Prepared for

PG&E *and the State Water Resources Control Board Nuclear Review Committee*

Independent Third-Party Interim Technical Assessment

for the Deepwater Offshore Intake for Diablo Canyon Power Plant

Prepared by Bechtel Power Corporation

Report No. 25762-000-30R-G01G-00005 Rev. 0

July 22, 2012

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Revision	Date	Affected Sections
0	July 22, 2012	Initial Issue

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List of Abbreviations and Acronyms

agl	above ground level
APCD	(San Diego) Air Pollution Control District
ATC	Air Pollution Control District Authority to Construct
BLM	Bureau of Land Management
Caltrans	California Department of Transportation
CDFG	California Department of Fish & Game
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CPUC	California Public Utility Commission
DCPP	Diablo Canyon Power Plant
EPCRA	Emergency Planning and Community Right-To-Know Act
FAA	Federal Aviation Administration
fps	foot per second
gpm	gallons per minute
GWA	Government of Western Australia
mgd	million gallons per day
NOI	notice of intent
NPDES	National Pollutant Discharge Elimination System
OHP	Office of Historic Preservation
PG&E	Pacific Gas and Electric
PTO	Air Pollution Control District Permit to Operate
RC	Resource Commission
RCRA	Resource Conservation and Recovery Act
RWQCB	Regional Water Quality Control Board
SDRWQCB	San Diego Regional Water Quality Control Board
SPCC	Spill Prevention Control and Countermeasure Plan
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Council Board
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USMC	U.S. Marine Corps
WDR	Waste Discharge Requirement

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1. Executive Summary

The primary objective of implementing the deepwater intake technology is to locate the withdrawal inlet selectively in deeper waters where, in theory, biological abundance will be lower. This relocation offers the possibility of substantially reducing the entrainment of aquatic species at different stages of life (including fish, fish egg, and larvae) and reducing impingement mortality.

Permitting is expected to be contentious and have lengthy processes that will be aligned with the California Environmental Quality Act (CEQA) Environmental Impact Report process. The primary difficulty appears to be that the deepwater intake system poses significant construction impacts to marine habitats, while offering only some limited potential for reductions in entrainment and impingement impacts. Despite this incremental improvement, the consistent message from all of the interested regulatory agencies was that there were no environmental impact issues or criteria that would preclude this technology option from securing the necessary construction and operating permits and approvals.

This study concludes that there is no advantage to relocating the offshore intake to deeper, more distant location, since the population of a variety of fish and larvae is present in a wide range of water depths. The relocation of the withdrawal point from the shoreline to a location 2,000 meter (6,560 feet) offshore will require the construction of a new 30- to 32-foot diameter tunnel under the seabed. This tunnel system will result in an additional pressure drop of over 8 feet, and will necessitate the need for a new shoreline pump intake structure and associated equipment.

There is no definitive evidence to demonstrate that the required reductions in impingement and entrainments can be achieved with this relocation to a deeper intake site. When considering the environmental impacts from the associated significant disturbance to the local marine environment to relocate the existing intakes to a deeper, more distant offshore location is not expected to produce any appreciable benefits regarding entrainment or impingement. Consequently, this option should not be a candidate for further evaluation in the next phase of the assessment.

Criterion	Status
External Approval and Permitting	No fatal flaws
Impingement/Entrainment Design	Studies have shown that the entrainment will unlikely be improved for this design, so this is considered not to be viable.
Environmental Offsets	No fatal flaws.
First-of-Kind to Scale	Not evaluated.
Operability of General Site Conditions	Not evaluated.
Seismic and Tsunami Issues	Not evaluated.
Structure and Construction	Not evaluated.
Maintenance	Not evaluated.
Conclusion	Technology is not a candidate for Phase 2 review

2. Background and Introduction

2.1 Purpose/Scope of Study

This study satisfies the requirement established by the State Water Resources Control Board (SWRCB) for Pacific Gas & Electric (PG&E) to conduct a detailed evaluation to assess compliance alternatives to once-through cooling for the Diablo Canyon Power Plant (DCPP). This requirement is associated with the *California Statewide Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling,* which established uniform, technology-based standards to implement the Clean Water Act Section 316(b), which mandates that location, design, construction, and capacity of the cooling water intake structures reflect the best technology available for minimizing adverse environmental impacts.

This report describes the detailed evaluation of the deepwater offshore intake technology for DCPP based on the list of site-specific criteria approved by the Nuclear Review Committee. The evaluation process includes critical review of published data and literature, consultation with permitting agencies, and technical assessment supported by engineering experience and judgment. No new field data was collected as part of this effort. The results of the evaluation are used to characterize the feasibility of this technology and its possible selection as a candidate for further investigation in a follow-on phase of this study.

2.2 Regulatory History

2.2.1 Federal

The U.S. Environmental Protection Agency (USEPA) has proposed standards to meet its obligations under the Section 316(b) of the Clean Water Act to issue cooling water intake safeguards. Specifically, this section requires that National Pollutant Discharge Elimination System (NPDES) permits for facilities with cooling water intake structures ensure that the location, design, construction, and capacity of the structures reflect the best technology available to minimize the harmful impacts on the environment. These impacts are associated with the significant withdrawal of cooling water by industrial facilities which remove or otherwise impact significant quantities of aquatic organisms present in waters of the United States. Most of the impacts are to early life stages of fish and shell fish through impingement and entrainment. Impingement occurs when fish and other aquatic life are trapped against the screens when cooling water is withdrawn resulting in injury and often death. Entrainment occurs when these organisms are drawn into the facility where they are exposed to high temperatures and pressures – again, resulting in injury and death. (USEPA, 2011)

In response to a consent decree with environmental organizations, the USEPA divided the Section 316(b) rules into three phases. Most new facilities (including power plants) were addressed in the Phase I rules, initially promulgated in December 2001. Existing power plants were subsequently addressed, along with other industrial facilities, in the Phase II version of the rules, issued in February 2004. Since then, the rule has been challenged, remanded, suspended, and re-proposed. The current proposed version of the rule dictates that all existing facilities that withdraw at least 25 percent of their water from an adjacent water body for cooling purposes and have a design intake flow range of 2 million gallons per day (mgd) would be subject to:

- Upper limit on the number of fish killed because of impingement and determining the technology necessary to comply with this limit, <u>or</u>

- Reduce the intake velocity to 0.5 feet/second or below (through-screen), which would allow most fish to avoid impingement.

Large power plants (water withdraw rates 125 (mgd) or greater) would also be required to conduct a studies to help their local permitting authorities (State Water Resources Control Board [SWRCB]) to determine site-specific best technology available for entrainment mortality control. Note this version abandoned the original performance standards approach that mandated the calculation of baseline against, which reduction in entrainment and impingement can be measured.

The Section 316(b) Phase II final rule is expected to be issued on July 27, 2012. When the final rule becomes effective, it is likely to include an implementation timeline, which would drive the implementation of technologies to address the impingement requirements within 8 years (2020).

2.2.2 State

The SWRCB is responsible for ensuring compliance with the finalized Section 316(b) rules in California and it has been actively pursuing a parallel path regulatory program that is focused on the state's coastal generating stations with once-through cooling systems including DCPP. The SWRCB's *Use of Coastal and Estuarine Waters for Plant Cooling Once-Through-Cooling Policy* became effective on October 1, 2010. This policy established statewide technology based requirements to significantly reduce the adverse impacts to aquatic life from once-through- cooling. Closed-cycle wet cooling has been selected as the best technology available.

Affected facilities, including DCPP, are expected to:

- Reduce intake flow (commensurate with closed-cycle wet cooling system) and velocity to 0.5 feet/second or below (through screen) – Track 1, or

- Reduce impacts to aquatic life comparably by other means – Track 2

This policy is being implemented through a so-called *adaptive management strategy,* which is intended to achieve compliance with the policy standards without disrupting the critical needs of the state's electrical generation and transmission system. A Nuclear Review Committee was later established to oversee the studies that will investigate the ability, alternatives, and costs for both SONGS and DCPP to meet the policy requirements. This study is a direct outgrowth of that adaptive management strategy to implement this Once-Through Policy (Bishop, 2011).

<u>Current Cooling Water Intake System and Section 316(b) Compliance History – DCPP</u>

DCPP operates a single cooling water intake structure to provide cooling water to Units 1 and 2. Each unit's water withdrawal rate is nominally 867,000 gpm or 1,248 mgd. Cooling water is withdrawn through a shoreline intake structure in a cove partially protected with man-made breakwaters. The inlet structure includes a set of inclined bar racks and traveling screens. A concrete curtain wall extends 7.75 feet below mean sea level to keep out floating debris. Incoming cooling water travels to one of four separate screen bays (two per unit). Each screen bay is fitted with three rotating vertical traveling screen assemblies with 3/8-inch stainless steel mesh panels. A high-pressure spray wash removes any debris or fish that may have become impinged on the screen face into a sump which leads back to the intake cove (Enercon, 2009)

This cooling water intake structure is not viewed as having technologies that are effective at reducing impingement mortality and entrainment losses. Consequently, this matter has been the subject of a number of Coastal Commission Regional Water Quality Control Board (CCRWQCB) initiatives, which have increasingly focused attention on mitigation of impingement and entrainment impacts via application of potentially viable alternative cooling system technologies.

2.3 Screening Process (A/B Criteria)

The technology screening process for the Phase I portion of the evaluation will be performed by using a Criteria Set A/B approach that achieves a technically comprehensive assessment while concurrently minimizing the time and effort required. The screening will be initially performed for Set A criteria. If the technology satisfies all of the Set A criteria, it will be evaluated using Set B criteria.

