

Appendix 4.11-1  
*CVBMP Paleo*

**TECHNICAL REPORT  
PALEONTOLOGICAL RESOURCE ASSESSMENT  
CHULA VISTA BAYFRONT MASTER PLAN  
CITY OF CHULA VISTA  
SAN DIEGO COUNTY, CALIFORNIA**

**INTRODUCTION**

The City of Chula Vista, the Port of San Diego, and Pacifica Companies propose to develop portions of the Chula Vista Bayfront Master Plan study area, an irregularly-shaped 550-acre parcel along the bayfront in the City of Chula Vista, San Diego County, California. The parcel is located generally south of the Sweetwater Marsh National Wildlife Refuge, north of Palomar Street, east of San Diego Bay, and west of Bay Boulevard (Figure 1). For planning purposes the project area has been subdivided into three districts as follows: the northern Sweetwater District, the middle Harbor District, and the southern Otay District.

This technical report provides an assessment of issues related to paleontological resources within the project footprint. The purpose of this report is to assist City of Chula Vista, Port of San Diego, and Pacifica Companies staff in planning and design efforts for the proposed project, as it relates to paleontological resource issues. Specifically, this report is intended to summarize existing paleontological resource data in the project area and vicinity; assess potential impacts to paleontological resources from implementation of the project; and identify mitigation measures to avoid or reduce project-related impacts wherever feasible. Additional discussion of report methodology is provided below. This report was prepared by Thomas A. Deméré and Matthew K. Burgess of the Department of PaleoServices at the San Diego Natural History Museum, San Diego, California.

As defined here, paleontological resources (i.e., fossils) are the remains and/or traces of prehistoric plant and animal life exclusive of humans. Fossil remains such as bones, teeth, shells, leaves, and wood are found in the geologic deposits (rock formations) within which they were originally buried. For the purposes of this report, paleontological resources can be thought of as including not only the actual fossil remains but also the collecting localities and the geologic formations containing those localities.

**METHODOLOGY**

A review was conducted of relevant published geologic reports (Kennedy and Tan, 1977), unpublished geotechnical reports (Geocon, Inc., 1987), unpublished paleontological reports (Deméré and Walsh, 1993), and museum paleontological site records (San Diego Natural History Museum-SDNHM; Natural History Museum of Los Angeles County-LACM). This approach was followed in recognition of the direct relationship between

