Staff recommendation
Authorize the General Manager to execute a Water Purchase Agreement Contract Administration Memorandum (CAM) between the Water Authority and Poseidon Resources (Channelside) LP for the Second Phase of Intake and Discharge System Modifications at the Lewis Carlsbad Desalination Plant.

Alternative
Do not authorize the General Manager to execute the Water Purchase Agreement CAM and direct staff to work with Poseidon on revising the terms.

Fiscal Impact
In accordance with the terms of the Water Purchase Agreement, authorization of this CAM will replace the unit price adjustment established for the Temporary Standalone Operating Period ($135/acre-foot) with a unit price adjustment of $94/acre-foot during the Interim Operations Period. This results in a $41 decrease in the unit price for desalinated water as compared to the total cost for desalinated water accounted for in the calendar year (CY) 2020 rates and charges.

Executive Summary
- The transition to new intake and discharge facilities is being implemented through three phases to allow for continual operation of the Lewis Carlsbad Desalination Plant under a revised NPDES permit. A CAM for the first phase of standalone operations was authorized in April 2019.
- The second phase is designated the “Interim Operations Period” and utilizes new dilution pumps in lieu of the pumps associated with Encina Power Station’s once-through cooling system.
- The CAM for interim operations includes risk transfer to the private sector, similar to the risk transfer provisions in the Water Purchase Agreement.
- The current Temporary Standalone Operations Period unit price adjustment of $135/AF will be replaced with the new Interim Operations Period unit price adjustment of $94/AF, a reduction in cost of $41/AF.
- Interim operations will begin after successful testing of the fish-friendly dilution pumps (anticipated by June 2020) and will conclude once the new intake screens in Aqua Hedionda Lagoon are constructed by Poseidon (anticipated December 2023).
Background
The Claude “Bud” Lewis Carlsbad Desalination Plant (CDP) started commercial operations on December 23, 2015. The project is a result of a long-term Water Purchase Agreement (WPA) executed between the Water Authority and Poseidon that was approved by the Water Authority Board on November 29, 2012. This agreement is the basis for the financing, construction and now the operation of the CDP. Under the WPA, the Water Authority agreed to purchase the output of the plant – a minimum of 48,000 acre-feet and up to 56,000 acre-feet of product water from the CDP annually. The Water Authority’s water purchase payments compensate Poseidon for the fixed and variable costs of the CDP including debt service and equity return payments, as well as fixed and variable plant costs for electricity and operations and maintenance (O&M).

The intake facilities for the CDP are currently configured to draw the Plant’s seawater supply from the Encina Power Station (EPS) once-through cooling water system as shown in Figure 1. In order to comply with the State Water Resources Control Board’s Once-Through Cooling Policy, adopted in 2010, that phases out once-through cooling for power plants, electricity generation operations at the EPS were shut down on December 12, 2018. For the near-term, Poseidon reached agreement with NRG Energy (NRG), the owner of the EPS, to temporarily extend the operation of just the cooling water circulation pumps solely to support desalination plant operations (See Intake Phasing section below). NRG’s current agreement with the City of Carlsbad (Settlement Agreement) requires complete demolition of the EPS, including the cooling water circulation pumps, by December 2021.

For the long-term, the shutdown of the EPS and its cooling water system requires the construction of new CDP intake and discharge facilities to allow a transition to a “stand-alone” operation of the desalination plant (Closure Improvements). In addition to addressing closure of the EPS, the new facilities are required to comply with the statewide Ocean Plan Amendment that covers desalination facility intakes and discharges (OPA Improvements), adopted by the State Water Resources Control Board in May 2015. Together, the Closure Improvements and OPA Improvements make up the new CDP intake and discharge facilities (Modifications).

The transition to stand-alone operations, including the construction of new intake facilities, was contemplated and is addressed in the WPA. The WPA obligates the Water Authority to pay, through adjustments to the unit price, for Poseidon’s incremental capital and operating costs associated with stand-alone operations, including the improvements resulting from the power plant closure and compliance with the OPA. Capital and operating costs eligible for pass-through to the Water Authority related to closure of the power plant (considered a Change in Law under the WPA), are capped in the WPA at index-linked amounts. Costs related to compliance with the OPA are also considered Change in Law under the WPA, but are not subject to the same caps as closure-related costs. However, the WPA protects the Water Authority by imposing a cap limiting increases due to changes in law (among other provisions) in the water unit price to 10 percent in any year and a total of 30 percent on an aggregate basis. These Change in Law costs fall under the general category of Uncontrollable Circumstances (U.C.) addressed in the WPA.
Poseidon secured a new NPDES permit for the project from the San Diego Regional Water Quality Control Board (Regional Water Board) on May 8, 2019 that covers operation under the current use of NRG’s cooling water circulation pumps and the proposed Modifications.

