FINAL

ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT

FOR THE TINIAN LANDFILL

Tinian Island
Commonwealth of the Northern Mariana Islands

Prepared For:
The Commonwealth of the Northern Mariana Islands
Department of Public Works
and
The U.S. Department of the Interior
Office of Insular Affairs

Prepared By:
U.S. Army Corps of Engineers,
Honolulu District
and
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Honolulu, Hawaii 96814

SEPTEMBER 2008

DEPARTMENT OF THE NAVY
U.S. DEFENSE REPRESENTATIVE GUAM/COMMONWEALTH OF THE
NORTHERN MARIANA ISLANDS/FEDERATED STATES OF
MICRONESIA/REPUBLIC OF PALAU
PSC 455, BOX 152
FPO AP 96540-1000

11350
Ser N003/750
July 15, 2009

The Honorable Benigno R. Fitial
Governor of the Commonwealth of the Northern Mariana Islands
Caller Box 10007
Saipan, MP 96950

Dear Governor Fitial:

SUBJECT : TINIAN CONSTRUCTION OF A SOLID WASTE FACILITY AND LANDFILL

Thank you for your letter of June 26, 2009, regarding the construction of a solid waste facility and landfill on the Island of Tinian, and for giving us an opportunity to clarify our position in relationship to the planned military build up in this region. I have discussed this matter with Mr. John Jackson, Director, Joint Guam Program Office – Forward. The Joint Guam Program Office was established by the Department of Defense (DoD) to facilitate, manage, coordinate, and execute the military buildup master planning effort.

Let me assure you that our current position on this matter is unchanged from that reflected in the minutes of our May 5, 2008, meeting. Further, we consider that the Memorandum of Understanding (MOU) regarding the Proposed Partial Termination of Tinian Leasehold Interest and Release Process of May 5, 2005, is still in effect. For your convenience, I have attached both the May 5, 2008, meeting minutes and the MOU.

My POC on this matter, Mr. Roy Tsutsui, is coordinating with Mr. Jim Stump, Commonwealth of the Northern Mariana Islands (CNMI) Assistant Attorney General and Mr. John Rosario, Secretary of CNMI Public Lands Authority.

It was my sincere pleasure working with you, and I deeply appreciated your warm welcome and relationship during my stay here in the Marianas. I look forward to our paths crossing again in the future. I have passed on the importance of the CNMI and your relationship to my relief, Rear Admiral Douglass T. Biesel.

If I may be of further assistance, please let me know.

Sincerely,

W. D. FRENCH
Rear Admiral, U.S. Navy
Commander

Enclosures: 1. Meeting minutes of May 5, 2008
2. Memorandum of Understanding of May 5, 2005

Copy to:
Joint Guam Program Office Forward – Guam
U.S. Naval Facilities Engineering Command Marianas

CNMI Tinian Leaseback Land Use: Proposed Landfill
MINUTES
[2nd Meeting]

Date: May 5, 2008
Time: 0900-1100
Location: CNMI Governor's Conference Room, Saipan

1.0 Introductions/attendance

Init	Name	Office	Phone	E-mail
X	Governor Benigno R. Fitial	Governor	(670) 664-2282	
	LtGov Timothy Villagomez	Lt. Governor	(670) 664-2282	
X	Rear Admiral William French	Defense Representative CNMI	(671) 339-3200	
X	Mr. Roy Tsutsui	Defense Rep CNMI Coordinator	(671) 339-5094	Roy.Tsutsui@guam.navy.mil
	CAPT Paul Fuligni	NAVFAC Marianas	(671) 339-5100	Paul.Fuligni@navfacmar.navy.mil
X	Mr. Paul Fisher	Navy Region Marianas Legal Counsel	(671) 339-2021	Paul.fisher@guam.navy.mil
X	Mr. John Del Rosario	Dept. Public Lands Secretary	(670) 234-3751	Secretary@dpl.gov.mp
	Mayor Jose San Nicolas	Tinian Mayor	(670) 433-1802	
X	Mr. Joey San Nicolas	Tinian Mayor Legal Counsel	(670) 433-1825	Mot.LegalCounsel@yahoo.com
	Senator Henry San Nicolas	Tinian Legislative Delegation Chair	(670) 664-8814	
X	Senator Jude Hofschneider	Tinian Legislative Delegation	(670) 285-1888	
X	Senator Joseph Mendiola	Tinian Legislative Delegation	(670) 664-8955	
	Congressman Edwin Aldan	Tinian Legislative Delegation	(670) 433-8868	
	Ms. Ester Ada	Revenue and Tax Director (Finance Secretary Rep)	(670) 664-1000	
X	Mr. Gregory Baka	Attorney General Acting	(670) 664-2340	
X	Ms. Ruth Coleman	Military Liaison and Veterans Affairs Exec Officer	(670) 664-2650	Ruthcoleman2003@yahoo.com
X	Matt Gregory	Attorney General		
X	William Cing	Tinian Mayor Office		
X	Steve Hiney	DPW Solid Waste		
X	Ike Quichocho	Tinian Mayor Office		
X	Sylvan Igisomar	DFW Director		
X	Charles Reyes	Governor PIO		
X	Paterno Hocog	Senator		
X	Chris Haley	Navy Region Marianas		
X	Howard Williams	Governor Special Legal Counsel		
X	Jeff Schorr	DOI Field Rep		

1.1 List of members not present:
a.

2.0 Purpose and overview

2.1 Purpose: To facilitate mutually beneficial planning and coordination of Department of Defense use of CNMI land. Always striving for win-win outcomes. Current focus is on Tinian military leased land, specifically the leased back portion. Discussion meetings were requested by the CNMI Governor Begnino R. Fitial in his letter to Defense Representative dated January 29, 2007, and agreed to in the Defense Representative reply letter dated February 2, 2007. These letters also designated their representatives for these meetings.

