2.7 Paleontological Resources

This section describes the existing paleontologic conditions within the Proposed Project site and vicinity, identifies regulatory requirements and industry standards associated with paleontologic issues, and evaluates potential impacts and mitigation measures related to implementation of the Proposed Project.

This analysis is based on mapping provided in two Geotechnical Investigations prepared for the Proposed Project by Geocon, and related Addenda prepared by Geocon to address technical comments by the County. Specifically, these include an analysis of the main (northern) portion of the Project site encompassing approximately 162 acres (Geocon 2012a), a separate analysis of the 48-acre southeastern site area (Geocon 2012b), and the noted Addenda (Geocon 2014b, 2013a). Relevant portions of these investigations are summarized below along with other applicable information, with the complete reports included in Appendix K of this EIR.

2.7.1 Existing Conditions

2.7.1.1 *Geologic Formations*

Paleontology is the science dealing with prehistoric plant and non-human animal life. Paleontological resources (or fossils) typically encompass the remains or traces of hard and resistant materials such as bones, teeth, or shells, although plant materials and occasionally less resistant remains (e.g., tissue or feathers) can also be preserved. The formation of fossils typically involves the rapid burial of plant or animal remains and the formation of casts, molds, or impressions in the associated sediment (which subsequently becomes sedimentary rock). Because of this, the potential for fossil remains in a given geologic formation can be predicted based on known fossil occurrences from similar (or correlated) geologic formations in other locations. Accordingly, while there are no recorded fossil occurrences or collection efforts known from the Proposed Project site, paleontological resource potential can be inferred from on-site geology and off-site fossil occurrences in similar materials, as outlined below.

Based on the geotechnical investigations undertaken for the Proposed Project, surficial materials and geologic formations observed or (potentially) expected to occur within the Project site include historic fill deposits; Quaternary-age alluvial, colluvial and terrace deposits and topsoil, the Tertiary-age Santiago Formation; Cretaceous-age igneous intrusive (granitic) rocks; and Cretaceous/Jurassic-age (Mesozoic) metasedimentary and metavolcanic rocks. Summary descriptions of the paleontological resource sensitivities associated with the surficial materials and geologic formations are provided below.

Historic Fill Deposits

Historical artificial fill deposits occur throughout the Proposed Project site and exhibit no potential for the occurrence of significant paleontological resources, due to their recent age and the destructive nature of their origin (i.e., they have been mechanically processed through methods such as crushing and screening). Similarly, Quaternary native topsoil deposits also occur throughout the site and do not exhibit any potential for significant paleontological resource

values due to their relatively recent age and high-energy methods of formation and deposition (i.e., physical and chemical weathering produces soil that is transported and deposited by methods such as water, wind, and gravity). On-site pockets of colluvial deposits exhibit no potential for significant paleontological resource values due to their relatively recent age and method of deposition, and the fact that they are derived from igneous rocks (as described below) or related materials.

Quaternary Alluvium

Quaternary alluvial materials occur throughout the Proposed Project site. The alluvial materials on site are assigned a low paleontological resource sensitivity due to their relatively recent age, high-energy formation/deposition environment, and the fact that, with rare exceptions, significant fossil occurrences are unknown from such deposits in San Diego County.

Quaternary River Terrace Deposits

Quaternary river terrace deposits were observed underlying colluvial materials in the east-central portion of the Proposed Project site. The locations of the terrace deposits were not mapped as they were not at the surface; however, Figures ~~2.11-1~~2.10-1a and 1b, *Geologic Map*, illustrate~~s~~ the locations of the colluvial materials in the east-central portion of the site. Quaternary river terrace deposits were formed at times of higher and older stream base levels than exist today, and of probable late Pleistocene age. Such deposits are assigned a moderate paleontological resource sensitivity. This designation is based on known occurrences of fossil resources from correlated materials in a number of locations, including well-preserved ground sloth remains from terrace deposits associated with the San Dieguito River Valley (Deméré and Walsh 1993); and mammoth, mastodon, camel, horse, and tapir remains from river terrace deposits within and adjacent to the San Luis Rey River in Oceanside.

