APPENDIX K
Mitigation Monitoring and Reporting Program

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County of Santa Cruz

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July 2009

MITIGATION MONITORING AND REPORTING PROGRAM for the Bonny Doon Limestone Quarry Boundary Expansion Project and Reclamation Plan Amendment

This document represents the Mitigation Monitoring and Reporting Program (MMRP) prepared by Santa Cruz County for the Bonny Doon Limestone Quarry Boundary Expansion and Reclamation Plan Amendment Project (project). When a lead agency makes findings on significant effects identified in the environmental impact report (EIR), it must also adopt a program for reporting or monitoring mitigation measures that were adopted or made conditions of project approval (Pub. Res. Code §21081.6[a]; CEQA Guidelines §15091[d], 15097). The MMRP describes in detail the mitigation measure identifies in the EIR for the project, identifies the timing (before or during mining), identifies who is responsible for implementing and monitoring the measure, and the impact being mitigated.

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Environmental Impacts	Mitigation Measures	Party Responsible for Implementing	Party Responsible for Verifying Compliance	Timing of Compliance
County Plans and Policies				
Impact: Loss of habitat for the San Francisco dusky-footed woodrat, a California Species of Special Concern, conflicts with General Plan/Local Coastal Program (GP/LCP) Biotic Resources Protection policies 5.1.7 and 5.1.10, Mining Regulation 16.54.050 Sensitive Habitat Protection standards, and Mining Regulations 16.54.055 Performance Standards for Wildlife Habitat.	**Measure BIO-1 and BIO-2** (see Biology below or Section 6.4 of the Draft EIR for a complete description).	Quarry Operator	County Planning Department	Prior to commencement of mining in the Boundary Expansion Area
Impact: The proposed 1996 Reclamation Plan Amendment would remove three sensitive habitat plant communities (needlegrass grassland, maritime chaparral, diverse native grassland) from the revegetation component of the 1996 Reclamation Plan tha were required as COC Conditions of Approval. Loss of these vegetation communities conflicts with GP/LCP Biotic Resources Protection policies 5.1.7 and 5.1.10, Mining Regulation 16.54.050 Sensitive Habitat Protection Standards, Mining Regulations 16.54.055 Performance Standards for Revegetation, and Certificate of Compliance (COC) Condition III.D.6.	**Measure BIO-3 and BIO-5** (see Biology below or Section 6.4 of the Draft EIR for a complete description).	Quarry Operator	County Planning Department	The revised revegetation plan shall be submitted to the Planning Department prior to public hearing on the project.
Impact: Project mining of the Boundary Expansion Area would result in increased sedimentation of storm water runoff entering Liddell Spring either as surface water drainage or through ground water recharge. Liddell Spring is a municipal water supply for the City of Santa Cruz. This impact conflicts with GP/LCP policies on Water Resources, Surface Water Quality, and Erosion, Mining Regulations 16.54.050 Drainage and Erosion standards, Mining Regulations16.54.055 Performance Standards for Surface Drainage Control, and Use Permit 3236-U Conditions 7 and 25 regarding protection of Liddell Spring and diminution of water supply.	**Measure HYD-1, HYD-2, and HYD-3** (see Hydrology and Water Quality below or Section 5.4 of the Draft EIR for a complete description).	Quarry Operator and City of Santa Cruz Water Department	County Planning Department	HYD-1: The design shall be submitted for review by the Planning Department prior to public hearing on the project and implemented during mining. HYD-2: During mining with further restrictions prior to mining below a depth of 800 feet (msl). HYD-3: Annually

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				during mining.
Impact: Project mining of the Boundary Expansion area would increase the volume of storm water runoff drained to the quarry floor and subsequently removed from the Liddell Spring recharge zone by the approved Final Drainage Plan for the Quarry. This impact would reduce the water supply available as recharge to Liddell Spring and conflicts with GP/LCP policies on Overdrafted Groundwater Basins, Mining Regulations 16.54.050 Water standards, and Use Permit 3236-U Conditions 7 and 25 regarding protection of Liddell Spring and diminution of water supply.	**Measure HYD-1 and 2** (see Hydrology and Water Quality below or Section 5.4 of the Draft EIR for a complete description).	Quarry Operator	County Planning Department	See Hydrology and Water Quality below or Section 5.4 of the Draft EIR for a complete description
Impact: Overburden removal from the 17.1-acre Expansion Area could result in excessive fugitive dust emissions if areas larger than 2.1 acres (significance threshold of the Monterey Bay Unified Air Pollution Control District) are stripped at any one time. This impact would conflict with GP/LCP Air Quality Policy 5.18.1 and Mining Regulations 16.54.050 Air Pollution standards.	**Measure AQ-1** (see Air Quality below or Section 7.4 of the Draft EIR for a complete description).	Quarry Operator	County Planning Department	During mining
Impact: Overburden removal and initial mining in the Boundary Expansion Area would occur in close proximity to the northern property line as permitted by the 25 foot setback limit. This would result in dust emissions that could be blown across the property line in conflict with Use Permit 3236-U Condition 25.	**MeasureAQ-1** (see Air Quality below or Section 7.4 of the Draft EIR for a complete description).	Quarry Operator	County Planning Department	During mining
Impact: The proposed 1996 Reclamation Plan Amendment does not provide required detail governing the management or use of the stockpile resource in conflict with Mining Regulations 16.54.055 Performance Standards for Topsoil Salvage, Maintenance, and Redistribution.	**Measure BIO-6** (see Biology below or Section 6.4 of the Draft EIR for a complete description).	Quarry Operator	County Planning Department	Topsoil Plan shall be submitted prior to commence-ment of mining and implemented during mining and reclamation
Impact: Mining the Boundary Expansion Area would result in increased runoff volumes and sediment loads entering quarry settlement basins. A liquefaction assessment of the basin levees has not been performed. The project may result in sedimentation of downstream areas if settlement basin levees receiving runoff from the quarry Boundary Expansion Area fail during a major seismic event. This potential impact conflicts with GP/LCP	**Measure GEO-1** (see Geology below or Section 4.4 of the Draft EIR for a complete description).	Quarry Operator	County Planning Department	Remedial measures shall be implemented prior to commencement of mining in