2.2 Overview: There were three meetings during the previous administration and this is the second meeting for the current administration. Previous outcomes include a signed Process MOU, priorities for a new landfill and wastewater treatment plant in the leased back land (including concept plans completion), list of Tinian development needs in the leased back area (i.e., casinos, golf resorts, museum and agriculture infrastructure), and preliminary discussions of potential military training expansion needs. The previous administration's fourth meeting was pending payment of Tinian leased back land rental fee debt. Debt payment was pending completion of a Tinian land survey to determine acreage needed to calculate the debt.

2.3 The current administration's first meeting was held on February 8, 2007, reviewed all previously discussed matters of the previous administration and agreed with the set priorities for the landfill and wastewater treatment plant. The current administration's second meeting was pending the Tinian land survey (mentioned above) completion and determination of CNMI rental debt.

3.0 Meeting Objectives and agenda approval

3.1 Review of last meeting minutes

3.2 Tinian leased back land legal status

3.3 Review of Memorandum of Understanding Proposed Partial Termination of Tinian Leasehold Interest and Release Process

3.4 Tinian land survey corrections and debt resolution status/schedule

3.5 Planning status of proposed landfill

3.6 Planning status of proposed wastewater treatment plant

3.7 CNMI priorities reconfirmation discussion

3.8 Planning way ahead strategy

3.9 Other discussion topics

3.10 Next meeting date

3.11 Review/approval of meeting minutes

3.12 Adjourn

4.0 Overview of February 8, 2007 meeting minutes

4.1 Reviewed Process MOU

4.2 Reconfirmed CNMI priorities for landfill and wastewater treatment plant

4.3 Confirmed CNMI concept for co-locating landfill and wastewater treatment plant for land use efficiency and potential cost savings

4.4 Strategy for way ahead including schedule for debt payment

5.0 Tinian leased back land legal status

5.1 Expired in August 2004 and temporarily extended (no change to rent provision) on a month-to-month basis subject to termination due to debt and new potential for military needs.

5.2 Interim proposed action: Recommend Tinian Mayor to keep the Tinian leaseback users informed of the short term temporary authorization status due to the expired leaseback. CNMI/Defense Rep working group will continue progress on the landfill and wastewater treatment plant potential locations in the leaseback area. The CNMI is recommended to confirm what debt is owed and resolve the issue so that the Defense Rep can make a request to Naval Facilities Engineering Command Pacific (NAVFACENGCOM PAC) to consider a temporary extension at least until 2010 when the military expects to have a final land use decision.

5.3 Long term proposed action: The military decision to renew the leaseback will depend on the military future needs for that area and the compatibility of those military operations with leaseback provisions. A draft military master plan for potential operations in the CNMI is scheduled to be completed by the end of 2008. However, a final decision can not be made until the National Environmental Policy Act (NEPA) Record of Decision is signed in 2010. All considerations such as socioeconomic impact (e.g., Tinian ranchers in the leaseback area), environmental, cultural resources, mitigation requirements and safety are solicited and will be included in the NEPA process to insure the military makes an informed decision in its Record of Decision.

5.4 Question by Governor: Is it legal and appropriate in accordance with the 1983 lease agreement that when the lease size is reduced that what was paid by the DoD for the reduced area is required to be reimbursed to the DoD? Action by DoD Attorneys and CNMI AG: Due within 30 days.

6.0 Memorandum of Understanding Proposed Partial Termination of Tinian Leasehold Interest and Release Process

6.1 The Process MOU was intended to help clarify the many requirements of the lease amendment process so that both parties may have a clear understanding of what is required before engaging in commitments that may require advance planning or budgeting. With the inputs of CNMI and DoD, it was signed on May 5, 2005. Two key points were: 1) rental debt must be

vulnerable to CNMI reprogramming. As of May 5, 2008, funding confirmed by CNMI for $3.1M is available but more may be needed to address access, environmental assessment deficiencies and transfer station or other issues emerging as design is being developed. As for the wastewater treatment plant, the CIP funds are still vulnerable to higher priority projects but this project a very high priority due to legal compliance issues with wastewater treatment compliance issues in Tinian.

