

Application No.: A.16-12-002  
Exhibit No.: SCE-03  
Witnesses: D. Neal  
R. Worden



(U 338-E)

***Rebuttal Testimony of Southern California Edison in  
Support of the Joint Application for Cost Recovery of  
the Wheeler North Reef Expansion Project Marine  
Mitigation Costs***

Before the

**Public Utilities Commission of the State of California**

Rosemead, California

July 14, 2017

**SCE-03: Rebuttal Testimony of Southern California Edison in Support of the Joint Application for Cost Recovery of the Wheeler North Expansion Project Marine Mitigation Costs**

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**I.**

**INTRODUCTION**

This rebuttal testimony responds to intervenor testimony submitted by the Office of Ratepayer Advocates (ORA) and The Utility Reform Network (TURN) regarding the Wheeler North Reef (WNR) Expansion Project proposed by Southern California Edison Company (SCE) and San Diego Gas & Electric Company (SDG&E) (collectively referred to as the Utilities) in Application (A.) 16-12-002. The WNR Expansion Project is a San Onofre Nuclear Generating Station (SONGS) marine mitigation project mandated by the California Coastal Commission (CCC). The project design will be reviewed by the California State Lands Commission (SLC) under the California Environmental Quality Act (CEQA), and is subject to final approval by the CCC.

As an overarching consideration, there is no dispute that SCE must implement the WNR Expansion Project to comply with a CCC-mandated regulatory requirement. There also should be no dispute that the Commission should authorize the Utilities to recover reasonable costs incurred to implement the project, consistent with cost-of-service ratemaking principles. In addition, SCE is required to seek ways to minimize SONGS marine mitigation costs, in accordance with Decision (D.) 15-11-021 (SCE's 2015 General Rate Case). To meet this additional obligation, SCE has sought to preserve design options for the WNR Expansion Project that will minimize costs. There also should be no dispute or controversy with SCE's efforts to preserve lower-cost options.

ORA and TURN assert in their testimony that there are substantial uncertainties regarding the final project design and cost estimate. TURN recommends that because of those uncertainties, the California Public Utilities Commission (Commission) should deny the Utilities' request for cost recovery of project costs until completion and the Commission has conducted an after-the-fact reasonableness review. ORA recommends the Commission authorize cost recovery either at completion or when SCE updates the estimated costs for the final project approved by the CCC. ORA does not recommend an after-the-fact reasonableness review, recommending instead a one-time audit at the completion of project that would confirm: (1) recorded costs relate exclusively to the WNR Expansion Project, and 2) SCE is not recording expenses to the WNR Expansion Project that might also be

1 recovered by SCE elsewhere. Finally, ORA objects to the 10% contingency that SCE included in the  
2 estimated costs.

3 SCE agrees with ORA's one-time audit proposal, which is consistent with SCE's proposal for  
4 recorded costs to be reviewed in SCE's Energy Resource Recovery Account (ERRA) Review  
5 proceeding. The Commission should reject ORA's and TURN's recommendations to deny cost-  
6 recovery until the project is completed, and ORA's objection regarding a 10% contingency.

7 First, ORA's and TURN's recommendation to deny cost recovery until the project is completed  
8 inappropriately uses the fact that there is not a final, approved design as a basis to deny the Utilities'  
9 timely cost recovery. If the Commission adopted this recommendation, it would be denying the Utilities'  
10 timely cost recovery for a regulatory-required project merely because SCE prudently took actions to  
11 preserve design options with lower costs. SCE stated from the outset that while it was proposing in its  
12 initial testimony a \$32.9 million project (Option 3 of eight options identified by the CCC), it would seek  
13 ways to reduce project costs, and would update its cost estimate for the WNR Expansion Project later in  
14 the proceeding. Now that SCE has completed various surveying activities of potential expansion areas,  
15 and discussed the survey results with CCC and SLC, SCE is able to update its project description and  
16 revise the WNR Expansion Project cost estimate to \$19.4 million (100% Share, 2016\$), a \$13.5 million  
17 reduction. SCE's significant and important efforts to preserve lower-cost design options do not raise  
18 cost-uncertainty issues warranting the Commission's denying SCE's and SDG&E's joint application.  
19 Rather, they constitute deliberate, prudent efforts by SCE to protect and advocate for customers'  
20 interests to minimize SONGS marine mitigation costs, as required under D.15-11-021. The Commission  
21 should approve SCE's revised and reduced project estimate of \$19.4 million as reasonable. SCE  
22 provides information regarding the revised estimate in Chapter II below.

23 Second, because the Commission is reviewing the reasonableness of the WNR Expansion Project  
24 in this proceeding, an after-the-fact reasonableness review in a subsequent proceeding is unnecessary.  
25 The WNR Expansion Project is necessary to meet SONGS marine mitigation regulatory requirements  
26 mandated by the CCC; SCE believes the reasonableness of the CCC's decision requiring the WNR  
27 Expansion Project and its decision approving a final design are not subject to modification in this

1 proceeding. The issues before the Commission are its determination of the reasonableness of SCE's cost  
2 estimate and the Utilities' cost-recovery proposals. The Utilities have presented sufficient information  
3 for the Commission to complete this review, including evidence describing the principal driver of costs,  
4 which are the rocks that will be used to construct the reef. The Commission can determine the  
5 reasonableness of these estimated costs in this proceeding, without the need for a subsequent after-the-  
6 fact reasonableness review. Moreover, SCE has proposed filing annual advice letters on the project  
7 status and costs, and submitting final recorded costs for an audit review in SCE's ERRA Review  
8 proceeding. The annual advice letters and ERRA audit review will provide appropriate Commission  
9 oversight of project costs. ORA also recommends a one-time audit.

10 Finally, the 10% contingency included in SCE's cost estimate is appropriate at this stage of the  
11 project, and is supported by established cost-engineering principles. The purpose of the 10%  
12 contingency is to address uncertainties that will exist until SCE completes the project, such as weather  
13 and work conditions in the ocean environment. Furthermore, since the rock is the main cost driver, it is  
14 appropriate to include a 10% contingency to account for potential market-cost shifts.

15 SCE addresses these issues in further detail below.

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**II.**

**THE COMMISSION SHOULD APPROVE THE UTILITIES' COST RECOVERY PROPOSAL**

**A. SCE's Prudent Efforts Have Allowed It To Preserve Design Options That Provide Flexibility To Reduce Project Costs**

ORA and TURN assert that SCE's proposal for the WNR Expansion Project suffers from substantial uncertainties because the final reef design has not been reviewed and approved by the CCC and SLC.<sup>1</sup> In support, ORA and TURN note that various design options are still under consideration and SCE has not obtained final project approval from the California State Lands Commission (CSLC) and the CCC.<sup>2</sup> ORA and TURN misunderstand the importance of SCE's efforts to preserve design options.

**1. SCE's Ocean Survey Activities Have Identified Potential Areas For Expansion And Allowed Other Reduced-Cost Design Options To Be Considered**

In its opening and supplemental testimony, SCE identified Option 3 – a 105 acre low relief/high density reef – as the selected design for further review by the CCC and SLC. SCE made this initial selection because the low relief/high density configuration was projected to attract sufficient fish biomass to meet the CCC's requirements for reef performance, and could fit within the areas previously surveyed by SCE during WNR Phase II. SCE's estimate for Option 3 was \$33 million (100% Share, 2016\$). Although SCE presented this information for the Commission's review, SCE noted then that its plan was to further engage the CCC and SLC to develop a final design for the WNR Expansion Project that would not only maximize fish biomass and integrate with the existing WNR, but "would reduce costs to below SCE's current [\$33 million] estimate." (Exhibit SCE-1, p. 9) (emphasis added).

An important component of that plan was to complete surveying activities that could increase the potential area for expansion of the reef, and provide flexibility for SCE to advocate for design options with reduced costs. SCE notified the SLC and the CCC in February, 2018 of SCE's

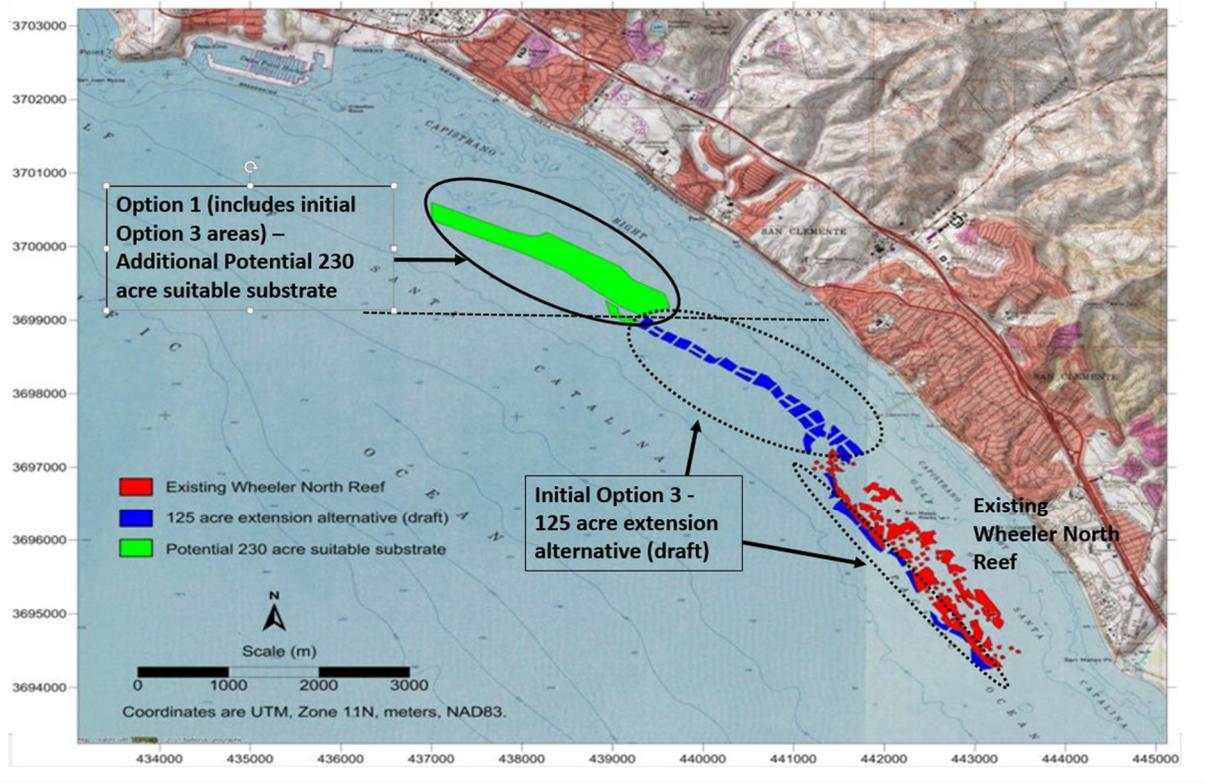
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<sup>1</sup> ORA Testimony, pp. 6-9; TURN Testimony, pp. 4-10.

<sup>2</sup> ORA Testimony, pp. 6-7; TURN Testimony, pp. 4-5.

1 intent to conduct surveys of potential expansion areas to determine if suitable ocean floor substrate was  
2 present in areas near WNR Phase II. Figure II-1 depicts the survey areas in green, the existing WNR in  
3 red, and the previously surveyed Option 3 area in blue.

**Figure II-1**  
**Potential Expansion Area**



4 By the end of May, 2017, SCE completed bathymetric and side scan sonar surveys of the  
5 ocean floor in the potential expansion areas (green area in Figure II-1 above). The initial Option 3  
6 would have fit in previously surveyed areas (blue area in Figure II-1) adjacent to existing WNR. In  
7 June, 2017, SCE analyzed the results and determined that up to 208 of the 230 acres surveyed as  
8 potential expansion areas were suitable for construction of the WNR Expansion Projection. The suitable  
9 expansion area is 4 kilometers north of the existing WNR along the coast of the City of San Clemente.

10 With these study results, obtained through SCE's prudent efforts to preserve design  
11 options, SCE can now advocate for a lower-cost reef design, and has updated its preferred option to  
12 Option 1, a 200 acres low relief/low density reef. The design extends the WNR in a long, linear fashion,

1 increasing the length of the reef’s overall interface with the ocean, which has been shown to attract  
 2 larger fish numbers. SCE and the CCC believe this will yield the most fish, and meet the CCC’s  
 3 requirements. This option has three advantages.

4 First, most importantly, the low density rock coverage reduces the amount of rock needed  
 5 from 288,750 tons (Option 3) to 152,000 tons (Option 1), significantly reducing construction costs. As  
 6 SCE noted in Exhibit SCE-01, the principal cost driver is the cost of rock. The other project costs for  
 7 environmental analysis and permitting, engineering and construction management support, mobilization  
 8 and demobilization, and SCE labor are the same for each option. Because the amount of rocks needed is  
 9 significantly lower for Option 1 than Option 3, the cost estimate for Option 1 is \$19.4 million (100%  
 10 Share, 2016\$), or about \$13.5 million (41%) less than Option 3. Table II-1 provides a summary of the  
 11 total estimated cost for each option, with Option 1 being the lowest-cost option.

**Table II-1**  
**Summary Of Estimated Construction And Total Costs For Each Option<sup>3</sup>**

<b>Option</b>	<b>Relief</b>	<b>Cover</b>	<b>Acres</b>	<b>Tons/Acre</b>	<b>Tons Required</b>	<b>Construction Cost (\$90/Ton)</b>	<b>Total Cost</b>
1	low	low	200	760	152,000	13,680,000	19,397,000
2	low	medium	125	1,500	187,500	16,875,000	22,911,500
3	low	high	105	2,750	288,750	25,987,500	32,935,250
4	high	high	30	7,000	210,000	18,900,000	25,139,000
5	low	low	240	760	182,400	16,416,000	22,406,600
6	low	medium	155	1,500	232,500	20,925,000	27,366,500
7	low	high	140	2,750	385,000	34,650,000	42,464,000
8	high	high	38	7,000	266,000	23,940,000	30,683,000

12 Second, the CCC previously identified a 200 acre low relief/low density reef as one of  
 13 eight reef sizes and configurations that would attract a sufficient amount of fish to meet the fish biomass  
 14 standard that the existing WNR is not meeting. The expanded reef will provide a buffer to the existing  
 15 WNR so that even in years with adverse oceanographic conditions (e.g. years of lower kelp canopy), the

<sup>3</sup> For Option 1, the total cost is \$13.7 million in construction costs, plus \$1.2 million for environmental analysis and permitting, \$1.6 million for engineering and construction management support, \$0.75 million for mobilization and demobilization, multiplied by a 10% contingency factor. Lastly, an additional flat amount of \$0.444 is added for SCE labor – (\$13.7M + \$1.2M + \$1.6M + \$0.75M) \* 1.1 + \$0.444M = \$19.4M.

1 reef will continue to meet the CCC's performance requirements. Although Option 1 must still be  
2 evaluated under the California Environmental Quality Act (CEQA) review process being performed by  
3 the SLC, and must subsequently be approved under a Coastal Development Permit (CDP) issued by the  
4 CCC, the CCC has endorsed this reef size and configuration, giving SCE increased confidence that this  
5 design has a strong likelihood of being approved.

6 Third, the low relief/low density configuration was used for WNR Phase II. Therefore,  
7 SCE will be able to leverage its prior experience with constructing this type of reef design.

8 **2. Project Status**

9 a) Updated Projection Description

10 On July 7, 2017, SCE submitted a revised project description for its CEQA  
11 application with the SLC. SCE identified Option 1 as the preferred project. SCE also identified four  
12 other alternative designs in the revised project description, as CEQA requires alternatives to be  
13 analyzed. These alternatives include design options that do not extend as far north of the existing WNR,  
14 including: (1) compacted 200 acres, low-coverage relief; (2) 150 acres, medium-coverage relief (similar  
15 to Option 2); (3) 105 acres, high-coverage reef (Option 3); and (4) no project alternative. None of these  
16 alternatives have lower costs than Option 1. Although SCE has identified Option 1 as the preferred  
17 option, the SLC Supplemental Environmental Impact Report (EIR) will analyze all alternatives and  
18 identify the approved project. Once CEQA is complete, the CCC will review the selected design and  
19 provide final approval. Appendix B contains the revised project description that SCE submitted to the  
20 SLC.

21 b) Updated Cost Estimate And Project Schedule

22 In its supplemental testimony in Exhibit SCE-02, SCE provided an accelerated  
23 schedule reflecting the SLC's forecast that it would be able to complete its CEQA review by February,  
24 2018. In recent discussions (June, 2017) regarding the project schedule, the SLC has indicated that it  
25 will not be able to meet the February, 2018 milestone for completing the CEQA process. The SLC has  
26 estimated that this milestone may be delayed as late as June, 2018.

In Exhibit SCE-01, SCE provided a project schedule forecasting construction being completed in 2020. The accelerated schedule included in Exhibit SCE-02 forecasted the CEQA process being completed within six months and construction being completed as early as 2018, in one construction season. SCE noted that completing the CEQA process within six months was ambitious and crucial to completing the project by this early date. Given that the CEQA delay risk has now been realized, construction will be shifted to a two-season construction schedule in 2018 and 2019, between approximately June 1 through September 30, 2018 and between approximately April 1 through September 30, 2019. Although the schedule has been extended to two seasons, SCE anticipates the construction period to last approximately 6 months in aggregate. The schedule change does not impact the Option 1 cost estimate of \$19.4 million, because SCE had already included two construction seasons as an assumption in this estimate.

Table II-2 provides SCE's revised forecast expenses for Option 1 by year.<sup>4</sup>

**Table II-2**  
**Option 1 Forecast Expenses (100% Share, 2016\$)**  
*(in Thousands)*

No.	Description	2017	2018	2019	Total
1	Materials, Transportation, and Construction		6,840	6,840	13,680
2	Mobilization and Demobilization of Construction Equipment		450	300	750
3	Environmental Studies and Document Preparation	300	200		500
4	Permitting	100	200		300
5	Compliance		200	200	400
6	Engineering, Construction Management, Construction Verification	200	600	800	1,600
7	Contingency (10%)	60	849	814	1,723
8	Project Management Support	110	110	224	444
9	Subtotal Costs	770	9,449	9,178	19,397

<sup>4</sup> Appendix A provides SCE's revenue requirement for Option 1.

Figure II-2 provides an updated comparison of the project schedule.

**Figure II-2**  
**Comparison of Original and Updated Project Schedules**

Project Element	Original Approximate Duration (months)	Original Completion Date	(Updated) Accelerated Approximate Duration (months)	(Updated) Accelerated Completion Date
CCC Staff Review, Revision and Staff Approval of Plan	3	Q1 2017	18	Q2 2018
Consult, Plan, Prepare and Submit Lease Application to State Lands Commission (SLC); Consult with Federal Agencies for NEPA Review	3	Q2 2017	2	Completed
SLC CEQA/NEPA Review, Analysis, Documentation (EIR/S) and Execute SLC Lease	12	Q2 2018	6	Q2 2018
Finalize Design and Engineering of Preferred Project	3	Q3 2018	3	Q3 2017
Consult, Plan, Prepare and Submit Permit Applications to CCC, U.S. Army Corps of Engineers, and Regional Water Quality Control Board	6	Q1 2019	6	Q4 2017 – Q2 2018
Obtain all Required Permits	6	Q3 2019	6	Q2 2018
Procure Construction Contractor	3	Q4 2019	3	Q4 2017
Execute Construction	6	Q2-Q3 2020	6 (Over 2 Construction Periods)	Q3 2018 Q2-Q3 2019

**B. The Fact That There Is Not a Final, Approved Design Is Not An Appropriate Reason To Deny Cost Recovery**

TURN recommends that because a final design has not been approved and there is uncertainty regarding a portion of the project costs (i.e. the construction costs due to the size of the reef), the Commission should deny the Utilities’ cost-recovery request until SCE completes the project and the Commission completes an after-the-fact reasonableness review.<sup>5</sup> ORA recommends that the Commission deny cost recovery either until SCE completes the project or submits an updated estimate

<sup>5</sup> TURN Testimony, pp. 2-3, 14-16.

1 after final design has been approved by the CCC.<sup>6</sup> The Commission should reject TURN's and ORA's  
2 recommendation that the Commission deny cost recovery until SCE completes the project for several  
3 reasons.

4 The primary reason is that SCE must implement the WNR Expansion Project to comply with a  
5 CCC-mandated regulatory requirement. There should be no dispute that the Commission should  
6 authorize the Utilities to recover reasonable costs incurred to implement the project, consistent with  
7 cost-of-service ratemaking principles that would match cost recovery with expenses when they are  
8 incurred.

