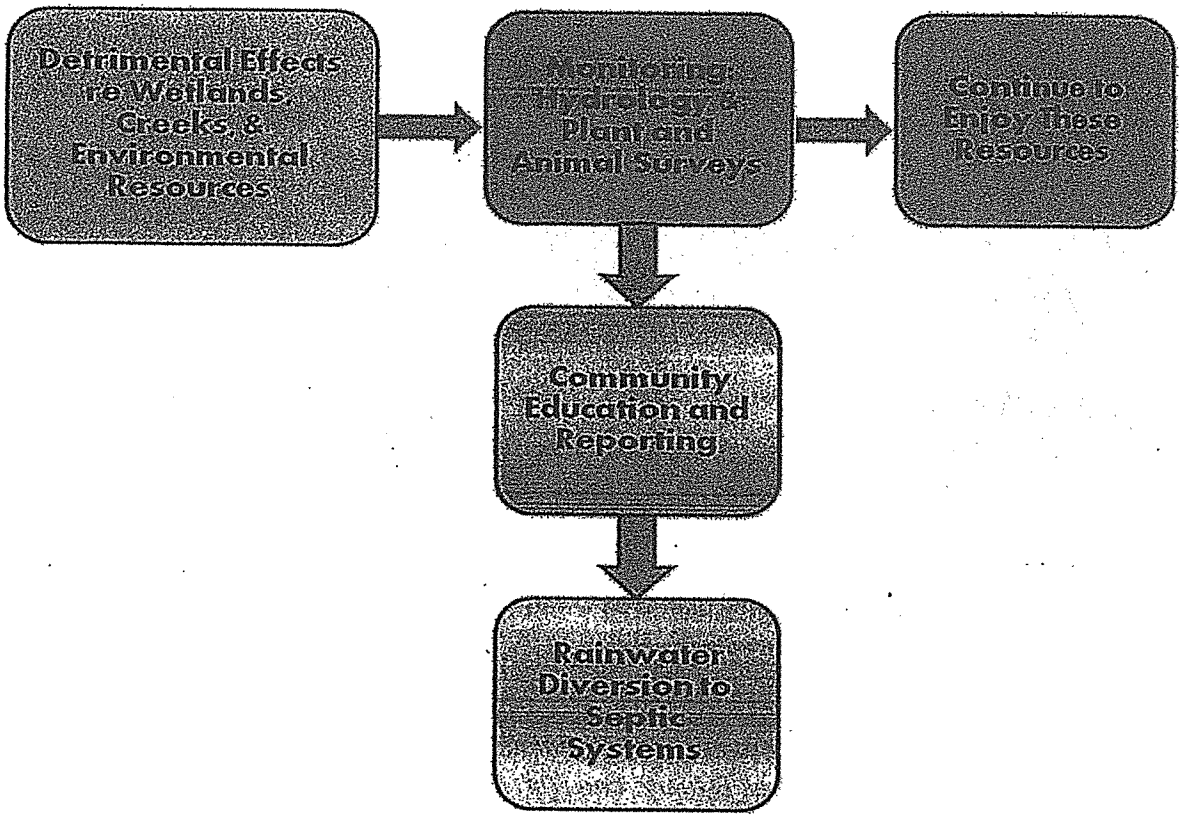


Figure 26. The beginning draft of a decision tree regarding the Environmental Resources, Creeks and Wetlands. There is a need for a monitoring and contingency plan to protect these resources from changes that may occur due to the LOWWP.

4 Recommendations

The challenge of developing a sustainable water supply for the community of Los Osos has been triggered, in part, by development of a waste water project in the area. Planning for the Los Osos Wastewater Project (LOWWP) has included the investigation of several opportunities to avoiding the impacts of the project on the groundwater, and this has highlighted the need to reverse salt water intrusion into the lower aquifers, while protecting the upper drinking water aquifer, and the environmentally sensitive eosystems in the area that depend on groundwater flows. Community members, water purveyors, San Luis Obispo Public County officials, and other stakeholders, are investigating a range of options to accomplish these water management goals, including shifting pumping locations, intensive conservation, rainwater harvesting and [illegible] strategies, and beneficial reuse of recycled water once the wastewater project goes on line.

Pursuing outside sources of water or a desalination facility to achieve a balanced water budget should be considered last resorts, as these alternatives are expensive, have questionable sustainability, and may bring unintended consequences. For example, desalination facilities are energy intensive and create environmental problems that are difficult to mitigate (Cooley et at. 2006).

4.1 Recommended Actions

For each topic of study, we recommended potential actions that could be taken by the Los Osos community, water purveyors, the County and other governing agencies, with input from the public as plans are developed. We hope that the suggestions will spark creative ideas amongst those who read and discuss them, and stimulate further investigation of possible means for creating a balanced hydrologic budget in the Los Osos basin. The goal of achieving a water balance is an important one, and we credit the community for seeking alternative strategies and outside perspectives toward achieving this goal.

4.2 Pursue a Balanced Hydrological Budget, Monitor to Improve Basin Understanding, and Update Models

Water in deep aquifers has been called "fossil water" because it is ancient water that has slowly accumulated over several millennia and is replenished by gradual processes that occur on a geological timescale rather than a human timescale. The reservoir of fossil water for Los Osos is stored in the lower aquifers and has been depleted at accelerated rates far exceeding the recharge rate. This practice must be stopped for a sustainable

[redacted] It is anticipated that water use will transition to the upper aquifer as a primary source; however [redacted] Due to the many factors and unknowns associated with groundwater hydrology and achieving a balanced Los Osos water basin, [redacted]

4.3 Rainwater Harvesting from Roof Top Collection

Rainwater harvesting and LID strategies represent a potential water source which can reduce outdoor water use and help recharge the aquifers supporting basin balance. While our calculation and analysis of the amount of water that can be collected from roof-tops deals with only one factor associated with this potential water source—and our findings were inclusive—the investigation suggests very significant volumes of water may be available from this source to help balance the basin. We recommend further analysis and consideration of t rainwater harvesting/LID options to help balance the basin and mitigate for the project. The option also has several co-benefits, including prevention of stormwater pollution and creation of attractive community features and on-site landscaping features.

4.4 Wetlands as an Alternative for Nitrate Reduction, Water Purification, Tourism, and Ecosystem Values

Wetlands are a relatively inexpensive means for water purification when compared with mechanical treatment systems because they are powered by the natural energies of sunlight, wind and bio-geological interactions (Kadlec and Knight 1996). The relative disadvantage of wetland treatment systems is that they require more land than some other treatment options; However wetlands can be integrated into a community plan that achieves other community goals. Wetlands can become parks, centers for education, and a draw for tourism into an area. They provide quality of life benefits and ecotourism opportunities by attracting wildlife, providing beautiful open space, and creating sites for outdoor recreation and enjoyment.

We have estimated a total wetland area between 30 and 50 acres would be needed to provide the treatment capacity required for the Los Osos waste water facility. The Cal Poly San Luis Obispo Department of Landscape Architecture has previously developed project plans and provided renditions of community parks incorporating wetland spaces. This group or other similar programs might be asked to propose a wetland park for Los Osos. Investigation of treatment wetlands that provide many simultaneous values (water purification, open space, recreation, education and habitat) could enhance the Los Osos community and become an example for other communities. We recommend visiting the Arcata, California wetland to see an outstanding example of a wetland sewage treatment system that is simultaneously a park space, recreational and educational facility, source of community pride, as well as a tourist destination. If a site can be found to accommodate the development of a wetlands and park in the Los Osos and if these goals and values are consistent those of the Los Osos community, then a wetland treatment system should be further investigated.

4.5 Rain and Drought

[redacted] The local rainfall average has quantifiable uncertainty, and typical droughts might not be adequately represented in previous analyses.

Statistical estimates of average rainfall can be stated as a range of values that are equally likely to be the true average with 95% confidence. One conservative approach to sustainable water planning is to model the hydrologic budget of the basin using the lower limit of the 95% confidence range rather than the central value. There are other ways to employ conservative values as inputs to the model. [redacted]

[redacted]

Exhibit 4

LOWWP Fine Screening Analysis (August 2007)

San Luis Obispo County
Los Osos Wastewater Project Development

VIABLE PROJECT ALTERNATIVES

FINE SCREENING ANALYSIS

FINAL
August 2007

Carollo
Engineers...Working Wonders With Water™

In association with Crawford Multani & Clark Associates, Cleath & Associates Engineering Geology/Hydrogeology

Table 2.3 Reuse/Disposal Considerations
Los Osos Wastewater Development Project
San Luis Obispo County

Disposal/Reuse Alternatives	Disposal Capacity (AFY) For Fully Developed Alternative[1]	Seawater Intrusion Mitigation Factor	Total Seawater Intrusion Mitigation (AFY)	Denitrification Likely Required (AFY)	Tertiary Treatment Likely Required (AFY)	Requires Purveyors' Participation
Spray Fields	1,190	0	0	No	No	No
Cemetery Reuse (in lieu)	50	0.1	5	Partial[2]	Yes	No
Urban Reuse (in lieu, large sites)	63	0.55	35	Partial[2]	Yes	Yes
Agricultural Reuse (in lieu)	460	0.1	46	Partial[2]	Yes	No
Agricultural Exchange	460	0.55	250	Partial[2]	Yes	Yes
Leachfields/Percolation Ponds without Harvest Wells (Broderson site)	448	0.22	100	Yes	No	No
Leachfields/Percolation Ponds with Harvest Wells (Broderson site)	896	<0.22[3]	<200[3]	Yes	No	Yes
Other Actions Influencing Seawater Intrusion Mitigation[4]						
Conservation[5]	160 (at buildout)	0.55	90			No
Harvest Water Exchange[6]	none	0.55	Up to 550[7]			Yes

Notes:
(1) The project is estimated to require a total disposal capacity of 960 AFY at current conditions and 1350 AFY at buildout, which can be reduced to 1,190 AFY with conservation.
(2) The NWRI report (2006) stated that effluent disposed by land application (i.e., spray irrigation) will not need to undergo nitrogen removal when applied at agronomic rates. However, application of high concentrations of nitrogen would exceed agronomic rates, so partial denitrification to between 10 and 20 mg/L N may be necessary.
(3) Harvesting water to prevent mounding when Broderson is used in excess of 448 AFY reduces the volume of water that percolates to the lower aquifer.
(4) These Other Actions are not reuse/disposal alternatives and therefore do not have an associated capacity.
(5) Conservation is assumed to be achieved through a toilet retrofit program financed by the wastewater project. Although it is not a disposal alternative, it provides an equivalent benefit to 160 AFY disposal capacity.
(6) Does not address wastewater disposal (capacity) and is therefore considered beyond the scope of the wastewater project.
(7) The total mitigation value of harvest water, urban reuse, agricultural exchange, conservation and any other activity that reduced production from the lower aquifer cannot exceed 550 AFY, which is the expected rate of seawater intrusion once septic flows are moved out of town.

Exhibit 5

Peter Mayer review of the Maddaus Water Management (MSM) conservation plan used for the LOWWP and Basin Plan (October 10, 2011)

Aquacraft
WATER ENGINEERING & MANAGEMENT

Memo

To: Los Osos Sustainability Group

From: Peter Mayer, P.E.

Date: October 10, 2011

Re: **Review of 2011 Water Demand Analysis and Water Conservation Evaluation prepared by Maddaus Water Management**

The Los Osos Sustainability Group (LOSG) contacted Peter Mayer of Aquacraft and requested his review of the *2011 Water Demand Analysis and Water Conservation Evaluation* prepared by Maddaus Water Management for the Los Osos ISJ Working Group. The LOSG wanted to know if the Maddaus plan maximized cost-effective conservation for the Los Osos area, and, what can be done to increase water use efficiency in Los Osos. We very much appreciate the opportunity to review this analysis and evaluation document and offer the following thoughts and comments for the LOSG.

In 2011, Aquacraft, Inc. completed a state-wide analysis of single-family home water use in California (DeOreo, 2011). This study provided detailed data on the patterns of indoor and outdoor water use homes across the State. The statistics on water use and models that were prepared for this study provide a clear picture of current, typical single family water use in California, and we have relied on these results in our analysis.

General Comments

Los Osos, California is a small community that has real concerns about the long term viability of its groundwater supply because of documented evidence of seawater intrusion into the aquifer that is relied upon for potable water. Based on documents provided to Aquacraft by the LOSG, the danger of seawater intrusion is significant and experts have recommended that Los Osos reduce groundwater pumping quickly to try and reduce further damage to the aquifer.

The evidence of seawater intrusion in the Los Osos basin is well documented. The *Los Osos Groundwater Basin Update* states, "Based on the increasing rate of seawater intrusion described, it is clear that quick and decisive action must be taken to address the intrusion" (ISJ Working Group, 2010). Dr. Douglas Smith of CSUMB notes in a June 9, 2010 letter to the California Coastal Commission, "The available chloride data from the basin (although not up to date) indicates that saltwater intrusion is quickly progressing." Eugene Yates, author of two studies on the Los Osos

21.

Basin states, "The seawater intrusion problem is extremely urgent. Seawater intrusion moved over a half mile in four years and has reached the center of municipal pumping from the lower aquifer" (Yates 2010).

Groundwater is the sole water source for the area at this time. A concerted water conservation effort in Los Osos has been identified as the quickest and least expensive way to reduce groundwater pumping and stabilize the endangered aquifer. A strong and aggressive water conservation program appears to be of critical importance for the sustainability of the Los Osos basin.

The Los Osos Wastewater Project, Coastal Development Permit (CDP-A-3-SLO-09-055/069) issued 9/7/2010 states that "prior to construction" a water conservation program must be implemented which, "limits indoor water use to no more than 50 gallons per person per day on average within the basin," and which should, "reduce potable water use as much as possible." The CDP document also states that the Los Osos conservation program, "shall include provisions for the use of the $5 million committed by the Permittee to initiate water conservation measures pursuant to the basin plan as soon as possible following CDP approval."

With this context in mind, I have prepared the following observations and comments about the Maddaus 2011 Water Demand Analysis and Water Conservation Evaluation.

Lack of Urgency

The first thing that struck me in reviewing the Maddaus report is that there is barely any mention of the seawater intrusion issue in the entire document. There is no indication from the Maddaus plan that the water supply of Los Osos is in peril and without substantial water conservation could be severely impaired. A single sentence on page nine notes that, "The implementation of the selected conservation program is intended to be a key element in the correction of the existing groundwater basin overdraft condition that has led to seawater intrusion." There is barely a mention of seawater intrusion in the rest of the document.

The Maddaus plan is not couched in the context of the potentially devastating impacts of seawater intrusion facing Los Osos. There is a distinct lack of urgency in the tone of the Maddaus report. The plan reads like a standard consultant water conservation study for a community that wishes to reduce water use for the purpose of obtaining a desired permit and meeting long-term and development goals.

The Maddaus plan does not appear to address all of the special conditions put forward in the CDP including the provision to "reduce potable water use as much as possible" and the "provisions for the use of the $5 million committed by the Permittee to initiate water conservation measures pursuant to the basin plan as soon as possible following CDP approval."

The LOSG is very concerned about the seawater intrusion issue and had hoped the Maddaus study would maximize conservation per the Coastal Development Permit. However, the Maddaus study appears not to go beyond a 50 gpcd goal, which is less aggressive than it could be. Based on my

review, it does not appear that the Maddaus plan was prepared with the goal of reducing seawater intrusion as the over-arching theme.

Outdoor Use Under-Estimated and Not Strongly Addressed

The Maddaus conservation strategy is heavily weighted towards indoor residential use. However it is likely that substantial additional cost effective demand reductions could be achieved in Los Osos through expanded outdoor efficiency efforts for both residential and non residential customers. If the Maddaus analysis had used a higher estimate of outdoor use and focused more on halting seawater intrusion, different conclusions about outdoor conservation programs might have been reached.

The minimum-month method used to estimate indoor and outdoor use in Los Osos[1] is a well-accepted standard approach, but it does tend to overestimate indoor use in warmer climates where some outdoor use occurs in every month of the year. The Maddaus study estimates residential demand to be 75% indoors and 25% outdoors. This is likely an overestimate of the indoor demand in Los Osos. It's not possible to say how large an overestimate it is with the available information, but the previous Wallace/Maddaus Urban Water Management Plan for Los Osos from 2000 estimated water use to be 54% indoor and 46% outdoor (Wallace et. al 2000). This is a substantial difference.

In the California Single Family study the data showed that on average as many households tended to under-irrigate as to over irrigate. With this in mind, the goal of an outdoor conservation program should not be to bring everyone into perfect alignment with the local evapotranspiration rate, but to reduce excess irrigation while encouraging the deficit irrigators to continue their low water use practices. By establishing water budgets for outdoor use based efficient levels of irrigation, Los Osos water providers could have strongest and quickest effect on outdoor use.

The Maddaus plan considers the following outdoor conservation measures:

- Design standards for new landscapes
- Educational workshops for residents.
- Rebates for rain sensors.
- Requirement for smart controllers and rain sensors in multi-family (a relatively small segment of customers in Los Osos)
- Turf removal (aka cash for grass)

Of these measures only rebates for rain sensors and turf removal had a benefit/cost ratio greater than 1 indicating it would be cost-effective to implement given the various assumptions. The Maddaus plan does not consider the most effective measure for reducing outdoor water use which is the creation of landscape water budgets that help both utilities and customers identify wasteful irrigation practices.

[1] In the Maddaus study, "Indoor use is based on an average of 2 lowest consecutive months in the winter if meters are read bi-monthly, or single lowest month if meters are read monthly.

The Maddaus conservation report uses an avoided cost for new water based on the Naciemento project. The report gives an annual cost for new water from the Naciemento project as follows: $400/Acre-Foot (AF) for operations, $3,000/AF for annualized capital costs for a total annual cost of $3,400/AF. At the relatively high cost of $3,400/AF for an alternative water supply, the benefit/cost ratio of a wide range of indoor and outdoor water conservation measures will be very attractive. However, this estimate must be solidified to answer key questions such as: Are all costs included? What are the environmental impacts and costs? How firm are the basic capital costs? Are there connection costs that must be borne by Los Osos? How reliable is the Naciemento project water?

Metering and Rates : Powerful Demand Management Tools

Perhaps the most startling omission from the Maddaus study is any substantive discussion of metering and rates. Charging users for the measured volume of water they use each month using a tiered, conservation-oriented water rate structure has been shown through numerous studies to be one the most effective and cost effective ways to reduce water use.

Some properties in Los Osos are currently not metered, including properties using private wells. Full metering of ***all*** water users (including private wells) and monthly billing for all customers of water suppliers should be an immediate goal for Los Osos. The Maddaus study assumes full metering of the S&T service area (currently not metered), which is a condition for the LOWWP coastal development permit (Condition 108). However, the Maddaus plan does not recommend full metering of private wells within the URL. Full metering of private wells is essential to quantifying the total amount of water pumped within the basin, an important step in combating seawater intrusion.

The Maddaus study states that two of Los Osos' three water providers have water rate structures that "encourage conservation", but the study does not describe these rate structures or provide any analysis of the effectiveness of these specific rate designs for reducing water use and encouraging efficiency. Furthermore, the study overlooks the fact that S & T water company will apparently continue to be without any sort of a conservation-oriented rate structure after metering is implemented.

The Maddaus study does include a "Conservation Pricing Modification" measure option, but there is little discussion of this measure in the text and it is unclear how its inclusion impacts demand (if at all) in the forecasts. It appears that reducing water use through pricing mechanisms was not a major consideration in this study.

If I were designing a water conservation program for Los Osos I would place a strong emphasis on metering and rates and I would recommend that Los Osos move quickly to adopt a water budget based increasing block rate structure which has been shown to be one the most effective ways to reduce water use quickly. This type of rate structure is different from a simple tiered rate structure. Traditional tiered rates go up with increasing water use regardless of household and property size. A water budget rate structure establishes billing rates based key factors such as landscaped area and average occupancy. Water budget-based rates encourage efficient water use among all users. Good examples of water budget-based rate structures can be found in Irvine, CA, San Juan Capistrano, CA,

Boulder, CO, and Castle Rock, CO. Full metering of all water uses in the Los Osos basin and implementation of aggressive water budget based rate structures may require governmental action possibly ordinances, and financial incentives to implement, but offer Los Osos maximum opportunity to reduce water demands and combat seawater intrusion.

A key element of metering is finding ways to provide water customers with real-time information on their consumption via a simple and convenient display. Several low cost devices are available on the market that allow the end users of water to track their use and be included as active participants in the water management efforts, rather than passive recipients of top-down commands.

The combination of conservative water budgets linked to a proper rate structure which compels over users to pay the full avoided costs for excess use as well as penalties for wasteful use, can provide maximum incentive for customers to alter their use patterns with minimum costs to the public. In this system subsidies and rebates would be replaced with a pricing system that accurately reflects the true cost of water and then allows the customer to make rational economic decisions. To the extent that rebates and public expenditures are included, they could be funded from the $5 million budget discussed in the CBA and/or from revenues generated from high water users under a water budget rate structure.

Why focus on new building provisions?

In the Maddaus study, efficiency measures impacting new development comprise a third of the program options considered in three of four scenarios. This is further indication that the Maddaus study was not developed for the primary purpose of reducing seawater intrusion. Even when designed for optimum efficiency, new development increases overall water use. Since seawater intrusion threatens the basin water supply, wouldn't it make sense to temporarily halt new development until the intrusion problem is solved? The Maddaus plan assumes new construction will begin in 2015, one year after LOWWP implementation and before the impacts of the water conservation program and seawater intrusion mitigation efforts can be fully assessed.

Greater conservation is achievable

The LOSG asked Aquacraft to consider what level of water efficiency could be achieved with water conservation program measures and a $5 million budget. The Maddaus study aims to reduce indoor per capita use to 50 gpcd by 2018 at the earliest.

Fifty gpcd is not particularly aggressive. Aquacraft's research has shown that 40 gpcd can be achieved today through the installation of water efficient toilets, high efficiency washers, and low flow faucet aerators. Indoor usage levels below 40 gpcd can be achieved with more efficient fixtures and a good leak detection and repair program.

The results from the California Single family study showed that indoor use of 120 gphd, which is equivalent to about 42 gpcd, is an achievable efficiency target for existing homes (DeOreo, 2011). This is equivalent to approximately 3,600 gallons per household per month, or 4.8 billing units. An effective way to set water budgets would be to base them on 42 gpcd. This combined with an appropriate outdoor budget, would provide water users an efficient monthly target to hit. It's

expected that residents in Los Osos will respond especially if they are presented with effective social marketing messages as part of a concurrent education program and appropriate technical and financial assistance as necessary.

In order to achieve a target of 42 gpcd the California Single Family study found that the following conditions are necessary (DeOreo, et. al. 2011):

1. Limit the average toilet flush volume to 1.28 gpf (That means old toilets must be replaced with high efficiency – HET – models)
2. Limit leakage to no more than 25 gpd in any home. (The data showed that high leakage rates in a few homes caused the bulk of the total leakage volume)
3. Limit clothes washers to an average of 20 gallons per load
4. Reduce miscellaneous faucet use by 10%.

If these things are done, and all other use patterns remain the same then the indoor use can be reduced to about 42 gpcd.

For outdoor use, the California study indicated that that key goals for reducing outdoor use were (DeOreo, et. al. 2011):

1. Eliminate excess irrigation where it is occurring, without encouraging deficit irrigators to increase their use
2. Change landscapes by replacing high water use plants and grass with varieties that require substantially less water
3. Reduce irrigated areas
4. Set water budget allocations that discourage wasteful swimming pool use.

Water use reductions beyond 42 gpcd are possible, but will require more efficient fixtures and appliances and additional reductions in faucet use and leaks. Given a budget of $5 million, it is certainly possible that with a properly designed and implemented conservation program Los Osos could achieve a level of savings below 42 gpcd.

Summary

This review was prepared at the request of the Los Osos Sustainability Group (LOSG) and members of the group provided background documents and feedback into the development of this memo.

Based on these documents, the danger of seawater intrusion is significant and experts have recommended that Los Osos reduce groundwater pumping quickly to try and reduce further damage to the aquifer. In my opinion this will require significant and aggressive water conservation

measures which go beyond those identified in the *2011 Water Demand Analysis and Water Conservation Evaluation* prepared by Maddaus Water Management for the Los Osos ISJ Working Group. The Maddaus conservation strategy does not "reduce potable water use as much as possible" as the CDP indicates. Outdoor usage is underestimated and not well addressed in the Maddaus plan and metering and water rates are not substantively discussed.

If the Los Osos community intends to rely on groundwater as the primary water source for years to come, a significant, aggressive and well funded water conservation strategy is recommended.

It is also recommended that Los Osos complete a thorough baseline water use analysis similar to the program used for the California Single Family Home study. By performing detailed analyses of water use patterns from a sample of homes from the service area it will be possible to determine the current indoor and outdoor use fairly accurately which can then be used to design the most rational and cost effective conservation program possible.

Sincerely,

Peter W. Mayer, P.E.

References

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DeOreo, W.B. et. al. (2011) *California Single Family Home Water Use Efficiency Study*. Aquacraft, Inc. Boulder, CO, and California DWR. (Available for free download at www.aquacraft.com)

ISJ Working Group (2010) *Los Osos Groundwater Basin Update.* ISJ Working Group, Los Osos, California.

John Wallace & Assoc. and Maddaus Water Management (2000) Los Osos Community Services District Urban Water Management Plan December 2000. Los Osos Community Services District, Los Osos, CA.

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Smith, D. (2010) Letter to the Coastal Commission. Prepared by Dr. Douglas Smith, Co-Director of the CSU Monterey Bay Watershed Institute, June 9, 2010.

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Exhibit 6

USEPA evaluation of climate change impacts on the Los Osos Basin, in cooperation with Los Osos Purveyors and the National Estuary Program (June 2013)

EPA
United States
Environmental Protection
Agency

Climate Resilience Evaluation and Awareness Tool Exercise with Los Osos Water Purveyors and the Morro Bay National Estuary Program

CLIMATE READY
WATER UTILITIES
EPA

CLIMATE READY
ESTUARIES
EPA

Office of Water (4608-T) | EPA 817-B-13-003 | June 2013

Basin Infrastructure Program	Repair/Retrofit	Altered Treatment (e.g., utilize blending stations/nitrate removal treatment to treat water for potability)
	Construct	Interconnections with other water systems
		General – new asset (e.g., relocation and/or development of a new treatment; changes to pumping schedule to adapt to saltwater intrusion)

2.6.1 SEAWAT Analysis

The SEAWAT program was developed to simulate three-dimensional, variable-density, transient groundwater flow in porous media. SEAWAT combines MODFLOW (modular flow) and MT3D (mass transport) code, and adds variable fluid density capability for saltwater intrusion simulations. For this project, a total of 14 basin model scenarios were defined, based on combinations of SLR, global scenario, and changes in precipitation, with and without adaptive measures. Section 2.6.2 summarizes results from the SEAWAT model runs.