8.2 Design status: Basic concepts completed but site location coordinates and more specific design is pending. Recent CNMI wastewater treatment design concept concerns of not having sufficient wastewater source flow, excessive uphill pumping maintenance/operational costs and potential impacts of outfall discharge up-current from popular fishing areas could affect the feasibility of co-locating the wastewater treatment facility with the proposed landfill. Therefore, some courses of action (COA) could be: 1) the proposed lease amendment includes use provisions such as maintaining military use until CNMI projects (considered separate projects but co-located) start construction and if not totally constructed the unused portions of land returns to the military lease, 2) proceed with COA 1 but CNMI re-addresses its preferred location for the wastewater treatment plant potentially resulting in a future modification/change of the lease amendment for a separate wastewater treatment plant parcel of land (e.g., closer to San Jose village), 3) delay the proposed lease amendment until CNMI decides its wastewater treatment preferred location, or 4) the proposed lease amendment only addresses the landfill. Governor's decision is to move with COA 2.

8.3 NEPA documents status: CNMI is nearly complete in complying with the NEPA process required when using Federal funding. Completion of the CNMI NEPA documents are not a requirement of the lease amendment process to declare land excess to military needs, however the law requires compliance prior to construction of the landfill and wastewater treatment plant. The CNMI NEPA studies may also be used to help document the condition of returned land as a baseline prior to future CNMI use.

8.4 Way ahead planning requirements:

8.4.1 COA determination (see section 8.2 above)

8.4.2 Survey data of proposed project site(s), including access route, outfall easement and buffer zones to be used as the Exhibit in the lease amendment describing the acres to be removed from the lease (except outer buffer zones). ECD to be provided by CNMI is 60 days.

8.4.3 Buffer zones: Recommend they be identified but not required to be removed from the lease since the military would still retain control of the buffer zones.

8.4.4 Access route and control: Recommend Riverside Road (coastline road) for the access to the preferred project

sites to minimize access control issues. CNMI will probably need to improve the access road to allow for large sized vehicle traffic to the proposed facilities. The military will still need to retain access control during certain training operations but CNMI use of Riverside Road should significantly reduce any access control impacts to CNMI facilities operations. Access controls may further justify a remote solid waste transfer station. A CNMI decision is needed to agree to the proposed lease amendment provision that the military retains access control authority to the proposed facilities but will coordinate any closures with the CNMI in writing in advance of the access controls. These closures, if required, are expected to be temporary and not of high frequency. CNMI decision: Acceptable to Governor and there is awareness of the risks to costs and operations.

8.4.5 Leaseback rental debt resolution

8.4.6 Solid waste Tipping Fees and wastewater treatment customer fees: Recommendation is for the proposed amendment to allow the military to be a fair paying customer of the proposed facilities. Therefore the facilities' designs are recommended to include growth potential and surge capability. CNMI decision: This is acceptable to the Governor.

9.0 Other discussion topics: No other discussions.

10.0 Next meeting date: Tentatively July 3, 2008.

11.0 Review/approval of meeting minutes

12.0 Adjourn: Meeting was adjourned at 1055.

Prepared by: Mr. Roy Tsutsui

APPROVED BY:

Benigno Fitial

CNMI: Governor Benigno Fitial **May 5, 2008**

William French

Defense Rep CNMI: Rear Admiral William French **May 5, 2008**

MEMORANDUM OF UNDERSTANDING PROPOSED PARTIAL TERMINATION OF TINIAN LEASEHOLD INTEREST AND RELEASE PROCESS

THIS MEMORANDUM OF UNDERSTANDING is entered into this 5th day of May, 2005, by and between the UNITED STATES OF AMERICA, Department of the Navy, represented by the United States Defense Representative Commonwealth of the Northern Marianas Islands, hereinafter referred to as "United States", and the COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS, hereinafter referred to as the "Commonwealth".

WITNESSED, that

WHEREAS, acting in accordance with Article VIII of the Covenant to Establish a Commonwealth of the Northern Mariana Islands in Political Union with the United States of America (Public Law 94-241; 90 Stat. 263), and the implementing provisions of a separate Technical Agreement Regarding Use of Land to be Leased by the United States in the Northern Mariana Islands executed simultaneously with said Covenant, the Commonwealth and the United States entered into a Lease Agreement on January 6, 1983, in which the Commonwealth leased to the United States effective on January 1, 1983, certain lands located in the Commonwealth of the Northern Marianas Islands that were needed for defense-related and other federal purposes for an initial term of fifty (50) years with a right in favor of the United States to renew the lease for an additional term of fifty (50) years at the end of the initial term; and

WHEREAS, acting in accordance with Article VIII of the Covenant to Establish a Commonwealth of the Northern Mariana Islands in Political Union with the United States of America (Public Law 94-241; 90 Stat. 263), the Commonwealth and the United States entered into a Leaseback and Disposal Agreement on August 8, 1994, in which the United States leased back to the Commonwealth its leasehold interest in certain lands located on Tinian, Commonwealth of the Northern Mariana Islands, for an initial period of ten (10) years with a right in favor of the Commonwealth, subject to the prior approval of the United States, to renew the lease back for successive additional periods of ten (10) years; and

WHEREAS, Article 10.f (Disposal) of the Lease Agreement of January 6, 1983, provides that should any portion of the leased premises not be required for the needs or the discharge of the responsibilities of the United States, or otherwise become surplus property under United States law, the Commonwealth will be given the first opportunity to acquire the interest of the United States in such property in accordance with United States law; and

WHEREAS, previously certain partial leasehold interests of the United States in the leasehold lands were terminated and released through certain agreements entered into by and between the United States and the Commonwealth in accordance with the above referenced authorities; and

WHEREAS, the Commonwealth has presently indicated a desire to acquire the leasehold interest of the United States in and to the lands within the Lease area on Tinian for the purpose of construction of economic development projects, and the United States is willing to consider the Commonwealth's request for said acquisition of leasehold interest; and

WHEREAS, the United States desires that certain terms contained in the Partial Release of Leasehold Interest, of September 23, 1999, (by and between the United States and the Commonwealth) be amended for purposes of clarification and consistency with federal law.