**Figure 1. Current Intake and Discharge Flow Schematic**

Previous Board Action: The Water Authority Board approved the Water Purchase Agreement on November 29, 2012.

Previous Board Presentation: On March 24, 2016, The Engineering and Operations Committee received a presentation on the Claude “Bud” Lewis Carlsbad Desalination Plant Intake System Modifications.

Previous Board Action: On August 17, 2016, the Board approved a Contract Administration Memorandum (CAM) Regarding the Proposed Intake and Discharge System Modifications for the Claude “Bud” Lewis Carlsbad Desalination Plant Water Purchase Agreement.

Previous Board Action: On August 17, 2016, the Board approved a supplemental EIR for the new intake structure.

Previous Board Action: On December 6, 2018, the Board authorized the General Manager to approve Contract Amendments for Hawkins Delafield & Wood LLP, Clean Energy Capital Securities and Louis Berger Group associated with the Lewis Carlsbad Desalination Plant Intake Modifications Project.

Previous Board Action: On April 25, 2019, the Board authorized the General Manager to execute a Water Purchase Agreement Contract Administration Memorandum (CAM) between the Water Authority and Poseidon Resources (Channelside) LP to support Temporary Stand-Alone Operations of the intake and discharge facilities at the Lewis Carlsbad Desalination Plant (CDP).
Discussion

Intake Phasing

As discussed above, NRG ceased energy production at the EPS effective December 12, 2018. In consultation with the Water Authority, the Regional Water Board and NRG, Poseidon is implementing a phased implementation of the Modifications that will allow the CDP to remain in service. The three phases are as follows:

1. Temporary Standalone Operating Period (current) – Poseidon reached agreement with NRG to allow for the operation of the cooling water circulation pumps by NRG staff to be extended while an interim intake/discharge system is constructed. On June 13, 2019, the Water Authority executed a CAM compensating Poseidon for this temporary phase of operation as authorized by the Board on April 25, 2019.

2. Interim Operating Period (IOP) – Expected to begin in mid-2020, this phase generally includes a new fish-friendly dilution pump system and modifications to the existing intake and discharge channels (Interim Modifications) to keep the plant in operation during and after demolition of the NRG facilities. Pilot studies to confirm the efficacy and operational characteristics of the submerged intake screens will also be conducted and the new, permanent screened-intake system will be designed and constructed on the floor of the Agua Hedionda Lagoon during this operational period. See Figure 2.

3. Permanent Operating Period – Building upon the pumps and facilities installed for the Interim Operating Period, the new screened-intake system is expected to be connected and commissioned in late 2023, achieving full compliance with the OPA and the new NPDES permit.

Figure 2. Interim Intake and Discharge Flow Schematic
The new NPDES permit includes a compliance schedule that requires that the Interim Modifications be completed by June 30, 2020 and that all Intake Modifications, including the new screened-intake system be completed by December 11, 2023. The permit also requires Poseidon to conduct an analysis to validate that the marine life mortality resulting from the proposed discharge methodology of flow augmentation (diluting brine with seawater) is less than that of a theoretical multiport diffuser impact. The multiport diffuser analysis must be completed by July 1, 2021 and should the results show that flow augmentation does not provide comparable marine life protections as compared to a multiport diffuser, Poseidon will be required to work with the Regional Water Board on a new Water Code determination.

The remainder of this memorandum will focus on the IOP, the subject of the requested action.