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Policies on Maintaining Surface Water Quality and Erosion, Mining Regulations 16.54.050 Drainage and Erosion standard, Mining Regulation 16.54.055 Performance Standards for Surface Drainage Control, and Use Permit Conditions III.26 and III.27.				the Boundary Expansion Area
Impact: The final cut slopes have equivalent bench widths of 24 feet, which do not meet the minimum width requirement of 30 feet as specified in Use Permit Condition III.8. The final cut slopes in the Boundary Expansion Area may not meet the minimum required stability factor of safety of 1.2 required by COC Condition III.A.7(2) when stability analyses are conducted using appropriate methodology. The overburden fill slopes may not be stable when analyzed using current seismic coefficients and laboratory strength data. This potential for slope instability conflicts with Mining Regulations 16.54.055 Performance Standards for Backfilling, Regrading, Slope Stability, and Recontouring.	**Measure GEO-2** (see Geology below or Section 4.4 of the Draft EIR for a complete description).	Quarry Operator	County Planning Department	Slope redesign shall be approved prior to commencement of mining in the Boundary Expansion Area.
Geology and Soils				
Impact: A liquefaction assessment of the quarry settlement basin levees has not been performed. A displacement analysis for seismic shaking shows basin levees would move under seismic shaking. Mining the Boundary Expansion Area may result in increased runoff volumes and sediment loads entering quarry settlement basins. The project may result in sedimentation of downstream areas if settlement basin levees receiving runoff from the quarry Boundary Expansion Area fail during a major seismic event.	**Measure GEO-1:** The Applicant shall update seismic stability evaluations and prepare liquefaction hazard evaluations for settlement basins that would be receiving runoff from the proposed Boundary Expansion Area, based on the current state of knowledge and standards of practice. The seismic stability and liquefaction hazard evaluations shall be completed and submitted to the County Planning Department as a condition of approval. The evaluations shall examine levee stability whether due to embankment deformation or liquefaction within or under the levee and shall consider the potential for piping to accompany deformation. Methodologies discussed in Blake, et al. (2002) for seismic slope stability evaluation and Seed et al. (2003) for liquefaction analysis are currently employed in Santa Cruz County, but more current analytical methods may be used. Given the proximity and 400-year recurrence interval on the San Gregorio fault, a deterministically derived maximum earthquake acceleration, magnitude, and distance based on the expected event on the San Gregorio fault may be more appropriate for analysis at this site than the probabilistic acceleration and de-aggregated magnitude and distance. The stability and liquefaction susceptibility evaluations shall include sufficient field investigation to document the foundation condition and relative density of both levees, that is, the field investigation shall be	Quarry Operator	County Planning Department	Remedial measures shall be implemented prior to commence-ment of mining in the Boundary Expansion Area

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	sufficiently detailed to develop an as-built plan for the levees, upon which the analysis can be based. If the analysis predicts permanent seismically induced deformation of the levee, the consequences of that deformation with respect to the overall stability of the levee shall be clearly stated. In general, permanent deformations greater than 6 inches (15 cm) shall be considered unacceptable, but any predicted deformation shall be evaluated within the context of the levee material properties and design. A completed liquefaction and stability analysis for the levees shall be provided to the County of Santa Cruz Planning Department for peer review. If the results of the stability evaluation indicate that there is a potential for failure of the levees and release of impounded runoff to downstream areas, the levees shall be modified by the quarry operator to satisfy stability concerns. Any modifications of the levee shall be based on sound engineering design. All design documents and evidence of satisfactory completion of the levee modifications must be provided for approval to the County of Santa Cruz Planning Department prior to inception of mining in the Boundary Expansion Area.			
Impact: The project may result in unstable proposed Boundary Expansion Area slopes, either during quarrying or after closure of the quarry, potentially resulting in accelerated erosion, water quality impacts, or encroachment of unstable areas onto lands adjacent to the proposed Boundary Expansion Area.	**Measure GEO-2:** The Applicant shall prepare an updated slope stability evaluation for proposed slopes in the Boundary Expansion Area. Local (bench) scale and the overall quarry wall stability shall be evaluated based on methodology appropriate for jointed/blocky rock masses. For overburden materials, such as the Santa Margarita Sandstone and overlying soils, traditional soil mechanics limit equilibrium analysis methods are considered appropriate. **Procedures for Stability Analysis of Jointed Rock Slopes** The stability of jointed hard rock excavations (such as the subject quarry) is generally controlled by the system of rock mass discontinuities (joints, fractures, faults etc.) that intersect to potentially form adversely oriented blocks in the excavation face. In such cases, discontinuity characterization (e.g. orientation, spacing, persistence, shear strength) therefore represents a key slope stability consideration. To obtain representative stability analysis input parameters, it is recommended that systematic discontinuity surveys be performed, for example using scan line and/or window mapping approaches. The discontinuity data should be filtered in such a manner that statistically homogenous sub-domains can be identified, as the geologic reconnaissance revealed three distinct fault-bounded structural sub-domains in the quarry (Geology and Hydrology Technical Appendix	Quarry Operator	County Planning Department	Slope redesign shall be approved prior to commencement of mining in the Boundary Expansion Area