NOW, THEREFORE, the parties desiring to set forth what must be accomplished in order to facilitate a termination of leasehold interest and release, as well as to identify their respective responsibilities, hereby mutually understand and agree as follows:

1. Purpose of Memorandum of Understanding.

The Parties understand and agree that the intended purpose of this MOU is to set forth the intent, framework, and procedure to facilitate a possible termination, in whole or in part, of leasehold interest and release concerning those certain lands as shown on the attached Exhibit "A" maps. The Parties further understand that the procedures as set forth herein are not intended to be definitive nor final, and that additional procedures may be required as determined by cognizant authorities.

2. Determination of Surplus Property.

The United States will undertake the required reviews and screenings to determine any continuing requirement for United States defense or other federal uses of the leasehold lands subject to this MOU. In the event it is determined by the United States that certain of the leasehold lands are no longer required for defense or other federal purposes and may be declared surplus to the needs of the United States in accordance with law, the United States shall declare the property as surplus except for the reservation of any certain rights and interests; and in accordance with Article 10.f. of the Lease Agreement, the United States shall provide the Commonwealth an opportunity to acquire certain interests of the United States in the subject property.

3. Negotiation of Terms of Conveyance.

In the event property subject to this MOU is determined surplus to the United States except for the reservation of any certain rights and interests, the United States and the Commonwealth shall enter into good faith negotiations regarding the specific terms and conditions of a termination, in whole or in part, of leasehold interest and release, including but not limited to types of consideration and manner of payment for the remaining value of the United State's leasehold interest and any additional benefits conveyed, reservation of rights and interests in favor of the United States, assumptions of liability, indemnifications, releases, restoration, restrictions on future use and development, and certain amendments to the terms of the Partial Release of Leasehold Interest, of September 23, 1999, (by and between the United States and the Commonwealth) as may be desired by the United States. All such mutually agreed to terms and conditions shall be memorialized in a Termination Agreement, as prepared by the United States, which shall facilitate the proposed conveyance of real property interests and be a legally binding agreement in all respects.

4. Authorities.

In the event the United States and the Commonwealth successfully negotiate mutually acceptable terms for a termination of leasehold interest and release, each shall attempt in good faith to obtain their respective required higher approvals and authorities in order to proceed with the proposed conveyance of interests.

5. Required Studies and Documentation.

A. Property Descriptions.

The Commonwealth shall at its own cost and expense provide to the United States property descriptions in a form satisfactory to the United States to facilitate a review and determination of surplus. Additionally, the Commonwealth at its own cost and expense shall prepare such additional property descriptions in the proper form to be used in the property conveyance documents as may be required. The United States shall provide the Commonwealth information concerning property description information requirements. The United States shall be the final required review and approval authority for the completed documentation.

B. Additional Documentation.

In the event it is determined that additional studies or documentation is required to support the proposed transaction, including but not limited to appraisals of valuation, the Commonwealth and the United States shall negotiate the responsibility for preparation of the documentation. The United States shall provide the Commonwealth information concerning documentation requirements. The United States shall be the final required review and approval authority for all documentation.

6. NO ANTI-DEFICIENCY ACT VIOLATION.

The United States and the Commonwealth understand and agree that no federal funds are obligated by this MOU. Furthermore, no provision herein shall be interpreted to require obligation of funds by the Navy in violation of the Anti-Deficiency Act, 31 U.S.C. Sections 1301, 1341, 1342, and 1517.

7. TERMINATION AND SUPERSEDURE.

This MOU shall be considered fully executed and so shall terminate if and when the United States and the Commonwealth have fully completed their respective actions as provided herein, and the Termination Agreement, as proposed herein, has been executed by both parties.

8. RIGHT OF TERMINATION.

The United States and the Commonwealth shall each have the right to terminate this MOU at any time by giving written notice to the other party.

IN WITNESS WHEREOF, the United States and the Commonwealth, through their appropriate and authorized representatives, do hereby execute this MOU on this 5th day of May 2005.