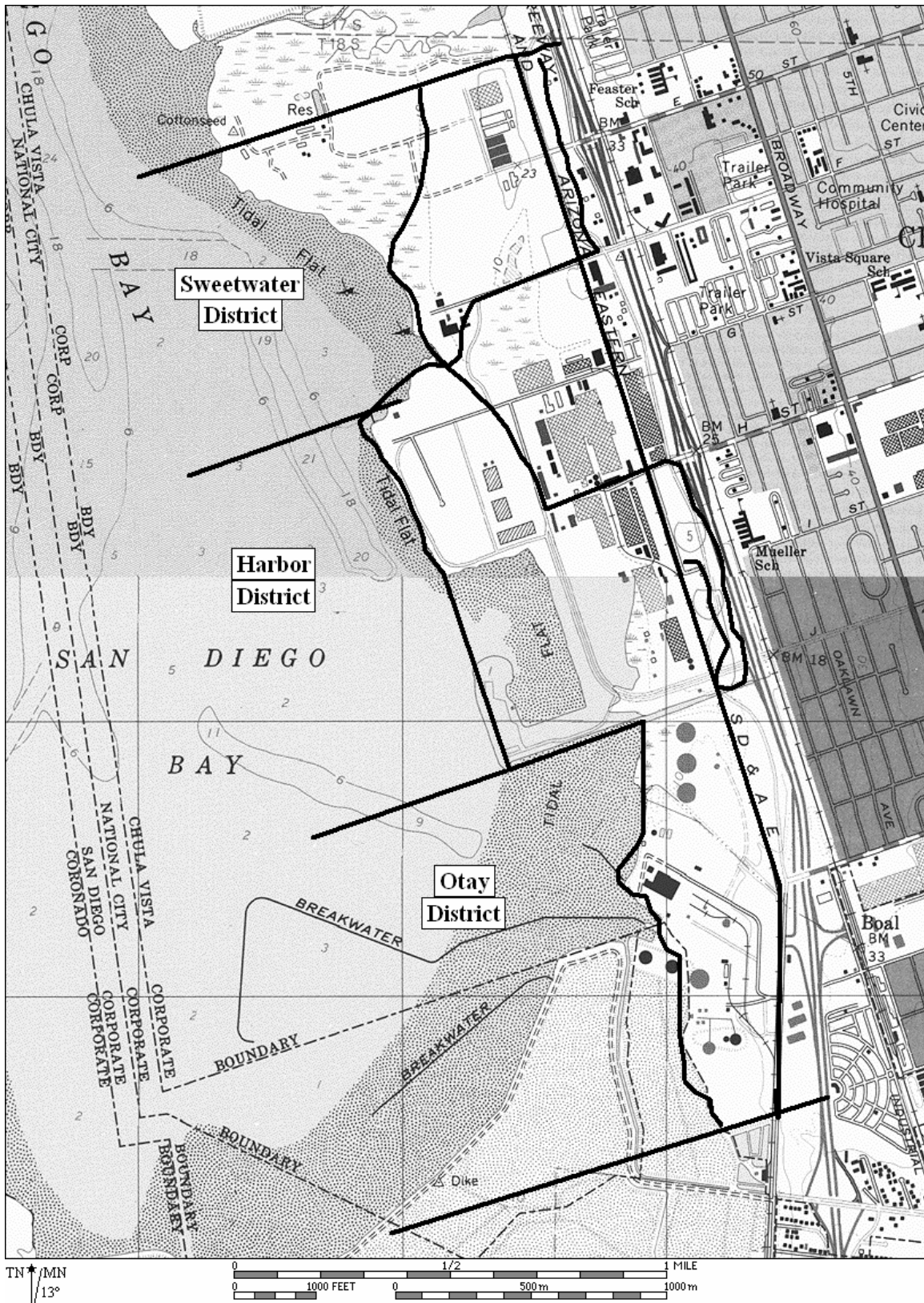


Figure 1. Index map showing location of the Chula Vista Bayfront Master Plan project site. Base map: National City, CA 7.5' USGS topographic quadrangle.

paleontological resources and the geologic formations within which they are entombed. Knowing the geology of a particular area and the fossil productivity of particular formations that occur in that area it is possible to predict where fossils will, or will not, be encountered.

A field walkover of portions of the project site was conducted to field check the results of the literature and record surveys and to determine the paleontological sensitivity of the geologic units that will be affected by the planned improvements. This field work involved inspection of the site for bedrock outcrops, geologic contacts, and presence or absence of paleontological resources (i.e., fossils).

## **EXISTING CONDITIONS**

### **PHYSICAL GEOLOGICAL SETTING**

As mapped by Kennedy and Tan (1977) the geologic deposits underlying the project area consist of artificial fill materials, Quaternary alluvium, and Pleistocene-age sedimentary rocks of the Bay Point Formation. The interpretations of Kennedy and Tan (1977) differ somewhat from those summarized in the draft report prepared by Carrier Johnson (2004). The nature of these differences are mentioned below.

#### **Artificial Fill Materials**

The geologic map of Kennedy and Tan (1977) indicates that artificial fill materials underlie essentially the entire Harbor District portion of the project site. These fill materials presumably were derived from earlier channel dredging operations and were placed in such a way as to provide topographically high areas for current and future development. The thickness of these fill materials is uncertain, although a generalized geologic cross section constructed by Allied Geotechnical Engineers, Inc. suggests thicknesses on the order of 10 to 20 feet. Artificial fill materials exposed along the shoreline of Bay Side Park consist of interstratified horizons of gray-brown, coarse-grained, shelly sand; dark brown sandy mud; and gray-brown, pebbly sand.

#### **Quaternary Alluvium**

The geologic map of Kennedy and Tan (1977) interprets the low lying areas at, and adjacent to, the mouths of the Sweetwater Valley and Telegraph Canyon drainages (Sweetwater District and Otay District portions of the project site, respectively) as being underlain by Quaternary alluvial deposits and/or slopewash. As mapped these deposits also include modern bay sediments within the littoral and shallow sublittoral portions of San Diego Bay. Also included in these Quaternary alluvial deposits are sands and muds occurring in the small isolated remnants of back bay marsh flats and tidal creeks that occur here and there along the Chula Vista bayfront. An alternative interpretation of these deposits is presented in the Carrier Johnson report, which suggests that the low-lying areas in the Otay District are underlain by bedrock terrace deposits (i.e., Bay Point Formation of Kennedy and Tan, 1977). This alternative interpretation is not followed in

the present report, primarily because of the low topographic position of this area and its occurrence at the mouth of the modern drainage of Telegraph Canyon.