2.6.2 SEAWAT Results Summary

Baseline Scenario

Under baseline conditions with no wastewater project, no adaptive measures, and no climate change, the sustainable yield of the groundwater basin with existing operational wells is estimated to be 2,455 acre-feet per year (AFY). Climate change reduces the baseline yield by 75 AFY due to late-century SLR, by 125 AFY due to increased average temperature, and by an additional 450 AFY due to potential declines in precipitation – illustrating a total potential decline up to 650 AFY, resulting in 1,805 AFY basin yield).

Management Scenario with Adaptive Measures

With the planned wastewater project and adaptive measures in place during the management scenario model runs, basin yield with no climate change increases to 2,709 AFY. Climate change reduces this projected basin yield by 160 AFY due to late-century SLR, by 125 AFY due to increased average temperature, and up to an additional 450 AFY due to potential declines in precipitation – illustrating a total potential decline of up to 1,075 AFY, resulting in 2,532 AFY basin yield.

When comparing management scenarios to the corresponding baseline scenarios, the wastewater project and adaptive measures increase the basin yield by 520 AFY to 945 AFY, depending on

[7] A stand-alone mid-century SLR scenario was not one of the 14 scenarios analyzed during this analysis. For more detailed information, see Appendix B.

Exhibit 7

Water Boards article on State-mandated conservation with water use data for California communities (March 2015)

Urban Water Conservation Drops From 22 Percent to Near 9 Percent in January; Additional Mandatory Conservation Measures to be Considered March 17

March 3, 2015 Maven Other news

From the State Water Resources Control Board:

CALIFORNIA
Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

As California enters a fourth year of drought, the State Water Resources Control Board (State Water Board) announced a steep decline in water conservation during the month of January, considered the driest January since meteorological records have been kept. Additionally, per capita water use inched up in January as compared to December 2014.

In the most recent statewide survey of nearly 400 urban water retailers, the amount of water conserved by the state's large water agency customers declined from 22 percent in December 2014 to approximately 8.8 percent in January in year-over-year water use comparisons. January followed a very wet December 2014, which reduced the need for outdoor water use and likely contributed to the high conservation rate in December.

"Today's announcement is a disappointment, but not a surprise considering how dry January was," said State Water Board Chair Felicia Marcus. "Clearly state residents used their outdoor irrigation in January, which appears to account for the decline in water conservation. At a time when communities are running out of water, fields continue to remain fallowed for a second year, and fish and wildlife are suffering, the prospect that this year will be worse than last year is very real. Urban water

users must cut back more – to extend their own supplies and to allow for flexibility in the system. Whether in self-interest or community spirit, conservation is by far the smartest and most cost effective way to deal with this difficult drought."

On March 17, the State Water Board will discuss renewing an emergency regulation supporting water conservation originally adopted in July 2014, which restricts outdoor water use and authorizes penalties for water waste. The emergency regulation must be renewed before April 25. Water board members today directed staff to offer additional measures intended to increase conservation statewide.

On Tuesday, board members discussed the importance of the State Water Board having measures in place for 2015 to assist water districts, and their customers, in making sure water conservation remains a priority statewide.

"We are in an extremely serious situation. We can and must do better conserving our water during 2015 because there's just no guarantee this horrendous drought will end anytime soon," Marcus said. "If 2015, and then 2016 continue to be dry, we will look back on today, and this month, let alone the last year, wishing we'd saved more water now. This board is prepared to make some tough decisions in the coming months, including adopting permanent, rather than emergency water conservation measures, going forward. It is that serious."

Water Conservation Efforts Decline

Year-over-year monthly residential water savings declined statewide to 8.8 percent in January, down more than 60 percent from December 2014. Broken down by hydrologic region, the results show that some parts of the state saved much less water in January than in any month since reporting requirements began. A few hydrologic regions sustained significant water conservation rates in January.

However, from June to January 2014, more than 146 billion gallons of water have been saved compared with the same period in 2013 – enough to supply 1.96 million California residents for a year.

Water Production Reductions from June 2014 to January 2015

Hydrologic Region	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-1
ntral Coast	9.5%	13.7%	15.3%	16.0%	14.1%	20.9%	29.1
lorado River	6.6%	3.1%	7.0%	6.3%	5.3%	6.6%	6.3
rth Coast	3.8%	10.4%	13.2%	9.5%	22.1%	19.5%	15.9
rth Lahontan	3.7%	5.0%	13.7%	-0.1%	-6.3%	-2.5%	14.2
ramento River	11.9%	19.7%	22.0%	16.4%	18.6%	25.7%	21.5
n Francisco Bay	10.3%	12.9%	14.9%	15.4%	15.3%	18.2%	21.6
n Joaquin River	6.6%	12.3%	13.2%	9.9%	9.9%	20.8%	18.7
uth Coast	-0.3%	1.7%	7.9%	7.5%	1.9%	3.4%	23.3
uth Lahontan	5.2%	3.8%	9.5%	7.9%	0.0%	1.2%	9.1
are Lake	8.2%	11.7%	12.9%	11.8%	6.3%	17.3%	27.4
tewide	4.4%	7.5%	11.5%	10.2%	6.9%	10.1%	22.2

The decline in water conservation by two of the most populated regions in the state did impact the statewide average for January. The South Coast hydrologic region decline, with 9.2 percent savings for January compared to 23.3 percent for December, had an impact on the state average because 56 percent of all the residential water customers statewide are in the South Coast hydrologic region. Representing approximately 20 percent of all residential water customers statewide, the San Francisco Bay Area hydrologic region decline – 3.7 percent savings for January compared to 21.6 percent for December – definitely impacted the statewide average.

The report also found that in January, 95 percent of water agencies reporting had instituted outdoor water use restrictions. Outdoor water use restrictions are a key requirement for urban water suppliers under the Emergency Water Conservation Regulation, because outdoor watering accounts for as much as 80 percent of urban water use in some areas.

Per Capita Daily Water Use Rises Slightly

In addition to the January conservation data, the State Water Board also reported residential gallons per capita per day (R-GPCD) for January. The report estimates daily water use by residential customers for nearly 400 urban water agencies statewide.

The statewide R-GPCD average for January was 72.6 gallons per person, a slight increase from December 2014 when the statewide average was 67.2 gallons per person, per day. State Water Board staff continues to study this trend in an effort to understand what is driving the reduction in water use in some hydrologic regions, but not in others.

The water use reports are a requirement of the Emergency Water Conservation Regulation adopted by the State Water Board in July 2014 and are provided to the Board monthly by urban water suppliers, along with total water conservation for each month. The complete report is posted here.

According to the R-GPCD data, water use varies widely by hydrologic region and showed consistent declines in water use during this fourth month of reporting. At the low end, the San Francisco Bay hydrologic region averaged 56.3 gallons per person, per day. On the high end, the Colorado River hydrologic region averaged 147.2 gallons per person, per day.

Examples of some communities with the respective R-GPCD averages for January 2015 in various hydrologic areas (in parenthesis) include: San Francisco Public Utilities Commission (San Francisco Bay) with 45 R-GPCD; city of Santa Cruz (Central Coast) with 46 R-GPCD; city of Santa Rosa (North Coast) with 49 R-GPCD; California American Water Company Monterey District (Central Coast) with 52 R-GPCD; city of Stockton (San Joaquin River) with 52 R-GPCD; city of San Diego (South Coast) with 55 R-GPCD; San Jose Water Company (San Francisco Bay) with 58 R-GPCD; California Water Services Company, Bakersfield (Tulare Lake) with 63 R-GPCD; city of Sacramento (Sacramento River) with 63 R-GPCD; Los Angeles Department of Water and Power (South Coast) with 70 R-GPCD; city of Riverside (South Coast) with 78 R-GPCD; and Sacramento County Water Agency (Sacramento River) with 82 R-GPCD.

For additional information on water use, please visit the following resources:

- The Pacific Institute has an R-GPCD mapping tool here.

- The State Drinking Water Program has an urban water R-GPCD Calculator here.

Background

In his Jan. 17, 2014, Emergency Drought Proclamation, Gov. Jerry Brown called for Californians to voluntarily reduce their water use by 20 percent. The trend of increasing reductions and specific local data shows that many California communities have met and even exceeded the call to conserve. However, more can and must be done to protect water supplies should the drought persist. Current forecasts indicate that Californians cannot count upon a wet winter to end the drought.

The Emergency Water Conservation Regulation will be in effect until April 25, 2015, and will likely be extended if drought conditions persist. The State Water Board will closely monitor the implementation of the regulations and the weather over the coming months to determine if further restrictions are needed.

During 2014, the State Water Board took action to increase access to recycled water in an effort to augment scarce water supplies. Water recycling is the use of treated municipal wastewater for beneficial purposes, such as agricultural and landscape irrigation, industrial processes and replenishing groundwater basins. In March 2014, the Board approved new low-interest financing terms for water recycling projects to help California produce an additional 150,000 acre-feet of recycled water annually. The effort makes $800 million available for projects such as recycled water treatment and distribution and storage facilities that can be completed by 2017. In June 2014, the Board adopted a general order that makes it easier for communities to use non-potable recycled water for agriculture, landscape and golf course irrigation and other uses. During the year, various regional boards took action to approve the use of recycled water for local projects under their jurisdiction.

As part of its efforts to build on conservation gains statewide, on Feb. 17 State Water Board members heard presentations by staff on ideas presented at a Dec. 17, 2014 water conservation workshop in Los Angeles. Multiple topics were addressed and actions were identified that could be implemented by the State Water Board to sustain and possibly improve water conservation efforts during 2015. The staff has been asked to bring the ideas to the March 17 Board meeting when the State Water Board is expected to decide to renew the emergency water conservation regulation, and discuss strengthening water conservation measures.

Visit SaveOurWater.com to find out how everyone can do their part, and visit Drought.CA.Gov to learn more about how California is dealing with the effects of the drought.

Exhibit 8

Comments and recommendations on the Basin Plan submitted to the Parties (December 2013 through December 2014)

February 18, 2014

San Luis Obispo County Board of Supervisors
County Government Building
San Luis Obispo, California

Subject: Request for immediate action to save the Los Osos Groundwater Basin, including amendments to the *Basin Plan for the Los Osos Groundwater Basin and conditions set on* a settlement of the Los Osos Basin adjudication, also improvements to the Los Osos Wastewater Project (LOWWP) mitigation programs.

Honorable Supervisors:

As property owners in Los Osos and members of Los Osos Sustainability Group (LOSG), we request that you take immediate action to save the Los Osos Groundwater Basin experiencing severe seawater intrusion by requiring improvements to the *Los Osos Groundwater Basin Plan and conditions set on a* settlement agreement of the groundwater adjudication, and we request that you substantially improve the LOWWP conservation, recycled water use, monitoring, reporting, and adaptive management programs required by Special Condition 5 of the Coastal Development Permit (CDP), which the Basin Plan proposes to adopt. (See Addenda 1 & 2 for summaries of requests and Addenda 5 & 6 for further detail.)

Substantial improvements must be made to the *Basin Plan* and LOWWP mitigation programs to minimize wastewater project impacts and to address the extremely urgent seawater intrusion threat to Los Osos's sole water supply. According to the draft Basin Plan, the Los Osos Basin has been over drafted on average 700 AFY to 1100 AFY for 35 years, 30% to 60%. Picture a thousand acres covered in 25 to 40 feet of water—that's how much the Basin has been over drafted, about 10 to 15 years worth of water for the entire area including farms at 2012 water use levels. The only reason water levels have not dropped like they have in the Paso Robles area is that seawater is moving in to replace the freshwater removed by over pumping (See Att #2, Basin Plan, Pages 46, 91, & 93.) The Basin Plan states that seawater intrusion has rendered community supply wells unusable, it threatens many more wells, and that seawater intrusion is a more significant threat to the Basin than nitrates (the reason for the LOWWP) for the foreseeable future. (See Att #2, Basin Plan, Page 91.)

Calculations in the draft *Basin Plan* of the remaining freshwater capacity of the Basin indicate that over half of the Basin has been lost to seawater intrusion in the past 30-40 years, and at the rate it is traveling through the community's main drinking supply aquifer, about ½ mile every 4-5 years, the urban water supply could be lost in 15 years or so—less time if it continues to accelerate. (See Att #2, Basin Plan, Pages 86 & 98.) The *Basin Plan* (Page 67) points out that the Department of Water Resources warned of an "urgent need" for comprehensive management in 1973, yet none happened, and the current *Basin Plan*, 40 years later, is "too little too late." No natural resource can sustain the level of neglect and abuse that the Los Osos Basin has suffered and survive. Our Basin—an ancient natural water source, an irreplaceable gift, and the sole source of water for the community of Los Osos—based on the evidence, is on the brink of extinction.

Furthermore, the county of San Luis Obispo is largely to blame for the problem. As one of the

main water purveyors until 1998, and as the principal authority in charge of making sure water demand does not exceed water resource supply, the County has had the primary responsibility and authority to ensure the Basin had ample capacity to support approved development. Furthermore, as the promoter and developer of the $183 million LOWWP, which officials have claimed is essential for the sustainability of the Basin--even though it has the potential to make seawater intrusion worse—the County has a responsibility to see that that project provides the benefit promised—a reduction in nitrates in the Upper Aquifer in 30 years sufficient to increase pumping there without treating the water. This requires ensuring the Basin is not destroyed by seawater.

Additionally, the project will have no measurable benefit on the estuary. This fact was recently acknowledged by the Regional Water Board. (See Att #12, Regional Board Transcript, 12/6/13.)

For the project to have a chance of providing its long-term benefit, LOWWP seawater intrusion mitigation measures must be maximized to minimize project impacts. Maximizing measures is consistent with CDP Special Condition 5, whose stated objective is to "ensure that implementation of the project...is accomplished in a manner designed to maximize long-term ground and surface water and related resource ...health and sustainability, including with respect to offsetting seawater intrusion as much as possible, within the Los Osos Basin." LOWWP conservation and reuse programs also must be maximized because the *Basin Plan* proposes to adopt and extend them Basin-wide.

The up side of these facts, many of which are very unsettling, is that the County's authority over, and responsibility for, the Basin and the LOWWP provide the County a unique opportunity to address the seawater intrusion problem cost-effectively. As County Supervisors, you have more ability to implement mitigation programs and ensure that programs are effective, than you do in the Paso Robles Basin—IF YOU ARE WILLING TO DO SO.

In fact, you can implement a truly state-of-the art model of sustainable water management—IF YOU ARE WILLING TO DO SO.

Like any problem, addressing severe seawater intrusion first requires acknowledging that it exists, including the fact that the LOWWP—especially in combination with the drought—can make it worse. Acknowledging these facts may be politically inconvenient for officials who've promoted the LOWWP as essential for Basin and Morro Bay Estuary sustainability, who have also promised people in Los Osos that there is enough water in the Basin to support further development.

In fact, the removal of millions of gallons of groundwater to install LOWWP pipelines, the dewatering that is going on now, appears to be causing seawater intrusion in the Upper Aquifer, the only aquifer that didn't have seawater intrusion up to this point. The Upper Aquifer is the aquifer the LOWWP is supposed to improve, yet dewatering tests show very high levels of salts, i.e., total dissolved solids (TDS) over 1000 mg/l (See Att 8, Dewatering Tests.)

When the LOWWP goes on line, the impacts of the project will be even greater. The LOWWP EIR was inadequate to address the urgent seawater intrusion problem. For instance, it did

not address the fact that the main seawater intrusion mitigation measure, Broderson leach fields (which is supposed to replace groundwater flows and recharge removed with septic systems) will not replace flows and recharge for 20 years or more in some parts of the Basin although septic recharge will stop within a year or so. Further, the leach fields are not certain to provide flows along the coastline when and where they are needed, and the project may not allow significantly more pumping from the Upper Aquifer needed to reduce seawater intrusion in the Lower Aquifers without adverse impacts on the Upper Aquifer. (See Att#13, CSUMB Study, Pages 32, 33, & 56-60, and Att#14, Hydrofocus 1/13/2010, Pages 1, 2, & 4.) Moreover, the project has no adaptive mitigation measures to minimize impacts when/if the project causes them. It relies on the *Basin Plan* to do this, and the Basin Plan doesn't even acknowledge that the LOWWP has potential impacts on the Basin.

The *Basin Plan* recommends adopting and extending the LOWWP mitigation programs to help remedy the seawater intrusion problem, but it doesn't recognize that they can be substantially improved at relatively little cost. The Basin Plan also recommends a property tax assessment for $30 million to fund mitigation programs, but it doesn't recognize that residents are unlikely to pass this assessment due to the high cost of the LOWWP assessment.

To economically reverse seawater intrusion requires maximizing the conservation, recycled water use, low impact development/recharge options, and the most cost-effective infrastructure program (Program D) immediately. These measures maximize the opportunity to save the Basin because they can be implemented quickly (within two years), they provide the most direct and immediate benefit on seawater intrusion, and they're affordable—a few million more than the $5 million required to be spent on the conservation program ($4 million of which remains unspent).

Since the LOSG became involved in the LOWWP process, we have supported maximizing the most cost-effective options—conservation (indoor and outdoor), recycled water use (agricultural exchange), and low impact development (LID rainwater capture and recharge). Experts have agreed with us, including Eugene Yates, a foremost authority on the Basin (co-creator of the Basin Model and co-author of the study on which the potential benefits of the LOWWP are based) and the California State University Monterey Bay Watershed Institute. (See Att #13, CSUMB Study, Pages iii-v, and Att#15, Hydrofocus 8/3/2010, Page 7.)

Although there was less conservation potential available in 2009 and 2010 than the LOSG and these experts realized, because official data significantly over stated community water use, there is even more reason now to maximize these measures, given the adverse impacts of the severe drought, escalating LOWWP costs, and further confirmation in the *Basin Plan* that alternative sources of water are not feasible for Los Osos.

For these reasons, we request that the County of San Luis Obispo does not agree to the *Basin Plan* or a resolution of the Los Osos Basin adjudication without substantial amendments to that document and conditions set on the settlement to maximize cost-effective opportunities for stopping and reversing seawater intrusion as soon as possible. We also request that you maximize seawater intrusion mitigation programs for the Los Osos Wastewater Project, including conservation, recycled water use, monitoring, reporting, and adaptive management programs in the next year to 1) minimize project impacts on the Basin, 2) prepare for those programs to be extended Basin wide per proposals in the *Basin Plan*, and

3) maximize the health and sustainability of the Basin.

These actions are essential to preserve the sole source of water for the Los Osos community experiencing a severe and urgent seawater intrusion problem, exacerbated by the severe drought, which threatens to destroy the freshwater basin. We realize that our request will require a public review of the *Basin Plan* and LOWWP programs, so we request this review. We respectfully ask that you respond within the week and schedule a review within two weeks since the Parties in the adjudication process may attempt to have the *Basin Plan* and adjudication settlement approved within 2-3 weeks.

Very truly yours,

Chuck Cesena for Keith Wimer Larry Raio Elaine Watson Bill Moylan

Chuck Cesena Keith Wimer Larry Raio Elaine Watson Bill Moylan

Los Osos Sustainability Group

(Please see Attachments 1-20 and the following Addenda #1-#6: #1 "Summary of requested amendments to the Basin Plan and conditions set on a settlement agreement," #2 "Summary of requested improvements in LOWWP seawater intrusion mitigation programs required by Special Condition 5, #3. "The severe and urgent seawater intrusion threat facing the Basin," #4 "Summary of Problems with the draft Basin Plan (Why it will not save the Basin)," #5 "Specific requested amendments to the Basin Plan and conditions set on an adjudication settlement," and #6 "Specific requested improvements to the LOWWP recycled water use, conservation, monitoring, reporting, and adaptive management programs.")

Addendum #1

Summary of requested amendments to the Basin Plan and conditions set on a settlement agreement

The Basin Plan is amended to maximize seawater intrusion mitigation. To preserve as much of the Basin as possible, water levels must be bought up as soon as possible Western and Central Areas of the Basin without adversely affecting the Upper Aquifer, and this is best accomplished by maximizing conservation, recycled water use, and the most cost effective infrastructure programs (including Program D that provides some water from the Eastern Basin) within two to three years. Since the *Basin Plan* proposes incorporating and extending the LOWWP conservation and recycled water programs Basin-wide—maximizing *Basin Plan* programs requires maximizing these LOWWP programs. (See Addendum #2 for more requested improvements to the LOWWP programs).

1. ***The Basin Plan is amended to include time-specific objectives and benchmarks for implementing programs and reversing seawater intrusion as soon as possible, and any settlement agreement includes a mechanism to ensure objectives and benchmarks are met.*** Based on *Basin Plan* estimates, reasonable objectives are one to three years for maximizing and implementing mitigation programs, five years for

measurable evidence of seawater intrusion reversing, and 10 years for raising water levels in every aquifer high enough to reverse seawater intrusion.

2. ***The County implements a Basin-wide water management ordinance, which incorporates the objectives and benchmarks in #2 above to reverse seawater intrusion as soon as possible applying improved programs, which also identifies a range of incentives to ensure objectives are met.*** The Interlocutory Stipulated Judgment (ISJ) agreement provides for such ordinance. (See Att #3, ISJ Agreement, Page 8.) Incentives do not have to be limited only to mandates to reduce water use and pumping. They can also include a variety of incentives and inducements, including effective media campaigns, rebates, water and sewer rate structures, and provisions in septic system management programs.

3. ***The Basin Plan is amended to include more conservative and precautionary assumptions, predictions, proposals, and programs.*** Much larger margins of safety in yield estimates should be applied, and Plan proposals/programs should not rely so heavily on the Basin Model, which has been 30 to 70% in estimating safe yields and 1000% off in predicting the rate of seawater intrusion. (See Att#2, *Basin Plan*, Page 99 and Att#4, County Resource Capacity 2007 Study, Page 8). For example, moving wells should not be assumed to increase basin yield by 30% to 40% based on the model as the Basin Plan does now. The Basin Plan should also include a clear statement that new building over the Basin should not occur until seawater intrusion is reversed as shown by clear and measureable evidence (well tests). Such language is consistent with the Coastal Development Permit (CDP) for the LOWWP, which requires "conclusive evidence" of sufficient water to support building before it's allowed within the wastewater service area (87% of the community). (See Final CDP, Special Condition 6, Att #1)

4. ***A Watermaster (if appointed) is someone who has a proven track record of independence and placing the sustainability of resources above all other considerations.*** If the Watermaster is a committee, the majority of members have this track record. The Watermaster must not be a representative of, or governed by the Parties, as the *Basin Plan* states, or comprised solely of, or a majority of, representatives of the Parties.

5. ***Property owners and resource/overseeing agencies should retain all water rights, including the right to reject the Basin Plan in the future and pursue other management options if the Basin Plan fails to reverse seawater intrusion as soon as possible or has other significant problems.*** Agencies also retain all rights and authority to require, modify, develop, and enforce various permits and plans to reverse seawater intrusion and protect the Basin and related resources.

6. ***The Parties formally request resource agencies and the State Legislature to declare the Basin a threatened, sole-source water supply, and also formally request assistance and participation from agencies in the form of technical, logistical, enforcement, funding, and other assistance.***

7. *The Parties provide the results of all tests, studies, assessments, and other information they develop to the public and agencies as soon as the information is developed.* In the past, the LOSG has requested information from the County about the status of the Basin and been told it is "privileged."

Addendum #2

Summary of requested improvements to the LOWWP seawater intrusion mitigation programs (e.g., required by Special Condition 5)

Recycled Water Program (Special Condition 5a)

1. *Limit the use of recycled water use to the Western and Central Areas of the Basin (west of Los Osos Creek) unless recycled water used in the Eastern Area (east of Los Osos Creek) is replaced with water from wells in the Eastern Area, effectively creating an agricultural exchange program.*
2. *Add purple pipe connections so that recycled water is available to more properties in Western and Central Areas of the Basin, in order to offset more water use in the seawater-impacted Western and Central parts of the Basin.*

Conservation Program (Special Condition 5b)

1. *Implement a much stronger media and public information campaign that informs the public about the seriousness of seawater intrusion and how their early and full participation in the program can help address it.*
2. *Strengthen the washer and water survey measures.*
3. *Implement an aggressive outdoor conservation program that targets a significant reduction in outdoor use.*
4. *Set indoor-outdoor water use targets at no more than 60 gallons per capita per day (gpcd) on average, consistent with standards set for County Titles 8 and 19.*

Monitoring Program and Reporting and Adaptive Management Program (Special Conditions 5c and 5d)

1. *Conduct semi-annual seawater intrusion monitoring in every aquifer and develop success criteria to reverse seawater intrusion in the Lower Aquifers and avoid it in the Upper Aquifer as soon as possible per Special Condition 5c.*
2. *Develop a report per Special Condition 5d that recommends the improvements in LOWWP programs listed above for full implementation as soon as possible (i.e., seawater intrusion monitoring within 3 months, conservation program improvements within 6 months, and recycled water improvements by project start up).*
3. *Develop adaptive measures per Special Condition 5d by project start up to address LOWWP impacts (e.g., delayed recharge, and the combined impacts of Basin Plan proposals and the drought), including new wells in the Eastern Area (west of Los Osos Creek) to provide added water to offset impacts.*

Addendum #3

The severe and urgent seawater intrusion threat facing the Basin (based on information provided in the draft *Basin Plan*)

1. Lower Aquifer Zone D, the main drinking water aquifer, is severely impacted: Seawater intrusion continues to progress through the main drinking water aquifer, Zone D, which supplies three fourths of the water for 95% of the community. It will continue to move through the aquifer until water levels are brought up to eight feet above sea level. Most of Zone D is now below sea level, with much of it 5 to 10 feet below. At the rate seawater was moving through Zone D when last measured in 2009 (500-600 feet per year or one-half mile every 4-5 years), it could potentially destroy this main supply aquifer within about 15 years—sooner if it continues to accelerate as it did between 2005 and 2009. (See Att #2, Basin Plan, Pages 86 and 98.)

- Lower Aquifer Zone E, which once comprised over one-third of the Basin's freshwater capacity, is too contaminated to use. Zone E, the deep aquifer, is almost completely unusable due to seawater intrusion. The *Basin Plan* refers to Zone E only as a source of seawater for desalination, and purveyors are apparently not trying to save it. (See Att #2, Basin Plan, Page 247.) Zone E was once an important drinking water source containing the Basin's oldest and purest water. In the 1970's it showed no signs of seawater intrusion west of the Morro Bay sand spit.