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	F). Once structural domains have been established and discontinuity data collected, statistical methods (using stereographic density contouring or specialized software) should be applied to determine the most likely parameter values and their associated ranges. This implies that a statistically significant number of field measurements must be collected. Based on discontinuity orientation data, kinematic analyses should be performed to identify domains of the quarry slope, at the bench to overall scale, that may be susceptible to block sliding (along a single plane), wedge sliding (simultaneous slip along two planes), and toppling (overturning). For those areas of the quarry meeting kinematic conditions for block instability, supplemental limit equilibrium-based stability analyses should be performed, using stereonet-based approaches or classical closed form solutions. In the stability analyses, appropriate water pressures and seismic loading conditions should be included. The selected pseudostatic seismic coefficient should account for topographic effects of steep slopes (Ashford and Sitar, 1994; 2002). Finally, the stability analyses should consider the potential for rupturing through the marble rock mass in developing failure modes. The results of rock slope stability analyses should be used in conjunction with a systematic and documented assessment of past quarry slope behavior, in order to develop prognoses for future slope performance. **Procedures for Stability Analysis of Soft Rock or Soil Slopes** Overburden, sandstone, and fill slopes associated with Boundary Expansion Area mining are adequately treated as classic soil slope stability problems, without specific reference to discontinuities. Typical rotational slope failure models, such as the Bishops, Janbu, or other commonly used analytical method may be employed. Rock or soil densities and strengths used in the analysis shall be based on laboratory testing of field samples of each material constituting the slope model. The seismic coefficient used in the analysis shall be based on current methods for coefficient selection (Blake et al. (2002) or more current) and shall account for topographic amplification. Soil strengths used in the analysis shall be selected to take into account potential dynamic and strain (displacement) related reductions in strength. If a displacement rather than limit equilibrium approach is taken to evaluating slope stability in this			

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	context, displacements of 4 to 12 inches (10 to 30 cm) shall be considered potentially significant. Displacements greater than 12 inches (30cm) shall be considered unacceptable. The results of both the jointed rock slope and soft rock or soil slope stability evaluations shall be used to define the type of slope failures expected in the proposed Boundary Expansion Area, whether deep-seated or shallow, and the degree of instability associated with the potential failures. "Significant" landsliding has been defined above as: • landslides of substantial size, such that they may encroach on adjacent properties (on the north side of the proposed Boundary Expansion Area) or have the potential to result in serious erosion and sedimentation; or • a determination that the proposed Boundary Expansion Area slopes are so unstable with respect to smaller scale landsliding that the occurrence of numerous landslides could interfere with the quarry reclamation plan. Evidence for significant landslide hazard would include stability analysis results that predict large block or deep-seated circular failures with factors of safety less than 1.2 or widespread smaller failures with factors of safety less than 1.0. A factor of safety against large-scale failures of 1.2 is indicated in the 1997 Conditions of Approval. The 1997 Conditions of Approval, Part 1, III.A.7.(2) (Santa Cruz County, 1997) state that "all final cut slopes completed after September 12, 1996, shall have a stability factor of safety not less than 1.2 …" The completed stability evaluation shall be provided to the County of Santa Cruz Planning Department for peer review. If the stability analysis indicates a potential for significant landsliding, the configuration of the working or finished Boundary Expansion Area slopes shall be redesigned by the quarry operator to mitigate the landsliding hazard. All documentation related to slope redesign shall be provided to the County of Santa Cruz Planning Department for review and approval prior to the inception of mining of the Boundary Expansion Area. The validity of the slope stability model shall be evaluated as mining progresses based on periodic surveys of rock types, fracture orientations, and faulting. These surveys shall be documented and provided to the			

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	County of Santa Cruz Planning Department at least once annually. If any changes in earth material lithology or structure occur that might affect the conclusions of the slope stability analysis, the analysis shall be revised. Any indication of significant landslide hazard based on the revised stability analysis shall be mitigated by design.			
Impact: Renewed movement of the Liddell Spring landslide could be caused if drainage is diverted towards the landslide or dumping of overburden, off-spec rock or other waste occurs on the slopes above the spring.	**Measure GEO-3:** No quarry waste (e.g., overburden and off-spec rock) or other soil or rock shall be placed on the slopes above Liddell Spring. All concentrated runoff from the quarry or road crossing the slope above the spring shall be carefully controlled and shall not be permitted to flow across the landslide area or across older quarry spoils above Liddell Spring.	Quarry Operator	County Planning Department	During mining
Impact: The project may result in accelerated erosion within the Boundary Expansion Area, potentially impacting water quality or quantity flowing to Liddell Spring.	**Measure HYD-1:** (see Hydrology and Water Quality below or Section 5.4 of the Draft EIR for a complete discussion.	Quarry Operator	County Planning Department	The design shall be submitted for review by the Planning Department prior to the public hearing on the project and implemented during mining
Hydrology and Water Quality				
Impact: Stripping of overburden material and mining the Boundary Expansion Area would result in an increase in turbidity and sedimentation at Liddell Spring. Any increase in turbidity and sediment load in the flow at Liddell Spring would also increase sedimentation and turbidity in downstream drainages. Implementation of the previously approved Final Drainage Plan would divert Boundary Expansion Area runoff from percolating through the quarry floor and reduce ground water flow to Liddell Spring. Mining in the Boundary Expansion Area may also intercept perched ground water zones, potentially affecting water quantity or quality at Liddell Spring. Liddell Spring is a municipal	**Measure HYD-1:** CEMEX shall prepare an engineered drainage plan for use during removal of overburden and mining of the Boundary Expansion Area. This plan shall be integrated with the Final Drainage Plan for the quarry. The plan shall specify disposal of no more than 4.6 million cubic yards of quarry overburden and spoils across the entire floor of the quarry pit (rather than only the western half as proposed) and construction of a filter for percolating surface water. Overburden and spoils shall be placed in the western portion of the quarry pit to a depth of approximately 15 feet and extend eastward across the quarry floor as mining proceeds. The entire quarry floor area shall be filled with overburden and spoils to a depth of approximately 15 feet. A detailed design shall be developed by	Quarry Operator	County Planning Department	The design shall be submitted for review by the Planning Department prior to the public hearing on the project and implemented