### **Bay Point Formation**

The geologic map of Kennedy and Tan (1977) indicates that bedrock deposits of the Pleistocene-age Bay Point Formation underlie the upland areas of the Sweetwater District portion of the project site. The site-specific geotechnical study conducted by Geocon, Inc. (1987) found that the Bay Point Formation here consists of at least 40 feet of loosely consolidated Pleistocene-age sedimentary rocks divisible into an upper 22-foot-thick sandstone unit and a lower 18-foot-thick claystone unit. The upper sandstone unit varies from red-brown, fine- to medium-grained, silty sandstone at the top to gray-brown, medium-grained micaceous sandstone at the base. The lower claystone unit consists of grayish-green, very stiff silty claystone with thin interbeds of gray-brown, very fine- to fine-grained, silty sandstone. No good exposures of the Bay Point Formation were observed during the field walkover, primarily because of the lush botanical overburden resulting from the recent heavy rains. As discussed above, the Carrier Johnson report suggests that the bedrock terrace deposits (i.e., Bay Point Formation of Kennedy and Tan, 1977) have a wider distribution in the project area, occurring throughout the Otay District, as well as the Sweetwater District. This alternative interpretation is not followed in the present report.

## **PALEONTOLOGICAL RESOURCE ASSESSMENT**

### **SENSITIVITY**

Impacts to paleontological resources are typically rated from high to zero depending upon the resource sensitivity of impacted formations. The specific criteria applied for each sensitivity category are summarized below.

#### **High Sensitivity**

High sensitivity is assigned to geologic formations known to contain paleontological localities with rare, well-preserved, critical fossil materials for stratigraphic or paleoenvironmental interpretation, and fossils providing important information about the paleobiology and evolutionary history (phylogeny) of animal and plant groups. Generally speaking, highly sensitive formations produce vertebrate fossil remains or are considered to have the potential to produce such remains.

#### **Moderate Sensitivity**

Moderate sensitivity is assigned to geologic formations known to contain paleontological localities with poorly preserved, common elsewhere, or stratigraphically unimportant fossil material. The moderate sensitivity category is also applied to geologic formations that are judged to have a strong, but unproven potential for producing important fossil remains (Bay Point Formation).

## **Low Sensitivity**

Low sensitivity is assigned to geologic formations that, based on their relatively youthful age and/or high-energy depositional history, are judged unlikely to produce important fossil remains. Typically, low sensitivity formations produce poorly-preserved invertebrate fossil remains in low abundance (Quaternary Alluvium).

## **Zero Sensitivity**

Zero sensitivity is assigned to geologic formations that are entirely igneous in origin and therefore have no potential for producing fossil remains. Artificial fill materials are also placed in this category.

## **SITE SPECIFIC RESOURCE ASSESSMENT**

There are no museum fossil collecting localities recorded from the Bay Point Formation deposits occurring within the Chula Vista Bayfront Master Plan project area. The nearest recorded localities occur approximately 2.5 miles east and northeast of the project site. Both localities occur within Pleistocene-age alluvial/fluvial deposits mapped as the Bay Point Formation by Kennedy and Tan (1977).

### **Artificial Fill Materials**

**Introduction** Artificial fill materials consisting primarily of dredged bay deposits have been placed in a number of areas along the shoreline of San Diego Bay.

**Paleontology** Because of the disturbed nature of artificial fill materials, any contained organic (e.g., fossil) remains have lost their original stratigraphic/geologic context.

**Site Specific Assessment** Artificial fill materials occur over a broad area of the Harbor District. Due to the loss of stratigraphic/geologic context, any organic (e.g., fossil) remains occurring within the artificial fill materials are considered to possess essentially no paleontological resource value.

### **Quaternary Alluvium**

**Introduction** Quaternary alluvium in the project area primarily consists of silts, sands, and gravels transported and deposited by the Sweetwater River and the stream flowing through the Telegraph Canyon drainage. These deposits are assumed to be entirely Holocene in age (approximately 0 to 10,000 years old).

**Paleontology** Because of the recent age of the Quaternary alluvial deposits and their close association with modern drainages, any contained organic (e.g., sub-fossil) remains are too young to be considered paleontological resources.