- Over one-half of the Basin's freshwater capacity has been rendered unusable for drinking and most other purposes since the 1970's. The *Basin Plan* reports the current freshwater capacity of the Basin at 205,000 acre feet (AF) (140,000 AF Lower Aquifers and 65,000 AF Upper Aquifer) (See Att #2, Basin Plan, Page 88.). However, in 2003, a major study reported Basin capacity at 500,000 AF (450,000 AF Lower Aquifers and 38,000 to 50,000 AF Upper Aquifer). (See Att # 5, Yates and Williams study, Pages 19 & 20). Given the near abandonment of Zone E and rapid progress of seawater intrusion through Zone D, we believe this means seawater intrusion has rendered 60% of the Basin's freshwater capacity unusable for drinking and other purposes. PICTURE 10,000 ACRES OF LAND COVERED IN 30 FEET OF WATER; THAT MUCH DRINKING WATER MAY HAVE BEEN LOST AS DRINKING WATER SINCE THE 1970'S.

- Upper Aquifer Zone C, which comprises 1/10th to 1/4th the Basin's freshwater capacity, once the only supply aquifer that did not have seawater intrusion, may have seawater intrusion now. The *Basin Plan* states the aquifer is the only aquifer with storage capacity above sea level, and it is not experiencing seawater intrusion, but the 2005 *Seawater Intrusion Assessment* reports that the aquifer is vulnerable to seawater intrusion during droughts and only "relatively stable." (See Att #6, Seawater Intrusion Assessment 2005, Page 27.) The Assessment also points out that the aquifer level along the shoreline is able remain lower than the level needed to keep seawater off shore (2.5 feet above sea level instead of 5 feet above) because there are outflows from the Basin. LOWWP dewatering is reducing outflows from Zone C near the shoreline, and the severe drought is exacerbating the impacts by lowering water tables. The August 2012

Los Osos Water Recycling Facility Baseline Grounwater Quality Monitoring" shows water levels in test wells dropped 1.5 feet on average, and dewatering samples show very high salt levels (total dissolved solids or TDS) indicating that seawater intrusion into the aquifer may be occurring. (See Att #7 LOWRF Monitoring, Page 4, and Att #8 Dewatering Tests.)

Addendum #4

Summary of Problems with the draft Basin Plan (Why it will not save the Basin)

- The Basin Plan downplays the severity of the problem. The Basin Plan does not clearly state or explain the severity of the problem as described in Addendum #1. (Also see Att #18, *Summary of Problems with the Draft Basin Plan and Recommended Actions*, Keith Wimer, 12/2013, Pages 1-7.)

- The Basin Plan has no time specific objectives and relies on speculative funding. The Plan does not require purveyors and the County to take any specific actions by any specific date, nor does it set time-specific benchmarks for reversing seawater intrusion. The Parties have failed to agree on a management plan and to implement effective measures in the past 40 years, and they were very slow to negotiate the draft *Basin Plan*, which was supposed to be completed in 2009 per the Interlocutory Stipulated Judgment (ISJ) agreement approved by the County Superior Court (see Att #3, ISJ Agreement, Page 7.) Without time-specific objectives and a means to ensure objectives are met, the Plan will most likely result in further endless delay. In addition, the only funding source the *Basin Plan* identifies is a Basin-wide assessment for about $30 million, which residents are not likely to approve on top of a costly sewer assessment. The $30 million would cover the cost of proposed Infrastructure Program C for $6.5 million. (Program A is already funded and being implemented.) and the conservation and recycled water programs ($5.5 million and about $18 million respectively). (See Att #2, Basin Plan, Page 297.) The Basin Plan recommends adopting the LOWWP conservation and recycled water programs, and transferring the costs ($5 million and about $18 million) to the assessment. Even though a Basin-wide assessment would reduce the costs of conservation and recycled water programs by about 13% for people living within the wastewater service area, the additional costs for proposed programs (e.g., Infrastructure Program C) offset that reduction. Furthermore, shifting these costs removes an incentive for the County to keep other project costs on budget.

- The Basin Plan exaggerates the benefits of the proposed conservation program and ignores the potential for a stronger program. The proposed conservation program is the LOWWP program extended Basin-wide with a few voluntary conservation measures (rain sensor rebates, education, and water audits/surveys). However, the benefits of the LOWWP program have been exaggerated because baseline water use was exaggerated in the study on which the program is based, the Maddaus Water Management (MWM) Plan, making potential reductions from the program appear much greater than they are. The MWM Plan assumed urban water use to be about 2050 AFY, when actual water use in 2010, the first year of the plan, was closer to 1620 AFY, the total purveyor production reported in 2010. (See Att #2, Basin Plan,

Page 46; Att # 18, *Summary of Problems with the Draft Basin Plan and Recommended Actions*, Keith Wimer, 12/2013, Pages 15 & 16; and Att #11, *Los Osos water use and potential conservation estimates*, Keith Wimer, 12/2013, Pages 5 & 6, "Variations from Basin Plan data/assumptions".) Further, according to Peter Mayer, a nationally recognized expert on conservation who has done several studies for the USEPA, the MWM plan overstates program benefits by over estimating indoor use versus outdoor use, and it does not "help residents reduce potable water use as much as possible..." per the CDP. (See Att #1, Final CDP, Special Condition 5b and Att #20, Mayer Review, Pages 2, 3, 5, & 6.) As a result, shortly after the LOWWP program was implemented in late 2012, it had already met the minimum project target set by the CDP of 50 gallons per capita per day (gpcd) (See Att #11, *Los Osos water use and potential conservation estimates*, Keith Wimer, 12/2013, Item #5, Page 1). Since then, the program has fallen short of first-year retrofit and survey targets by at least 40%, and washer retrofit washer retrofit targets by 95%. The media campaign, with a $200,000 budget, has been non-existent, and just $800,000 of the $5 million that the CDP requires to "initiate the program as soon as possible" was spent the first year. (See Att #16, Conservation Plan, Pages 4 & 19, and Att #17, Construction Update 11/2013, Pages 9, 10 & 12.) Furthermore, Special Condition 5b states that the program "shall be designed to help residents to reduce their potable water use as much as possible through measures including but not limited to retrofit and installation of low water use fixtures and grey water systems." Clearly, the CDP requires including outdoor conservation measures in the program, but the program does not include them. The CDP does states that the County "shall coordinate with water purveyors to the maximum extent feasible to integrate this conservation program with purveyor implemented outdoor water use reduction measures," yet the *Basin Plan* recommends against grey water use, rainwater harvesting, and turf replacement—measures that can reduce outdoor water use by 50% to 100% according to the landmark conservation study, *Waste Not Want Not* (Gleick et al, 2002). (See Att#10, *Waste Not Want Not*, Pages 71 & 73.) Therefore, coordinating measures with purveyors will not likely be feasible, and the County must implement them as part of the LOWWP to "help Basin residents to reduce their potable water use as much as possible" per the CDP. Improvements in the LOWWP program, including an outdoor component, can double the water use reduction of the program (provide 246 AFY of offset/mitigation rather than 123 AFY). (See Att #11, *Los Osos water use and potential conservation estimates*, Keith Wimer, 12/2013, Item 8 and "Discussion/Conclusion").

- <u>The Basin Plan exaggerates the benefits of the recycled water program and ignores the potential for a stronger program.</u>

The *Basin Plan* recommends simply adopting the existing LOWWP recycled water program. However, the LOWWP program does not use recycled water effectively to maximize seawater intrusion mitigation, as the CDP requires it to. The CDP states that the objective of Special Condition 5 (which required the County to submit the "Recycled Water Management Plan" or RWMP in 2011), is to "... to ensure that implementation of the project, including sites designated for disposal of the treated effluent, is accomplished in a manner designed to maximize long-term ground and surface water and related resource... health and sustainability, including with respect to offsetting seawater intrusion as much as possible..." Special Condition 5a states that the Recycled Water program "... shall ensure ... recycled water is disposed of in locations within the Los Osos Groundwater Basin that will maximize its ability to

meet *Basin Plan* objectives..." To maximize the program's benefits requires recycling the water it the Eastern and Central Areas of the Basin (west of Los Osos Creek) because offsetting pumping in these areas has a direct benefit on water tables in seawater-impacted aquifers. However, the County has signed contracts with several farmers, which will not offset pumping because the recycled water will be used to convert dry land faming to irrigated farming. Further, the *Basin Plan* proposes to commit most of the recycled water in the future to farms in the Eastern part of the Basin. This recycled water use in the Eastern Basin will have minimal, very long-term benefits on seawater intrusion, if any at, all because the Eastern Basin is a semi-discrete part of the Basin and located far from seawater-impacted aquifers. The EIR estimates the benefits of recycled water used in the Eastern Basin is only about 20% of recycled water used in the Western and Central parts of the Basin, and the Monterey Bay Watershed Institute estimates the time it will take changes in the Eastern part of the Basin to affect the Western and Central parts is over 30 years. (See Att#13, CSUMB Study, Page 32 & 33.) Thus, recycled water used in the Eastern Basin does not benefit the urgent problem, unless potable water is returned to establish an agricultural exchange program. Basin Plan Infrastructure Program D would provide water from the Eastern area to offset reuse in the area to offset pumping in the Western Basin and offset recycled water use (effectively create an ag exchange program, but the Basin Plan recommends the program only to allow more building in the area. Eugene Yates and the California State University Monterey Bay Watershed Institute agree that agricultural exchange is important to offsetting LOWWP impacts and preserving the Basin. (See Att #13, CSUMB Study, Pages iv, and Att #14, Hydrofocus 8/2010, Page 7.) Only 60 AFY of recycled water from the project will be used (for schools) to offset pumping from the Western and Central Areas. Another, approximately 45 AFY is may be used to offset pumping at Sea Pine Golf Course, but that will happen only if residents of the Monarch Grove housing development elect to hook up the LOWWP. Monarch Grove now provides recycled water to the golf course. The LOWWP Fine Screening and EIR estimate that Broderson leach fields will provide only about 20% of the seawater intrusion benefit of recycled water use that offsets pumping, and Broderson leach fields will have delayed and uncertain effects on groundwater flows and seawater intrusion. However, most of the recycled water from the LOWWP is supposed to go to the leach fields (about 448 AFY).

- The *Basin Plan* relies far too heavily on a Basin Model that has been 1000% off in predicting the rate of seawater intrusion and 30% to 80% off in predicting safe yields. Based on modeling, the *Basin Plan* claims that Basin yield can be increased 20% to 40% by relocating wells inland and to the Upper Aquifer. However, a foremost expert on the Basin, Eugene Yates, disagrees that shifts in pumping will substantially increase yield, and he points out that the Basin Model has substantial levels of uncertainty (e.g., 40%) (See Att #14, Hydrofocus 1/2010, Page 3.) The 2010 *Los Osos Groundwater Basin Update*, released by the Parties, showed seawater intrusion had advanced over ten times faster than the Model predicted, making the Model 1000% off. (The model showed it to be moving inland about 60 feet per year when it was moving closer to 600 feet per year.) The *Basin Plan* estimates the "sustainable yield" of the entire Basin is 2450 acre feet per year (AFY) under current conditions (2012). The "sustainable yield" per the Basin Plan," defines a condition in which seawater is allowed to intrude substantially further, and the *Basin Plan* recommends setting the yield at 20% under "sustainable yield" to reverse seawater intrusion, which would

reduce Basin yield to 1960 AFY. This means that Basin yield estimates have overstated yield 30% to ~~70%~~ 80% since about 1990 due to modeling error (1960-2450 AFY versus 3250-3560 AFY). (See Att #4, *Resource Capacity Study 2007*, Page 8, and Att #2, Basin Plan, Pages 46, 99, &106.) Reliance on a faulty modeling are also partly to blame for the Basin's being over drafted on average 700 to 1100 AFY, about 30% to 55%, for 35 years (since 1979)—a total of about 24,000 acre feet (AF) to 38,000 AF. PICTURE 1000 ACRES UNDER 24 TO 38 FEET OF WATER; THAT'S HOW MUCH THE BASIN WAS OVERDRAFTED SINCE 1979.

(Also see Att #18, *Summary of Problems with the Draft Basin Plan and Recommended Actions*, Keith Wimer, 12/2013, Pages 1-7.)

Addendum #5

Specific requested amendments to the *Basin Plan* and conditions set on an adjudication settlement

1. ***The Basin Plan is amended to maximize seawater intrusion mitigation.*** Improved water use efficiency (conservation), recycled water use, and infrastructure programs, implemented as soon as possible and no later than within three years, can provide much greater seawater intrusion mitigation than the proposed programs. Since the *Basin Plan* proposes incorporating and extending the LOWWP conservation and recycled water programs Basin-wide—LOWWP programs must be maximized. The LOWWP program should have a better education/outreach, washer replacement program, and survey/leak detection-repair component, as well as an aggressive outdoor program—and be fully implemented within two years. Currently the *Basin Plan* toilet retrofit program extends 22 years and the LOWWP media and outreach programs extend 10 years, far too long to address the urgent seawater intrusion problem. San Luis Obispo Greenbuild (SLOGB) is designing and helping to administer the septic system repurposing program; the group can also design and help administer an outdoor conservation program very cost effectively. Since people have to restore their yards after installation of sewer laterals, a strong media/outreach campaign, possibly with modest rebates, should motivate residents to install Xeriscape and other effective measures as they restore their yards. Drought conditions and the reduction is soil moisture/groundwater flows with the elimination of septic systems provide further incentives and justification for residents to convert landscaping and install water saving measures. (See further specific requests for LOWWP program improvements below.)

   The recycled water use program for the LOWWP and *Basin Plan* should prohibit the use of recycled water in the Eastern part of the Basin (farming area) unless potable water is returned, and identify more receiver sites in the Western and Central Parts of the Basin, also providing connections to the purple pipe mainline along Los Osos Valley Road (LOVR), e.g., to the Los Osos Commercial District and large properties along LOVR (to offset outdoor water use).

The Plan's infrastructure programs should include Program D as a higher priority than Program C. The *Basin Plan* recommends Programs A and C for the "no further development" (first-step) scenario, with Program D implemented only to support further building. Program A is already in the works with existing funding. Program C moves some pumping inland in Lower Aquifer Zone D and substantially increases pumping in the Upper Aquifer. However, the Upper Aquifer is already most likely already adversely impacted by the LOWWP dewatering program and drought, and since Program C still requires most pumping to be from Lower Aquifer Zone D, it will not likely let Lower Aquifer Zone D water levels rise enough to reverse seawater intrusion. Although Program C it can provide flexibility in where water is pumped, Infrastructure Program D, which entails installing new wells in the Eastern area of the Basin, provides a more certain and cost-effective way to reduce seawater intrusion because it provide water to offset pumping from the seawater-impacted Western and Central Areas (now below sea level), rather than hoping the model is correct that in its prediction that moving pumping around in the same aquifers will stop seawater intrusion. At a cost of $4.2 million versus about $6.5 million for Program C, Program D provides the best investment and should be implemented within two years. (See Att #2, Basin Plan, Page 297.) Program C can be implemented on a 3-4 year time schedule, especially with conservation and recycled water use maximized.

2. ***The Basin Plan is amended to include time-specific objectives and benchmarks for implementing programs and reversing seawater intrusion as soon as possible, and any settlement agreement includes a mechanism to ensure objectives and benchmarks are met.*** Based on *Basin Plan* estimates, reasonable objectives are 1 to 3 years for maximizing and implementing mitigation programs, five years for measurable evidence of seawater intrusion reversing, and 10 years for raising water levels in every aquifer high enough to reverse seawater intrusion. (See #3 for a mechanism to ensure objectives/benchmarks are achieved.) Also, the proposed programs must not depend on uncertain Proposition 218 funding as *Basin Plan* programs do now. LOWWP program improvements can be funded with project funds (if project funding is used efficiently and overruns are contained), and *Basin Plan* programs can be funded, as necessary, via sewer and water rates and charges, with grant funds and a Prop 218 assessment offsetting costs when/if such funds become available.

3. ***The County implements a Basin-wide water management ordinance, which incorporates the objectives and benchmarks in #2 above to reverse seawater intrusion as soon as possible, which also identifies a range of incentives to ensure objectives are met.*** The Interlocutory Stipulated Judgment (ISJ) agreement provides for such ordinance. (See Att #3, ISJ Agreement, Page 8.) An effective ordinance would avoid water rights conflicts by providing a range of incentives besides mandated water use reduction and enforcement, to ensure objectives and benchmarks are

met—and all water users in the Basin participate in maximizing mitigation programs and share the costs. Such ordinance should require private well monitoring, and Basin-wide conservation and recycled water use. In lieu of enforcement, it could encourage participation via sewer/water rate strategies (e.g., individual water budgets with steeply tiered rates when budgets are exceeded), conditions set on septic system use, and/or options presented to residents, such as the choice between using recycled water or conserving to meet water use targets. Incentives/consequences may require some innovation, but conditions within the Basin allow for many alternatives—and the extremely urgent seawater intrusion problem justifies decisive action, including restrictions on water use. (We will be willing to meet with County supervisors and staff to discuss alternatives.)

4. ***The Basin Plan is amended to include more conservative and precautionary assumptions, predictions, proposals, and programs.*** Amendments should include 1) elimination of so called "sustainable yields" that allow further seawater intrusion, 2) revised sustainable/safe yield estimates set at least 40% below current "sustainable yields," 3) less reliance on the model and more on the generally-accepted fact that water tables must be brought up in all aquifers to several feet above mean sea level as soon as possible by minimizing extractions from the Western and Central parts of the Basin as soon as possible, 4) a metric for determining that programs are working and seawater is reversed in the Lower Aquifers, and not occurring in the Upper Aquifer, which sets historical chloride levels at no more than 60 mg/l, rather than 100 mg/l as the Basin Plan recommends, which also uses more metric test wells than the *Basin Plan* recommends, including wells in every aquifer, 5) a clear statement that the Basin may not support future building given the severity of seawater intrusion, 6) a clear statement that conclusive evidence (well tests applying the metric) must show that seawater intrusion is reversed and there is surplus freshwater (above what is needed to reverse seawater intrusion under current conditions with a margin of safety) before building is allowed, and 7) provisions for adaptive/contingency programs to avoid adverse impacts from the LOWWP (including combined impacts from the drought and *Basin Plan* programs).

5. ***If a Watermaster is appointed, the person has a proven track record of independence and placing the sustainability of resources above all other considerations.*** If Watermaster committee is appointed, the committee should have a majority of members with a resource-protection track record. The Watermaster must not be a representative of, or governed by, the Parties, as the *Basin Plan* states, or comprised solely of, or a majority of, representatives of the Parties if the Watermaster is a committee.

6. ***Property owners and resource/overseeing agencies should retain all water rights, including the right to reject the Basin Plan in the future and pursue other management options if the Basin Plan fails to reverse seawater intrusion as soon as possible or has other significant problems.*** Agencies also retain all rights and authority to require, modify, develop,

and enforce various permits and plans to reverse seawater intrusion and protect the Basin and related resources. For instance, the Basin Plan must not interfere with the Coastal Commission's authority to amend the CDP to better protect the Basin and other resources. (See Att #1, Final CDP, Condition 7.)

7. ***The Parties formally request resource agencies and the State Legislature to declare the Basin a threatened, sole-source water supply, and also formally request assistance and participation from agencies, in the form of technical, logistical, enforcement, funding, and other assistance.*** The Basin is in such bad shape that all overseeing agencies must take part in helping to save it because it is the sole source of water for the community, with no other feasible options available, in part due to the very high cost of the LOWWP, which overseeing agencies required as vital to the sustainability of the Basin and other resources. To maximize the potential of the LOWWP to provide benefits other agencies should take the steps needed to ensure the Basin is, in fact, sustainable.

8. ***The Parties provide the results of all tests, studies, assessments, and other information they develop to the public and agencies as soon as the information is developed.*** In the past, the LOSG has requested information from the County about the status of the Basin and been told it is "privileged."

Addendum #6

Specific requested improvements to the LOWWP recycled water use, conservation, monitoring, reporting, and adaptive management programs

Recycled Water Program (Special Condition 5a)

1. ***Limit the use of recycled water to the Western and Central Area of the Basin (west of Los Osos Creek) unless recycled water used in the Eastern Area (east of Los Osos Creek) is replaced with water from wells in the Eastern Area (creating an agricultural exchange program).*** Recycled water must be used in the Western and Central Area to provide a direct offset of pumping from impacted aquifers to maximize mitigation; using recycled water in the Eastern Basin provides minor, very long-term benefits, so it does not address the urgent problem. Basin Plan Infrastructure Program D provides for wells in the Eastern Area, and the LOWWP can also provide them if necessary. Such wells would provide at least 250 AFY of water to mitigate seawater intrusion and help raise aquifer levels in the Western and Central Basin to reverse seawater intrusion as soon as possible. (See *Summary of Problems with the Draft Basin Plan and Recommended Actions*, Keith Wimer, Att #18, Pages 6 & 7.) This water is also needed to address unmitigated project impacts, and provide adaptive capability to account for uncertainties and unanticipated impacts (e.g., seawater intrusion caused by the project and/or *Basin Plan* programs). The LOWWP does not now have adaptive management capability.

2. ***Add purple pipe connections to make recycled water available to more receiver sites in the Western and Central Areas of the Basin.*** More connections should be

added to the purple pipe mainline along Los Osos Valley Road to make recycled water available to large private properties in the area and the Los Osos Commercial District. Sea Pines Golf Course should offset all outdoor water use with recycled water. These improvements to the recycling program will offset 100 to 200 AFY of groundwater pumping, providing a direct benefit on seawater intrusion.

Conservation Program (Special Condition 5b)

1. ***Implement a much stronger media and public information campaign that inform the public about how serious the seawater intrusion problem is.*** Spend most of the approximately $400,000 budget for these measures in the next 2-3 years, rather than spreading it over 10 years. (See Att #16, Conservation Plan, Page 4.) Let residents know that they are required to retrofit by project start up, but their early participation will help protect the Basin. An effective media/outreach campaign can reduce the need for rebates and be very cost-effective.

2. ***Strengthen the washer and water survey measures.*** Be sure residents know that they can receive a $300 rebate along with a $150 rebate to help pay for an efficient washer, and target 100% of households for efficient washers by project start up. This will probably require targeting about 2/3rds of households within the wastewater service area for retrofits, about double the current target. Conduct surveys concurrent with all retrofit inspections, even if plumbers have to complete them. Currently, surveys appear to be voluntary and the number of surveys conducted have fallen well below targets. The measure is supposed to collect data on current resident use to help improve the program, and to provide leak detection-repair and information to residents on how they can further reduce use (e.g., with outdoor measures). (See Att #16, Conservation Plan, Page 4 & 46 and Att #17, Construction Update 11/2013, Page 9.) This measure is an important part of the information/outreach component of the program, but it is not being applied. The residents we've talked to say they were not asked to complete surveys, or provide information and leak detection-repair service, when County staff did retrofit inspections. The Conservation Implementation Plan indicates the surveys would be conducted concurrent with inspections, so should be very cost-effective.

3. ***Implement an outdoor conservation program that targets a significant reduction in outdoor use.*** Special Condition 5b requires the LOWWP conservation program "...to help Basin residents to reduce their potable water use as much as possible through measures including but not be limited to retrofit and installation of low water use fixtures, and grey water systems." Clearly, the language does not limit the LOWWP program to indoor measures since grey water systems are outdoor measures. SLOGB submitted a proposal for a comprehensive indoor-outdoor LOWWP conservation program to the Coastal Commission in 2010, and the group could easily expand its present role, designing a septic system repurposing program, to include an outdoor conservation program that combines low water-use landscaping with grey water use and rainwater capture and infiltration (i.e., low impact development--LID). Most Los Osos residents will have to restore their yards after installing laterals and it is a particularly good time to encourage residents to install low-water use landscaping, LID, and rainwater/grey water systems. If information on outdoor options is distributed through a strong media and information campaign (e.g., as part

of the water survey measure) residents are very likely to participate in an outdoor program, especially with small rebates.

4. ***Set indoor-outdoor water use targets at no more than 60 gallons per capita per day (gpcd) on average.*** This is the standard the County is proposing for single-family residential homes to calculate retrofit offsets for Titles 8 & 19 ~~(per James Caruso, January 2014;~~ (i.e., 150 gallons per household/2.5 people per household = 60 gallons per capita per day, gpcd.) (See Att #9, Caruso Staff Report, Page 3.) An indoor-outdoor target is much more effective than the current indoor-only target because residents can monitor their use via water meters and monthly bills.

Monitoring Program and Reporting and Adaptive Management Program (Special Conditions 5c and 5d)

1. ***Conduct semi-annual seawater intrusion monitoring in every aquifer and develop success criteria to reverse seawater intrusion in the Lower Aquifers and avoid it in the Upper Aquifer as soon as possible per Special Condition 5c.*** CDP Special Condition 5c the "Monitoring Program" requires the County to "...assess the effectiveness of the Basin Plan...to ensure its objectives are achieved..." (The "Basin Plan" in this case is the "Recycled Water Management Plan" required by Special Condition 5.) The conditions goes on to say the monitoring program.. "shall include a baseline physical and ecological assessment of ground and surface water and related resources to be monitored, goals and interim and long-term success criteria for those resources, including at a minimum clear criteria that demonstrate that the health and sustainability of the Plan area resources are steadily improving over time, including with respect to seawater intrusion." (See Att #1, Special Condition 5c.)

2. ***Develop a report per Special Condition 5d that recommends the improvements in LOWWP programs listed above for full implementation as soon as possible (i.e., seawater intrusion monitoring within 3 months, conservation program improvements within 6 months, and recycled water improvements by project start up).*** Condition 5d the "Reporting and Adaptive Management Program" requires the County to provide "Annual reports ...documenting implementation and effectiveness of the Basin Plan... (adding that) "Each report shall include all monitoring data (including ... all water conservation efforts and effects, and all resource changes identified), shall describe the progress towards achieving the success criteria of the plan, and shall make recommendations, if any, on changes necessary to better meet Basin Plan objectives and achieve success."

3. ***Develop adaptive measures per Special Condition 5d by project start up to address LOWWP impacts (e.g., delayed recharge, and the combined impacts of Basin Plan proposals and the drought with LOWWP impacts), including new wells in the Eastern Area (west of Los Osos Creek) to provide added water to offset impacts.*** Condition 5d provides for project changes to be developed to response to monitoring data to better meet success criteria. Monitoring data regarding seawater water intrusion in the Upper Aquifer (from dewatering) and Basin Plan information (e.g., regarding severity of seawater intrusion) would reinforce the need for improvements in programs and development of an ag exchange program to maximize the health and sustainability of the Basin.

May 4, 2014
California Coastal Commission

Subject: Request for Immediate Actions to Preserve the Los Osos Valley Groundwater Basin

Honorable Commissioners:

We are contacting you to request that you take action immediately to preserve the Los Osos Groundwater Basin, threatened by a severe and worsening seawater intrusion problem. Our requests include the following, which we explain in further detail in attachments, including the letter we submitted to the San Luis Obispo County Board of Supervisors on February 21, 2014.