9 In addition, the Commission should acknowledge that there is not a final, approved design  
10 because SCE prudently took actions (e.g. conducted surveys and engaged with the CCC and SLC on  
11 design issues) that allowed SCE to preserve and now advocate for Option 1 – the design option with the  
12 lowest cost estimate – for the benefit of customers. It would be fundamentally unfair for the  
13 Commission to deny the Utilities timely cost recovery because there is not a final, approved design,  
14 when the main reason for that fact is SCE's prudent actions to preserve alternative, lower-cost design  
15 options. The Commission should approve cost recovery for Option 1, estimated to be \$19.4 million.

16 Further, SCE's ratemaking proposal includes a balancing account mechanism so that customers  
17 only pay for actual WNR Expansion Project costs that SCE incurs. The estimate approved in this  
18 proceeding merely serves as a basis for an initial revenue requirement. Therefore, contrary to TURN's  
19 suggestion that customers potentially would be harmed if the Commission approved a revenue  
20 requirement for a project design still under review by the SLC and CCC,<sup>7</sup> the Commission's approval of  
21 the estimate and associated revenue requirement will not harm customers. Under SCE ratemaking  
22 proposal, any differences between the WNR Expansion Project revenue requirement in rate levels and  
23 the actual recorded WNR Expansion Project costs will be "trued up" in SCE's Base Revenue

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<sup>6</sup> Appendix C, ORA Data Request Responses A.16-12-002. SCE has effectively met the second criteria for cost recovery suggested by ORA, as SCE has submitted an updated estimate of \$19.4 million for Option 1, which the CCC has endorsed.

<sup>7</sup> TURN Testimony, pp. 12-16.

1 Requirement Balancing Account (BRRBA). Any over-collection recorded in BRRBA at the end of each  
2 year would be refunded to customers in the subsequent year. Likewise, any under-collection that is  
3 recorded in the BRRBA would be recovered from customers in the subsequent year. While the actual  
4 project costs ultimately may vary from the estimate to some degree, the Commission's approval of the  
5 estimate and setting of a revenue requirement will not result in over-recovery from customers.

6 Customers would ultimately pay for actual costs, no more or less. Because there is no uncertainty about  
7 expenses actually being incurred by SCE, principled ratemaking should match revenues to expenses to  
8 the greatest extent possible.

9 Although customers are not harmed under SCE's ratemaking proposal, as demonstrated above,  
10 they are harmed under a proposal to deny recovery until SCE completes the project. If the Commission  
11 were to choose this path, SCE would add accumulated interest to the undercollection (which is  
12 customary for balancing accounts) that would add to the ultimate cost of the project paid by SCE  
13 customers.<sup>8</sup> SCE calculates a potential interest cost of \$1.1 million for the Option 1 project. TURN  
14 shrugs this off as a "reasonable trade off if the choice is bearing that cost or bear the risk of excessive  
15 recorded costs without having a meaningful reasonableness review opportunity."<sup>9</sup> The Commission  
16 should not agree with TURN, as the recommendation is based upon the incorrect premise that the  
17 Commission cannot conduct a meaningful review of the WNR Expansion Project and estimated costs.  
18 In addition, contrary to TURN's view, SCE believes that \$1.1 million (5% of the project costs as  
19 estimated) is not a trivial amount to be charged to customers, particularly when the expense is entirely  
20 avoidable if the Commission approves immediate cost recovery for the Utilities.

21 Finally, ORA and TURN ignore the realities of utility projects and estimates, which will always  
22 contain some uncertainties until completed. ORA and TURN seek to impose an estimating standard  
23 requiring absolute certainty and finality that cannot possibly be met by any cost estimate. SCE's actual

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<sup>8</sup> The interest calculation is symmetrical in its application. If SCE collects revenues for which it does not incur matching expenses, the ultimate refund to customers likewise includes interest to recognize SCE had the use of the funds for some period of time before returning them to customers.

<sup>9</sup> TURN Testimony, p. 15.

1 recorded costs are bound to vary from SCE's estimate to some degree, regardless of whether that  
2 estimate is based on a conceptual or final approved design. The fact that this variation will occur due to  
3 uncertainties inherent in project designs and estimating is not a valid basis for denying the Utilities  
4 timely cost recovery.

5 **C. An After-The-Fact Reasonableness Review Is Unnecessary**

6 As noted above, TURN argues due to uncertainties with the project design, , the Commission  
7 also should deny the Utilities cost recovery of project costs until the Commission conducts an after-the-  
8 fact reasonableness review of the final recorded costs.<sup>10</sup> TURN questions that given the uncertainties in  
9 the project design, it is unclear what the Commission is supposed to be approving as reasonable, and  
10 argues that it will be impossible for the Commission to determine the reasonableness of anything the  
11 Utilities have proposed.<sup>11</sup> TURN also argues that SCE's proposal for submitting annual advice letters  
12 and utilizing its ERRA Review proceeding to audit final costs does not provide the Commission a  
13 meaningful opportunity to determine the reasonableness of costs.<sup>12</sup> Finally, TURN characterizes SCE's  
14 proposal as unnecessarily complicated.<sup>13</sup> TURN's criticisms are hyperbole and without merit. The  
15 Commission should reject TURN's recommendation.

16 **1. The Utilities Have Presented Sufficient Information For The Commission To**  
17 **Determine Reasonableness Of The Utilities' Request For Cost Recovery**

18 a) The Utilities' Showing Is Comprehensive

19 The Utilities have provided sufficient information for the Commission to review  
20 and determine the reasonableness of the Utilities' request. The showing consists of information  
21 establishing that: (1) SCE must implement the WNR Expansion Project to comply with a CCC-  
22 mandated regulatory requirement; and (2) SCE's cost estimate for the project is reasonable.

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<sup>10</sup> TURN Testimony, pp. 14-16.

<sup>11</sup> TURN Testimony, p. 11.

<sup>12</sup> TURN Testimony, p. 12.

<sup>13</sup> TURN Testimony, pp. 13

1 SCE first established that the WNR Expansion Project will fulfill a regulatory  
2 requirement. In Exhibit SCE-01, SCE provided background information regarding the CCC's  
3 permitting and regulatory requirements for SONGS marine mitigation,<sup>14</sup> and explained the regulatory  
4 basis for the WNR Expansion Project.<sup>15</sup> As SCE explained, the CCC is requiring SCE to take remedial  
5 action and implement the WNR Expansion Project immediately.<sup>16</sup> The CCC's direction presents an  
6 unavoidable regulatory requirement and demonstrates the reasonableness of SCE's request for funding  
7 to complete the project.

8 Next, SCE has demonstrated the reasonableness of the cost estimate for the  
9 project, revised in this testimony from \$32.9 million (for Option 3) to \$19.4 million (for Option 1).  
10 Exhibit SCE-01 provided information regarding the overall sequence of work planned for WNR  
11 Expansion Project (designing, permitting, engineering, and construction); the design options being  
12 considered, the anticipated construction schedule; and the components of the cost estimate – regardless  
13 of which option ultimately would be selected and approved.<sup>17</sup> In Exhibit SCE-02, SCE submitted  
14 additional information regarding SCE's cost calculations, including the basis for the principal driver of  
15 project costs – the costs for procuring, transporting, and placing the rocks to be used in the WNR  
16 Expansion Project.<sup>18</sup> Notably, neither TURN nor ORA specifically challenge SCE's \$90/ton cost  
17 estimate for the rocks, except to note that SCE has not procured the rock.<sup>19</sup> But there is no requirement  
18 that a cost estimate be based upon a signed contract or actual costs, and indeed SCE still has the  
19 flexibility to negotiate favorable terms for the protection of customers as the reef design is being  
20 finalized.

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<sup>14</sup> Exhibit SCE-01, pp. 3-5.

<sup>15</sup> Exhibit SCE-01, pp. 5-7.

<sup>16</sup> Exhibit SCE-01, pp. 6-7.

<sup>17</sup> Exhibit SCE-01, pp. 9-12.

<sup>18</sup> Exhibit SCE-02, pp. 1-4.

<sup>19</sup> ORA Testimony, p. 9; TURN Testimony, p. 9.

1 SCE also provided additional information in Exhibit SCE-02 regarding the eight  
2 potential options considered for the WNR Expansion Project, the size and configuration of each option,  
3 and total costs of each option.<sup>20</sup> In addition, SCE referenced the ocean surveying activities that would  
4 preserve lower-cost design options.<sup>21</sup> SCE also provided in Exhibits SCE-01 and SCE-02 numerous  
5 supporting studies, agency reports, and regulatory filings submitted with the SLC and CCC.<sup>22</sup> Further,  
6 SCE provided all information requested by ALJ Darling in the April 4, Scoping Memo regarding the  
7 project status as of May, 2017; the basis for selecting the design options; and the likelihood of obtaining  
8 CCC approval of a final design.<sup>23</sup>

9 Finally, this rebuttal testimony provides a revised cost estimate, forecast annual  
10 cash flows, and schedule for Option 1, which is the preferred option based upon the ocean survey  
11 results. SCE also has established in this testimony that Option 1 is the lowest-cost design option, has  
12 been endorsed by the CCC, and is likely to be approved.

13 In short, there is no valid basis for ORA or TURN to challenge the evidentiary  
14 sufficiency of information SCE has provided. SCE has met its burden of proof to establish the  
15 reasonableness of its requests. The supporting information provided by SCE is consistent with and, in  
16 many cases exceeds, the amount of information that the Commission considers sufficient in other  
17 reasonableness reviews completed in SCE's GRCs, ERRAs, and other applications.

18 b) The Lack Of A Final, Approved Project Does Not Undermine The Utilities'  
19 Showing

20 As opposed to challenging the details of SCE's proposals, the crux of ORA's and  
21 TURN's objection is that SCE has failed to identify a final, approved project for the Commission's  
22 reasonableness review. But as noted above, the standard ORA and TURN seek to impose ignores the

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<sup>20</sup> Exhibit SCE-02, pp. 3-4.

<sup>21</sup> Exhibit SCE-02, pp. 4, 6, 11-12.

<sup>22</sup> Exhibit SCE-01, Appendix A, and Exhibit SCE-02, Appendices A and B.

<sup>23</sup> April 4, Scoping Memo, p. 7, fn. 3; Exhibit SCE-02; pp. 1-12.

1 dynamic and iterative process of utility projects and cost estimates. Projects with the complexity of the  
2 WNR Expansion Project, which involves multiple layers and sequencing of regulatory review and is  
3 being completed in a challenging ocean environment, will inevitably have certain uncertainties, and  
4 remain subject to change through the regulatory review process and as exigencies arise. Absolute  
5 certainty and finality of a design and cost estimate is not the reasonableness standard, and SCE is aware  
6 of no Commission cases that require that standard. SCE's actual recorded costs are bound to vary from  
7 SCE's estimate, regardless of whether that estimate is based on a conceptual or final approved design.  
8 The fact that these variations will occur due to various uncertainties inherent in obtaining regulatory  
9 approvals and implementing the project is not a valid basis for denying the Utilities' joint application.

10 **2. SCE'S Proposal For Annual Advice Letters And An ERRA Review Audit Of Final**  
11 **Costs Is Reasonable**

12 a) There Is No Requirement That The Commission Review Actual Costs

13 To be sure, SCE does not object to the Commission's directing a reasonableness  
14 review of recorded costs for utility projects when appropriate. But there is no requirement that the  
15 Commission review the actual costs of the completed WNR Expansion Project to authorize cost  
16 recovery as posited by TURN. In fact, SCE's experience is that although the Commission at times  
17 certainly requires after-the-fact reasonableness reviews for various projects, the Commission frequently  
18 reviews and approves cost recovery for projects presented in GRCs and separate applications on a  
19 forecast basis, without requiring an after-the-fact reasonableness review.

20 Further, SCE does not believe circumstances warrant departing from that practice  
21 here. SCE does not have the type of discretion, latitude, or decision-making authority in implementing  
22 the WNR Expansion Project that typically exist when an after-the-fact reasonableness review may be  
23 appropriate. As noted above, the WNR Expansion Project is a regulatory-required project, and the CCC  
24 ultimately is deciding the final scope of the project, including the size and configuration of the reef  
25 expansion, amount of rock, location, timing, etc. SCE has also established that there are few options for  
26 procuring the rock used to construct the reef. With these limitations, there is essentially no discretionary  
27 SCE decisions or activities for the Commission to review for reasonableness, other than the fact that

1 SCE completed the project as directed by the CCC.<sup>24</sup> The Commission, however, is not reviewing the  
2 CCC's decisions.

3 In sum, the WNR Expansion Project is a compliance obligation, just like taxes or  
4 franchise fees. It does not make sense for the Commission to conduct an after-the-fact reasonableness  
5 review on this type of activity and associated costs.

6 b) SCE's Proposal Does Not Preclude Any Additional Review Deemed Necessary

7 In any event, SCE's ratemaking proposal provides an opportunity for the  
8 Commission to complete a meaningful review of SCE's recorded costs. As explained in Exhibit SCE-  
9 01, SCE proposed submitting an annual advice letter in November of each year until it completed the  
10 WNR Expansion Project. The advice letters would report, among other things, the status of the project,  
11 recorded costs, and the remaining forecast. SCE also proposed an ERRA audit review of final, recorded  
12 project costs. There is nothing in SCE's proposal preventing the Commission from later directing an  
13 additional review deemed necessary based upon the information SCE provides in these submittals. SCE  
14 believes it makes more sense for the Commission to determine whether an additional review is  
15 necessary after the Commission has reviewed SCE's annual advice letters and/or completed the ERRA  
16 audit review. It would be premature to direct an after-the-fact reasonableness review now. TURN's  
17 proposal would result in the Commission completing a review in this proceeding, and then conducting  
18 an after-the-fact reasonableness review even if there was no reason for doing so. This result would be  
19 inefficient and an inappropriate use of the Commission's and Utilities' resources.

---

<sup>24</sup> TURN cites SCE's Bark Beetle Catastrophic Event Memorandum Account (Bark Beetle Program) and Residential Rate Implementation Memorandum Account (Residential Rate Program) as two examples demonstrating the Commission's policy of requiring an after-the-fact reasonableness review for project costs tracked in a memorandum account. TURN Testimony, p. 15, fn. 47. These projects, however, are vastly different and distinguishable given the absence of discretion, latitude, and decision-making authority SCE has in connection with the WNR Expansion Project as opposed to SCE's activities in the Bark Beetle Program and Residential Rate Program.

1                   ORA agrees that a one-time audit is appropriate. ORA clarified that it would  
2 intend to conduct this audit in SCE’s GRC or other appropriate venue.<sup>25</sup> Because ORA conducts  
3 detailed audits as a part of every GRC, they could add this audit to their work plan to save resources.

4 **D.     A Ten-Percent Contingency Is Appropriate And Supported By Established Cost-**  
5 **Engineering Principles**

6                   ORA asserts that SCE does not provide any rationale or analysis supporting the 10% contingency  
7 included in SCE’s estimate. SCE addresses this issue here. The issue is generally beside the point  
8 because SCE is proposing a balancing account so that only actual recorded costs are ultimately paid by  
9 customers. But the 10% contingency included in the estimate is reasonable under established cost-  
10 engineering guidelines.

11                 **1.     What Is Contingency?**

12                   Contingency is defined by the Association for the Advancement of Cost Engineering  
13 (AACE)<sup>26</sup> as “specific provision for unforeseeable elements of cost within the defined project scope,  
14 particularly important where previous experience relating estimates and actual costs has shown that  
15 unforeseeable events, which will increase costs, are likely to occur.” The amount of contingency  
16 included in an estimate is typically based on (1) the best judgment of the cost engineer, the project  
17 manager, and the team of engineering professionals; and (2) experience gained on other projects.

18 Contingency accounts for reasonable external, project execution, and estimating uncertainties:

- 19                 • External uncertainties are typically outside of the applicant’s control, such as: (1) pricing  
20                   variations, (2) changes in the work scope from the baseline, and (3) currency exchange  
21                   variations;
- 22                 • Project execution uncertainties, such as: (1) change in work conditions, (2) first time  
23                   evolutions, (3) weather delays, and (4) tool/equipment breakage; and

---

<sup>25</sup> Appendix C, ORA Data Request Responses A.16-12-002.

<sup>26</sup> Formerly known as the *American Association of Cost Engineers*; See AACE’s “Project and Cost Engineers’ Handbook.”

- Estimating uncertainties, such as: (1) omissions, (2) quantity calculations, and (3) material waste.

Contingency is not intended to cover every unforeseen circumstance or catastrophic event.

**2. How Contingency Is Determined**

Contingency is usually applied to each activity based on the level of confidence associated with the estimate for the activity. Table II-3 provides the AACE guidelines that may be utilized for the application of contingency.<sup>27</sup>

**Table II-3  
Application of Contingency Under AACE Guidelines**

Percent	Description
5%-20%	Well-defined scope; low risk of scope growth; task has been performed many times.
25%-40%	Scope is conceptual in nature; moderate risk of scope growth; potential pricing increases
45%-60%	Very rough scope; high potential for external impacts; first of a kind activity
65% and Above	Extremely unclear scope; potential for external impact with large cost impact

**3. Basis For Applying A 10% Contingency**

SCE applied a 10% contingency for each design option, including Option 1, except SCE labor. This level of contingency is supported by AACE guidelines for determining contingency. The scope (i.e. the amount of rock) for each option is generally well defined, even if the SLC and CCC have not yet approved the final reef design. SCE also has experience with reef construction, through its experience with WNR Phases 1 and 2. Therefore, a contingency range of 5% to 20% is warranted under AACE guidelines. In addition, some uncertainties remain. As noted above, external uncertainties include the fact that the scope (amount of rock) for each option is subject to the SLC’s and CCC’s final

---

<sup>27</sup> AACE’s “Project and Cost Engineers’ Handbook.”

1 approval. While SCE reasonably estimates, for example, that Option 1 will involve 152,000 ton of rock  
2 and cost \$19.4 million to implement, the final scope of that design (amount of rock) remains subject to  
3 change by the SLC and CCC. Project execution uncertainties include potential changes in work  
4 conditions, weather, and the availability of the construction barge. The reef expansion work is being  
5 completed in an unpredictable ocean environment, and also could be impacted by marine life in the  
6 construction area. Finally, although SCE is confident in its estimating, various estimating errors could  
7 arise due to various project unknowns that cannot be reasonably foreseen at this time. Based on these  
8 factors, SCE selected 10% as a reasonable contingency to be applied to project costs, except SCE labor.  
9 The contingency is based upon established AACE cost-engineering principles and should be approved  
10 as reasonable.

1 **III.**

2 **CONCLUSION**

3 For the reasons explained above, the Commission should approve SCE's revised cost estimate of  
4 \$19.4 million (100% Share, 2016\$) for Option 1 as reasonable, and approve the Utilities' request for  
5 cost recovery of project costs.

**Appendix A**

**Option 1 Revenue Requirement**

**Appendix A**

**Option 1 Revenue Requirement (78.21% Share, Nominal) (in Thousands)**

<b>No.</b>	<b>Description</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>Total</b>
1	Materials, Transportation, and Construction		6,840	6,840	13,680
2	Mobilization and Demobilization of Construction Equipment		450	300	750
3	Environmental Studies and Document Preparation	300	200		500
4	Permitting	100	200		300
5	Compliance		200	200	400
6	Engineering, Construction Management, Construction Verification	200	600	800	1,600
7	Contingency (10%)	60	849	814	1,723
8	Project Management Support	110	110	224	444
9	Subtotal Costs	<u>770</u>	<u>9,449</u>	<u>9,178</u>	<u>19,397</u>
10	Escalation	23	562	817	1,402
11	Subtotal Costs incl. Escalation	793	10,011	9,995	20,799
12	SCE Share (78.21%)	620	7,829	7,817	16,267
13	FF&U	7	90	90	187
14	SCE Revenue Requirement	<u>628</u>	<u>7,919</u>	<u>7,907</u>	<u>16,454</u>

**Appendix B**

**Project Description Wheeler North Reef Expansion at San Clemente, CA**

**(SONGS Artificial Reef Mitigation Project) Phase 3**

## PROJECT DESCRIPTION

### WHEELER NORTH REEF EXPANSION AT SAN CLEMENTE, CALIFORNIA (SONGS ARTIFICIAL REEF MITIGATION PROJECT)

#### PHASE 3



for

SOUTHERN CALIFORNIA EDISON  
P.O. Box 128, MS D3D  
5000 Pacific Coast Highway  
San Clemente, CA 92672

by

COASTAL ENVIRONMENTS, INC.  
2166 Avenida de la Playa, Suite E  
La Jolla, CA 92037

23 June 2017 (Revised 07 July 2017)  
CE Reference No. 17-10

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## PROJECT DESCRIPTION

### WHEELER NORTH REEF EXPANSION AT SAN CLEMENTE, CALIFORNIA (SONGS ARTIFICIAL REEF MITIGATION PROJECT)

#### PHASE 3

##### 1.0 INTRODUCTION

Southern California Edison Company (SCE) proposes to expand Wheeler North Reef (WNR) by approximately 200 acres to satisfy California Coastal Commission (CCC) Permit No. 6-81-370-A. The WNR is located 0.6 miles offshore of the City of San Clemente (Figure 1-1) between the San Clemente City Pier to the north and San Mateo Point to the south, in approximately 11.5 m to 15 m water depth (38 to 49 ft).