**Site Specific Assessment** Quaternary alluvial deposits occur over the entire Otay District, the easternmost portion of the Harbor District, and the low-lying southern and western portions of the Sweetwater District. Due to the youthful nature of the Quaternary alluvial deposits they are considered to possess essentially no paleontological resource value.

## **Bay Point Formation**

**Introduction** The Bay Point Formation (Kennedy, 1975) represents a sequence of marine and/or non-marine sedimentary deposits of late Pleistocene age (approximately 0.1-0.5 million years old, Ma). Typical exposures of this formation consist of light brown to gray, fine- to coarse-grained, micaceous, friable sandstones and pebble conglomerates. The Bay Point Formation varies in thickness from less than 10 feet to over 100 feet and is thought to have been deposited under fluvial, aeolian, and/or shallow nearshore marine conditions (Kennedy, 1975). For the most part these deposits accumulated on flat, wave-cut platforms (i.e., sea floors) during periods of dropping sea levels. Today, these deposits form the low mesa surfaces immediately adjacent to the coastline in the Oceanside, Carlsbad, Encinitas, Solana Beach, Del Mar, Torrey Pines, La Jolla, and Pacific Beach areas of San Diego County. In the bayfront region of San Diego Bay sedimentary rocks of the Bay Point Formation are not associated with a wave-cut platform and instead occur as a thick sequence of primarily non-marine deposits that accumulated in the structural graben formed by faulting within the La Nacion and Rose Canyon fault zones. Typically bedrock exposures in this area consist of reddish-brown to gray-brown, fine-to coarse-grained massive fluvial sandstones; reddish-brown sandy paleosols; and light gray to brown, fine-grained, sandy siltstones.

**Paleontology** Fossil localities are locally common in the Bay Point Formation and have been recorded from a number of coastal sites from Carlsbad to Chula Vista. Fossils collected from these sites primarily consist of well-preserved remains of nearshore marine invertebrates including shells of oysters, clams, scallops, snails, barnacles, crabs, and sand dollars (Valentine, 1961; Kern, 1977; Kern and Rockwell, 1992). Also recovered from these sites, however, are sparse dental remains of sharks and rays, as well as rare remains of land mammals (Deméré and Walsh, 1993.). While there are no recorded museum localities within the Bay Point Formation deposits in the immediate vicinity of the project site, correlative strata are known to be fossiliferous. The nearest recorded Bay Point Formation localities occur in non-marine fluvial sandstones exposed east of Hilltop Drive in Chula Vista (SDNHM Locality 4839) and along Palm Avenue in National City (LACM Locality 594). A single well-preserved lower leg bone of a fossil rabbit (cf. *Lepus* sp.) was collected from SDNHM Locality 4839, while LACM Locality 594 yielded a single lower molar of an extinct species of tapir (cf. *Tapirus* sp.).

**Site Specific Assessment** Sedimentary deposits of the Bay Point Formation are confined to the northeastern portion of the Sweetwater District where they underlie the low coastal mesa adjacent to Bay Boulevard. Although no fossils were observed in deposits of the Bay Point Formation during the field walkover and no previous fossil collecting localities are known from the project site, the sedimentary origin of the Bay Point Formation and its general fossiliferous character suggests that this rock unit has the potential to yield

significant fossils during development of the Sweetwater District portion of the project site.

## **IMPACT ANALYSIS**

### **INTRODUCTION**

Direct impacts to paleontological resources occur when earthwork activities, such as mass grading operations, cut into the geological deposits (formations) within which fossils are buried. These direct impacts are in the form of physical destruction of fossil remains. Since fossils are the remains of prehistoric animal and plant life they are considered to be nonrenewable. Such impacts can be significant and, under CEQA guidelines, require mitigation.

Impacts to paleontological resources are rated in this report from high to zero depending upon the resource sensitivity of impacted formations. The specific criteria applied for each sensitivity category are summarized below.

#### **High significance**

Impacts to high sensitivity formations.

#### **Moderate significance**

Impacts to moderate sensitivity formations (Bay Point Formation).

#### **Low significance**

Impacts to low sensitivity formations (Quaternary alluvium).

#### **Zero significance**

Impacts to zero sensitivity formations (Artificial fill materials).

### **SITE SPECIFIC IMPACTS**

Specific impacts to moderate, low, and zero sensitivity paleontological resources are described in the following section. Because of the preliminary nature of the two alternative project designs, the impact descriptions given below are generally qualitative rather than quantitative.