FOR THE COMMONWEALTH:

JUAN N. BABAUTA
GOVERNOR
COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS

FOR THE UNITED STATES:

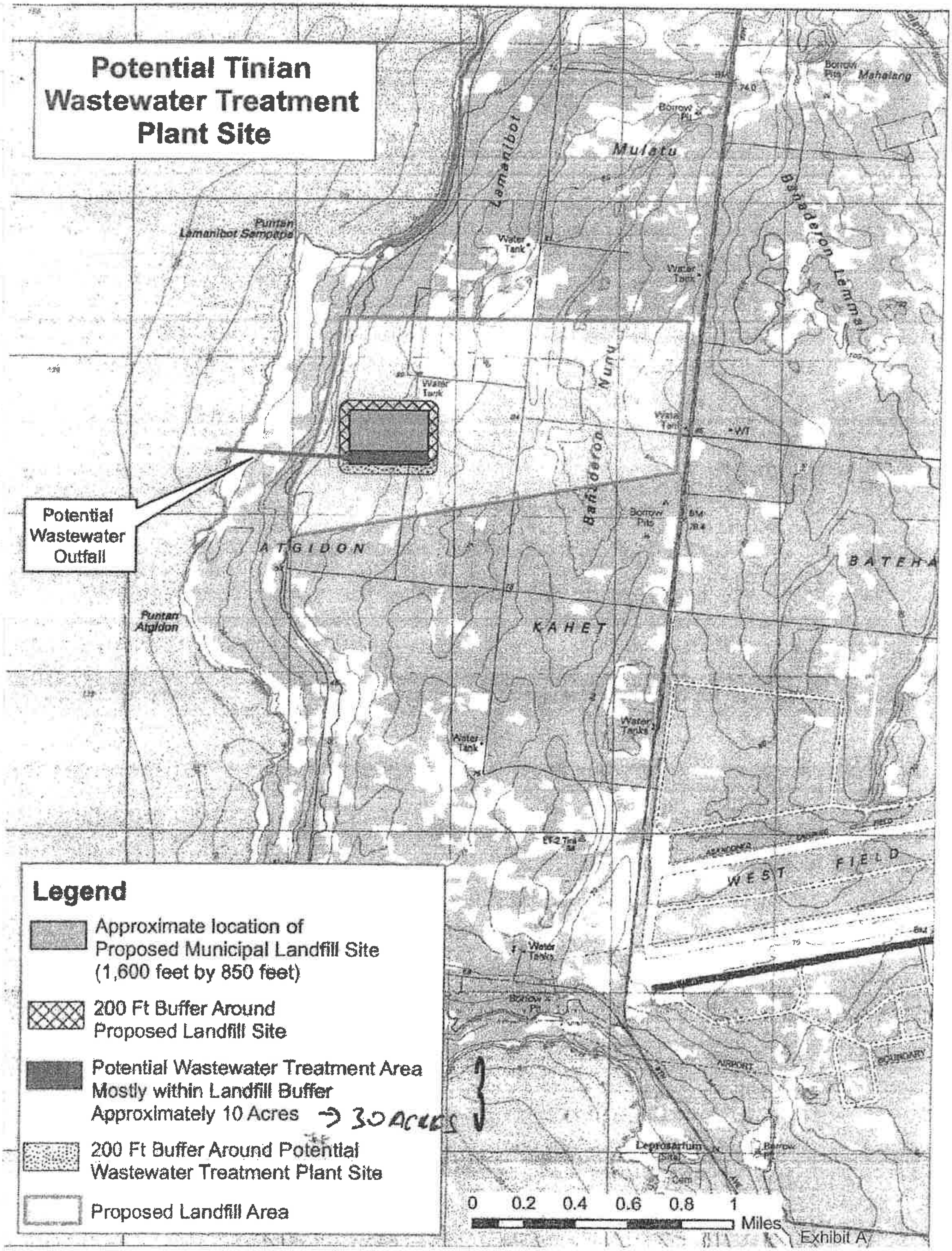
UNITED STATES DEFENSE REPRESENTATIVE
COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS

Approved as to Form:

Steven M. Newman
Governor's Legal Counsel

Approved as to Form:

PAUL M. FISHER
GENERAL COUNSEL, COMMANDER NAVY REGION MARIANAS


Potential Tinian
Wastewater Treatment
Plant Site
Potential
Wastewater
Outfall
Legend
Approximate location of
Proposed Municipal Landfill Site
(1,600 feet by 850 feet)
200 Ft Buffer Around
Proposed Landfill Site
Potential Wastewater Treatment Area
Mostly within Landfill Buffer
Approximately 10 Acres → 30 Acres
200 Ft Buffer Around Potential
Wastewater Treatment Plant Site
Proposed Landfill Area
0 0.2 0.4 0.6 0.8 1
Miles
Exhibit A
Puntan
Lamanibot Sampapa
Lamanibot
Mulatu
Banaderon Lemmai
Mahalang
Borrow Pit
Water Tank
Banaderon
Nunu
ATGIDON
BATEHA
KAHET
Puntan
Atgidon
WEST FIELD
AIRPORT
BOUNDARY
Leprosarium Site

Finding of No Significant Impact
for the Tinian Landfill, Tinian Island, CNMI

ENVIRONMENTAL ASSESSMENT: The Environmental Assessment (EA) for the "Tinian Landfill, Tinian Island, Commonwealth of the Northern Mariana Islands" dated January 2008, is incorporated by reference.

AUTHORITY: Pursuant to the National Environmental Policy Act (NEPA), as amended (42 USC 4347, Section 102 (2)(C); the implementing regulations issued by the Council on Environmental Quality (CEQ) (40 CFR 1500-1508), and the U.S. Department of the Interior (DOI), Office of Insular Affairs (OIA) Draft NEPA Instruction the OIA gives notice that an Environmental Assessment (EA) has been prepared for the proposed Tinian Landfill, Tinian Island, Commonwealth of the Northern Mariana Islands.

