

# Submersible Pumps and Motors

## CASE

## STUDY

Poseidon Water-Carlsbad Desalination Plant  
Dilution Pumps-Intake Pumping Station



Claude "Bud" Lewis  
Carlsbad Desalination Plant



Figure 1. Claude "Bud" Lewis Carlsbad Desalination Plant. (A) Dilution Pumping Station. Source: Poseidon Water.

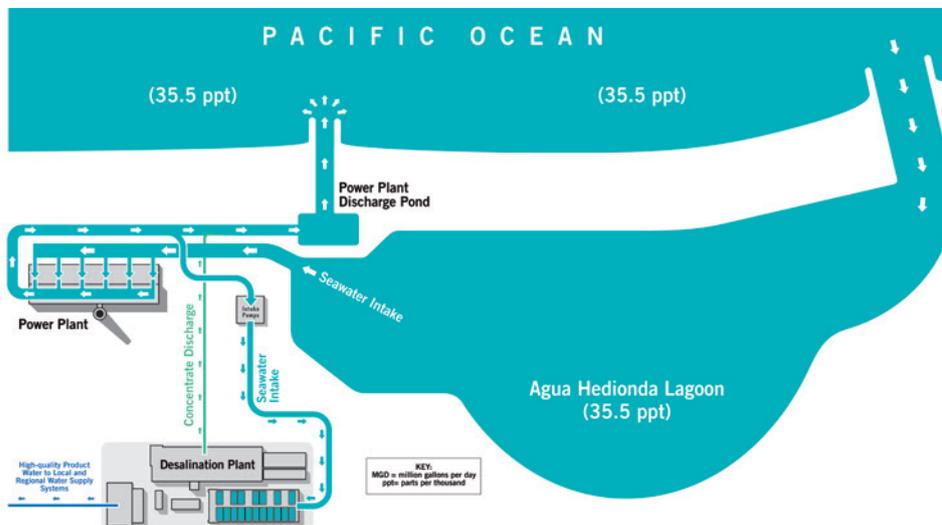
### Claude "Bud" Lewis Carlsbad Desalination Plant

The Claude "Bud" Lewis Carlsbad Desalination Plant is **the largest, most technologically advanced and energy-efficient seawater desalination plant in the US**. Each day, the plant delivers nearly 190,000 m<sup>3</sup> (56,000 acre-feet per year (AFY)) of fresh, desalinated water to San Diego County – enough to serve approximately 400,000 people and accounting for about one-third of all water generated in the County.

Located adjacent to the Encina Power Station in Carlsbad, California, the Carlsbad Desalination Plant was developed as a public-private partnership. The project originated in 1998 was launched in 2015 with a purchase agreement between Poseidon Water and the San Diego County Water Authority. It uses a reverse osmosis filtering process that separate salt from seawater, has garnered numerous awards for design, implementation and energy efficiency.

Poseidon Water is the owner and operator of the desalination plant. IDE is the operator for the next 25 years.

### Sustainable Water Production: The Challenge



In May 2019, the San Diego Regional Water Quality Control Board and the California Coastal Commission issued a permit for the installation of new, technologically advanced and environmentally sensitive seawater intake and discharge facilities at the Claude "Bud" Lewis Carlsbad Desalination Plant. The new intake-discharge system is needed for long-term operations of the desalination plant that now uses water withdrawn from Agua Hedionda Lagoon for once-through cooling at the Encina Power Station.

The closure of the power station in December 2018 led to temporary intake-discharge operations that will continue while new, stand-alone desal intake-discharge facilities are built.

Figure 2. Collocation of Carlsbad Desalination Plant with Encina Power Station. Source: Poseidon Water.



## Sustainable Water Production: The New Intake

With the decommissioning of Encina Power Station, the Carlsbad Desalination Plant is modernizing the existing intake facilities to provide **additional environmental enhancements** to protect and preserve the marine environment complying with the regulations in the California State Water Board's Ocean Plan Amendment.