In August 1999, the State Lands Commission (SLC) issued a General Lease (PRC 8097) to SCE for the construction of the Phase 1 (SCE's test modules), and ultimately the Phase 2 build out of the reef. The original lease was for 862 acres, and included a large enough area for SCE to develop the mitigation reef. The lease was a parcel of submerged land in the Pacific Ocean in the vicinity of the city of San Clemente, and San Mateo Point, Orange County, California, more particularly described as follows.

A four (4) sided parcel of submerged land in the Pacific Ocean having the following North American Datum 1983 geographic coordinates:

Latitude 33° 25' 01.7" North, Longitude 117° 37' 45.0" West  
Latitude 33° 23' 15.2" North, Longitude 117° 36' 20.0" West  
Latitude 33° 22' 57.6" North, Longitude 117° 36' 45.2" West  
Latitude 33° 24' 47.3" North, Longitude 117° 38' 14.9" West

The lease agreement between SCE and the SLC was amended to a smaller area after completing the construction of Phase 2 of WNR in September 2008. SCE now seeks to expand the lease area for the expansion of the WNR.

The WNR was built in two phases. The Phase 1 Experimental Artificial Kelp Reef was completed on September 29, 1999. It consisted of 56 modules (40 m x 40 m), totaled 22.4 acres (CE, 1999a,b), and served as a scientific platform for experimental study to determine the optimal materials and design specifications for subsequent reef construction (Reed, 2005). Phase 2, the final build-out of the reef, commenced on June 9, 2008, and concluded on September 11, 2008, a construction period that lasted 73 days. Phase 2 involved the placement of 152 acres of low-relief, low-coverage rock.

The Phase 2 WNR reef (CE, 2008a,b) was constructed of 17 polygons, varying spatially from 1.35 to 38.88 acres. Polygon siting relied primarily on the historical locations of kelp beds (maps) and multibeam and sub-bottom profiling sonar surveys. The acoustic surveys were

verified (ground-truthed) by SCUBA diver surveys. Additionally, the dive surveys evaluated the biological diversity and habitat value of the Phase 2 project area. The design also considered the historical, physical, and biological data collected during previous studies in the area and the results of experimental reef monitoring between 1999 and 2004 (Reed, 2005).

The Phase 2 reef construction achieved the following: 1) all polygons were built in close proximity to the San Mateo Kelp Bed; 2) all polygons avoided hard substrate areas; 3) the integrity of the Phase 1 Experimental Reef modules was maintained; 4) navigation channels were provided; and 5) all constructed reef polygons avoided areas of historical kelp growth, as well as areas of special interest to local fisheries. The Phase 2 reef construction material consisted exclusively of quarry rock cast upon the appropriate benthic substrate in a single-layer deposition at a density of approximately 760 to 850 tons per acre.

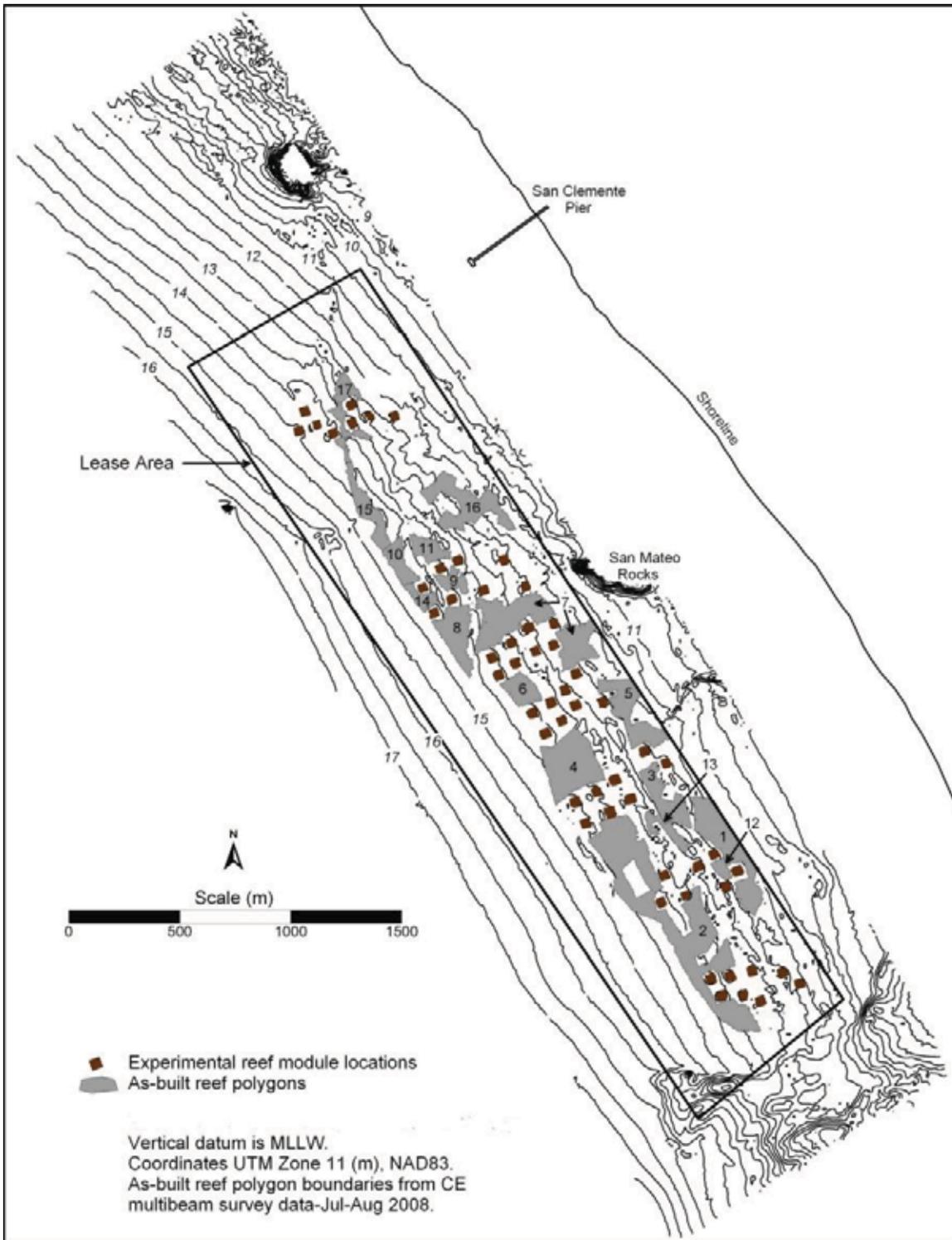
Figure 1-1 shows the general location of WNR at San Clemente with respect to SONGS, the San Mateo Kelp Bed, and Dana Point Harbor. Figure 1-2 shows the Experimental Reef modules (Phase 1) and Phase 2 polygons sequentially numbered from 1 to 17. Figure 1-3 shows the existing WNR in red and the proposed WNR expansion areas in blue and green. The total proposed project area is about 380 acres.

The objective of this report is to outline the project background and proposed project objectives and to describe SCE's preferred project in Sections 2 to 5, as well as to identify project alternatives (Section 6) for the CEQA analysis. The preferred project alternative is denoted in this report as the "proposed project." The purpose of and need for the WNR expansion will be discussed in Section 2, as well as the project location, including site-specific studies that have been conducted in the project area and reef construction assumptions (Section 3). The potential environmental effects of the construction and management of this project will be addressed in an effort to determine the extent of environmental review required under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA).

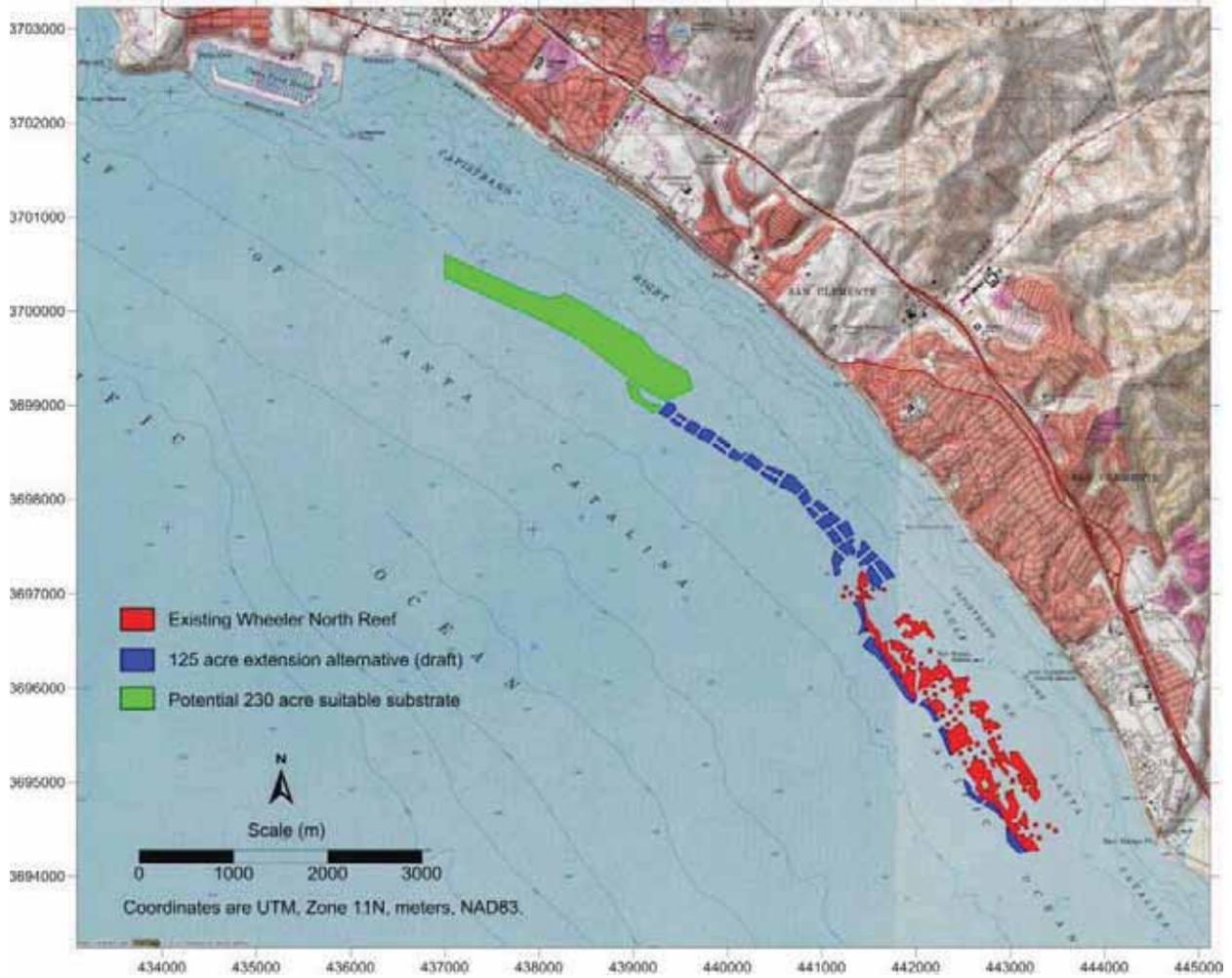
The proposed WNR Phase 3 layout is presented in Section 4. The reef expansion will be constructed of quarry rocks. The specifications of the reef materials are discussed in Section 5. Section 7 outlines the potential project schedule. The reef construction is expected to start on June 1, 2018. Construction activities will be completed by September 30, 2018 to avoid the lobster season. If the reef is not completed within this first construction timeframe, a second window of construction will be used between June 1, 2019 and September 30, 2019. Appendices A and B contain the California Department of Fish and Wildlife (CDFW) guidelines and the May 24th letter from CCC to SCE, respectively.



**Figure 1-1. Location map of WNR site (project area).**



**Figure 1-2. Current WNR, with Phase 1 modules represented by brown squares and Phase 2 polygons represented by gray areas.**



**Figure 1-3. Potential expansion area. Existing WNR is shown in red, proposed WNR expansion areas are shown in blue and green.**

## 2.0 PROJECT BACKGROUND

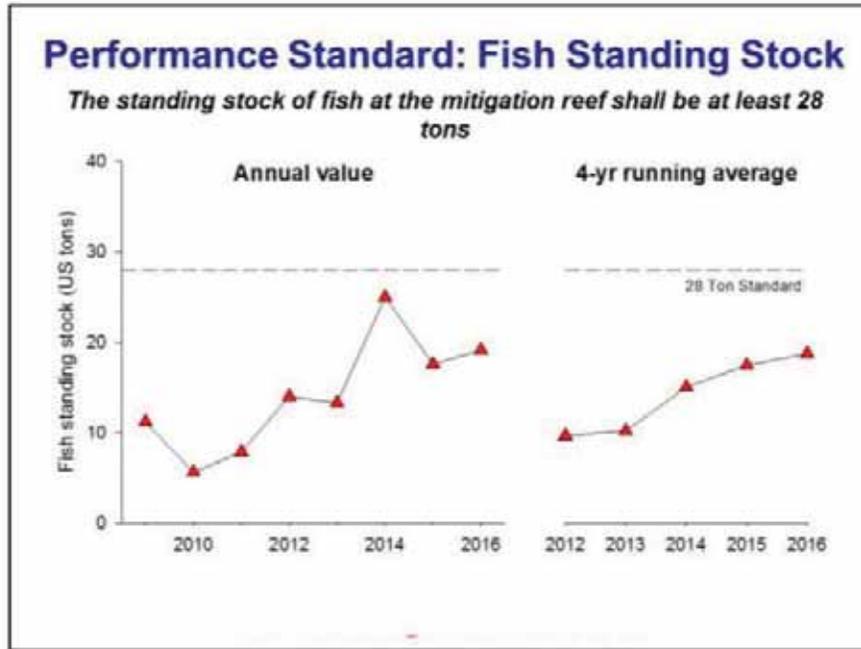
### 2.1 PURPOSE, OBJECTIVES, AND NEED

The CCC issued a Coastal Development Permit (CDP) No. 6-81-370-A for the construction and operation of the San Onofre Nuclear Generating Station (SONGS), Units 2 & 3, in 1974. This permit required a Marine Review Committee (MRC) to monitor the impact of the operations of SONGS on the marine environment. After a 15-year study, the MRC concluded that the operation of SONGS had resulted in significant impacts to the San Onofre Kelp (SOK) community through the discharge of turbid water. The CCC adopted permit conditions in 1991 that required mitigation to compensate for these losses, which included the construction of a 300-acre artificial reef for kelp growth. Subsequent studies determined that resource losses at SOK were fewer than originally estimated, and the CCC amended the permit conditions in 1997 to require an artificial reef that would sustain 150 acres of medium-to-high-density kelp and the associated biota, along with a mariculture/fish hatchery program. The amended SONGS permit called for an experimental reef project (Phase 1) with a minimum of 16.8 acres and a five-year monitoring program to provide guidance on how to design the full reef. A second phase (Phase 2) of construction with a minimum of 133.2 acres was to be completed for the total mitigation reef. The actual acreages of Phase 1 and 2 were 22.4 and 152 acres, respectively.

The CDP contains performance standards that the WNR must meet. The WNR is monitored by independent scientists for these performance standards. The performance standards are divided into absolute standards that are measured against fixed values and relative standards that are measured at WNR and two reference reefs. To receive mitigation credit, the WNR must meet each absolute standard and must perform similar to a natural reef based on the relative standards. The four absolute standards are: 1) at least 90% of the exposed rock must remain available for the attachment of reef biota, 2) the artificial reef shall sustain 150 acres of medium-to-high density giant kelp, 3) the standing stock of fish must be at least 28 US tons, and 4) the important functions of the reef shall not be impaired by undesirable or invasive benthic species.

Results from CCC independent monitoring show that although SCE is meeting 3 of the absolute standards and is performing similar to the natural reefs, one absolute standard has not been met. In a letter dated May 24, 2016, the CCC stated that SCE is not meeting the absolute standard for fish standing stock (28 US tons) and would not likely meet the standard and for SCE *“to comply with the requirements of CDP 6-81-330-A, SCE must remediate WNR by building new reef acreage that at a minimum meets the size, relief, and cover requirements of one of the options described in Table 1”* [of the CCC letter] (See Appendix B).

The main purpose of the WNR expansion (Phase 3) at San Clemente is to increase the fish standing stock in order to comply with the fish standing stock absolute standard. The expansion of WNR will supplement the existing reef. Phases 1 and 2 of the WNR, with a 4-year running average of 18.8 tons, fall short in complying with the fish biomass condition that requires a standing fish stock of 28 tons. Figure 2-1 shows the one-year and four-year average values of fish standing stock at WNR between 2009 and 2015 (UCSB, 2016). A secondary objective is to make sure that in the future, existing permit conditions, which are currently in compliance, remain in compliance, even during years of adverse oceanographic conditions.



**Figure 2-1. One-year and four-year average values of fish standing stock at WNR (UCSB, 2017).**

## 2.2 PROJECT AREA USAGE PATTERNS

This is a marine project that is restricted to an offshore site. The area is open to recreational and commercial vessels. Fishing and diving is prevalent in the area. Kayaking and paddle boarding also occurs in the area. Other recreational activities such as surfing and swimming are located inshore in the surf area.

Onshore of the project area, it is predominantly urban, with the exception of several public and private open-space areas scattered along the San Clemente coastline, and to the southeast, much of the San Diego County coastline.

Directly onshore of the project area are San Clemente City Beach, San Clemente State Beach, and Calafia Beach Park. Doheny State Beach and Dana Point Harbor are just north of the project. Project area beaches support a variety of activities, such as sunbathing, swimming, and surfing, as well as organized community events, and attract over two million visitors annually (City of San Clemente, 1993). Above the beach, most of the coast is occupied with single-family residences, with the exception of the Pier Bowl area, which supports higher-density residential and commercial development (i.e., vacation-oriented facilities such as retail stores, restaurants, bars, offices, and lodging). There is also a group of four gated communities—the Cotton's Point, Breakers, Cypress Shores, and Cypress Cove neighborhoods—located at the southern end of the City. The San Clemente coastline boasts 14 public and four private improved coastal-access points, many of which incorporate developed recreational amenities.

Activities that occur in the offshore project vicinity include boating, commercial and sport fishing, SCUBA diving, surfing, whale-watching, and kayaking.

### **3.0 PROPOSED PROJECT**

#### **3.1 THE PROJECT**

The proposed project would create approximately 200 acres of kelp reef on low-relief quarry rocks located on submerged lands located offshore of the City of San Clemente (Figure 3-1). The proposed action is referred to as WNR Expansion (Phase 3). The submerged lands to be used are owned by the State of California and administrated by the California State Lands Commission (CSLC).