PROPOSED ACTION: The Commonwealth of the Northern Mariana Islands (CNMI) Department of Public Works (DPW) with the assistance of the U.S. Army Corps of Engineers, Honolulu District, and in cooperation with the DOI OIA, propose the construction, and operation of a new regulatory-compliant municipal solid waste landfill (MSWL) on Tinian Island in the CNMI. The purpose of the new MSWL is to replace an existing non-regulatory compliant open-burning dump currently being used for all solid waste disposal on the island. The proposed MSWL would accommodate Tinian's present and future solid waste demands in an environmentally compliant manner and eliminate the environmental and public health hazards associated with the continued operation of the existing open-burning dump.

ALTERNATIVES CONSIDERED: Four alternatives to the proposed action were considered: 1) Construction of the MSWL at the Atgidon Site (Preferred Alternative); 2) Construction of the MSWL at the Masalok site; 3) Construction of the MSWL at the Carolinas site, and 4) the "no action" alternative. Under Alternative 1 (the Preferred and Environmentally Preferred Alternative) the proposed MSWL site would result in no significant impacts to environmental resources. Under Alternatives 2 and 3 construction of a new MSWL would result in potential adverse and/or significant impacts to threatened and endangered species, biological, coastal habitat, and recreational and aesthetic resources. Under the "no action" alternative the existing open dump would continue to operate and adverse impacts would continue to occur to public health, land use, groundwater, coastal water, soil, and biological resources.

SUMMARY OF FINDINGS: The EA evaluated the potential effects of the proposed project on environmental resources at each of the alternative sites and the surrounding areas. Environmental resources which could potentially be impacted by the proposed project included: biological resources, water resources, coastal resources, air quality, traffic, noise, utilities and solid waste, and cultural resources. Potential impacts of the proposed action on these environmental resources are summarized below. Mitigation measures are described in the EA.

Cultural Resources: A archaeological study was conducted as part of the environmental assessment process and it was determined that the proposed MSWL will have no effect on any significant historic properties. The CNMI Division of Historic Preservation has concurred in this determination pursuant to Section 106 of the National Historic Preservation Act of 1966 as amended.

Traffic: Traffic related impacts resulting from the construction and operation of the proposed MSWL will not result in adverse impacts to vehicular traffic within and outside of the proposed project area. A traffic impact analysis was completed as part of the EA process supporting this determination.

Air Quality: Potential short-term, temporary impacts on air quality include vehicle emissions and fugitive dust from construction activities. These emissions are not considered significant and will be mitigated by compliance with control measures and permitting requirements. An air quality impact study conducted as part of the EA also determined that operation of the proposed MSWL would not result in significant long-term adverse air quality impacts. Furthermore, the proposed action would result in positive short-term and long-term impacts to air quality as the current practice of burning solid waste at the existing open dump would cease.

Noise Environment: Short-term, temporary noise impacts are anticipated during construction activities. Impacts on housing units adjacent to the project site will be minimized through properly muffled heavy equipment, appropriate staging area locations, and restriction of construction activities during early morning and late evening periods. The proposed project will not result in significant long-term adverse noise impacts.

Biological Resources: No significant impacts to threatened or endangered species will occur as a result of the proposed action. Consultation was undertaken with the U.S. Fish and Wildlife Service (USFWS) pursuant to Section 7 of the Endangered Species Act of 1973 [16 U.S.C. 1531-1544; 87 Stat. 884], as amended, regarding potential adverse impacts of the Proposed Project on threatened or endangered species. The USFWS has concurred with the determination that the proposed MSWL would not adversely affect any threatened or endangered species. In addition, consultation was undertaken with the CNMI Division of Forestry and Wildlife regarding potential adverse impacts from invasive species (esp. the Brown Treesnake) introduction into Tinian. Through implementation of appropriate preventive mitigation measures the proposed action would not result in adverse impacts resulting from invasive species introduction.

Utilities and Solid Waste: No significant impacts are anticipated as existing systems will be able to accommodate the proposed project. The proposed MSWL would result in overall positive impacts to the environment and public health by providing a regulatory-compliant, state-of-the-art solid waste disposal facility for the population of Tinian.

SUMMARY OF CUMULATIVE IMPACTS: The cumulative impacts of implementing the proposed action in consideration of other past, present, and reasonable foreseeable future projects on Tinian Island were assessed, based upon available information. No significant cumulative impacts were identified.

DECISION: Based on information compiled during the preparation of the EA, the DOI OIA finds that the proposed MSWL at the Atgidon site on the island of Tinian would not result in significant direct, indirect, or cumulative adverse impacts on the man-made or natural environment. Therefore, an Environmental Impact Statement will not be prepared.