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water source for the City of Santa Cruz. The Project would cause water quality or water quantity impacts to Liddell Spring resulting in the loss of water production levels for the City of Santa Cruz. Any loss of water production is a significant impact.	CEMEX for approval by County Planning. The design shall be peer reviewed by a representative of the County and approved prior to public hearing of the project proposal. Appendix G is an engineering feasibility study for the proposed quarry bottom filter. The following basic design features shall be considered and addressed: 1. A revised drainage plan shall be prepared that will supersede the 1996 Drainage Plan (Use Permit No. 3236-U). The intent of the redesigned drainage plan is to retain surface water in the quarry pit for groundwater recharge and sediment removal. 2. An engineered graded bed or other sediment barrier shall be placed beneath any overburden and spoil material placed within the quarry pit to prevent sediment from collapsing into the karst aquifer through fractures and other pathways. A filter shall be designed to remove suspended sediment from quarry runoff and to percolate the runoff into the underlying karst aquifer. Appendix G contains preliminary design recommendations for filter construction. This provision shall be combined with sloping of the working floor of the quarry towards the filter-lined portion of the quarry floor and /or capture of runoff in closed pipe or lined ditches to carry runoff directly to the filter and to prevent ponding in areas with no filter. Ponding of water above a specified design depth shall be prevented by pumping or by providing external drainage from the quarry. (Note: this measure will be necessary regardless of the design of overburden and spoil disposal. 3. The filter and associated settlement ponds shall be designed to minimize water depths, and settlement pond depths shall be minimized to avoid retaining standing water except for short periods following rainstorms. The filter and ponds shall be regularly maintained during operation of the quarry. 4. After the end of active quarrying, an overflow pipe or pumping system shall be constructed to direct any overflow of the filter system to settlement basins. Alternatively, if monitoring of the filter system for a period of five years following cessation of mining indicates that it has the capacity to recharge expected runoff without further maintenance, a overflow spillway system will not be required. Should it be required, development of the spillway shall include design and construction of a fail-safe drainage system in the crusher			during mining.

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	area to prevent any runoff from flowing down slopes above Liddell Spring or onto the Liddell Spring landslide, during quarrying or after quarry closure. The drainage system shall be designed so that plugging of ditches or inlets for the settlement basins does not result in water being diverted towards the spring. 5. Drainage provisions shall be developed to reduce erosion and runoff during removal of overburden in the Boundary Expansion Area. Drainage design shall incorporate the following elements during removal of overburden: • Capture or divert runoff flowing towards the quarry from upland areas. This measure should take the form of a cut-off ditch around the perimeter of the working area, to prevent runoff from adjacent uplands from adding to direct runoff from the Boundary Expansion Area. Runoff from upland areas shall be collected and dispersed away from the quarry. • Stage the overburden removal during the dry season to allow drainage provisions to be instituted in working areas prior to the onset of winter rains. No overburden stripping shall take place between October 15 and April 15 of any year. A representative of Santa Cruz County Planning Department shall inspect and approve all erosion control measures prior to October 15 each year • Temporary berms shall be constructed at the contact between overburden and any exposed marble to prevent runoff carrying sediment from flowing across exposed marble. These berms shall be in place from October 15 to April 15 each year. Runoff from these areas shall be collected and carried by pipe and/or lined impermeable ditch to the filtration system constructed in the quarry bottom. • All areas of exposed marble shall be positively sloped to flow to runoff collection points. Benches shall cut with inboard collection ditches that are sloped to runoff collection points. Infiltration of runoff in the ditches shall be prevented by impermeable linings where open fractures exist. On working			

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	benches, use of movable plastic membranes can be used to provide temporary lined drains. If it is not feasible to cut the marble surface to the required slopes, it is permissible to develop the required slopes with compacted soil, provided that the soil surface is protected from erosion. Alternatively, benches may be outboard sloped, provided that infiltration of runoff is prevented by impermeable membranes. Runoff from all marble areas shall be collected in pipes and/or lined ditches and conducted to the filtration system constructed in the quarry bottom • Identify any prominent fissures or sinks exposed within the quarry as mining progresses and install drainage provisions to prevent runoff from entering the fissures. Runoff in disturbed areas shall be directed away from surface drainages leading to Liddell Spring as well as any subsurface drains such as sinkholes and open fractures. Sinkholes, fractures, and dissolution cavities shall be identified, mapped, and maintained in such a way as to prevent any precipitation or runoff capture. • A representative of Santa Cruz County Planning Department shall review the sinkhole/fissure/dissolution cavity mapping data and inspect the quarry drainage system at least once per month between October 15 and April 15 each year. 6. The revegetation plan specified in the 1996 Reclamation Plan Amendment shall include hydrophytic native plant species that can tolerate wet conditions for areas on the quarry floor receiving additional retention due to the modified drainage plan. The revised revegetation plan shall be developed by CEMEX in cooperation with a qualified revegetation specialist for approval by County Planning prior to public hearing of the project proposal.			
Impact: Because existing data is inadequate to define maximum water levels in the Boundary Expansion Area, there is a potential for mining to intercept ground water. Exposing significant perched ground water zones, mining to within 20 feet or less of maximum ground water elevations, and flushing additional water through the quarry floor would potentially impact water quality and cause turbidity at Liddell Spring by exposing ground water to surface	**Measure HYD-2:** Improved groundwater level monitoring is needed in areas proposed for new and ongoing quarrying (e.g. the northeast corner of the Boundary Expansion Area) to prevent mining from intercepting the groundwater table. . It is important that groundwater level information be obtained within the Boundary Expansion Area itself, and that groundwater data be recorded through several annual cycles, so that seasonal water level changes can be assessed. CEMEX shall therefore augment the	Quarry Operator	County Planning Department	During mining with further restrictions prior to mining below a depth of 800 feet (msl).