Set A criteria include the following items that are judged to be critical to the screening process:

- External approval and permitting (nonnuclear licensing)
- Impingement/entrainment design
- Offsetting environmental impacts

All remaining criteria are grouped into Set B criteria, which are shown below:

- First-of-a-kind to scale
- Operability general site conditions
- Seismic and tsunami issues
- Structural
- Construction
- Maintenance

During the screening process, if any criterion cannot be met, the screening process is suspended and a summary report for that technology is then prepared.

3. Technology Description

3.1 General Site and Intake Descriptions

3.1.1 Land and Sea Conditions

The terrestrial and marine environment, including the physical oceanographic conditions at DCPP, results in unique constraints affecting the practical selection of any cooling water intake system. DCPP is located on a coastal terrace above a rocky shoreline with bathymetry characterized by a sloping bedrock bottom with steep relief, rocky pinnacles, and prominent rocky ridges. The land side topography of the DCPP site, in general, exhibits steep topographic relief where the plant itself lies on gently sloping, narrow, coastal terrace at an elevation of 85 feet (mean sea level) above the rugged coastline, with the Irish Hills rising steeply behind the facility, to the east (Tetra Tech, 2002).

The near-shore marine environment near DCPP is naturally divided into intertidal and subtidal zones. The ocean water level normally varies between zero and +6 feet mean lower low water datum. Mean sea level zero is equivalent to +2.6 ft mean lower low water. Maximum tidal range is approximately 9 ft and extends from 7 mean lower low water to approximately 2 feet below mean lower low water. The subtidal zone reaches a maximum depth of approximately 60 feet below mean lower low water within 100 ft of shore in some area (DCPP, 2009).

Normal wave activity is in the 5- to 10-feet range, with storms generating waves between 20 and 30 feet. During the storm season between September 1997 and August 1998, peak swells exceeded 10 feet on 64 days. The DCPP cooling water intake is located in an area of significant production of marine algae, including surface kelp and understory algae. Kelp growth can reach two feet per day during the growing season between June and October. DCPP is located in a "wet marine" weather environment where ocean winds are commonly 10 to 25 miles per hour and can reach 40 to 50 miles per hour. Rainfall averages 20 inches per year; and the normal daily weather pattern is characterized by wet/foggy conditions in the morning and mild to strong winds in the afternoon (Tetra Tech, 2002).

Daily mean seawater temperature ranges from approximately 10.5°C (50.9°F) in May to approximately 15°C (59°F) in September. The maximum seawater temperature is approximately 18°C (64°F) (Tetra Tech, 2002). Seawater temperature measurements at the Coastal Data Information Program (CDIP) observation buoy (Station 076 Diablo Canyon) moored at 0.2 nautical miles offshore of the plant indicate the same order of temperature range with the maximum and minimum values (based on measurements from 1996 to 2012 recorded at half-hourly intervals) at 22°C (71.6°F) and 8.4°C (47.1°F).

3.1.2 Existing Shoreline Intake Description

DCPP uses a common shoreline intake structure to withdraw cooling water from the ocean to two independent once-through systems, one for each unit. The intake structure is protected by two breakwaters that extend offshore to form a semi-enclosed cove. Each unit is serviced by two, single speed circulating water pumps. The cooling water flow rate for Unit 1 ranges from 778,000 to 854,000 gallons per minute (gpm) and for Unit 2 from 811,000 to 895,000 gpm. The intake structure, with the inlet oriented more or less normal to the shoreline, is furnished with inclined bar racks and travelling screens for debris filtering. A concrete curtain wall extends 7.75 feet below mean sea level to keep out floating debris. Trash bars are flat bars, 3 inches by 3/8 inches on 3-3/8 inch centers, which create 3-inch openings in the racks, designed to exclude large debris. There are six travelling screens per unit, each at 10 feet (width) x 30 feet (depth), and are equipped with stainless steel 3/8 inch mesh panel. In addition, for each unit, there are two safety-related auxiliary saltwater pumps housed in separate pump bays located near the center of the intake structure, and serviced by a common 5-ft wide traveling water screen. One auxiliary saltwater pump per unit must remain operational at all times. Traveling water screens can be set to rotate at 10 or 20 feet per minute and can be washed manually or automatically, with high-pressure spray (Tetra Tech 2002).

An additional 9-foot-wide bar rack bay serving as a fish escape route is provided at each end of the intake structure. The partition is open between the units behind the bar racks, providing free flow of seawater and a migration route for fish from one end of the structure to the other (DCPP, 2009).

During routine operations, the traveling water screens are rotated and washed by high-pressure saltwater spray for 15 minutes every 4 hours. In high-energy ocean swell events, and/or periods of increased source water debris loading conditions, the traveling screens can be placed into continuous operation at either low or high speed. The traveling screen wash system spray nozzles discharge into sluiceways located on the intake structures exterior upper deck. The sluiceways flow to a central refuse collection sump. The sump is dewatered by pumping systems capable of transferring high percentage solids laden flow. The saltwater screen wash effluent and entrained debris is pumped from the sump to a discharge outside of the power plant intake cove. Grinding and mincing equipment installed in the inlets of the refuse sump process debris captured by the traveling screens and subsequently washed off. The debris grinders reduce potential for clogging of the sump when seawater inlet flow is laden with significant quantities of ocean debris (primarily kelp and under story algae) (DCPP, 2009).

3.2 Deepwater Intake Technology Requirements

As described in Sections 4.2.1 and 4.2.2 below, the fish and fish larvae are distributed over a wide range of water depths and offshore distances. In addition, fish can be attracted to the offshore intake structures due to their behavioral characteristics. As a result, no definitive site and water depth can be identified for the offshore intake that would comprehensively meet the objectives of the Section 316(b) *California Once-Through Cooling Policy* rule, especially pertaining to improvements on entrainment reduction. Nonetheless, the engineering requirements for a deepwater intake system (velocity cap technology), with a withdrawal location approximately 2,000 meters (6,560 feet) offshore of DCPP is used as the basis for the screen criteria evaluation described in Section 2.3. This offshore location combined with DCPP once-through cooling water flow rate are pushing the limits of the state of technology for hydraulic design for large pump intake systems.

The relocation of the withdrawal point from the shoreline to a location 2,000 meter (6,560 feet) offshore will require the construction of a new tunnel under the seabed. This tunnel system will result in an additional pressure drop of over 8 feet, and will necessitate the need for a new shoreline pump intake structure and associated equipment.

The implementation of the deepwater tunnel intake system will require that that the intake cove (basin) be enclosed with a breakwater to prevent direct inflow from the open sea to the intake basin. The new tunnel will pass underneath the breakwater and extend offshore to the intake head assemblies. The offshore tunnel/velocity caps intake system consists of the following components:

- Construction of a common drop shaft (main shaft) near shore in the enclosed shoreline basin.
- Installation of an offshore rock tunnel of 30 to 32 feet diameter that connects the main shaft to the offshore drop shafts.
- Installation of six offshore drop shafts which support installation of the offshore velocity caps.
- Installation of six offshore velocity caps, one for each drop shaft, to supply water to the tunnel.
- Construction of a new shoreline pump station with new pumps, motors, and screens.
- Construction of an enclosed shoreline basin by extending the existing inner breakwater.
- Modification of the shoreline pump house to have a deeper pump forebay and a new set of trash bar and screens.

Figures DW-1 and DW-2 show the schematic arrangements for this alternative. A brief description of these components follows below.

