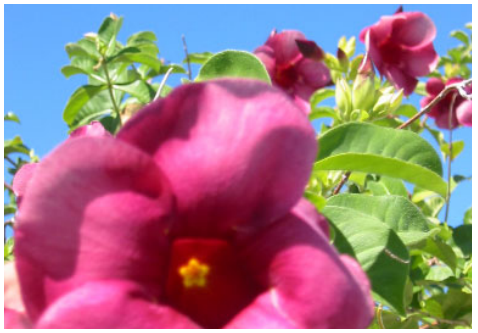
Appendix A: Roosevelt Roads Reuse Plan: Site, Context, & Market Conditions





Prepared for

Local Redevelopment Authority
US Naval Station Roosevelt Roads

&

Department of Economic Development
and Commerce, Commonwealth of Puerto Rico

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Appendix A: Table of Contents

A.I Introduction

IN AUGUST 2003, the Department of Economic Development and Commerce of the Commonwealth of Puerto Rico retained a consulting team lead by CB Richard Ellis Consulting to assist in identifying reuse opportunities for Naval Station Roosevelt Roads (NSRR). In late September 2003, the U.S. Congress ordered the Secretary of the Navy to close NSRR within six months and to do so pursuant to the Defense Base Realignment and Closure Act of 1990 ("BRAC"). That event triggered a series of actions organized around the need to prepare a Reuse Plan for the base. The CB Richard Ellis Consulting team is now assisting the Local Redevelopment Authority in preparing the Reuse Plan.

The Consulting Team is composed of:

- CB Richard Ellis Consulting: Real Estate and Development Advisors
- Cooper, Robertson & Partners: Architecture and Urban Design
- Moffatt & Nichol Engineers: Engineering
- Puerto Rico Management & Economic Consultants, Inc.: Economics

This progress report focuses on an analysis of existing conditions at the base and on the potential market support for its reuse. Specifically, it addresses the site's location, physical condition and natural features; buildings; infrastructure; transportation systems; environmental considerations; and the economic and real estate market conditions that will influence the likelihood of attracting an array of different land uses (e.g. residential, hotel, industrial, manufacturing, research and development, marina, etc.) to the site. The findings from this report will be used as a basis for developing reuse alternatives and, ultimately, for formulating a preferred reuse plan.

Report Organization

This report is designed to present the results of the Consulting Team's assessment of existing conditions and focused market analysis. In order to provide as concise a report as possible, we have captured summary level information in the body of the report while providing detailed data and back-up material in the appendices.

Following this introduction, the report is organized as follows:

- Executive summary
- Overview of location, physical conditions and natural features
- Potential development areas
- Opportunities and constraints

Information contained in the appendices includes: real estate market analysis; environmental, transportation and infrastructure assessment; and an assessment of existing buildings.

Important Notice

A great deal of the material obtained and reviewed by the Consulting Team comes from documents provided by governmental agencies including the Department of the Navy and various consultants. In reviewing these documents, the Consulting Team found certain conflicting information related to a number of conditions including, for example, the location of wetlands, mangroves, and bird habitats. Efforts are currently under way to resolve the inconsistencies in order to better understand the existing site conditions that will influence reuse opportunities.

For these reasons, the information in this progress report should be treated as preliminary only and subject to revision as additional information becomes known. Together with the Local Redevelopment Authority (LRA), the Consulting Team is trying to move quickly to understand the site to the degree necessary to identify realistic reuse options. The NEPA process (National Environmental Policy Act) and work by other consultants retained by the LRA should help facilitate resolution of the many environmental issues surrounding the site.

In conclusion, it would be inappropriate and premature to reach conclusions and begin to advocate a specific reuse scenario until the outstanding issues are resolved. This progress report is intended primarily for the benefit of the LRA as it works with the Consulting Team to formulate a Reuse Plan.

A.II Executive Summary

This summary presents preliminary findings and conclusions related to each of the subject areas analyzed by the Consultant Team including:

- Location, physical conditions and natural features
- Economic and market analysis
- Environmental, transportation and infrastructure
- Existing buildings

Location, Physical Conditions & Natural Features

The Consultant Team conducted an overview of adjacent neighborhoods, the site's physical conditions and natural features order to identify the physical development opportunities and constraints associated with the reuse of Roosevelt Roads. Our team collected and reviewed base and facilities drawings, documents and previous studies and other secondary sources provided by the Navy, other agencies and conservation groups. Amplified by field notes and photographs taken during our field trips to the site, the team's work effort results in a series of analytic drawings illustrating these physical informational layers, and which provide an understanding of the site's unique characteristics, its development constraints and an introduction to the opportunities for future reuse.

Elements considered in the overview included regional and local context, site structure, dimensions, topography and hydrology, existing vegetation, wetlands and ecology, and archeological sites. Existing land uses and supporting infrastructure were identified and mapped, as were the site's varying gradients, which must be considered when identifying areas for potential development. These conditions were then organized as a series of overlays, culminating in a summary of Constraints and Opportunities for future reuse of the base. (A separate section on Existing Building Assessment is included in Appendix C).

Our findings from this investigation are included in Sections III, IV and V of this report and are summarized below:

- The site is at the physical center of the Eastern Caribbean region. Excellent air and ship transportation is readily available; San Juan is one of the busiest and largest air, cruise and cargo ports in the region. The Roosevelt Roads site has the advantage of proximity to existing and new tourist resorts and second home market developing along the eastern coast, as well as to Vieques and Culebra, both in sight of the base, across the sound.

- At the foothills of El Yunque and at the edge of the sea, Roosevelt Roads is intrinsically linked to its regional ecology of rainforests, marine habitat, migratory birds, and coastal flora. There is the opportunity to augment a widely recognized emerging regional eco-tourism, forming a regional recreational linkage with such tourist sites both within Puerto Rico, Vieques and Culebra, and the islands of the Greater Antilles Archipelago.

- Ceiba and Naguabo are small neighboring coastal towns, both formerly agricultural, and now primarily residential in character, with supporting small-scale retail and institutional facilities. These towns are visibly impacted by the closure of the Naval operations at Roosevelt Roads, with For Sale signs proliferating throughout the residential streets and neighborhoods and now along some of the prime retail sites at the center of town. There is little industry in either town; both were dependent on the Navy for local employment. With the closure of the base, it appears that many local residents are relocating out of the immediate area. The town has enjoyed beach access and development of a fishing boat pier on property belonging to the Navy, to the east of the northern gate. A concern is how ownership of this portion of the property will be determined in the future.

- Access to the site is limited and circuitous at the northern end of the site and would require reconfiguration and wayfinding. Access to the southern gate from the regional road network is direct and well market. Of great advantage, there is the opportunity for direct access to the airport area, regardless of whether it remains an active airfield or is redeveloped for other purposes. The airfield has helipads and multiple runways, the longest over 11,000 feet in length, and as such, can accommodate virtually any size aircraft. While the airfield today is visually screened from outlying areas by heavy vegetation, it could become visible to the main highway with selective tree thinning creating value for new commercial development activity.

- One of the largest coastal properties in Puerto Rico remaining in single ownership, the site encompasses a sweeping 8,300 acres on mainland Puerto Rico plus two smaller islands, Isla Pineros Isla and Cabeza de Perro that together represent some 300 additional acres. The site geographically is the easternmost extension of the foothills of El Yunque, forming notable, twin "booted" peninsulas that together frame Ensenada Honda, the large and well-protected harbor at the center of the site with a distinctive ring of hills, nearly 300 feet at the highest point. A smaller bay, Bahia de Puerca, presents a second "outboard" opportunity for water-related activity and adjacent development.

- Limited largely by topography and mangrove forest preserves, opportunity for direct access to the water is restricted to a few locations at the site's small but charming beachfronts, and along the extensively bulkheaded frontage of the harbor along the northern peninsula. Along this formerly industrial waterfront, the infrastructure is sufficient to support a variety of regionally appropriate uses, such as a passenger terminal to Vieques and Culebra.

- The encircling Delicias Hills influence the direction of the site's surface water drainage in addition to providing dramatic water and coastal views to the north and south. They also serve to contain noise generated by activity at the airfield, which is located in the site's major northeast/southwest valley. Dual views of El Yunque to the west and Island Pineros and Vieques to the east are equally compelling, and can be best seen from two spectacular vantage points, Punto Medio Mundo, jutting into the bay at the northernmost high point of the site, and at the site's dramatic northern eastern "heel" on the peninsula, among the most valuable on the site.

- The richness of natural diversity, of natural flora, extensive wetlands, mangrove forests and surrounding sea grass beds, underscores multiple ecologies and biodiversity present at the site. The site is an important coastal resource and potential habitat for a number of threatened and endangered species including the Yellow Shouldered Blackbird and the West Indian Manatee. Again, under single ownership, this presents a unique opportunity for conservation as well as development. Additionally, there are a number of listed archeological sites potentially warranting future investigation.

- Existing development at the base falls within six fragmented zones separated by topography, wetlands or land use: the airfield, Bundy to the southwest, "Downtown" at the center of the site, Capehart (residential neighborhoods on the southern peninsula), the waterfront along the northern bulkhead of Ensenada Honda, and Camp Moscrip at the edge of Bahia de Puerca. Each area is dominated by a singe land use with supporting adjacent facilities; each is adaptable to reuse or appropriate for redevelopment. Support facilities at the base are diverse and include a recently renovated hospital, a well-equipped ambulatory care medical and dental facility, two air-conditioned schools, libraries, a theater, a public works building, refrigerated storage areas, commercial buildings of varying sizes and recreational facilities that include tennis courts, small-boat marina, fitness center, a 9-hole golf course and a variety of ball fields. As with most military installations and with few exceptions, base facilities were developed with little regard to aesthetic quality or siting, designed to be purely functional and operationally necessary, with minimal support facilities. It is an environment of mostly well-maintained, "no-frills" structures and facilities.

- Infrastructure at the base was developed in support of specific land uses and zones, and while adequate to support reuse, it is likely that with reuse of the base, elements of existing infrastructure will require updating and modification, particularly roads, which are not designed to service significant traffic generated by private vehicles, and piers, which are sized to service naval and tanker vessels not passenger ferries or private charter boats.

- With much of the site falling within wetland areas, the 100-year floodplain and areas with greater than 15% gradient or in existing development or the 521 acres reserved for new development at the airport, new development is limited 1,208 acres throughout the remainder of the site.

- Areas of concern (AOCs) related to the presence of potential contaminants, and solid waste management units (SWMUs) require further definition and clarification, and will present significant constraint to future development. The Navy's Environmental Assessment, currently underway, will provide additional information regarding these areas, and the scope of potential cleanup.

Economic and Market Analysis

The Consulting Team conducted an economic and real estate market overview in order to assess the market opportunities and constraints likely to be associated with the reuse of Roosevelt Roads. Uses considered in the market analysis included research and development (science park), industrial, retail, lodging, cruise ship terminal, marinas, nautical tourism, and residential. The anticipated outcome of this overview is the identification of the types of land uses that are likely to be supported from a market perspective. Findings and preliminary conclusions from the market analysis are presented in detail in Appendix A and are summarized below.

- Some of the uses considered are more likely to be supportable in the near-term while others will require a longer-term perspective to find market acceptance. Market findings indicate that supportable near-term uses, including reuse of some existing buildings, include:
  - Residential
  - Research and development in the form of university sponsored research and educational programs
  - Industrial including distribution, warehouse and, perhaps, some manufacturing
  - Marina
  - Eco-tourism activities
- In the longer-term, several additional uses could be supportable as demand grows and as the market acknowledges the success of early projects at Roosevelt Roads. These other uses could include:
  - Resort hotels
  - Specialty retail/restaurants in a marina and tourist port setting
  - Convenience retail (i.e. a grocery store-anchored neighborhood shopping center) to serve the needs of local residents living at Roosevelt Roads and in immediately surrounding neighborhoods
- Current residential market conditions in the Fajardo/Ceiba Region are depressed, with declining prices and increased vacancy, which are due primarily to the closure of Roosevelt Roads and the departure of associated military and civilian jobs. In the near term, Roosevelt Roads is not proximate to job centers, which will temper demand for housing. However, the Fajardo/Ceiba Region is projected to require 13,000 new housing units by 2025 to keep up with population growth. Therefore, future demand for housing located at Roosevelt Roads could be strong, either for re-use of current housing or construction of new units, especially as jobs are attracted to Roosevelt Roads over time. The site attributes of Roosevelt Roads, including spectacular views and existing infrastructure including schools, hospital, etc., as well as the future improvements in access to San Juan via new highway construction, could make the site an attractive location for both the primary and second-home markets.
- Past case study research performed by CBRE Consulting indicates that Roosevelt Roads has many of the attributes necessary for a Science Park. There has been preliminary interest expressed by both the University of Puerto Rico and the Polytechnic University of Puerto Rico in locating select research and development efforts on the site. If one of the universities were to serve as an anchor for the park, the ability to attract additional public and private sector tenants would be greatly enhanced.
- Potential demand for industrial development at Roosevelt Roads appears to be somewhat limited based

on the current supply of general-purpose industrial buildings in the Fajardo/Ceiba Region and the corresponding vacancy rate in the Region. However, Roosevelt Roads does have an advantage in the presence of the base airport, which could be attractive to industrial users. Additionally, Roosevelt Roads has the potential to attract industrial owner-occupiers, such as pharmaceutical and high technology manufacturers.

- There appears to be good potential for a marina at Roosevelt Roads given its location within the Fajardo/Ceiba Region, where many of Puerto Rico's marinas are concentrated, as well as its proximity to Vieques and Culebra. However, the marina inventory in the eastern region could be increasing significantly in the coming years if proposed expansion plans at various marinas are executed, which could temper demand at Roosevelt Roads.

- Roosevelt Roads has several attributes that support the potential for ecotourism on the site, including existing mangroves that may be explored by hiking and/or kayaking excursions, canoeing and other forms of boating that may be launched from the existing marina on the site, and ecotourism-oriented visits that could be organized to the islands off the northeast coast of Puerto Rico, such as Vieques and Culebra. Given its location, coastal setting, and environmentally sensitive areas, Roosevelt Roads could be well positioned to cater to this growing tourism sector.

- The lodging market in Puerto Rico has been stable or growing throughout the past ten years, as evidenced by the steady growth in the inventory of hotel rooms on the island. The Fajardo/Ceiba Region is known for its access to activities and amenities such as El Yunque, the sister islands of Vieques and Culebra, and water sport activities and golf, and is anticipated to experience increasing demand in the lodging market. Such demand could be captured by a potential lodging development at Roosevelt Roads, which could capitalize on the beauty of the site, its proximity to Vieques, and Culebra, and complementary land uses (such as a marina and a golf course) that could be accommodated nearby.

- Due to a lack of expressway visibility and direct access, the location of Roosevelt Roads does not lend itself to major shopping center development. However, the site does have characteristics that could support other types of retail development. There will be potential for a grocery-anchored neighborhood shopping center supported by local residents currently living in the area and future residents at Roosevelt Roads, once there are a significant number of occupied homes on the site. Additionally, specialty retail, adjacent to the water, could also be supportable if it is developed with the appropriate mix of adjacent uses (e.g., residential, marina, lodging, and tourist-oriented facilities).

- Due to Puerto Rico's location within the Eastern Caribbean, most cruise ships that make port of call stops in San Juan do so for only a partial day, often in the afternoon and evening. As a result, San Juan is an attractive destination because passengers can enjoy city activities during their brief time on the island. Interviews with planning executives at two major cruise lines indicate that there is not sufficient demand for a cruise ship terminal at Roosevelt Roads because of the site's disadvantageous location from an itinerary planning perspective.

Environmental, Transportation, and Infrastructure

The Consulting Team was tasked with reviewing existing data on infrastructure at NSRR, and supplementing with field notes and photos during field trips to the site. The team collected existing reports, base maps, coastal charts, construction plans, and utility information to ascertain that the general infrastructure of the base is currently adequate to support the existing development on the base, and has capacity to support additional development. The specifics of the surplus capacity will be studied during the alternatives analyses. Appendix B of this report details specifics of the base infrastructure, in addition to documenting environmental considerations and regional transportation system. The most important aspects of this desktop study and of Appendix B are summarized below.

- NSRR is a fully functioning base, with adequate infrastructure systems to convey potable water, fire water and power to buildings and facilities. The systems have been developed and maintained in accordance with or above the standard of care.

- Base wastewater is treated and discharged and is fully permitted under a National Pollution Discharge Elimination System permit. With the decommissioning of the base, the sanitary system will cease to be operational. If any one of the three wastewater systems ceases to be operational, the NPDES permit will become invalid. Keeping the permit valid is of key importance, since applying for and obtaining new permits for wastewater treatment and discharge is a long and arduous process. The NSRR Public Works Department plans to "mothball" and maintain equipment for the next two years.

- Base maintenance for other systems is also important. The buildings will quickly succumb to mildew and rot without minimum level of air conditioning.

- The base receives its water from a pipeline from Rio Blanco in the El Yunque Mountains. The raw water is treated and distributed throughout the base. Monitoring data for trihalomethanes (THMs) at the discharge of the treatment plant and at remote points on the water distribution system show that the addition of chlorine for disinfection at the plant is causing the formation of this organic chemical contaminant at unacceptable concentrations. THMs may be controlled by various techniques, including enhanced treatment process control, removal of the precursor organic chemicals, elimination of chlorine as the disinfecting agent or removal of the fully formed THMs by physical or chemical treatment. This should be evaluated further with regard to regulations governing Roosevelt Roads.

- NSRR, on mainland Puerto Rico, is approximately 8,600 acres in area. This area consists of military installations, residential regions, an airfield, wetlands and floodplains. Approximately 4,250 acres, or 53% of the total area, consists of mangroves, seagrass beds, natural animal habitats and other environmentally sensitive areas.

- An Area of Concern (AOC) is an area identified for possible contamination. If confirmation of contamination is obtained, the area becomes a Solid Waste Management Unit (SWMU). A process is currently in place for identifying and designating SWMUs and AOCs on the base. It is the subject of a concurrent study being completed by the LRA. For the purposes of this report, AOC and SWMU locations are not necessarily eliminated from consideration for development, since they can be remediated.

- The marine infrastructure of the base consists of 6 piers, bulkheading, one drydock, and a landing ship tank (LST) ramp. The pier adjacent to the drydock is dilapidated and does not lend itself to remediation. The visible features of the drydock, those above the waterline, are in

a state of disrepair. The remaining piers, bulkhead and LST ramp are or were recently operational, and have been maintained.

- The federal channel to Ensenada Honda is maintained to a depth of 40 ft Mean Sea Level (MSL). This is not considered a deepwater commercial port, which would be on the order of 50 ft below MSL.

- There is a 72 slip marina on base that was constructed in the mid-1990s. Each ship service box provides potable water and 110 V power. Conduit has been placed for cable television but cables were never installed. The average depth at the seawall is approximately 6–8 feet. The facility is generally in good condition as it is relatively new.

- The airfield at Roosevelt Roads has several runways, the longest of which is 11,000 feet. Future development around the runway must respect hazard zones and noise zones. These are documented in Appendix B.

Existing Building Assessment

The Team assessed the existing facilities on the base using data supplied by the Navy and on-site inspections during February 2004. One outcome of these studies and investigations was the realization that approximately 10% of the 1,600 facilities on the Base have not yet been mapped and documented to the same degree as the remaining 90%. The team is in the process of attempting to verify information about these "Unconfirmed" facilities. That said, a number of conclusions can still be drawn regarding the existing facilities at Roosevelt Roads.

The facilities were built over the course of the past 65 years from the beginnings of the Base in the late 1930s right up until the present. Approximately 75% of the buildings were built before the end of the 1960s. Most of the built facilities at Roosevelt Roads have been adequately maintained over the years and are in good condition.

A small but significant number of facilities are considered essential for continued operation of the Base infrastructure, airport or seaport. In addition, 29% of the remaining facilities are judged to be of high economic value due to their unique characteristics. Taken together these figures total more than 500 facilities spread out over the entire Base. The cost of maintaining this large number of essential or economically valuable facilities will be significant.

The remaining facilities comprise more than 1,000 structures currently serving a myriad of uses by the Navy. Because their physical condition, quality of construction and location vary considerably, their future usefulness will depend largely on the specific re-use plans developed and implemented. Again, the shear number of facilities falling into this category will make even minimal maintenance a costly endeavor. Serious consideration will have to be given to demolition of facilities that are not either used or minimally maintained in the near future to limit the cost of stabilizing and securing such a vast number of structures.