Tertiary Santiago Formation

The Santiago Formation was encountered beneath undocumented fill deposits north of the site during off-site geotechnical investigation, and could potentially occur beneath on-site surficial deposits as well. The middle Eocene-age (between approximately 45 and 49 million years old) Santiago Formation includes three distinct members, with the upper two (Members B and C) consisting of interbedded sandstones, siltstones and/or claystones, and the lower member (Member A) comprised of massive mudstones. Member B and C are assigned a high paleontological resource sensitivity, based on known occurrences of well-preserved vertebrate (e.g., mammals and reptiles) and invertebrate remains from numerous locations in northern San Diego County. While the lower Member A of this formation has not produced substantial fossil remains, it is assigned a moderate paleontological resource sensitivity due to its largely unknown potential (Deméré and Walsh 1993). Based on the description of this formation in the Project Geotechnical Investigation (i.e., sandstone and claystone units, Geocon 2012a), it is assumed that the materials encountered on site represent Members B and C as noted above.

Cretaceous Igneous Intrusive Granitic Rocks

Igneous intrusive rocks occur in large swaths throughout the Proposed Project site. Granitic rocks exhibit no potential for the occurrence of paleontological resources due to their molten origin. As such, residual soil deposits also exhibit no paleontological resource potential due to their formation from igneous rocks and relatively recent age.

Jurassic/Cretaceous Metavolcanic and Metasedimentary Rocks

Based on mapping and descriptions provided in the separate analysis of the 48-acre southeastern site area (Geocon 2012b), metamorphic rocks including undifferentiated metasedimentary and/or metavolcanic units were encountered on site. Metavolcanic rocks are assigned a zero potential for the occurrence of paleontological resources, for similar reasons as noted above for igneous intrusive rocks. Metasedimentary rocks are typically assigned a marginal sensitivity for paleontological resources. This designation is based on the fact that while these units are unlikely to produce important fossil remains due the destructive effects of metamorphism (i.e., heat and pressure), they exhibit a limited probability for the localized occurrence of paleontological resources.

2.7.1.2 *Regulatory Setting*

Section 87.430, Paleontological Resources, of the San Diego County Code of Regulatory Ordinances (Grading Ordinance) states:

> The County Official may require that a qualified paleontologist be present during all or selected grading operations, to monitor for the presence of paleontological resources. If fossils greater than twelve inches in any dimension are encountered, then all grading operations in the area where they were found shall be suspended immediately and not resumed until authorized by the County Official. The permittee shall immediately notify the County Official of the discovery. The County Official shall investigate and determine the appropriate resource recovery operations, which the permittee shall carry out prior to the County Official's authorization to resume normal grading operations.

The San Diego County General Plan COS Element provides policies for protection of natural resources, including paleontological resources and unique geologic features for conservation, many of which are fossiliferous formations. The associated policies, however, do not place legal requirements on projects with regard to paleontological resources. It is the general policy of the County to maintain an inventory of fossils and unique geological formations and to provide opportunities for public education on paleontological resources.

2.7.2 Analysis of Project Effects and Determination as to Significance

2.7.2.1 *Paleontological Analysis*

Guideline for the Determination of Significance

The Proposed Project would have a potentially significant environmental impact to paleontological resources if it would:

1. Directly or indirectly damage a unique paleontological resource or site, or include grading or excavation that would disturb the substratum or parent material below the major soil horizons in any paleontologically sensitive area of the County, as shown on the San Diego County Paleontological Resources Potential and Sensitivity Map.

Guideline Source

Guideline No. 1 is taken from the County Guidelines for Determining Significance – Paleontological Resources (2009b).