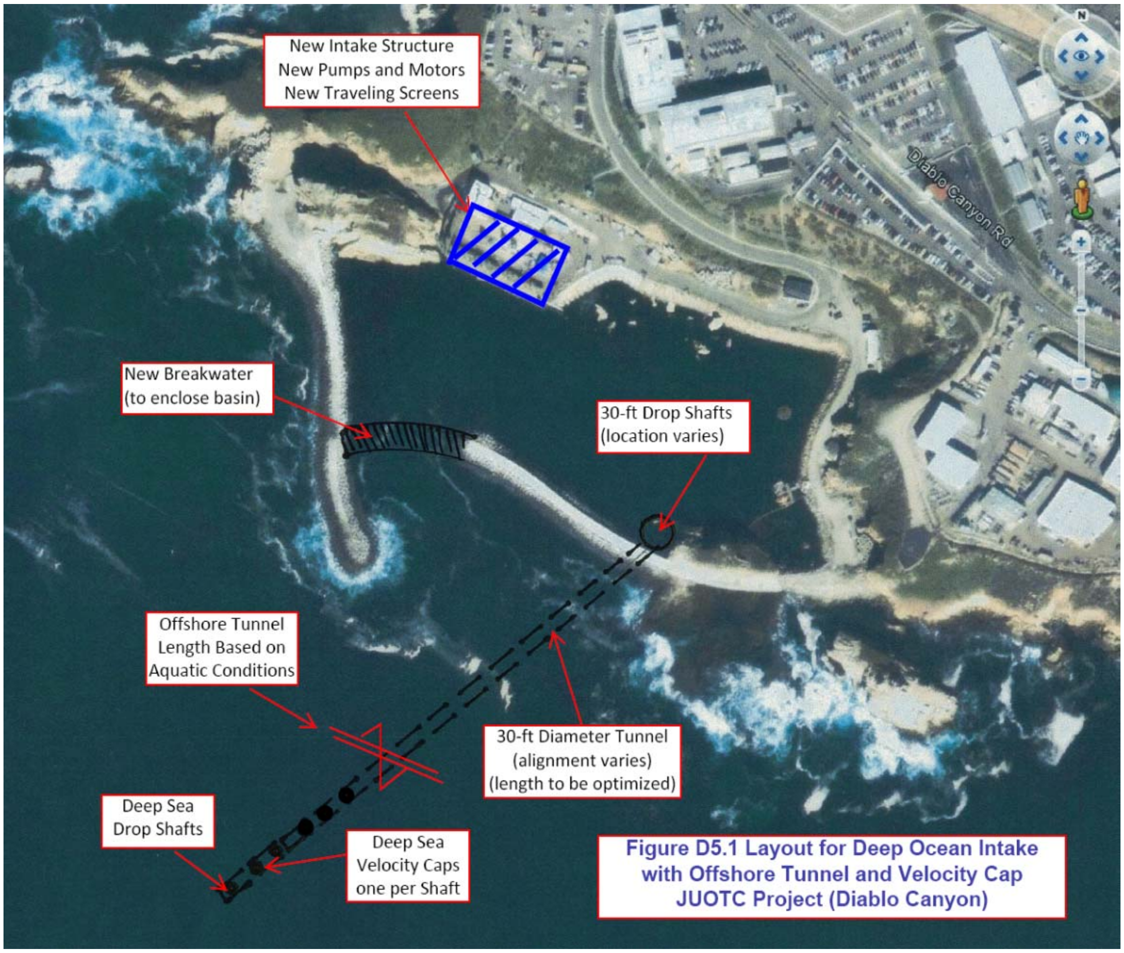

Figure DW-1. *Layout for Deep Ocean Intake with Offshore Tunnel and Velocity Cap*

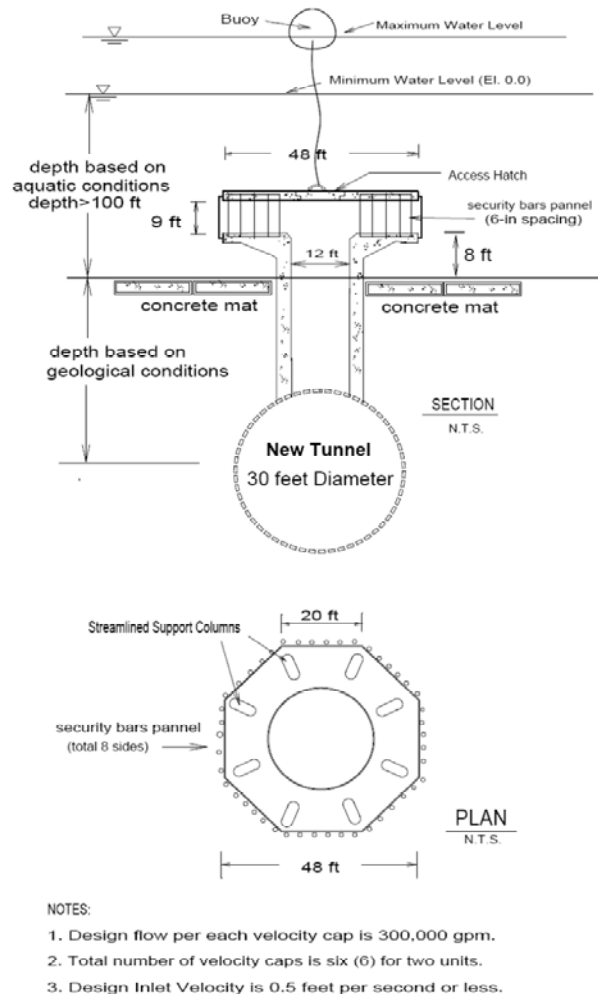

***Figure DW-2**. Deep Sea Velocity Cap Intake Concept*

A 30- to 32-foot-diameter rock tunnel will be constructed using a tunnel boring machine to connect the main drop shaft to the offshore drop shafts. The offshore tunnel length will depend on the seawater depth criteria and its relationship to marine biological sensitivity and species populations. The tunnel length of 2,000 meters and higher is considered for evaluation.

The tunnel lining requirement depends on the rock conditions encountered, but the tunnel is assumed to be unlined for hydraulic concept assessment,. The main drop shaft will have a diameter similar to the tunnel to provide access for the tunnel boring machine. The shaft will ultimately be used as seawater supply conduit. A construction access shaft (not shown in Figure DW-1) may be required to facilitate construction sequencing. The depth of the tunnel below seabed will be determined based on local geological conditions. A longer tunnel will likely encounter more geological variations along its alignment and will require special engineering considerations with respect to seismic and geotechnical design.

The common main shaft will be used to convey the plant cooling water, collected from offshore velocity caps, to the shoreline basin through the underground rock tunnel. The offshore drop shafts (total 6) that receive water from velocity caps will be constructed through barge based marine drill operations. The method of construction will depend on the selected sea depth and it may require specialized construction methods, which can be time-consuming. The tie-in of the drop shaft to the underground tunnel will be performed after completion of the tunnel. The offshore drop shafts will have a minimum inside effective diameter of 12 feet limited by availability of the associated specialized equipment.

The shoreline basin is constructed by extending the existing inner breakwater westward, which will close the intake cove from direct contact with open sea environment. The only connection of this basin to the sea will be through the tunnel and its shafts.

Due to the anticipated substantial pressure drop along the long offshore tunnel system, the existing shoreline pump intake structure cannot be used due to the considerable drop in water levels at the pump resulting from the long intake tunnel and a new shoreline pump station will be required. The new, deeper pump station will have new pumps, new motors, new traveling screen, new trash bars, and new fish collection and return system. Consideration of additional traveling water screen areas may be necessary to reduce through screen velocity to 0.5 feet per second (fps) or lower. Also the screens should be equipped with a fish-handling and return system to further reduce impingement losses and avoid fish entrapment. During the construction phase of the new shoreline intake structure, measures will be implemented to maintain the safety-related auxiliary saltwater pumps operational, as required.

For this evaluation, it is assumed that the velocity caps will be octagonal in shape and designed with an inlet average flow velocity of 0.5 fps or lower to satisfy the Section 316(b) *California Once-Through Cooling Policy* impingement criterion. Considering the large amount of cooling water withdrawal requirements, the velocity caps horizontal openings will be sized to provide the required flow and inlet velocity. Large object/large debris exclusion bars will be provided at the inlet to prevent these object and debris from entering the tunnel. The bars will be 150 millimeters (6 inches) apart center to center.

Generally, the velocity cap technology can be designed to provide a controlled inlet velocity, a submerged inlet elevated above the sea floor, and a radial horizontal inlet velocity field, free from swirling flows. The offshore velocity caps assemblies will not present an obstacle to surface navigation due to its deepwater location.

4. Criterion Evaluation

4.1 External Approval and Permitting

4.1.1 General Discussion

The external approval and permitting assessment focused on identifying the applicable (required) permits and approvals for construction and operation of a deepwater offshore intake system.

The initial assessment effort focused on developing a comprehensive list of potentially applicable permits and approvals at the federal, California, county, and municipal level (as applicable). This applicability of each permit/approval to the proposed deepwater offshore intake option was evaluated. Those permits and approvals that were deemed applicable were subsequently scrutinized to characterize the expected duration and complexity of the regulatory review process. Special attention was directed to identifying environmental impact issues or criteria, which would preclude the applicable permit or approval from ever being issued or granted. That is, the focus was to screen each applicable permit or approval for fatal flaws in the associated regulatory review process, which would preclude the deepwater offshore intake system from further consideration.

The assessment also focused on identifying the critical path (longest duration) initial preconstruction permitting processes, that is, those that support site mobilization, physical site access, initial earthwork/foundations for each cooling system technology option. The duration of the permitting and the approval process, while not a definitive fatal flaw, could later serve as a screening tool if combined with specific schedule limitations.

Permits and approvals that support later stages of construction and operation that are not critical path to the commencement of construction were also included in the assessment since these items could pose significant operational constraints to future DCPP operations.

4.1.2 Detailed evaluation

This summary list of permits provided the basis for subsequent discussions with key relevant regulatory authorities regarding the applicable permit application needs and the permit review time frames. These discussions were also critical for the identification of potential regulatory or permit-related barriers to implementation—fatal flaws.

The following regulatory authorities contacted:

- U.S. Army Corps of Engineers (USACE)
- California Public Utility Commission (CPUC)
- California Coastal Commission (CCC)
- California State Lands Commission
- State Water Resources Control Board (SWRCB)
- Central Coast Regional Water Quality Control Board (CCRWQCB)
- San Luis Obispo Air Pollution Control District (APCD)
- San Luis Obispo County

The following sections describe the relevant key permitting/approval processes for the deepwater offshore intake technology and summarize these findings in Table DW-1. This table lists the applicable permits and approvals, determines the critical path review processes and most importantly, highlights those processes which may be fatally flawed.

4.1.2.1 Deepwater Offshore Intake System

The deepwater offshore intake system shifts the shoreline intake system to an offshore velocity cap system, which will be located thousands of feet offshore in much deeper water that is anticipated to be less biologically rich.

U.S. Army Corps of Engineers

The USACE is the lead agency for Clean Water Act Section 404 and Section 10 permitting processes, which are focused primarily on impacts to waters of the United States and waterborne navigation. The deepwater intake system will involve offshore cut and fill or tunneling (tunnel boring machine) processes, which will pose significant construction impacts to USACE jurisdictional waters.