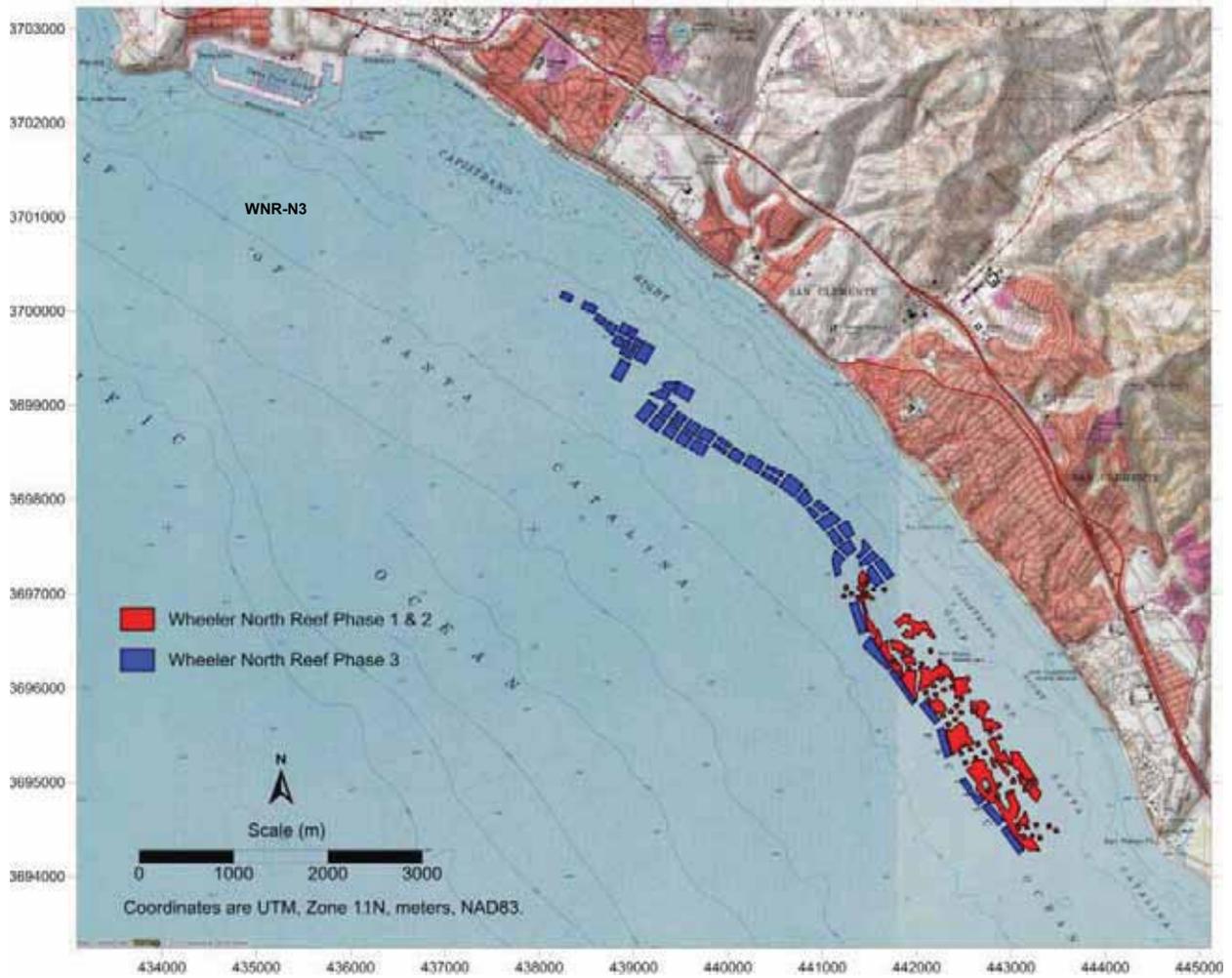
Figure 3-1 shows the proposed WNR Expansion (Phase 3). It consists of 52 polygons covering an area of 208 acres. Eight polygons are located offshore of the Phase 2 WNR, and 44 polygons are located northwest of the WNR and adjacent to the Phase 1 and 2 modules and polygons. The reef would be created through the placement of 150,000 ( $\pm 10\%$ ) tons of quarried rock on top of the sandy ocean bottom, which has a sand thickness of less than 0.75 m. The estimated hard substrate coverage for the proposed reef is 42% based on the method recommended by the CCC consulting scientists (coverage from Reed et al., 2005). The quarry rock would be transported to the site via tugboat and barge. The source of rock is yet to be determined; however, Phase 2 was constructed with rock primarily from Catalina Island. During construction of Phase 2, the Catalina Island quarry could not produce enough rock so some of the rock was obtained from a quarry in Mexico.

#### **3.2 SONAR AND DIVER SURVEYS (2017)**

##### **3.2.1 Sonar Surveys**

Maps representing bathymetry, seafloor characterization, and sub-bottom sonar surveys of sediment thickness were generated for the area of the project surveyed in 2017 (CE, 2017) (Figure 3-2). A multibeam system was used to obtain bathymetry data and locate sea bottom hard substrate. The bathymetry data were plotted in a 3D format to show bottom relief. The bathymetric relief, in conjunction with the backscatter data, allowed for the accurate delineation of areas of hard substrate coverage. The use of backscatter data produces images similar to those obtained using side-scan sonar (“pseudo-side-scan-sonar”). These data were used to prepare the seafloor characterization map presented in this study. The use of multibeam data was successful in characterizing the seafloor bottom, and the results were comparable to those of previous surveys that used side-scan sonar.

Sonar surveys carried out in 2017 provided useful information about the areas that would be suitable for the WNR Expansion Project. The bathymetry survey defined the seafloor topography within the survey area and allowed the delineation of areas suitable by depth for kelp growth (at this location, between 11-16 m). Maps of bathymetry and seafloor characterization and isopachs of sediment thickness are presented in Figures 3-3 through 3-6. Figures 3-3 and 3-4 provide bathymetry and substrate information for the seafloor off San Clemente. Figure 3-5 shows a 0.5-m sediment thickness isopach, which was verified by groundtruth probe in 2017 (Section 3.2.3). Figure 3-6 shows the substrate classifications: hard substrate, coarse sand/shell hash/cobbles/hard substrate, and sand.



**Figure 3-1. Proposed Phase 3 WNR Expansion (blue areas).**

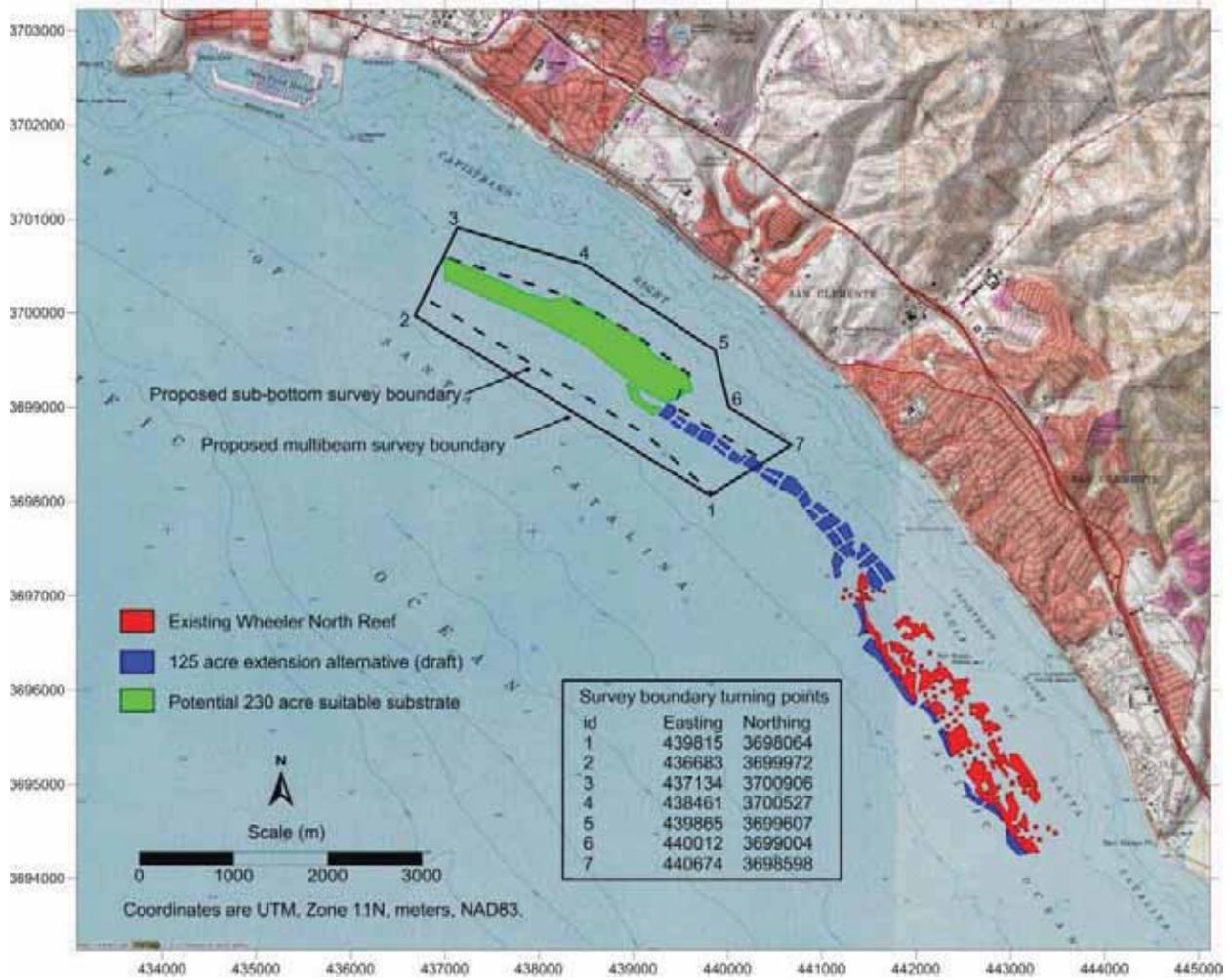
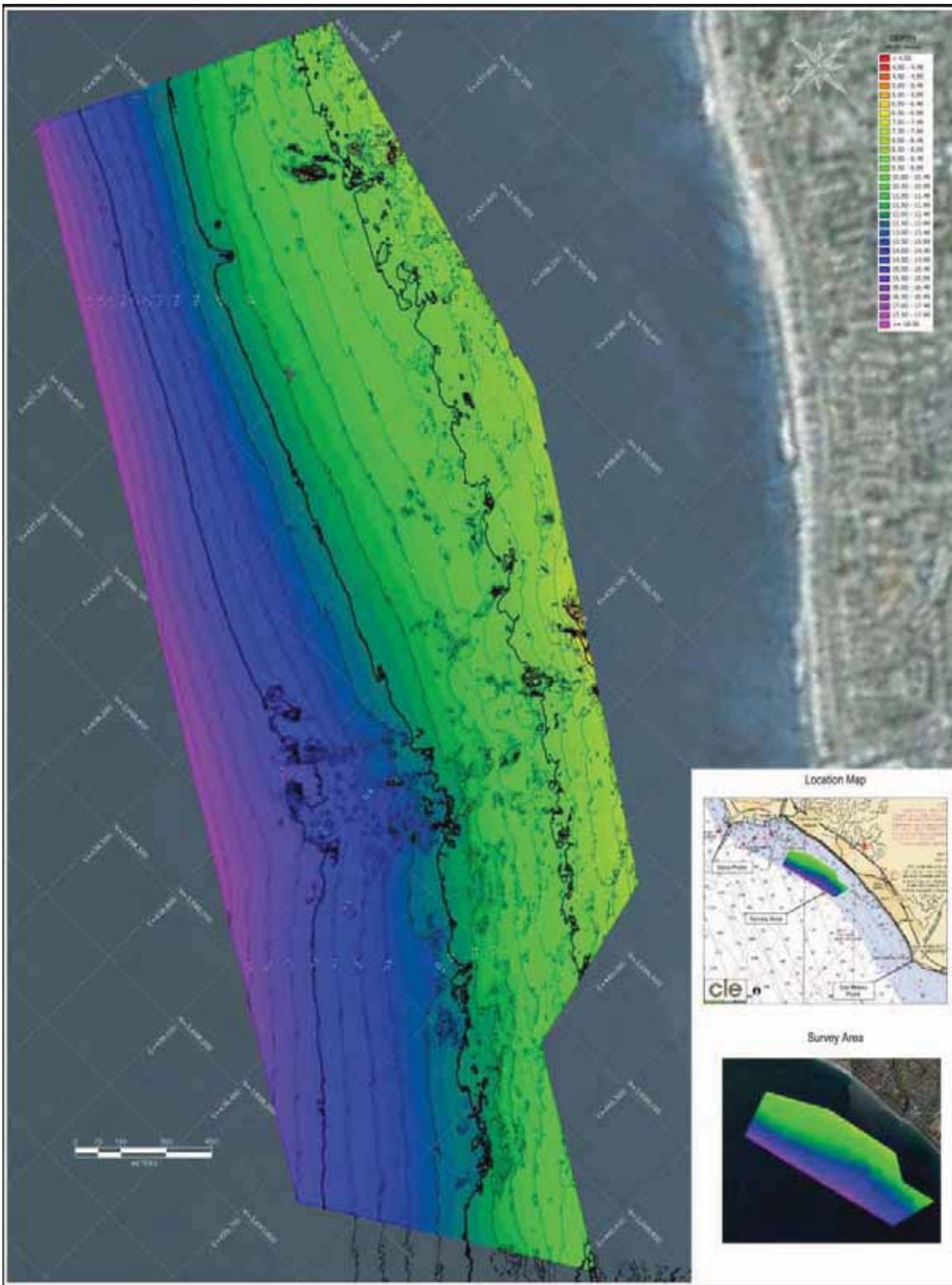
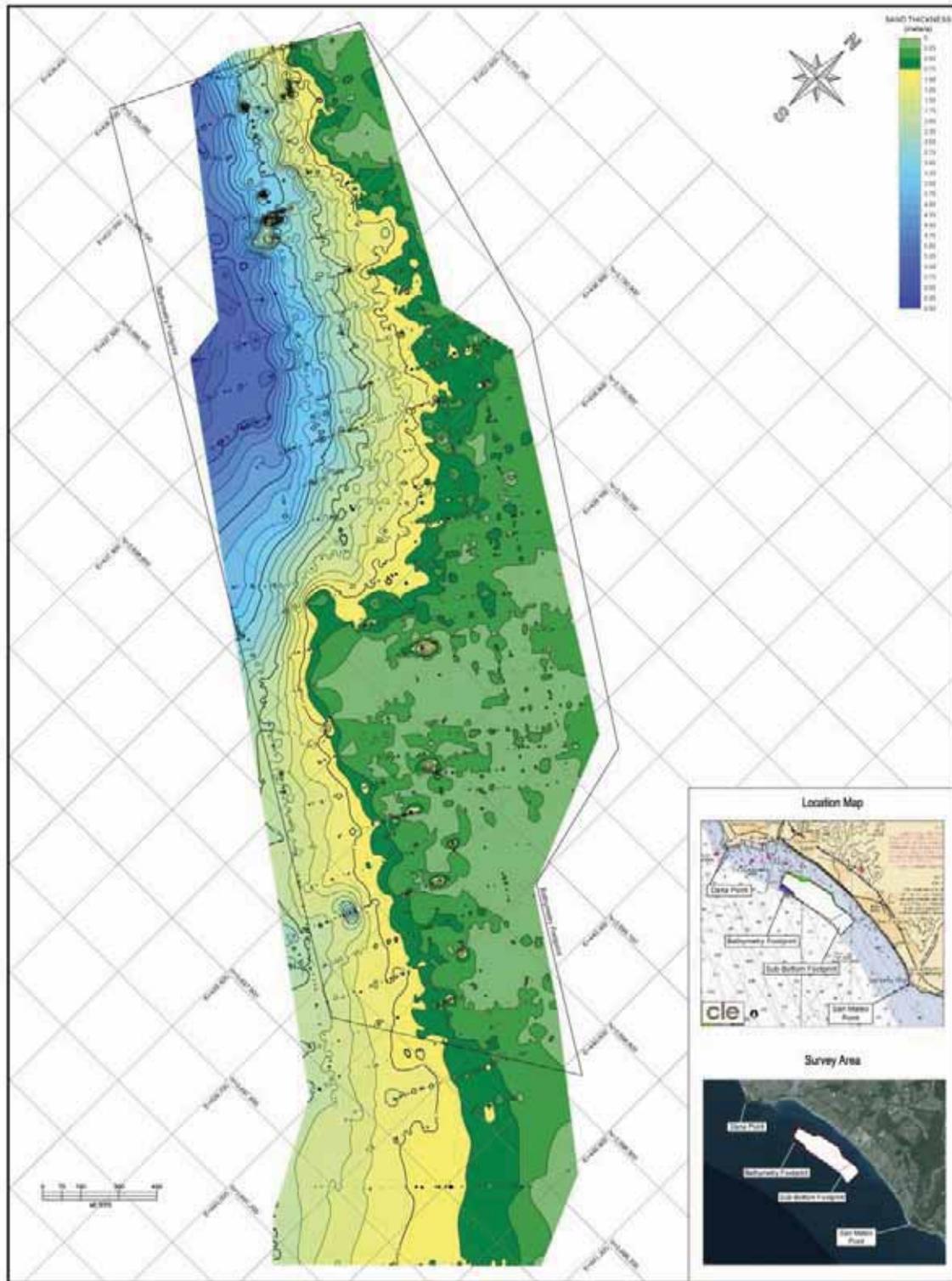


Figure 3-2. Boundary of 2017 sonar survey area.

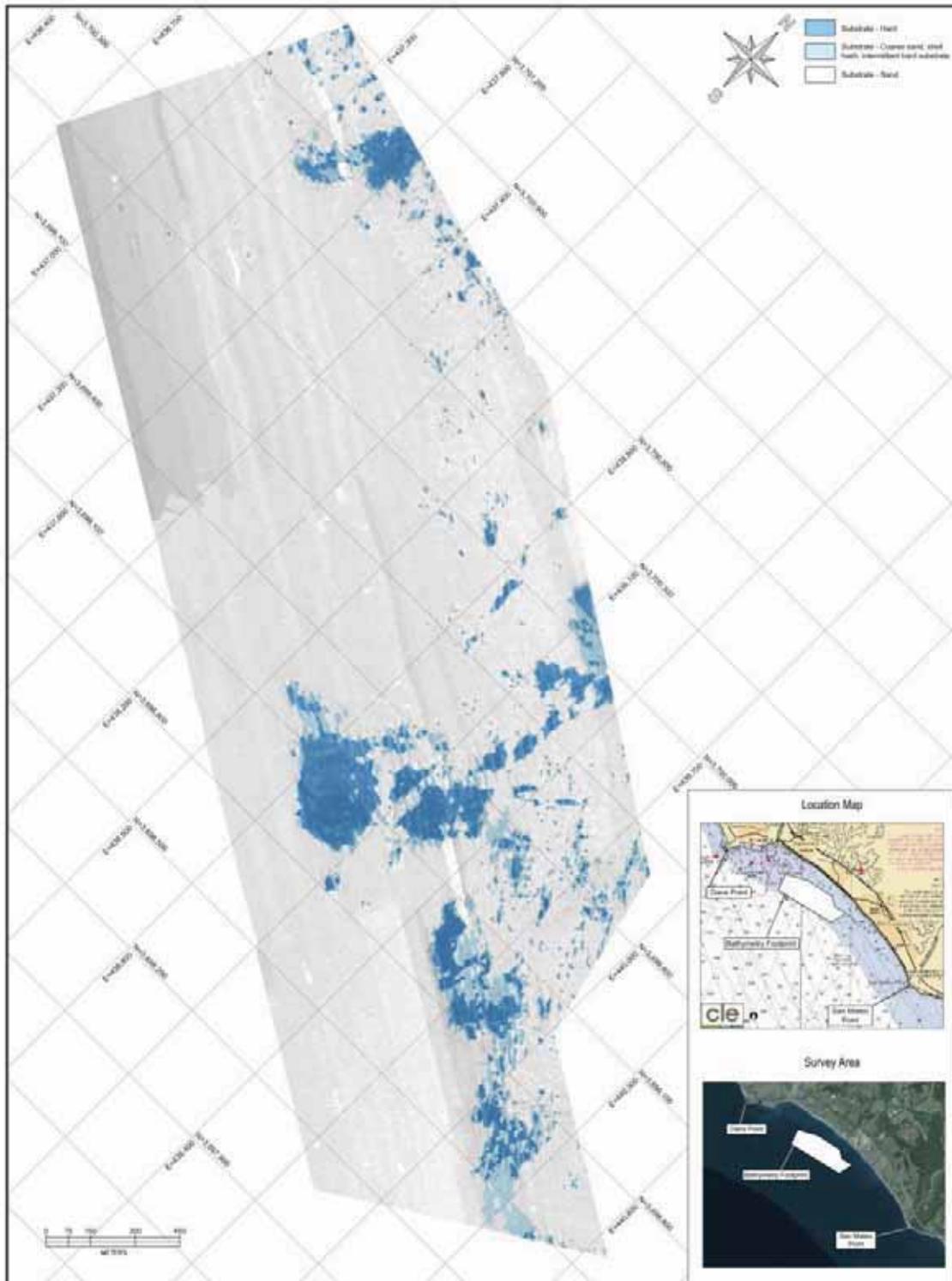




**Figure 3-4. Backscatter map offshore San Clemente with 1 m bathymetry contour lines.**



**Figure 3-5. Sediment thickness map offshore of San Clemente.**



**Figure 3-6. Substrate characterization (hard, coarse sand, and shell hash and sand).**

For the WNR Expansion, areas offshore and adjacent to the northern portion of Phases 1 and 2 were surveyed by multibeam, side-scan sonar, and sub-bottom profiler in 2006 (CE et al., 2006). Figure 3-7 shows the sub-bottom profile and sediment thickness in this area.

### 3.2.2 Jet Probing

Divers performed jet probes at 25 bottom locations in the project area to verify the accuracy of the sonar survey for sand thickness. The locations for jet probing were selected to calibrate and verify the sonar sand thickness results. The groundtruth probes were concentrated in areas that were of high probability for placement of the expansion reef. Consequently, the majority of the sites had sediment thicknesses less than 1.0 m.

Figure 3-8 shows the locations of these probes. Table 3-1 gives the coordinates of the jet probes. EcoSystems Management Associates' 26-foot Farrallon survey boat and divers were used to make these determinations. Divers were deployed off the boat at preselected locations, shown in Table 3-1. Location was determined using a differential global positioning system (DGPS) with an accuracy of 1 to 3 m.