Nikolao Pula

Nikolao I. Pula, Director
Office of Insular Affairs
U.S. Department of the Interior

8/19/08

Date

FINAL

ENVIRONMENTAL ASSESSMENT FOR THE TINIAN LANDFILL

Tinian Island
Commonwealth of the Northern Mariana Islands

Prepared For:

The Commonwealth of the Northern Mariana Islands
Department of Public Works
and
The U.S. Department of the Interior
Office of Insular Affairs

Prepared By:

U.S. Army Corps of Engineers,
Honolulu District
and
Wil Chee – Planning and Environmental
1018 Palm Drive
Honolulu, Hawaii 96814

January 2008

APPROVED AND SUBMITTED BY:

Nikolao Pula 1/31/08

Nikolao I. Pula, Acting Deputy Assistant Secretary
Office of Insular Affairs
U.S. Department of the Interior

Date

1/14/08

Jose S. Demapan, Secretary
CNMI Department of Public Works

Date

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ACRONYMS AND ABBREVIATIONS

AAQS	Ambient Air Quality Standards
ACM	Asbestos Containing Material
APCR	Air Pollution Control Regulations
AQIR	Air Quality Impact Report
BGS	Below ground surface
BMP	Best Management Practices
BMPP	Best Management Practices Plan
BTSIC	Brown tree snake Identification and Capture
BTSQP	Brown tree snake Quarantine Program (CNMI DFW)
CAA	Clean Air Act
C/C/DCD	Construction/Demolition/Disaster Clean-up Disposal
CEPA	Commonwealth Environmental Protection Act
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIP	Capital Improvement Project
CNMI	Commonwealth of the Northern Mariana Islands
CO_2	Carbon Dioxide
CO	Carbon Monoxide
CRM	Coastal Resources Management
CUC	Commonwealth Utilities Corporation

CWA	Clean Water Act
CZM	Coastal Zone Management
DA	Department of the Army
dB	Decibel
dBA	A-Weighted Decibel
DEQ	Division of Environmental Quality
DFW	CNMI Division of Fish and Wildlife
DHP	Division of Historic Preservation
DNL	Day-Night Average Sound Level
DOI	U.S. Department of the Interior
DPW	Department of Public Works
EA	Environmental Assessment
EIS	Environmental Impact Statement
E.O.	Executive Order
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FNSI	Finding of No Significant Impact
FY	Fiscal Year
GISD	Global Invasive Species Database
HAPC	Habitat of Particular Concern
HDPE	High Density Polyethylene
HPO	Historic Preservation Office
IBB	International Broadcasting Bureau
ISSG	Invasive Species Specialist Group (IUCN)
IUCN	International Union for Conservation of Nature and Natural Resources
Leq	Equivalent Sound Level
LOS	Level of Service

MARPOL	Marine Pollution
MBTA	Migratory Bird Treaty Act
Mg	Megagram
MMPA	Marine Mammal Protection Act
MSWL	Municipal Solid Waste Landfill
MW	Mega Watts
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NANPCA	Nonindigenous Aquatic Nuisance Prevention Control Act
NEPA	National Environmental Policy Act
NIS	Nonindigenous Invasive Species
NISA	National Invasive Species Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NMOC	Non-Methane Organic Compound
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollution Discharge Elimination System
NRHP	National Register of Historic Places
OIA	Office of Insular Affairs
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Poly Chlorinated Biphenyl
PM	Particulate Matter
PPM	Parts per million
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act

SWMF	Solid Waste Management Facility
SWMR	Solid Waste Management Regulations
TIAR	Traffic Impact Analysis Report
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound
WCP	Wil Chee – Planning, Inc.
WQC	Water Quality Certification
WQS	Water Quality Standards
WWTF	Waste Water Treatment Facility

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COVER SHEET
Environmental Assessment for the Tinian Landfill
Tinian Island, Commonwealth of the Northern Mariana Islands

Report Designation:	FINAL Environmental Assessment (EA)
Proposed Action:	Construction of a new municipal solid waste landfill (MSWL) for Tinian Island
Proposing Agency:	U.S. Department of the Interior, Office of Insular Affairs (OIA)
Cooperating Agency:	Commonwealth of the Northern Mariana Islands (CNMI), Department of Public Works
EA Preparer:	U.S. Army Corps of Engineers, Honolulu District (OIA Representative) and Wil Chee – Planning and Environmental

Abstract:

The CNMI Department of Public Works with the assistance of the U.S. Army Corps of Engineers, Honolulu District, and in cooperation with the United States (U.S.) Department of the Interior (DOI), Office of Insular Affairs (OIA), propose the siting, construction, and operation of a new MSWL on Tinian Island in the CNMI. The proposed MSWL would be significantly different from the existing open dump and would include the installation of a new liner, leachate collection and treatment system, and environmental monitoring. The new MSWL is proposed to be located in western Tinian in the district of Atgidon.

This EA has been prepared pursuant to the authority of CNMI Public Law 3-47, and implementing CNMI "Coastal Resources Rules and Regulations" (Title 15, Chapters 10-001 – 20-405) as promulgated under the CNMI Coastal Resources Management Program, the National Environmental Policy Act of 1969, and in accordance with the Department of the Interior Departmental Manual, Chapter 16 (draft), Managing the NEPA Process – Office of Insular Affairs.

Comments:

Written comments and inquiries on this document should be directed to: Mr. James Hatashima, Project Manager, U.S. Army Corps of Engineers, Honolulu District, Civil and Public Works Branch (CEPOH-PP-C), Rm. 312, Bldg. 230, Fort Shafter, Hawaii 96858-5440

Public Input: The public comment period on this Final EA will be accepted during a 30-day public comment period commencing on the date the public notice is published informing the general public of the Final EA availability.