For minor impacts, the USACE has established a general permit program (nationwide permit) for a host of less significant work processes involving waters of the United States. The significant marine work associated with this cooling system option precludes any Nationwide Permit permitting process for tunneling construction. DCPP, therefore, would then be faced with securing the more complex individual Section 404/10 permit.

While Section 404 permit review periods can often be lengthy, the USACE representative for the DCPP area explained that all USACE facilities have a goal to issue an individual Section 404 permit within 120 days of deeming the associated application complete (Lambert, 2012). This period is a goal, not a statutory commitment. Consequently, in many cases, this goal is not realized. These delays are often associated with the mandated consulting processes that need to be pursued with the State Historic Preservation Office, U.S. Fish and Wildlife Service. or National Marine Fisheries Service. In other cases, there are extensions of public notice periods or scheduling complications for the public hearing. The applicant for the Section 404/10 permit has to directly pursue consultations with the California Coastal Commission (CCC) and SWRCB. Receipt of an individual Section 404 permit is contingent on previous receipt of permits from the CCC and SWRCB.

This difficult situation in permitting process is impeded further by the understaffed local USACE office (two to three permit writers), so permit review durations have been getting longer. For the more complex and contentious situations, the permitting process can extend to 1–2 years. Hence, the USACE permits are often characterized as the critical path permitting process. Given the significant new marine work associated with this cooling technology option, it is likely that the Section 404 will represent a critical path item to the completion of permitting.

Despite the potential for review periods longer than the 120-day target, the USACE did not see any specific barriers or fatal flaws regarding the Section 404 permitting process for the deepwater intake system. (Lambert, 2012)

California Public Utility Commission

DCPP is regulated by the California Public Utility Commission (CPUC), which is charged with overseeing investor-owned public utilities. San Luis Obispo County may share the role of Lead Agency for the CEQA review process with the CPUC. CEQA is regulatory statute, which requires state or local regulatory agencies to identify, assess, avoid, or otherwise mitigate the significant environmental impacts from the proposed action—the addition of new cooling system technology.

The proposed deepwater offshore system will certainly trigger preparation of Environmental Impact Report. The EIR is a detailed report that identifies the potentially significant environmental effects the project is likely to have; identifies feasible alternatives to the proposed project; and indicates the ways in which significant effects on the environment can be mitigated or avoided. This Environmental Impact Report will also be used by other state agencies to support their respective review and approval processes.

Following finalization of the Environmental Impact Report, the CPUC will evaluate whether to certify CEQA compliance. This certification then supports their subsequent decision regarding whether the costs associated with the new cooling system can be reclaimed via a consumer rate base adjustment.

While the CPUC-sponsored review process and decision regarding cost recovery will likely be a lengthy, complex and contentious process, there are no definitive environmental barriers which preclude successfully completion of the CEQA review and a positive record of decision.

California Coastal Commission

The CCC has a broad mandate to protect the coast resources of California, which includes the entire DCPP facility. Consequently, the CCC's environmental concerns address a broad range of subject matter include visual resources, land and marine-based biological resources, land use and socioeconomic concerns (for example, recreational use/access). Despite this comprehensive focus, the CCC has little in the way of specific, objective criteria that could be used to effectively screen any of the cooling technology options from further consideration.

The CCC representatives (Detmer, 2012 and Luster, 2012) indicated that the Commission recognized that there were no great options to the existing once-through cooling system at DCPP. Indeed, she indicated that almost all of the cooling system technology replacement options present some sort of negative impacts. Given that basis, the CCC appears to be resigned to consider options, which may present additional onshore or different offshore impacts to help mitigate the offshore environmental consequences of the existing once-through cooling. The CCC mandate to protect the coastal resources offers this agency some latitude to balance one set of impacts versus another. This evaluation process is on a case-by-case basis, which can be translated into the conclusion that there are few triggers that would automatically preclude any cooling system options from consideration, including the deepwater intake system.

Despite the lack of obvious fatal flaws, the deepwater intake system will certainly include significant offshore construction efforts, so the CCC will be focused on the deleterious construction impacts on marine resources (for example, local fish, shellfish, vegetation, hard marine substrate, commercial fishing) and the potentially offsetting positive benefits associated with reducing operational entrainment impacts. These impacts will be reduced simply because there is less likely to be a less rich biological environment and so less entrainment losses despite the largely unchanged water withdrawal rate. Visual impacts in the coastal zone, a typical key CCC subject area, will obviously not be an important factor for this largely submerged system. Thermal discharge impact matters will also be sideline issues, since they remain largely unchanged with this cooling system.

The CCC consideration of these issues and their follow-on approval process is mostly aligned with the CEQA process. That is, any application for a Coastal Development Permit will depend on information generated by associated Environmental Impact Report development process. Consequently, the CCC permit review process will also be aligned with CEQA and consequently its duration will mirror the CEQA timeline (approximately 1 year). That period offers evidence that the Coastal Development Permit could be a critical path permitting process.

California State Lands Commission

Construction efforts in subaqueous lands associated any cooling system modifications will be evaluated/approved by the California State Lands Commission. This review and associated lease approval process can follow three different tracks, as shown below:

- **Categorical Exemption –** applicable to those situations where there are no significant environmental impacts and there are no substantive changes in the existing land use. It is unlikely that this option would apply to any of the potential cooling system options that require marine work.
- **Mitigated Negative Declaration** - applicable for work that poses minor environmental impacts, during noncritical seasons, for limited period of time.

- **Environmental Impact Report/CEQA Process** – applicable for work that could potentially generate significant environmental impacts, uses heavy construction equipment, and/or will continue over a significant time period (months). This review process is not fast-track and could extend for a year.

The State Lands Commission evaluates each project individually and determines the appropriate review/approval path. As the deepwater intake system will obviously result in a significant addition of cooling system infrastructure to subaqueous lands, DCPP will not be able to pursue the largely administrative *Categorical Exemption* path or the streamlined *mitigated negative declaration* process. This option will invoke the longer, more complex Environmental Impact Report/CEQA review process.

Commission representatives (DeLeon, 2012 and Oggins, 2012) explained the current process for nonnuclear coastal power plant lease holders to develop and implement their "implementation plan" to meet *California's Once-Through-Cooling Policy* performance goals has been very slow. Most of these facilities have requested extensions to continue to evaluate the potentially available mitigation strategies. This experience offers evidence that the associated CEQA review will not be an expeditious process. A review period of at least a year is a distinct possibility.

Despite this expected lengthy review process, the associated marine work in subaqueous lands does not appear to offer any specific impacts or regulatory considerations that represent fatal flaws.

State Water Resources Control Board – Central Coast Regional Water Quality Control Board

While the SWRCB has overall permit authority for California's two active the nuclear power stations, the CCRWQCB has the follow-on inspection and enforcement role for the issue permits. For DCPP, the SWRCB expects to modify the existing NPDES permit in support of the proposed deepwater intake system. The lack of significant disruption to local land surfaces is expected to negate any need for new waste discharge requirements permit for construction impacts to jurisdictional streambed areas and possibly avoid the need to seek coverage under the general storm water permit for construction activity.

The deepwater intake construction activities will potentially generate significant, temporary water quality and marine habitat impacts. Installation of the new velocity cap system using the tunnel boring machine will reduce marine habitat losses and water quality impacts areas close to the new velocity cap.

Operationally, the deepwater offshore intake system will not appreciably reduce the impingement impacts, because the current system has proven to already reduce impingement losses. This system will not, by itself, reduce the overall water withdrawal or discharge rates. Entrainment-related impacts will be reduced primarily because water withdrawal will occur in a deeper and less biologically active region. Thermal discharge impacts to aquatic life will remain largely unchanged.

Given that the cooling water withdrawal and discharge rates will remain essentially unchanged, any revisions to the current DCPP NPDES permit will be limited to compliance provisions of Section 316(b), *California Once-Through Cooling Policy,* Phase II requirements. There will ostensibly be no changes to the current water treatment system, as this option is still a once-through system.

Both the SWRCB and CCRWQCB representatives (Jauregui, 2012 and Morris, 2012) explained that there are no obvious regulatory barriers regarding issuance of this revised NPDES permit for any of the cooling system options currently under consideration, including the deepwater intake system. The CCRWQCB and SWRCB will not necessarily preclude cooling system options from consideration, even if these options fall short of full compliance with the performance criteria tied to Section 316(b) *California Once-Through Cool-*

ing Policy, Phase II rules (that is, through-screen velocity less than 0.5 fps and entrainment/impingement levels equivalent that associated with a closed-cooling cycle system). The deepwater intake system entrainment reduction performance will fall well short of closed-cycle cooling attributes.

The SWRCB is ultimately a political body (9 individuals), whose members are interested in reviewing as much information/evidence from the applicant and from their own technical staff regarding the feasibility and impacts of various cooling system alternatives. Consequently, none of the SWRCB permits represent a fatal flaw or critical path permitting process to the deepwater intake screening system.

San Luis Obispo Air Pollution Control District

DCPP is located within the San Luis Obispo APCD, a state-designated, non-attainment area for PM-10 and PM-2.5, that is, the District has failed to achieve compliance with the state ambient air quality standards for these pollutants (Willey, 2012). In addition to this air quality compliance issue, there are also local concerns regarding visibility impacts on the nearest visibility sensitive areas, so-called Class I areas that are comprised of national parks (over 6000 acres), wilderness areas (over 5000 acres), national memorial parks (over 5000 acres), and international parks that were in existence as of August 1977. While these situations may have ramifications for those cooling system options that generate significant particulate emissions (closed cooling cycle systems), air quality permits/approvals are not expected to play an appreciable role for the deepwater intake system—a system that is not expected to generate any additional operational air emissions.