1. Require the County of San Luis Obispo to improve seawater intrusion mitigation measures for the LOWWP consistent with Special Condition 5 of the Coastal Development Permit (CDP).
2. Recommend/require improvements in the *Los Osos Groundwater Basin Plan* (Basin Plan), August 1, 2013, to protect and restore the resource and to ensure consistency with the LOWWP (e.g., Special Condition 5.) (Note that the Basin Plan and adjudication process are in the final stages and require immediate action.)
3. Prohibit new building in Los Osos until conclusive evidence (water quality and water level tests) shows seawater intrusion is reversed and the Basin can support a larger population.
4. Recommend against desalination and imported water as supplemental water sources for Los Osos until conservation, recycled water use, and low impact development (LID) rainwater recharge options have been maximized and given a chance to preserve the Basin as the sole water source for the community.

Special Condition 5 of the CDP

Special Condition 5 requires "...project implementation to be accomplished in a manner designed to maximize long-term ground and surface water and related resource...health and sustainability, including with respect to offsetting seawater intrusion as much as possible." The Commission recognized the need to maximize seawater intrusion mitigation with the project, but responded to the County's request to expedite project approval, allowing the County to implement proposed groundwater measures with the provision that programs would be reviewed and improved over time. (See Att #1, CDP Special Condition 5, e.g., Paragraph 5d "Reporting and Adaptive Management" and Att #27, CDP Staff Report, e.g., Pages 2 & 63.)

The severity of the seawater intrusion problem, signs that the LOWWP dewatering program may have contributed to seawater intrusion in the Upper Aquifer, and the severe drought (which exacerbates seawater intrusion)—require Condition 5 programs to maximize seawater intrusion mitigation now to minimize project impacts and help preserve the Basin. Because seawater intrusion is very difficult to reverse, so much of the Basin has already been lost to it, and the Basin is facing an urgent threat from a record drought; the long-term health and sustainability of the Basin requires maximizing its short-term health and sustainability with immediate, significant improvements to Condition 5 programs.

Maximizing mitigation from the LOWWP Recycled Water Reuse Program (Special Condition 5a) requires using more recycled water for urban reuse and implementing a program that provides the benefits of agricultural exchange. Maximizing the Conservation Program (Special Condition 5b) requires implementing an outdoor component (which the program does not have now), also strengthening the media, public information, washer replacement, and water survey measures. The improvements we request can more than double the seawater intrusion mitigation potential of the project. Also, the Monitoring and Reporting-Adaptive Management Programs (Special Conditions 5c and 5d) must be implemented to assess project and program effects, and to ensure the project maximizes benefits to the Basin pursuant to Special Condition 5. We request that the Commission review, enforce, and, if necessary, amend the CDP per Special Condition 7 to maximize project benefits to the Basin. (See Addenda A & D for requested LOWWP program improvements. Also, see Addendum E for how much more mitigation is possible with improved programs.)

The *Basin Plan* and the severity of seawater intrusion

The draft Los Osos Groundwater Basin Plan, released by the County and local water purveyors in late August 2013 (available on line at the County LOWWP website) confirms the severity of the seawater intrusion problem. It points out that seawater intrusion has rendered most all of Zone E unusable (Zone E is the deepest aquifer, once over 1/3rd of the freshwater Basin.), seawater is likely still moving rapidly into the main drinking water aquifer (Zone D) as a result of the Basin's water levels and freshwater storage capacity being below sea level. Also, seawater intrusion may be starting in the Upper Aquifer, the only supply aquifer that didn't have intrusion previously. (See Addenda C for the severity of the problem, including drought and climate change impacts.)

One of three "immediate goals" of the Basin Plan is to "Halt or, to the extent possible, reverse seawater intrusion into the Basin." However, the Plan (as presented in the "Public Review Draft") has several major problems: 1) it has no time-specific objectives or mechanism to ensure any mitigation action is taken, 2) it has no feasible funding source--a $30 million assessment is not feasible with the high cost of the LOWWP assessment, 3) it relies on a Basin model that has over estimated safe yields by 30% to 80% and underestimated the rate of seawater intrusion by 1000%, 4) it comes to the highly questionable conclusion (using the unreliable model) that Basin yield will go up 40% and the Basin will support full build out primarily with changes in pumping regimes, 5) it does not adequately address drought or climate change impacts, 6) it proposes incorporating the LOWWP Conservation and Recycled Water Reuse Programs, but it does not recommend needed improvements to maximize their benefits to the Basin and other resources as required by Condition 5. The Basin Plan also indicates that it will provide the monitoring needed to assess and improve LOWWP seawater intrusion programs, but it's not designed or required to do so.

A major concern we have is that the Basin Plan might limit or remove the County's responsibility to meet the requirements of Special Condition 5 "...to ensure that the implementation of the project is accomplished in a manner designed to maximize the long-term ground and surface waters and related resource...health and sustainability, including with respect to offsetting seawater intrusion as much as possible..."

Since the County of San Luis Obispo and local purveyors (Parties to the Basin Plan) may submit the Plan and a settlement agreement to County Superior Court for approval in the very near future, we request that you take immediate action to review the plan and

recommend/require improvements. We provide a summary of recommendations in Addendum B. Also, see Addenda 4 and 5 attached to our letter to the San Luis Obispo Board of Supervisors dated February 18, 2014, and Att # 18 for further discussion of problems with the Basin Plan and recommended improvements. See Addendum C for discussion of drought and climate change impacts.)

Special Condition 6 and future building

Special Condition 6 of the CDP requires the Estero Area Plan to be amended to "identify appropriate and sustainable build out limits, and any appropriate mechanisms to stay within such limits, based on conclusive evidence indicating that adequate water is available to support development of such properties without adverse impacts to ground and surface waters, including wetlands and all related habitats" (Emphasis added.) We request that you not allow further development inside or outside the wastewater service area until you see conclusive evidence (i.e., water quality and water level test data—not modeling predictions), which establishes that seawater intrusion is reversed and a sustainable Basin condition exists, with enough extra water to support further building. Given that the County and purveyors have not stopped seawater intrusion for 30 years, it accelerated between 2005 and 2009, and it's likely continuing to accelerate due to the severe drought (which could define a new "normal" for the area); available evidence shows there is not enough water in the Basin to support further building without harm to the resource.

Alternative Water Sources

We also request that the Commission support maximizing conservation, recycled water use, and low impact development (LID)/rainwater recharge programs within one year—and give them a chance to reverse seawater intrusion—before you consider desalination or imported water as alternative water sources for the area. The measures we recommend are quicker, more environmentally sound, and cost-effective ways to preserve the Basin. Desalination is more than two to three times the cost of the measures we recommend assuming brine disposal is even feasible in Los Osos. (See Addendum E.) Development of desalination or imported water supplies in Los Osos will divert attention and very scarce economic resources away from saving the Basin.

Conclusion

The Commission approved the very expensive LOWWP, understanding its long-term potential benefits (a reduction in nitrates in the Upper Aquifer after several decades) relative to its potential adverse impacts on seawater intrusion and on the economy of the area. We ask that you take all actions necessary to ensure the Basin becomes a sustainable sole source of water for the community, including the actions we request in this letter. Action must be taken immediately due to the dire condition of the Basin, also because LOWWP conservation funding may be in jeopardy due to project cost overruns, and the Basin Plan is in its final stages of development.

We would like to meet with Coastal staff to go over these requests at the earliest possible date. Please schedule a date, time, and place to meet. We look forward to an early response.

Sincerely,

Chuck Cesena, Chair, Los Osos Sustainability Group (LOSG)
clcesena@charter.net (See a list of attachments on the following pages.)

ATTACHMENTS

Addenda
(labeled "Addenda" in attachments)

A. Summary of requested improvements to Special Condition 5 seawater intrusion mitigation programs required by of the CDP.
B. Summary of Requested Amendments to the Basin Plan.
C. The severe seawater intrusion and climate change impacts.
D. Specific requested improvements to Special Condition 5 seawater intrusion mitigation programs required by of the CDP.
E. Estimates of seawater intrusion benefits from improved programs versus current programs

Letters and Record Request submitted to the County of San Luis Obispo Board of Supervisors (labeled "Letters" in attachments)

1. LOSG letter dated February 18, 2014, submitted February 21, 2014. (The addenda referred to in the letter are attached to the letter; the attachments referred to are the cited documents listed below.)
2. Letter from Keith Wimer, dated February 11, 2014.
3. LOSG follow up letter dated and submitted March 4 2014.
4. Records request dated March 4, 2014 and submitted on about March 20, 2014

Cited documents
(labeled #1, #2, #3, etc. in attachments)

1. *Coastal Development Permit* (CDP) for the LOWWP, September 7, 2010, Special Conditions 5, 6 and 7, Pages 1, 9 & 10.
2. *Basin Plan for the Los Osos Groundwater Basin*--Public Review Draft (Basin Plan), August 1, 2013, Pages 1, 13, 19, 39, 46 , 66, 67, 84-86, 88, 91, 98, 99, 106, 108-111, 113, 114, 120, 140,186, 187, 188, 205, 210, 211, 213-216, 239, 240, 247, 249, 250, 289, 297.)
3. *Interlocutory Stipulated Judgment* (ISJ) (Agreement approved by the Superior Court of San Luis Obispo County under which Parties in the Los Osos Basin Adjudication are developing the Basin Plan.), Pages 1, 7 & 8.
4. *Resource Capacity Study* (RSC) for the Los Osos Area, February 2007, Page 8.
5. *Simulated Effects of a Proposed Sewer Project on Nitrate Concentrations in the Los Osos Valley Groundwater Basin*, Gus Yates and Derrik Williams, November 6, 2003, Pages 1, 7, 19 & 20.
6. *Seawater Intrusion Assessment and Lower Aquifer Source Investigation of the Los Osos Valley Groundwater Basin* (Seawater Intrusion Assessment), Cleath & Associates, October 2005, Pages 1, ES-3, ES-4, 27, and Figures 5, 7, & 9.
7. *Los Osos Water Recycling Facility Baseline Groundwater Quality Monitoring,* Cleath-Harris Geologists, July 2013, Pages 1-7
8. Dewatering Tracking Data, December 12, 2013 (3 pages).
9. County of San Luis Obispo Board of Supervisors Agenda Item (to consider changes to Titles 8 & 19), January 14, 2014.

10. *Waste Not Want Not: The Potential for Urban Water Conservation in California, Pacific Institute,* November 2003, Pages 1, 71 & 73.
11. *Los Osos water use and potential conservation estimates* (Conservation Estimates), Keith Wimer, December 12, 2013.
12. Transcript of Regional Water Board Meeting, December 6, 2013 (Comments regarding dewatering and no data to show measurable septic system impacts on Morro Bay National Estuary).
13. *Can Los Osos Valley Groundwater Basin Provide a Sustainable Water Supply?* The Watershed Institute, California State University Monterey Bay, January 2010, Pages 1, iii, iv, v, 32, 33, 56, 57, 58, 59, 60.
14. *Review of Cleath-Harris Geologists' July 2009 Memorandum "Flow Model Conversion and Urban Area Yield Update,"* Gus Yates, January 13, 2010.
15. *Review of Los Osos Basin Update and Current Wastewater Project Description—Revised,* Gus Yates, August 3, 2010.
16. *Water Conservation Implementation Plan for the Los Osos Wastewater Project* (Conservation Implementation Plan) San Luis Obispo County Public Works Department, October 2012 (Adopted October 23, 2012), Pages 1, 4, 19, 46, 47, 49-52.)
17. *Los Osos Wastewater Project, Project Construction Update, Month of November 2013,* (Construction Update), John Waddell, Pages 1, 9, 10, 12 (includes a 1-page LOSG summary of conservation plan first-year targets and expenditures. The summary refers to the Conservation Implementation Plan—Attachment #16.)
18. *Summary of Problems with the Draft Basin Plan and Recommended Actions,* Keith Wimer, December 12, 2013.
19. *Achieving a Sustainable Los Osos Valley Water Basin* (Sustainable Basin Plan or SBP), Keith Wimer, September 2009 Draft.
20. *Review of 2011 Water Demand Analysis and Water Conservation Evaluation prepared by Maddaus Water Management* (Mayer Review of LOWWP Conservation Program), Peter Mayer, October 10, 2011.
21. *Recycled Water Management Plan for the Los Osos Wastewater Project* (RWMP), San Luis Obispo County Public Works Department, May 2012, Pages 1, 2, 10-14, 54-56, 86 & 87.
22. *Los Osos Wastewater Project, Project Construction Update, Month of February 2014,* (Construction Update), John Waddell, Pages 1, 9, 10 & 12.
23. *LOWWP DEIR* (Page 3-43), *Appendix D-2* (Pages 3, 13, 14, 20, 21 & 24), *Appendix Q* (Pages 3-36 & 3-37).
24. *Viable Project Alternatives Fine Screen Analysis,* Carollo Engineers, August 2007, Page 2-8.
25. *EIR Comment Letter,* Roger Briggs (Executive Officer of the Central Coast Regional Water Board), January 30, 2009, Pages 1,3, 4-8.
26. *Climate Resilience Evaluation and Awareness Tool Exercise with Los Osos Water Purveyors and the Morro Bay National Estuary Program,* EPA, June 2013, Pages 1, 8,9, 11
27. Coastal Development Permit Staff Report, May 27, 2010, Pages 1, 2, 57, 58,62-64
28. Rainfall in Morro Bay 2003 through April 14, 2014
29. *Los Osos Groundwater Basin Update,* ISJ Working Group (representatives of the County and Los Osos Purveyors involved in developing the Basin Plan), May 4, 2010, Pages 1 and Exhibit B (TM, Figures 1-3 and Table 1.)

30. "Water Shortage Contingency Plan Decision Points" Agenda Item 12 A, 5/1/2014 LOCSD Borad Meeting, Pages 12A1-1, 12A-2, and Memorandum from the Water Shortage Sub-Committee, February 12, 2014, Pages 1-6, with Attachments 1-2 and Exhibit B
31. Agreements for Delivery of Recycled Water, Goodwin contract Pages 1-9, and May and Judge contracts, Pages 1,2,9, with Attachments A (maps).
32. LOWWP Technical Memorandum: "Effluent reuse and disposal alternatives," Corollo Engineers, April 2008, Page 10 & 54.
33. ISJ Work Group Technical Memorandum: "Water use estimates for Los Osos Creek Valley irrigation wells," Cleath-Harris Geologists, Inc., Pages 1 &2, Figures 1 & 2, and "Cropping Data."

The LOSG has submitted many of the above cited documents to the Commission previously, and several are available on line, e.g., at the SLO County LOWWP website.

Addendum A
Summary of requested improvements to Special Condition 5 seawater intrusion mitigation programs

Recycled Water Program (Special Condition 5a)

1. ***Increase recycled water use in the Western and Central Areas of the Basin by adding purple pipe connections and mandating reuse, if necessary. .***
2. ***Replace recycled water used in the Eastern Basin with well water from the Eastern Basin to provide the benefits of an agricultural exchange program.*** These two changes can more than double the benefits of the program at very little added project expense, if any. They are also needed to provide adequate reuse sites for all LOWWP treated effluent. Landowners have not committed to about 200 AFY of the reuse proposed in project documents.

Conservation Program (Special Condition 5b)

1. ***Implement stronger media and public information campaigns.***
2. ***Strengthen the washer replacement and water survey measures.***
3. ***Implement a strong outdoor conservation component***
4. ***Set an indoor-outdoor target at 52 to 57 gallons per capita per day (gpcd).***
5. ***Optimize use of the $5 million the CDP requires to be spent.*** These measures can more than double the benefits of the current program and be implemented with the $4 million remaining, especially if programs are coordinated with purveyors (e.g., supported by water-budget rate structures and outreach). Almost half of households now meet minimum retrofit requirements for sewer hook up, and the outdoor program can be cost-effectively combined with the septic system re-purposing program to increase the benefits of both programs. Effective use of the money could leave $1-2 million, which should be spent on the Recycled Water Reuse program to help achieve the objective of Special Condition 5.

Monitoring Program and Reporting and Adaptive Management Program (Special Conditions 5c and 5d)

1. ***Develop a Monitoring Program with success criteria specifically to assess LOWWP impacts and improve LOWWP programs.***
2. ***Develop reports per Special Condition 5d that recommend improvements in the programs being implemented (including the improvements listed here.)***
3. ***Develop an adaptive management program specifically to respond to LOWWP impacts.*** The RWMP and Basin Plan indicate that the County will rely heavily on the Basin Plan for these programs, but Basin Plan programs are not designed specifically to assess LOWWP impacts, improve programs, and maximize project benefits. The drought has changed baseline conditions, seawater intrusion is likely worse in Lower Aquifers and could be starting in the Upper Aquifer, and recycled water and conservation program implementation is not meeting the Condition 5 objective.

   (See Addendum D for specific improvements and Addendum E for cost-effectiveness.)

Addendum B
Summary of requested amendments to the Basin Plan
Introduction

We are concerned that the *Basin Plan for the Los Osos Groundwater Basin*, as proposed in the Public Review Draft (available at the SLO County LOWWP website) will allow seawater intrusion to destroy the Los Osos Basin and could interfere with the objective of LOWWP Coastal Development Permit (CDP) Special Condition 5 ("...to ensure that project implementation is accomplished in a manner designed to maximize the long-term ground and surface water and related resource health and sustainability..."). We submitted the following recommended changes to the County of San Luis Obispo Board of Supervisors and requested a response at several subsequent meetings, but did not receive one. (See Addenda #1 & #5 of our letter to the County Board of Supervisors, dated February 18, 2014.) We ask the Commission to utilize the LOWWP Coastal Development Permit and Local Coastal Plan (LCP) policies and all other options that may be available to you to support these improvements. We also ask that you encourage the County, other agencies, and major stakeholders to support them.

1. ***The Basin Plan is amended to maximize seawater intrusion mitigation and the health and sustainability of the Basin as soon as possible (consistent with the objective of Special Condition 5 of the CDP).*** Maximizing the long-term sustainability of the Basin requires maximizing seawater intrusion mitigation in the short term to preserve as much of the Basin as possible. This is best accomplished by maximizing conservation, recycled water use, and the most cost-effective infrastructure programs to bring freshwater water levels up in the three main aquifers (Zones C, D, and E) in the Western and Central Areas of the Basin as soon as possible. The *Basin Plan* proposes adopting the LOWWP conservation and recycled water programs and extending them Basin wide (to the 13% of the population outside the wastewater service area). The LOWWP conservation funding (the $5 million required by the CDP) would be covered by a community-wide assessment, after being increased 10% ($500,000) to pay for measures outside the wastewater service area. However, the Basin Plan exaggerates the benefits of LOWWP programs and does not maximize program benefits as required by Special Condition 5. (See Addenda D & E and Att #20.) It recommends against many effective outdoor conservation measures, including turf replacement, rainwater harvesting, and grey water reuse, as well as mandatory outdoor conservation for people living outside the wastewater service area. (See Att #2, Page 186.) It also recommends a conservation "goal" that does not substantially reduce water use. We request that you support a more aggressive conservation target (see note below), mandatory conservation throughout the Basin, and contingency measures that require water use/pumping restrictions as needed—see 4 below and note on Page 5.

   The Basin Plan also proposes implementing Infrastructure Programs A and C to shift more pumping to the Upper Aquifer and inland (to the Central Area of the Basin between the Los Osos Commercial District and Los Osos Creek) in a "no further development scenario." (Program A is already paid for and being implemented). The combined cost of Program C,

the Basin Plan monitoring program, and proposed conservation and recycled water programs (i.e., the cost of LOWWP programs plus $500,000) is about $31 million, which the Basin Plan recommends funding with an assessment. (See Att #2, Page 297.) The Basin Plan recommends Program D (additional wells east of Los Osos Creek in the Eastern Area) only in a "buildout development scenario." (See Att #2, Page 289.) However, Program D substantially increases the benefits of the recycled water program because it effectively allows for an agricultural exchange program (the exchange of potable water for recycled water) maximizing the benefits of recycled water reuse on seawater intrusion. We ask that you support implementing Program D as soon as possible (within one year) as part of the "no further development" scenario. We also ask that you require making Program D, or its equivalent (e.g., wells at the treatment site) a part of the LOWWP if the Parties in the Basin Planning process do not commit to full implementation by project start up. (See further discussion in Addendum D, Item 2.) . Finally, we ask that you do not allow funding for the LOWWP Conservation and Recycled Water Reuse programs to be shifted away from LOWWP funding since it may limit the responsibility of the County to meet the objective of Special Condition 5 and the Commission's ability to ensure objectives are met. (See Att #2, Pages 13 & 215. Also see Addendum E, Page 25, for why shifting funding could impede improvements.) The improvements we recommend can more than double the seawater intrusion benefits of the Basin Plan (increase offset by over 700 AFY) very cost effectively. (See Addendum E and Att #18, Pages 6 & 7.) These improvements are needed to bring Basin-wide pumping down to within a reasonable "safe" yield (see #4 below) and to ensure the Basin Plan is consistent with Special Condition 5.

Note: The Basin Plan sets a conservation "goal" of 95 gallons per capita per day (gpcd) with all urban water use included (residential, commercial, institutional, and unaccounted for water). However, water use for 95% of the community (properties not using private wells) was only slightly above that in 2012 based on Basin Plan production records, and indoor-outdoor water use for people living within the wastewater service area (about 87% of the community) was about 71 gpcd, with indoor use about 50 gpcd—the minimum target for the LOWWP. Thus, about the time the LOWWP conservation program got underway in 2012, it had reached (or nearly reached) its target. (See Att #11, Pages 1, 5 & 6.) Due to the severity of the drought, potential for low rainfall in the future (climate change impacts), LOWWP impacts (dewatering and elimination of septic system return flows), and very poor condition of the Basin (see Addendum C); we recommend a target of 52 gpcd average indoor-outdoor use for residential water users. This is consistent with the Stage III "Emergency" action level of the *Water Shortage Contingency Plan* the LOCSD is now considering. (See Att #30, Memo, Page 3 & Exhibit B.) The LOSG is recommending the "emergency" level rather than the more-restrictive Stage IV or V levels because we're also recommending other ways to reduce pumping as soon as possible. We believe the 52 gpcd is achievable and an appropriate target for reducing water use as much as possible per the CDP, but we are also providing estimates for the benefits of a 57 gpcd target. (See Addendum E, Pages 19. Also see Addendum D, Page 15, for further discussion of the target.) In addition, we recommend a critical shortage contingency plan—see note below.

2. ***The Basin Plan is amended to include time-specific objectives and benchmarks for implementing programs and reversing seawater intrusion as soon as possible (5-7 years), in addition to a mechanism to ensure objectives are met and adequate funding sources.*** We request that you recommend/require time-specific, enforceable objectives that maximize and implement mitigation programs within 1-2 years, to reverse seawater intrusion as soon as possible (5-7 years), along with a range of funding sources to ensure programs are implemented quickly. These are essential for the Basin Plan to effectively address the urgent problem and support the long-term health and sustainability of the Basin.

3. ***The County implements a Basin-wide water management ordinance that incorporates time-specific objectives (see #2 above) to reverse seawater intrusion as soon as possible, with contingency measures and a range of incentives to ensure objectives are met and all users of the Basin participate.*** We request that the Commission supports a County ordinance that sets time-specific objectives (see #2 above) for reversing seawater intrusion, which provides adequate incentives to ensure all water users in the Basin fully participate in programs that maximize seawater intrusion mitigation and share in the cost. The ordinance should include requirements for comprehensive indoor-outdoor conservation (with the low water use target above and an emphasis on low impact development/recharge options—see Addendum D, Pages 14 & 15.) The ordinance should also require recycled water use and private well monitoring for 100% of wells Basin wide. The Interlocutory Stipulated Judgment (ISJ) agreement, under which the Parties (County and purveyors) are developing the Basin Plan, provides for the County to implement a Basin Water Management Ordinance. (See Att #11, Page 8.)

4. ***The Basin Plan is amended to include more conservative and precautionary assumptions, predictions, proposals, and programs.*** The Basin Model has overstated safe yields by 30% to 80% for over 20 years, and it underestimated the rate of seawater intrusion by 1000%. Largely as a result of County and purveyor overreliance on the Model, the Basin has been over drafted by 30% to 55% for 35 years. The Basin Plan states that 2450 AFY is the "sustainable yield" under current conditions, and recommends a 20% margin of safety (which would make the yield 1960 AFY). (See Att #2, Pages 46, 99, 106.). However, in 2007, when the LOWWP EIR was being developed, the model showed Basin safe yield to be 3250 AFY and in 2002, 3560 AFY. (See Att # 4, Page 8, and Att # 23, Page 13.). Based on modeling, the Basin Plan predicts Basin yield will increase about 40% to 3500 AFY and support full build out primarily with shifts in pumping. (See Att #2, Page 240.) However, Eugene Yates has said pumping shifts will not increase yield and could cause seawater intrusion in the Upper Aquifer in conjunction with the LOWWP (See Att #14, e.g., Page 4). Mr. Yates did not factor the added impacts of the severe drought or climate change. Therefore, we request that the Commission supports an approach to Basin management that does not rely on the model, but on bringing water tables up as soon as possible in all aquifers above the levels needed to reverse seawater intrusion. This means maximizing the quickest, most certain, and cost-effective measures available, conservation

and urban reuse, to offset pumping in the Western and Central parts of the Basin. (See Addendum E for how much more seawater intrusion offset/groundwater mitigation is possible and why it is necessary to avoid impacts from the LOWWP.) Toward this end, we request that you require total Basin production (yield) of no more than 2100 AFY with all programs maximized and in place (including the improved conservation and recycled water programs we recommend, and Basin Plan Infrastructure Programs A, C, & D) until seawater intrusion is reversed. This allows a 5%-10% increase in the 1960 AFY yield, a reasonable increase with programs in place, rather than the 50% to 80% increase the Basin Plan claims will occur based on the model (20% to 40% increase in the "sustainable yield" of 2450 AFY). The yield we recommend is consistent with EPA climate change modeling for the Basin (1800 AFY with none of the programs recommended in the Basin Plan and 2325 AFY with all the recommended programs). (See Att #26, Page 11.) The EPA evaluation assumes a 35-year planning horizon, but Basin resilience must be maximized now for the Basin to withstand climate change. We also request that the Commission allows new building in the area only after conclusive evidence (well tests over time, rather than modeling) shows seawater intrusion is reversed, the Basin is sustainable as the sole water source for the current population, and ample additional water exists for new development with a margin of safety to account for climate change and other uncertainties. Such language is consistent with Special Condition 6 of the CDP.