Interim Modifications Contracting and Financing

The Interim Modifications allow for the transition from the EPS cooling water circulation pumps to new fish-friendly permit-compliant dilution pumps and for NRG to initiate demolition activities in accordance with the Settlement Agreement. These improvements include the following:

- New fish-friendly brine dilution pumps and discharge piping;
- Intake structure modifications to provide a wet well for new dilution pumps;
- Extension of the existing 63-inch brine discharge pipeline;
- Modifications to the existing EPS forebay including replacement of existing traveling screen wash pumps and discharge piping;
- A new electrical building including switchgear, VFDs and control system, and;
- Connection to existing 12 kV service located at the Plant and modifications to Cabrillo Generating Facility storm water and seepage water management system

On August 7, 2019, Poseidon executed a design-build contract with Kiewit-Shea, a Joint Venture (KSJV) to design and construct the Interim Modifications. KSJV is the same team that designed and constructed the CDP as well as the product water pipeline that connects the plant to the Second Aqueduct. Poseidon also pre-procured the fish-friendly dilution pumps and associated steel piping under a separate contract with Indar, the manufacturer, as a measure to preserve schedule and reduce costs.

To finance these contracts and the ancillary costs necessary to implement the Interim Modifications, Poseidon intends to execute a Bank Loan Agreement concurrently with the CAM. The WPA provision to pursue a financing structure similar to the original plant financing is being waived to support a bank loan alternative that is $3 million to $4 million cheaper than a tax-exempt private activity bond financing. The proposed terms of the Bank Loan Agreement are for an amount not to exceed $45 million repayable over a six-year term, interest only in years one through three and with the principal amount amortized in years four through six. To avoid a significant increase in the unit price adjustment beginning in year four, Poseidon and the Water Authority intend to refinance the principal amount of the bank loan along with the initial 2012 Plant Bonds, anticipated on or about January 2023 at which time a separate adjustment to the unit price will be brought to the Board for approval.
The current bond documents that govern the existing and new debt under the Series 2012 Plant Bonds requires evidence that Poseidon meets certain conditions including but not limited to rating confirmations from Moody’s and Fitch in order to incur additional debt for the project. Poseidon and the Water Authority led separate ratings presentations with Moody’s and Fitch on October 8, 2019 and anticipates that both entities will confirm the bond ratings by October 21, 2019. Staff plans to present the results of the rating process at the October 24, 2019 Board meeting.

Interim Operations Period Terms and Structure

Water Authority staff and Poseidon have negotiated the key terms addressing financial and contractual conditions during the IOP. These conditions align with the provisions and intent of the WPA. Key terms and conditions of this IOP CAM are detailed below.

**Risk Transfer**

In keeping with the provisions of the WPA, a fundamental aspect is the risk transfer to the private sector. Provided that water is produced by Poseidon, the Water Authority will pay a unit price adjustment for each acre-foot produced to compensate Poseidon for the increased cost to implement the Interim Modifications, but only after the Interim Modifications are placed into commercial operation. Similar to the pricing structure developed for the WPA, by paying a fixed adjustment to the unit price, the Water Authority is effectively transferring risk to Poseidon. If the costs to construct or operate the Interim Modifications are higher, that cost is borne by Poseidon, subject only to the U.C. relief provisions provided for in the WPA.

**Duration**

The IOP shall commence with successful completion of the new intake pump system performance test, currently anticipated to take place in June 2020, and remain in place until the permanent intake screens are installed and commissioned. Terms and conditions for permanent operations will be defined in a future CAM, with that period anticipated to begin in December 2023, consistent with the NPDES permit schedule.

**Closure Improvements Cost Cap Consideration**

As previously mentioned, the Water Authority’s cost liability related to the closure of the EPS is capped as stated in Section 4.8(B) of the WPA. Adjusting for inflation, the capital cost cap equals $25,027,897 and the annual operating cost cap equals $3,125,552. In a previous CAM, the Water Authority and Poseidon agreed to identify: (i) which elements of the Modifications would have been required to solely account for the closure of the EPS and which elements are required as a result of adoption of the OPA; and (ii) the respective permitting, engineering, procurement, design, construction, operating, and electricity costs of the respective elements, such that all costs are allocated or prorated into one or the other category.

To accomplish this, Poseidon developed a closure configuration concept meeting the Water Authority’s criteria for feasibility and permitability. Cost estimates covering capital
improvements and annual operations and maintenance were developed by both Poseidon and the Water Authority based on the accepted design concept for the Closure Modifications. The independent cost evaluations both concluded that the capital and operating cost cap provisions provided for in the WPA have not been reached.