San Luis Obispo County

While many of potential cooling systems options for DCPP will likely trigger the need for the San Luis Obispo County Planning and Building Department to initiate a conditional use permit process, which in turn will be wholly dependent on a CEQA review process, there is some question as to whether the deepwater intake screen system will represent a sufficient trigger for the condition use permitting or CEQA process. A significant modification to the pumphouse or construction of a new pumphouse is likely to mandate a conditional use permit process.

The county recently completed a CEQA/conditional use permit review process for the DCPP steam generator replacement project (Hostetter, 2012). The county, along with NRC, were designated the “lead agencies” for the CEQA review. The CEQA/conditional use permit process for the steam generator replacement project, which involved significant rounds of negotiations, was characterized as complex and lengthy (years long).

As the county (Hostetter, 2012) predicted that any cooling system option with significant potential for environmental impacts would likely trigger a similar complex and lengthy CEQA/conditional use permit review, the deepwater intake system’s significant marine impacts will be subject to this rigorous process. The county can be expected to aggressively pursue the evaluation of alternative cooling system options in addition to reviewing the deepwater intake system.

The county also explained (Hostetter, 2012) that it is unlikely that they will identify any environmental impact criteria from the CEQA review process, which would immediately preclude any of the cooling system alternatives under consideration, including the deepwater intake system. The county views the CEQA review process as the mechanism which will ultimately identify the best solution for DCPP—all solutions will be considered.

Other Regulatory Agencies

In addition to the key regulatory agencies described above, there are a number of regulatory agencies that could potentially play a role in the permitting of the various cooling system technology options. The U.S. Fish and Wildlife Service, California Department of Fish & Game, and California Office of Historic Preservation, for example, often play significant regulatory roles in power plant upgrade projects. Construction and operation of the deepwater intake system is likely to temporarily and permanently disturbance sensitive marine habitat and also reduce impingement impacts to local fish and shellfish. These attributes will make the U.S. Fish and Wildlife Service and California Department of Fish & Game service key parties to CEQA review process, but they are not expected to trigger the need to secure a 2081 Incidental Take Permit because of the lack of marine-based endangered species. Since this option primarily involves offshore work and underwater facilities, it is unlikely the cultural or historic resources (land-based) will be impacted.

Modification of the existing pumphouse or construction of a new pumphouse, along with installation of this largely submerged screening system, will not alter the overall profile of the DCPP facility and will certainly not require significantly tall or large construction equipment. These considerations will preclude significant interactions with California Department of Transportation (Caltrans) (roadway crossings, encroachments, oversized vehicles) and the Federal Aviation Administration, whose focus would be limited to aviation obstruction impacts posed by tall new permanent or temporary features (less than 200 feet above ground level).

Finally, the CEC will be largely excluded from the permitting processes primarily because deepwater intake system will not boost currently power levels of the DCPP facility, let alone reach the 50 MW thresholds, which would mandate CEC review.

4.1.2.2 Summary

The external approval and permitting assessment for the deepwater intake system identified a list of potentially applicable federal, state, and local permits and approvals that, not surprisingly, focused on its significant impacts to the marine environment. The efforts to conduct a successful CEQA review and secure the requisite USACE Section 404 permit, CCC Coastal Development Permit, State Lands Commission Lease, NPDES permit modification will represent the primary regulatory challenges.

These permits are all expected to be contentious and have lengthy review processes that are aligned with the CEQA/Environmental Impact Report review process. The primary difficulty appears to be that the deepwater intake system poses significant construction impacts to the sensitive and productive marine habitats, while offering only some reductions in entrainment and impingement impacts which are already partially mitigated by the existing intake system. Despite this incremental improvement regarding impingement-related losses, the consistent message from all of the interested regulatory agencies was that there were no environmental impact issues or regulatory criteria which would preclude this technology option from securing the necessary construction and operating permits and approvals. That is, there were no fatal flaws in the associated regulatory review process, which would preclude the deepwater intake system from further consideration.

The assessment also indicated that the Section 404 permit and the CPUC-sponsored CEQA review process will likely represent the critical path review and approval processes (approximately 12 month) for the deepwater offshore intake system. This critical path process does not represent a barrier to development of this cooling technology system.

4.2 Impingement/Entrainment Design

The primary objective of implementing the deepwater intake technology is to locate the withdrawal inlet selectively in deeper waters where, in theory, biological abundance will be lower. This relocation offers the possibility of substantially reducing entrainment of aquatic species at different stages of life (including fish, fish eggs, and larvae) and reducing impingement mortality. A detailed evaluation regarding the potential of this technology to meet the impingements and entrainment requirements of Section 316(b) *California Once-Through Cooling Policy* are described below. This evaluation was supported by reviews of the available literatures and studies of fish and larvae abundance and distribution along the California Coast.

4.2.1 Fish and Larvae Distribution

The degree of benefit of an offshore intake in reducing entrainment depends to a large degree on the vertical stratification of entrainable organisms in the water column at the point of water withdrawal. In such a system, a reduction in entrainment is achieved by locating the offshore submerged intake at a location where the density of entrainable organisms is less than at other locations.

Larval fish surveys were conducted, before DCPP was operational, at two sampling locations offshore during 1974 and 1975 by Icanberry (Tenera, 2000). Comparison of larval fish densities collected in oblique near-bottom to surface plankton net hauls at the two sampling stations (located 300 meters (1,000 feet) and 1,500 meters (5,000 feet) offshore) showed no statistically significant differences in total larval fish densities between the two locations. Statistical differences were found between locations for two of the six most abundant fish taxa. Densities of larval sculpin were found to be greater at the 300-meter station and densities of larval northern lampfish were found to be greater at the 1,000-meter station. Results of these larval fish studies provide no evidence that larval fish densities are consistently lower offshore at locations where an offshore intake could be constructed (Tenera 2000).

After plants operation, densities of larval fish were collected during 1986 and 1987 and compared between sampling locations within the DCPP intake cove and at an offshore location close to Icanberry's 300 meter station (Tenera, 2000). Results of the comparison indicate that although the plankton densities at both locations are characterized by high variability, densities were generally higher in the intake cove than at the offshore location. A more detailed examination of the trends in species-specific densities between the two locations indicated that the higher densities observed in the intake cove were largely attributable to the presence of cottid (sculpin) larvae during 1986–1987. No significant differences in larval fish densities were detected between the two sampling locations when larval sculpin were excluded from the analysis (Tenera, 2000).

Density and seasonality of larval fish populations are also reported in the assessment of fishes collected in entrainment and study grid samples performed by Tenera during the period of 1996 through 1999. Larval fish populations demonstrated wide variability in density affected by episodic oceanographic events. Fish composition analysis indicated that a diverse assemblage of fish larvae inhabit the waters where a hypothetical offshore intake could be constructed. The cumulative density of fishes collected in paired entrainment and study-grid surveys. The cumulative density of each species collected was quantified as a percentage of the entire density of fishes collected and summarized by family. The paired intake grid samples were collected for two year periods between July 1, 1997 and June 30, 1998 and from July 1, 1998 to June 30, 1999.

Fishes collected in both entrainment and study grid surveys represented diverse group of species that inhabit shallow and deeper habitats near DCPP. Many fishes that typically inhabit shallow near-shore areas comprised a larger portion of the species collected in entrainment samples. At the same time, a high diversity of larval fishes was collected in the study grid in areas where an offshore intake could be constructed. The differences in mean percent composition indicate that ronquil, blenny, herring and sardine, anchovy, lanternfish, rockfish, and many others would become susceptible to entrainment at an hypothetical offshore location compared to the kelpfish, sculpin, goby, prickleback, and others currently entrained from the DCPP shoreline intake location.

4.2.2 Fish Behavior at Intake Structures

Generally, the offshore intake structures attract two types of fish species with different types of behavior—reef-associated species (such as shiner perch and white sea perch) with directional movement, which use intake structures as artificial reefs and transient species (such as queenfish, white croaker, surfperch, northern anchovy, and Pacific pompano), which generally encounter intake at night (Helvey, 1985a). For transient species, the intake encounters are a result of random movements, while for many reef-associated fishes, these encounters are tied to directional movements toward the structures.

The entrapment of these species results from different behavioral activities that bring these species into direct contact with the intake water currents at times when their vision is impaired, or during the presence of storms and swirling flows, which disorient fish (Helvey, 1985a). Proper design of offshore intake structures, such as avoidance of placing riprap piles around the structure, plays a major role in minimizing the entrapment of various types of fish (Helvey, 1985b). The hydraulic design of the velocity cap, however, avoids formation of swirling flows, assisting fish to swim away from the structure (ASCE, 1982).

4.2.3 Entrainment

As described in Sections 4.2.1 and 4.2.2, the fish and fish larvae found over a wide range of water depths and distances offshore of DCPP and these fish can be attracted to the intake due to their behavioral characteristics. Review of fish and larval density and variability studies, referenced above, indicate that there is no clear evidence to support that withdrawal from a deep sea location will achieve the entrainment reduction required under the Section 316(b), *California Once-Through Cooling Policy* rules.