In terms of re-use of the existing facilities approximately 98% of the Net Square Footage (NSF) on the Base could be used for civilian purposes. Approximately 60% of this Square Footage (SF) consists of Residential, Institutional and Recreational facilities. The remainder is comprised largely of Commercial and Industrial facilities including offices, stores, warehouses, workshops, etc. Most of these can be readily adapted to serve any number of uses depending on the final re-use plans adopted.

A.III Overview: Location, Physical Condition, Natural Features

Every property is unique; its precise location and a broad range of physical characteristics combine to form the essential qualities of any given site.

The consulting team has reviewed a number of detailed environmental assessments of the site, extensively toured the site and has researched a number of the site's physical characteristics. The following chapter focuses on the key findings with respect to the physical nature of the site. It is then followed by a study of the existing facilities, infrastructure, land uses and development potential.

Location

Regional Context: The Caribbean

Puerto Rico is strategically located as the easternmost island of the Greater Antilles, centrally located among the eastern Caribbean archipelago. It enjoys excellent access from the U.S. Mainland via air and water transportation, and is a jumping off point to neighboring U.S. and British Virgin Islands, as well as Anguilla, Nevis and St. Kitts and the West Indies.

Among the larger islands in the Caribbean islands Puerto Rico is approximately 110 miles long and 55 miles wide and has a population that is approaching 4 million residents.

The Atlantic Ocean lies off the northern coast of Puerto Rico, the Caribbean Sea off the southern coast. Off the coast of the eastern portion of the island, two significantly sized islands, Vieques and Culebra, are separated from mainland Puerto Rico by surrounding bays, Passages de Vieques and the Sonda de Vieques.

Figure III.1
Location Context

Sources: Puerto Rico Planning Board; and CBRE Consulting

Island Context: Gold Coast

The eastern side of the island is characterized by a topographically dramatic juxtaposition of tropical rainforest and beaches framed by mangrove preserves and steeply sloping promontories affording unparalleled waterfront views.

With its peak of 3533' above sea level, El Yunque and the Caribbean National Forest in the Sierra de Luquillo Mountains is visible from nearly every venue at Roosevelt Roads, presenting a dramatic backdrop to the west, often concealed in the clouds. Its terrain changes from gentle slopes at lower elevations to deeply vegetated and rock-faced mountain slopes that exceed 60% gradient at higher elevations. To the east, the craggy coastline is characterized by distinctive heavily-vegetated and steeply sloping peninsulas framing bays and coves and limited beach accessibility.

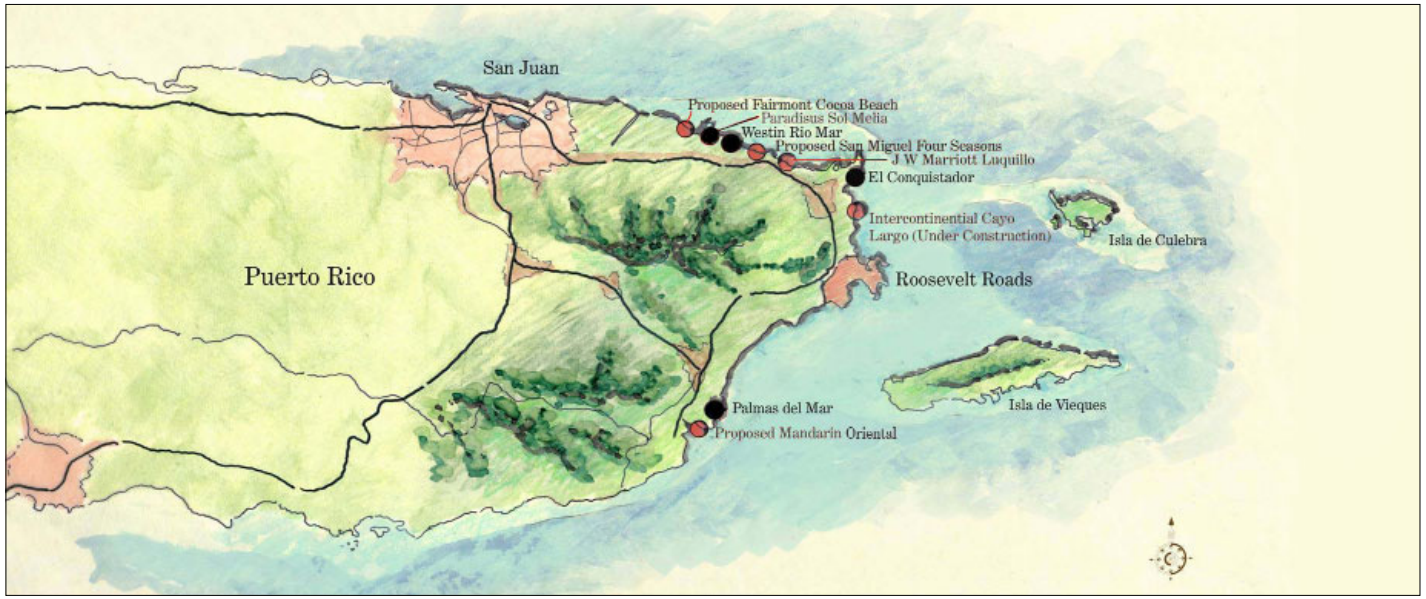


Figure III.2
The Gold Coast

Sources: Puerto Rico Planning Board; and CBRE Consulting

Approximately thirty-three (33) miles southeast of San Juan, Roosevelt Roads is situated mid-east coast, equidistant along the Gold Coast between the resorts to the northeast, including the Westin Rio Mar and Paradisus Sol Melia, and the proposed Fairmont, Four Season, J.W. Marriott, and Intercontinental properties; and those to the southeast, Palmas del Mar and the proposed Mandarin Oriental Resort near Humacao. The emerging resorts on Vieques and Culebra are accessed by ferry from Fajardo, a large town on the eight miles north of the property.

Puerto del Rey, one of the Caribbean's major recreational marinas is located less than three miles to the north of Roosevelt Roads. Ensenada Honda is one of the Gold Coast's most unspoiled and significant bays and lies at the center of the Roosevelt Roads property. The bay is twelve (12) nautical miles from Isabel Segunda on the north coast of Vieques and six (6) miles from its southwestern pier. It is also forty-four (44) nautical miles from St. Thomas; sixty (60) nautical miles from Christiansted, St.Croix; and sixty-five (65) miles from Tortola, BVI.

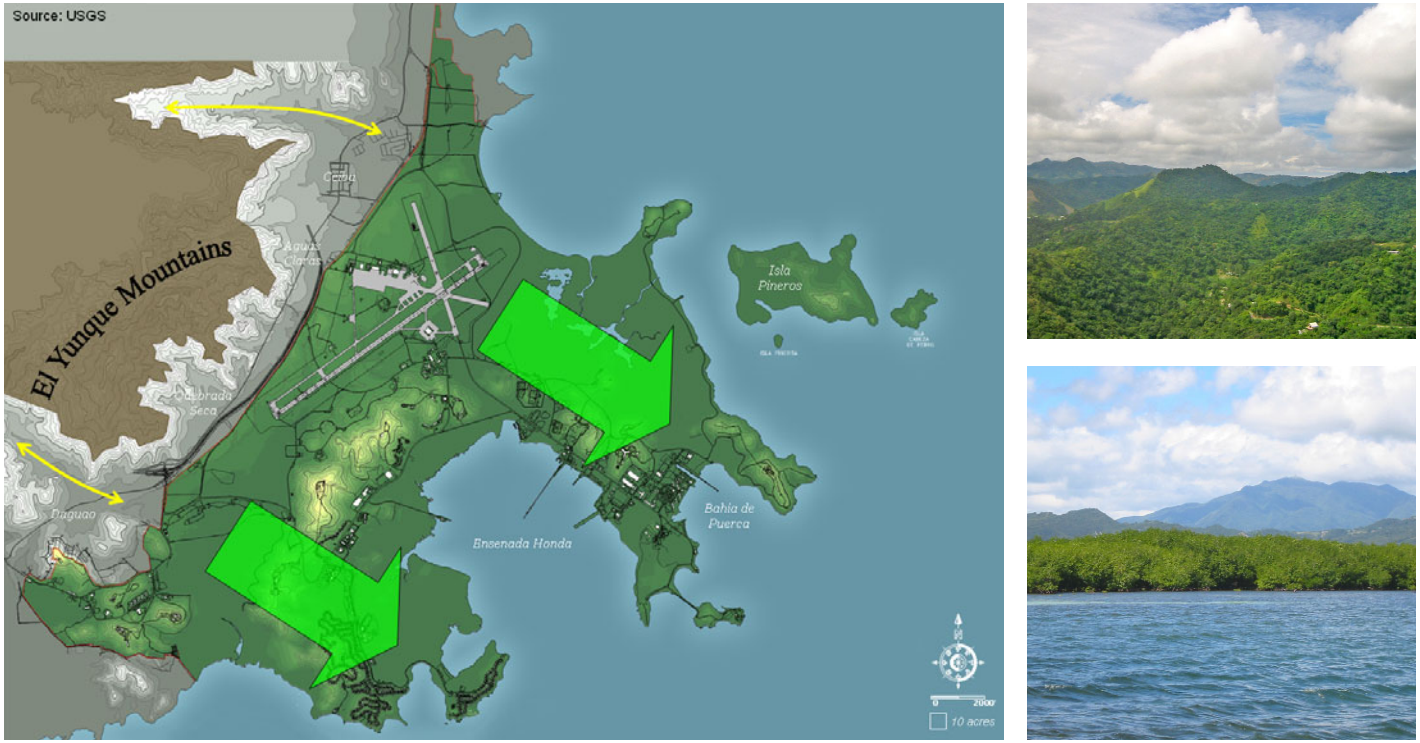
Local Context: Surrounding Neighborhoods
Ceiba and Naguabo

Two small neighboring towns, Ceiba to the west of the Roosevelt Roads Naval Base and Naguabo to the south are the nearest centers of local population. Ceiba, founded in 1838, derives its name from the name of a famous tree that grows on the island, Ceiba Pentandra.

Both Ceiba and Naguabo were rooted to agriculture as their main source of economic activity prior to the Navy's siting of the Roosevelt Roads Naval Base in the 1940s.

Figure III.3
Site Structure

Source:USGS



Site Structure

The site is a natural extension of the continuous foothills of the rainforest, forming a visually powerful backdrop and termination of the rainforest watershed.

Ensenada Harbor, the large sound at the center of the site is framed by dual southeast-oriented peninsulas, typical of the geographic character of Puerto Rico's eastern shore. The northern peninsula is higher; its top elevation approaches 200' above sea level at its peak. The southern peninsula is somewhat lower in elevation and is completely ringed by mangroves at the water's edge with limited exception. A pair of "boots", the small points at the end of the peninsulas create parallel "islands" into the sea.

Bahia de Puerca, a small bay at the northern peninsula is a smaller-scale mirror version of the overall site, framed by two smaller waterfront promontories that orient toward the long vista toward Vieques.

Off the coast of the northern peninsula, two additional small islands are part of the property. The larger one, Isla Pineros, is 1 mile by ½ mile in dimension; Cabeza de Perro, the smaller one, is ¼ mile in diameter.

Physical Condition

Site Dimensions

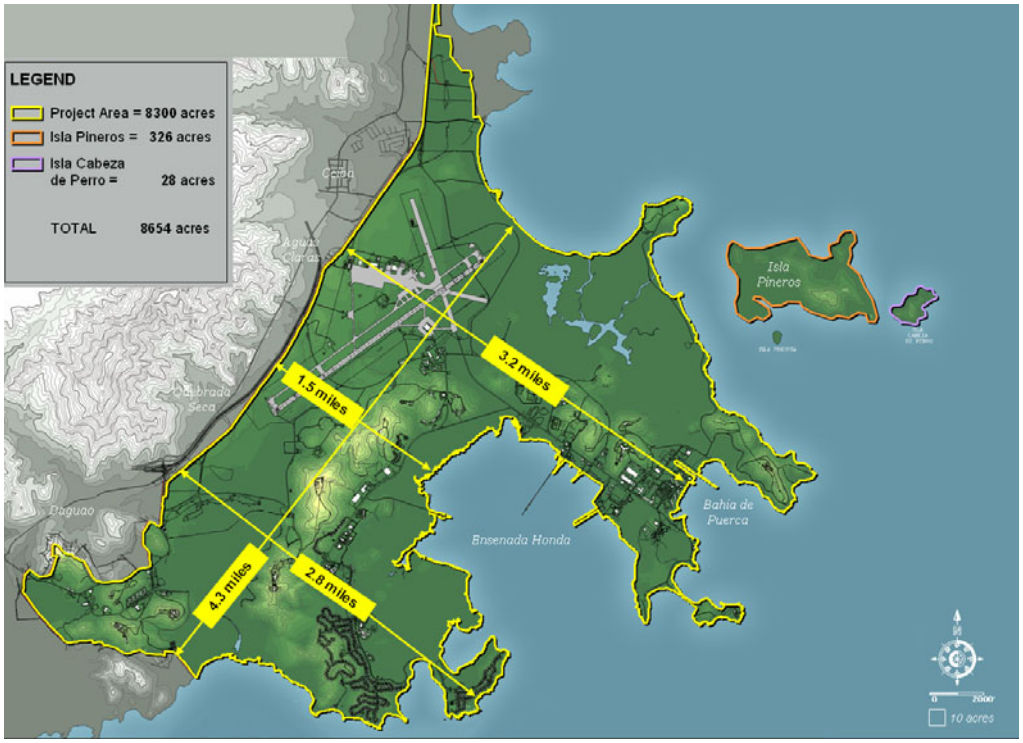


Figure III.4
Site Dimensions:

A remarkable expanse of coastal waterfront property, the Roosevelt Roads site encompasses just over 8,300 acres. Certainly this is one of the largest coastal properties under single ownership on the island.

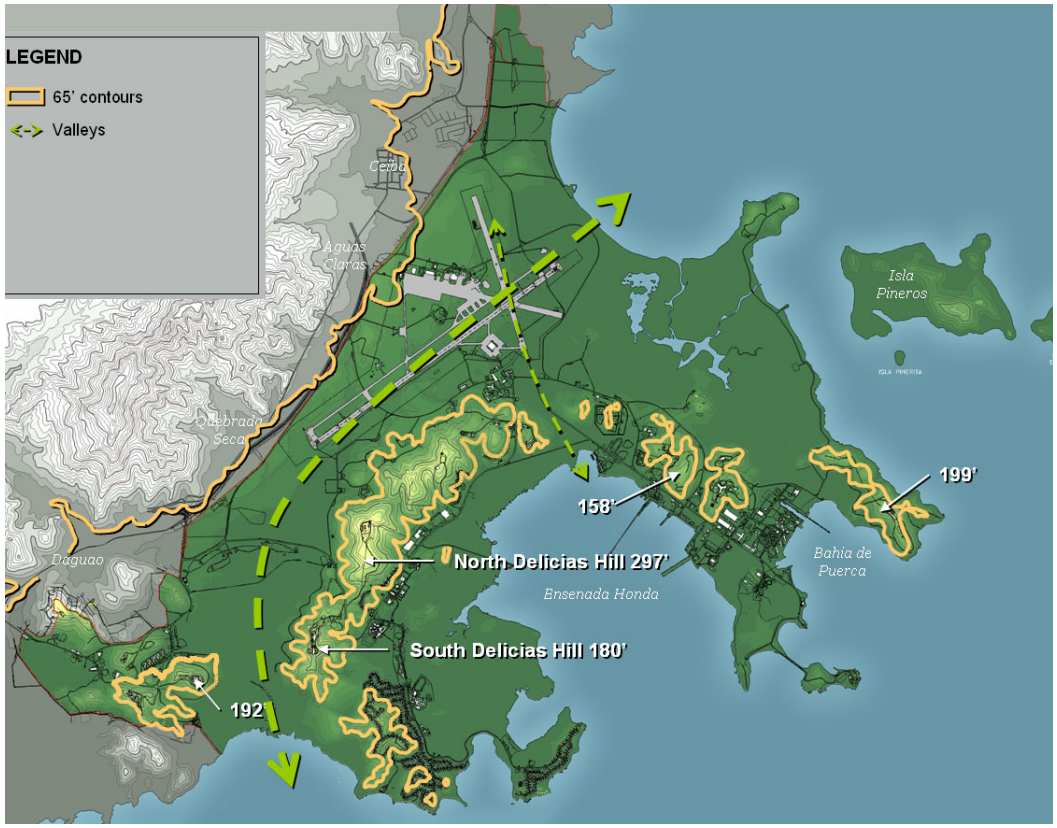
In dimensions it measures nearly five miles across (northeast to southwest) and nearly four miles at its width (northwest to southeast). At its narrowest, the midsection of the site is 1.5 miles wide.

Ensenada Honda is a large and naturally protected harbor measuring roughly 1.25 miles wide by 2.15 miles long. The smaller Bahia de Puerca is exposed to the prevailing outboard swells and chop of open water; it measures approximately .5 miles wide by .7miles long.

Local Site Topography

Figure III.5
Local Site Topography: Varied, broad range from sea level to 297' in elevation

Sources: USGS, BakerCAD



The site has a varied topographical aspect, typical of the eastern coastal properties of this region and the foothills of the rainforest. There is a broad range in elevation from sea level to 297' vertical elevation at the high point in the middle of the site's central ridge.

The site's principal defining topographic feature is the distinctive ring of nearly continuous hills framing Ensenada Honda from the southern peninsula to the northern peninsula. At its midpoint in the center of the site is a high ridge dividing the upland airport from the harbor. On the central northern peninsula, the hills have been cut away to create a significantly sized building pad for the public works building.

The hills create major northeast/southwest valley, an ideal site to have aligned and located the well-protected, visually protected airfield with a naturally "built-in" wind screen. From the west, and the east, the airport's main runways are effectively hidden by topography, enhanced by dense vegetation. A secondary valley aligned along the northwest/southeast secondary runway alignment, penetrates the ring of hills.

Another cluster of hills at the southern end of the site afford substantial elevation and therefore views south toward Naguabo and Humacao.

North of Bahia de Puerca, the site consists of a large rectangular high promontory of nearly 200' elevation above sea level. Surrounded by densely vegetated and steeply sloping terrain, this point has sweeping views overlooking the harbor, all of the surrounding and distant islands, and a singular view toward northern coastline to the recently restored Cabezas Lighthouse and to Fajardo.

Natural Features

Hydrology and Watercourses

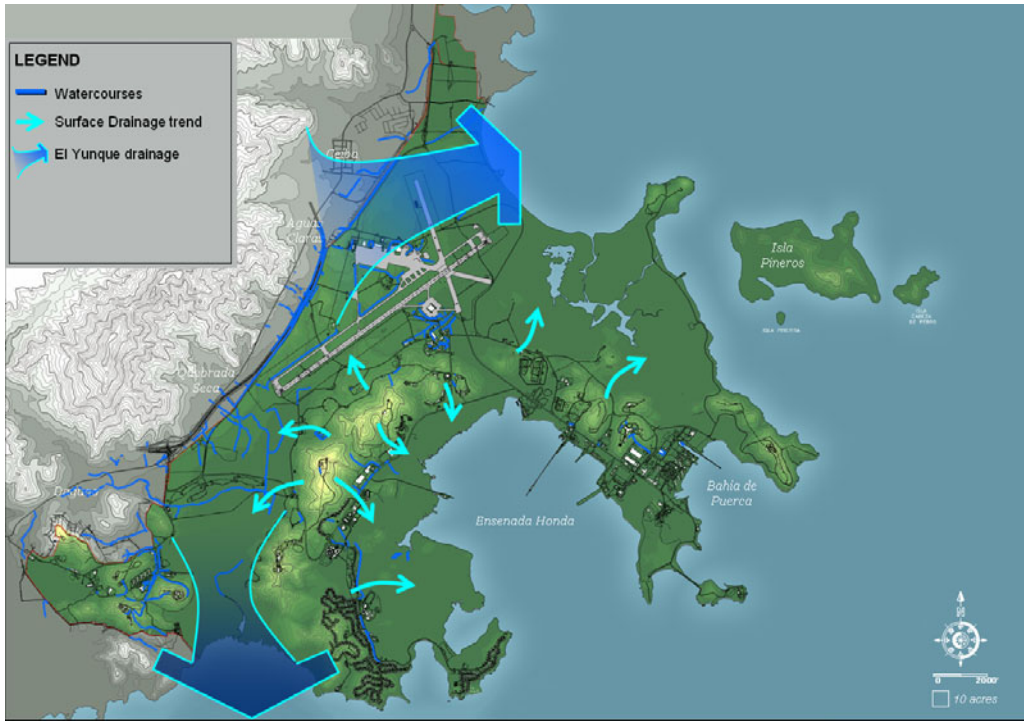


Figure III.6
Hydrology and Watercourses: In the accompanying figure, large blue arrows indicate how larger regional ground water drainage patterns seek coastal outlet. Light blue arrows indicate general natural drainage patterns leading from Delicias Hills and the elevated areas of the site.