Divers were equipped with a pneumatic probe that could be inserted into the seafloor sediments down to bedrock or other hard substrate. The probe consisted of metal tubing 1 cm in diameter and 2 meters in length. While inserting the probe into the seafloor, a valve was opened to admit pressurized air from an accompanying SCUBA tank, pushing the probe into the seafloor. The probe was marked along its length so that the diver could accurately determine the depth to hard bottom. At each location, the diver made three probes, one at the center and the others one meter apart in opposite directions from the center point. The measurements were recorded on data forms made for that purpose.

### 3.2.3 Biological Observations

Detailed biological surveys were conducted along 28 transects (CE, 2006a) during the surveying for Phase 2 of the WNR. The objective of these surveys was to determine areas at the project site or nearby that are available for the placement of hard substrate material for the expansion reef. The observations were made in a 1-m-wide swath on either side of each 60-m-long transect. The data were subdivided into 5-m increments along the transects, resulting in twelve 10-m<sup>2</sup> quadrants for each transect. The divers collected abundance data on epibenthic macroinvertebrates, adult and juvenile *Macrocystis*, and individuals of large algal species, such as *Laminaria*, *Pterygophora*, and *Cystoseira*.

The biota observed during this survey were those commonly encountered in the nearshore area along the southern California coastline and did not include sensitive or rare biotic communities, such as sand dollar beds (*Dendraster excentricus*). There are multiple habitat types in this area, each supporting biota adapted to the particular bottom substrate and associated conditions.

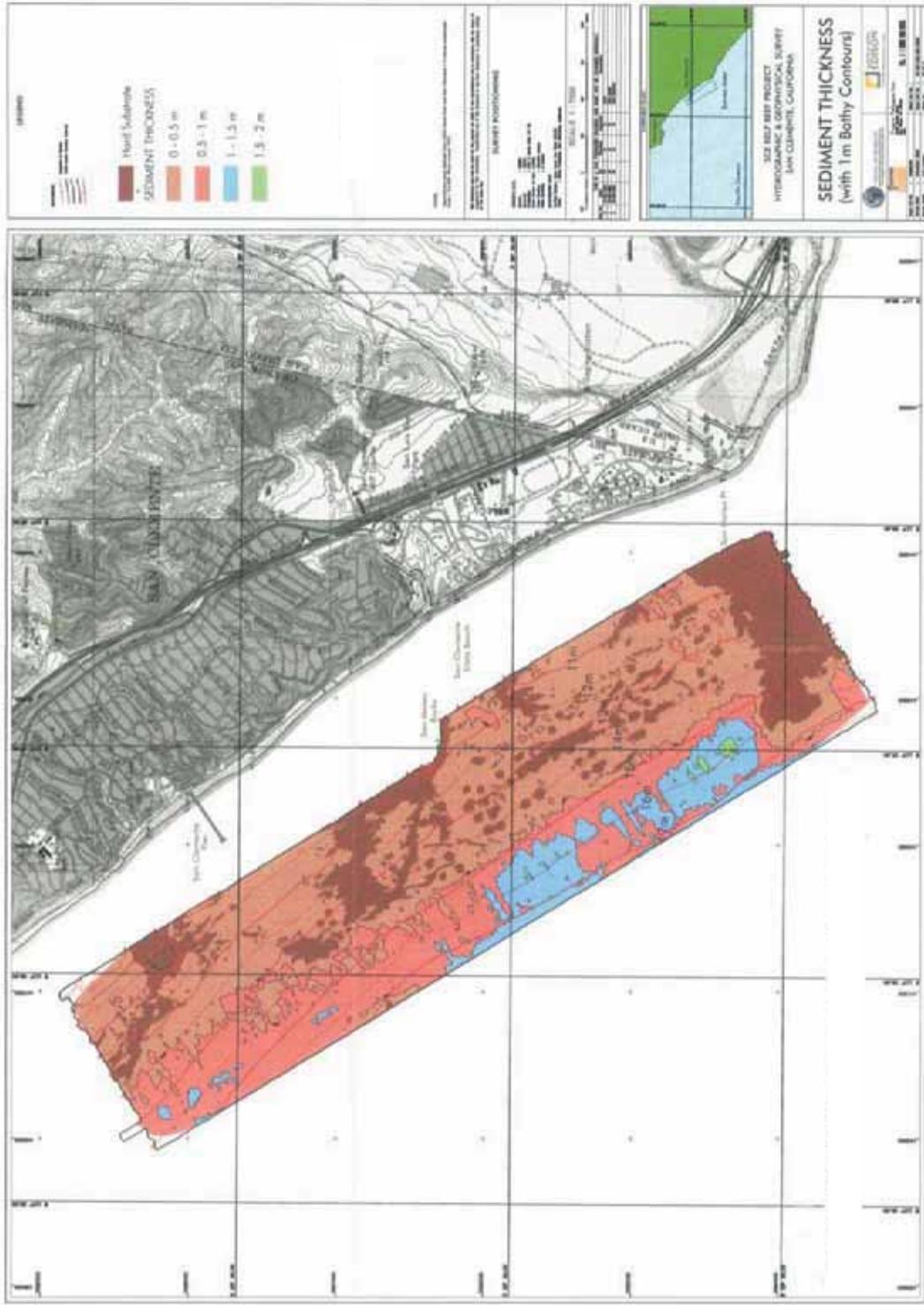
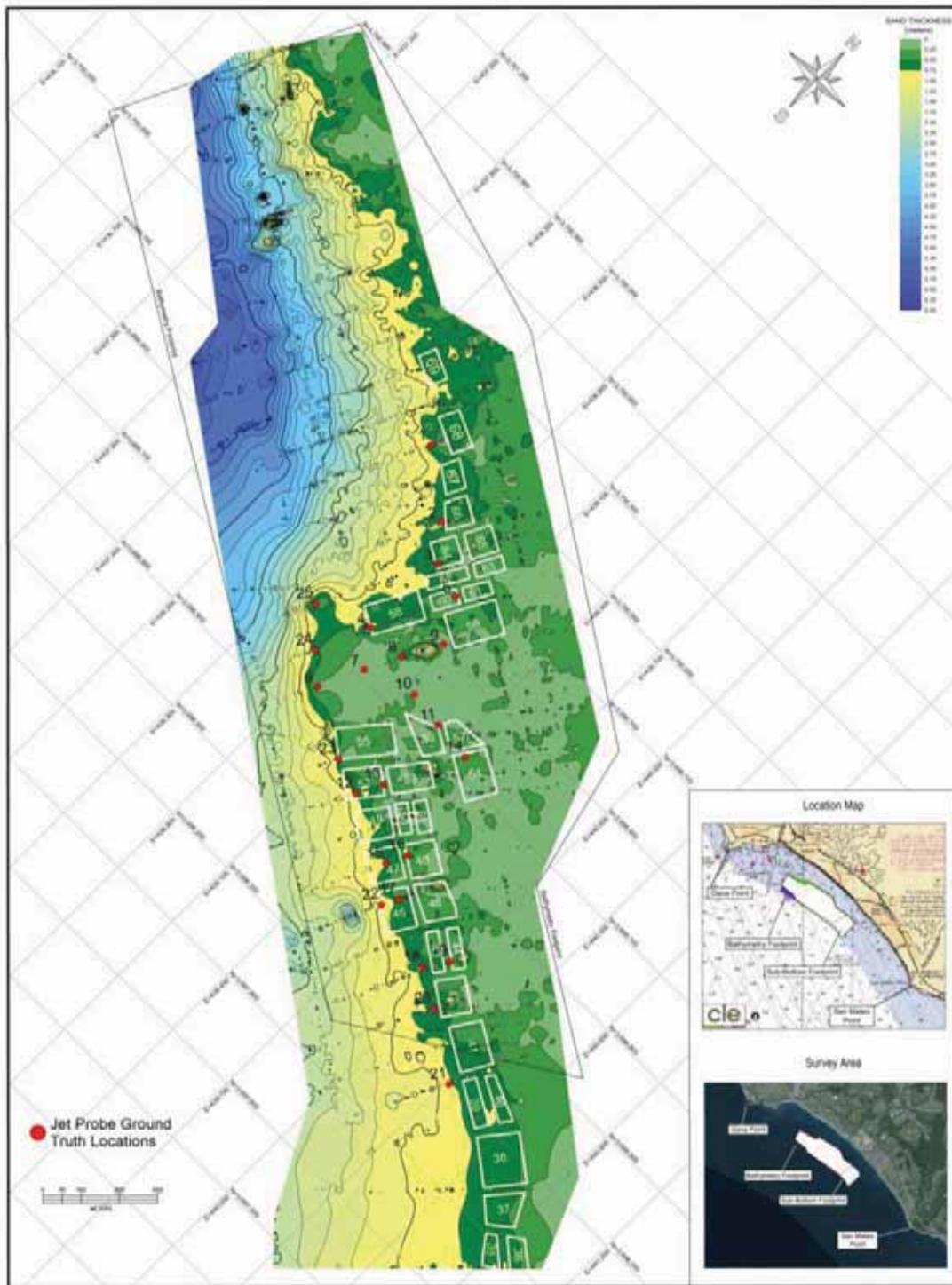


Figure 3-7. Sediment thickness map with bathymetry for Phase 2 WNR.



**Figure 3-8. Locations of the 25 jet probes shown as red circles.**

**Table 3-1. Locations of underwater jet probe.**

Station ID	UTM, Zone 11, WGS84		Sediment Thickness Data (meters)				Sediment Type
	X Meters	Y Meters	Probe 1	Probe 2	Probe 3	Average	
1	438496.3	3699939	0.5	0.5	0.5	0.5	Sand/Silt
2	438738.9	3699752	0.3	0.4	0.4	0.37	Sand/Silt
3	438843.5	3699625	0.4	0.4	0.4	0.4	Sand/Silt
4	438834.6	3699263	0.3	0.3	0.3	0.3	Sand/Silt
5	438985.3	3699585	0.4	0.4	0.4	0.4	Sand/Silt
6	438852.5	3698953	0.3	0.6	0.5	0.47	Sand/Silt
7	438934.2	3699128	0.4	0.4	0.4	0.4	Sand/Silt
8	438999.3	3699271	0.3	0.4	0.3	0.33	Rocky
9	439083.6	3699419	0.3	0.1	0.4	0.27	Sand
10	439142.3	3699198	0.3	0.3	0.4	0.33	Sand
11	439292.9	3699179	0.8	0.9	0.8	0.83	Sand
12	439253.4	3698762	>2	>2	>2	>2	Sand
13	439307	3698862	>2	>2	>2	>2	Sand
14	439456.4	3699164	0.2	0.4	0.5	0.37	Sand
15	439531.7	3698649	0.6	0.5	0.5	0.53	Silt and Sand
16	439570	3698733	0.6	0.6	0.6	0.6	Sand
17	439665.7	3698588	0.5	0.5	0.5	0.5	Sand
18	439921.1	3698464	>2	>2	>2	>2	Sand
19	439981.1	3698555	0.6	0.6	0.6	0.6	Sand
20	440065.4	3698380	0.5	0.6	0.6	0.57	Sand
21	440318	3698212	>2	>2	>2	>2	Silt and Sand
22	439633	3698523	0.2	0.2	0.2	0.2	Sand
23	439111	3698810	0.5	0.5	0.5	0.5	Sand
24	438745	3699047	0.6	0.5	0.5	0.53	Sand
25	438618	3699177	0.1	0.2	0.1	0.13	Rock and Sand

Biota associated with the sandy-bottom habitat would be buried by the reef materials, but past studies have determined the impact to be minimal. The Final Program Environmental Impact Report for the construction and Management of an Artificial reef in the Pacific Ocean, San Clemente, California (Resource Insights, 1999) concluded that “the loss of sand bottom community biota and habitat through burial by concrete and quarry rock is considered to be a ‘less-than-significant impact’.” Many of the species found in the sandy areas are mobile and are expected to move to avoid burial.

Areas with hard substrate coverage of 10–30 percent supported species common to sandy-bottom areas and had occasional areas of hard substrate. These hard substrate areas supported additional species such as red algae, sea urchins, and the sea fan *Muricea*. The limited quantity of hard substrate in these areas consisted of small isolated patches and would not be a major impediment to reef placement.

Transects representing areas with hard substrate coverage of 30 to 60 percent supported understory kelps, other perennial large brown algae, and sea fans. The presence of these biota shows that at least some of the hard substrate in these areas, although surrounded by and interspersed with sand, has remained uncovered for periods long enough to support biota over a period of several years. These areas should be avoided during rock placement.

Transects representing areas with hard substrate > 60 percent supported biota commonly associated with kelp, such as the understory kelps *Pterygophora* and *Laminaria* and the invertebrates *Pisaster*, *Strongylocentrotus*, and *Muricea*. As with other areas of hard substrate that support similar biota, these hard substrate areas will be avoided when the rock is placed. The results of the biota diver survey presented above are discussed in detail in Section 4.3 of CE (2006a).

The “Final Program Environmental Impact Report (PEIR) for the Construction and Management of an Artificial Reef in the Pacific Ocean near San Clemente, California” presents the results of the PEIR (Resource Insights, 1998). Section 2.4 of the PEIR addresses the biological resources that are potentially vulnerable to impacts, which include three types of ecological communities—the subtidal sandy-bottom community, the kelp-forest community, and the beach community—and species assemblages of marine mammals, birds, and turtles. The resources addressed in this section also include the habitats of the potentially vulnerable ecological communities and species.

Section 6 (Biology) of the “Summary of Environmental Impacts and Mitigation Measures for the Proposed Project” concluded that no mitigation measures were required (Resource Insights, 1999).

A biological survey is underway to confirm the above conclusions that the biota present in the WNR Expansion area are those commonly encountered in the nearshore area along the southern California coastline and did not include sensitive or rare biotic communities (Table 3-2). Additional data can be provided by the California Coastal Commission from the eight-year study of the Phase 1 and 2 reef areas.

**Table 3-2. Latin and common names of biota relevant to dive survey.**

Scientific Name	Common Name
<b>Algae</b>	
<i>Macrocystis pyrifera</i>	Giant Kelp (Brown Alga, Adult)
<i>Macrocystis pyrifera</i>	Giant Kelp (Brown Alga, Juveniles)
<i>Pterygophora californica</i>	Understory Stipitate Kelp (Brown Alga)
<i>Cystoseira osmundacea</i>	Chain Bladder Kelp (Brown Alga)
<i>Laminaria farlowii</i>	Oar Weed (Brown Alga)
<i>Desmarestia ligulata</i>	Acid Kelp (Brown Alga)
<b>Invertebrates</b>	
<i>Pisaster giganteus</i>	Giant-spined Star (Echinoderm)
<i>Pisaster brevispinus</i>	Pink or Short-spined Star (Echinoderm)
<i>Dermasterias imbricata</i>	Leather Star (Echinoderm)
<i>Asterina miniata</i>	Bat Star (Echinoderm)
<i>Strongylocentrotus franciscanus</i>	Red Sea Urchin (Echinoderm)
<i>Strongylocentrotus purpuratus</i>	Purple Sea Urchin (Echinoderm)
<i>Lytechinus anamesus</i>	White Sea Urchin (Echinoderm)
<i>Dendraster excentricus</i>	Sand Dollar (Echinoderm)
<i>Muricea spp.</i>	Sea Fans (Cnidarian)
<i>Kelletia kelletii</i>	Kellet's Whelk (Gastropod Mollusc)

### **3.3 HISTORICAL KELP ABUNDANCE**

One of the primary criteria for the selection of sites for placement of new reef material was the avoidance of areas with significant biological resources. Historical records of kelp canopy that were collected by the California Department Fish and Wildlife (CDFW) and MBC for the period of 1989 to 2015 were analyzed. The kelp canopy maps in the WNR Expansion area were digitized and entered into a geographic information system (GIS) database.

The new canopy data were then combined to produce a composite canopy persistence database that showed the number of years that kelp canopy was present at any location within the expansion areas. Figure 3-9 shows the kelp canopy in the project area surveyed in 2017 along with the proposed Phase 3 polygons. The historical kelp canopy prior to WNR Phase 2 construction is shown in Figure 3-10. The presence of natural kelp beds near the Phase 3 polygons demonstrates that the proposed reef expansion project is within the area of suitable habitat for kelp growth and persistence.

### **3.4 ROCK SOURCES**

Two commercial Catalina Island quarries, Pebbly Beach and Empire Quarry, are capable of supplying the quarried rock (Figure 3-11). The individual rocks used for the project would range from approximately 0.25 to 0.5 tons. The rocks would be clean and free of contaminants, per CDFW material specification guidelines (Wilson et al., 1990), which include being durable in seawater and having a specific gravity greater than 2.3 tons/m<sup>3</sup>. Testing performed by an independent laboratory would assure the size, specific gravity, durability, purity, water absorption, and abrasion resistance of the quarry rock to be used for the project.

These two commercial quarries are located on Catalina Island with loading docks that have direct marine access for the loading of quarried rock. Cranes and front-end loaders would be used to load the quarry rock onto 2,000-ton-capacity, flat-deck supply barges. The supply barges would be towed by tugboat, two at a time, approximately 58 miles to the project site. Each trip would transport about 4,000 tons of quarry rock, and approximately 38 trips from Catalina Island to the project site would be required for 150,000 tons of rock. The trip from Catalina Island to the project site is estimated to take approximately 6 hours, using an assumed average speed of 9.3 miles per hour.

### **3.5 CONSTRUCTION METHOD**

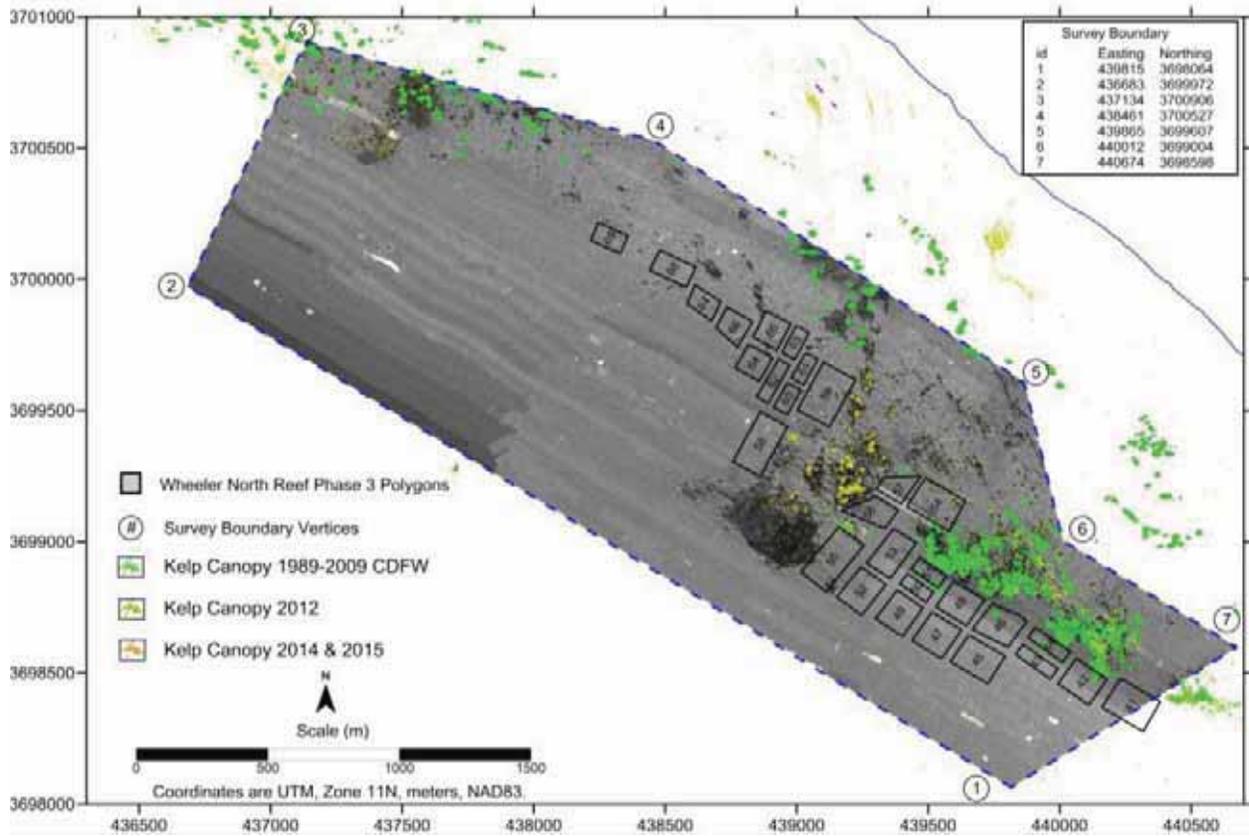
SCE has not requested bids from a construction contractor. Variations in the equipment and the methodology for placing rock may occur. Therefore, SCE is using the methodology from Phase 2 to describe the potential construction methodology. Figure 3-12 shows a schematic of the potential construction method and equipment, including the derrick barge, the flat-deck supply barge, GPS markers, anchoring points, rock placement lines, and front-end track loader. A “push off” construction method using a front-end track loader would be used for placing the quarry rock within the project area. The front-end track loader would be lowered via crane from the derrick barge to the flat-deck supply barge so that boulders could be pushed over the side. The winch operator would maneuver the edge of the flat-deck supply barge to the required

position (e.g., at the first line) by winching “in” or “out” on six anchor cables connected to their respective anchors. The derrick-barge winch operator would use a computer monitor displaying the triangulated data to assist in locating the edge of the supply barge at the exact line of deployment. Two differential GPS (DGPS) receivers would be mounted on the derrick barge to keep the barge accurately positioned as it moves along the lines. Positional accuracy of the DGPS system would be estimated at one to two feet, and the software acceptance limits would be set at six feet, meaning that the winch operator would hold position to within a tolerance of six feet.