4.2.4 Impingement

The relocation of the withdrawal inlet from shoreline to a deeper offshore location does not in itself demonstrate compliance of the Section 316(b), *California Once-Through Cooling Policy* rules. Compliance with the impingement reduction requirement will likely require the offshore velocity caps to be designed with a 0.5 fps or lower intake velocity. At the new shoreline screen house and pump structure consideration may also needs to have a 0.5 fps or lower through screen velocity. Also, addition of a fish-handling and return system will be required to reduce impingement mortality and avoid fish entrapment.

4.2.5 Summary and Impacts

As stated in this Section 4.2:

- The DCPP coastal area previous field studies do not identify a statistically significant correlation between fish densities and offshore distances and water depths

- The deep sea offshore velocity caps will likely attract the reef species as well as other types of fish, which pass the structure on a random basis and become entrained in the system

- Velocity cap will need to be sized for a 0.5 fps intake inlet velocity to comply with Phase II impingement mortality reduction rule, while the shoreline intake screening system may also need to consider sizing for a 0.5 fps through screen velocity to further reduce impingement. Finally, a fish handling and return system will be required to return fish trapped in the shoreline intake area back to the ocean

As described above, substantial new constructions and modifications to existing structures are required to implement this deep sea intake technology. However, this system offers no clear benefit or advantage over other technologies, such as the wedge wire screen system, with respect to fish protection. As a result, there is not sufficient justification to recommend that this technology be a candidate for further evaluation in the next phase of the assessment.

4.3 Environmental Offsets

4.3.1 General discussion

The environmental offsets are an environmental management tool, which has been characterized as the "last line of defense" after attempts to mitigate the environmental impacts of an activity are considered and exhausted (GWA, 2006). In some cases, significant unavoidable adverse environmental impacts may be counterbalanced by some associated positive environmental gains. Environmental offsets, however, are not a project negotiation tool, that is, they do not preclude the need to meet all applicable statutory requirements and they cannot make otherwise "unacceptable" adverse environmental impacts acceptable within the applicable regulatory agency.

In some cases, regulatory agencies may be so constrained by their regulatory foundation that offset opportunities are limited or unavailable. The San Luis Obispo APCD, for example, has the regulatory authority to offset new air emissions in their district from previously banked emission reductions as long as the new emission sources meet appropriate stringent emission performance criteria. The APCD cannot offset new air emissions with reductions in the impingement and entrainment impacts to aquatic life or reductions in land disturbance. In other cases, the regulatory agencies, such as the California Coastal and State Lands Commissions, have a more broadly based, multidisciplinary review process, which supports a more flexible approach to using environmental offsets to generate the maximum net environmental benefit.

With these considerations in mind, the following assessment of offsetting environmental impacts focuses on identifying both positive and negative construction and operational environmental impacts associated with the construction and operation of the deepwater offshore intake system from a broad range of environmental evaluation criteria.

4.3.2 Detailed Discussion

The following sections evaluate the air, water, waste, noise, marine and terrestrial ecological resources, land use, cultural and paleontological resources, visual resources, transportation, and socioeconomic issues associated with construction and operation of the deepwater intake system. Given the wide range of environmental impact subject areas under consideration, the systematic approach used in the Diablo Canyon License Renewable Application process was used (PG&E, 2009). Consequently, following discussion of the individual environmental subject areas, the related consequences are categorized as having either positive or negative small, moderate or large impact significance. The specific criteria for this categorization are shown below:

- **Small:** Environmental effects are not detectable or are minor such they will not noticeably alter any important attribute of the resource

- **Moderate:** Environmental effects are sufficient to noticeably alter, but not significantly change, the attributes of the resource.

- **Large:** Environmental effects are clearly noticeable and are sufficient to change the attributes of the resource.

The results of these evaluations and impact categorization are subsequently summarized in the Table DW-2.

Air

The air quality impacts associated with the installation of the deepwater intake system are small, given that the primarily marine-based nature of the associated construction activities. There will be little or no opportunity to generate fugitive dust from land disturbance activities, as the primary activity will involve offshore marine work. Some additional vehicle-related air emissions can be expected from the small number of outage workforce personal vehicles and over-the-road project construction vehicles. Self-propelled earthmoving equipment will be unnecessary, but there may be some emission sources on temporary offshore platforms or barges. Construction supplies and piping-related equipment deliveries may be significant in the early phases of construction.

The offshore system may result in a minor decrease in overall DCPP overall plant efficiency due to increased pumping power demands associated with a more distant offshore deeply submerged velocity cap intake. The resulting power reduction is not expected to produce any tangible increase in greenhouse gas or other pollutant emissions from replacement fossil power sources.

Surface Water

Deepwater intake system construction activities are primarily marine-based and they have the potential to generate significant water quality impacts. Placement of the velocity cap and connecting piping will result in localized turbidity impacts from disruption of the local seabed. Since the connecting piping systems to the velocity cap are installed via a tunneling (tunnel boring machine), this impact could be a moderate negative level. The construction efforts are not expected to result in any land-based disturbance or storm water-related impacts.

The deepwater intake system will not change the overall cooling water withdrawal or discharge rates.

Groundwater

Given the primarily offshore construction environment associated with the installation of the deepwater intake system, no significant additional groundwater resources will be needed.

The deepwater intake system is not expected to require any additional groundwater resources.

Waste

Constructions-related waste, including marine bed sediment, tunnel spoils, and recyclable metals associated with surplus piping and cap materials, will be generated during the outage. Tunneling wastes are expected to be considerable. The final disposition of these materials has not been determined. Most of the piping and velocity cap wastes are expected to have salvage value and, therefore, will not represent a burden to offsite disposal facilities. Disposal of the marine sediment, whether directed to an onsite or offsite disposal area, will represent a moderate construction negative impact.

While operation of the velocity cap system may include self-cleaning capability, physical inspection and cleaning of the individual modular screens have the potential to generate additional biological wastes (vegetative debris). Collection and disposal of these marine wastes represent a small operational negative impact.

Noise

The County of San Luis Obispo County General Plan and Local Coastal Plan limit noise levels to 70 dBA at the property line of the affected public area (Tetra Tech, 2008). Noise impacts from construction activities for the deepwater intake system are not expected to be significant for land-based locations, since the primary work areas will be well offshore. Buffer areas around offshore construction zones will likely be established for safety reasons, but will also serve to reduce noise impacts to offshore noise receptors (watercraft) and shoreline areas that have public access. Given that PG&E owns all coastal properties north of Diablo Creek to the southern boundary of Montana de Oro State Park and all coastal properties south of Diablo Creek for approximately 8 miles, the potential for construction-related noise impacts to the public along shoreline areas is unlikely. Consequently, the construction activities are expected to pose little or no additional noise impact.

Operational noise levels are expected to be largely unchanged following installation of the new deepwater intake system.

Land Use

Construction activities associated with deepwater intake system are primarily offshore and these activities will likely temporarily preclude normal recreational activities in waters in the immediate construction areas. As mentioned above, buffer zones will be created and maintained during the course of construction for the safety of the workforce and public. The potential temporary restriction of normal public access in these marine areas represents a small negative impact for this cooling technology option.

The velocity cap and associated piping (assuming surface placement) will obviously represent a change in land use in those previously natural subaqueous areas. The offshore velocity cap will be located in relatively deep waters and therefore should not represent an impediment to surface navigation. However, the modules locations may be marked with surface buoys to preclude deepwater activities. Given these impacts, operation of this underwater system is expected to offer a small term negative impact.

Marine Ecological Resources

Deepwater intake system construction activities will potentially generate significant, temporary water quality and marine habitat impacts. Installation of the velocity cap system using the tunnel boring machine will reduce marine habitat losses and water quality impacts to localized areas around the screen modules—a moderate negative impact.

While the offshore system may reduce the impingement and entrainment impacts associated with the DCPP once-through systems (assuming the deeper intake area is less biologically productive), this once-through system results in the lowest impingement biomass rate (weight/gallons of water withdrawn) of all coastal power plants (Tenera, 2011). This is due primarily to its relatively confined engineering cove and exposed rocky coast, which create a localized environment where the local fish and shellfish population adapted to strong coastal currents and variable ocean surges making them somewhat resistant to the flow dynamics of cooling water intake systems. This deepwater intake system will not, by itself, reduce the overall water withdrawal or discharge rates. The thermal discharge impacts to aquatic life will remain largely unchanged. Consequently, this system will, operationally, will offer a moderate positive impact relative to the current condition.

Terrestrial Ecological Resources

Construction activities associated with the deepwater intake system are primarily marine-based and consequently present little or no impact to land areas. Thus, there will be no construction impacts to terrestrial natural habitat areas or areas with significant ecological value or sensitivity. Operation of the deepwater intake system will similarly present no new threat to these resource areas.

Cultural and Paleontological Resources

Since installation of the velocity cap and associated piping will be primarily confined to subaqueous lands, there is little or no potential to discover new cultural or paleontological resources in these developed areas. Operation of this system will similarly pose no new threat to cultural or paleontological resources.

Visual Resources

All construction equipment will be low profile, that is, the construction support features and equipment will not extend above the height of local facility structures.

The deepwater intake system will be submerged and will present no permanent change in external profile of the facility.

Transportation

Increased commuting traffic from the construction workforces and construction deliveries could worsen the existing level of service on local roads during the plant outage. While the associated construction period means that related traffic impacts will not be transitory, the necessary workforce is not expected to be large. Consequently, the transportation-related construction impacts should be considered a small negative impact.