Note: The Basin Plan has a number of problems not addressed here, including that it defines "sustainable yield" as a yield that allows further seawater intrusion. (See Att #18, Pages 7-11 for further discussion.) The Plan also has no contingency plan or measures to respond to impacts if programs fail to protect resources, including critical threats to the water supply and habitat. The LOCSD is currently revising its "Water Shortage Contingency Plan," which would mandate water use restrictions (limit allocations) for households and businesses, based on physical evidence (triggers) indicating seawater intrusion or low rainfall threatens the water supply. (See Att #30.) Golden State Water Company, the other main purveyor in Los Osos and Party to the Basin Plan, has "...expressed a willingness to participate in contingency planning and mandatory conservation." (See Att # 30, Page 12A-2.) We request that the Commission maximize groundwater mitigations to proactively avoid/minimize impacts (erring on the side of caution), but we also ask that the Commission supports contingency measures for the Basin, including mandatory water use and pumping restrictions, to respond to critical threats to the water supply or habitat.

5. ***A Watermaster (if appointed) is a person or committee with a proven track record of independence and placing the sustainability of resources above all other considerations.*** If a Water Master is appointed, we ask that you support someone with a strong record of independence and placing resource preservation as a top priority, and if it is a committee, we request that you support a majority of members with that record.

6. ***Resource/overseeing agencies retain all authority and responsibility to oversee the Basin and pursue management options needed to ensure the Basin becomes a sustainable sole source of water for Los Osos.*** We request that you support and ensure that the California Coastal Commission and other agencies with oversight authority and responsibility for the Basin retain all rights and responsibility to ensure the Basin becomes a sustainable sole source of water for the Community of Los Osos.

7. ***The Parties formally request resource agencies and the State Legislature to declare the Basin a threatened, sole-source water supply, and also formally request assistance and participation from agencies in the form of technical, logistical, enforcement, funding, and other assistance.*** We request that you encourage the parties to make these requests, and that you take these actions regardless of whether the Parties make the requests.

8. ***The Parties provide the results of all tests, studies, assessments, and other information they develop to the public and agencies as soon as the information is developed.*** We ask that you make sure all information developed is provided to the public and agencies as it is developed. (The LOSG has requested information from the Parties regarding the status of the water supply on several occasions and been told it is "privileged" information.)

(See Addenda #4 & #5 of our letter to the County Board of Supervisors and Att #18 for further discussion of the problems with the Basin Plan, including problems with the Model, and recommendations.)

Addendum C

The severe and urgent seawater intrusion problem and climate change impacts

Introduction

Much of the information below is based on the draft Basin Plan. The Basin Plan states "Currently, and for the foreseeable future, seawater intrusion is the most serious challenge facing the Basin," and it points out that that seawater intrusion has caused some community supply wells to become unusable for drinking and is threatening many more. (See Att #2, Page 91.) It also provides information that raises very troubling questions about the amount of overdraft that has occurred in the Basin, how much of the Basin's freshwater capacity has been lost to seawater intrusion since 1970's, and the likelihood seawater intrusion has accelerated in both lower aquifers since 2005 despite a 40% reduction in water use between 1988 and 2012. (See Att #2, Page 140.) However, the Basin Plan is vague and at times contradictory about the specific rate of seawater intrusion and status of the Basin. Therefore, the following status summary has required us

to compare Basin Plan information with earlier reports and studies, in addition to information we received from other sources (e.g., a presentation of the draft Basin Plan for the LOCSD), and to draw conclusions.

We submitted basically the same summary (without the drought-climate change section) to the Board of Supervisors and asked for a response but did not receive one. We ask that the Commission's staff hydrologist review the Basin Plan and issues raised, and contact us with any questions or information/conclusions that differ from ours. These could also be discussed in the meeting we're requesting with Staff. We also ask the Commission to require a seawater intrusion update immediately and semi-annual updates after that pursuant to Special Condition 5c. (Also see request in Addendum D, Item 8.)

State of the Basin

1. Lower Aquifer Zone D, the main drinking water aquifer is severely impacted by accelerating seawater intrusion. Zone D supplies three-fourths of the water for 95% of the community. Although the Basin Plan states that seawater intrusion in Zone D may not have accelerated as much as estimated in the 2010 *Los Osos Groundwater Basin Update* (Update) (about 12 times, 60 feet per year to 700 feet per year), it confirms that seawater intrusion did accelerate in the aquifer. Further, the information it provides (e.g., a geophysics report showing a 25-foot rise in sea level at a main supply well) indicates that seawater intrusion progressed into the aquifer in a broad front along the seawater interface at about the same rate estimated in the 2010 Update, i.e., about twice as far in 4-5 years as it had in the previous 20 (about 10 times as fast). (See Att #2, Pages 84-86 and Att # 29, Figures 1-3.) At this rate (about ½ mile every 5-6 years), the front could be nearing major LOCSD supply wells, and it could potentially destroy the urban part of the aquifer (west of Los Osos Creek) as a drinking water source in about 15 years—sooner if the current drought or cumulative impacts cause it to accelerate further—see 5 and 6 below.) Other information in the Basin Plan indicates that seawater intrusion will continue to move through the aquifer until water levels are brought up to 8-9 feet above sea level. (See Att #2, Pages 84, 98 & 106.) Most of Zone D is now below sea level, in part due to very large pumping depressions in much of the Western and Central Areas. (See Att #2, Pages 66 and 88.) The 2005 *Seawater Intrusion Assessment* shows these depressions. (See Att #6, Figure 5.)

2. Lower Aquifer Zone E, which once comprised over one-third of the Basin's freshwater capacity, for the most part, is too contaminated to use. The Zone E portion of the Palisades Well, a main community supply well, was sealed off in 2013 due to very high salt levels (over the Title 22 limit for drinking water.) Now, Zone E is pumped by only one community supply well in the Central Basin, so it has been abandoned, for the most part, to seawater intrusion. The Basin Plan refers to Zone E only as a source of seawater for desalination. (See Att #2, Page 247.) Zone E was once an important drinking water source containing the Basin's oldest and purest water. The Basin Plan refers to Lower Aquifer

Zones D and E as a single aquifer although the aquifers have been analyzed and referred to separately in seawater intrusion evaluations in the past. The interaction of Zones D and E is apparently not well understood. The Basin Plan states that the clay layer between them "may be discontinuous," and the *Seawater Intrusion Assessment* mentions the potential for "up coning" (seawater moving up from below), suggesting that seawater intrusion in the Zone E could adversely affect Zone D. (See Att #2, Page 64 and Att #6, Page 26. Also see "Conclusion" below.)

3. Over one-half of the Basin's freshwater capacity may have been rendered unusable for drinking and most other beneficial uses since the 1970's due to severe overdraft. The Basin Plan reports the current freshwater capacity of the Basin at 205,000 acre feet (AF) (140,000 AF Lower Aquifers and 65,000 AF Upper Aquifer) (See Att #2, Page 88.) However, in 2003, a major study reported Basin capacity at 500,000 AF (450,000 AF Lower Aquifers and 38,000 to 50,000 AF Upper Aquifer). (See Att # 5, Pages 19 & 20). Given the near abandonment of Zone E and rapid progress of seawater intrusion through Zone D, we believe this means seawater intrusion has rendered about 60% of the Basin's freshwater capacity unusable for drinking and other purposes. (See Att #2, Pages 88, 98 & 99.)

4. The only reason Basin water levels have not dropped dramatically, as occurred during the 1970's and 1980's, is that seawater has flowed in to replace the overdraft. Based on the "sustainable yield" stated in the Basin Plan (2450 AFY), and yield with the 20% recommended buffer (1960 AFY), the Basin has been over drafted 700 to 1100 AFY on average, 30% to 55%, for 35 years. (See Att #2, Pages 46, 99, & 106.) The Basin Plan indicates that the only reason aquifer levels have not dropped dramatically since the late 1980's is that seawater has flowed in to replace the overdraft. (See Att #2, Page 98.)

5. Upper Aquifer Zone C, which comprises about 1/4th of the Basin's remaining freshwater capacity, once the only supply aquifer that did not have seawater intrusion, may have seawater intrusion now. The *Basin Plan* states the aquifer is the only aquifer with storage capacity above sea level and not experiencing seawater intrusion, but the 2005 *Seawater Intrusion Assessment* reports that the aquifer is vulnerable to seawater intrusion during droughts and only "relatively stable." (See Att #2. Page 88 and Att #6, Page 27.) The 2005 Assessment also points out that water levels (hydraulic heads needed to hold back seawater intrusion) "...have historically been in excess of 2.5 feet above sea level along the bay (National Estuary) at Pasadena Drive except during severe drought, based on data from community supply well 30S/11E-7N1." (Att # 6, Page 27.) Well 7N1, the Third Street Well, is an important community well operated by the LOCSD. The Assessment states that during the 1976-77 and 1987-1999 droughts, well levels dropped to below sea level. The monitoring data required by the Regional Water Board for 2012 (October) show water levels in the well at 7.6 feet above sea level, but by July of 2013 levels had dropped to 3.7 feet above sea level. At that rate levels could now be below the 2.5 feet needed to hold back intrusion and may be below sea level, resulting in active seawater intrusion into the

aquifer. The results of the 2012 and 2013 groundwater monitoring required by the Regional Water Board show water levels in test wells (shallow wells and a few Upper Aquifer supply wells) dropped on average 2.9 feet. (See Att #7, Pages 3 & 4.) LOWWP dewatering removed over 200 millions of gallons of groundwater (over 600 acre feet), much of it in the vicinity of well 7N1. (See Att #8.) The aquifer rises to the surface in that area, and dewatering likely contributed to the disproportionate drop in water levels at the well. Dewatering samples from some locations showed very high salt levels (total dissolved solids, or TDS, levels above 1000 mg/l) indicating that dewatering induced intrusion into the aquifer. (See Att #8.) Clearly, the aquifer is vulnerable to seawater intrusion if it does not already have seawater intrusion. As Eugene Yates points out,l the aquifer is also vulnerable to seawater intrusion from the combined impacts of the LOWWP (elimination of septic return flows) and increases in pumping of the Upper Aquifer, as proposed in the Basin Plan. Mr. Yates did not consider dewatering, the drought, or climate change. (See Att #15 Pages 2 & 4.)

6. <u>The severe drought, climate change, and sea level rise threaten to make seawater intrusion much worse.</u> For the past three years, the drought has reduced rainfall in the Los Osos area by about 75% (an average of 4 inches per year versus the historic 16-17 inches). (See Att # 5, Page 11 for average historical rainfall and Att # 28 for the most recent 10-year rainfall data. Note that recent data is for Morro Bay about three miles away.) Roughly one-third of the Basin's annual recharge is from direct percolation of rain. The other main sources of recharge are septic system return flows, irrigation return flows, inflows from Los Osos Creek, and seawater. (See Att #3, Pages 3 & 4.) Very little freshwater recharge is from flows into the Basin from outside its boundaries. Ultimately, virtually all Basin recharge—that is not seawater—comes from rain percolating from above or Los Osos Creek. Recent low rainfall years will reduce freshwater storage, lower water tables, and likely worsen seawater intrusion. Between 2006 and 2009 annual rainfall averaged about 11.6 inches, and the 2010 *Los Osos Groundwater Basin Update* indicates those three drought years (2006 to 2009) are the reason seawater intrusion accelerated by about 10 times. (See Att #29, Exhibit B.)

   Rainfall over the past 10 years averaged about 14 inches per year due to above average rainfall for several of those years. However, recharge during wet years does not offset the seawater intrusion impacts of dry years, especially several dry years in a row. Eugene Yates points out that seawater intrusion is very difficult to reverse once it advances (e.g., during droughts). (See Att #14, Pages 3 & 4 and Att #15, Page 1.) Also, Los Osos has a very poor storm water management system, as the EPA climate change evaluation points out. As a result, during heavy rains much of the runoff enters creeks and Morro Bay National Estuary, polluting those resources, rather than percolating to the groundwater. With the high cost of the LOWWP, the community is not likely to assess itself for better storm water management. (Note: One reason we recommend a strong outdoor conservation program, with low impact development (LID)/recharge options, is that the program will provide the triple benefit of reducing water use, reducing run off, and increasing recharge at very low

cost—see Addendum E.)

Climate change scenarios include heavier rains, greater variability in rain patterns, and less rain overall (as may be occurring in much of California). The EPA climate change evaluation for the Los Osos Basin conducted between January 2013 and June 2013 assumed average rainfall of 11.8 inches over the next 35 years (until 2050) along with a 16-inch rise in sea level and higher average temperatures. (See Att # 26, Pages 8 & 9.) The evaluation considered the scenario to be the "worse case;" however, as current rainfall data suggest, it may not be. Moreover, given the severity of the seawater intrusion problem, a 35-year planning horizon is too long. It implies serious climate change preparation can begin in the future—which is the approach the Basin Plan takes. (See Att #2, Page 111.)

The Basin Plan projects a "sustainable yield" for the Basin of 2450 AFY under current conditions (without any of the programs it proposes) and 3500 AFY with all proposed programs in place. Applying climate change projections for the year 2100 (55 inches of sea level rise, average rainfall of 14.7 inches, and increased temperatures) the SEAWAT Model (used in the EPA evaluation) projects a "sustainable yield" for the Basin of 1800 AFY without the proposed Basin Plan programs and 2325 AFY with all programs. (See Att #2, Pages 46, 99, 106, 240 and Att #26, Pages 8 & 11.) Thus, sustainable yields with climate change are projected to be 25% to 33% lower than the Basin Plan's estimated sustainable yields, and the evaluation assumes 14.7 inches of rain—more than the average rainfall for the past 10 years. (See Att # 28.) The Basin Plan proposes to address climate change as one of several uncertainties, suggesting that the recommended 20% buffer (margin of safety in "sustainable yields") will account for climate change and other uncertainties, also bringing up water tables—and it also suggests that there will be time in the future to make adjustments if needed. (See Att #2, Pages 110 & 111.) However, as we point out in Addendum D (and Addenda #4 & 5 of our letter to the SLO Board of Supervisors, dated February 18, 2014), the benefits of all Basin Plan programs are overstated (e.g., infrastructure programs are not likely to substantially increase yield). Also, the 20% buffer does not likely account for other uncertainties, including LOWWP and Basin Plan impacts. The poor condition of the Basin requires substantially improving the Basin's health and resilience now if it is to survive climate change impacts, which are already being felt. Moreover, the cost of not preparing—loss of the Basin—is unaffordable. Climate change is a major reason we say mitigation measures must be maximized now and the maximum yield of the Basin should be set at no more than 2100 AFY, with production in the Western and Central Areas limited to 1000 AFY until seawater intrusion is reversed. (These yields are achievable with the improvements we recommend.)

Conclusion
(Is there a tipping point?)

No resource can sustain the level of over use the Basin has experienced for the past 35

years without severe consequences. The above information clearly shows the need for maximizing mitigation programs now to preserve the Basin as a sole sustainable water source for the community. It also shows the need to maximize measures to avoid catastrophic consequences, suggesting the potential for a tipping point that results in the loss of the Basin as a drinking water source in a relatively short period of time. If cumulative impacts on the Upper Aquifer (dewatering, elimination of septic return flows, shifts in pumping, and the severe drought) cause serious seawater intrusion in that aquifer at the same time seawater intrusion in Zone D accelerates into the large pumping depressions—and/or intrusion into Zone E rises into the pumping depressions in Zone D—the Basin could be lost within a few years. The Basin Plan suggests the possibility of Zone E contaminating Zone D by stating that the separation between the aquifers is "possibly discontinuous." (See Att #2, Page 64.) The *Seawater Intrusion Assessment* mentions the potential for seawater moving up from below ("up coning—see Page 26). Moving a lot of pumping to the Upper Aquifer and inland in Zone D, as the Basin Plan recommends, does not avoid these scenarios. Shifts to the Upper Aquifer make impacts to that aquifer more likely, and shifts inland could adversely impact private wells and/or habitat (e.g., Los Osos Creek). Furthermore, shifts in pumping inland in Zone D do not address low water levels throughout the aquifer, the root cause of accelerating seawater intrusion in Zone D. (See Att #2, Pages 84 & 98, and Att #15, Page 6.) The large pumping depression in Zone D extends into the Central Basin where pumping it supposed to be relocated. (See Att # 2, Page 66 and Att # 6, Figure 5.)

Note: The measures we recommend minimize the chance of severe or catastrophic consequences from cumulative adverse impacts by reducing pumping as much as possible in the Western and Eastern Basin. This allows major reductions in pumping from the Lower Aquifer without significant increases in Upper Aquifer pumping or shifts inland. (See Att #18, Pages 1 & 7 for further discussion.) Increased pumping of the Lower Aquifer in the Eastern Basin to support the Lower Aquifer in Western and Central Basin optimizes Basin management. The Eastern Basin has the highest Lower Aquifer water levels, and water balance is maintained with recycled water (See Addendum D, Item 2, and Att # 6, Page 13.) Recommended improvements provide the quickest and most cost-effective ways we know of to maximize flexibility in where water is pumped, while raising water levels and increasing Basin storage capacity to reverse seawater intrusion and adjust to/prepare for climate change.

Addendum D

Specific requested improvements to Special Condition 5 seawater intrusion mitigation programs

Introduction

We ask the Commission to require the following improvements to Special Condition 5 seawater intrusion mitigation programs to maximize the health and sustainability of the Basin and related resources. These improvements not only more than double the seawater mitigation benefits of the project maximizing opportunities to avoid impacts, but provide much greater adaptive capacity to account for uncertainties and address climate change and other impacts. They also maximize benefits for surface waters (e.g., the National Estuary and Los Osos Creek) by reducing polluted run off.

Recycled Water Program (Special Condition 5a)

1. ***Increase urban reuse in the Western and Central Areas of the Basin (west of Los Osos Creek) by adding purple pipe connections and mandating reuse, if necessary.*** To use more recycled water where it has the greatest benefit more connections to the purple pipe system must be installed west of Los Osos Creek. At a minimum recycled water should be made available to large private properties and the Los Osos Commercial District along the main recycled water pipeline. Also, Sea Pines Golf Course should offset all outdoor water use with recycled water. These improvements to the recycling program could offset 100 to 150 AFY of groundwater pumping, providing an equivalent direct benefit on seawater intrusion. Urban reuse provides at least five times the seawater intrusion benefits of agricultural reuse in the Los Osos Basin. (See Att #23, Page 20, Att #24, Page 2-6, and Addendum E.) California Water Code provides for mandatory use of recycled water for outdoor use if it is available. (See Att #2, Page 205.) The County should be encouraged to make recycled water use west of Los Osos Creek mandatory, as necessary.

   Note: The above recommendation may be necessary for all the treated effluent from the project to be used beneficially. Currently, about 200 AFY of the approximately 780 AFY of treated effluent at project start up has nowhere to go because growers and other potential recycled water users (e.g., Sea Pines Golf Course and Los Osos Memorial Park) have apparently not signed contracts. (See Att # 2, Pages 214-216.)

2. ***Return well water from the Eastern Basin to offset the recycled water sent to the Eastern Basin, effectively creating an agricultural exchange program.*** For recycled water used in the Eastern Basin to provide a significant benefit on seawater intrusion, potable water from the Eastern Basin must replace it. When growers exchange well water for recycled water, it is called "agricultural exchange." When it is used to offset pumping for agriculture, as proposed for the LOWWP, it is called "agricultural in lieu." Growers in

the Eastern Los Osos Basin have been reluctant to commit to recycled water from the LOWWP for agricultural in lieu, and will be even less willing to exchange their well water for recycled water in an ag exchange program. However, the Basin Plan provides for installing wells east of Los Osos Creek (Infrastructure Program D), and the wells can achieve the same Basin management goal as an agricultural exchange program, improving the seawater intrusion benefits of agricultural reuse by over five times. The LOWWP Fine Screening Report assigns seawater intrusion "mitigation factors" to various measures. Agricultural exchange, conservation, and urban reuse receive the highest value (.55) because these measures directly offset pumping of the Western and Central Basin, providing a direct benefit to water levels and seawater intrusion. Agricultural in lieu in the Eastern Basin receives a .1 value, less that 20% of the mitigation value of ag exchange. (Broderson leach fields receive a .22 factor because not all the water provides a direct benefit.) (See Att #23, Page 20 and Att #24, Page 2-6.) Even the .1 factor overestimates the benefit of the LOWWP agricultural reuse program as it is being developed because very little, if any, of the recycled water (as we understand it) will go to offsetting pumping. Rather, it will go to convert dry land farming or fallow land to irrigated acreage. (See Addendum E, Pages 20 & 21 for further discussion.) Both Eugene Yates and the CSUMB Watershed Institute stress the need for agricultural exchange in their 2010 reviews of the LOWWP and Basin to avoid project impacts and achieve a sustainable Basin. (See Att #15, Pages 3, 4, & 7 and Att #13, Page iv.) However, the Basin Plan recommends Program D only to support future building (See Att #2, Page 289). The program is needed now and should be implemented as part of the LOWWP, if necessary, i.e., the Parties to the Basin Plan process do not make a firm commitment to having the program on line by project start up or shortly after (within 2 years). We believe, the LOWWP design plans call for at least one well at the treatment site, and the County could install wells on the Andre site, if necessary. According to the Basin Plan, wells in the Eastern Basin will provide at least 200 AFY. (See Att #2, Pages 239 & 240.) This water is needed not only to maximize project benefits and avoid impacts but to provide adaptive capacity for the project. (See Item 10 below an Addendum E.). Program D is the most cost-effective infrastructure program in the Basin Plan at $4.2 million (see Att # 2, Page 240.), and it will substantially improve the LOWWP Recycled Water Management Plan (RWMP) and Basin Plan. Moreover, it makes good sense from an overall Basin management perspective: It helps to restore the impaired Western/Central Basin without harming the unimpaired Eastern Basin (water balance would be maintained in the Eastern Basin). According to the 2005 *Seawater Intrusion Assessment*, Zone D water levels are highest in the Eastern Basin and have remained high even as levels declined in other parts of the Basin (See Att # 6, Page 13.)

Conservation Program (Special Condition 5b)

3. ***Implement stronger media and public information campaigns.*** The LOWWP conservation program currently has weak media and public information campaigns despite budgets of $178,500 and $220,500 respectively. (See Att #16, Page 4.) Neither has a strong theme (or message), has informed residents how much they should conserve, or

challenged residents to "reduce ...water use as much as possible" per the CDP to help protect and preserve the water supply consistent with the goals and descriptions of the programs. The programs put off radio and television ads until the third year and the budgets for both programs are spread over 10 years, far too long to comply with Special Condition 5b, which requires the County to "...initiate water conservation measures as soon as possible..." per the CDP. (See Att #16, Pages 4 & 49-52, Att #17 Page 10 & "First Year Summary," and Att #22, Pages 9 & 10.). Radio public service announcements, like the one the City of Paso Robles airs, with a strong message mentioning the threat of seawater intrusion, would increase participation in the program, reduce the need for rebates, and help to cost-effectively maximize program benefits.

4. ***Strengthen the washer replacement and water survey measures.*** The washer replacement program is 95% behind first-year targets and the survey program is 55% behind, despite a $385,000 budget for the washer program and an $824,250 budget for the survey program. (See Att #16, Page 4, Att #17, "First-Year Summary," and Att #22.) Clearly, the washer rebate of $150 is not enough to encourage residents to purchase efficient washers at an average cost of about $750. Furthermore, the washer program targets only about 40% of households (2000 households), when it should target at least 60% (3000 households) to maximize benefits (target 100% of households with efficient washers by project start up). (See Att #16, Pages 4 & 19.) Currently, surveys are voluntary and the people we talked to didn't know that surveys are available. One purpose for the measure is to collect data on residents' current water use to help improve the conservation program. The measure also provides leak detection and repair service, and information on how residents can further reduce water use (e.g., with outdoor measures). (See Att #16, Pages 22, 46 & 47.) Water surveys should be conducted as part of a comprehensive indoor-outdoor program concurrent with home visits/retrofit inspections for cost-effectiveness. Stronger washer replacement and water survey measures will significantly improve the benefits of the program. (See Att #11, e.g., Item 10, Page 3.)

5. ***Implement an outdoor conservation component.*** Special Condition 5b requires the LOWWP conservation program "...to help Basin residents to reduce their potable water use as much as possible through measures including but not be limited to retrofit and installation of low water use fixtures, and grey water systems." Clearly, the language does not limit the LOWWP program to indoor measures (e.g., grey water systems are outdoor measures). San Luis Obispo Green Build (SLOGB) submitted a proposal for a comprehensive indoor-outdoor LOWWP conservation program to the Coastal Commission in 2010 that included drought tolerant landscaping combined with grey water reuse and a full range of water-saving low impact development (LID) measures, which have the triple benefit of reducing water use, reducing storm water run off, and recharging the Basin. The group is currently designing and helping to administer the septic system re-purposing program and could easily expand its present role to design and help administer a state-of-the-art outdoor conservation program. Increasing LID/rainwater recharge options with a combined program is Consistent with Special Condition 5 because it maximizes the

"health and sustainability of ground and surface water, and related resources." Most Los Osos residents will have to restore their yards after installing sewer laterals, and it is a particularly good time to install low-water use landscaping, LID, rainwater harvesting, and grey water systems. If Los Osos residents are informed and encouraged to install outdoor measures through a strong media and information campaign, residents will undoubtedly take advantage of it, especially with small rebates or other incentives such as help with landscaping designs, plant selection, and installation.

Note: The current LOWWP drainage program (about 18 features—mostly infiltration pipes installed where water collects/puddles during storms) does not significantly increase recharge or reduce polluted run off to creeks and the National Estuary. On-site LID measures installed as part of an improved conservation program will substantially increase the infiltration of clean (filtered) rainwater, also reducing polluted run off to surface waters.