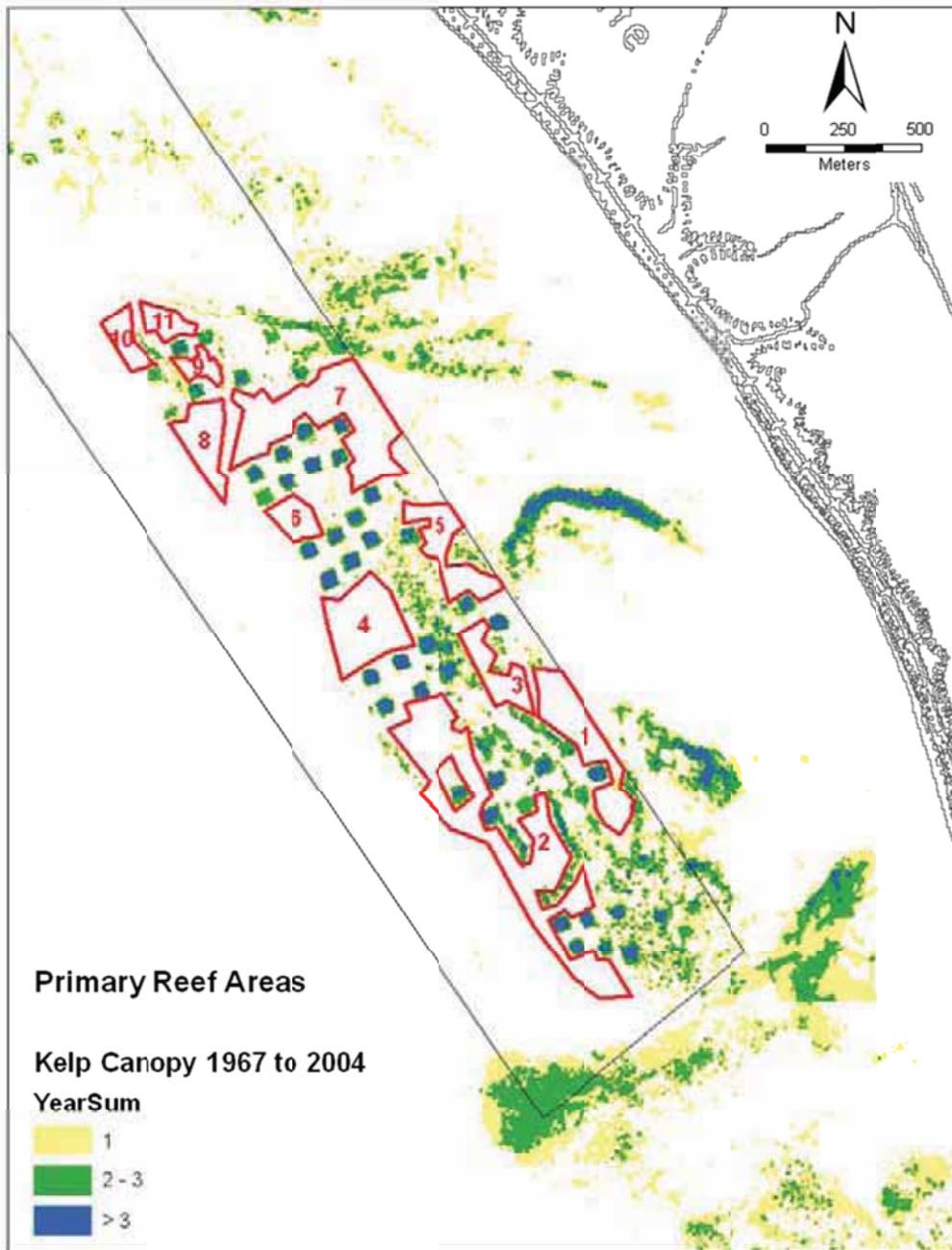
The construction of Phase 2 was carried out by an eight-person crew that included a crane operator, foreman, crane oiler, deck engineer, barge-hand, loader operator, superintendent, and project manager.

The construction activities are proposed to take place between June 1, 2018 and 30 September 2018 to avoid the lobster-fishing season and to utilize the calm weather conditions that are typical of that time of year in southern California (although a second construction period may be proposed for 2019 if work is not completed by September 30, 2018). The construction time period is controlled by weather conditions, the time required to move from one site to another, and the tonnage of rock placement per day. It is expected that about 1,750 tons of rock per day would be placed. This calculates to a minimum of about 100 days of construction to place 150,000 tons of rock. Construction would be carried out during daylight hours six days a week (Monday through Saturday), except on holidays and during inclement weather (no construction would be performed if wave heights were larger than four feet). Onsite work would begin no earlier than 7:00 AM and be halted no later than 7:00 PM. The average work day placing quarry rock at the project site is expected to be about 10 hours.

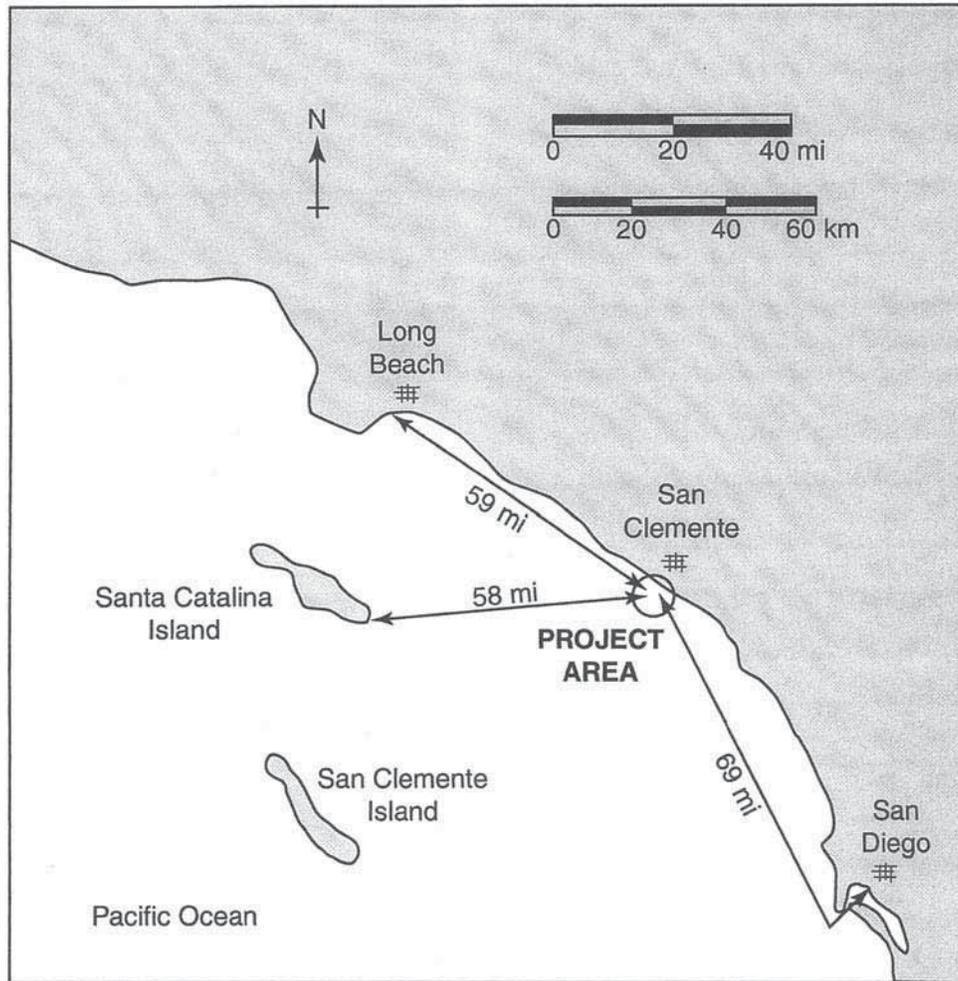
The minimum average amount of rock coverage on a per-acre basis for Phases 1 and 2 is approximately 790 tons. These low-density modules were found to have bottom coverage of approximately 42% based on methods used in the CCC surveys (Reed et al., 2005).



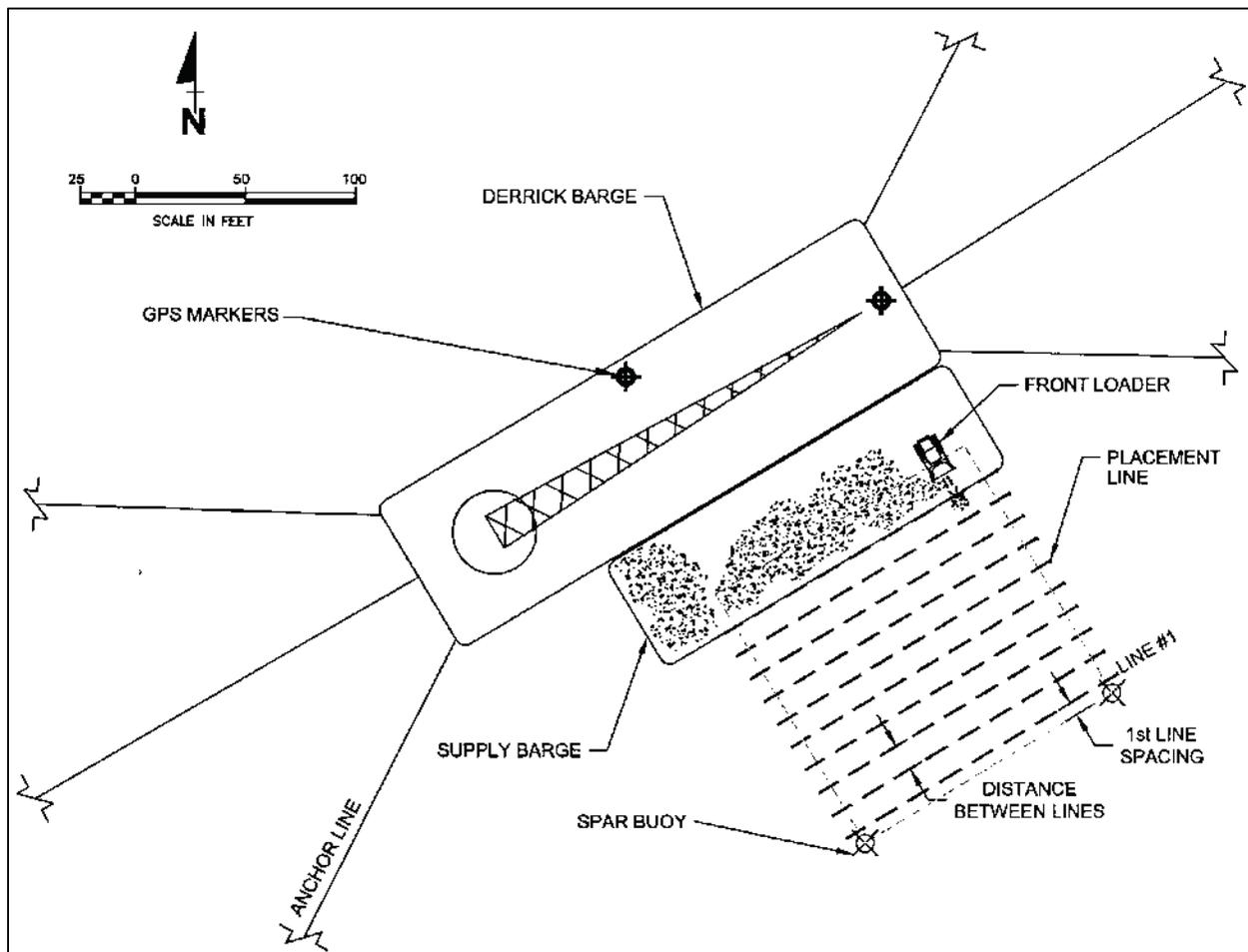
**Figure 3-9. Kelp canopy of 2017 survey area overlaid on top of backscatter substrate map.**



**Figure 3-10. Kelp canopy map prior to Phase 2 reef construction.**



**Figure 3-11. Distance from Santa Catalina Island to the project area.**



**Figure 3-12. Construction method schematic showing derrick barge, supply barge, front loader, rock placement lines, and six-anchor positioning.**

#### 4.0 PROPOSED ARTIFICIAL REEF DESIGN

The exclusive building material for the construction of the Phase 3 Expansion will be quarry boulders for all alternatives. The criteria used to determine and design the polygon areas for the WNR reef expansion are as follows:

- Sited within the expanded State Lands lease area.
- Water depth between 11.5 and 15 m.
- Sand thickness 0.75 m ( $\pm 20\%$ ).
- Polygon areas designated as having less than 30 percent exposed hard substrate.
- Constructed in areas with no kelp presence greater than one year in the historical database from 1967 to 2004.
- Quarry rock will not be deposited within 50 m of areas of special interest (e.g., fishing sites).
- Anchor sites will not be located in a way that would impact areas of special interest.
- Anchors will not be placed in areas that would impact hard substrate. The large areas of hard substrate at the northern edge of the San Mateo Kelp Bed will be of specific concern in anchor placement.
- Quarry rock will not be deposited within 7 m of the existing reef modules and polygons.
- Adequate navigation channels will be provided.
- Project site is in close proximity to an existing kelp bed.

For the preferred project, fifty-two polygons were selected to construct the 200 acres and comply with the above criteria. The boulders will be graded to assure a low projected profile (relief) distributed at a low-coverage density (42%, 790 tons per acre) upon the appropriate benthic substrate. The polygons have been overlaid onto a 3D GIS map of the seafloor bathymetry (Figure 4-1). In Figure 4-1, the yellow (40 x 40 m) modules are shown in seven blocks representing the Phase 1 Experimental Reef, the red polygons represent the 17 reef areas constructed during Phase 2, and the white polygons represent the Phase 3 WNR Expansion. Table 4-1 gives the areas of the Phase 3 polygons.

The design achieves the following:

- Proximity to persistent kelp bed,
- Avoids hard substrate areas of greater than 30 percent,
- Avoids areas of persistent historical kelp growth,
- Places substrate on sand with a depth of less than 0.75 m to minimize subsidence of the new substrate,
- Locates the reef in water depths suitable for kelp recruitment and growth,
- Isolates the experimental reef modules from the new reef,
- Provides a 7 ( $\pm 1$ ) meter margin from existing hard substrate,
- Allows several navigation lanes between inshore and offshore areas,
- Avoids areas of special interest (e.g., local fisheries), and
- Is designed to increase the perimeter of the reef.

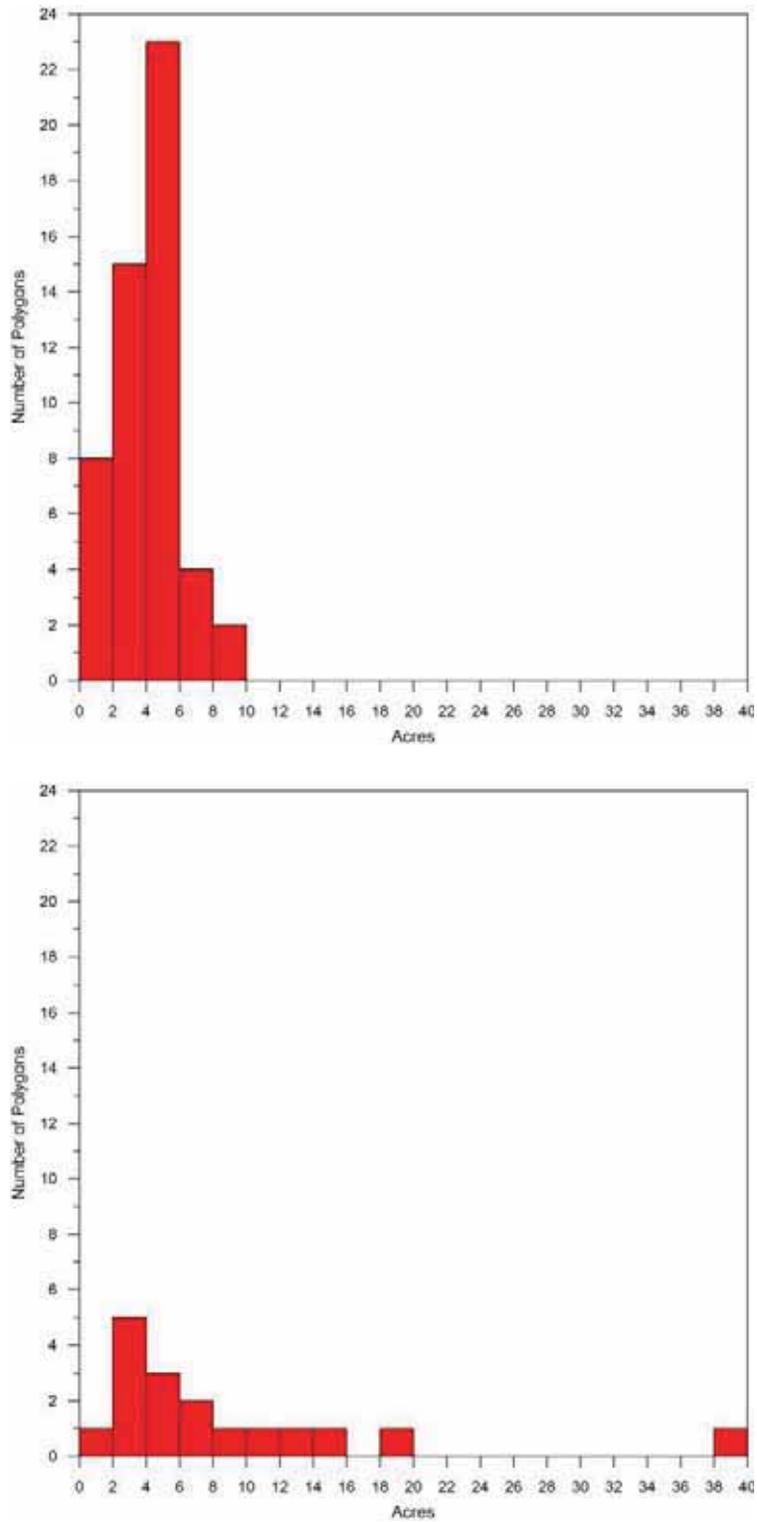
Additional polygons (not selected yet) totaling eight acres were designed as contingency areas of reef construction and potential future remediation areas. The contingency (remediation) polygons will be utilized at the discretion of the SCE Project Manager and will serve as an alternate reef-construction location if site-specific issues dictate termination of construction at any of the primary locations (polygons). Some of the eight acres may be utilized as areas of high-relief reef having heights between 2 to 3 m. Histograms are presented in Figure 4-2 for the Phase 3 Expansion (preferred project) and Phase 2 polygon areas.



**Figure 4-1. Phase 3 Expansion (208 acres), including eight contingency acres, overlaid onto a seafloor bathymetric map.**

**Table 4-1. Areas of polygons 18 to 69 of the Phase 3 Expansion.**

<b>Polygon #</b>	<b>Acres</b>	<b>Polygon #</b>	<b>Acres</b>
18	5.43	44	1.94
19	5.13	45	4.98
20	4.88	46	4.60
21	5.55	47	4.30
22	4.42	48	4.04
23	4.86	49	4.06
24	8.29	50	1.46
25	7.37	51	1.65
26	4.92	52	4.28
27	4.84	53	4.35
28	3.51	54	5.84
29	2.87	55	6.69
30	5.00	56	3.29
31	4.27	57	2.52
32	3.63	58	6.32
33	4.52	59	7.06
34	5.84	60	1.55
35	1.80	61	1.44
36	2.50	62	2.02
37	4.13	63	1.60
38	8.31	64	2.70
39	2.61	65	2.91
40	2.14	66	2.73
41	5.80	67	2.23
42	4.21	68	3.21
43	1.92	69	2.25
<b>Total</b>			<b>208.7</b>



**Figure 4-2. Histograms of polygon areas for Phase 3 (upper) and Phase 2 (lower).**

## 5.0 SPECIFICATIONS FOR REEF MATERIALS

### 5.1 PHYSICAL PROPERTIES

Materials availability, source locations, and minimization of air quality impacts influenced SCE and CE to select quarry boulders as the exclusive building material for constructing the reef for the first two phases. Quarry boulders were acceptable to CCC staff for construction of the Phase 1 and 2 reef.