Operationally, the deepwater intake system may increase maintenance and service requirements for the offshore velocity cap, but any related maintenance staff increases are expected to be minimal. Therefore, there are limited or no operational transportation impacts for this system.

Socioeconomic Issues

While there will be some additional construction-related employment opportunities with installation of this system, these opportunities are not expected to significantly strain local community resources (that is, housing, school, fire/police services, water/sewer).

Operational maintenance staff levels may increase slightly, but will not result in any related community service or resource concerns.

4.3.3 Summary

Table DW-2 summarizes the air, water, waste, noise, marine and terrestrial ecological resources, land use, cultural and paleontological resources, visual resources, transportation, and socioeconomic environmental offsets for the deepwater offshore intake system. The construction impacts could be characterized as having moderate negative impact significance since the installation method is tunneling. The construction practice will involve significant marine-based work, which will generate increased turbidity in the seawater near construction areas, produce a sizeable marine spoils waste, and result in permanent and temporary losses of marine habitat. Theses impacts are not offset by the limited employment opportunities that may be gained during this same period.

Operationally, there is a moderate positive impact significance related to the deepwater intake systems reduction of the already partially mitigated impingement impacts and its reduction of previously unconstrained entrainment impacts. There is no coincident reduction of cooling water withdrawals, so no change in thermal discharge impacts. Overall, the moderate benefits associated with reductions of impingement impacts appear to be outweighed by the significant (large) impacts associated with the disruption of the marine habitats and associated water quality degradation when the cut and fill construction practices are employed. The balance of positive and negative environmental offsets is more even when considering the less disruptive tunneling installation process.

4.4 First-of-a-Kind

There is no need to evaluate this technology since it fails to satisfy a critical Set A criterion in Section 4.2.

4.5 Operability General Site Conditions

There is no need to evaluate this technology since it fails to satisfy a critical Set A criterion in Section 4.2.

4.6 Seismic and Tsunami Issues

There is no need to evaluate this technology since it fails to satisfy a critical Set A criterion in Section 4.2.

4.7 Structural

There is no need to evaluate this technology since it fails to satisfy a critical Set A criterion in Section 4.2.

4.8 Construction

There is no need to evaluate this technology since it fails to satisfy a critical Set A criterion in Section 4.2.

4.9 Maintenance

There is no need to evaluate this technology since it fails to satisfy a critical Set A criterion in Section 4.2.

5. Conclusion

As described in detail in Section 4.2, there is no advantage to locating the intake withdrawal point from the shoreline to a deeper offshore location, since the density of fish and larvae appear to be present at various distances from shore with no statistically significant spatial differences. Reconfiguring the existing shoreline intake system by enclosing the existing inner breakwater, constructing an offshore tunnel and associated shafts, and attaching a set of velocity caps to the tunnel is technically feasible, but improvements in entrainment are not anticipated to be realized at deeper offshore locations. There will be major construction and maintenance challenges for the extensive, high-capacity, deep offshore system.

There is no definitive evidence that the required reductions in entrainments can be achieved with this relocation to a deeper intake site alone, unless it is combined with other measures, such as wedge wire screens.

When considering the environmental impacts and the operational risks posed by the long tunnels, the relocation of the intakes to a deeper offshore location is not expected to produce any appreciable benefits regarding entrainment. Consequently, this option should not be a candidate for further evaluation in the next phase of the assessment.

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7. Sketches

Figures DW-1 and DW-2 provide the conceptual arrangement for a typical offshore deepwater intake at DCPP oceanside.

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
Diablo Canyon Power Plant

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
National Environmental Policy Act – BLM or Other Responsible Lead Federal Agency (Record of Decision, ROW)	Not applicable – the addition of the deepwater intake system does not constitute major federal action (federal land, funding).	Not applicable	NA	NA
Section 404/10 Permit – U.S. Army Corps of Engineers (USACOE)	Installation of the deepwater intake system, tunneling will generate significant impacts to waters of U.S. and will involve work in navigable waters. Individual form of permit will be required.	120 days from complete application (goal) ~12 months (expected)	Potential	NA
Section 401 Water Quality Certificate – U.S. Army Corps of Engineers (USACE) & Regional Quality Control Board (RWQCB)	The Section 401 permit process will parallel Section 404 permit process.	~12 months (expected)	Potential	NA
Nationwide Permit – U.S. Army Corps of Engineers (USACE)	Not applicable - the installation of the deepwater intake system will generate significant impacts to waters of the U.S. that cannot be addressed by the Nationwide permitting process.	Not applicable	NA	NA
Section 7 Consultation with U.S. Fish and Wildlife Service (Endangered Species Act of 1973)	Installation of the deepwater intake system will pose significant impacts marine habitat and aquatic life and also serve to reduce operational impingement and entrainment losses.	Connected to CEQA process	No	No
Notice of Proposed Construction or Alteration – Federal Aviation Administration (FAA), Permanent Facilities	Not applicable - the addition of the addition of the deepwater intake system will not result in any exterior changes to existing structures.	Not applicable	NA	NA
Notice of Proposed Construction or Alteration – FAA, Temporary Facilities	Not applicable - the addition of the deepwater intake system will not demand the services of a crane or other construction equipment in excess of 200 feet agl.	Not applicable	NA	NA
Multiple-Use Class L Limited Land Use Designated Utility Corridor – Bureau of Land Management (BLM) or Other Responsible Federal Agency	Not applicable - the addition of the deepwater intake system will not require any additional land, nor involve any exterior changes to existing structures	Not applicable	NA	NA

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
California Public Utility Commission (CPUC) Approval	CPUC will likely be the Lead Agency for the California Environmental Quality Act (CEQA) review process regarding the proposed deepwater intake system. The CEQA review process trigger development of a comprehensive EIR.	~12 months	Potential	No
California Energy Commission (CEC) – Final Decision	Not applicable – the addition of the deepwater intake system will not result in a net power capacity (increase) > 50 MW, the threshold for CEC.	Not applicable	NA	NA
Coastal Development Permit - California Coastal Commission/Local Coastal Programs	Applicable because of the considerable offshore and near-shore development within the coastal zone While there are no specific fatal flaws with the deepwater intake system, the significant construction-related marine habitat impacts and associated limited reduction in operational entrainment losses are likely to make for a contentious approval process.	Connected to CEQA (~12 months)	Potential	NA
Coastal Development Lease – California States Lands Commission	Applicable because of the considerable offshore development on subaqueous lands. While there are no specific fatal flaws with the deepwater intake system, the significant construction-related marine habitat impacts and associated limited reduction in operational entrainment losses are likely to make for a contentious approval process.	Connected to CEQA (~12 months)	Potential	NA
Regional Pollution Control District Authority to Construct (ATC) – San Luis Obispo Regional Air Pollution Control District	Not applicable - the deepwater intake system will not generate any additional operational air emissions.	Not applicable	NA	NA
Regional Control District Permit to Operate (PTO) – San Luis Obispo Air Pollution Control District	Not applicable - the deepwater intake system will not generate any additional operational air emissions.	Not applicable	NA	NA

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Title V Federal Operating Permit – San Luis Obispo Air Pollution Control District and USEPA	Not applicable - the deepwater intake system will not generate any operational additional air emissions.	Not applicable	NA	NA
Title IV Acid Rain Permit - USEPA	Not applicable - the deepwater intake system will not generate any additional operational air emissions.	Not applicable	NA	NA
Dust Control Plan – San Luis Obispo Air Pollution Control District	Not applicable – construction of the deepwater intake system expected to disturb little or ground surfaces and so there is little potential to generate significant dust emissions. The deepwater intake system, itself, will not generate any additional air emissions.	Not applicable	NA	NA
NPDES Industrial Discharge Permit – Central Coast Regional Water Quality Control Board (CCRWQCB) and State Water Resources Board	The deepwater intake system will not change the cooling water withdrawal or blowdown rates. This system is not expected to demand any changes in the water treatment system. Any subsequent required alteration of the current NPDES permit will be minor.	~6 months	No	No
Notice of Intent (NOI) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, Central Coast Regional Water Quality Control Board (CCRWQCB)	Not applicable – construction of the deepwater intake system is not expected to disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan (SWPPP) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity – Central Coast Regional Quality Control Board (CCRWQCB)	Not applicable – construction of the deepwater intake system is not expected to disturb ground surfaces or alter storm water management features onsite.	Not applicable	NA	NA

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notice of Intent (NOI) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Water Quality Control Board (CCRWQCB)	Not applicable - DCPP NPDES permit addresses operational storm water. No changes to existing storm water management system are expected from addition of the deepwater intake system.	Not applicable	NA	NA
Storm Water Pollution Prevention Plan (SWPPP) – National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activity, Central Coast Regional Quality Control Board (CCRWQCB)	Not applicable - DCPP NPDES permit addresses operational storm water. There is no separate operational phase SWPPP.	Not applicable	NA	NA
2081 Permit for California Endangered Species Act of 1984 (Fish and Game Code, §2050 through 2098) – California Department of Fish & Game (CDFG)	The installation of the deepwater intake system is expected to impact marine habitat areas, but there are no threatened or endangered species in the immediate marine area.	Not applicable	NA	NA
Lake and Streambed Alteration Agreement - California Department of Fish & Game (CDFG)	Not applicable – the addition of the deepwater intake system will not results in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Waste Discharge Requirements (WDR) – Central Coast Regional Water Quality Control Board	Not applicable – the addition of the deepwater intake system will not results in impacts to jurisdictional streambed areas (waters of the state).	Not applicable	NA	NA
Section 106 Review – Office of Historic Preservation (OHP)	Not applicable - the deepwater intake system will not demand any additional land nor generate any new surface disturbances.	Not applicable	NA	NA