**Plant Production**

With the exception of regular maintenance-related shutdowns and the limited duration shutdowns that will be required for construction of the Interim Modifications, plant production is not expected to be impacted during the IOP. In addition, the terms of the Settlement Agreement between and among the City of Carlsbad, Carlsbad Municipal Water District, Cabrillo, Carlsbad Energy Center LLC and San Diego Gas & Electric Company currently require NRG to begin demolition by December 2019 and complete physical demolition and removal of the above-ground structures of the Cabrillo Generating Facility by December 2021. Given the schedule for the IOP, NRG and Poseidon are seeking an adjustment to the demolition schedule that will ensure that use of existing facilities during the IOP does not impact NRG’s ability to meet the demolition requirements of the Settlement Agreement. The City of Carlsbad is scheduled to consider this matter at its November 12, 2019 City Council meeting. Once the IOP start date is more clearly defined early next year, the Water Authority and Poseidon may need to discuss with NRG any schedule/cost impacts related to the EPS demolition plan and schedule.

Water production relief will also be modified as part of the IOP conditions. The additional relief conditions that were added during the Temporary Standalone Operating Period (TSOP) to account for the age of the NRG cooling water pumping system will not be carried forward into the IOP. The only relief provided will be up to 110 hours annually during which production and delivery is precluded by a shutdown of the NRG facilities still in use.

**Cost Components**

In accordance with the WPA, the compensation relief provided to Poseidon for the Interim Modifications shall be provided through adjustments to the various charge components of the unit price. Each component is described below along with future dredging costs which are not included in the IOP unit price adjustment.

*Debt Service Charge and Equity Return Charge Adjustments*

The Debt Service Charge and Equity Return Charge adjustments compensate Poseidon for the capital and financing expenses incurred for the implementation of the Interim Modifications and include permitting, design, construction, administrative and financing costs as well as portions of the intake screen demonstration project and other study costs that will be implemented during the IOP. The lump sum loan amount for the Interim Modifications capital improvements is $45,000,000. The component costs are summarized in Table 1 below.
Table 1. Interim Modifications Capital Costs

<table>
<thead>
<tr>
<th>Component</th>
<th>Capital Cost</th>
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<tbody>
<tr>
<td>Development and Construction</td>
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<tr>
<td>KS JV Design-Build Contract</td>
<td>$15,680,000</td>
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<tr>
<td>Indar Pre-Procurement Contract (pumps and pipe)</td>
<td>$6,227,000</td>
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<tr>
<td>Permitting</td>
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<tr>
<td>Preliminary Design</td>
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<td>Administration</td>
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<tr>
<td>Other</td>
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<td><strong>Sub-Total</strong></td>
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<tr>
<td>Financing and Allowances</td>
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<tr>
<td>Capitalized Interest</td>
<td>$1,027,000</td>
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<tr>
<td>Transactional Costs</td>
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<tr>
<td>Construction Risk Allowances</td>
<td>$2,155,000</td>
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<tr>
<td>Other</td>
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<tr>
<td><strong>Sub-Total</strong></td>
<td><strong>$7,282,000</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$45,000,000</strong></td>
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1 Covers Poseidon’s internal and third-party consultant permitting costs from 2014 to 2019 including engagement in the OPA development process and securing a new NPDES permit

The WPA includes provisions detailing how the capital charge component of the unit price will be adjusted to account for the Interim Modifications. Generally, the actual debt service cost incurred by Poseidon will be passed through as an adjustment to the Debt Service Charge component of the unit price. For the portion of the Interim Modifications attributable to plant closure, the WPA provides a modification to this general provision in that 20 percent of the associated debt shall instead be passed through as an adjustment to the Equity Return Charge component of the unit price, at an assumed interest rate of 15 percent. This Equity Return Charge adjustment was included in the WPA to account for Poseidon’s risks associated with their acceptance of a cap on closure costs eligible for cost recovery.

Similar to the original financing for the CDP and in keeping with the U.C. provisions of the WPA, the total bank loan amount of $45 million includes the following allowances to deal with different elements of U.C. construction risk:

1. **Differing Existing Condition Allowance** – An estimated allowance of $985,000 has been included in the financed amount to account for the potential that the configuration and/or condition of below-ground structures integral to the construction of the Interim Modifications are different from the assumptions (based on record drawings and site inspection) made at the time the project was bid. This allowance, if not utilized, will accrue to the benefit of the Water Authority once the construction project is complete and interim operations is
under way. If the cost exceeds the allowance, the U.C. provisions of the WPA will be used to evaluate any potential additional payment or unit price adjustment and would be brought to the Board for consideration.