Source: BakerCAD

Generally, the subsurface at Roosevelt Roads is a combination of volcanic rock and a range of more permeable materials close in to the water's edge.

In the heavy rainfall that this part of Puerto Rico experiences annually, groundwater runoff will likely be accelerated because of these conditions.

The site's proximity to the sea results in a high presence of salinity in on-site ground water. Additionally, relatively slow recharge rates indicate poor suitability for generating potable water from local wells.

Water Depth

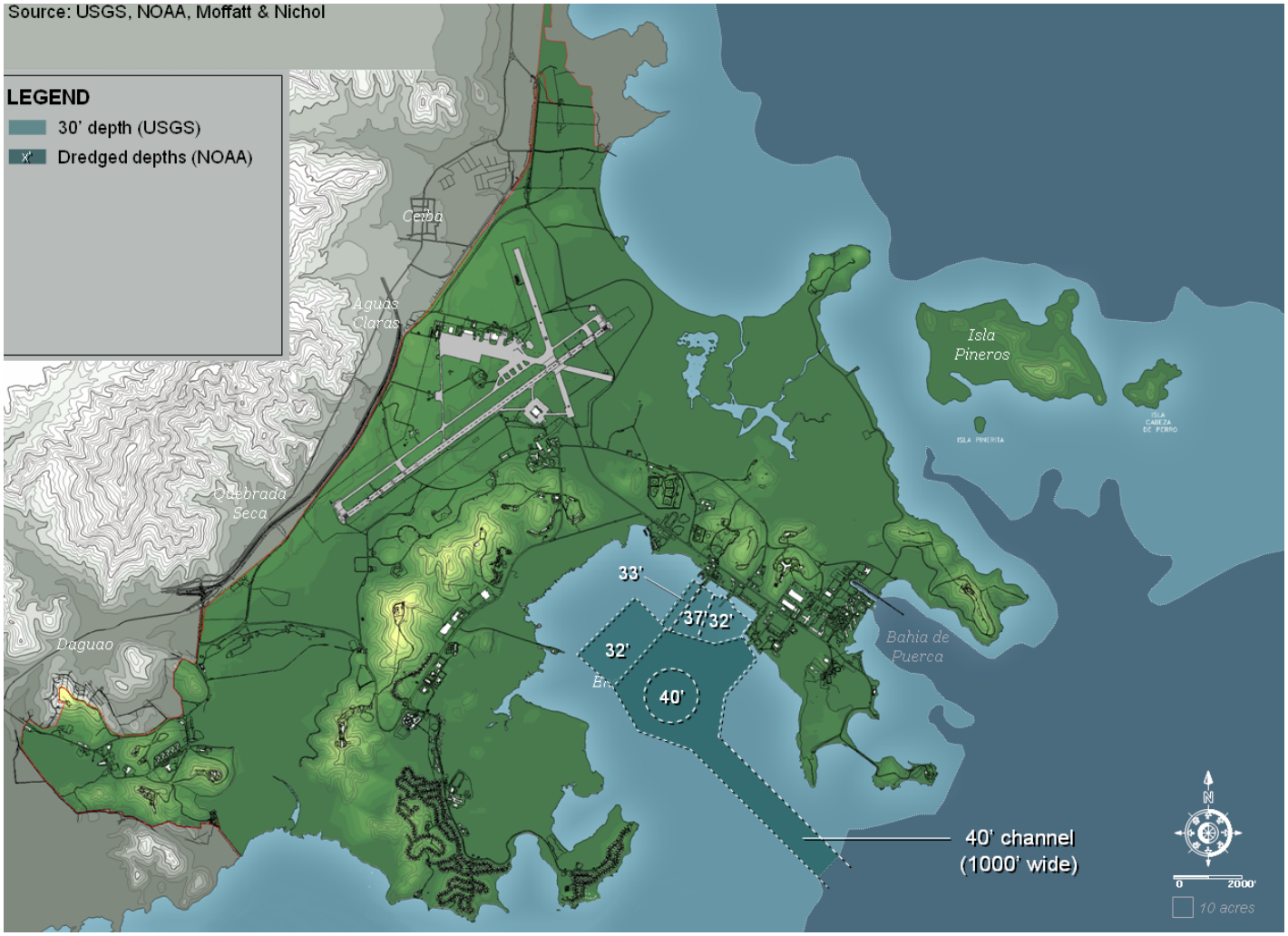


Figure III.7
Water Depth. For additional information on the central channel and condition of the piers, please refer to Appendix B.

Source: USGS, NOAA, Moffatt & Nichol

The site is surrounded by water on three sides. Along its extensive coastline, the depth of water at the coastal shelf is variable, and ranges from zero (0) to 30 feet. These shallow shelves extend up to 4000 linear feet off the coastline along the Puerto Medio Mundo, while deeper waters approach the north peninsula north of Bahia de Puerca. The shelf of up to 30' deep extends out 10,000' south of the southern peninsula.

There is an existing deep-water channel leading into the harbor, allowing larger vessels and fuel tankers access to the naval piers located along the northern edge of harbor.

Existing Vegetation

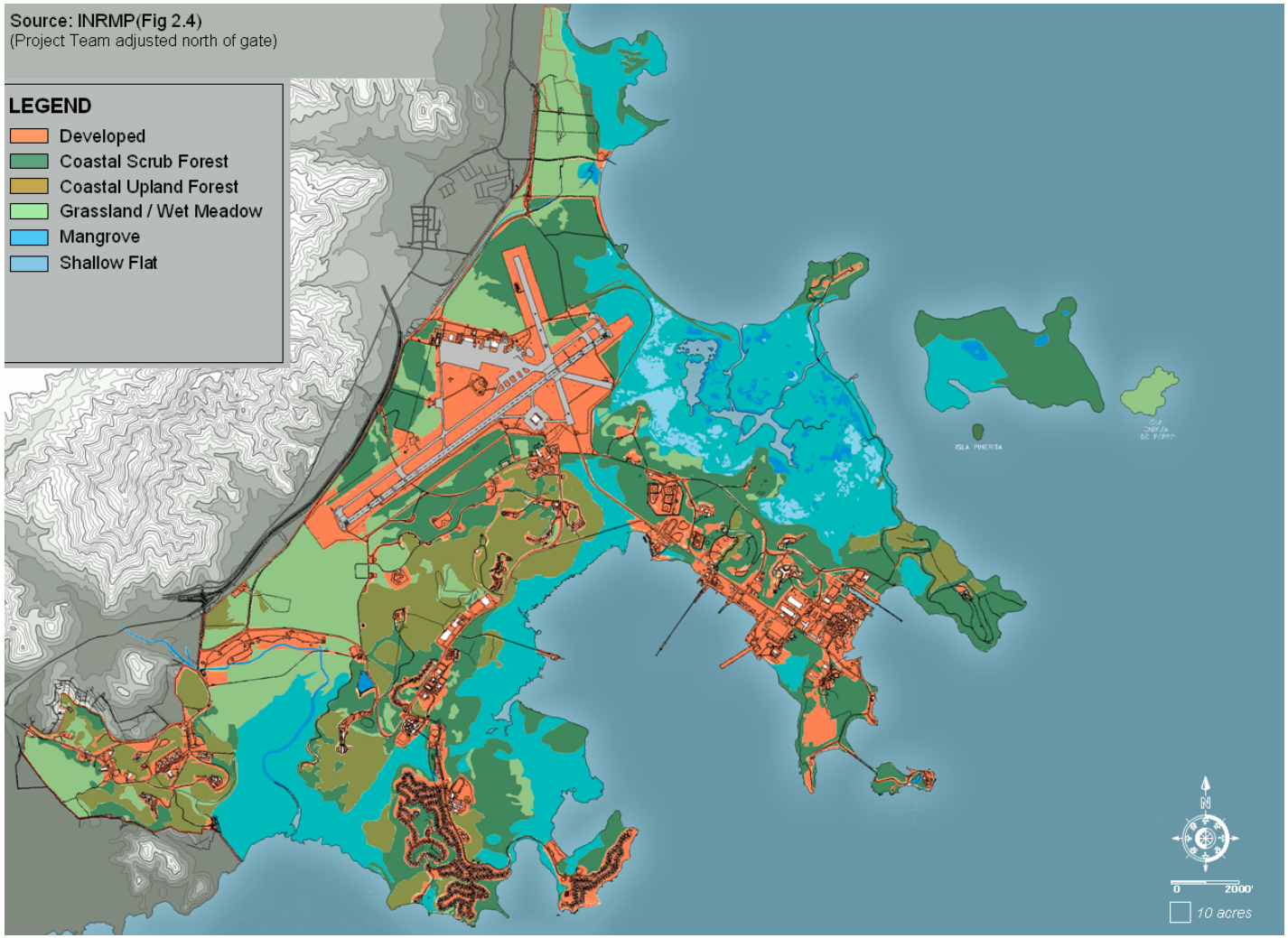


Figure III.8
Existing Vegetation

Source: INRMP (fig 2.4) (Project Team adjusted north of gate)

Existing vegetation at Roosevelt Roads is richly diverse, reflecting the multiple adjacent ecologies present on the site. A variety of native flora species underscore the characteristic of the site's range of biodiversity: upland forests, coincident with higher elevations on the site; coastal scrub forest coincident with the mid-sections; grassy, meadowed fresh water wetlands coincident with the inland floodplain; and coastal wetlands, coincident with the tidal "outboard" areas of the site. Of the 8,300 acres that comprise the site, approximately 2,900 acres are designated wetlands according to the recent ECP report, and of those 60% are mangroves, considered protected under Federal Law.

The prevailing vegetation found along the coastal regions of eastern Puerto Rico and at Roosevelt Roads include:

- Upland and Coastal Scrub Forests: Native vegetation at the site includes small trees such as: leadtree, boxbriar, sweet acacia, Australian corkwood tree; larger trees including ucar, sand box, ficus, flamboyants, Puerto Rica Royal Palm, ginep and Indian almond. There is a predominance of successional stands of small trees, that are essential to enhancement of watershed protection areas and ground water recharge

- Grassland/Wet Meadow: this is predominant in the "valley" floor of the site to the northwest and southwest of the airport. Native species would include cattails, and a variety of grasses, a natural habitat for herons, egrets, coots, and fresh water turtles that are found in these areas.

- Mangrove and Shallow flats are distributed throughout the low-lying coastal areas of the site. Ambient average water temperature in these areas ranges from 75° to 84°. Typically, these areas require stable salinity of 35 parts per 1000, clear water allowing deep light penetration to enhance the quality of the habitat for a diversity of species. Sea grass beds, critical habitat for manatees, and the site's coral reefs are prime candidates for conservation. The mangroves are essentially "self-maintaining" coastal landscape areas to the extent that they are protected from encroachment or pollution.

- Beach strand ecosystem: This occurs on slightly elevated sandy ridges that are seen in a few areas of the sight. Common shrubs include the bay cedar and the sea grape. Trees typically found in these areas include coconut, buttonbush and poisonous manzanillo.

According to the environmental assessments completed previously at the sight, a number of protected species that have inhabited undeveloped areas of Roosevelt Roads include:

Fauna

- West Indian Manatee.
- Yellow-Shouldered Blackbird
- Artic Peregrine
- Brown Pelican
- Roseate Tern
- Loggerhead Sea Turtle
- Green Sea Turtle
- Leatherback Sea Turtle
- Hawksbill Sea Turtle
- Puerto Rican Boa

Flora

- Cobana Negra




Wetlands & Mangroves

Figure III.9
Wetlands

Source: NSRR uplands X-ref drawing

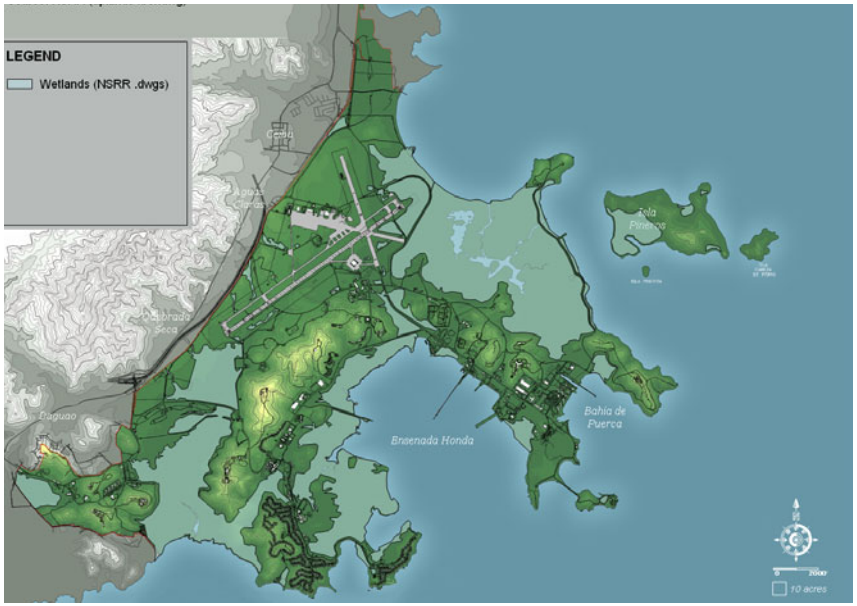
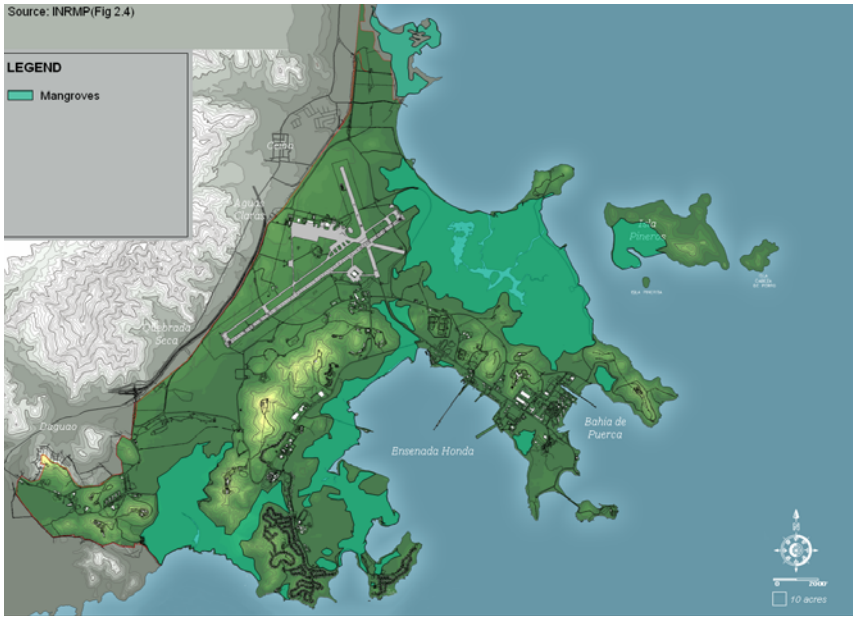


Figure III.10
Mangroves

Source: INRP (Fig 2.4)



Inclusive of the two smaller islands, approximately 3,882 acres or 45% of the Roosevelt Roads site is identified as wetlands. Within these areas, 10% are categorized as fresh water wetland and 60% are mangroves (2,295 acres).

Of the more than six (6) miles of coastline at Roosevelt Roads, mangroves line the majority of land at the water's edge, defining areas of access and limiting access to the water's edge. Within these designated areas, three types of mangroves are found and each serves a different but vital ecological function. Key in protecting and supporting the low-level organisms in the food chain, each has unique characteristics:

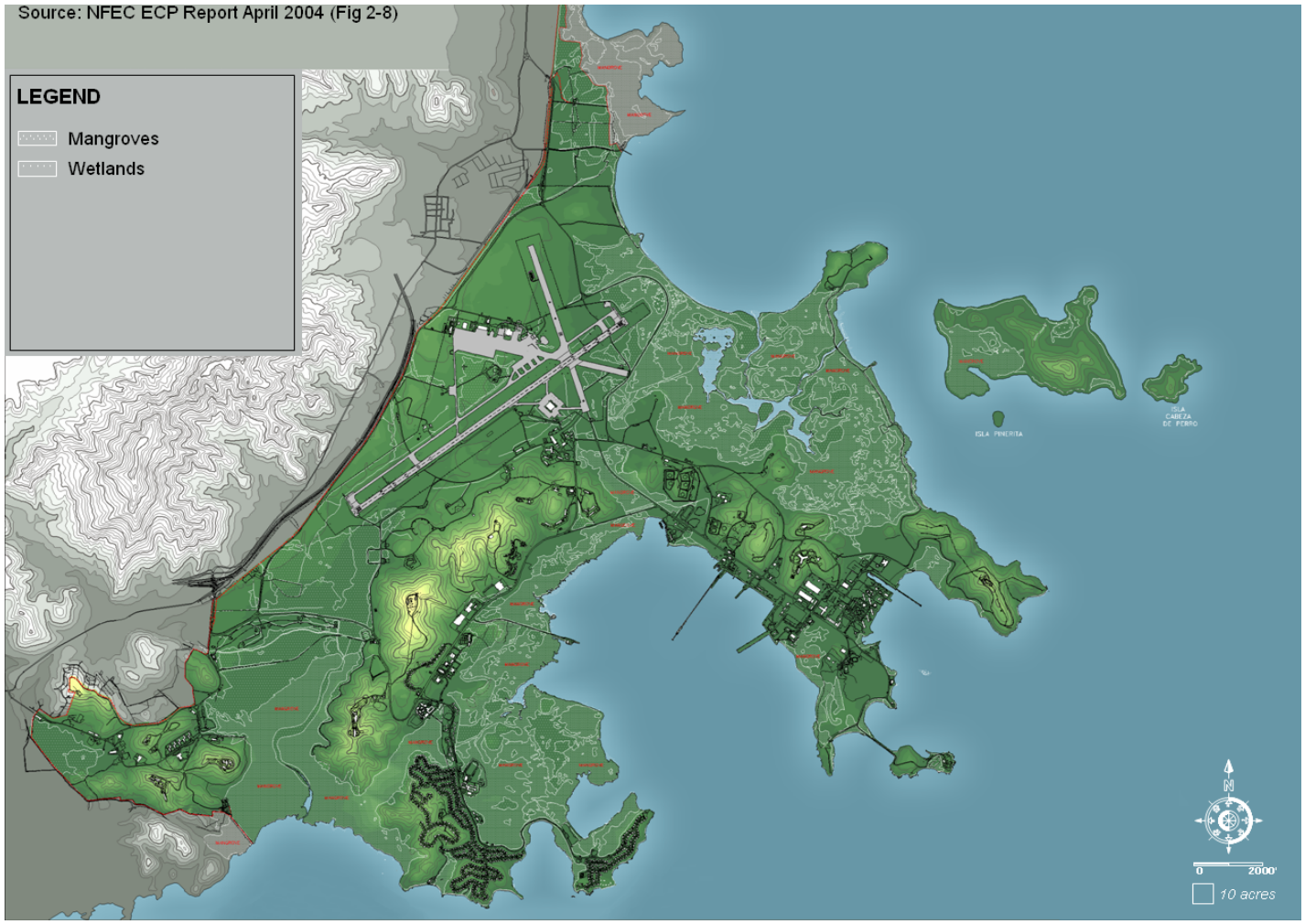
a) **Red Mangroves:** located at the seaward sites, and requiring the highest salinity, these are the first line of defense with respect to beach erosion. Their highly visible and arching prop root systems are typically partially submerged, creating a kind of marine peat, an ideal breeding environment for marine organisms.

b) **Black Mangroves:** to be found closer inland from the shore, typically reached at high tide. Its characteristically high tannin black root system cannot tolerate total submersion.

c) **White Mangroves:** found in upland coastal areas and are rarely inundated with sea water. Their characteristic prop roots are highly visible and the trees are fast growing in fertile soil.
source: INRNP