#### **Option B (Non-Land Transfer Option)**

**Sweetwater District** Option B proposes relatively extensive residential development in that portion of the Sweetwater District underlain by the Bay Point Formation. Without

being able to review site-specific excavation plans and a more comprehensive geotechnical report of subsurface conditions in the areas of excavation, it is not possible to accurately assess the extent of Option B impacts on paleontological resources. However, it is clear that any excavation operations located in deposits of the Bay Point Formation have the potential to temporarily unearth and permanently destroy buried paleontological resources.

**Harbor District** Although Option B proposes extensive development in the Harbor District, any construction related excavations will be confined to areas underlain by artificial fill materials and/or Quaternary alluvium. Such work will not result in any significant impacts to sensitive paleontological resources.

**Otay District** Option B proposes extensive commercial and recreational development in the Otay District. However, construction related excavations will be confined to areas underlain by artificial fill materials and/or Quaternary alluvium. Such work will not result in any significant impacts to sensitive paleontological resources.

### **Option C (Land Trade Option)**

**Sweetwater District** Option C, the preferred option, proposes commercial and hotel development in that portion of the Sweetwater District underlain by the Bay Point Formation. Without being able to review site-specific excavation plans and a more comprehensive geotechnical report of subsurface conditions in the areas of excavation, it is not possible to accurately assess the extent of Option C impacts on paleontological resources. However, it is clear that any excavation operations located in deposits of the Bay Point Formation have the potential to temporarily unearth and permanently destroy buried paleontological resources.

**Harbor District** Although Option C proposes extensive development in the Harbor District, any construction related excavations will be confined to areas underlain by artificial fill materials and/or Quaternary alluvium. Such work will not result in any significant impacts to sensitive paleontological resources.

**Otay District** Option C proposes extensive residential and commercial development in the Otay District. However, construction related excavations will be confined to areas underlain by artificial fill materials and/or Quaternary alluvium. Such work will not result in any significant impacts to sensitive paleontological resources.

### **Impact Summary**

Based on the proposed improvements for both project alternatives, it appears that the only potential significant impacts to sensitive paleontological resources will occur during development of the Sweetwater District. These potential impacts will be in the form of destruction of buried fossil remains during mass grading of the low coastal mesa in this area. Proposed development plans for the Harbor District and Otay District will not result in significant impacts to sensitive paleontological resources.

## **MITIGATION MEASURES**

If excavation activities penetrate to a depth sufficient to encounter unweathered deposits of the Bay Point Formation, then these development activities may produce direct impacts to potential paleontological resources of the Bay Point Formation. Should this occur, it is recommended that the following mitigation measures be undertaken to mitigate the impact to an insignificant level.

1. A qualified paleontologist should be at the pre-construction meeting to consult with the grading and excavation contractors concerning excavation schedules, paleontological field techniques, and safety issues. (A qualified paleontologist is defined as an individual with a MS or Ph.D. in paleontology or geology who is familiar with paleontological procedures and techniques, who is knowledgeable in the geology and paleontology of San Diego County, and who has worked as a paleontological mitigation project supervisor in the county for at least one year.)
2. A paleontological monitor should be on-site on a full-time basis during the original cutting of previously undisturbed deposits of high paleontological resource potential (Bay Point Formation) to inspect exposures for contained fossils. (A paleontological monitor is defined as an individual who has experience in the collection and salvage of fossil materials. The paleontological monitor should work under the direction of a qualified paleontologist.)
3. When fossils are discovered, the paleontologist (or paleontological monitor) should recover them. In most cases this fossil salvage can be completed in a short period of time. However, some fossil specimens (such as a complete large mammal skeleton) may require an extended salvage period. In these instances the paleontologist (or paleontological monitor) should be allowed to temporarily direct, divert, or halt grading to allow recovery of fossil remains in a timely manner. Because of the potential for the recovering of small fossil remains, such as isolated mammal teeth, it may be necessary to set up a screen-washing operation on the site.
4. Fossil remains collected during monitoring and salvage should be cleaned, repaired, sorted, and cataloged as part of the mitigation program.
5. Prepared fossils, along with copies of all pertinent field notes, photos, and maps, should be deposited (as a donation) in a scientific institution with permanent paleontological collections such as the San Diego Natural History Museum. Donation of the fossils should be accompanied by financial support for initial specimen storage.
6. A final summary report should be completed that outlines the results of the mitigation program. This report should include discussions of the methods used, stratigraphic section(s) exposed, fossils collected, and significance of recovered fossils.

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