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contamination and by introducing additional natural and quarry-generated sediment into ground water. This opportunity for contamination of the water would affect both surface and ground water quality downstream and is therefore a potentially significant impact according to the thresholds of significance. Draining the quarry to Settlement Basin 3, as envisioned by the Final Drainage Plan, would lessen the potential water quality impact at Liddell Spring, but this plan would also increase the potential for the quarry to affect flow quantities at the spring, also a potentially significant impact.	existing and proposed water level monitoring program with at least two additional wells drilled to coincide with the planned northeast corner of the floor of the Boundary Expansion Area and the western side of the Boundary Expansion Area (approximate California Coordinate System coordinates N198,000 E1,519,350 and N197,700, E1,518,850, per the project Final Development Plan). It may be necessary to re-drill or re-develop the well in the northeast quarry corner during quarrying, or the hole may be drilled at an angle from a location outside the area to be mined. The actual well location shall be reviewed and approved by a representative of Santa Cruz County Planning Department prior to drilling. These wells can be substituted for two of the three additional monitoring wells proposed by the quarry operator (as described in the "Application for Approval of Amendments to Surface Mining and Reclamation Plans", August 1999, page 7). Continuously reading water level data loggers shall be installed in all wells selected for water level monitoring, to include the proposed new wells, and wells M1B, M2B, M5A, and M6A. The data loggers should be programmed to record water levels at least four times daily. The monitoring at these wells shall continue through the mining period, or at least until water levels during two average or higher than average rainfall seasons are recorded. Mining shall be restricted to a level no deeper than 800 feet (msl) until water levels in the proposed wells have been recorded through at least two average or higher than average rainfall years. Once mining approaches elevation 800 feet (msl), the water level data shall be reviewed by a representative of Santa Cruz County Planning Department, who shall have the authority to determine the appropriate final depth of mining. The determination of final mining depth shall take into account the results of the groundwater monitoring proposed above, historic water level data, rainfall amounts during the monitoring period, and any new information regarding the karst aquifer that is revealed during the initial mining phase. In addition to the monitoring proposed above, precaution shall be taken during mining to protect perched water zones uncovered by mining. The quarry operator shall cease quarrying within 50 feet of any flowing water observed exiting the walls or floor of the quarry. If the water flow persists for more than 96 hours and exceeds a discharge rate of 20 gallons per minute, a permanent means of protecting the water source shall be provided. Santa Cruz County Planning Department shall be informed of any discharge meeting these criteria and a Planning Department			

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	representative shall approve any proposed mitigation measure. In general, appropriate mitigation will include capturing the discharge in such a way as to protect it from contamination and recharge of the runoff to the karst system.			
Impact: Even with implementation of mitigation measures HYD-1 and HYD-2, impacts to water quality and/or water quantity at Liddell Spring by continued quarrying may be significant. Based on the results of the analysis contained in the Geology and Hydrology Technical Appendix (Appendix F), some impacts on Liddell Spring water quality are attributable to the quarrying operation, either due to the ponding and recharge of turbid water in the quarry pit or due to blasting. To the extent the proposed quarry expansion would extend the life of the quarry operation in time, it would prolong the impacts of the current quarry operation.	**Measure HYD-3:** Existing turbidity in Liddell Spring discharge, whether naturally occurring or due to quarry operations is presently being mitigated by the City with their own treatment system, without any demonstrated loss of production. The potential impacts of the quarry operation on turbidity at Liddell Spring shall be mitigated by requiring the quarry operator to reimburse the City of Santa Cruz for the reasonably determined cost of treating water exceeding the standards proposed by the 1964 agreement. CEMEX shall therefore compensate the City of Santa Cruz for the costs of treating the water for the purpose of reducing project-generated turbidity at Liddell Spring, as previously provided for, and agreed to in the 1964 agreement. SCCWD shall furnish information to CEMEX documenting reasonably determined treatment costs, which shall, in combination with the terms of the 1964 agreement, serve as the basis for the compensation. EMEX and SCCWD shall conduct a joint monitoring program at Liddell Spring during the early phases of mining in the Boundary Expansion Area (at least through overburden removal) to monitor implementation of this mitigation measure and to facilitate communication and response to any turbidity or sedimentation issues that arise. The quarry operator shall also provide SCCWD with the blasting schedule, so that blast related turbidity events can be anticipated and precisely mitigated.	Quarry Operator and City of Santa Cruz Water Department	County Planning Department	Annually during mining
Biological Resources				
Impact: The Limestone Quarry Boundary Expansion Project would impact San Francisco dusky-footed woodrat (SFDW) populations within the Boundary Expansion Area through the loss of 17.1 acres of habitat and displacement/take of approximately 40 individual woodrats.	**Measure BIO-1:** To mitigate the loss of SFDW habitat, a conservation easement shall be placed over suitable SFDW habitat at a ratio of 1:1 (one acre habitat preserved for one acre of habitat removed). The following steps shall be taken: 1. Prepare an assessment of SFDW habitat on three sites and identify the preferred site for the conservation easement. The three sites recommended for assessment are shown in Figures 36 and 37 and include: 1) APN 063-132-08, mixed evergreen forest and redwood	Quarry Operator	County Planning Department and California Department of Fish and Game (CDFG).	Prior to commencement of mining in the Boundary Expansion Area.