Figure III.12
Wetlands and Mangroves

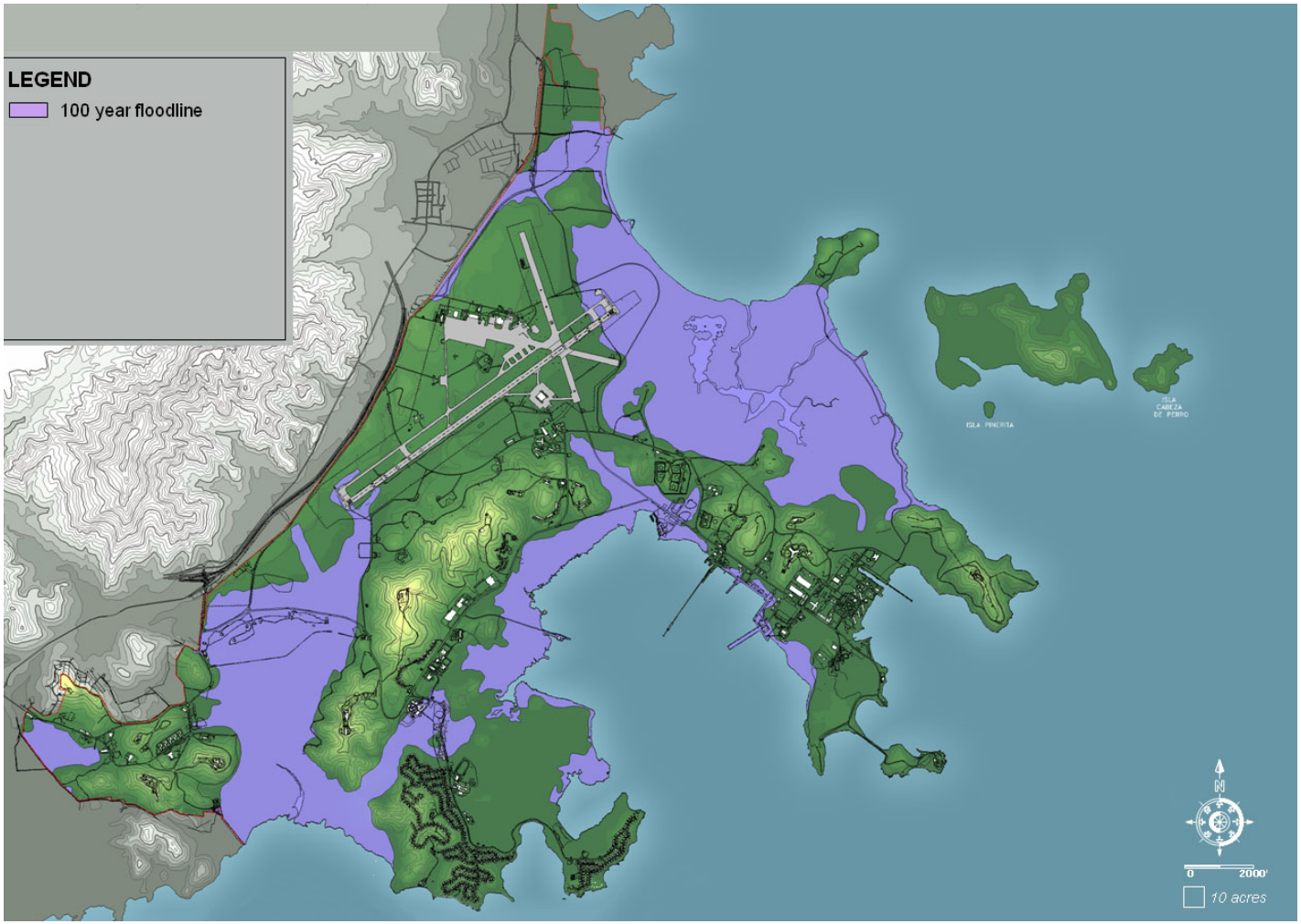
Source: NFEC Report April 2004 (Fig 2–8)



100-Year Floodplain

Figure III.12
100 Year Floodplain

Source: FEMA combined zones A, AE, and VE



According to the FEMA maps for Roosevelt Roads, the 100-year floodline extends beyond the coastal areas at several points far into the northern areas of the site.

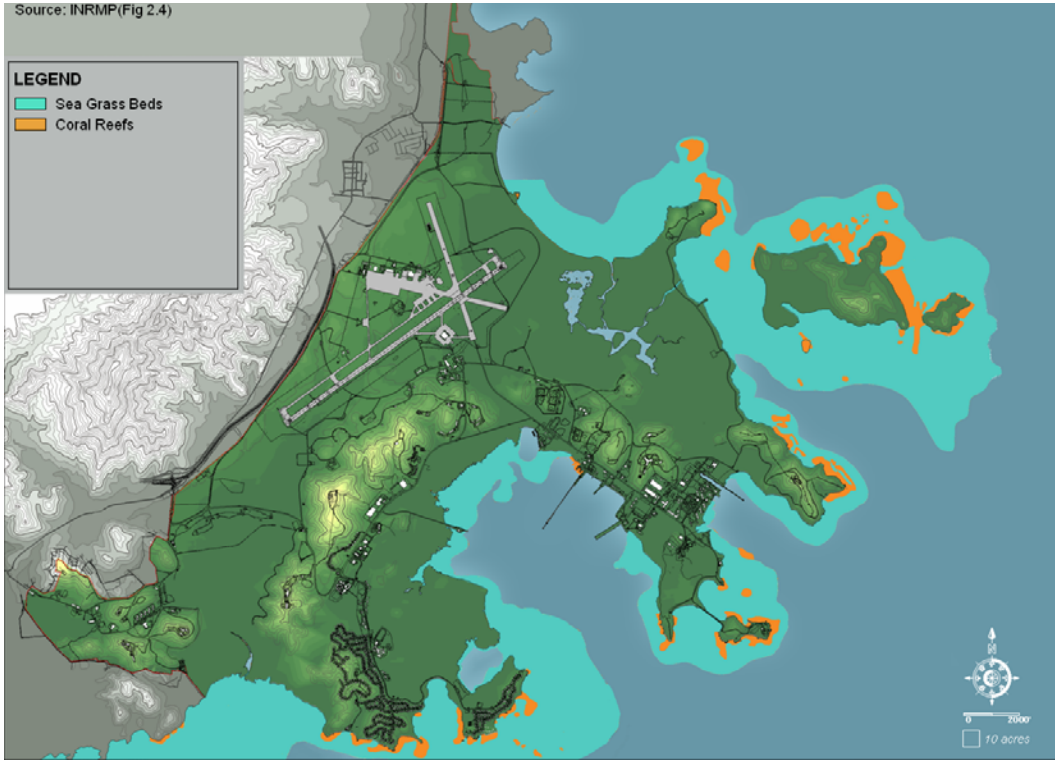
The Floodline takes into account the A, AE and VE FEMA zones.

Whereas these areas are to be avoided in development, mitigation measures may be taken to facilitate development of selected locations within the floodplain if required or economically feasible.

Marine Ecology

Figure III.13
Marine Ecology

Source: FEMA combined zones A, AE, and VE



With the exception of bulkheading on the northern peninsula and small recreational facilities at two beach areas, much of the coastline at Roosevelt Roads is undeveloped. Thus, marine ecology along the coastline at the site has developed with relatively few permanent intrusions.

According to a report entitled *Critical Conservation Areas Roosevelt Roads Naval Station, Ceiba, Puerto Rico* August 2003, issued by the Conservation Trust of Puerto Rico, four endangered species use the marine habitat in and around the site: the Leatherback Turtle; the Green Sea Turtle, the West Indian Manatee and the Brown Pelican; migratory birds and waterfowl use this area on their migratory route. The Conservation Trust's report asserts the regionally synergistic ecological relationship between the Cabezas de San Juan Nature Reserve, the Vieques Western Conservation Areas, the Humacao and Culebra coastal lagoons and the Roosevelt Roads property.

Among the most important features of the site's marine ecology are the vast seagrass beds that provide critical breeding grounds and habitat for the West Indian manatee population. In addition, in conjunction with mangrove forests, the seagrass beds are extremely important breeding grounds for a number of commercially productive species such as snappers and lobsters.

Figure III.14
West Indian Manatee

Source: www.elenas-vieques.com

According to mapping provided by prior environmental assessments of Roosevelt Roads, the sea grass area measured from drawing "INRMP Fig 2-4" is 4,000 acres. Conservation Trust suggests this is one of the most significant areas of undisturbed sea grass beds remaining in Puerto Rico, estimating an area of up to 30,000 acres adjacent to the base, subject to verification.

Fringing coral reefs appear in many of the coastal areas of the site and small islands off the site's northern coast. Considered potentially significant by the Conservation Trust, they are estimated to be of high quality due to lower use pressure of these habitats around the station.

Yellow Shouldered Blackbird

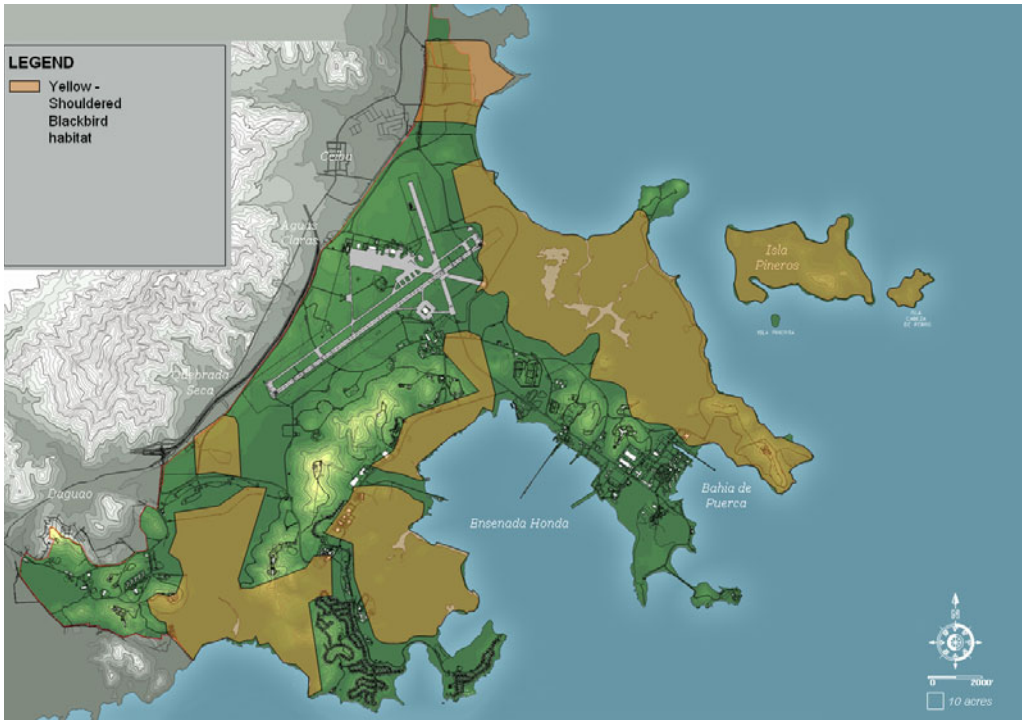


Figure III.15
Yellow Shouldered Blackbird: 1980 Agreement

Source: 1980 Agreement Between US Navy and US National Fish & Wildlife Service

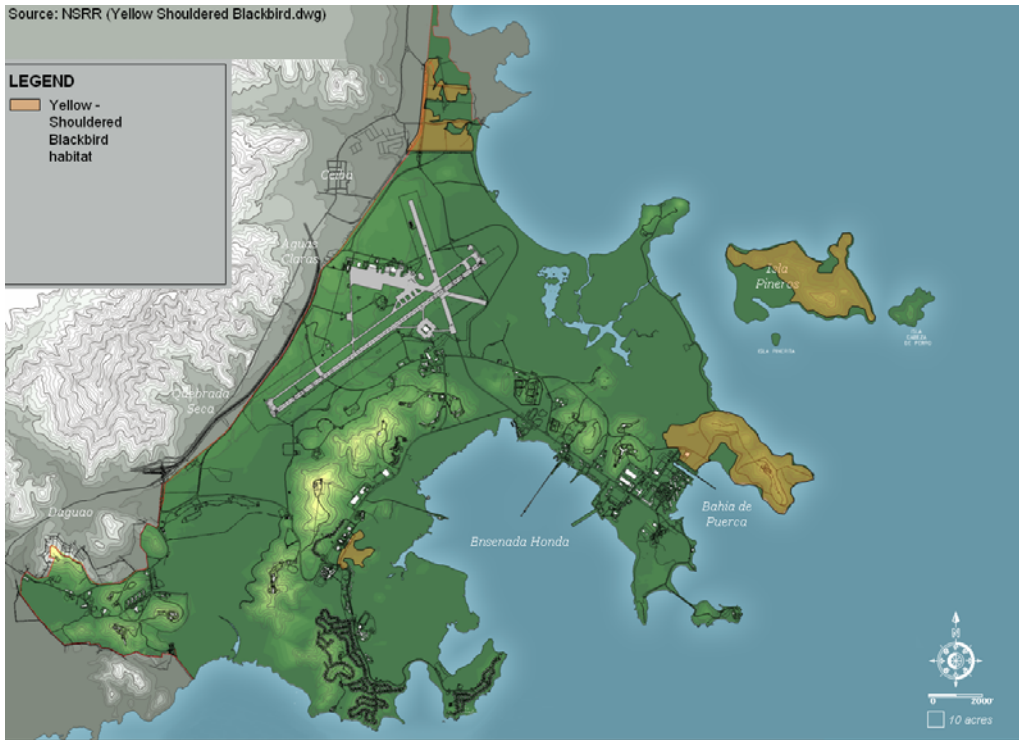
The presence of the Yellow Shouldered Blackbird, (YSBB), a species of "Critical Concern", is one of the most sensitive environmental issues that the reuse plan will address. Its area of natural habitat is the mangrove forest; the extent to which the birds nest in areas beyond those boundaries will be addressed in the on-going environmental assessment.

Figure III.16
Yellow Shouldered Blackbird

Source: Peter Ferrera.

Figure III.17
Yellow Shouldered Blackbird Habitat

Source: NSRR (Yellow Shouldered Blackbird.dwg)



A number of mappings show conflicting information with respect to the area of critical habitat:

- 1976: the entire NSRR site was the declared habitat for the birds;

- 1980: an agreement was reached between the Navy and U.S. NFWS (U.S. National Fish & Wildlife Service) that would exempt certain areas within the site from categorization as critical habitat (see Figure III.16).

- 1985: procedures with USNFWS were simplified to allow for project development in "unmarked" areas of the property without express consideration; and a USNFWS review for projects within the "marked" areas with advice to the Navy if the project had no impact. If a project has deemed to have impact on the Yellow Shouldered Blackbird, it would have a formal Section 7 consultation with the USFWS prior to initiation.

- 1996: a study was conducted to better delineate areas that could be used as habitat; per this study, mangrove forests should be considered the most important habitats for the YSBB.

- Present: The latest NSRR drawings indicate that the YSBB habitat is in a very limited area of the site, pending clarification from the the current environmental assessment effort recently initiated by the navy (see Figure III.17).

Marine Turtles

According to the US Fish & Wildlife Service, all six sea turtle species are protected under the endangered species act of 1973. Four species of sea turtles are known to utilize habitats at the Roosevelt Roads property:

- Loggerhead Sea Turtle, *threatened*
- Green Sea Turtle, *endangered*
- Leatherback Sea Turtle, *endangered*
- Hawksbill Sea Turtle, *threatened*

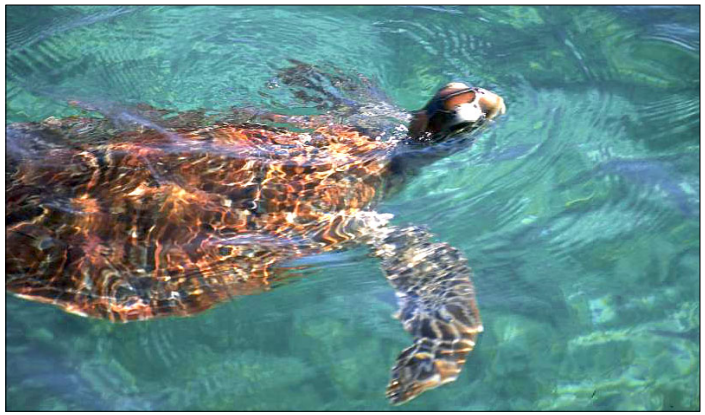


Figure III.19
Loggerhead Sea Turtle

Source: micktravels.com

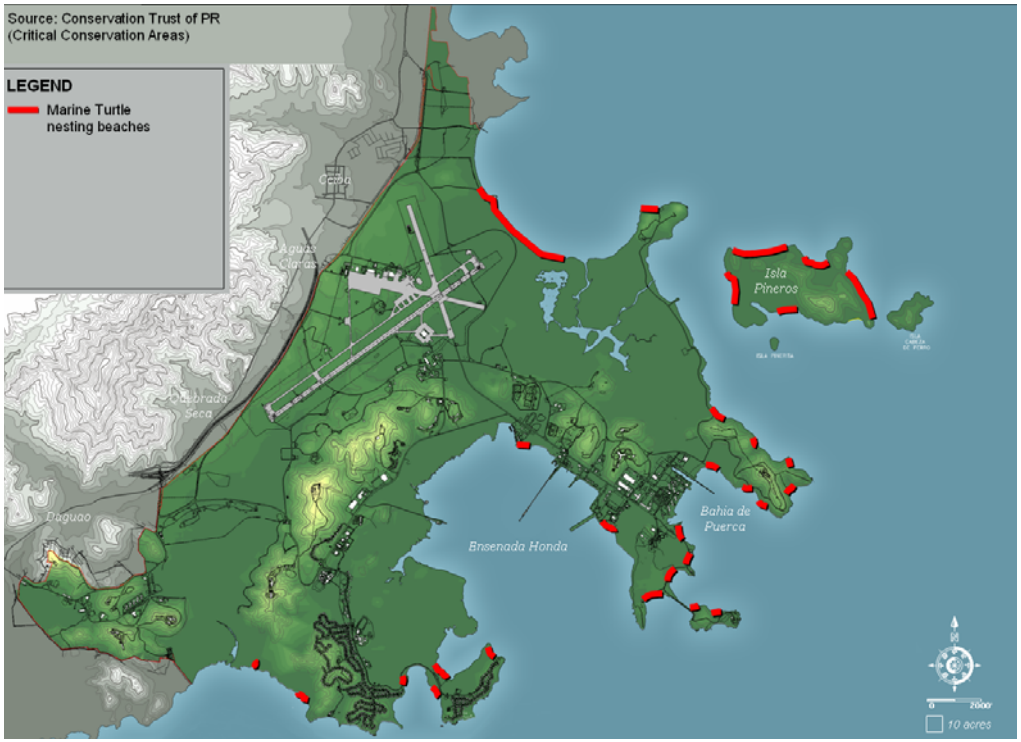


Figure III.18
Marine Turtle Beaches

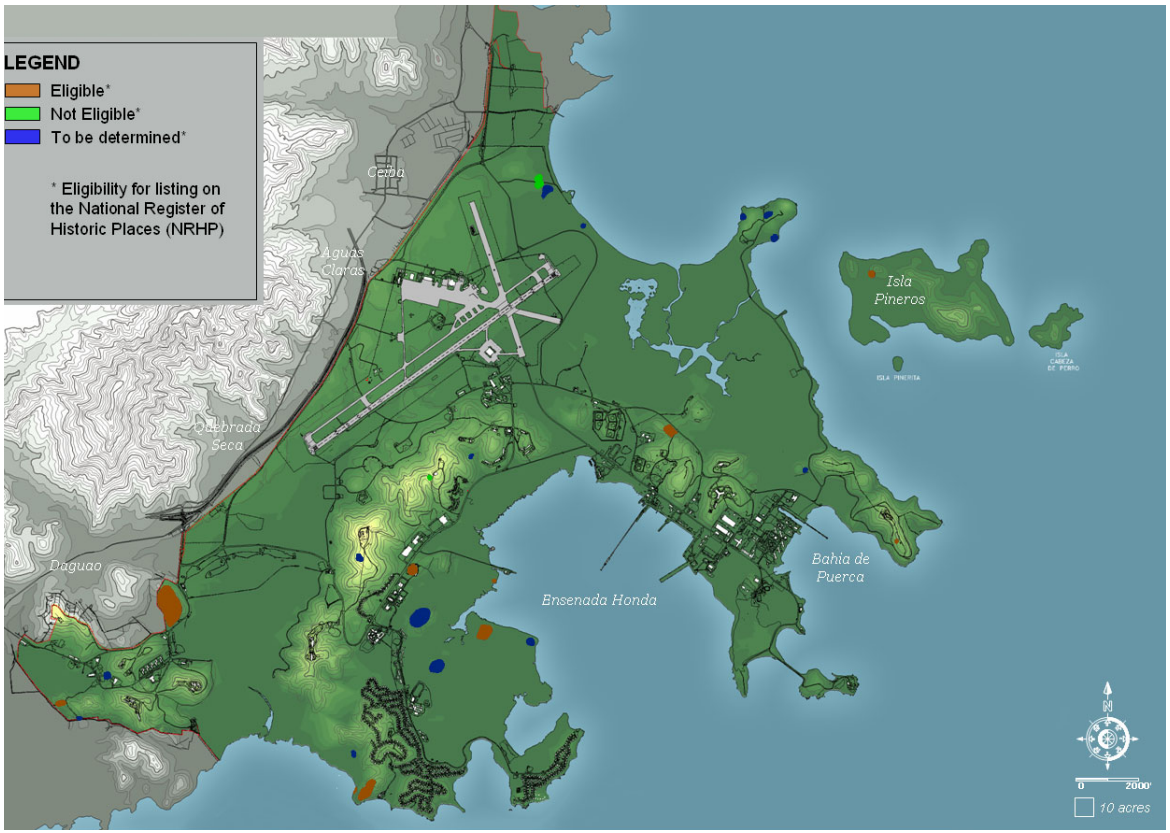
Source: Conservation Trust of PR (Critical Conservation Areas)

Figure III.18 indicates areas believed potential sea turtle nesting beaches according to the Conservation Trust of Puerto Rico; these will be subject to confirmation in the coming months. Designated nesting areas in St. Croix, Isla de Mona and Culebra, established by the Fish and Wildlife Service, are mapped on their

Archaeological Sites

Figure III.20
Archaeological Sites

source: ECP (Figure 2–7, Arch.Sites.dwg)



In accordance with Section 110 of the National Historical Preservation Act, the Navy performed a survey to identify cultural sites at Roosevelt Roads. Findings include evidence of settlement during the Archaic and Ceramic Ages, and the period occurring during the Spanish Colonial occupation period up to 20th Century historic period. These were evidenced among the noted findings:

- small tenant-farmer agricultural sites dating prior to development of the Naval base, which is entirely consistent with local development patterns;
- a 19th century Spanish Colonial domestic site on the southern fringe of Ensenada Honda
- a 19th century sugar complex in higher elevation Bundy area

Of the twenty-nine sites explored, four (4) are Spanish Colonial, seventeen (17) are Pre-Columbian, four (4) are multi-component sites from both periods, and four (4) are rock art sites. In summary, two (2) sites were determined eligible for NRHP listing, another twenty (20) were determined to be potentially eligible for listing, three (3) determined not to be eligible; and four (4) were not evaluated.