All rocks used for this project shall conform to the CDFW material specification guidelines for augmentation of artificial reefs with surplus materials (Appendix A; Bedford, 1997). Written approval will be obtained from CDFW prior to depositing any rock. Pertinent criteria include:

1. The materials shall be clean and free of any contaminants, especially those that could dissolve in seawater (e.g., asphalt, paint, oil, or oil stains).
2. All rocks used for this project must be accepted by state and federal agencies in the following respects:
  - Purity: The materials shall be free of contamination and foreign materials.
  - Specific gravity: Shall be greater than 2.3 tons/m<sup>3</sup>.
  - Durability: Rocks used must remain unchanged after 30 years of submersion in seawater.

### 5.2 BOULDER DIMENSIONS AND WEIGHT

Table 5-1 shows the dimensions of the quarried boulders to be used. Boulders used in this project will have a specific gravity greater than 2.3 tons/m<sup>3</sup>. Table 5-2 gives rock weight distribution per acre and estimated number of rocks per class.

Figure 5-1 shows rock distribution by weight, and Figure 5-2 shows the weight distribution and estimated number of rocks per class.

Approximately 790 ( $\pm 10\%$ ) tons of graded quarry rock distributed over one (1) acre will achieve the desired density of artificial hard substrate ( $\sim 42\%$  density, as estimated by CCC contract scientists in Reed et al., 2005). An estimated 150,000 ( $\pm 10\%$ ) tons of quarry rock will be deposited on 200 acres to construct the Phase 3 Expansion reef.

### 5.3 MATERIAL TEST SPECIFICATIONS

Table 5-3 specifies the material tests required to ensure contractor compliance with the specific weight, absorption, and durability requirements of the rocks used for this project.

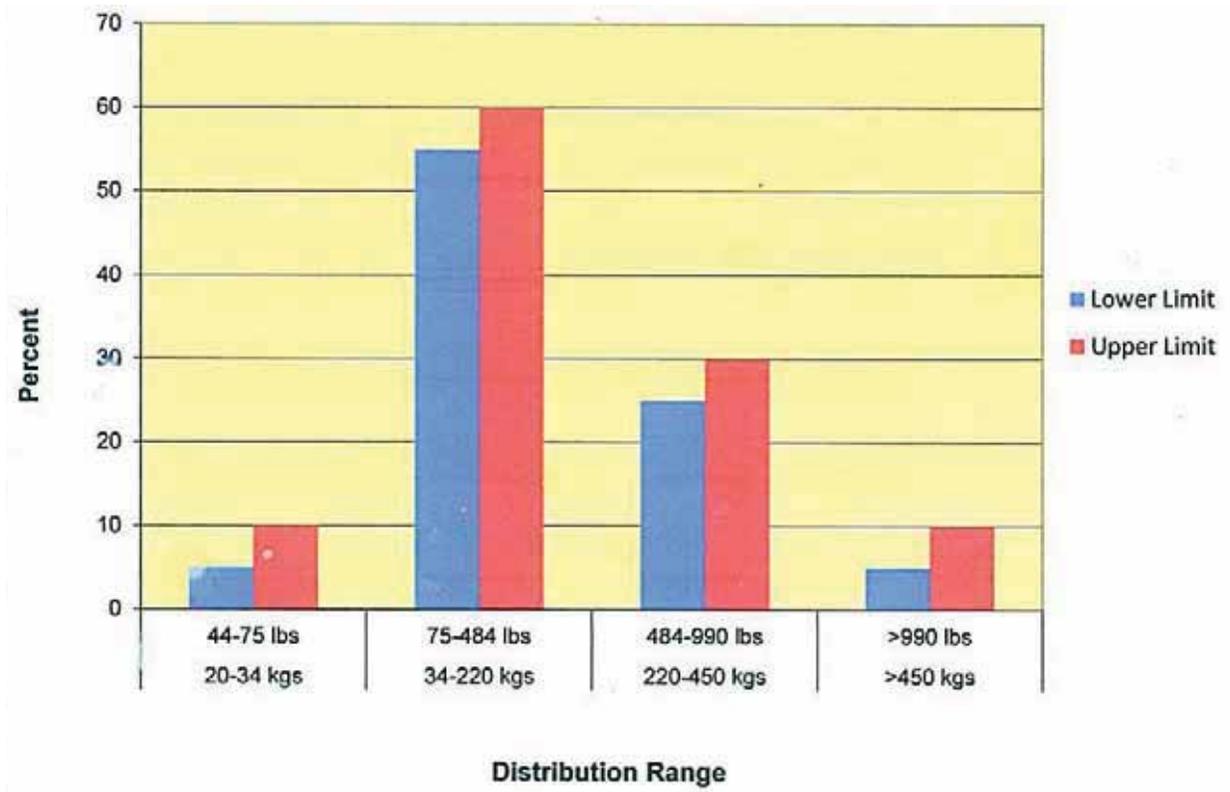
**Table 5-1. Quarried rock dimensions for the Phase 3 Expansion.**

<b>Parameter</b>	<b>Nominal Dimensions (ft)</b>	<b>Tolerance (ft)</b>	<b>Percent of Quarried Rock At Nominal Dimensions</b>
Length	2	± 1	85
Width	1.5	± 0.5	85
Height	0.5 – 2	+ 1	85

Note: Less than 5% of the boulders shall exceed 3 feet in length.

**Table 5-2. Rock weight distribution by range.**

<b>Distribution Range</b>		<b>Mean, Rock Weight</b>		<b>% of Rocks by Weight</b>
<b>kgs</b>	<b>lbs</b>	<b>kgs</b>	<b>lbs</b>	
20 – 34	44 – 75	27	59	5
34 – 220	75 – 484	127	279	55
220 – 450	484 – 990	335	737	30
> 450	> 990	450	990	10
<b>Total</b>				100



**Figure 5-1. Upper and lower rock distribution per range. The percentages for both distributions add up to 100%.**

**Table 5-3. Required material tests (revised on March 25, 2008).**

<b>Test</b>	<b>California / *ASTM Test</b>	<b>Requirement</b>
Apparent Specific Gravity	206 / ASTM C127	2.3 minimum
Absorption	206 / ASTM C127	4.2% maximum
Durability Index	ASTM C535	38% maximum at 500 revolutions, 50% maximum at 1000 revolutions

\* American Society of Testing and Materials

## 6.0 PROPOSED PROJECT ALTERNATIVES

### 6.1 INTRODUCTION

The proposed project (Figure 4-1) would have an area of 200 acres of low relief with 42% hard substrate coverage of quarry rock. The footprint of this alternative is stretched laterally along the coast, extending north of the Phase 1 and 2 modules by 4.2 kilometers to maximize the ocean edge of the project. Based on data from the CCC's independent monitoring program of the WNR, it is suggested that this edge is the most productive for fish. This design will utilize the ocean edge to increase the amount of fish biomass. The low-coverage/low-relief design mimics the existing reef's construction. Since the WNR has been shown to be successful for many of the performance standards, duplication of the design presents a high confidence level that the reef expansion will perform as well as the existing reef. This alternative uses the least amount of rock compared to other alternatives that would produce the necessary fish biomass, which has two positive effects: 1) reduced air emissions and 2) lower costs to SCE customers. Chapter 4 gives a full description of the preferred project alternative.

In this chapter, we present three additional alternatives. The range of reasonable alternatives considered in this study includes those with polygons of different sizes or those with different coverage from the proposed project. All of the alternatives are low relief (< 1 m) and are located near the existing WNR Phase 1 and 2. The project alternatives presented below are within the City of San Clemente. All the project alternatives satisfy the CCC's recommendations as presented in its letter to SCE dated May 24, 2016 (Appendix D).

Alternatives 2 and 3, presented below, have a higher percentage of hard substrate coverage than the proposed project (68% and 86%, respectively). These two coverage percentages are referred to in this report as medium and high coverages.

The screening criteria used to select the agency's preferred alternative are described in the following section.

### 6.2 SCREENING CRITERIA

The alternatives were evaluated individually and were screened by considering the purpose of and need for the proposed expansion and the relative environmental benefits and adverse effects of each alternative. The screening criteria focused on achieving the greatest environmental benefits in terms of extent, numbers, and diversity of restored organisms, while minimizing the potential adverse effects on other environmental resources.

The criteria used to select the additional module/polygon areas for the extended Phase 3 reef are as follows:

- Located within the State Lands lease area or near WNR Phase 1 and 2.
- Water depth between 11.0 and 16 m.
- Sand thickness of 95% of the reef area should be less than 1 m.

- Polygons constructed on areas designated as having less than 30% exposed hard substrate.
- Constructed in areas with no kelp presence greater than one year in the historical database from 1967 to 2015.
- No areas of special interest (e.g., fishing sites) within 50 m of proposed deposition area for quarry.
- No need for anchor sites located in a way that would impact areas of special interest.
- No need for anchor placement in areas that would impact hard substrate. The large areas of hard substrate at the northern edge of the San Mateo Kelp Bed would be of specific concern regarding anchor placement.
- No deposition of quarry rock within 7 m of the existing reef.
- Project site in close proximity to natural kelp bed.

### **6.3 DESIGN ALTERNATIVES**

The design for the WNR Phase 3 Expansion requires polygons of optimal size and spacing in order to increase both the footprint and the perimeter-to-area ratio of the reef. The polygons should not be too small or too large in order to ensure kelp persistence and the project goal regarding fish biomass. Several design alternatives were considered (CE, 2016). Below we present three feasible alternatives.

#### **6.3.1 Alternative 1: Compacted 200 Acres, Low-Coverage Reef**

Figure 6-1 shows the footprint of the 200-acre low-coverage reef (42% hard substrate coverage). This alternative would place 150,000 ( $\pm 10\%$ ) tons of quarry rock within nine polygon areas (Table 6-1). In Figure 6-1 and Table 6-1, the total reef area is shown as 229 acres; however, only 200 acres would be constructed. The footprint of this alternative is adjacent to and north of the existing reef. Unlike the preferred project alternative, Alternative 1 compresses the northward design, extending only 3 kilometers northwest of the existing WNR. This compressed, northerly design reduces the ocean edge. The polygons are larger, and they extend into deeper water and deeper sand than the preferred alternative.

While this alternative may satisfy the project goal, the rocks are placed on a sand thickness of about 1 m, increasing the probability of reef burial, and the polygons are larger than the preferred alternative, decreasing the perimeter-to-area ratio and thus decreasing the fish biomass per unit of placed rock (Wilson et al., 1990).

#### **6.3.2 Alternative 2: 150 Acres, Medium-Coverage Reef**

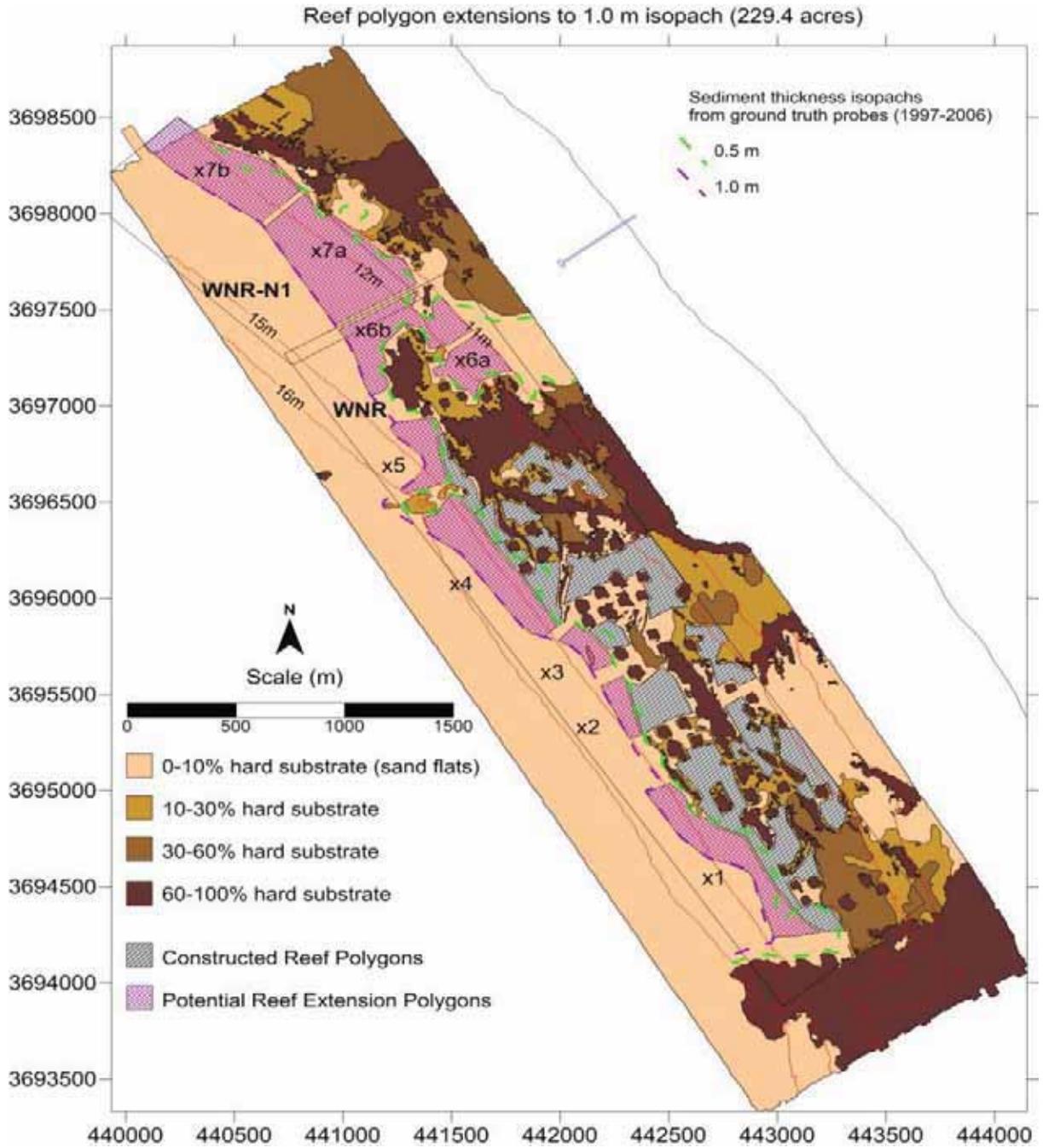
Figure 6-2 shows the layout of the 150-acre, medium-coverage reef (68% hard substrate coverage). This alternative would place 225,000 ( $\pm 10\%$ ) tons of quarry rock within 15 polygon areas (Table 6-2). The increased rock coverage would allow for a smaller footprint. This design uses nearly 50% more rock than either Alternative 1 or the proposed project. The increased quantity of rock would increase emissions, extend the amount of time required to place the rock, and increase costs for SCE's customers.

### **6.3.3 Alternative 3: 105 Acres, High-Coverage Reef**

Figure 6-3 shows the layout for the 105-acre, high-coverage reef (86% hard substrate coverage). This alternative would place 288,750 ( $\pm 10\%$ ) tons of quarry rock within 37 polygon areas (Table 6-3). The increased rock coverage would allow for a smaller footprint. This design uses almost 93% more rock than either Alternative 1 or the proposed project. The increased quantity of rock would increase emissions, extend the amount of time required to place the rock, and increase costs for SCE's rate-payers.

### **6.4 NO-ACTION ALTERNATIVE**

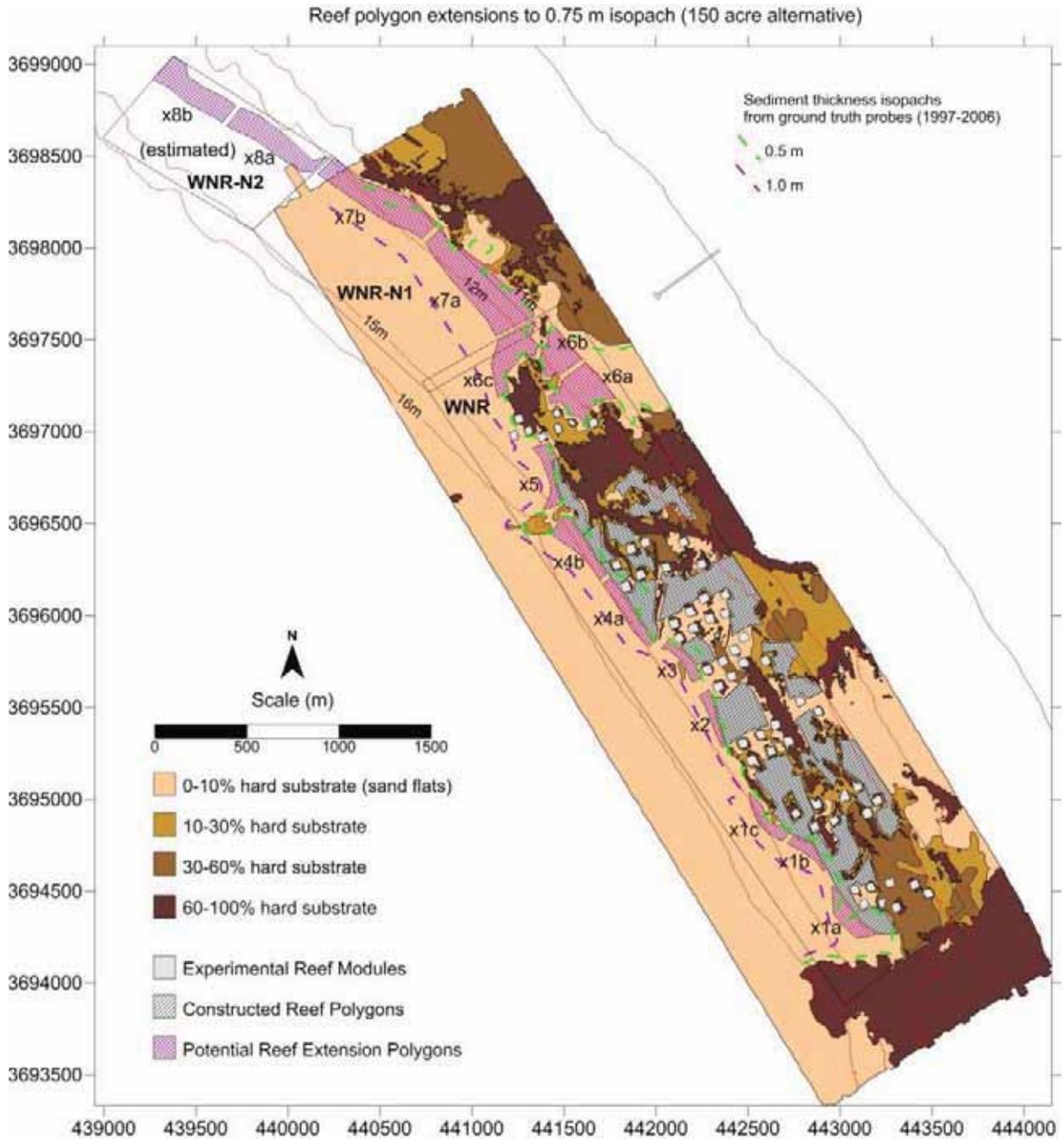
Under the No-Action Alternative, SCE would not implement the WNR Expansion and would not be able to satisfy the CCC's permit requirements. As such, the No-Action Alternative would not address the purpose of and need for the proposed action. Design parameters for the proposed project and its alternatives are presented in Table 6-4.