2. **Construction Contingency Fixed Allowance** – A fixed construction contingency amount of $675,000 has been included in the loan amount. This contingency provides for construction issues that typically arise during construction. Similar to the contingency that was provided for the construction of the CDP, Poseidon accepts the risk that actual costs may exceed the contingency amount. Conversely, if the contingency amount is not exceeded, the benefit would accrue to Poseidon.

3. **Limited Notice to Proceed Fixed Allowance** – Currently, the KSJV team is evaluating certain existing conditions and hydraulic assumptions. Based on the information available to date, a fixed allowance of $495,000 was assumed in the loan amount to account for potential changes. Once this effort is complete, and subject to Bank loan funding and execution of the IOP CAM, a formal Notice to Proceed will be issued by Poseidon for KSJV to begin construction activities.

### Operating Charge Adjustment (fixed and variable)

The operating charge adjustment compensates Poseidon for the fixed and variable costs associated with the operation and maintenance of the Interim Modifications. There are no operating or maintenance activities linked to the variable flow processed through the new dilution pumps, so the variable cost adjustment is zero. The fixed operating cost on an annual basis is approximately $2,200,000.

### Electricity Charge Adjustment (fixed and variable)

The Electricity Charge adjustment compensates Poseidon for the fixed and variable electrical costs associated with the Interim Modifications. The electricity cost on an annual basis is approximately $400,000.

### Dredging

With the closure of the EPS, Poseidon assumed responsibility for periodic dredging of Agua Hedionda Lagoon to maintain flow through the lagoon and into the existing and future intake facilities. This function was previously the responsibility of NRG to support power generation at the EPS and was last performed in 2018. Under the terms of the WPA, Poseidon is allowed to recover dredging costs.

It is anticipated that additional dredging will be required as early as October 2020 and again as part of the construction effort for the permanent intake screens located in the lagoon (October 2023). While some historical costs for dredging have been shared by NRG, the work is highly specialized and costs can vary significantly, based on actual conditions at the time of the dredging. As such, dredging was not included in the fixed price increase for IOP. Staff plans to address the first Poseidon dredging event anticipated in 2020, and potentially the 2023 effort, as a direct pass through of substantiated costs.
**IOP Unit Price Adjustment**

The total increase to the unit price of desalinated water based on the cost components above is estimated at $94/acre-foot as shown in **Table 2** below. This equates to a reduction in the unit price of water by $41/acre-foot as compared with the current TSOP unit price adjustment of $135/acre-foot.

**Table 2. IOP Unit Price Adjustment for Contract Year 2020 ($/AF, estimated)**

<table>
<thead>
<tr>
<th>Cost Components</th>
<th>IOP Unit Price Adjustment</th>
<th>Estimated IOP Unit Price</th>
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<tbody>
<tr>
<td>Debt Service</td>
<td>$22/AF</td>
<td>$609/AF</td>
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<tr>
<td>Equity Return</td>
<td>$18/AF</td>
<td>$428/AF</td>
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<tr>
<td>Fixed Operating</td>
<td>$46/AF</td>
<td>$522/AF</td>
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<tr>
<td>Variable Operating</td>
<td>$0/AF</td>
<td>$123/AF</td>
</tr>
<tr>
<td>Fixed Electricity</td>
<td>$8/AF</td>
<td>$174/AF</td>
</tr>
<tr>
<td>Variable Electricity</td>
<td>$0/AF</td>
<td>$693/AF</td>
</tr>
<tr>
<td><strong>Total Unit Price</strong></td>
<td><strong>$94/AF</strong></td>
<td><strong>$2,549/AF</strong></td>
</tr>
</tbody>
</table>

**Current Unit Price (w/ TSOP)** $2,590/AF

**Change in Unit Price** ($41)/AF

The IOP CAM will be executed and the unit price adjustment will be finalized with completion of the Bank Loan Agreement.

Prepared by: Jeremy Crutchfield, Water Resources Manager
Reviewed by: Robert R. Yamada, Special Projects Director
Reviewed by: Kelley Gage, Director of Water Resources
Approved by: Sandra L. Kerl, Acting General Manager