A.IV Potential Development Areas

Parallel with the study of physical and natural aspects of the site, the consulting team identified areas of the Roosevelt Roads that could potentially support development while observing constraints that its coastal ecology presents.

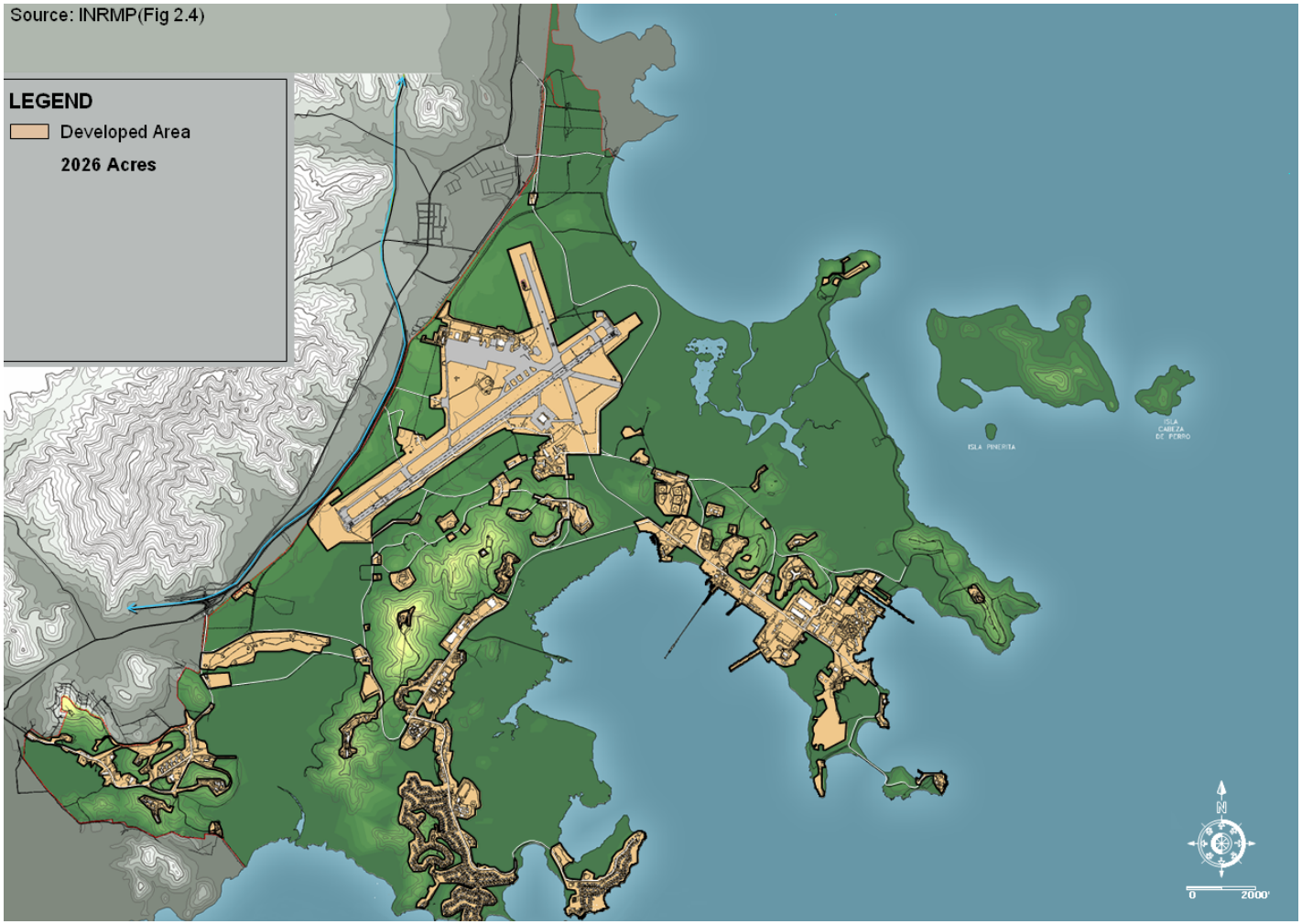
The consulting team investigated existing land use and existing infrastructure. They sought to identify and then quantify potential developable areas through a series of key "lenses" that non-subsidized development would typically address relative to valuation.

Existing Land Uses: Developed Area

Roosevelt Roads today consists of non-contiguous or "fragmented" concentrations of existing development. Existing land use on the base is clearly related to topography, and building typology, partially explaining the predominance of small-scale rather than large-scale structures. The total existing developed area of the base approaches 2,026 acres, exclusive of most of the infrastructure.

Figure IV.1
Developed Area

Source:INRMP Report (fig. 2.4)



According to land configuration, existing developed areas within these precincts are "multi-use" versus "mixed-use": adjacent structures house relatively similar or related uses, rather than a broad mix of uses within a given area. Uses therefore tend to be clustered together.

- Airfield: The primary runway (7-25) at the airfield is 11,200 linear feet long, exceeding the length of the runway at San Juan International airport. A secondary runway (18) is 6,000 feet, including its southern extension south of the main runway. There are also two helicopter landing pads at the airport. Together with a series of buildings north and south of the airfield that include hangars, repair shops, an operations building, and those used specifically for military purposes (weapons buildings, survival equipment workshops, etc) and storage facilities, the airport facilities are a major asset for the site and the entire region. A small "campus" of classroom and office buildings, with an adjacent gymnasium and other support facilities, are clustered near the vehicular entry to the airfield.

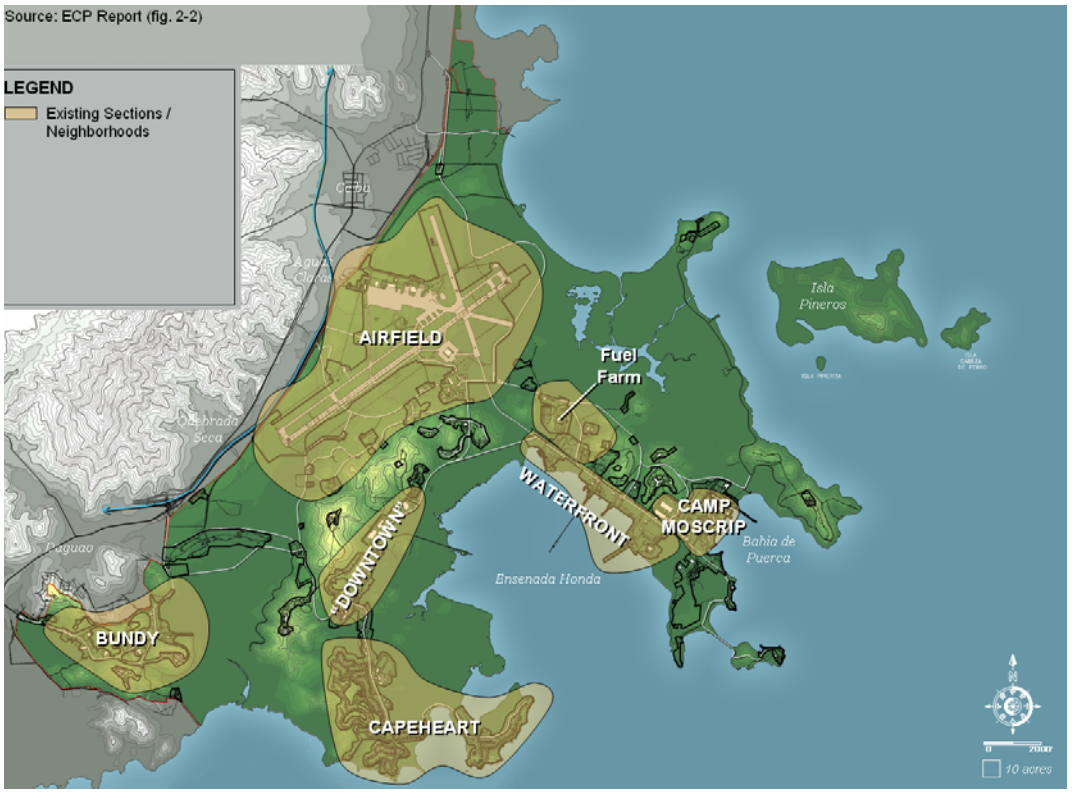


Figure IV.2
Developed Area

Source:ECP Report (fig. 2-2)

Figure IV.3
Airfield Terminal

Source:CRP

- Bundy: Accessed directly through Gate 2, the controlled southern access gate to the property, as well as with a small outlet near Naguabo, the Bundy area is the western-most grouping of facilities at the site. Its pre-dominant land uses include multiple clusters of multi-family housing and supporting facilities (fitness center, small theater, library, outdoor recreational fields). There are also a number of small storage and office buildings.

- "Downtown": Between the eastern ridge of the Delicias Hills and the mangroves along the center of the harbor, the "Downtown" area of the base contains many of the commercial and institutional use buildings: the Commissary, the Navy Exchange (PX), an ambulatory medical facility with doctor and dental offices, the chapel, the day care center, the bowling alley, a fast food restaurant. There is also the base's "hotel", the Navy Lodge, a number of multi-family structures to the north that house new and recently renovated quarters for enlisted personnel. To the east, one single pier at the center of the harbor affords a sweeping view over Ensenada Harbor and the Caribbean beyond.

- Capehart: Southeast of the Downtown, the Capehart area is the primary residential district at Roosevelt Roads. The northern portion of this area consists of family-sized garden apartment buildings, a large elementary school, housing office building, and metal storage buildings. The central section of Capehart consists primarily of smaller one (1,800'–1,900' SF) and two family houses, some with water views, many recently renovated. A large middle/high school with air-conditioned gymnasium and dining facilities is sited conveniently to this residential area. The largest houses, many sited along the elevated waterfront promontory and located at the "boot" of the southern peninsula, range in size from 2,100 to 3,200 SF, housing ranking officers and their families.

Figure IV.4
Bundy

Source:CRP

Figure IV.5
Capeheart

Source:CRP

- Waterfront: A 2,600' long fuel mooring pier dominates the waterfront, jutting far enough into the harbor to allow large tankers to pump out their fuel loads to be stored in the "fuel tank farm" to the north. Other facilities include many of the water-related facilities on the base: a 1,200' long cargo pier, a small marina, the port operations buildings; various hauling facilities, and extensive bulkheading characterize this portion of the site. Adjacent to the harbor front, across the peninsula's main access road, the commanding officer's headquarters, the public works building, and a significant refrigerated storage facility are clustered together, their siting carved out of the surrounding ridge. Overlooking the waterfront, at the upper portion of the surrounding hills, the base hospital, a staff residential facility and a small restaurant have outstanding views of the harbor as well as the islands to the north.

Figure IV.6
The waterfront at Ensenada Honda

Source:CRP

Figure IV.7
The fuel pier

Source:CRP

- Camp Moscrip: A cluster of facilities is located at the southeastern end of the northern peninsula. It includes numerous two-story military quarters buildings and adjacent support facilities, the dry-dock/pier, new, never-occupied Navy Seal administrative offices and new barracks. It also includes the large-scale former dry-dock facility (now-flooded), the Army Reserve facilities and equipment/truck parking lot.

Figure IV.8
The new Navy Seal administrative offices at Camp Moscrip

Source:CRP

Infrastructure Supports Existing Land Use

Infrastructure at the base supports the existing land uses. Infrastructure is purely functional, and has not been designed to have an aesthetic quality. Please refer to Appendix B of this report for a thorough overview of all key aspects of the base's infrastructure including roads, water, sanitary systems, electricity, and fiber optics and communications. The two small islands to the north have no infrastructure improvements. As long as the systems are maintained, the site's existing infrastructure allows for accelerated "early phase" activity at the base without major investment in infrastructure to the extent that it occurs within the confines of existing developed areas. A summary of Land Uses and their locations are indicated on the drawing below.

Figure IV.9
Land Use

Sources: Project Team

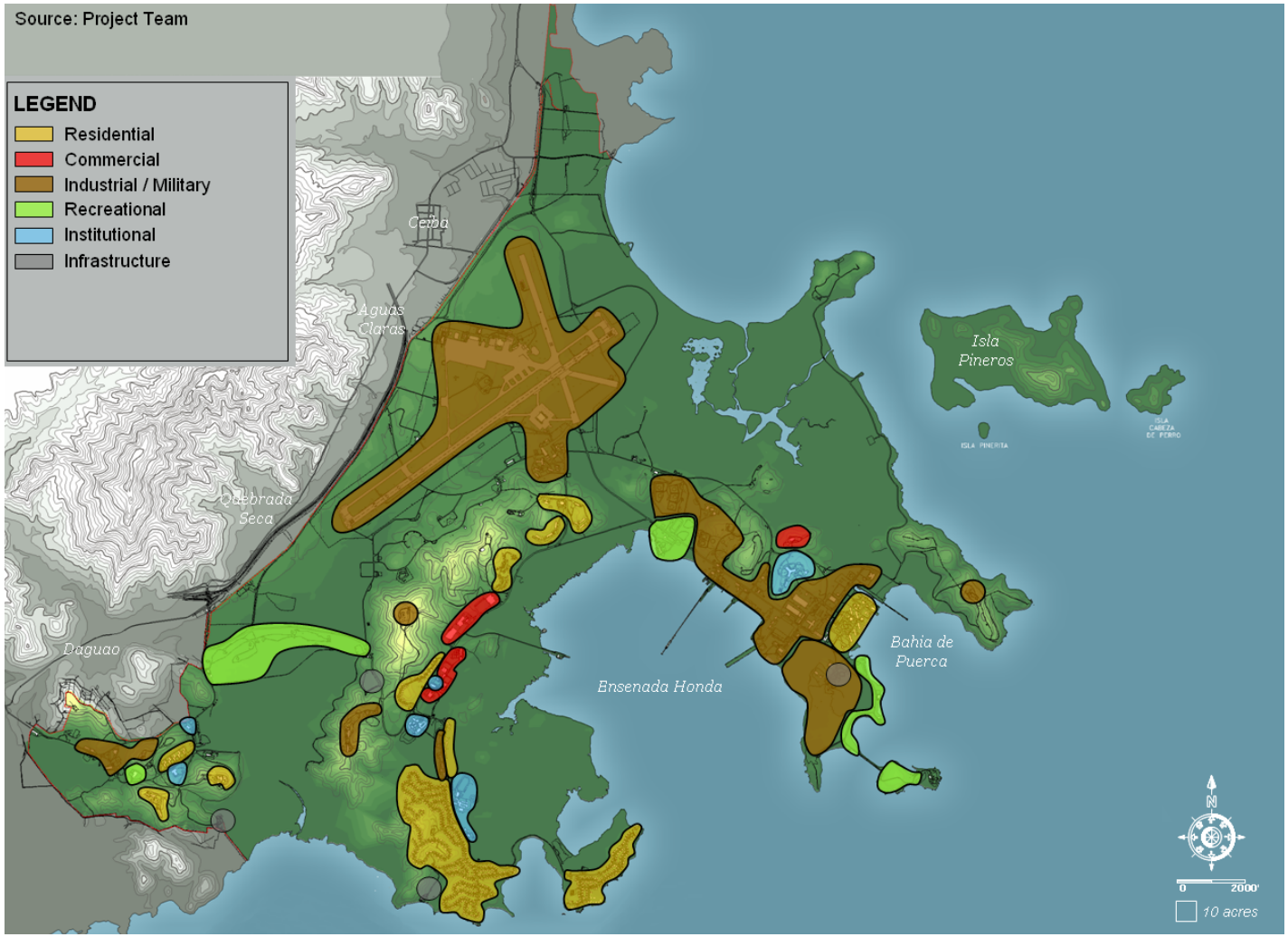
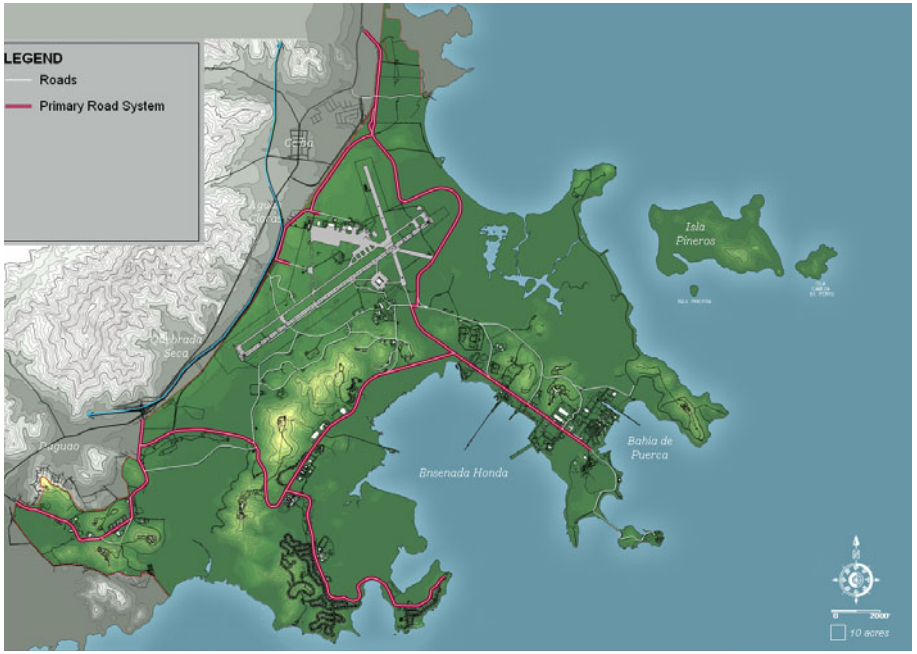


Figure IV.10
Roads

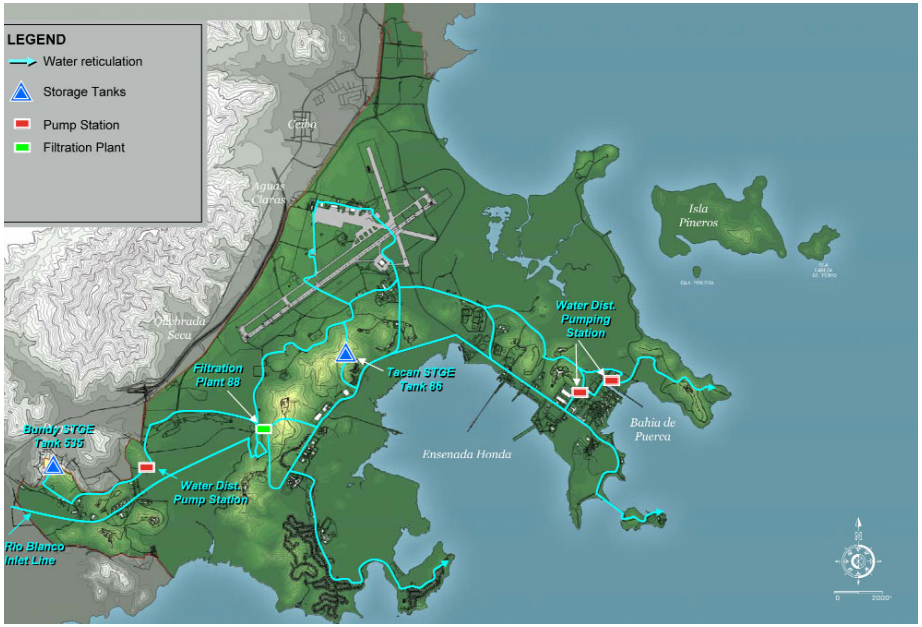
Source: NSRR



Roads: The two main gates to the base, one to the north of Ceiba, and another south of town are controlled access points. The northern gate can easily service the airfield and could be isolated if required. There is a central road through each of the two peninsulas, lined by the access road through the "Downtown" portion of the site. To the west, the Bundy access roads could potentially outlet toward Naguabo.