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	forest in the buffer zone adjacent to the east side of the Boundary Expansion Area; 2) APN 063-121-07, coyote brush scrub located immediately north of the Boundary Expansion Area; and 3) APN 058-011-01, chaparral and knobcone pine vegetation near the San Vicente Quarry. The assessment shall include: • A map and description of vegetation communities, based on Holland 1986, Preliminary Description of the Terrestrial Natural Communities of California; • A map of the locations of SFDW houses, with GPS coordinates; • The number of houses per acre by mapped vegetation community; • An assessment of each house to determine if it is active or inactive, using observation techniques (unless trapping is required by CDFG); • A description of the tree and shrub species found within 25 feet of each house; • A description of the percent and type of ground cover immediately around each house; • A description of the building materials used for the house and an assessment as to whether similar materials remain in the area or the supply has been depleted; • A description of what the house is built on (e.g., ground, crotch of tree); • A description of enhancement measures that could be implemented to improve the quality of habitat for SFDW on the parcel; and • An assessment of connectivity of the SFDW habitat on the parcel to other similar habitat. 2. Collect additional data on habitat conditions and use in the Boundary Expansion Area. The purpose is two-fold: a) to determine whether the atypical redwood forest habitat is suitable for long-term use by SFDW and thus redwood forest can be used for the conservation easement; and b) to determine how many acres of SFDW habitat will require replacement at the 1:1 ratio (this is currently estimated to be 17.1 acres). Data shall include: • Collection and analysis of fecal samples from all SFDW houses in the proposed Boundary Expansion Area and from a random sample of SFDW houses in the northern portion of the 1,000 foot buffer area to the east of the project area. The purpose is to determine whether the			

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	redwood forest vegetation community provides suitable foraging habitat in addition to other habitat requirements (e.g., breeding). • If lab results from fecal analysis are ambiguous or inconclusive, the use of telemetry and tracking of selected animals shall be conducted for a period of 30 days to determine where SFDWs in the Boundary Expansion Area are foraging (i.e., what vegetation communities). • If the data collected under No. 2 indicate that the redwood forest vegetation community provides suitable nesting and foraging habitat for SFDW, then preservation of redwood forest habitat in the adjacent buffer zone east of the Boundary Expansion Area (APN 063-132-08), or an alternate parcel with suitable habitat, is an acceptable measure to reduce the impacts to below a level of significance. • If the data collected under No. 2 indicate that the redwood forest vegetation community does not provide suitable breeding and foraging habitat for SFDW, then a site containing coyote brush scrub, and/or northern coastal scrub, and/or coast live oak forest, and/or chaparral shall be used. **Measure BIO-2:** In addition to Measure BIO-1, up to 40 SFDW shall be actively and passively relocated from the Boundary Expansion Area prior to land-clearing activities that will impact SFDW houses. Two potential relocation sites have been identified. The first relocation site is located immediately north of the Boundary Expansion Area on parcel 063-122-05. A second site is located northeast of the Boundary Expansion Area near the San Vicente Quarry (APN 058-011-01); a habitat evaluation of these sites will be provided under Measure BIO-1. Any remaining houses/animals shall be passively relocated. The specific implementation methods for this mitigation measure shall be described in a SFDW Mitigation Plan. All relocation and tracking data collected under the SFDW Mitigation Plan shall be compiled into a report for submittal to CDFG and the County Planning Department. The SFDW Mitigation Plan shall at least include: • Safety measures to avoid transmittal of Hantavirus and Arenavirus. Both the Hantavirus and Arenavirus are typically found in rodent populations and are shed in their saliva, urine, and feces. Humans can become infected after inhaling aerosolized droplets of urine or particulates contaminated with rodent excreta. Appropriate safety measures shall be taken including protection against inhalation of			

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	contaminated particulates, protection against particulates coming into contact with conjunctiva (eyes), and protection against fleabites. Those handling house materials shall use appropriate respiratory, eye and skin protection (e.g., use of a hazardous materials suit). • Data collection at each house to be dismantled (under either passive or active relocation) to identify house-building materials, contents of house cavities (particularly stored food plants), the percent and type of ground cover immediately around each house, the tree and shrub species surrounding the house, and what the house is built on (e.g., ground, crotch of tree). • Trapping method and length of time an animal can be held during house relocation • New house design: for example, a wine barrel or similar receptacle staked into the ground, upside down and at an angle in appropriate microhabitat (based on data collected above and in Measure BIO-1), with materials from the nest chamber of the dismantled house placed inside, and other house materials placed over and around the barrel, including a long tunnel-shaped entrance that leads only into the receptacle so that when released the SFDW can only enter the house and cannot exit except through the tunnel. Food and house building materials shall be provided. Slash generated during land clearing activities within the Boundary Expansion Area could be spread throughout the mitigation site to provide additional house building materials. • Releasing method (how the trapped SFDW is released into the new house) • Tracking of the relocated animals with radio telemetry for a period of 30 days following their release to determine the success of the relocation effort. • Methods of passive relocation, including whether animals are to be trapped and released locally prior to house dismantling, and what time of day passive relocation shall occur.			
Impact: The 1996 Reclamation Plan Amendment would eliminate the 1:1 replacement requirement of all habitat types previously impacted in favor of vegetation communities that can be more easily re-established in reclaimed quarry areas. Replacement of maritime chaparral, needlegrass grassland, and diverse native grassland would not occur, and test plots would not be continued. This does not reflect current knowledge and would result in the	**Measure BIO-3:** Revise the proposed 1996 Reclamation Plan Amendment to incorporate sensitive habitats, a test plot system and to update the vegetation maps. This can be accomplished by incorporating the approach provided in the "2005 Alternative Revegetation Plan", referenced as Appendix D. The "Mitigated 1996 Reclamation Plan Amendment" shall also include 0.9 acre of coast live oak forest, and a suitable mix of hydrophytic (growing wholly or partially in water) vegetation species to	Quarry Operator	County Planning Department	The revised revegetation plan shall be submitted to the Planning Department prior to public