6. ***Set an indoor-outdoor water use target of 52 to 57 gallons per capita per day (gpcd) on average.*** Fifty-two gallons per capita per day (gpcd) is consistent with the mandatory water allocation for Stage III "Emergency" action level of the *Water Shortage Contingency Plan* the LOCSD is currently considering (i.e., 154 to 157 gpcd for a three-person household). (See Att #30.) We are recommending it as a target for reducing water use as much as possible per the CDP. Although low by traditional standards, the 52 gpcd target is justified due to the dire condition of the Basin, the severe drought, and the potential impacts from the LOWWP and Basin Plan (shifts in pumping to the Upper Aquifer and inland). These factors require maximizing conservation to build enough resilience into the resource to survive these impacts and the impacts of climate change. The LOCSD *Water Shortage Contingency Plan* under consideration has two more-restrictive levels, Stages IV and V, that would limit water use to 42 to 45 gpcd and 35 to 42 gpcd respectively. However, we believe the 52 gpcd target is appropriate if the other measures we recommend are implemented to reduce pumping from the Western and Central Basin. We also believe the target is achievable with the intensive program we recommend, including a media campaign with a strong message and an outdoor program emphasizing the measure discussed above that incorporates the septic system repurposing program. Such program should enable many households to limit outdoor potable use to very low levels, e.g., with use of native plants, rainwater harvesting/LID measures, and grey water reuse. The community has reduced water use substantially without a strong conservation program. We are sure it will rise to the challenge of implementing a state-of-the-art program to save its sole water source. Moreover, the target can be achieved based on a review of the Basin by Peter Mayer, who indicates that 42 gpcd indoor water use is easily achieved, and who recommends a budget-based rate structure and other measures to cost-effectively reduce outdoor use. (See Att #20, Pages 3-6.) The 52 gpcd target is also achievable based on the landmark conservation study, *Waste Not Want Not,* (Gleick et al, 2003) which reports that outdoor use can be reduced 50 – 100% with the measures we recommend. (See Att # 10, Pages 71 & 73 and Att #11, Pages 2 & 3.) With the support of a

budget-based rate structure (similar to the one the LOCSD is currently considering)—in addition to incentives in the form of rebates, design and installation assistance, and a strong outreach-media effort that challenges residents to reduce water use as much as possible (as proposed in the LOWWP conservation plan but not implemented); Los Osos can provide a model of water-use efficiency for other California communities. We recommend that the Commission sets 52 gpcd indoor-outdoor use as the LOWWP target. If the Commission believes it is too low, we request the target is set at no more than 57 gpcd. We provide estimates for the seawater intrusion benefits of both in Addendum E (see Page 20). Both more than double the current benefits of the LOWWP conservation program. We also recommend that LOWWP contingency measures include lower levels of water use/allocations (e.g., equivalent to Stages IV and V of the LOCSD contingency plan). (See Att # 30.)

7. ***Optimize use of the $5 million for conservation to achieve the objective of Special Condition 5.*** The County is committed to spending $5 million, but has about $4 million left. (See Atts #17 & #22, Page 12.) At least one County official, Supervisor Gibson, has said the program is near to meeting its goals and not all the $5 million will be spent on conservation although Special Condition 5b states that the program "shall be designed to help Basin residents to reduce their potable water use as much as possible...(and) "...include provisions for use of the $5 million committed by the Permittee (County) to initiate water conservation measures pursuant to the Basin Plan as soon as possible..." [The "Basin Plan" referred in Special Condition 5 is the Recycled Water Management Plan (RWMP) the County submitted to the Commission in 2012—see Att # 21.] A good media campaign with a strong message and radio spots that inform residents how they can help save the Basin will reduce the need for rebates and more expensive forms of outreach and education (town hall meetings) improving program cost-effectiveness. Combining measures into a comprehensive indoor-outdoor program that County staff and/or SLOGB members present to homeowners in a single home visit will also reduce program costs. Right now, total program costs are running about 50% higher than rebate costs, suggesting administrative costs are higher than the 15% budgeted. (See Att #16, Page 19, Atts #17 & #22, Pages 10 & 12.) (The LOSG will be submitting a follow up to a records request asking for specific conservation program expenditures. The list of expenditures we received did not include itemized expenditures.) The $4 million remaining, if spent effectively, should cover the improvements we recommend and achieve the 52 gpcd indoor-outdoor target, especially if the program is coordinated with purveyors (e.g., purveyors support the target with budget-based water rate structures and outreach assistance). This conclusion is supported by experts, including Peter Mayer, who has indicated that $5 million is enough money to achieve very low water use levels. (See Att #20, Page 6.) Effective use of the money (e.g., a strong media campaign) we believe will result in $1 to $2 million of the required $5 million ($4 million remaining) left over, which should be applied to Recycled Water Reuse Program improvements to help achieve the objective of Special Condition 5.

Note: Potential conservation benefits are overstated in the RWMP and Basin Plan largely because baseline water use was overstated in the LOWWP/Basin Plan program submitted in 2011. (See Att #11, Pages 3-6, Att # 18, Pages 15 & 16.) Consequently, the benefits estimated in the 2010 LOWWP CDP Staff Report (168 AFY to 370 AFY) can't be achieved without the improvements we recommend. (See Att #27, Page 58 and Addendum E.)

Monitoring Program and Reporting and Adaptive Management Program (Special Conditions 5c and 5d)

8. ***Develop a Monitoring Program with success criteria specifically to assess LOWWP impacts and improve LOWWP programs.*** CDP Special Condition 5c the "Monitoring Program" requires the County to "...assess the effectiveness of the Basin Plan (RWMP)...to ensure its objectives are achieved..." Special Condition 5c also states that the program "...shall include a baseline physical and ecological assessment of ground and surface water and related resources to be monitored, goals and interim and long-term success criteria for those resources, including at a minimum clear criteria that demonstrate that the health and sustainability of the Plan area resources are steadily improving over time, including with respect to seawater intrusion..." (See Att #1, Final CDP, Special Condition 5c.) The RWMP indicates that the Monitoring Program will rely heavily on the Basin Plan and the County will "expand the scope where needed..." (See Att #21, Page 10.) However, neither the RWMP nor Basin Plan specifically provides for monitoring, success criteria, or assessment of/for LOWWP seawater intrusion impacts and programs to minimize/avoid impacts and maximize benefits. (See Att #2, Pages 144 & 120). For example, base-line data, success criteria, and assessments have been needed to evaluate the effects of dewatering and the drought, as well as conservation and recycling program implementation. Baseline data for the conservation program was overstated as noted above and should be corrected. We ask the Commission to require regular monitoring and assessment of seawater intrusion, and project and program effects to ensure the project maximizes benefits on the Basin. We recommend that these are semi-annual until seawater intrusion is reversed.

9. ***Develop reports per Special Condition 5d that recommend improvements in the programs being implemented (including the improvements listed here.)*** Condition 5d the "Reporting and Adaptive Management Program" requires the County to provide "Annual reports ...documenting implementation and effectiveness of the Basin Plan... (adding that) "Each report shall include all monitoring data (including ... all water conservation efforts and effects, and all resource changes identified), shall describe the progress towards achieving the success criteria of the plan, and shall make recommendations, if any, on changes necessary to better meet Basin Plan objectives and achieve success" (Emphasis added.) The County RWMP, submitted to the Commission, states that the County will provide annual reports, which include such information as the "Agricultural Reuse Outreach Process," "Actual Program Savings (from conservation) Compared to Projected Savings," and a "Summary of Seawater Intrusion Status." (See Att #

21, Page 13.) The County has not provided an annual report per Special Condition 5d to the Commission (to our knowledge). (The records request we submitted to the County asks for a copy of the report if submitted—see attached.) Given the severity of the seawater intrusion problem and current drought, the conservation program's performing below projections, and the County's apparent difficulty in securing contracts for recycled water—the report(s) should be submitted with recommended improvements (including those listed in this addendum) as soon as possible (i.e., seawater intrusion monitoring within three months, conservation program improvements within six months, and recycled water program improvements by project start up .

10. ***Develop adaptive management measures to respond to LOWWP impacts.*** Condition 5d requires an adaptive management program for the LOWWP. An adaptive plan and measures should be developed and implemented now to prepare for impacts. The improvements to programs we request, including the addition of wells in the Eastern Basin (to offset seawater intrusion in the Western and Central Areas) will help avoid impacts, reducing the need for adaptive measures. They also provide adaptive management capacity for the project, e.g., the ability to cut back use of Broderson leach fields, reduce pumping in the Upper Aquifer or redirect recycled/potable water to habitat without harming the Basin. Experts recommend a proactive approach (having measures in place and ready), also erring on the side of caution by building generous margins of safety into mitigation measures to avoid harm to the Basin, rather than attempting to respond to it. (See Att #13, Page 56 and Att #14, Pages 4 & 5. Also see Addendum E.) The RWMP indicates that pumping can be reduced and recycled water disposed in different ways or locations to avoid impacts, but the options are not feasible (i.e., within a timeframe that avoids harm to the Basin) without the measures we recommend. (See Att # 21, Pages 12, 86 & 87.) Adaptive plans, with specific adaptive measures, including levels of water use below the 52 gpcd, should be implemented as part of the LOWWP and Basin Plan to respond to impacts not avoided, e.g., signs of threats to the community water supply or habitat. (See Addendum B note on Page 5.)

Addendum E

Estimates of seawater intrusion benefits from improved programs versus current programs

How much more seawater intrusion offset is possible with the improvements

1. Recommended improvements to the Recycled Water Reuse Program

- Additional connections to the recycled water (purple) pipeline to provide water to large properties with high outdoor water use and the Los Osos Commercial District (approximately 50 AFY of added offset) (Total outdoor use for large and commercial properties is estimated to be more than 150 AFY, so this is conservative even with

stronger conservation measures--see Att #11, Pages 2, 4 & 5.)

- 100% recycled water use at Sea Pines Golf Course (approximately 50 - 100 AFY of added offset) (See Att #2, Pages 212.)
- Wells installed in the Eastern Basin to offset the recycled water delivered to the Eastern Basin, effectively creating an agricultural exchange program (200 to 250 AFY of added offset—see Att #2, Pages 239 & 240.)

➢ Added offset with the improvements = **approximately 300 - 400 AFY**

2. Recommended improvements to the Conservation Program

- A stronger washer replacement component (This measure is performing 95% below the targets set in the *Conservation Implementation Plan*—see Att # 17, "First-Year Summary.")
- A stronger Water Survey program. [This measure is performing at 55% below targets. It is supposed to provide the County information on typical water use to improve the conservation program, also leak detection and repair services, and information to help residents save as much water as possible. (See Att # 16, Page 46, and Att #17, "First-Year Targets."]
- An outdoor conservation component. (The LOWWP conservation program does not include an outdoor program although Condition 5 requires helping residents to reduce water use as much as possible. An outdoor component provides most of the added benefit below.)

➢ Added mitigation benefit with the improvements = **approximately 190 AFY** (Total benefit from conservation with added mitigation = approximately 315 AFY). (See Att #11, Page 3.) [Note: Program improvements are needed to achieve the benefits estimated in the 2010 LOWWP CDP Staff Report, i.e., 168 AFY to 370 AFY of offset. (See Att #27, Page 58.)]

3. Total added offset with improved conservation and recycled water programs = approximately **490-590 AFY**

Offsets from improvements compared to current offsets

1. **Current offsets** (after three years of operation) (See below--"Groundwater Imbalance in the Upper Aquifer" #3 & #4 for offset sources.) This applies the seawater intrusion mitigation factors provided in the EIR and LOWWP *Fine Screening Report.* (See Att #23, Page 20, and #24, Page 2-6.)
   - Broderson leach fields—448 AFY x .22 = 99AFY
   - Conservation—125 x .55 = 69 AFY (Several documents overstate these benefits—see note on Page 13 above.)
   - Bayridge Estates leach fields—33 AFY x .22 = 7 AFY
   - Urban reuse (schools and Sea Pines GC)—103 AFY x .55 = 57 AFY
   - New drainage features—10 AFY x .22 = 2 AFY
   - Septic system repurposing—18 AFY x .22 = 4 AFY

- Agricultural reuse—65 AFY x .1 = 6.5 AFY
- ➢ Total current offset = <u>245 AFY</u>

2. <u>Offsets from improvements</u> (See #3 above.)
   - Urban reuse and exchange using Eastern Basin wells—300-400 AFY x .55 = 165 AFY to 220 AFY
   - Conservation—193 x .55 = 106 AFY
   - ➢ Total added offset with improvements = <u>271 AFY to 326 AFY</u>

Conclusion

The 271 AFY to 326 AFY of offset with mitigation factors applied (490-590 AFY of offset without factors applied) can more than double the seawater intrusion benefits of the LOWWP.

Note: If the Commission requires a 57 gpcd target for the conservation program rather than a 52 gpcd target, it would also more than double benefits. It would reduce water use by about 125 AFY over the current program, rather than the 193 AFY and make the offset 425 to 525 AFY, rather than 490-590 AFY. It would provide about 68 AFY of offset applying the mitigation factors in #2 above, rather than 106 AFY, making the total offset of recommended improvements 233 AFY to 288 AFY, rather than 271 to 326 AFY. The additional benefits estimated for a program targeting 52 gpcd assume the lower average only for residential water use. Our calculations assume a smaller reduction in potable water use from conservation and a larger reduction from recycled water use for commercial and institutional properties. (See Att #11, e.g., Pages 2 & 3.)

Why the improved LOWWP programs are needed to mitigate project impacts

With the help of experts, the LOSG demonstrated to the Commission in 2010 that the LOWWP EIR groundwater analysis is not adequate, largely because it relies on a Basin Model with substantial, unstated uncertainties, a model that failed to predict the rate of seawater intrusion by over 1000% between 2006 and 2009.

The Basin Plan reinforces the unreliability of the Model by estimating the current "sustainable yield" of the Basin at 2450 AFY, down from the 3250 AFY assumed in the EIR. (See Att # 2, Page 99 and Att # 23, Page 13.) Furthermore, "sustainable yield" as defined in the Basin Plan is a yield that allows seawater to intrude further. The Basin Plan recommends a 20% margin of safety to account for all uncertainties, claiming it will also reverse seawater intrusion. This would make the recommended yield to reverse seawater intrusion under current conditions 1960 AFY. (See Addendum B, Item 4, Addendum C, Item 5, and Att # 18, Pages 7-11 for problems with the model.)

Despite major problems with the model used in the EIR analysis, County officials continue to say that the LOWWP is mitigated for seawater intrusion at 2:1, and no more mitigation is needed. County Officials did not respond to our requests for improvements to Condition 5 programs (see letter dated February 18, 2014) and we believe they will say Condition 5

programs are adequate and condition requirements have been satisfied.

Therefore, we are providing the following analysis to show why improvements are needed to minimize or avoid LOWWP impacts. This analysis eliminates the Basin model (and its unstated uncertainties) by relying on the basic principle of water balance. To avoid/minimize potential project impacts on the Basin (impacts on seawater intrusion and habitat), the LOWWP must replace all the water removed from the Western and Central Areas (wastewater service area and immediate vicinity west of Los Osos Creek) where adverse impacts can occur --or the project must offset pumping in that area to maintain water balance at a ratio of 1:1. This theoretically provides the water necessary to offset groundwater impacts. However, measures must also provide a margin of safety to account for the uncertainties inherent in mitigating impacts, i.e., replacing/offsetting groundwater where and when needed. (See "Uncertainties" below.) In 2010 Eugene Yates and the CSUMB Watershed Institute emphasized that seawater intrusion mitigation measures must err on the side of caution due to the difficulty of reversing seawater intrusion and the need to avoid any more harm to the Basin. They supported maximizing conservation, urban reuse, agricultural exchange, and low impact development (LID) recharge measures as the most immediate, certain, and cost-effective ways to avoid LOWWP impacts and achieve Basin sustainability. They also stressed the need to have adaptive measures in place—even with measures maximized. (See Att # 13, Pages iii-v, & 56-60; Att #14, Pages 4 & 5; and Att #15, Pages 1,3,4,6 & 7.)

The following shows why the current programs do not maintain the water balance, so do not avoid or minimize project impacts.

Ground water imbalance with the LOWWP

1. Groundwater removed within the first three years from the Western and Central Areas of the Basin = 1100 AFY
    - 780 initial wastewater flows (per the draft Basin Plan)
    - 20 AFY inflow and infiltration (Conservative estimate—the LOWWP CDP Staff Report estimates 336 AFY) (See Att # 27, Page 58.)
    - 300 AFY for dewatering (Conservative estimate—dewatering data show over 600 AF of groundwater removed with much of it disposed in the estuary, Los Osos Creek, or used for construction.) (See Att #8.)
2. Groundwater returned or offset within the first three years to the Western and Central Areas of the Basin = 472 AFY
    - 225 AFY Broderson leach fields (According to the EIR, the leach fields will be tested for the first two years at 200 to 250 per year—see Att #23, LOWWP DEIR, Pages 3.43, Q.3-37, Y Q.3-38.)
    - 123 AFY conservation (Realistic estimate--the Basin Plan and RWMP substantially overstate potential benefits --see Att # 11, Pages 3-6.)
    - 33 AFY Bayridge Estates Leach Fields (See Att #2, Page 214.)
    - 63 AFY of recycled water offset for schools and the Community Center (This is

the amount of recycled water actually committed to in the Western and Central Areas of the Basin—see Att #2, Pages 212 - 214)

- 18 AFY percolated from new drainage features (County officials recently reported at a town hall meeting that 18 features were installed. This assumes each of 18 features collects runoff from 1 acre and rainfall is 12 inches.)
- 10 AFY from septic system re-purposing (This assumes a modest benefit from the program for several reasons—see fifth bullet in "Uncertainties in the short term" below.)

Note: The groundwater balance estimates above apply current information (e.g., current recycled water reuse contracts, the EIR proposal to operate Broderson leach fields at about half capacity for several years.) (See Att # 23, Pages 3-43, Q3-36 & Q3-37.) This information indicates that the LOWWP does not have sufficient disposal/reuse capacity to account for the estimated 780 AFY of wastewater flows (not counting I/I). Clearly, the 36 AFY of storage capacity on the treatment site is not enough to accommodate the approximately 400 AFY of recycled water with nowhere to go at project start up.

3. Groundwater removed after the first three years from the Western and Central Areas of the Basin = **1080 AFY** (assumes no building and no dewatering)
   260 AFY inflow and infiltration/collection system flushing (Conservative estimate—the LOWWP CDP Staff Report estimates 336 AFY of I/I—see Att # 27, Page 58.)

4. Groundwater returned or offset after the first three years to the Western and Central Areas of the Basin = **737 AFY** (assumes 225 AFY more recycled water going to Broderson leach fields and 40 AFY more to Sea Pines Golf Course, as proposed in the Basin Plan, but not yet committed to by landowners—see Att #2, Page 214).

5. **Total groundwater imbalance within three years and after three years with no margin of safety = 628 AFY and 343 AFY**

6. **Imbalance with a 20% margin of safety (Within 3 years—628 AFY + 220 AFY = 848 AFY) (After 3 years—350 AFY + 216 AFY = 566 AFY)**

How much the improvements will restore water balance

The improvements we recommend are estimated to restore **490-590 AFY** of the water removed, so they don't make up the balance deficit in the short term, but may make up the longer-term deficit. They also provide more certain and immediate seawater intrusion benefits than proposed LOWWP measures. Thus—although they may not avoid impacts to the Basin and resources due to the uncertainties below—they greatly improve the chances of avoiding impacts and do so cost-effectively. (See "Cost Effectiveness..." below). Besides being proactive (designed to avoid further project impacts, rather than respond to them) they substantially increase adaptive options, e.g., the ability to shift pumping where and when needed to avoid/minimize impacts.

Note: Our estimate of benefits does not include the added recharge/groundwater benefits of a strong outdoor conservation program with LID/recharge measures. A strong program incorporating the current septic system repurposing program, should provide several times the groundwater recharge benefits of the LOWWP drainage and repurposing programs, estimated at 18 AFY, in addition to substantially greater reductions in polluted runoff. (See Att #13, Page iv, and Att # 19, Pages 11 & 13).

Why recycled water use east of Los Osos Creek is not included in balance calculations

Recycled water use in the Eastern Basin (e.g., east of Los Osos Creek) is not included above because it will not likely provide a significant benefit. The LOWWP Fine Screening Report estimates the potential mitigation of agricultural reuse at 20% of the benefit of urban reuse, conservation, and agricultural exchange. (See Att #23, Page 20 and Att # 24, Page 2-6.) However, this factor assumes that the LOWWP program will offset pumping (i.e., be an "agricultural in lieu" program). Most (and possibly all) of the 65 AFY of recycled water growers have been willing to commit to will not be used to offset pumping (as we understand it). Instead, it will be used to convert dry land farming to irrigated farming or to bring fallow land into production. Project documents show most of the property where reuse will occur was not identified as potential reuse sites during project review, and the contracts the growers signed do not require them to offset the pumping of potable water. (See Att # 31, Goodwin contract, Page 5, and Atts. #32 & #33.) Further, the reuse sites are located along the southeastern edge of the Basin at the farthest point from the seawater intrusion front. The long distance and timeframes involved for this reuse to benefit seawater intrusion (assuming some of the water is used to offset pumping) make it ineffective for mitigating the urgent seawater intrusion problem. The Monterey Bay Watershed Institute estimates that changes in creek recharge (much closer to the Western and Central Basin than these properties) would take 18 years to affect the Upper Aquifer and 30 to 100 years to affect the Lower Aquifer under the Commercial District. (See Att # 2, Page 32.) For measures to provide a benefit, they must offset pumping or provide water to restore flows/recharge by project start up and be available where impacts occur (in the Western and Central Basin). As discussed in Addendum D, for reuse in the Eastern Basin to provide a significant benefit, an equal amount of potable water must be returned to the Eastern and Central Areas, effectively creating an ag exchange program.

Uncertainties in the short term

- The severe drought could continue reducing recharge and exacerbating impacts further.
- Broderson leach field disposal might have to be cut back or completely stopped due to salt build up, soil destabilization, or daylighting water. Roger Briggs, the past Executive Officer of the Central Coast Regional Water Board, warned of the potential for salt build up and harm to soils and aquifers from recycled water use. (See Att # 25, Pages 3 & 4.)
- The mitigation benefits of Broderson leach fields will be delayed and uncertain. The CSUMB Watershed Institute points out that Broderson leach fields could take over 100 years to recharge the Lower Aquifer and over 20 years to replace flows in some parts of the

Upper Aquifer although septic system recharge will stop within a few months. The Institute also points out that the leach fields may not replace flows where and when needed to keep seawater from advancing. (See Att # 13, Pages 32, 33, & 57.)

- The property owners/growers who've signed up to take recycled water may drop out of the program, e.g., if they believe the water can harm crops or degrade soils. The signed contracts (we believe) allow growers to reject the water they believe will hurt crops, e.g., if salt (total dissolved solids, or TDS) levels are too high. The Regional Water Board has set minimum TDS levels for the LOWWP at 900 mg/l. This is too high for many crops and should be lowered.
- Bayridge leach fields, septic system repurposing, and drainage measures are intended mainly to restore/replace groundwater flows to habitat. If they don't, potable water could be used according to the RWMP, adding to overdraft and seawater intrusion. (See Att # 21, Page 87).
- The amount of new development that might be approved as a result of the sewer moratorium being lifted is uncertain at this time, also the amount of retrofit development with higher water use. New development adds to the imbalance, impacts, and uncertainties listed. Supervisor Gibson has said he believes there is ample water for further development.
- The benefits of the septic system repurposing (recharge/reuse) measures are uncertain. The program is voluntary and most roof runoff already percolates on site. (See Att #5, Page 7.) Therefore, the least expensive option (use of septic leach fields to percolate roof runoff) will not provide significant benefits. More effective options (e.g., rainwater harvesting-reuse and peak flow retention/percolation) involve significant effort and cost for homeowners to purchase, install, and/or maintain pumps, filters, landscaping (etc.). (Note: We recommend incorporating the septic system repurposing program into a indoor-outdoor LOWWP conservation program with a full range of options to cost-effectively increase the conservation and recharge benefits of both programs—see Addendum D, Item 5.)
- The absence of seawater intrusion monitoring, reporting, and adaptive programs specifically to assess and improve LOWWP programs could result in adverse LOWWP impacts and more serious impacts than would have occurred with measures in place. For instance, the potential benefits of the LOWWP conservation program are exaggerated in the RWMP and Basin Plan largely due to an exaggerated baseline (See Att #11.) A more accurate baseline and a review of the program will help optimize program benefits and funding. Also, water use in the community could increase with implementation of the project unless the program is improved. Spencer Harris, a main contributor to the hydrology section of the LOWWP EIR, testified to the County Planning Commission that elimination of septic systems will likely result in a vegetation change in Los Osos to that of more arid climates. Without a strong outdoor conservation program, supported by a strong media campaign, residents may attempt to keep existing landscaping/trees alive by using more water.

Summary of essential Basin Plan provisions to save the Los Osos Valley Basin (December 2014)

(Submitted to the LOCSD by K. Wimer, December 2014. Also see LOSG recommendations included in its letter to the California Coastal Commission, May 2014, distributed to ISJ Parties and the Regional Water Board.)

Introduction: The recently-released seawater intrusion update shows seawater intrusion continues to pose a critical threat to the Basin. Despite significant reductions in pumping, seawater continues to contaminate the main drinking water aquifer of the Basin (Zone D) at an accelerated rate of 200-250 feet per year. As the LOCSD press release points out, seawater intrusion can make the Palisades Well undrinkable within 5 years.

As bad as the news is, the Update most likely underestimates the problem. The report is based on July-August well data, rather than November-January data like earlier reports, so may not show seasonal effects. The Update is also not likely to show the full effects of the record drought. Furthermore, large pumping depressions, which begin at about the Palisades Well and extend under the commercial area, could cause seawater intrusion to move rapidly through most of the rest of the western Basin. The impending impacts of the LOWWP (reduced/delayed recharge of the Basin) and long-term impacts of global warming (low future rainfall and rising sea levels) are likely to make the problem worse.

Clearly we are out of time in Los Osos if the Basin is to be a sustainable water supply for the current population. In 2010, an update published by the ISJ Parties said "decisive" action was needed, but very little action was taken making decisive action even more necessary now. The most effective mitigation measures must be maximized immediately. The quickest, most direct, and cost-effective measure is conservation. With a strong program in place, conservation can stop the pumping from the western wells having the greatest adverse effects on the Basin within a few months, also providing the most permanent fix for seawater intrusion by correcting the root cause—Basin imbalance (more water pumped from the Basin than recharging it).

Despite general agreement that the Basin is threatened and conservation is the quickest, cheapest, and most effective way to address it; the Basin Plan (and individual purveyors) lack strong conservation programs. The draft Basin Plan also lacks a strong recycled water reuse plan, time specific objectives for stopping seawater intrusion, a provision for restricting pumping if needed, and a requirement that all wells are monitored. Instead, it relies almost exclusively on a modeling prediction that more water can be pumped from the Basin if pumping is shifted to the Upper Aquifer and inland—using a model that has substantially overestimated Basin yield many times in the past. The final Basin Plan must not rely on a promise of uncertain future water as the Basin's actual water disappears. To preserve the sole source of water for Los Osos, a final Basin Plan must have the following provisions:

Essential Basin Plan provisions to save the Los Osos Valley Basin:

1. **An enforceable, time-specific objective to reverse seawater intrusion as soon as possible (3-5 years).** The current Basin Plan metric for gauging the benefits of mitigation

programs can be applied initially, i.e., an average of 100 mg/l of chlorides and water levels 8 feet above mean sea level at key wells. However, a longer-term objective of 60 mg/l of chlorides in all Basin wells—the historical average level of chlorides in the Basin—must be met to establish Basin sustainability.