Figure IV.11
Water Distribution System for Roosevelt Roads

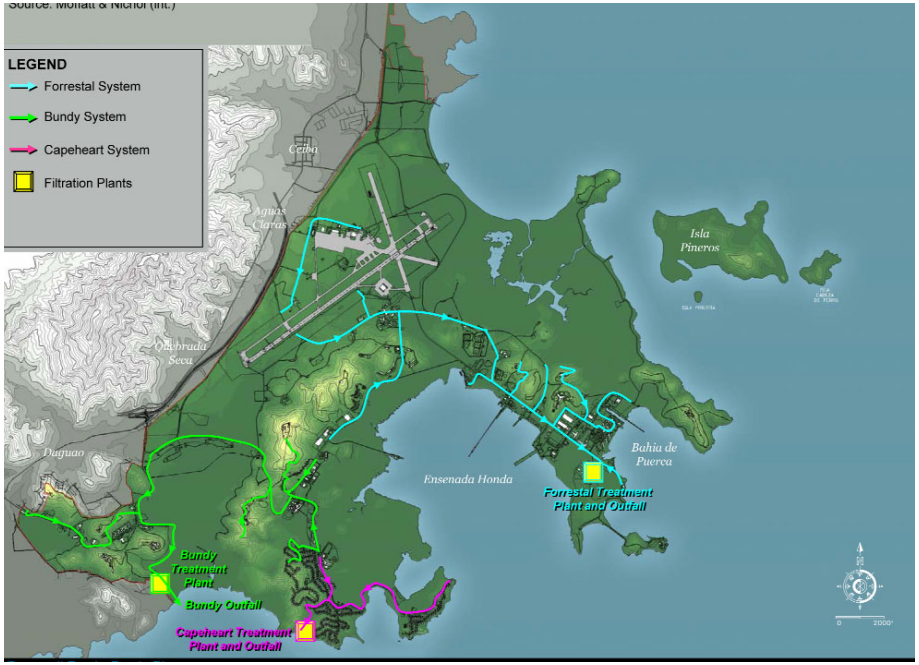
Sources:
NSRR Jan 2004
Water Distribution Dwg



Water: Raw water is sourced from the Rio Blanco River in the Sierra Loquillo Mountains of the rain forest preserve. An extensive water filtering, storage, and distribution system exists at the site, and can provide up to 4,000,000 gpd. The potable/fire protection system is combined at the base.

Figure IV.12
Sanitary Infrastructure

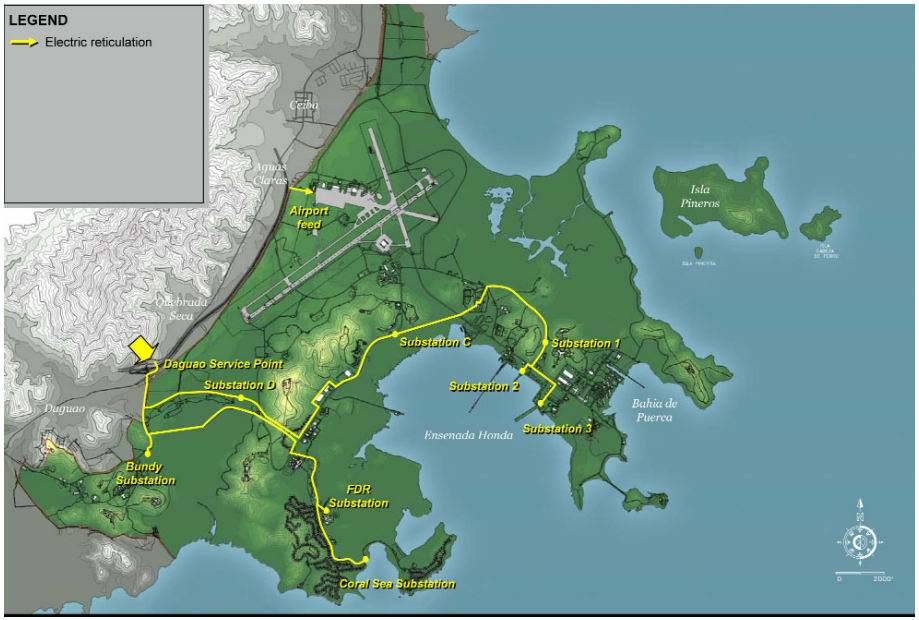
Sources: Moffat & Nichol (int.)



Wastewater: There are three waste water filtration treatment plants, each with its system of pump/lift stations and distribution system: Bundy, Capehart and Forrestal on the northern peninsula.

Figure IV.13
Electricity Infrastructure

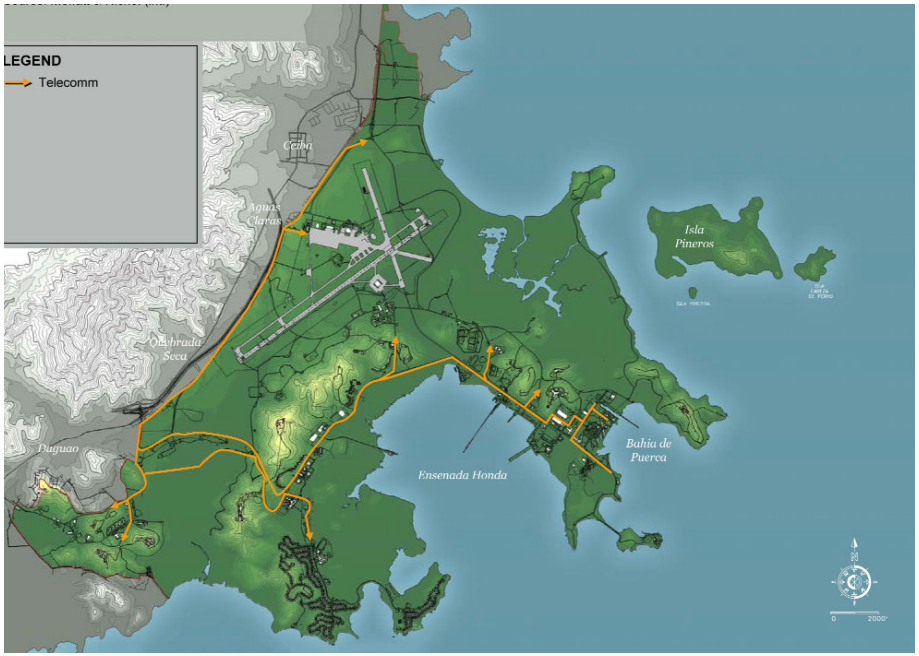
Sources: Moffat & Nichol (int.)



Electricity: The prime feed for electric service is the Daguao Service Point; the airport has its own independent main electrical service feed. A series of substations and primary distribution system are indicated on the drawing.

Figure IV.14
Telecomm Infrastructure

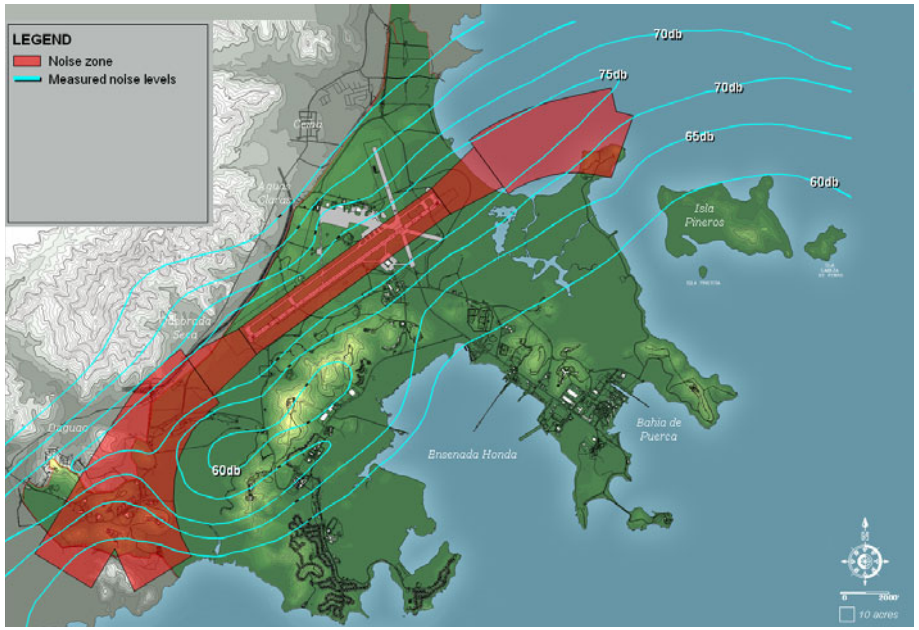
Sources: Moffat & Nichol (int.)



Fiberoptic/Telecomm: Communications at Roosevelt Roads had been upgraded to fiber optics at all of key operational sites and the Downtown areas. The residential areas at Capehart have had cable installed but the final wiring was not implemented prior to base closure.

Figure IV.15
Airport Noise

Source: Baker CAD



Airport Noise: The noise zone created at takeoff and landing is indicated in the above drawing. The configuration of the hills surrounding the airfield helps to contain the noise from the "Downtown" area. Bundy is the area most extensively impacted by the airfield noise.

Development Constraints

The consulting team's investigation of natural, physical characteristics together with man-made impacts to the site yield a series of analytic drawings culminating in "layers" of development constraints. These superimposed constraints reveal the resulting developable land.

Gradient Constraints

The first constraint relates to the site's topography. The consultants mapped the site's gradients in 5% increments from 0% to 25% in order to locate the most easily developable areas of the site. Figures IV.16–IV.20 indicate the sequence and outcome of this investigation.

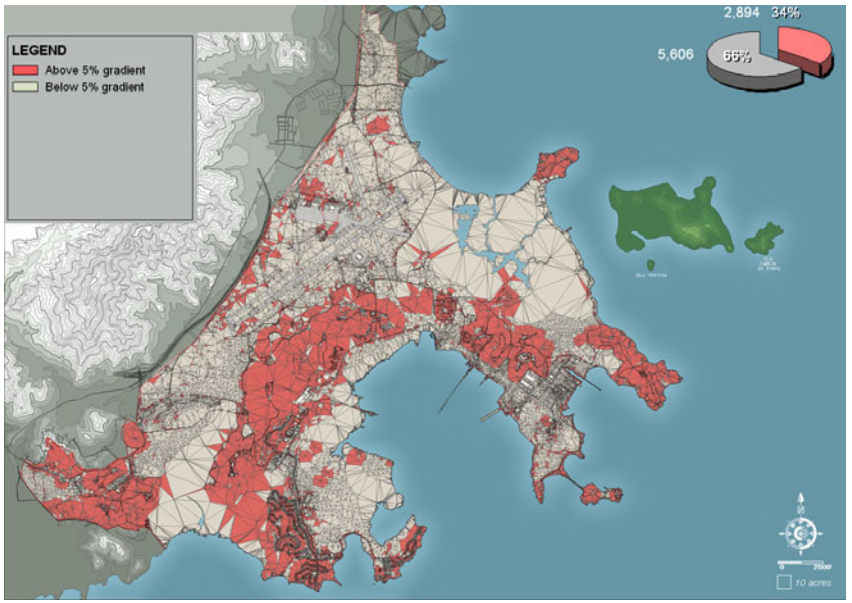


Figure IV.16
5% Gradient

Source: CRP

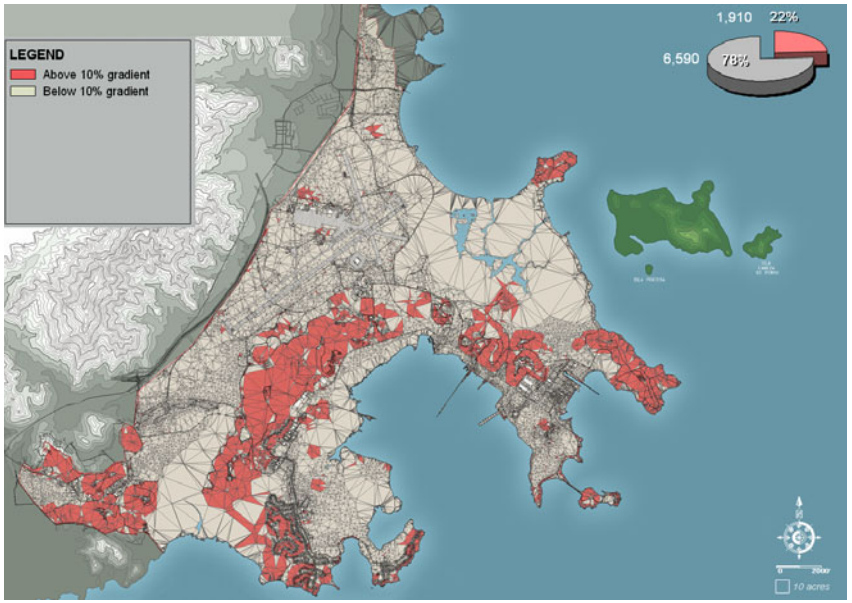


Figure IV.17
10% Gradient

Source: CRP

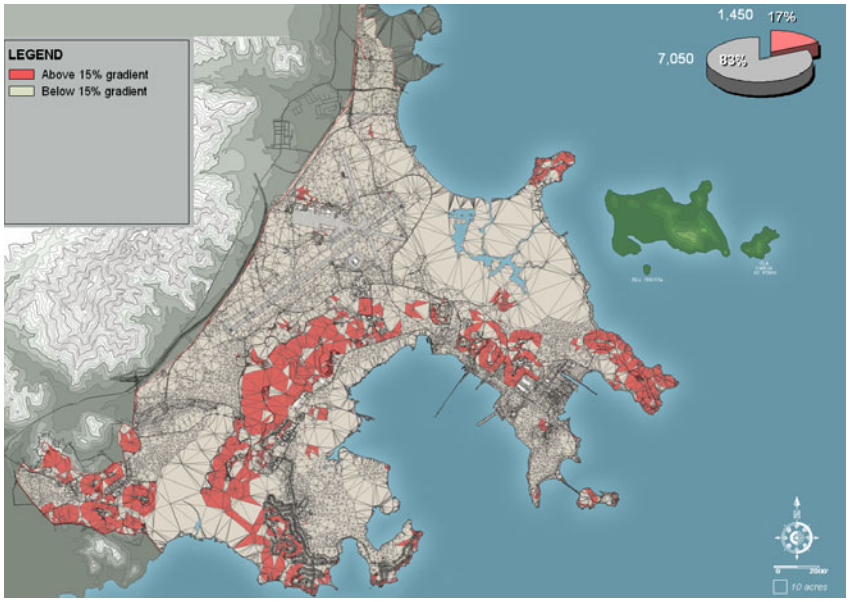


Figure IV.18
15% Gradient

Source: CRP

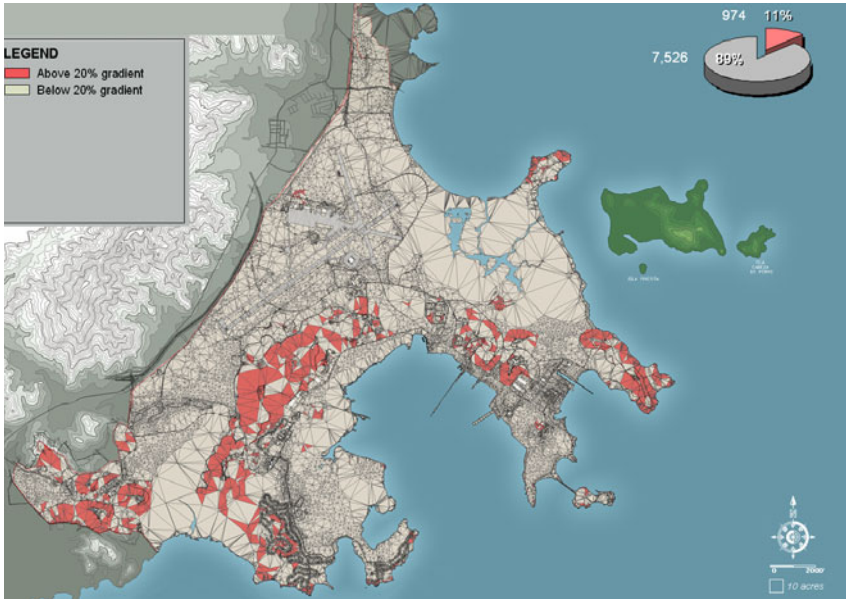


Figure IV.19
20% Gradient

Source: CRP

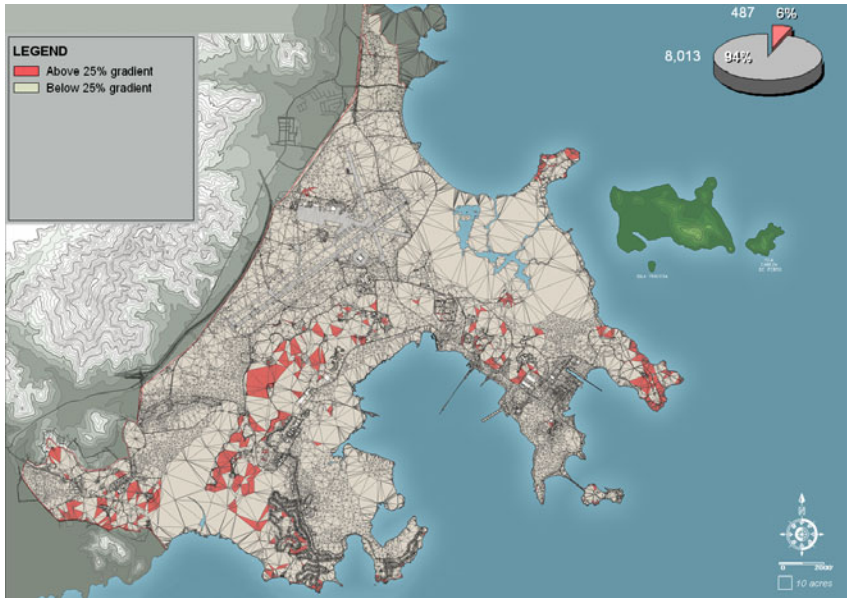


Figure IV.20
25% Gradient

Source: CRP

Summary of Gradient Constraints

The site's varied topography and steep slopes impact where development can occur without significant cost penalty. The site's gradients are depicted in the series of accompanying drawings, and quantified at 5% increments above and below 5%, 10%, 15%, 20% and 25% slopes. Typically, a gradient above 15% is determined too steep to build on with out additional cost premium for earthwork, foundations and sitework and is therefore a development constraint.