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase - Department of Toxic Substance Control, USEPA, San Luis Obispo County Environment Health Services - California Unified Program Agency	Installation of the deepwater intake system could potentially require an ID number to support management or construction wastes, unless current DCPP ID will be used.	1-2 weeks	No	No
Notification of Waste Activity - RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Operation - Department of Toxic Substance Control, USEPA, San Luis Obispo County Environmental Health Services - California Unified Program Agency	Not applicable – the addition of the deepwater intake system will allow for the continuing use of the existing hazardous waste ID number. There will be not impacts to the onsite hazardous treatment facility (oil separation unit).	Not applicable	NA	NA
SPCC Plan - 40 CFR 112 and Aboveground Petroleum Storage Act – San Luis Obispo Environmental Health Services- California Unified Program Agency and USEPA	Not applicable – the addition of the deepwater intake system is not expected to require additional water treatment chemicals.	Not applicable	NA	NA
Underground Storage Tank Permit - San Luis Obispo County Environmental Health - California Unified Program Agency and State Water Resources Board	Not applicable - the addition of the deepwater intake system is not expected to require force the relocation of underground tanks.	Not applicable	NA	NA
Risk Management Plan (Clean Air Act 112r) – San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	Not applicable – the addition of the deepwater intake system will not require the addition of any new volatile chemicals.	Not applicable	NA	NA

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
Emergency Planning and Community Right-to-Know Act (EPCRA) – 40 CFR 311 & 312 - San Luis Obispo County Environmental Health Services - California Unified Program Agency and USEPA	Not applicable – the addition of the deepwater intake system is not expected to require any new chemicals are stored in quantities that exceed applicable thresholds (e.g., 10,000 lbs for hazardous chemicals, 500 lbs for extremely hazardous chemicals).	Not applicable	NA	NA
Land Use Zones/Districts Approval - San Luis Obispo County Department of Planning and Building	Not applicable – the addition of the deepwater intake system will be an internal improvement conducted wholly within existing structures.	Not applicable	NA	NA
Condition Use Plan Amendment - San Luis Obispo County Department of Planning and Building	While the scope of work associated with installation of largely offshore submerged facility may pose some jurisdictional issues, the deepwater intake system will likely be addressed by an amendment to the existing Conditional Use Permit.	Not applicable	NA	NA
Grading Plan Approval or Permit - San Luis Obispo County Department of Public Works & Planning and Building	Not applicable – there will be no onsite grading during the installation of the offshore deepwater intake system.	Not applicable	NA	NA
Erosion and Sediment Control Plan (Rain Event Action Plan) - San Luis Obispo County Department of Public Works	Not applicable - similar to the construction phase SWPPP. No separate submittal is expected to be directed to the County.	Not applicable	NA	NA
Building Permit (including plumbing and electrical) – San Obispo County Building Division	Not applicable - the addition of the deepwater intake system may demand an individual or set of county Building permits.	Not applicable	NA	NA
Domestic Water Supply Permit (public potable water) -San Obispo County Department of Environmental Health	Not applicable – no new potable water systems are planned.	Not applicable	NA	NA

Table DW-1.
Environmental Permit/Approval Assessment: Deepwater Offshore Intake System
Diablo Canyon Power Plant *(cont.)*

Permit/Approval	Assessment	Permit Review Period (Preconstruction)	Critical Path	Fatal Flaw
San Luis Obispo County Well Water Permit - San Luis Obispo County Environmental Health Services	Not applicable – no new wells to be developed.	Not applicable	NA	NA
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Not applicable – the deepwater intake elements and associated piping are expected to be oversized.	Not applicable	NA	NA
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	Not applicable - the velocity cap elements and associated piping are expected to be oversized.	Not applicable	NA	NA
Resource Conservation (RC) Land Use Management Approval	Not applicable - while local municipality rules may supersede this regional land use//watershed protection-related project approval process, this is not the case for DCPP.	Not applicable	NA	NA
Temporary Power Pole – Local municipality or San Luis Obispo County Public Works Department	Not applicable - the installation of the deepwater intake system is not expected to require local power poles.	Not applicable	NA	NA
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – San Luis Obispo County Fire Department	The addition of deepwater intake system may require minor revisions to the existing Fire Safety Plan.	1 month for approval of Fire Safety Plan.	No	No
Sewer and Sewer Connections – San Luis Obispo County Environmental Health Services	Not applicable - No new sanitary connections are envisioned.	Not applicable	NA	NA
Road Crossing or Encroachment Permit (Caltrans)	Not applicable – the addition of deepwater intake system will not pose any road crossing or encroachment issues.	Not applicable	NA	NA

Table DW-2.
Offsetting Impacts for the Deepwater Offshore Intake
Diablo Canyon Power Plant

Category	Impacts - Construction	Impacts - Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Air	Minor increase in greenhouse gases, NOx, volatile organic compound, CO, and particulate matter from construction equipment, material deliveries, commuting workforce. Increased greenhouse gases emissions from replacement fossil-fuel generation to offset the short term loss of DCPP generation during the plant outage to install wedge system.	While the deepwater intake system could result in some reduction of plant efficiency, but there should be no significant changes in overall air quality impacts or greenhouse gas emissions during operation.	Insignificant temporary increase in CO_2 greenhouse gas emissions from temporary increase in commuting traffic during associated plant outage.	Small Negative	None
Surface Water	Construction activities are primarily marine-based and they have the potential to generate significant water quality impacts from disruption of the intertidal and sub-tidal lands.	Operational cooling water withdrawal and discharge rates will be remain largely unchanged.	Not applicable	Moderate Negative - tunneling	None
Groundwater	No additional ground water resources will be needed to support construction.	No additional ground water resources will be needed to support operations.	Not applicable	None	None
Waste	A significant marine sediment wastes will be generated to facilitate installation of the offshore piping system.	No increase in waste generation is expected from maintenance activities on the new velocity cap system in deeper water.	Marine Spoil Wastes (pending subsequent assessments)	Moderate Negative	None

Table DW-2.
Offsetting Impacts for the Deepwater Offshore Intake
Diablo Canyon Power Plant *(cont.)*

Category	Impacts - Construction	Impacts - Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Noise	Buffer areas around offshore construction zones will serve to reduce noise impacts to offshore noise receptors (watercraft) and distant shoreline areas that have public access.	Operational noise levels are expected to be largely unchanged as a result of the deepwater intake system.	Noise impacts above the 70 dBA threshold value in areas with public access are not expected to occur during construction or operation.	None	None
Land Use	Construction activities are primarily offshore and they may temporarily preclude normal recreational activities in nearby waters.	The deepwater intake system and associated piping represent a change in land use of the marine bed and could preclude some water borne activities.	Works Schedule (pending subsequent assessments)	Small negative	Small negative
Marine Ecological Resources	Construction will potentially generate significant, temporary water quality and marine habitat impacts (localized turbidity impacts and loss of marine habitat). These impacts will be more significant for the cut and fill installation option then the tunneling option.	Marginal improvement is possible if the deeper intake locations prove to be less biologically productive. Impingement impacts which are already mitigated by engineered cove and local fish populations resistant to heavy currents and ocean surges. Overall water withdrawal or discharge rates are unchanged. Entrainment and thermal discharge impacts to aquatic life will remain largely unchanged	Marine bed area (pending subsequent assessments)	Large Negative – cut and fill Moderate Negative - tunneling	Moderate Positive
Terrestrial Ecological Resources	Since construction will be confined to previously disturbed land, there is no potential to disturb natural habitats or other areas with significant ecological value or sensitivity.	No permanent loss of natural habitat areas or other areas with significant ecological value or sensitivity.	Not applicable	None	None

Table DW-2.
Offsetting Impacts for the Deepwater Offshore Intake
Diablo Canyon Power Plant *(cont.)*

Category	Impacts - Construction	Impacts - Operations	Magnitude	Construction Impact Significance	Operation Impact Significance
Cultural & Paleontological Resources	Since construction will be confined to previously disturbed land there is little or no potential to discover new cultural or paleontological resources in these developed areas.	No permanent loss of cultural or paleontological resources.	Not applicable	None	None
Visual Resources	All construction equipment will be low profile, i.e., not extend above the height of local facility structures.	The deepwater intake system will be submerged and present no permanent change in external profile of the facility.	Not applicable	None	None
Transportation	Increased traffic from the construction workforce and construction deliveries could temporarily worsen the existing level of service on local roads during the plant outage.	The deepwater system will not significantly alter the current number of plant deliveries or operating personnel.	Workforce and Level of Service (pending subsequent assessment)	Small Negative	None
Socio-Economic Issues	While there will be some additional construction-related employment opportunities, these opportunities are not expected to significantly strain local community resources (e.g., housing, school, fire/police services, water/sewer).	Maintenance staff levels are expected to be largely unchanged in response to the deepwater intake system.	Workforce (pending subsequent assessment)	Small Positive	None

Notes: Levels of Impact of Significance
Small: Environmental effects are not detectable or are minor such they will not noticeably alter any important attribute of the resource
Moderate: Environmental effects are sufficient to noticeably alter, but not significantly change the attributes of the resource.
Large: Environmental effects are clearly noticeable and are sufficient to change the attributes of the resource