2. **An enforceable, time specific interim objective of less than one year to stop all pumping from Lower Aquifer wells in the Western Basin.** This can be achieved with well-funded conservation programs--see #4 below.
3. **An enforceable, time specific interim objective of less than one year to reduce total pumping in the Basin to about 2000 AFY.** This is the Basin Plan "sustainable yield" under current conditions (about 2500 AFY) with a 20% buffer. It is achievable with a well-funded Basin-wide conservation program and allows all pumping to stop in western Lower Aquifer wells to stop, and it provides the most certain means of reversing seawater intrusion and establishing long-term Basin sustainability. It also avoids the uncertainties of strategy that relies on moving more pumping inland and to the Upper Aquifer, which provides a temporary solution at best and could pull seawater intrusion further inland. As the draft Basin Plan points out, the reason seawater continues to move inland in a broad front is because average water levels in the Lower Aquifers are below the levels needed to repel it (9-17 feet above mean sea level depending on the aquifer).
4. **An enforceable, time specific interim objective of less than one year to maximize conservation.** This would mean at least a 25% reduction in potable water use (pumping) Basin wide within 8 months, with the focus on the Western and Central Basin. All purveyors should be required to set targets and implement programs (e.g., water shortage plans) to achieve the 25% reduction. The reduction can be achieved using a conservation program similar to Cambria's Stage III budget-based program, which has reduced Cambria's water use by over a third in a few months. (See K. Wimer's review of the Cambria program submitted to the LOCSD 11/11/14, also K. Wimer *Basin Plan* comments submitted in December 2013, and LOSG recommendations to the Coastal Commission submitted in April of 2014). These reviews/reports and cited documents make it clear that conservation can reduce pumping in the Basin by at least another 400 AFY within a few months. This would allow all pumping to stop from the Lower Aquifer in the Western Basin to stop. If the program is well funded (e.g., the County spends all the $5 million required for the LOWWP conservation program to maximize the program with a range of indoor-outdoor measures) then the reduction can be achieve without inconvenience or quality-of life impacts. The LOWWP Coastal Development Permit requires that the County spend $5 million to "help Basin residents to reduce potable water use as much as possible," and it specifically states that measures should not be limited to "retrofit and installation of low water use fixtures, and grey water systems." The provision should be integrated with purveyor budget-based rates and other measures—and 50 gpcd residential indoor-outdoor targets should be enforced with a County and LOCSD ordinance.
5. **An enforceable, time specific interim objective to install the recycled water use infrastructure needed to maximize reuse by start up of the LOWWP, along with an interim, enforceable objective of one year after LOWWP start up to maximize recycled water use.** Before the LOWWP is implemented, the recycled water program must be substantially improved to maximize recycled water use to offset pumping in the Western and Central parts of the Basin (west of Los Osos Creek). This will require adding purple pipe connections along the trunk line that can deliver recycled water to large properties along the line and to the commercial district. Sea Pines Golf Course should use 100% recycled water for irrigation. Laws in effect should be applied to require recycled

water use as needed, Ordinances and water rates should be developed encourage recycled water use, along with programs to assist property owners in connecting to the system. Some of the LOWWP $5 million for conservation might be used to add purple pipe connections if any money remains after maximizing conservation.

6. **A time-specific objective of one year to install wells east of Los Osos Creek to deliver water west of Los Osos Creek as needed.** This is similar to Program D recommended in the Draft Basin Plan, but the Draft Plan recommends Program D only to allow buildout. The program should be implemented without further building to address the critical seawater intrusion problem, increase management options, and offset recycled water used in the Eastern Basin.)
7. **A time-specific objective of five years to install/implement infrastructure programs (new wells/well relocations, interties, and nitrate removal facilities in the Western and Central Basin) to move as much pumping as safe and necessary inland and to the Upper Aquifer (See #5).** This is provided for in Programs A and C recommended in the draft Basin Plan. Some of these projects may require CEQA review and will take time and money to implement (about $9 million per the Draft Plan) so they should not all be implemented if conservation achieves the objective of reversing seawater intrusion. Conservation should be maximized first since it is the quickest, cheapest, and surest way to address the immediate crisis and stop the advance of seawater intrusion long-term.
8. **An enforceable, time specific interim objective of two years for all private and public well production to be monitored**
9. **A provision to restrict pumping, as needed to enforce the provisions and objectives above.**
10. **County and LOCSD ordinances to enforce the provisions and objectives above.**
11. **Agencies responsible for overseeing the Basin (e.g., the State Water Board) retain authority to enforce provisions if provisions are not implemented on time and objectives (including interim objectives) not met.**
12. **No building is allowed inside or outside the wastewater service area until conclusive evidence shows seawater is reversed, ample water exists for the current population, and ample surplus water is available to support building.** Any additional building, including building permitted through "retrofit or conserve-to-build" programs, ultimately add to water use and jeopardize Basin sustainability by adding straws to the Basin.

Summary of Problems with the Draft Basin Plan and Recommended Actions

Prepared by Keith Wimer 12/2013

(Revisions to 10/2013 draft are highlighted)

Overview of problems and recommendations

In general, the Draft Basin Plan (Basin Plan) down plays the seriousness of the seawater intrusion problem in the Los Osos Groundwater Basin (the Basin) and overestimates the potential for the Plan's proposals (recommended programs) to stop and reverse it. This is largely because the Plan relies too heavily on a Basin model that projects overly-optimistic Basin yields from the relocation of wells (i.e., Infrastructure Programs A-D). As proposed, Basin Plan solutions will be too little too late to solve the severe seawater intrusion problem—and only "kick the can down the road" for others to fix when it is too late to save the Basin. Because The County, local water purveyors, and key agencies have delayed effective Basin management and real solutions for 40 years, the Basin's freshwater capacity has been seriously reduced and remedial actions now must be bold, decisive, and immediate. (The Basin Plan acknowledges that the Basin has been over drafted since 1979—34 years—at an average annual rate of 700 to 1100 acre feet per year, 30% to 40%.) Because Los Osos has been forced to put virtually all of its financial eggs in one basket with the Los Osos Wastewater Project, Basin Plan programs must also be the most cost-effective possible. While the basic actions recommended in the Basin Plan (relocation of wells, water-use efficiency, and recycled water use) are likely to be the most cost effective actions, the Plan does not maximize them. The benefits of Basin Plan programs are overstated and the potential for better programs ignored. Further, the Plan does not acknowledge the need for urgent action, nor support it with time-specific objectives and mechanisms to ensure rapid implementation. In fact, the Basin Plan does not guarantee any action will be taken. A Basin-wide water management ordinance is needed—and provided for in the ISJ agreement—to ensure quick implementation of the most effective measures. Maximizing cost-effective water-use efficiency, recycling, and infrastructure programs—and implementing the programs with a Basin-wide ordinance that requires all water users in the Basin to participate within the next two years—provides the best chance of reversing seawater intrusion as soon as possible (5-7 years). As a result, it provides the best chance of preserving the basin as a sustainable sole water source for the community. The Los Osos Groundwater Basin must be preserved as the sole sustainable water source for the community because supplemental water is unreliable and/or infeasible economically, socially, and technically. Furthermore, preserving the Basin as the sole source is the only way to begin to justify the tremendous costs and environmental impacts of the LOWWP, which agencies have required and justified as "essential" for the sustainability of the Basin and community.

I. **The draft *Basin Plan* does not adequately describe the severity of seawater intrusion in the Basin or the need for urgent action.** The Plan provides an overview of seawater intrusion's relentless march through the basin since the 1970's and explains that the *Los Osos Groundwater Basin Update* (Basin Update) (released by the Parties in May 2010) showed seawater intrusion had accelerated from an 60 feet per year to 700 feet per year (about 12 times) between 2004 and 2009 (Page 85). Also, the *Basin Plan* states: "Currently,

and for the foreseeable future, seawater intrusion is the most serous (sic) challenge facing the Basin," and it includes, as one of three "Immediate Goals," to "Halt or, to the extent possible, reverse water intrusion into the Basin." However, the draft Plan does not state the need for "quick and decisive action" as the Parties stated in the 2010 *Basin Update*—nor does the Basin Plan state how destructive seawater has been and will continue to be without bold, decisive, immediate action.

In a review of the seawater intrusion problem in 2010, Eugene Yates, a foremost authority on the Basin, called the problem "extremely urgent," and recommended an aggressive water-use efficiency program, agricultural exchange, and low impact development/recharge—along with major shifts in pumping to the Upper Aquifer and inland within two years. He said the actions were needed to raise the water tables in the Lower Aquifer to above sea level as soon as possible to reduce the threat to the water supply. He added that seawater intrusion destroys water for most uses at very low concentrations and is very difficult to reverse once it advances. He also warned that LOWWP impacts on the Upper aquifer, in conjunction with necessary shifts in pumping to the Upper Aquifer, could cause seawater intrusion in the aquifer. (See Yates 8/2010 review, e.g., Page 1 & 6, attached.) In addition to maximizing conservation and other programs, he recommended having contingency measures in place, if seawater intrusion results from the major changes planned for the Basin. The Basin Plan lists one of Mr. Yate's reviews from 2010, but cites neither.

The 2010 *Basin Update* showed seawater intrusion was advancing about 700 feet per year between 2004 and 2009 and had accelerated by 12 times. Instead of explaining the serious implication of this rapid advance, the Basin Plan states "...while accelerated rates of intrusion since 2005 have occurred, they may not be as high as rates calculated in 2010." The Plan then provides a cross-sectional diagram of the Basin showing seawater in Zone D had not reached the Palisades Well as the *Basin Update* reported (Page 85). However, the Basin Plan does not provide an estimate of how fast seawater intrusion is moving inland. Figure 26 (Page 86), when examined closely, shows that intrusion into Zone D along a broad front at the seawater interface moved about twice as far in four years as it had in the previous 20 years. In other words, seawater intrusion moved 10 times as fast, rather than 12 times as fast (500-600 feet per year). The Basin Plan plays down the severity of the problem by not clearly stating this fact.

Seawater intrusion into Zone D along a broad front, rather than along preferred pathways ("fingers" extending into Zone D to the Palisades well) is caused by low water tables in Zone D. The Basin Plan points this out, but then confuses the issue. It states

> *In order to maintain the freshwater-seawater interface at a defined location in the Basin, average static groundwater levels in the freshwater portion of the aquifer must be held higher than sea level. If freshwater levels fall below a certain level (defined in more detail below), then seawater will progress inland in order to equilibrate the pressures between seawater and freshwater portions of the aquifer.* (Page 98)

This acknowledges that seawater intrusion will continue until water tables are brought up in all of Zone D, but the Basin Plan then states:

> *In order to control seawater intrusion in the Basin, the Purveyors and other groundwater users need to reduce their production from the Lower Aquifer in the Western Area. That action will allow freshwater levels to rise, thereby preventing*

further seawater intrusion and pushing the freshwater-seawater interface seaward and away from the Los Osos community. (Emphasis added)" (Page 98)

This statement gives the impression that shifting pumping in Zone D from the Western Area to the Central Area will stop seawater intrusion. However, the strategy is designed primarily to stop localized intrusion and to create a freshwater "barrier" to slow intrusion into the aquifer along preferred pathways (e.g., into the large pumping depression under the commercial area). The strategy will not stop the broad front of seawater moving in under the aquifer, which may still be advancing at the 2005-2009 rate of 500 to 600 feet per year. This front can only be stopped by bringing up water levels in Zone D to 8-9 feet above sea level, which requires reducing pumping enough in all Zone D wells to eliminate the large pumping depression, which extends "throughout the Central and Western Areas," according to the *Basin Plan* (Page 66). The fact that seawater intrusion will continue (and the reasons) are explained on Pages 84 and 85 of the Basin Plan, which, at one point states, "Given that Lower Aquifer groundwater elevations inland of the coast have been below sea level or within a few feet of sea level for many years, seawater intrusion was inevitable" (Page 85).

The Basin Plan also fails to mention that seawater intrusion permanently destroys the Basin as it advances. The 2005 *Seawater Intrusion Assessment* by Cleath and Associates (now Cleath-Harris Geologists, Inc.) indicates that, when chloride levels reach 2500 mg/l, seawater intrusion is not reversible. Figure 9 of the Assessment shows how much of the two Lower Aquifers (Zones D & E) had been destroyed between 1985 and 2005. However, neither the 2010 *Basin Update*, nor the draft Basin Plan, shows how much permanent destruction of the Basin has occurred since 1985.

The Basin Plan also does not clearly describe the state of Lower Aquifer Zone E (the deep aquifer). Based on responses by Rob Miller of Wallace Group to questions asked at an LOCSD special meeting on the Basin Plan, purveyors are not pumping from Zone E, except from one inland well, due to severe seawater intrusion. The Basin Plan refers to Zones D and E as a single aquifer (calling them the "Lower Aquifer"); however, the Plan reports that Zone E was sealed off at a main community supply well (Palisades Well) due to chloride levels above safe limits, and it refers to Zone E as a source of seawater for desalination. It adds that total dissolved solids (TDS) levels in Zone E exceed the levels of brackish water (1,000 mg/l to 10,000 mg/l) (Page 247). TDS levels are typically roughly double chloride levels. The fact that chloride levels are not presented for Zone E suggests the Plan is avoiding the issue. As stated, seawater destroys the Basin when chlorides reach 2500 mg/l, and the Title 22 safe limit for chlorides in drinking water is 500 mg/l. At the LOCSD meeting, Mr. Miller acknowledged that the Parties were "not trying to save Zone E." The deep aquifer once comprised over 1/3rd of the basin's freshwater capacity and contained its purest water, 5,000 to 10,000-year-old "fossil water," unpolluted by nitrates and other contaminants. It showed no signs of seawater intrusion in the 1970's.

If Zone E is no longer a viable drinking water source, a major concern is whether the Basin has enough capacity to sustain the current population; another concern is the extent to which severe intrusion in Zone E will affect Zone D since the Basin Plan describes the aquitard (clay layer) separating the aquifers as "possibly discontinuous" (Page 64).

Further, the Basin Plan does not estimate how long it will take to raise water levels in Zone D enough to reverse seawater intrusion, or how much more of the basin will be destroyed by that time. Currently, three-fourths of the urban water supply is pumped from Zone D, and

the Basin Plan acknowledges pumping levels are not sustainable. It estimates 460 AFY of pumping must be shifted from Zone D in the Western Area to Zone D in the Central Area, and to the Upper Aquifer to achieve "sustainable" conditions. However, a "sustainable" condition, as defined in the Basin Plan is a condition in which no active well has a chloride level above 250 mg/l. Therefore—as acknowledged in the Plan—"sustainable" defines a condition in which seawater advances much further into the basin. This additional progress is seen when Figure 27 is compared to Figure 38. Although the Basin Plan provides a map showing where seawater would stop under "sustainable" conditions, it does not estimate how long this condition will take to achieve. A 2009 report prepared by Cleath-Harris for the Parties ("Flow Model Conversion and Urban Area Yield Update" by Spencer Harris of Cleath-Harris Geologists, Inc.") predicts "sustainable" conditions based on "50 and 500-year snapshots," but that report assumes much different "sustainable yields" (much lower yields for Zone D and much higher for Zone C, the Upper Aquifer). Thus, *Basin Plan* "sustainable yields" are questionable to begin with. At best, they would not stop seawater intrusion for several decades. (See 2009 report by Cleath-Harris, Pages 5 & 6, and Parts II).

The draft Plan estimates that recommended Infrastructure Program AC will take about three years to construct and another five years before the first signs of rising water tables are seen (Pages 106 and 238). It also estimates it will take 15 years for chloride levels to drop, once the aquifer levels are high enough to reverse intrusion (8 feet above msl) (Page 106). Thus, if seawater continues to move inland at the 2005-2009 rate (about 1/2 mile every 4-5 years), it could progress another mile into the Basin even before the first signs of rising water levels (about eight years), and it could travel two miles or more inland before the contamination of freshwater by seawater shows the first signs of reversing—assuming the programs are effective. The Western and Central Areas of the Basin extend only about two miles from where the seawater intrusion front was last measured in Zone D--even with Broderson Avenue (see Figure 26). Therefore, at the 2005-2009 rate of seawater intrusion, Zone D could be destroyed by seawater before the *Basin Plan* predicts intrusion will show signs of reversal (i.e., in 15 years or so).

The Basin Plan recommends adding a 20% margin of safety to "sustainable" yields to account for uncertainties (i.e., reducing production to 20% below these yields), and it states that the margin will push the seawater interface offshore. Undoubtedly the margin increases the likelihood of reversing seawater intrusion, but the Plan does not estimate when seawater will be reversed under any scenario—and the margin of safety is not likely enough to reverse seawater intrusion (see Part II).

Two other facts presented in the Basin Plan show how severe the problem is and how difficult it will be to reverse. The Basin Plan estimates total freshwater storage capacity of the Basin at about 205,000 acre feet (AF), 140,000 AF in the Lower Aquifer and 65,000 AF in the Upper. It says only 40,000 AF are above sea above sea level (can be pumped without inducing seawater intrusion) almost all in the Upper. It adds that the storage above sea level provides a sufficient buffer against seawater intrusion during droughts, given annual community water use under 3,000 AF. However, the 2003 Yates and Williams study estimates total Basin storage at about 500,000 AF (452,000 AF in the Lower Aquifers and 37,800 AF to 50,400 AF in the Upper Aquifer). Unless one of the studies is way off in its estimate, the difference could mean that over half of the Basin's freshwater capacity has been rendered unusable by seawater intrusion.

Also, the Basin Plan reports that the community reduced water use by almost 40% since about 1988 (Page 140). This is good news because the large reduction has brought production in the Basin down much closer to a true safe yield. (The safe yield of the Basin has been overestimate by 700 to 1000 AFY for at least 15 years (3,200 to 3,500 AFY versus the 2450 AFY per the *Basin Plan*), and the Basin has been over drafted by over 700 AFY on average for 34 years. It is bad news because seawater intrusion has continued although conservation is widely recognized by experts as the most cost-effective and immediate way to reduce seawater intrusion (since it reduces the pumping causing it and allows water levels to rise). The fact that rapid seawater intrusion continues with almost a 40% water use reduction shows how difficult seawater intrusion will be to reverse, and it means there is much less conservation potential to do it with. Undoubtedly, so much conservation would have had a greater effect on seawater intrusion if, at the same time, more pumping had been shifted away from Western Area in Zone D, but it remains to be seen if enough conservation potential still exists to bring up low water tables in Zone D (the large pumping depression under much of the community) without over pumping Zone C or other parts of the Basin. One fact is certain—all of these programs must be maximized to optimize flexibility and the potential for success.

Recommendations:

1. Accurately describe the threat of seawater intrusion to the Basin by explaining the conditions above.
2. Acknowledge the need for urgent, decisive action so that more of Basin is not destroyed.
3. Present scenarios/programs to bring water tables up in all of Zone D to an average of 8 feet above mean sea level (msl) as soon as possible and project how long each will take to meet the objective.
4. Stop pumping altogether from Zone E, analyze its potential adverse impacts on Zone D (from very high salt levels and a discontinuous layer separating the aquifers), and devise a plan to save Zone E. Present scenarios/programs to bring water tables up in the aquifer an average of 17 feet above mean sea level (msl) as soon as possible and project how long each will take to meet the objective.
5. Expand water level and chloride metrics to include wells measuring changes in the pumping depressions of all production zones (Zones C, D, and E)—and change the chloride metric to 60 mg/l (much closer to historic chloride levels than the proposed 100 mg/l, which indicates continued seawater contamination). (The water level metric for Zone E will have to be near 17 feet above mean sea level.)
6. Implement enhanced conservation and reuse programs that maximize seawater intrusion benefits by maximizing pumping reductions in the Western and Central Areas (see recommendations below)—also include an enhanced infrastructure program (Implement Program D with the recommended Program AC as a first step).
7. Target a reduction in pumping in the Western and Central Areas of the Basin to no more than 1000 AFY within two years. [Target 0 AFY pumped from Zone D in the Western Area, 400 AFY pumped from Zone D in the Central Area, 600 AFY pumped from the Upper Aquifer in the Western and Central Areas (with Program AC), and 250 AFY pumped from the Eastern Area (via Program D). This would make total production for the urban population including "community" (cemetery and golf course use) 1300 AFY, well under the 1450 AFY recommended in the Basin Plan (Page 6), which does not include "community" use. also maintaining the current production for agriculture at 750 AFY. With this scenario, total production for the Basin would be about 2000 AFY or

about 450 AFY (18%) under the Basin Plan's "sustainable yield" for current conditions (2450 AFY) and 40 AFY (2 %) over the "sustainable yield" with a 20% margin of safety for current conditions (1960 AFY). This approach applies a 20% margin of safety (as the Basin Plan recommends) but reduces reliance on the Model by assuming shifts in pumping with Infrastructure Programs ACD increase Basin yield by about 5% rather than 20-40%. The 1000 AFY pumping target within two years for the Western and Central Areas should maximize the potential to bring up water tables in Zone D, while not adversely impacting Zone C. If Zone C is not adversely impacted by more pumping and LOWWP impacts, then more pumping can be shifted away from Zone D. This scenario does far more to reverse seawater intrusion as soon as possible than the *Basin Plan* scenarios, substantially increasing the chances of Basin sustainability. This scenario uses only 250 AFY of the estimated 600 AFY of potential production from new wells with Program D. (Also, see Part 2 below for why these assumptions and the approach are needed.)

Sample distribution scenario to maximize the potential for a sustainable Basin (applies the recommendations in #7 above):

Zone D (Western Area) = 0 AFY
Zone D (Central Area) = 400 AFY
Zone C (Western and Central Areas) = 600 AFY - Western and Central Area estimates include about 900 AFY for urban use (including commercial), 50 AFY for private domestic well use, and 50 AFY for golf course use. (This assumes a reduction of 300 AFY in urban use and 75 AFY in private domestic well use with conservation, and a reduction of 110 AFY with recycled water use for schools and the golf course, i.e., 66 and 45 AFY.)

Zones D & C (Eastern Area) = 1000 AFY - The Eastern Area estimate includes 250 AFY for urban use (from new wells with Program D), 50 AFY for domestic private well use, 0 AFY for the cemetery, and 700 AFY for agriculture. (This assumes ag use is reduced 50 AFY and cemetery use is eliminated with recycled water use, and it assumes a reduction of 25 AFY in private domestic well use with conservation. [See note below and conservation estimates attached].)

Total Basin water production = 2000 AFY [Total Urban and Community = 1300 AFY; Total Agricultural 700 AFY agriculture]

Note: According to the *Basin Plan*, total water production in the Basin in 2012 was about 2610 AFY – 1520 AFY delivered by purveyors, 200 AFY from private domestic wells (about 75 AFY in the Eastern Area), 140 AFY for "community" water use (memorial park, golf course, community center), and 750 agricultural use (See *Basin Plan*, Table 14, Page 46; see Pages 38 & 39 for private well breakdown). Therefore, this scenario requires about a 600 AFY reduction in pumping/water use from conservation and recycled water use (2610 AFY – 2000 AFY).

Based on the conservation estimates attached and the approximately 300 AFY of recycled water available (i.e., approximately 780 AFY of wastewater flows minus 480 AFY going to leach fields), a reduction of 600 AFY should be relatively easy to achieve – if LOWWP conservation and recycled water programs are strengthened. With a better washer retrofit program, media campaign, and leak detection/repair program – also an outdoor program added – the LOWWP conservation program, extended to a basin-wide program, can reduce

production about 400 AFY (460 AFY if a stronger unaccounted for water program is implemented). The recycled water program can reduce water use another 300 AFY for a total potential reduction of 760 AFY.

These estimates show it is possible to maximize intrusion mitigation by another 100 AFY or more in the Western and Eastern Areas if the recycled water is improved (i.e., all golf course use, and some commercial and large property outdoor use is offset). The estimates also show that this scenario is nearly achievable without new wells in the Eastern Area. The 460 AFY of conservation and the approximately 100 AFY of recycled water use in the Western and Central Areas proposed currently for the LOWWP *Basin Plan* program could provide 560 AFY of reduced pumping.

However, the new wells in the Eastern Area allow a needed margin of safety to ensure the scenario is achievable. The *Basin Plan* points out that uncertainties in non-purveyor production make Basin-wide estimates accurate only to within 100 AFY – see Page 46. New wells and additional connections to increase recycled water use in the Eastern Area will take two-three years to install assuming the Basin Plan is funded (unless they are installed as part of the LOWWP). Therefore, new wells and additional purple pipe connections should be funded with LOWWP funds, along with an improved LOWWP conservation program in the near future, with LOWWP funds reimbursed by future *Basin Plan* funding, if it is secured.

It is important to note that to keep production from new wells in the Eastern Area as low as possible, it is necessary to use recycled water in the Western and Eastern Areas of the basin to the extent possible. This is because water recycled in the Eastern Area has little to no effect on the urgent seawater intrusion problem unless it is replaced with potable water from new wells. On the other hand, new wells allow all water recycled in the Basin to directly benefit seawater intrusion up to the safe yields of new wells.

(See Parts III & VI for further comments on the recycled water and conservation programs.)

II. The Plan relies too heavily on a Model with substantial uncertainty and a questionable finding/assumption that moving production in Lower Aquifer Zone D to the Upper Aquifer and inland will increase basin yield significantly.

A main focus of the Plan is to move more pumping inland in Zone D and to the Upper Aquifer with infrastructure programs. The Plan estimates Infrastructure Program AC will increase the yield of the basin to 3000 AFY from 2450 AFY, and it estimates that adding Infrastructure Programs B and D to Program AC will raise "sustainable yields" to 3500 AFY (Pages 237 & 239). Eugene Yates, however, is clear that shifts in pumping do not increase basin yields long-term. In a January 2010 review of Basin yields (entitled "Review of Cleath-Harris Geologists' July 2009 Memorandum 'Flow Model Conversion and Urban Area Yield Update'"), Mr. Yates states

> *The proposed management actions to address the saltwater intrusion problem do not increase basin yield, but shift the location of groundwater extraction. For example, pairing shallow and deep wells at major pumping locations provides the opportunity to adjust the proportion of water pumped from the upper and lower aquifers but it does not increase yield. Furthermore, there are limits to this strategy because of the uncertainty in the capacity of the upper aquifer to support additional extractions and*

the possibility of seawater intrusion occurring in the upper aquifer. (See Yates 1/13/ 2010 review, Page 4).

In an August 2010 review of the *Basin Update* (entitled "Review of Los Osos Basin Update and Current Wastewater Project Description—Revised"), Mr. Yates points out that seawater intrusion is mainly a problem of basin imbalance ("more water consumed in the basin than being replenished") and he recommends maximizing indoor-outdoor conservation, storm water recharge, rainwater harvesting and low impact development recharge to tip the balance toward more water entering the basin than leaving it (see Yates 6/10/2010 review, Page 1).