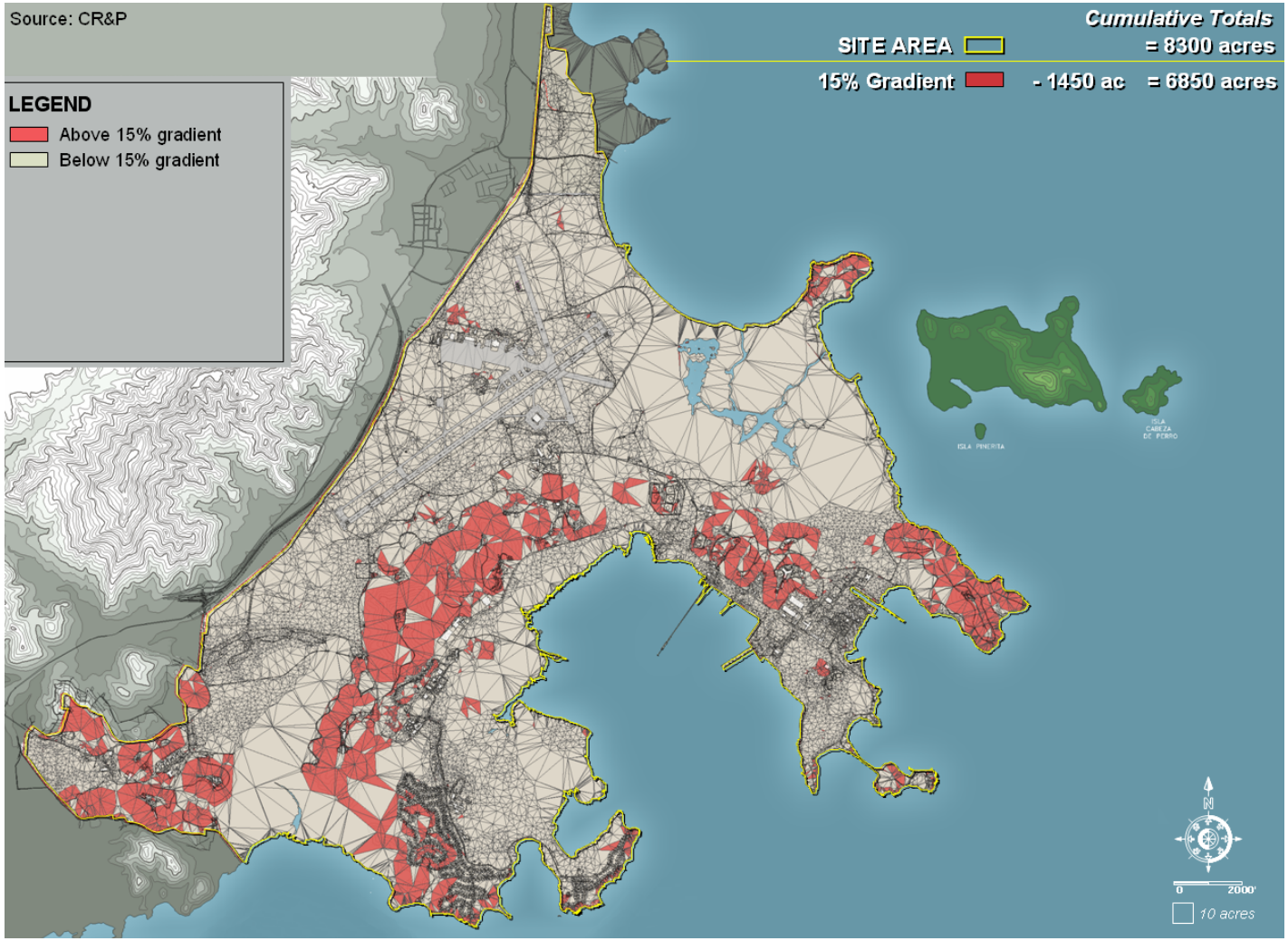


Figure IV.21
In this analysis, site area is understood in terms of resulting land area above and below this threshold. Approximately 83% of the site area, or 6,850 acres is 15% gradient or below; 1,450 acres are above 15% gradient. Total site area less 15% gradient leaves 6,850 remaining acres.

Source: Project Team

Water Access: Coastline

Of the 21 actual mile length of the Roosevelt Roads coastline, approximately 9.1miles of waterfront is inaccessible due to wetlands, and another 2.9 miles of waterfront is inaccessible due to the site's steep topography. Just under half of the coastline, 9.3 miles is accessible.

Figure IV.22
Water Access

source: Project Team

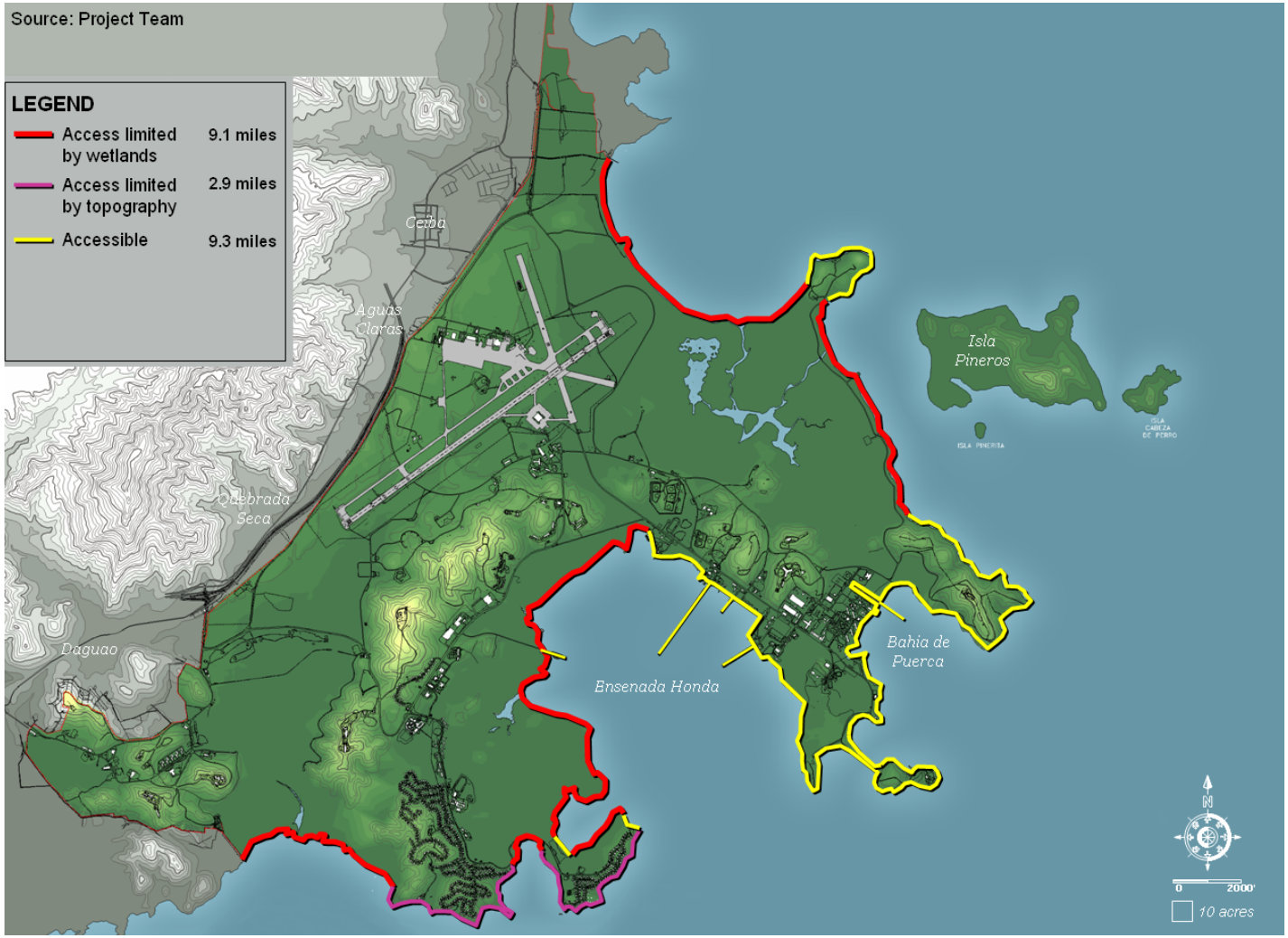
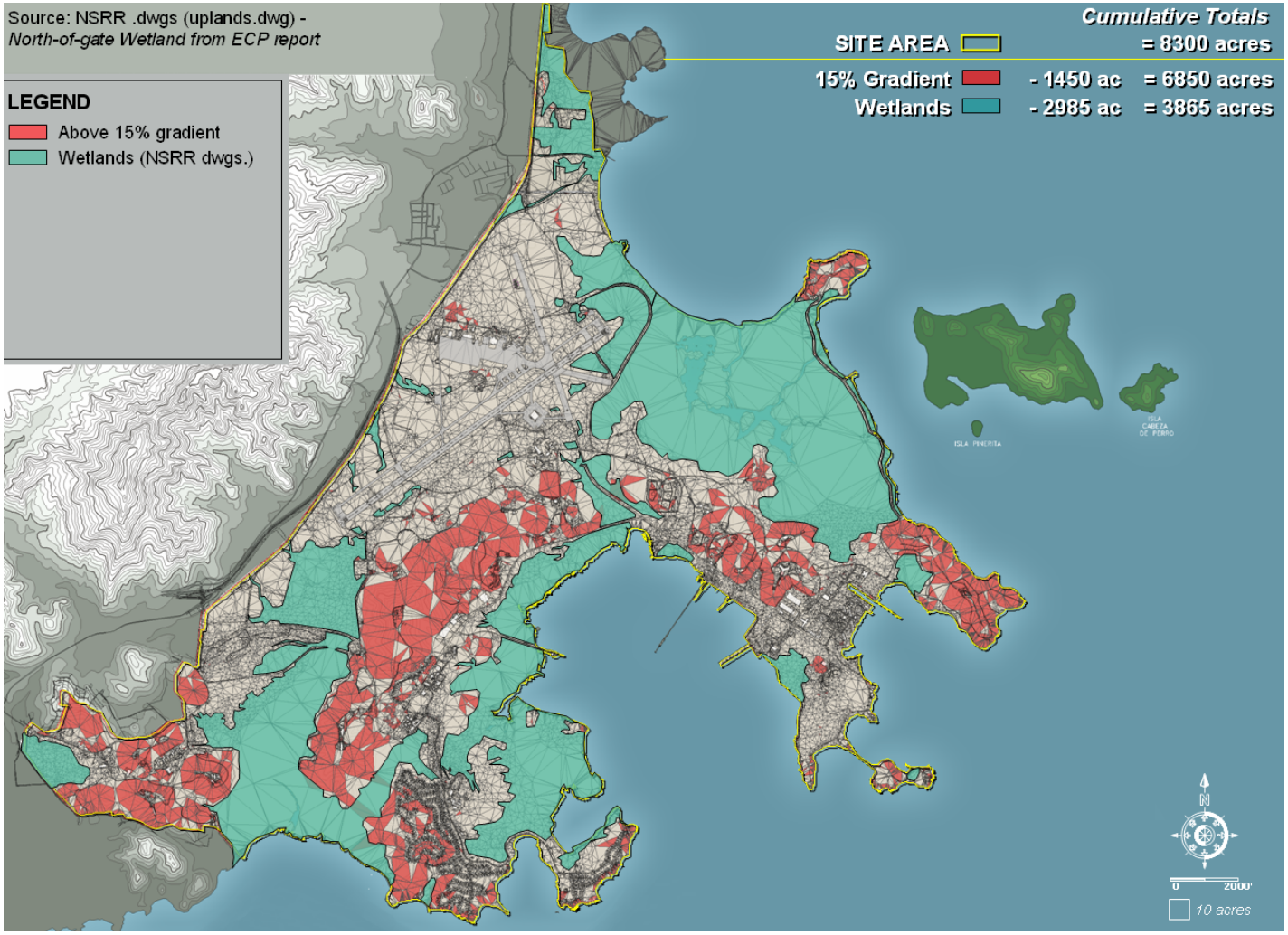


Figure IV.23
Wetlands and Gradient

Source: NSRR (uplands.dwg)- North-of-gate Wetland from ECP Report



Wetlands with Gradients

Taken together, the site's extensive wetlands including the mangrove forests and wetland meadows present a development constraint, limiting water access and restricting sites for new development. The accompanying drawing locates 2,985 acres of combined wetlands (inclusive of mangroves per the Navy ECP report) on the site superimposed on the 1,450 acre area with above 15% gradient. Together these yield remaining developable area of 3,865 acres.

Wetlands, Gradients and Existing Development

The existing development at Roosevelt Roads encompasses 2,026 acres. inclusive of some portion of roads and infrastructure. When this acreage is combined with 521 acres of additional airport property potentially developable for airport-related or public benefit purposes, this totals 2,547 acres. There are 1,318 acres available for development, exclusive of wetlands, gradient constraints, existing development, and the potential airport related development area (521 acres).

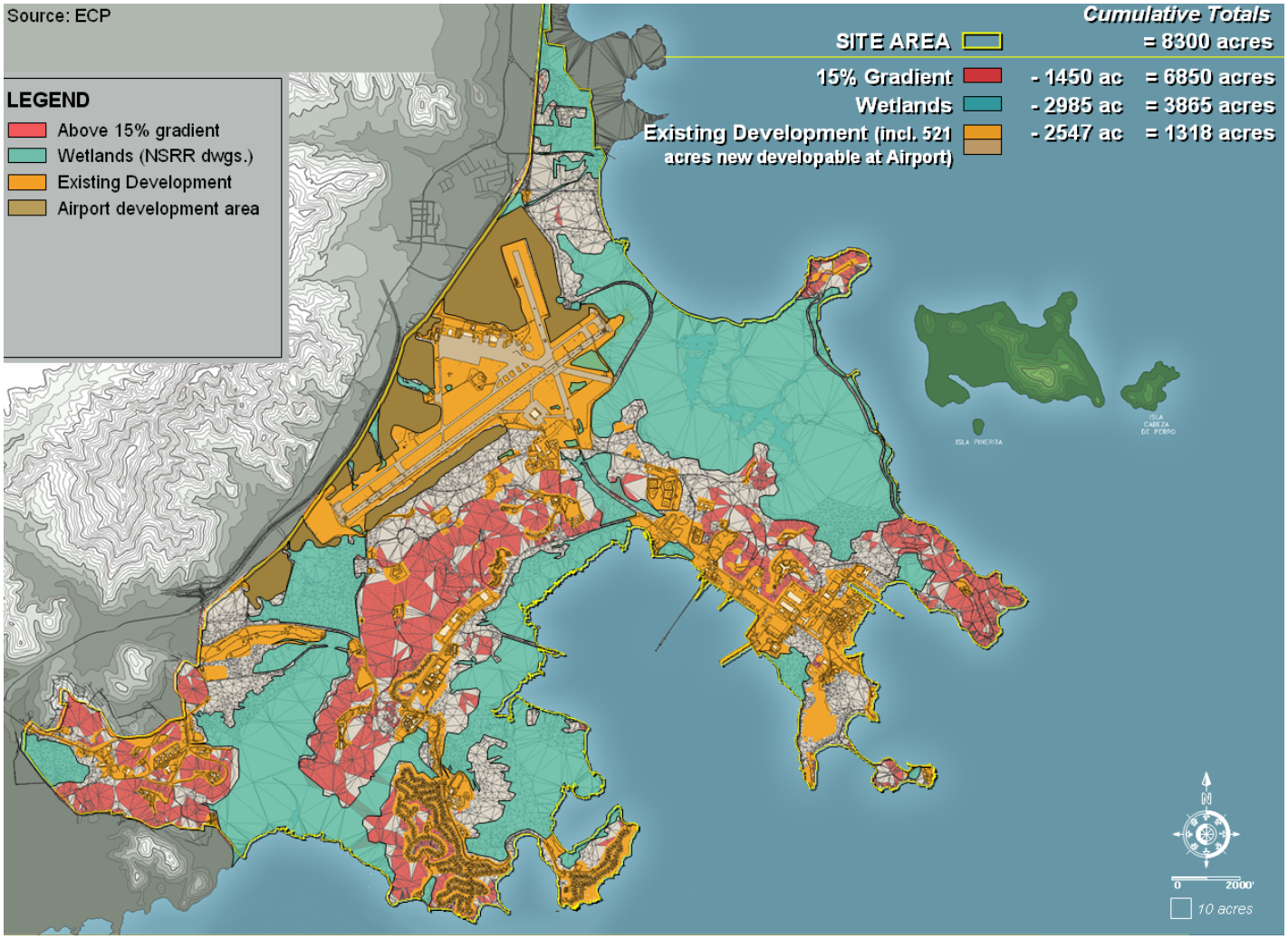


Figure IV.24
Wetlands, Gradient and Existing Development

Source: NSRR (uplands.dwg)- North-of-gate Wetland

Wetlands, Gradients, Existing Development and Floodplain

The 100-year Floodplain limits potential development even further. When floodplain acreage is excluded, the resulting acreage available for new development is 1208 acres (exclusive of the 521 acres of development area at the airport).

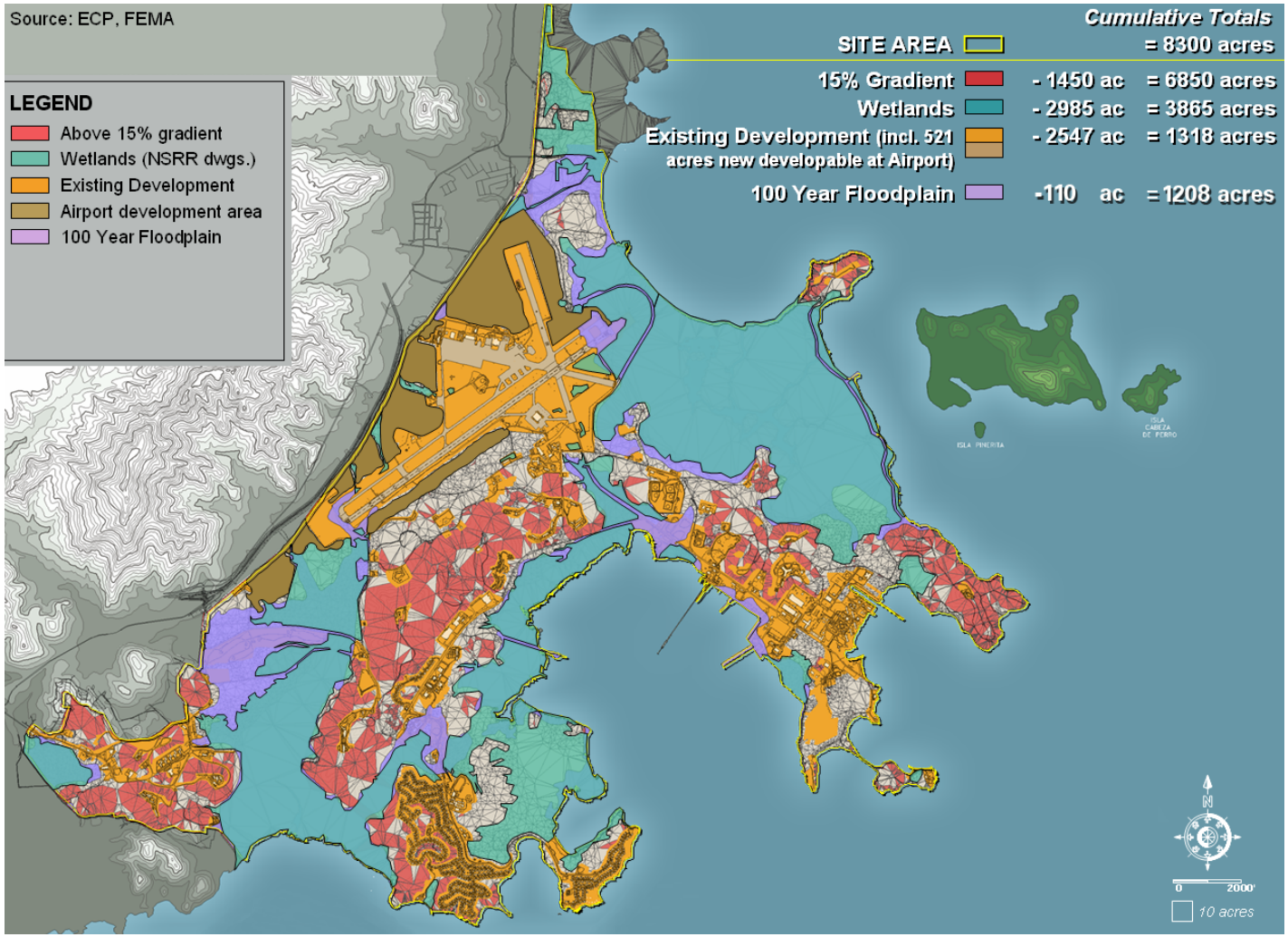


Figure IV.25 *Wetlands, Gradient, Existing Development and 100 year Floodplain*

Source: ECP

Summary of Developable Land

Combined area available for development and re-development = 3,755 acres, including the 521 acres of new airport development.