**Figure 6-1. Alternative 1: Compacted 200 acres, low-relief reef, showing polygons.**

**Table 6-1. Alternative 1: Compacted 200 acres, low-relief reef, with polygon sizes.**

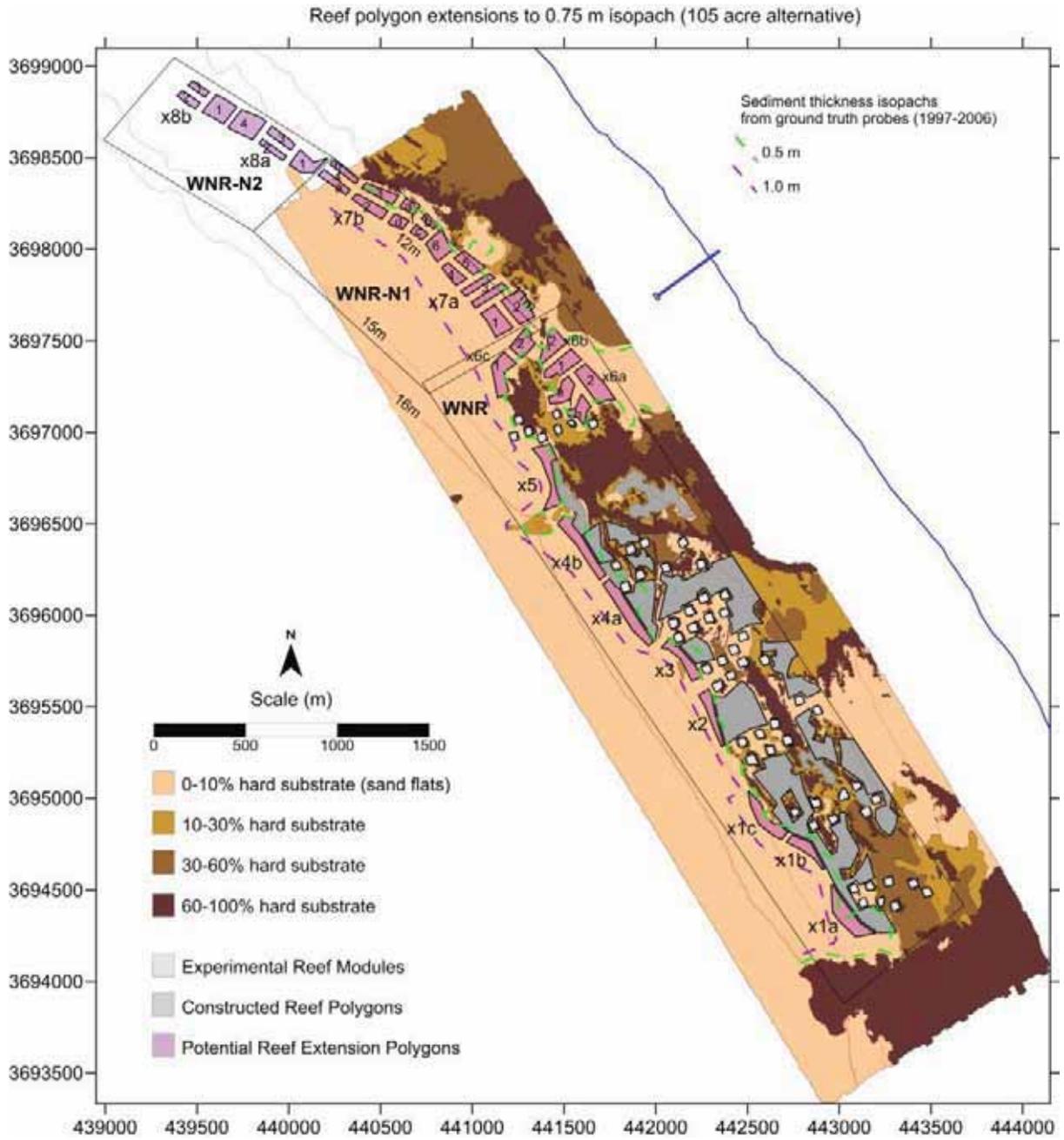
<b>Extension Area</b>	<b>Polygon ID</b>	<b>Acres</b>
<b>WNR</b>	x1	31.0
	x2	6.6
	x3	6.8
	x4	32.2
	x5	13.0
	x6a	13.9
<b>WNR-N1</b>	x6b	28.6
	x7a	56.1
	x7b	41.3
	<b>Total</b>	<b>229.4</b>



**Figure 6-2. Alternative 2: Medium-coverage reef, showing polygons.**

**Table 6-2. Alternative 2: Medium-coverage reef, polygon sizes.**

<b>Extension Area</b>	<b>Polygon ID</b>	<b>Acres</b>
<b>WNR</b>	x1a	5.5
	x1b	2.6
	x1c	4.0
	x2	2.9
	x3	3.2
	x4a	5.6
	x4b	7.3
	x5	4.7
	x6a	13.9
	x6b	8.3
	x6c	11.3
<b>WNR-N1</b>	x7a	29.7
	x7b	22.2
<b>WNR-N2</b>	x8a	14.6
	x8b	14.1
	<b>Total</b>	<b>149.9</b>



**Figure 6-3. Alternative 3: High-coverage reef, showing polygons.**

**Table 6-3. Alternative 3: High-coverage reef, polygon sizes.**

<b>Extension Area</b>	<b>Polygon ID</b>	<b>Acres</b>
<b>WNR</b>	x1a	5.5
	x1b	2.6
	x1c	4.0
	x2	2.9
	x3	3.2
	x4a	5.6
	x4b	5.0
	x5	4.7
	x6a-1a	2.7
	x6a-1b	2.3
	x6a-2	5.1
	x6b-1	3.5
	x6b-2	3.0
	x6c-1	4.1
	x6c-2	2.9
<b>WNR-N1</b>	x7a-1	3.6
	x7a-2	4.5
	x7a-3a	1.7
	x7a-3b	2.0
	x7a-4	1.8
	x7a-5	2.5
	x7a-6	3.3
	x7b-1a	1.3
	x7b-1b	0.8
	x7b-1c	1.0
	x7b-1d	1.3
	x7b-2	2.4
	x7b-3	2.3
	x7b-4a	1.8
x7b-4b	1.4	
<b>WNR-N2</b>	x8a-1	3.1
	x8a-2	1.3
	x8a-3	1.8
	x8a-4	4.6
	x8b-1	3.9
	x8b-2	1.3
	x8b-3	1.0
	<b>Total</b>	<b>105.9</b>

**Table 6-4. Parameters of proposed project and alternatives.**

<b>Design</b>	<b>Phase 3 Acres</b>	<b>Sand Thickness (m)</b>	<b>Relief (m)</b>	<b>Percent Coverage</b>	<b>Tonnage of Rock (ton)</b>
Proposed Project	200	< 0.75	< 1	42%	150,000
Alternative 1	200	< 1.0	< 1	42%	150,000
Alternative 2	150	< 0.75	< 1	68%	225,000
Alternative 3	105	< 0.75	< 1	86%	288,750
No-Action Alternative	0	–	–	–	–

## **7.0 PROJECT SCHEDULE**

### **7.1 PROJECT SCHEDULE CONSIDERATIONS**

The following issues have been considered in estimating the project's duration:

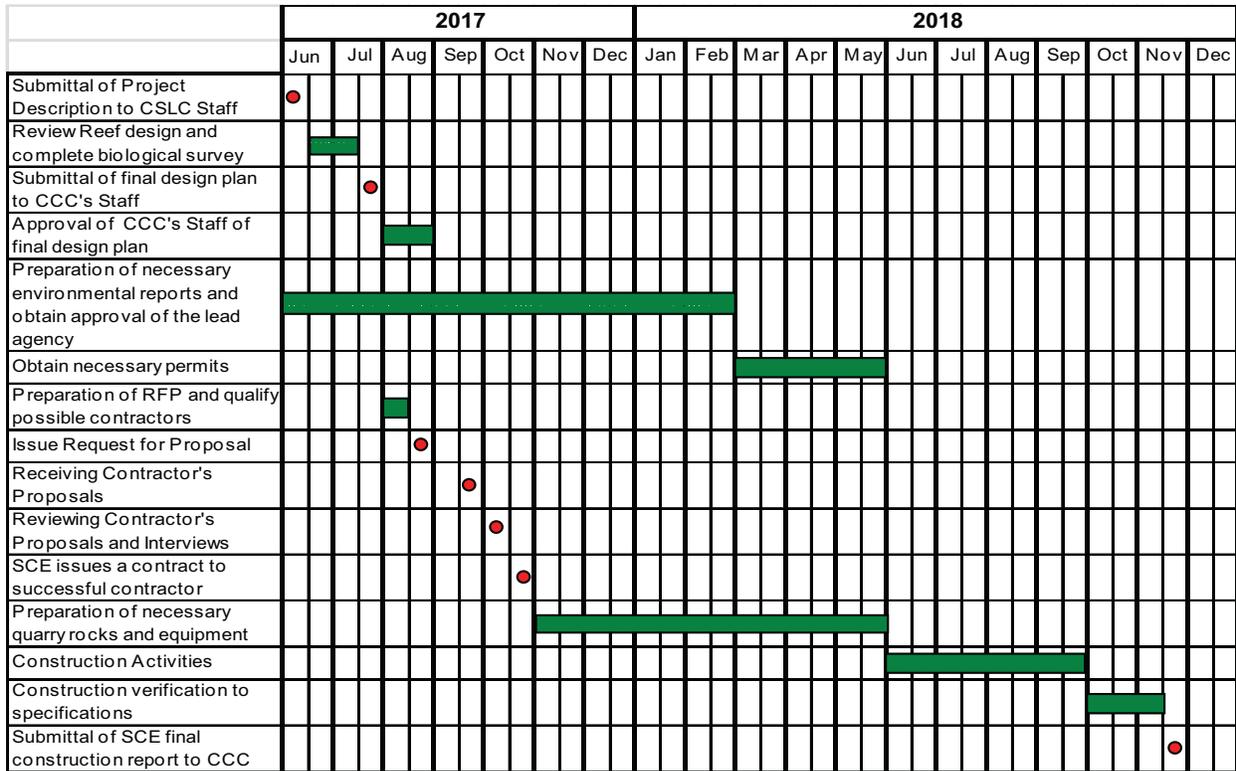
1. The construction company will need at least a four- to six-month lead-time to secure an adequate supply of quarry rocks of the appropriate dimensions.
2. Lobster season prevents construction activities between the beginning of October and mid-April.
3. Weather conditions may interfere with the construction schedule. Twenty-four hours before the development of weather conditions that would generate ground swells (waves) greater than 1.6 m, all construction vessels will be withdrawn to a safe location. The estimated schedule delay for each adverse weather event is 2-3 days.
4. Air quality and cumulative construction daily emissions of PM10 and NO<sub>x</sub>.
5. Possible damage to existing kelp at the experimental reef modules by anchor lines or relocation of construction vessels.
6. Equipment failure and unforeseen circumstances.

### **7.2 SCHEDULE OUTLINE**

Figure 7-1 shows the project timeline. The timeline shows activities between 1 June 2017 and 30 November 2018. The compressed schedule is dependent on the regulatory process moving quickly. If construction cannot begin by June 2018, the schedule may be extended into a second construction season extending from June 2019 to September 2019.

Work will stop completely if wave heights exceed 1.5 m (4-9 ft), and the derrick barge will be moved to a location where it can be anchored safely, to deep water, or to Long Beach Harbor. The anchoring plan has been designed so that minimal time will be spent moving the barge from one location to another.

**Figure 7-1. Project schedule.**



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## **APPENDIX A**

### **CALIFORNIA DEPARTMENT OF FISH AND GAME GUIDELINES**

## APPENDIX A

### CALIFORNIA DEPARTMENT OF FISH AND GAME GUIDELINES

#### MATERIAL SPECIFICATION GUIDELINES AND NOTIFICATION PROCEDURE FOR AUGMENTATION OF ARTIFICIAL REEFS WITH SURPLUS MATERIALS

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*The California Department of Fish and Game (CDFG) coordinates the state program for research and construction of artificial reefs off the coast of California. Department biologists have been involved in the planning and construction of over 35 artificial reefs off our coastline. Some of these reefs, in Orange and San Diego Counties, are permitted for future expansion through the use of surplus materials of opportunity. Cities, counties, public agencies and private organizations or businesses are invited to submit proposals to CDFG for disposal of certain categories of surplus materials for use in the construction of artificial reefs.*

#### **Acceptable Materials**

Materials suitable for construction of artificial reefs must meet the following criteria:

- (1) The material must be persistent. It must be hard, but may not be so brittle that collisions with other similar materials or boat anchors would tend to shatter it. It must remain unchanged after years of submersion in seawater.
- (2) The material must have a specific gravity at least twice that of seawater. The material must be dense enough to remain in position during strong winter storms, even in water depths as shallow as 30 feet.
- (3) The material must not contain potentially toxic substances. Petroleum products, including tires, are not acceptable reef material.
- (4) Acceptable materials include, but may not be limited to, quarry rock and high density concrete. Other materials may be considered on a case-by-case basis.

#### **Procedure for Placement of Materials**

Placement of material at any reef site requires prior written approval from the California Department of Fish and Game. Specific off-loading sites and actual configuration of material placement will be determined by CDFG, in writing, and will be strictly adhered to.

#### **Responsibilities of Principal Party to Agreement (City, Port District, etc.)**

NOTIFICATION: The Principal party to the agreement must notify CDFG a minimum of one full month prior to moving any material to the specified reef site.

#### **Responsibilities of Barge Contractor**

NOTIFICATION: The barge contractor must notify the U.S. Coast Guard two weeks prior to moving any material to the reef site. The Coast Guard must be given a minimum of two weeks lead time to include this job in their Aids to Navigation and Notice to Mariners (Los Angeles area, 562-499-5410; San Diego area, 619-557-5877).

This notification must include:

- (1) Location of work site.
- (2) Size and type of equipment that will be performing the work.
- (3) Name and radio call sign for working vessels, if applicable.
- (4) Telephone numbers for on-site contact with project engineers.
- (5) Schedule for completing the project.

PLACEMENT OF MATERIALS:

The contractor must arrange for inspection of loaded barge materials immediately prior to movement of any barge to the reef site.

CDFG shall place temporary buoys at the off loading site. The barge loads of materials must not be allowed to drift off-site during material augmentation.

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Prepared by:  
Dennis W. Bedford  
Marine Resources Region – Long Beach  
October 30, 1997

**APPENDIX B**

**MAY 24, 2016 LETTER FROM CCC TO SCE  
REGARDING REMEDIATION OF THE WHEELER NORTH REEF**

**CALIFORNIA COASTAL COMMISSION**

45 FREMONT, SUITE 2000  
SAN FRANCISCO, CA 94105-2219  
VOICE (415) 904-5200  
FAX (415) 904-5400  
TDD (415) 597-5885



May 24, 2016

Dr. David Kay  
Southern California Edison Company  
6040 North Irwindale Avenue  
Irwindale, CA 91702

Re: Requirement to remediate Wheeler North Reef

Dear David:

On March 10, 2015, Coastal Commission staff sent you a letter documenting that the Wheeler North Reef (WNR) has not met the absolute performance standard for fish standing stock required by Coastal Development Permit (CDP) 6-81-330-A, issued to SCE for the construction and operation of the San Onofre Nuclear Generating Station (SONGS), and the conclusion by Commission staff, the Science Advisory Panel (SAP) and the University of California Santa Barbara (UCSB) independent monitoring team that the current size (174.42 acres) and configuration (low relief reef with an average of 47.6 % coverage of rock) of WNR is insufficient to consistently meet the permit requirement for a minimum fish standing stock of 28 US tons.

Attached to that letter was a paper entitled Report on the Causes of Low Fish Standing Stock at Wheeler North Reef and Possible Solutions for Remediation, written by the UCSB independent monitoring team in consultation with the Scientific Advisory Panel, that analyzed the reasons for WNR's inability to meet the fish standing stock requirement and provided estimates of additional reef needed to consistently meet the requirement. Since March 2015, our staff has met with your team several times to discuss the report and how to move forward to ensure compliance with CDP 6-81-330-A.

We appreciate the time that the Southern California Edison (SCE) team has spent with Commission staff, the SAP and the UCSB independent monitoring team discussing potential feasible remediation options. The purpose of this letter is to formally notify SCE of my determination as acting Executive Director that remediation of WNR is necessary to meet the requirements of CDP 6-81-330-A. CDP 6-81-330-A, Condition C, Section 2.4 includes the following condition:

*Monitoring independent of the permittee shall be implemented in accordance with Condition D to: (1) determine whether the performance standards of this condition are met (i.e., whether the mitigation reef successfully replaces the lost and damaged resources in the San Onofre Kelp bed), (2) if necessary, determine the reasons why any performance standard has not been met, and (3) develop recommendations for appropriate remedial measures. The permittee shall be*

*responsible for fully implementing any remedial measures deemed necessary by the Executive Director.*

In accordance with Condition C of CDP 6-81-330-A, the UCSB independent monitoring team used monitoring data collected at the Phase I reef since 2000 to determine the area of different configurations of new reef needed for remediation. Results from these analyses, summarized in Table 1 below and further explained in the March 2015 report, indicate the area of additional reef needed for the WNR to meet the performance standard for fish standing stock. The acreage of additional reef varies for different configurations of relief and rock coverage and the level of statistical confidence that it will support an annual standing stock of at least 28 tons. Table 1 shows that for a given level of statistical confidence, the acreage of additional reef needed is highest for low relief and low cover and decreases as the relief and cover of the additional reef increases. The level of confidence in meeting the 28 ton standard also increases as the acreage of additional reef increases.

(a) Reef Configuration		(b) Level of Confidence	(c) Additional acres
Relief	Cover		
low	low	95%	200
low	medium	95%	125
low	high	95%	105
high	high	95%	30
low	low	99%	240
low	medium	99%	155
low	high	99%	140
high	high	99%	38

**Table 1.** Additional acreage required for WNR to consistently meet the 28 ton fish standing stock permit requirement as a function of reef design and level of confidence.

I have reviewed the analysis described above and concur that to comply with the requirements of CDP 6-81-330-A, SCE must remediate WNR by building new reef acreage that, at a minimum, meets the size, relief and cover requirements of one of the options described in Table 1. We hope SCE staff will work with us to move forward with the planning and implementation of remediation as quickly as possible.

Although WNR has provided substantial benefits to the marine ecosystem and has successfully met many of the permit requirements, WNR's inability to meet the fish standing stock requirement, a critical element of the mitigation plan, represents a significant loss to the marine biological community. SCE benefited from the operation of SONGS for over 30 years without fully mitigating its impacts, and thus it is critical that we move quickly to ensure that resources that have been damaged and lost are replaced and SCE is in full compliance with the SONGS permit.

To that end, please submit a Remediation Plan of Action to Commission staff within 45 days of the receipt of this letter. At a minimum, the Plan of Action should include a list of steps and a proposed timeline for implementation of remediation of WNR. My staff and I would be happy to meet with you and your team to discuss the Remediation Plan of Action or to address other questions or concerns you may have. We understand that SCE has engaged the CPUC on the issue of remediation, and we will also plan to coordinate with CPUC staff to ensure that they are informed of our process moving forward. Please let us know if you would like us to set up a joint meeting with the CPUC.

We look forward to working with you to bring WNR into compliance with Condition C of the SONGS permit. If you have questions or would like to discuss this determination, please call Susan Hansch, Chief Deputy Director, at (415) 904-5244 or Kate Huckelbridge at (415) 396-9708.

Sincerely,



John Ainsworth  
Acting Executive Director

CC: Eric Greene, CPUC  
Cy Oggins, SLC  
Jennifer Lucchesi, SLC

**Appendix C**

**ORA Data Request Responses**



# ORA

Office of Ratepayer Advocates  
California Public Utilities Commission  
505 Van Ness Avenue  
San Francisco, California 94102  
Tel: 415-703-1584  
<http://ora.ca.gov>

## ORA DATA REQUEST RESPONSES: A.16-12-002

### Joint Application of Southern California Edison Company and San Diego Gas & Electric Company for Cost Recovery of the Wheeler North Reef Expansion Project Marine Mitigation Costs

Data Request No: SCE-ORA-WNR-01

Date of this Request: July 3, 2017

Date Responses Due: **July 13, 2017**

#### Questions

1. On page 5 and 10 of ORA's testimony in A.16-12-002, submitted on June 16, 2017, ORA recommends that the recorded costs for the Wheeler North Reef (WNR) Expansion Project be "subject to a one-time audit at the conclusion of the project."
  - a. Under ORA's recommendation, when would SCE and SDG&E be authorized cost-recovery of recorded costs, as costs are recorded, at the completion of the project, at the completion of the audit, or at the completion of some other event?
  - b. Does the one-time audit recommended by ORA differ from an after-the-fact reasonableness review by the California Public Utilities Commission, and if yes, how is the one-time audit different from an after-the-fact reasonableness review?
  - c. Please explain what the one-time audit recommended by ORA would involve and how it would work procedurally?

---

#### Responses

1.
  - a. Under ORA's recommendation SCE and SDG&E would be authorized cost recovery for any recorded costs incurred either at the end of the project's completion in 2019 through a true-up or by updating the



# ORA

*Office of Ratepayer Advocates*  
*California Public Utilities Commission*  
505 Van Ness Avenue  
San Francisco, California 94102  
Tel: 415-703-1584  
<http://ora.ca.gov>

forecasted costs through an advice letter filing once the Expansion Project has been selected and received a Coastal Development Permit from the California Coastal Commission.

- b. Yes. ORA is not proposing to conduct an after-the-fact reasonableness review. ORA's one-time audit would be conducted to confirm that the costs incurred are; 1) related exclusively to the WNR Expansion Project, and that 2) SCE is not booking costs to the WNR Expansion Project that are recovered by SCE elsewhere.
- c. See ORA's response to b, above. ORA intends to conduct a one-time audit to verify that the costs recorded are 1) related exclusively to the WNR Expansion Project, and that 2) SCE is not booking costs to the WNR Expansion Project that are recovered by SCE elsewhere. Procedurally, ORA will conduct the audit in SCE's next GRC or other appropriate venue.