Analysis

On-site Resources

As discussed above, much of the site is underlain by topsoils/fill. Recent colluvial deposits occur along the flanks and toes of most on-site slopes, and alluvial deposits were observed in most on-site drainages. Cretaceous igneous intrusive rocks are present within or beneath much of the site both near the surface and at depth. Each of these soils types and the cretaceous rocks is rated as having no to low paleontological sensitivity. Marginal-sensitivity metamorphic rocks are present in the southeastern portion of the site, south of Mount Whitney Road. Terrace deposits, which have a moderate paleontological sensitivity rating, underlie colluvial materials in the east-central portion of the site, and the high-sensitivity Santiago Formation (Members B and/or C) was observed beneath fill deposits in the northern portion of the site. The Project Geotechnical Investigation (Geocon 2012a) notes that while this formation is not expected to be encountered during Project grading, it may be encountered "…during trenching operations for utilities." Table 1 in the Paleontological Guidelines, "Formations with a High or Moderate Potential to Contain Paleontological Resources in San Diego County," includes river terrace deposits among the formations with paleontological potential. While the Santiago Formation is not specifically listed in this table, it is included in this analysis due to the previously noted high sensitivity for Members B and C (Deméré and Walsh 1993). The County Guidelines further note that for projects within areas of high or moderate paleontological resources potential that propose excavation equal to or greater than 2,500 cy, the services of a project paleontologist and a paleontological resources monitor are required.

Conservative (worst-case) grading estimates for the Proposed Project include approximately 1,090,000 cy of cut and fill within the site, including excavation for on-site utilities. Earthwork for the Project would impact areas containing deposits with both high and moderate

paleontological sensitivity ratings; therefore, **potential impacts to paleontological resources are significant. (Impact P-1)**

Off-site Resources

River terrace deposits considered to have a moderate paleontological sensitivity rating underlie off-site roadway improvement areas that consist of colluvial surface materials (that have no potential for significant paleontological resource values). Other off-site roadway improvement areas consist of non-sensitive granitic rock and alluvial materials with a low paleontological sensitivity rating. **Potential impacts from disturbance of terrace deposits associated with the off-site roadway improvements are significant. (Impact P-2)**

2.7.3 Cumulative Impact Analysis

The cumulative study area would be any project in the area with "High or Moderate Potential to Contain Paleontological Resources in San Diego County" in the vicinity of the Proposed Project site depicted on Figure 1-34 of this EIR.

Based on review of regional geologic mapping (California Geological Survey [CGS] 2007b), and as indicated above, the Proposed Project vicinity is generally dominated by volcanic/granitic formations. Also as noted above, these formations are generally not fossil bearing. The projects most likely to contain paleontological resources potentially encompass older alluvium associated with terrace deposits and/or the Santiago Formation (such as the Proposed Project). These include some projects immediately adjacent to the Valiano site (i.e., Harmony Grove Village), as well as the following 38 projects that may be located within the noted formations potentially exhibiting moderate or high paleontological resources sensitivity: (1) 35 projects apparently located at least partly within older alluvium associated with terrace deposits (Nos. 35-37, 79-89, 92-94, and 101-108); and (2) three projects apparently associated with the Santiago Formation (Nos. 38, 39 and 78, refer to Figure 1-34). All of the listed projects, along with any other projects with potentially sensitive formations identified during site-specific review, would be subject to similar analysis and (if applicable) mitigation requirements for paleontological resources as described in this subchapter (and pursuant to CEQA).

The importance of individual resources comes from the research value and the information they can provide to the paleontologist. The information gained from test excavations and data recovery programs for projects with paleontological resource impacts within the County would be presented in reports and filed with the County, as well as a scientific institution with permanent paleontological collections, such as the San Diego Natural History Museum. The fossil collections from any potentially significant site also would be curated at such a scientific institution and would be available to other paleontologists for further study. Based on the required regulatory compliance (Grading Ordinance) of both the Proposed Project and cumulative projects, **effects on paleontological resources would be less than significant.**

2.7.4 Significance of Impacts Prior to Mitigation

The following potentially significant impacts related to paleontological resources could occur under Proposed Project implementation:

Impact P-1 Project grading for on-site facilities, including excavation and grading activities, could have a potentially significant impact to paleontological resources within terrace deposits and the Santiago Formation.

Impact P-2 Project grading for off-site facilities could have a potentially significant impact to paleontological resources within terrace deposits.