Mr. Yates points out (and the *Basin Plan* agrees) seawater intrusion cannot be stopped and reversed until water levels in the aquifers are above sea level. The infrastructure program recommended in the Basin Plan (Program AC) involves moving most pumping inland to the Central Area, but maintaining most of the pumping from Zone D (1260 AFY Zone D vs. 950 Zone C—Page 237). Water levels in Zone D are already low throughout the Western and Central Areas (Page 64). The assumption that shifting more pumping inland in Zone D will increase yields and bring water levels up in the aquifer is not credible—especially when the recharge regime and structure of the Basin are considered. Virtually all recharge of the Lower Aquifer in the Western and Central Areas is from the Upper Aquifer, or Lower Aquifer in the Eastern Area, according to the 2005 *Seawater Intrusion Assessment* (p. 77). Also, based on cross sectional maps of the Basin (e.g., Figure 27, Page 87) Zone D tapers up as it nears Los Osos Creek, indicating that proposed wells will tap the aquifer at higher elevations. Higher elevations of Zone D undoubtedly supply lower elevations. Whereas additional wells in the Central Area may increase yields incrementally (i.e., allow extraction of some additional water flowing toward the estuary or creek), most of the groundwater in the Central Area apparently flows west to lower parts of the Basin. Therefore, additional inland Zone D wells (e.g., Program C) are not likely to produce a significant net increase in yield or bring up water levels significantly. It is just as likely to lower water levels and pull seawater further into Zone D and/or cause adverse impacts on private wells or sensitive habitat in the area.

The prediction in the Basin Plan that moving production inland and to the Upper Aquifer will substantially increased yields is based on the Basin Model, with substantial margins of error. Based on a peer review of the Model, the Basin Plan says the Model has been found to be a good basis for determining yields and the rate of seawater intrusion (Page 77). However, Mr. Peter Pyle, of Stetson Engineers, chooses his words carefully in his review of the Model (which is included in the 2010 *Basin Update.*) According to the *Basin Plan*, Mr. Pyle says that the Model is okay to use to "initiate" changes so long as changes are "gradual" and there are monitoring and contingency plans in place. He also states that the "structure" of the Model is "sound and able to simulate hydrologic processes in the Basin, particularly as regards to the ... extent of seawater intrusion in each of the main water bearing units (Zones C, D, and E)," but he recommends refinements in the Model and he does not say the Model is able to accurately predict the extent of seawater intrusion now—and for good reason. The technical memorandum entitled "Flow Model Conversion and Urban Area Yield Update" by Spencer Harris of Cleath-Harris Geologists, Inc. (2009)—which introduced the latest version of the Model and first estimated "sustainable yields" based on the Model—reports that the Model underestimated seawater intrusion progress in Zone E by 1000 to 2000 feet per year (see Cleath-Harris TM "Urban Yield," Page 4, attached). More recent information in the *Basin Plan* reveals the inaccuracy was even greater because seawater

intrusion in Zone E had moved even faster. The *Basin Plan* states "...a back calculation of historical water quality data shows that the intrusion front in Zone E had already reached the Palisades Well by 2005," which required changing the "...historical rate of seawater intrusion in Zone E between 1977 and 2005 "...from 54 feet per year to approximately 180 feet per year" (Page 85).

The Basin Plan also fails to mention that Mr. Pyle wrote his review without the benefit of the 2010 *Basin Update* (and the Cleath-Harris technical memorandum contained in the Update), which first revealed that seawater intrusion had accelerated by at least 10 times in Zone D between 2005 and 2009. In other words, in 2009 the Model was at least a 1000% off in its simulation of the rate of seawater intrusion, showing "an average velocity of 60 feet per year" when it was closer to 700 feet per year (Page 4).

The Basin Plan acknowledges there is a good deal of uncertainty in the Model and it mentions some of the sources. However, it leaves out some of the sources Mr. Yates lists in his 2010 review of the Cleath-Harris 2009 technical memorandum. Eugene Yates, one of the creators of the Model, cites one source that could result in an error of 40% in yield estimates (see Yate's 1/13/10 review, Page 3). He expresses particular doubts about the Model's ability to predict yields with the combined impacts of the LOWWP and a lot more pumping from the Upper Aquifer (a condition unlike any in the basin's history). He also cites the possible use of potable water for habitat restoration to mitigate LOWWP impacts on wetlands as a source of error, and he points out that Broderson leach fields will not restore groundwater flows to some habitat along Morro Bay Estuary (see Yate's 1/13/10 review, Page 4). The LOWWP is likely to stop at least 300 AFY of groundwater flows to Morro Bay Estuary and sensitive habitat (the difference between eliminated septic system flows, 780 AFY, and the groundwater Broderson and Bayridge leach fields is supposed to replace, 480 AFY). There is no LOWWP project document that makes it clear how this water will be replaced if necessary to avoid adverse impacts on habitat.

To account for uncertainties in the Model, the Basin Plan recommends adding a 20% margin of safety to yields (targeting yields of 80% of "sustainable yields" as determined by the Model), and it states the margin will also result in reversing seawater intrusion. However, the Plan does not say how it arrives at the 20% margin—and 20% is not likely enough to account for uncertainties—let alone reversing seawater intrusion.

One fact supporting the need for a larger margin of safety and less reliance on the Model is that Cleath-Harris has had to revise down basin yield estimates for current conditions from about 3,500 AFY in 2000 to 3,200 AFY in 2009, down to 2,450 AFY in 2012 (with the Basin Plan). (Note that 2,450 AFY is a "sustainable yield," which allows seawater intrusion to advance substantially further). With the 20% margin applied, under current conditions a yield of 1960 AFY would be required to reverse seawater intrusion per the *Basin Plan.* As the Plan points out, the "sustainable yield" has been exceeded since 1979 (34 years) by an average of 700 AFY or 30%, and it has been over drafted by 1100 AFY if the safer yield estimate of 80% of sustainable yield is applied. The total overdraft is 23,800 AF to 37,400 AF or 10 to 15 years of water use in the Basin as "sustainable yield" levels. This long-standing overdraft, which resulted in much of the Basin being destroyed—is due to modeling error. More fundamentally, it is due to an over reliance on the Model and a tendency for decision-makers to support overly-optimistic projections of Basin yield (i.e., to err on the side of maximizing production rather than sustaining the Basin).

In 2009, Cleath-Harris drastically changed the yield estimates for the Upper and Lower Aquifers. Estimates for the Lower Aquifer in the Western and Central Areas of the Basin were cut in half to between 600 and 725 AFY from 1300 AFY, and "safe" yield for the Upper Aquifer was increased from 1150 AFY to about 1450 AFY, indicating that the Lower Aquifer yields had been overestimated by 600-700 AFY and Upper Aquifer yields underestimated by 300 AFY for many years. The Cleath-Harris safe yield estimates for the Upper and Lower Aquifers are taken from the 2007 *Resource Capacity Study,* Page 9.

Finally, the "sustainable yields" based on the latest version of the Model, which Cleath-Harris presents in 2009 in the "Flow Model Conversion and Urban Area Yield Update," are different from the yields Cleath-Harris presents in the *Basin Plan* based on the same version of the Model. The 2009 memo estimates "sustainable yields" for water purveyors from the Lower Aquifer (with the LOWWP) at 725 AFY and Upper Aquifer yields 1325 AFY (see ISJ TM "Urban Yield," p. 8). The Basin Plan estimates "sustainable yields" with the LOWWP at 1160 AFY for the Lower Aquifer and 580 AFY for the Upper Aquifer (Page 226). This is 435 AFY (or 60%) more than the earlier Cleath-Harris estimates for the Lower Aquifer.

According to the Basin Plan, all pumping options (i.e., Infrastructure Programs A, B, C, & D) will produce greater "sustainable yields" from the Lower Aquifer than the 2009 Cleath-Harris technical memorandum estimates—even though the 2009 memorandum also assumes there will be changes in pumping locations (see ISJ Urban Yield, p. 5 and *Basin Plan,* pp. 226-233).

If the Model, including the latest version by Cleath-Harris, cannot consistently and accurately predict the yields of the aquifers, there is no reason to believe it can predict variations in yields (including much higher yields) when pumping is shifted to specific locations within the aquifers.

As explained in the 2009 Cleath-Harris technical memorandum, "sustainable yields" are basically theoretical conditions that would develop 50 to 500 years out, assuming the Model is exactly accurate and past conditions match future conditions perfectly (i.e., there are no droughts, no changes in weather patterns, and no LOWWP). The Basin Plan warns of potential harm to the Basin from not monitoring private wells and applying inaccurate water use estimates in the Model, and it points out that the error might not be known for 15 years or more, when it is too late to undo the damage. The same observation applies to modeling errors.

Because there is no room for error with the Los Osos Valley Water Basin, sustainable yield estimates and production targets should be substantially lower than the 80% of current "sustainable yields," as proposed in the Basin Plan. Also, Infrastructure Programs ACD should be put in place to buy time, optimize safe production, and allow adaptive management (flexibility in where production occurs) to maximize benefits to the Basin.

Recommendations:

1. Add a 30 to 40% margin of safety to current "sustainable yields" to arrive at truer sustainable yields (and/or) recalibrate the Model to calculated safe yields, such that no production well has a chloride level exceeding the historical chloride level of 60 mg/l.
2. Apply the revised definition of "sustainable yield" (from #1 above) and "sustainable" Basin conditions" throughout the Basin Plan. Eliminate all references to "sustainable

yields" and "a sustainable Basin," which use the "no more than 250 mg/l of chlorides" criterion.

3. Limit yield estimates for the Basin to four: one each for the Upper and Lower Aquifers in the Western and Central Areas of the Basin (west of Los Osos Creek) and one each for Upper and Lower Aquifers in the Eastern Area (east of the Los Osos Creek).
4. Implement Infrastructure Programs ACD immediately and assume no more than a 10% increase in yield from the Western and Central Areas with the programs.
5. Rely less on the Model and more on basic principles: 1) that the water levels in Zones D and E must be brought up to above sea level as soon as possible, and 2) this requires tipping the balance towards substantially more recharge than extraction with a large margin of safety. (The larger the margin of safety, the less of the Basin is lost and the more likely it is to be sustainable).
6. Upgrade the Model and continue to refine it based on actual well tests.
   (See Part I for further sustainable yield recommendations and sample production scenario.)

III. **The Plan does not commit the County and purveyors to take urgent action, or any action, and a Basin-wide ordinance is needed.** Although the Basin Plan recommends a set of programs for the Parties to implement, the Basin Plan does not commit the Parties to any specific action, especially urgent action.

The Plan is basically a set of goals with recommendations reflecting the same general recommendations presented in every draft management plan and agency review of the Basin for 40 years—i.e., relocating wells and intensive conservation. The Basin Plan states in several places that the Parties are deciding what actions to take and haven't agreed on any. It also recommends that funding for actions comes from a general assessment on the Community of Los Osos, but the community is likely to reject an assessment due to large assessments for the LOWWP, which are causing steep increases in property taxes.

The Parties have been very slow to implement well relocations and aggressive conservation in the past, and have taken five years just to negotiate the draft Basin Plan although it was their stated goal in the ISJ Agreement to have the *Basin Plan* fully implemented within 12 months of the signing of the ISJ Agreement in August 2008 (see *ISJ Agreement*, Page 6). The Parties were also supposed to negotiate and implement an intertie agreement within four months of signing the agreement (*ISJ Agreement*, Page 9), but this is still not done. In 2010 the Parties commissioned a study, which showed a community nitrate facility would be cost effective, but it was not implemented. The fact that most of the production in the Basin is still from Zone D wells in the Western Area and the Parties have not completed the above actions is a good indicator of the Parties' level of commitment to stopping seawater intrusion and it bodes poorly for the future. In the 2010 *Basin Update*, the Parties state the need for "quick and decisive action," but the *Basin Plan* doesn't restate or convey that need—and the level of action taken so far does not reflect the level of commitment needed to address the severe problem.

While the Plan sets an "Immediate Goal" of halting and reversing seawater intrusion, it does not identify specific, aggressive objectives and timeframes.[21] It further does not maximize conservation with a strong outdoor component, nor does it propose an aggressive recycled water use program. The law and the ISJ agreement under which the Parties are developing the Basin Plan, allow the County to implement a basin-wide ordinance to implement the Plan, which could set time-specific objectives for stopping seawater intrusion, but the Basin

Plan does not mention the option. Instead, it indicates that a Water Master under the Control of the Parties will be appointed to oversee implementation.

The Basin Plan does recommend that the County implements an ordinance requiring private well owners to report well production, but it rejects an ordinance requiring the same property owners to conserve water. What is needed is a County basin-wide water management ordinance, enacted within one year that implements these measures and others within two years, in order to reverse seawater intrusion as soon as possible (5-7 years).

Recommendations:

1. Support/require implementation of a County basin-wide water management ordinance to implement maximized Basin Plan measures/programs within one year.
2. Support/require the Basin-wide ordinance to set a time-specific objective to stop seawater intrusion by fully implementing maximized conservation, reuse, and infrastructure programs within two years and raising water tables in Zones D and E to above sea level within 10 years, with targeted benchmarks (e.g., rises in water levels as measured in metric wells). The ordinance would also include adequate incentives/enforcement mechanisms to achieve the objectives.
3. Apply for funding from the State Water Board and other agencies to implement programs.

The Basin Plan ignores established facts regarding the structure of the basin.

Since the 1980s, Basin studies have recognized that the Basin east of Los Osos Creek (the Eastern Area) is a separate compartment, historically referred to as the Creek Compartment, which functions semi-independently of the part of the Basin west of Los Osos Creek (the Urban Compartment). As a result, safe yields have traditionally been calculated separately. The Creek Compartment (or the Eastern Area in the *Basin Plan*) contributes some groundwater flows to the Urban Compartment (Western and Central Areas in the Basin Plan), but a reduction in pumping in the Creek Compartment (Eastern Area) would not be noticed as an increase in water levels in the Urban Compartment (Western and Central Areas) for several decades if at all. This is why the LOWWP EIR estimates that the seawater intrusion mitigation potential of recycled water use in the Creek Compartment is only 1/5th or 20% of the Urban Compartment's mitigation value (a 0.1 mitigation factor versus a 0.55 factor). Furthermore, the 1/5th or 20% would be a long-delayed benefit with much higher levels of uncertainty than mitigation in Western and Central Areas, where recycled water reduces pumping causing seawater intrusion and immediately mitigates seawater intrusion.

The Basin Plan recognizes that pumping from different locations in the Basin has greater or lesser effects on seawater intrusion, but it fails to recognize that conservation and recycled water use in the Eastern Area will have much less benefit on seawater intrusion than the same programs in the Western and Central Areas. The "Solutions" section of the Basin Plan, estimates the degree to which various programs achieve target yields, chloride levels, and water levels as shown by "metrics," but the metrics and calculations do not factor what parts of the Basin the programs affect. By failing to distinguish the effects of programs on the Eastern Area versus the Western and Central Areas, the Basin Plan exaggerates the benefits of conservation and reuse programs in the Eastern Area on seawater intrusion, and it

ignores the potential for stopping seawater intrusion and managing the Basin sustainably by redistributing water from the Eastern to Western and Central Areas of the Basin and vice-versa. Recognizing that the Basin has two relatively distinct sub-basins is necessary for maximizing resources and opportunities to achieve a sustainable Basin.

Recommendation:

1. Recognize and build into programs and planning the fact that the Basin has two semi-discrete compartments, one of which is severely impacted by seawater intrusion with low water tables and the other of which is apparently healthy with excess capacity that allows additional pumping.
2. Recognize and build into planning the fact that reduced pumping must occur in the Western and Central Areas to mitigate seawater intrusion significantly.

V. **The Plan overstates the benefits of water recycling programs and ignores the need and potential for a much stronger program.**

The Plan indicates the Urban Water Reinvestment Program (essentially the LOWWP recycling program) will increase basin yield over current conditions (Pages 279 & 281). The Plan, therefore, assumes that the combination of recycled water discharged in Broderson and Bayridge Estates leach fields (up to 480 AFY), the water recycled in the Western and Central Areas of the Basin (about 100 AFY), and the water recycled in the agricultural area east of Los Osos Creek (about 200 AFY); will provide greater recharge benefits than septic systems (i.e., current conditions). However, this assumption is faulty as shown by a simple calculation of Basin balance, keeping the Basin's structure in mind. The LOWWP removes 780 AFY of groundwater from the Western and Central Areas of the Basin by removing septic systems, and it returns only about 580 AFY to these areas. The Basin Plan claims the program increases irrigation return flows; however, since it does not increase irrigation, it does not increase return flows (Page 281). The Model may credit Broderson leach fields with more efficient recharge of the aquifer, which could explain the additional mitigation benefit; however, the Model is not time sensitive. Broderson leach fields will take more than 15 years to restore flows and Basin equilibrium—if it works as the EIR predicts, which is far from certain—so the measure will not effectively offset seawater intrusion for that many years. In fact, discharging water in the leach fields results in a significant deficit in water balance and mitigation (i.e., adverse potential impact on water levels) in the near term. This adverse impact is compounded by the dewatering program going on now, which removes recharge from Upper Aquifer.

The *Basin Plan* also fails to recognize that water recycled in the agricultural areas (Eastern Area) does not offset pumping significantly in the Western and Central Areas (as described in Part IV above). Pumping must be reduced in the Basin west of Los Osos Creek to stop seawater intrusion. The *Basin Plan* treats the Basin as a single unconfined aquifer when calculating the benefits of the recycled water program, although the LOWWP EIR and all Basin studies since the 1980's make it clear that a reduction in potable water use in the Eastern Area (e.g., via recycling) will have only minor benefits on seawater intrusion, if any at all.

21.

Without clear justification, the Basin Plan considers Infrastructure Program D (additional wells in the Eastern Area) only as a source of water to support further development in the community. It fails to consider the program as a source to help stop seawater intrusion and

mitigate the impacts of the LOWWP. Program D can and should be implemented immediately along with Program AC for three reasons: 1) to reduce pumping from the Western and Central Areas to stop seawater intrusion as soon as possible, 2) to offset the removal of recycled water from the Western and Central areas, and 3) to provide a water source for adaptive mitigation measures for seawater intrusion and habitat impacts as needed, e.g., to reduce pumping where and when needed to respond to signs of seawater intrusion or habitat destruction from the LOWWP and *Basin Plan* programs. An important benefit of program D is that it effectively provides an agricultural exchange program—as recommended by several authorities, including Eugene Yates and the Monterey Bay Watershed Institute. Basically, Program D optimizes Basin management by maximizing sources of water.

Finally, the recycled water program can and should be made stronger with the installation of more purple pipe, especially to parts of the community with larger lots now drawing water from the Central and Western Areas of the Basin. These properties use water at rates 3 to 4 times that of water users in other parts of the urban area, with most of it outdoors. Use of recycled water for outdoor irrigation on large lots (about 200 properties now using an average of about 1 AFY per lot) could reduce potable water use by more than ½ AFY per lot per year (more than 100 AFY). Also, recycled water should be used to offset the outdoor water use of the Commercial District in Los Osos and to offset all golf course water use. Based on my conservation estimates attached, offsetting outdoor use in the Los Osos Commercial District can reduce pumping about 50 AFY since total outdoor commercial use including use in Baywood Commercial District is about 74 AFY. Unfortunately, it is not likely that sufficient connections were installed on the purple pipe main line along Los Osos Valley Road to supply the Commercial District. Nevertheless, connections should be installed before the project is operational since maximizing recycled water use is essential for Basin sustainability—also because farmers have been reluctant to sign contracts for the water.

Recommendations:

1. Implement Program D as a higher priority than Program C and use the water to offset pumping in seawater-impacted areas, to (effectively) implement an agricultural exchange program that offsets recycled water applied in the Eastern Area, and to adapt/respond to potential impacts from major changes in Basin hydrology in the next few years.
2. Install additional purple pipe, especially to the Commercial District and parts of the community with large lots drawing water from the Central and Western Areas of the Basin. A large percentage of these receiver sites are located along Los Osos Valley Road where the purple pipe main line is installed, so costs should be relatively modest in relation to the benefits.
3. Offset all of the water used by the golf course with recycled water.
4. Do not assume the Urban Water Reinvestment Program increases Basin yield; instead, focus on maximizing the program to ensure the water extracted in the Western and Central Areas and entering the wastewater system is offset either with recycled water or freshwater from the Eastern Area that replaces recycled water delivered to that part of the Basin--i.e., be sure be sure the Recycling Program achieves a 1:1 offset.

VI. The Plan overstates the benefits of the current conservation program and ignores the potential and the need for a much stronger program.

The Basin Plan stresses the need for a "state-of-the-art" water-use efficiency (conservation) program to stop seawater intrusion, and sets the goal of achieving such a program (Pages 139 & 147). However, the Basin Plan's proposed Urban Water Use Efficiency Program (UWUEP) sets conservation targets too low (with water use targets too high) and overstates the benefits of the proposed program. It also rejects effective measures, including leak repair, turf replacement, low-water use landscaping, and rainwater harvesting/recharge measures such as rain gardens. In general, it backs away from implementing a state-of-the-art program even though the public would most likely support it, and such program is vital to stopping seawater intrusion.

The Basin Plan proposes to extend the LOWWP conservation program Basin-wide (adding a few outdoor measures) to create the proposed "Urban Water Use Efficiency Program." It also recommends that the County administers the entire indoor-outdoor program until 2018, at which time Purveyors will take it over. The Plan further recommends that LOWWP conservation funding ($5 million) is increased to $5.5 million, and shifted from LOWWP funding to a Basin-wide assessment.

The Basin Plan program, like the LOWWP conservation program, does not maximize conservation, in large part because both programs rely on a plan the Parties commissioned by Maddaus Water Management (MWM), which does not maximize conservation. The MWM Plan sets the water use target too high (50 gpcd indoor by 2015), recommends against incorporating many effective measures, and extends implementation over too long a time period (until 2035). The MWM plan also exaggerates potential water use reduction in at least two ways: 1) by overstating baseline water use using out-of-date data provided by the Parties, and 2) by overstating indoor water use versus outdoor use (which results in exaggerated benefits for the LOWWP indoor program). (See "Los Osos water use and potential conservation estimates" by K. Wimer 12/2013, attached.)

The Los Osos Sustainability Group (LOSG) commissioned a review of the MWM plan by Peter Mayer of Aquacraft located in Boulder Colorado. Aquacraft and Mr. Mayer have done several conservation end-use studies for the USEPA. Mr. Mayer concludes that that the MWM plan does not reduce water use as much as possible, and thus does not maximize seawater intrusion mitigation. Based on a California-wide survey of water use by Aquacraft for the USEPA, Mr. Mayer states that indoor water use can be reduced to 42 gallons per capita per day (gpcd) with efficient appliances and fixtures on the market and a leak detection-repair program. He adds that a 42 gpcd indoor target can be easily achieved using the $5 million the County is required to spend to "initiate" the LOWWP program (fee, per Coastal Development Permit, Special Condition 5b). Although a good deal more of the $5 million should be spent on the indoor LOWWP program, a substantial portion should be available for an outdoor program.

Using 2012 water use figures, the conservation estimates attached show that the *Basin Plan* program has the potential to reduce water use about 194 AFY, whereas a program with stronger outdoor and unaccounted for water (UFW) programs will reduce water use 468 AFY, or an added reduction of 247 AFY. The estimates also show that the current LOWWP program has the potential to reduce use about 123 AFY, but reductions would double with an outdoor program, in addition to a stronger washer and leak detection-repair program.

reducing use another 123 AFY for a total reduction of 246 AFY. With a stronger UFW program implemented by purveyors, the total reduction would increase to 312 AFY.

Clearly, there is a good deal of conservation potential not being tapped with the LOWWP and *Basin Plan* programs—and the LOWWP program is not currently helping "residents to reduce water use as much as possible" per the CDP. The attached estimates show both programs can provide at least double the seawater intrusion mitigation benefits. Stronger programs should be implemented immediately to help maximize the potential for establishing a sustainable Basin. (see "Los Osos water use and potential conservation estimates" by K. Wimer, 12/2013, attached.)

Recommendations:

1. Implement a comprehensive indoor-outdoor program with a full range of measures, including leak repair, low-water use landscaping, rainwater harvesting/recharge, turf replacement, and grey water reuse.
2. Set the target for indoor residential use at 42 gpcd, with the indoor-outdoor target at no more than 60 gpcd.
3. Set the baseline target at 80 gpcd Basin wide (Baseline use is calculated by dividing total use, including residential, CII use, and unaccounted for water (UFW) by the total population.)
4. Fund the measures with grants and, if grants are not available, with rate increases so they can be implemented in the near future. (Later, shift costs to a Basin-wide assessment.)
5. Apply tiered rates and be sure rate increases reflect the full avoided costs for supplemental water.
6. Purveyors and the County share in the funding and administration of the program beginning this year, so that rate increases, if necessary, can cover some of the costs early on.
7. Enact conservation targets, measures, and incentives with a Basin-wide management ordinance that has the specific objective of reversing seawater intrusion (per recommendations above).
8. Implement tiered rates based on individual water budgets, as recommended by Peter Mayer, in the near future to avoid undue impacts on larger families.
9. Expand the septic system decommissioning/repurposing program with the Basin-wide indoor-outdoor conservation program for efficiency and cost-effectiveness (and consider having SLO Greenbuild extend its current role to help implement all programs).

VII. The Plan fails to account for the potential impacts of the LOWWP

The Basin Plan fails to acknowledge or account for potential adverse impacts from the LOWWP on the Upper and Lower Aquifers. Eugene Yates points out that project impacts are likely to be greatest on the Upper Aquifer, due the combined impacts of the elimination of septic recharge and increased pumping from the Upper Aquifer. He did not factor the adverse impacts from dewatering or the continuing drought. As mentioned, the main mitigation measure to avoid/minimize groundwater impacts (Broderson leach fields) will not restore water levels for 15 years or more after elimination of septic recharge, according to the Monterey Bay Watershed Institute. Although the Basin Plan acknowledges some "uncertainty" associated with the LOWWP, it does not mention impacts or propose a

contingency plan. Further, it does not assume the LOWWP conservation and reuse programs will be needed to offset the impacts of the project as intended, but instead it assumes the programs will contribute to stopping seawater intrusion. In fact, the impacts of the LOWWP on the Upper Aquifer may cause seawater intrusion in that aquifer, and preclude shifting more pumping to the Upper Aquifer resulting in further destruction of the Lower Aquifer. The LOWWP is a main reason mitigation programs must be maximized as soon as possible. If the Basin (e.g., Upper Aquifer) does not survive in the short term, the potential long-term benefits of the LOWWP (a reduction in nitrates in the Upper Aquifer) will not be realized.

Recommendation:

1. Acknowledge LOWWP impacts and build adaptive measures into the Basin Plan and Basin-wide ordinance that address impacts (also see recommendations in Parts I and II.)
2. Support stronger mitigation programs for the LOWWP as part of the CDP, WDR, and other permitting requirements.