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permanent loss of sensitive habitats. The 1996 Reclamation Plan Amendment does not replace the 0.9 acres of coast live oak forest occurring in the Boundary Expansion Area that would be removed by the project.	revegetate a portion of the quarry floor in accordance with Part 7 of Measure HYD-1. A suitable mix of hydrophytic species for a seasonal wetland may include such species as rush (*Juncus* spp.), bulrush (*Scirpus* spp.), sedge (*Carex* spp.), etc. The revised revegetation plan shall be developed by CEMEX in cooperation with a qualified revegetation specialist for approval by County Planning prior to public hearing of the project proposal.			hearing on the project.
Impact: The removal of 17.1 acres of forest and shrub-dominated upland habitat has the potential to impact or disturb nesting raptor and migratory bird species that may establish nests within the Boundary Expansion Area, resulting in a violation of state code and the MBTA	**Measure BIO-4:** Tree removal or land clearing that removes nesting habitat shall be conducted outside of the breeding season (February 15 to August 15) for raptors and migratory birds. Alternatively, the mining Boundary Expansion Area shall be surveyed for nesting birds by a qualified biologist using established CDFG protocols no more than 30 days prior to tree removal or land clearing, if these activities are to occur during the breeding season. If nesting birds are detected within the construction zone, methods of avoiding active nest sites (e.g., establishment of a buffer area around the active nest until hatchlings have fledged) shall be developed in coordination with CDFG. Surveys shall be completed between February 15 and August 15 of any given year.	Quarry Operator	County Planning Department and California Department of Fish and Game	Prior to commencement of mining in the Boundary Expansion Area.
Impact: Overburden removal and mining in the Boundary Expansion Area could increase sediment levels entering Liddell Spring and discharged downstream to Liddell Creek. The project could also reduce the quantity of water in Liddell Spring. Central coast steelhead habitat could be impacted by increased sediment loads in lower reaches of Liddell Creek, and decreased flows.	**Measure HYD-1** (see Hydrology above or Section 4.4 of the Draft EIR for a complete description).	Quarry Operator	County Planning Department	The design shall be submitted for review by the Planning Department prior to the public hearing and implemented during mining.
Impact: The Revegetation Plan component of the proposed 1996 Reclamation Plan Amendment does not provide adequate performance standards that meet the standards provided in Section 16.54.055 of the County Code.	**Measure BIO-5: Performance Standards for Revegetation** 1. Revegetation shall be part of the approved Reclamation Plan, unless it is not consistent with the approved end use. A native species vegetative cover suitable for the proposed end use and capable of self-regeneration without continued dependence on irrigation, soil amendments or fertilizer shall be established on disturbed land (including roads, ponds, streambeds, and other areas used in the mining operation) unless introduced species are consistent with the approved Reclamation Plan or unless native species prove infeasible.	Quarry Operator	County Planning Department	The revised revegetation plan shall be submitted to the Planning Department prior to public hearing on the project.

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	Vegetative cover or density, and species-richness shall be, where appropriate, sufficient to stabilize the surface against effects of long-term erosion and shall be similar to naturally occurring habitats in the surrounding area. The vegetative density, cover and species richness of naturally occurring habitats shall be documented in baseline studies carried out prior to the initiation of mining activities. However, for areas that will not be reclaimed to prior conditions, the use of data from reference areas in lieu of baseline site data is permissible. 2. Test plots conducted simultaneously with mining shall be required to determine the most appropriate planting procedures to be followed to ensure successful implementation of the proposed revegetation plan. The Planning Director may waive the requirement to conduct test plots when the success of the proposed revegetation can be documented from experience with similar species and conditions or by relying on competent professional advice based on experience with the species to be planted. 3. Where surface mining activities result in compaction of the soil, ripping, disking, or other means shall be used in areas to be revegetated to eliminate compaction and to establish a suitable root zone in preparation for planting. When it is not necessary to remove road base materials for revegetative purposes, the Planning Director may set a different standard pursuant to Subsection 16.54.055(b)(3). 4. Prior to closure, all access roads, haul roads, and other traffic routes to be reclaimed shall be stripped of any remaining road base materials, prepared in accordance with Subsection 16.54.055(f)(7), covered with suitable growth media or top soil, and revegetated. 5. Soil analysis shall be required to determine the presence or absence of elements essential for plant growth and to determine those soluble elements that may be toxic to plants, if the soil has been chemically altered or if the growth media consists of other than the native topsoil. If soil analysis suggests that fertility levels or soil constituents are inadequate to successfully implement the revegetation program, fertilizer or other soil amendments may be incorporated into the soil. When native plant materials are used, preference shall be given to slow-release fertilizers, including mineral and organic materials that mimic natural sources, and shall be added in amounts similar to those			