Figure IV.26
New and Re-Developable Land

Source: North-of-gate Wetland from ECP Report

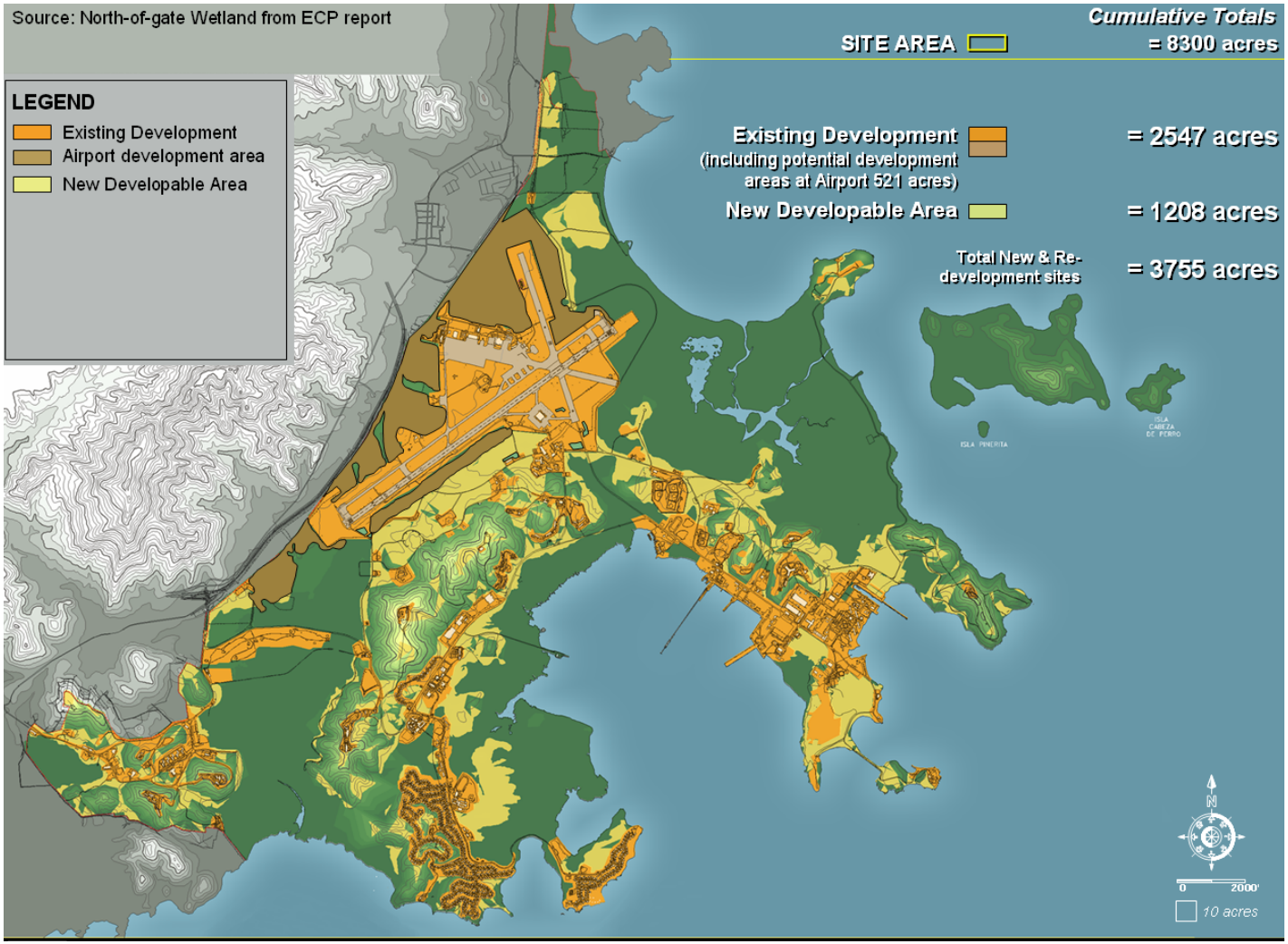
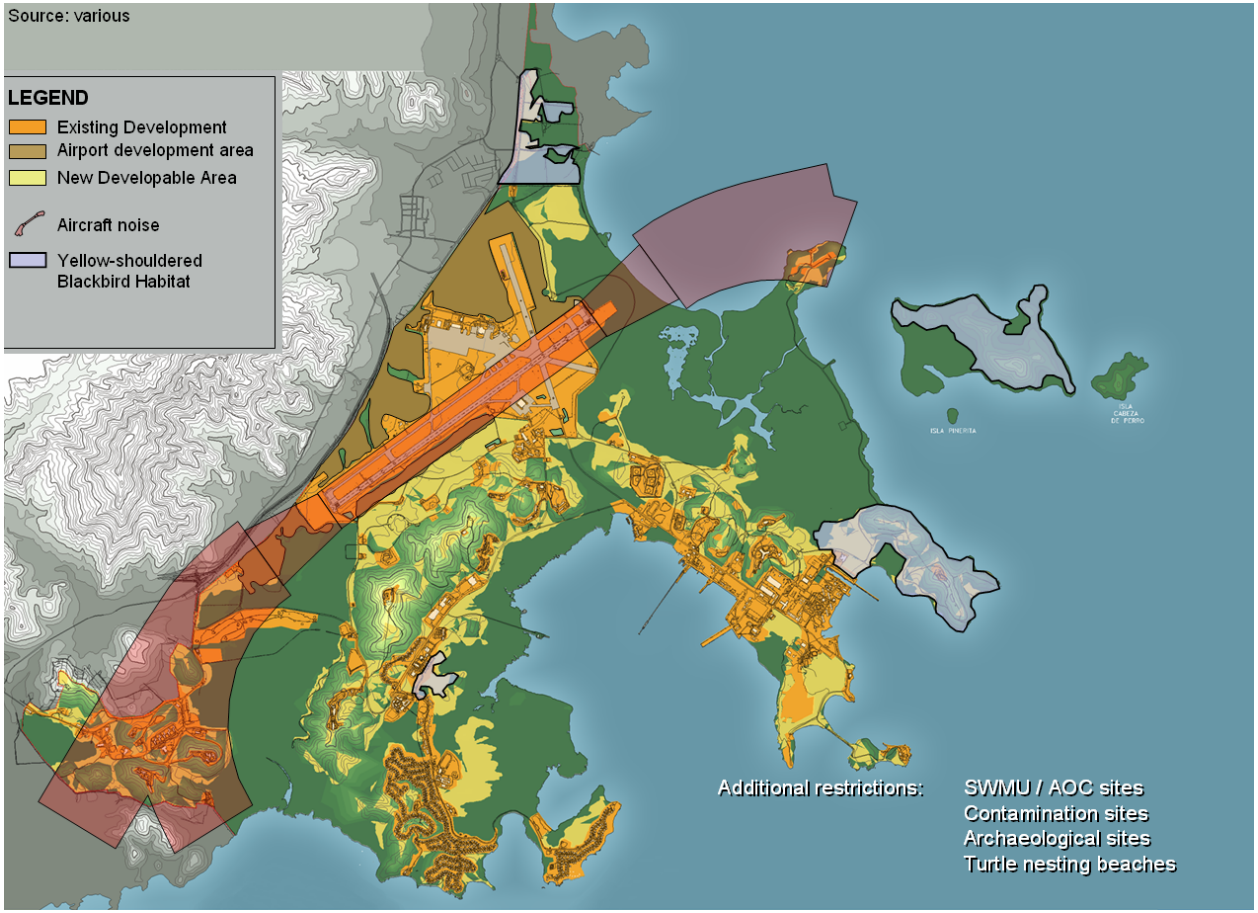


Figure IV.27
Additional Constraints

Source: North-of-gate Wetland from ECP Report



Additional Development Constraints

There are several additional potential development constraints that are awaiting further clarification with respect to precise location, permanence and adjacency to new development:

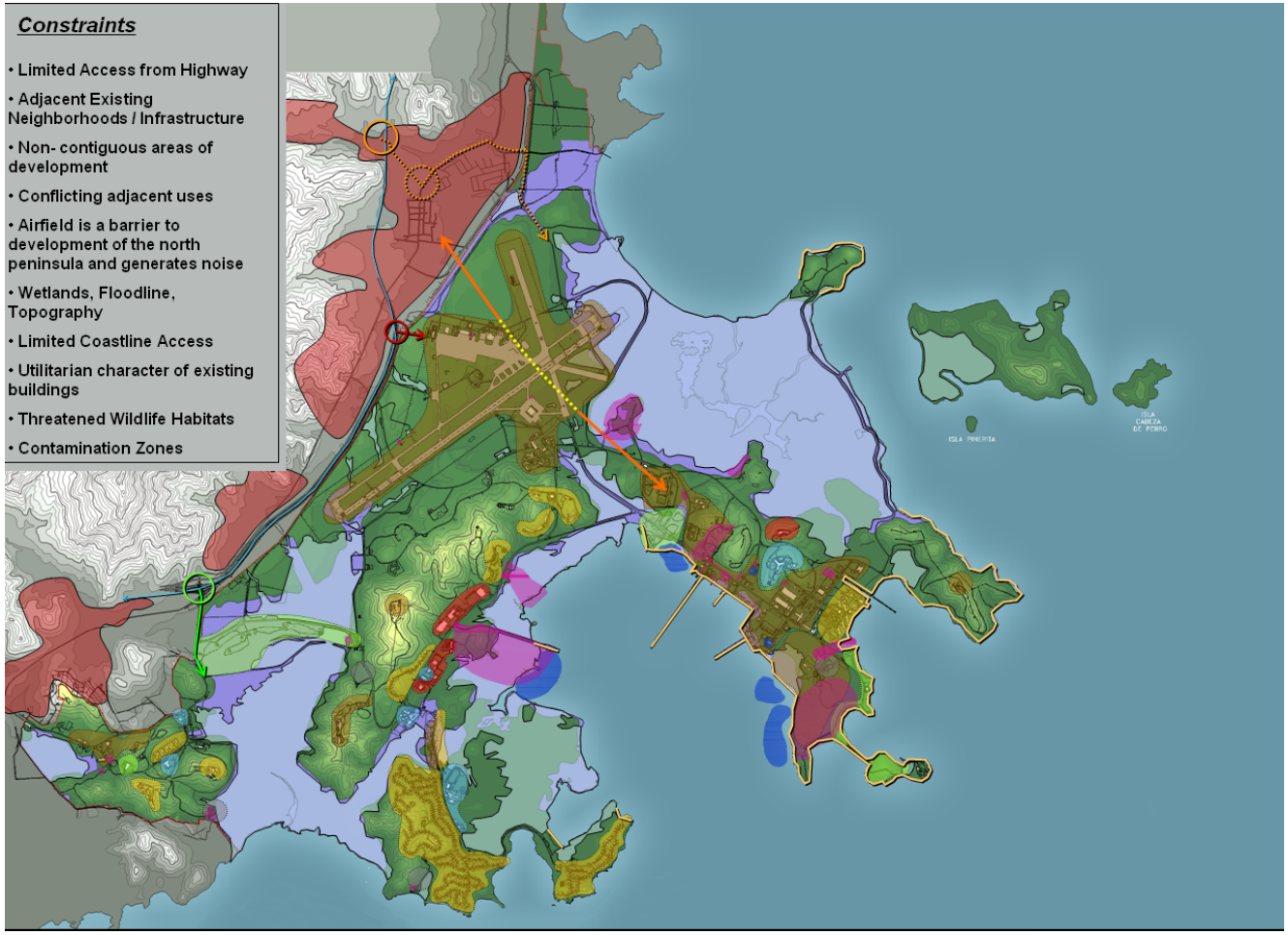
- Solid Waste Management Unit (SWMU) Sites
- Area of Concern (AOC) Sites
- Contamination Sites
- Archaeological Sites
- Yellow-Shouldered Blackbird Habitat
- Turtle Nesting Beaches
- Aircraft noise

Section A.V Opportunities & Constraints

The following is a summary of the physical constraints facing any development effort at Roosevelt Roads.

Figure V.1
Summary of Constraints

Source: Consulting Team



Summary of Constraints

- **Limited Access from Highway:**
  At first glance, Roosevelt Roads appears to be well-serviced by the PR-53 Freeway which runs tangential to a fairly long section of its western boundary. However, the Bundy section in the south is well served by the Bennington Road offramp while the northern gate is served only via a circuitous route through Ceiba. No direct access is currently available from the freeway in the airport vicinity.

- **Adjacent Existing Neighborhoods / Infrastructure:**
  The adjacent neighborhoods of Ceiba, Aguas Claras, Quebrada Seca and Daguao offer little in the way of commercial or infrastructural support.

- **Non- contiguous areas of development:**
  Existing development on the station is characterized by a fragmented arrangement of developed areas tenuously connected by a network of low capacity roads. Future development may concentrate on "stitching together" the disparate parts in order to create a more cohesive built environment.

- **Conflicting adjacent uses:**
  In cases where pockets of development do meet each other, adjecent uses occasionally conflict and do not allow for a synergistic relationship between them.

- **Airfield is a barrier to development of the north peninsula:**
  Almost half the length of Roosevelt Roads is rendered inaccessible by the sheer length of the airfield runway. Access to the north peninsula in particular is compromised due to the relatively short stretch of land between the runway and the ocean which is non-developable mangrove forest. The airfield also generates substantial noise, particularly in the Bundy area.

- **Wetlands, Floodline, Topography:**
  The combination of designated wetlands, mangrove forests, and low, flat topography in the valleys as well as the potential flood inundation of almost half the site results in the scarce availability of developable ground. The haphazard arrangement of existing development reflects this.

- **Limited Coastline Access**
  As a result of steep topography at the peninsula extremities and low-lying wetlands between them, just under half the coastline of Roosevelt Roads offers water accessibility.

- **Utilitarian character of existing buildings**
  Although many of the existing buildings at the station are in good condition, few could be considered to exhibit any architectural character upon which to develop a vernacular.

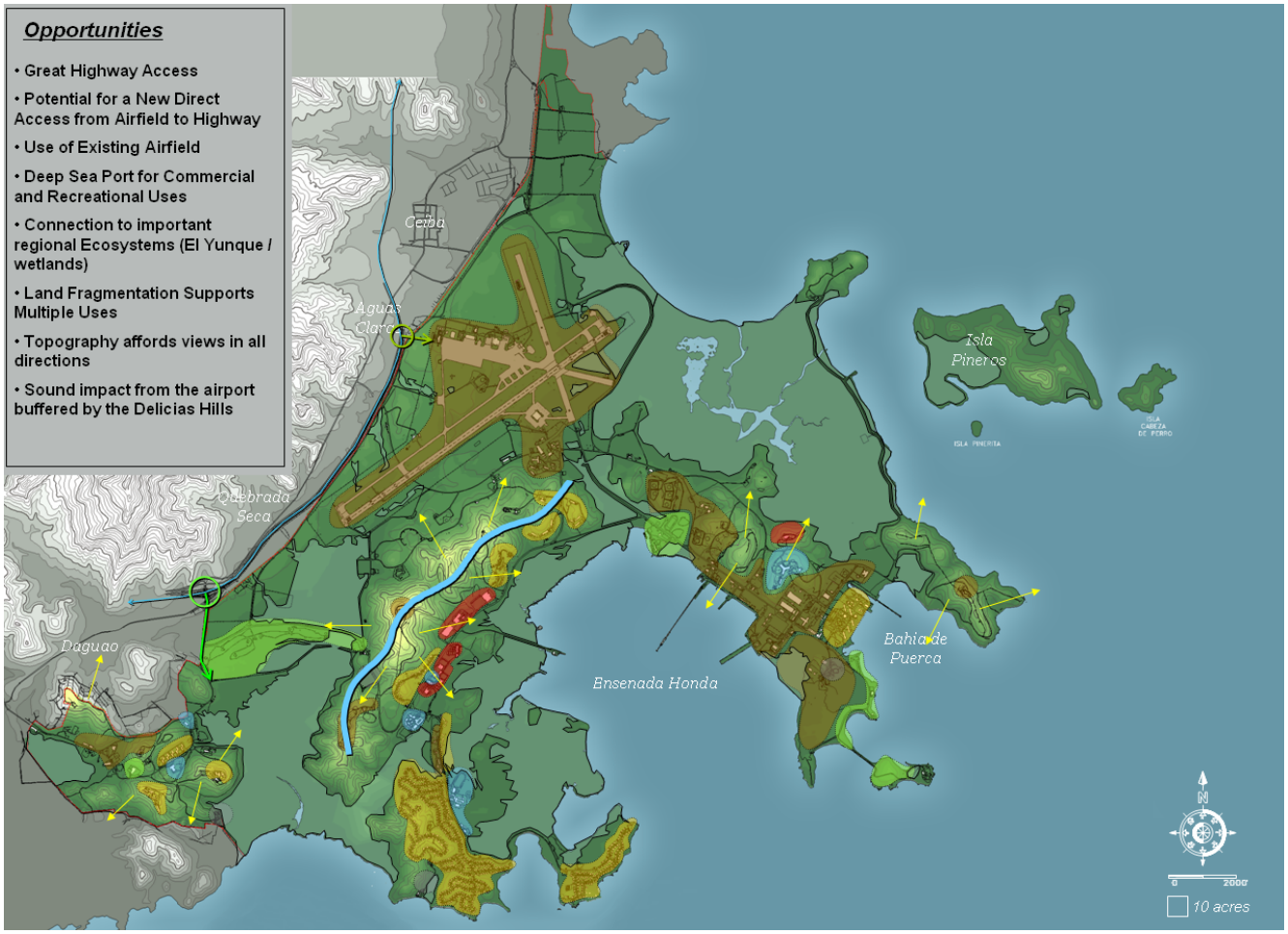
- **Threatened Wildlife Habitats**
  The extent and location of natural habitats for several threatened and endangered species of flora and fauna need to be considered before any development of Roosevelt Roads can be considered.

- **Contamination Zones**
  The clean-up or mitigation of identified areas of concern (AOCs) and solid waste management units (SWMUs) would be an essential prerequisite to development.

The site affords several opportunities which will be explored further as part of the design options in the next phase of work.

Figure V.2
Summary of Opportunities

Source: Consulting Team



Summary of Opportunities

- **Direct Highway Access at Southern Gate**
  Particularly good highway access is available from the south from the Bennington Road offramp to Bundy. This route also feeds into Langley Drive providing access to the "Downtown" and north peninsula areas.

- **Potential for a New Direct Access to Airfield from Highway:**
  The introduction of a third highway interchange in the airport vicinity would greatly improve airport accessibility.

- **Use of Existing Airfield**
  The airfield is well served by its support facilities and would be a tremendous asset to certain future development scenarios.

- **Deep Sea Port for Commercial and Recreational Uses**
  The current dredge depth of 40' in Ensenada Honda and 30' in Bahia de Puerca widens the range of marine craft docking possibilities.

- **Connection to important regional Ecosystems (El Yunque/wetlands)**
  The linkage of regional marine ecosystems to that of the El Yunque rainforest is a rare asset. This adjacency provides a unique opportunity to forge a network of seamless preserves and open spaces

- **Land Fragmentation Supports Multiple Uses**
  The physical arrangement of land sections (peninsulas and valleys) allow for the potential separate development of unrelated land uses if deemed desirable by further market analysis.

- **Topography affords views in all directions**
  Views in all directions are afforded by the steep topography of the Delicias Hills and other promontories around the site.

- **Sound impact from the airport is buffered by the Delicias Hills**
  Ensanada Honda is protected from intrusive airport noise by the ribbon of hills surrounding it.

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