2.7.5 Mitigation

The following mitigation measure shall be implemented to ensure that potential adverse impacts to paleontological resources (Impact P-1 and P-2) from Proposed Project implementation would be reduced to less than significant. Evidence shall be provided to the Director of PDS that the following notes have been placed on the grading plan:

M-P-1–Paleontological Monitoring and Report

In order to mitigate for potential impacts to paleontological resources on the project site, a monitoring program during grading, trenching or other excavation into undisturbed rock layers beneath the soil horizons and a fossil recovery program, if significant paleontological resources are encountered, shall be implemented pursuant to the County of San Diego Guidelines for Determining Significance for Paleontological Resources. A County approved Paleontologist shall be contracted to perform paleontological resource monitoring and a fossil recovery program if significant paleontological resources are encountered during all grading, trenching, or other excavation into undisturbed rock layers beneath the soil horizons for on- and off-site grading associated with the Proposed Project's grading permit. The following shall be completed:

a. A County approved Paleontologist shall perform the monitoring duties pursuant to the most current version of the County of San Diego Guidelines for Determining Significance for Paleontological Resources, including the authorization to direct, divert, or halt any grading activity, and to perform all other acts required by the provisions listed below. If the qualified paleontologist or paleontological monitor ascertains that the Santiago Formation or river terrace deposits are not fossil bearing, the qualified paleontologist shall have the authority to terminate the monitoring program. The contract provided to the county shall include an agreement that the grading/ trenching/excavation monitoring will be completed, and a Memorandum of Understanding (MOU) between the approved Paleontologist and the County of San Diego shall be executed. The contract shall include a cost estimate for the monitoring work and reporting.

b. The cost of the monitoring shall be added to the grading bonds or bonded separately and include:

1. Salvage unearthed fossil remains.

2. Record stratigraphic and geologic data to provide a context for the recovered fossil remains.

3. Prepare collected fossil remains for curation.

4. Curate, catalog, and identify all fossil remains to the lowest taxon possible, inventory specimens, assign catalog numbers, and enter the appropriate specimen and locality data into a collection database.

5. Transfer the cataloged fossil remains to an accredited institution (museum or university) in California that maintains paleontological collections for archival storage and/or display.

6. In order to ensure the final Paleontological Resource Mitigation Report documents the results, analysis, and conclusions of all phases of the Paleontological Monitoring Program, the following shall be completed. The report shall and include the following items:

- If no paleontological resources were discovered, submit a Negative letter report, which states that the monitoring has been completed and that no paleontological resources were discovered.

- If resources were discovered and recovered during grading, a detailed report shall be prepared by the Project Paleontologist. The report shall comply with the County of San Diego's Guidelines for Determining Significance for Paleontological Resources. The report shall identify which accredited institution has agreed to accept the curated fossils and include proof of the Transfer of Paleontological Resources, in the form of a letter, from the director of the paleontology department of the accredited institution to the Director of PDS verifying that the curated fossils from the project site have been received by the institution."

The Project Paleontologist shall prepare the final report and submit it to PDS for approval prior to final grading release. If resources were discovered, then the applicant shall complete the following:

- Transfer the cataloged fossil remains and copies of relevant field notes, maps, stratigraphic sections, and photographs to an accredited institution (museum or university) in California that maintains paleontological collections for archival storage and/or display, and

- The applicant shall submit hard and electronic copies of the final Paleontological Resources Mitigation Report to the PDS for final approval of the mitigation. In addition, submit the report to the San Diego Natural History Museum and to the institution that received the fossils.

Prior to approval of any grading and/or improvement plans and issuance of any Grading or Construction Permits, the applicant shall provide a copy of the Grading Monitoring Contract, cost estimate, and MOU to PDS. Additionally, the cost amount of the monitoring work shall be added to the grading bond cost estimate. Upon acceptance of the report, the bond amount can be relinquished.

2.7.6 Conclusion

Grading and excavation activities associated with development of on- and off-site facilities for the Proposed Project could result in potentially significant impacts related to disturbance/ destruction of sensitive fossil resources preserved within the Quaternary (Pleistocene) river terrace deposits (Impacts P-1 and P-2) and the Santiago Formation (Impact P-1). Mitigation for these impacts would reduce the impact to less than significant because monitoring during original cutting of previously undisturbed Quaternary river terrace deposits and the Santiago Formation and collection of fossils, if discovered (M-P-1), would recover and document relevant information contained in the paleontological record, which is important in understanding prehistory. The mitigation also ensures that the paleontological monitor has the authority to halt or divert grading activities in the area of any discovery until the important resources are removed.