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	found in reference soils under natural vegetation of the type being reclaimed. 6. Temporary access for exploration or other short-term uses on arid lands shall not disrupt the soil surface except where necessary to gain safe access. Barriers shall be installed when necessary to prevent unauthorized vehicular traffic from interfering with the reclamation of temporary access routes. 7. Native species shall be used for revegetation, except when introduced species are consistent with the approved Reclamation Plan or native species prove infeasible. Areas to be developed for industrial, commercial, or residential use shall be revegetated for the interim period, as necessary, to control erosion. In this circumstance, non-native plant species may be used if they are not noxious weeds and if they are species known not to displace native species in the area. 8. Planting shall be conducted during the most favorable period of the year for plant establishment. 9. Soil stabilizing practices shall be used where necessary to control erosion and for successful plant establishment. Irrigation may be used when necessary to establish vegetation. 10. If irrigation is used, the operator must demonstrate that the vegetation has been self-sustaining without irrigation for a minimum of two years prior to release of the financial assurances by the Planning Director, unless an artificially maintained landscape is consistent with the end use. 11. Noxious weeds shall be managed: (i) When they threaten the success of the proposed revegetation; (ii) To prevent spreading to nearby areas; and (iii) To eliminate fire hazard. 12. If recommended by the botanist, horticulturist or plant ecologist, plants and seed shall be propagated from sources on the site. If purchased, seed should be from a local source. A local source is defined as being as close as possible to the same geographic location or watershed, elevation, aspect, and soil type as the project.			

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	13. The revegetation plan shall provide for re-establishing or enhancing any rare and endangered, or locally unique plant communities disturbed by any mining operation. 14. Success of revegetation shall be judged based upon the effectiveness of the vegetation for the approved end use, and by comparing the quantified measures of vegetative cover, density, and species-richness of the reclaimed mined lands to similar parameters of naturally occurring vegetation in the area. Either baseline data or data from nearby reference areas may be used as the standard for comparison. Quantitative standards for success and the location(s) of the reference area(s) shall be set forth in the approved Reclamation Plan. Comparisons shall be made until performance standards are met provided that, during the last two years, there has been no human intervention, including, for example, irrigation, fertilization, or weeding. Standards for success shall be based on expected local recovery rates. Valid sampling techniques for measuring success shall be specified in the approved reclamation plan. Sample sizes must be sufficient to produce at least an 80 percent confidence level. Standard statistical methods in commonly available literature may be utilized for determining an 80 percent confidence level on a site-by-site basis. Examples of such literature include (without limitation) D. Mueller-Dombois and H. Ellenberg, 1978 "Aims and Methods of Vegetation Ecology," John Wiley & Sons, Inc., or D.D. Bonham 1988 "Measurement for Terrestrial Vegetation." Protection measures, such as fencing of revegetated areas and/or the placement of cages over individual plants shall be used in areas where grazing, trampling, herbivory, or other causes threaten the success of the proposed revegetation. Fencing shall be maintained until revegetation efforts are successfully completed.			
Impact: The proposed 1996 Reclamation Plan Amendment does not provide required detail governing the management or use of the stockpile resource in conflict with Mining Regulations 16.54.055 Performance Standards for Topsoil Salvage, Maintenance, and Redistribution.	**Measure BIO-6:** The 1996 Reclamation Plan Amendment shall be revised in conformance with Mining Regulations 16.54.055(h) Performance Standards for Topsoil Salvage, Maintenance, and Redistribution. 1. All salvageable topsoil suitable for revegetation shall be removed as a separate layer from areas to be disturbed by mining operations. Topsoil and vegetation removal shall not precede surface mining	Quarry Operator	County Planning Department	Topsoil Plan shall be submitted prior to commence-ment of mining and implemented during mining and

Environmental Impacts	Mitigation Measures	Party Responsible for Implementing	Party Responsible for Verifying Compliance	Timing of Compliance
	activities by more than one year, unless a longer time period is approved by the Planning Director. 2. Topsoil resources shall be mapped prior to stripping and the location of topsoil stockpiles shall be shown on a map in the Reclamation Plan. If the amount of topsoil needed to cover all surfaces to be revegetated is not available on site, other suitable material capable of sustaining vegetation (such as subsoil) shall be removed as a separate layer for use as a suitable growth media. Topsoil and suitable growth media shall be maintained in separate stockpiles. Test plots may be required to determine the suitability of growth media for revegetation purposes. 3. Soil salvage operations and phases of reclamation shall be carried out in accordance with a schedule that: (i) is set forth in the approved Reclamation Plan; (ii) minimizes the area disturbed; and (iii) is designed to achieve maximum revegetation success allowable under the mining plan. 4. Topsoil and suitable growth media shall be used to phase reclamation as soon as can be accommodated by the mining schedule presented in the approved reclamation plan following the mining of an area. Topsoil and suitable growth media that cannot be utilized immediately for reclamation shall be stockpiled in an area where it will not be disturbed until needed for reclamation. Topsoil and suitable growth media stockpiles shall be clearly identified to distinguish them from mine waste dumps. Topsoil and suitable growth media stockpiles shall be planted with a vegetative cover or shall be protected by other equally effective measures to prevent water and wind erosion and to discourage weeds. Relocation of topsoil or suitable growth media stockpiles for purposes other than reclamation shall require prior written approval from the Planning Director. **5.** Topsoil and suitable growth media shall be redistributed in a manner that results in a stable, uniform thickness consistent with the approved end use, site configuration, and drainage patterns.			reclamation

Environmental Impacts	Mitigation Measures	Party Responsible for Implementing	Party Responsible for Verifying Compliance	Timing of Compliance
Air Quality				
Impact: Site preparation including vegetation clearing and overburden removal would occur in several stages over the initial 2-year period. These activities would result in increased emissions of fugitive dust in addition to existing mining operations.	**Measure AQ-1:** CEMEX shall limit active work areas for site preparation to less than 8.2 acres for vegetation clearing or 2.2 acres for overburden stripping at any point in time.	Quarry Operator	County Planning Department	During mining

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