The new screened-intake (1mm) will use **three (3) Indar high-tech customized fish-friendly submersible pumps** that will replace the existing circulating pumps:

**H-1800-1697 +S-450-X/8.**

The pumps are projected with variable speed to absorb all the potential possibilities of demand in the plant.

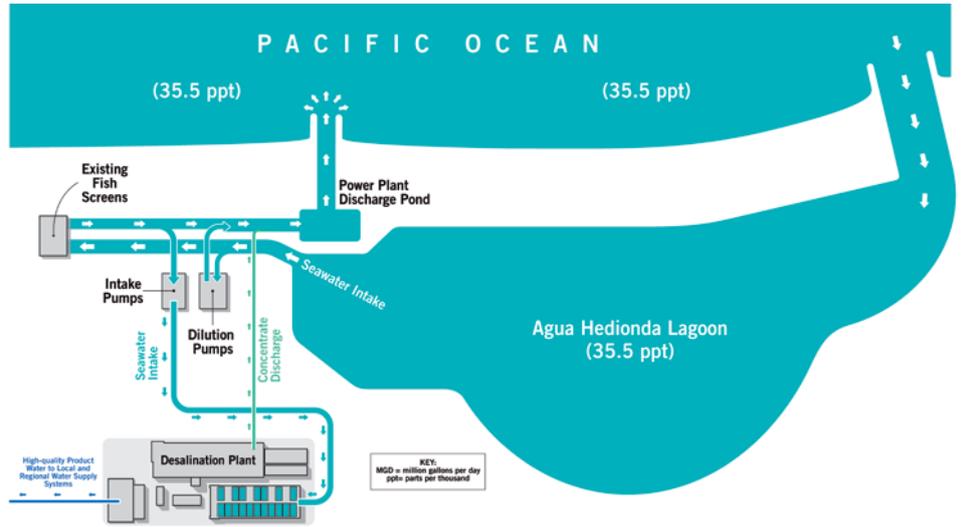


Figure 3. Collocation of Carlsbad Desalination Plant without Encina Power Station: New Dilution Pumping Station. Source: Poseidon Water.

| Pump        | Motor     | Flow (CMD) | Head (m) | Motor Output (kW) | Voltage (V) | Discharge Diameter (mm) |
|-------------|-----------|------------|----------|-------------------|-------------|-------------------------|
| H-1800-1697 | S-450-X/8 | 370.000    | 3        | 269               | 460         | 2.000                   |

The submersible pumps with axial flow, single stage and single inlet have an opened multi-channel (3) impeller with big free ball passage.

Being projected with shroud (H-type Pumps), the cables once outside the unit are protected, preventing these from coming into contact with the pumped water.

Motorpump sets are installed suspended from the discharge piping.

This innovative solution of Dilution PS, for Carlsbad Desalination Plant, will allow protection and preservation of the lagoon so that the community can enjoy its recreational and marine resources now and for generations to come.

## The New Intake: Transition

The transition to the new intake and discharge facilities will be implemented in three phases:

- **Temporary Operations** – NRG Energy, which owns Encina Power Station, continues to operate the water circulation pumps while an interim intake system is constructed.
- **Interim Operations** – Expected to begin in mid-2020, this phase uses new Indar fish-friendly pumps as a replacement for the existing circulation pumps. A new, permanent screened intake system also will be designed and built in the lagoon during this phase of operation. The new intake will rely on innovative technology.
- **Permanent Operations** – The new submerged, screened-intake system is expected to be connected in late 2023, achieving the best available technology to minimize impacts to marine life in full compliance with the 2015 California Ocean Plan Amendment.



Once permanent operations begin in 2023, the Carlsbad Desalination Plant will be the first to comply with the 2015 Ocean Plan Amendment, designed to advance ocean water as a reliable supplement to traditional water supplies while protecting marine life and water quality.