1.0 INTRODUCTION

1.1 Project Scope and Authority

The Commonwealth of the Northern Mariana Islands (CNMI) Department of Public Works (DPW) with the assistance of the U.S. Army Corps of Engineers, Honolulu District, and in cooperation with the United States (U.S.) Department of the Interior (DOI), Office of Insular Affairs (OIA), propose the closure of an existing open dump site, and the siting, construction, and operations of a new municipal solid waste landfill (MSWL) on Tinian Island in the CNMI.

The proposed project would be partially funded through a DOI OIA Capital Improvement Program (CIP) grant. As part of the CIP grant DPW is required to comply with all applicable federal and territorial laws and regulations including compliance with the NEPA process (13 CFR Part 316). Via the Intergovernmental Cooperation Act (31 USC 6505), the Corps may provide assistance to state and local governments on a reimbursable basis. Under this program, DPW has requested the Corps of Engineers, Honolulu District, Program and Project Management Division to conduct the NEPA evaluation process for this project.

The intent of this Environmental Assessment (EA) is to ensure that comprehensive and systematic consideration is given to potential impacts of the proposed action upon the natural and human environment. It is intended to serve as an environmental disclosure document which identifies the purpose and need of the proposed action, reasonable alternatives to the proposed action, existing environmental conditions, potential environmental impacts, and mitigation measures to avoid or minimize such impacts. The finding presented in this EA will provide the basis to determine whether an Environmental Impact Statement (EIS) or Finding of No Significant Impact (FNSI) is appropriate.

The proposed project is presently in the conceptual stage and the design phase has not yet been initiated. Therefore, this EA does not address specific design/engineering details but, rather focuses on potential environmental impacts associated with the siting and operation of a typical MSWL.

This EA has been prepared pursuant to the authority of CNMI Public Law 3-47, §§ 8(d), 9(c) [2 CMC §§ 1531(d), 1532 (c)], and 1 CMC § 9115, and implementing CNMI "Coastal Resources Rules and Regulations" (Title 15, Chapters 10-001 – 20-405) as promulgated under the CNMI Coastal Resources Management (CRM) Program, and in accordance with the National Environmental Policy Act (NEPA) of 1969, et seq.; Council on Environmental Quality (CEQ) regulations (Code of Federal Regulations [CFR], Title 40, Parts 1500-1508), and OIA NEPA Instruction (Draft).

1.2 Project Location and Description

Tinian, along with Saipan and Rota are the three principal islands of the Northern Mariana Islands. Tinian is the second largest island in the archipelago which is located in the Western Pacific Ocean approximately 3,730 miles (6,000 kilometers) southwest of Hawaii. At latitude 15 degrees 5 minutes north and longitude 145 degrees 45 minutes east, Tinian lies about 6 miles (10 kilometers) south-southwest of Saipan and about 124 miles (200 kilometers) north-northeast of Guam (OEDPC 1997; USDA 1989, 1994). The regional location of Tinian Island is shown in Figure 1-1 and a map of CNMI shown in Figure 1-2 (All figures in the EA are attached herein as Appendix A).

On Tinian Island an existing open dump site is currently being used for disposal of municipal solid waste. It encompasses an area of approximately 4 acres and is located less than one mile north of San Jose (to the west of 8th Avenue). The Open dump is also located less than 3,000 feet southwest of the West Tinian Airport runway.

The proposed action involves the construction of a new MSWL. The proposed MSWL would be significantly different from the existing open dump and would include the installation of a new liner, leachate collection and treatment system, and environmental monitoring.

The proposed MSWL would be located in western Tinian in the district of Atgidon. A map of Tinian Island is shown in Figure 1-3. Also shown in Figure 1-3 is the location of the existing open dump and the location of the proposed MSWL site. The proposed project and alternatives are discussed in further detail in Section 3.0.

1.3 Project Schedule and Cost

At the present time, specific construction start and end dates for a new MSWL have not yet been determined due to the fact that a site has not yet been selected. However, the duration of the overall MSWL construction process (e.g., site selection, technical studies, design/engineering, permitting, and construction) is anticipated to be between three to five years (WCP, 2005).

Actual construction costs of a new MSWL are dependent on site conditions such as topography, subsurface geology and soils, and site drainage. With only a conceptual layout and without such site-specific information, it is difficult to develop precise construction costs. Bearing this in mind, the estimated MSWL construction costs (including equipment) is $4.4 million, estimated operational cost is $155,000 annually, and estimated closure costs are $682,000. Thus, the overall total MSWL construction and operational costs would be approximately $5.2 million (Ibid.).

2.0 PURPOSE AND NEED FOR THE ACTION

2.1 Existing Conditions

The current site is being used for disposal of municipal solid waste on Tinian is located less than one mile north of San Jose and west of 8th Avenue. It is also located less than 3,000 feet southwest of the West Tinian Airport runway. An aerial photograph of the existing open dump site is shown in Figure 2-1.

The disposal site is being operated as an open burning dump and waste pile burning occurs on a regular basis. Operations at the open dump consist of the dumping of solid waste from a platform into an open area several feet below. When the waste reaches a level that makes unloading difficult, a bulldozer is used to push the waste away from the unloading area. The solid waste is then spread and no consistent effort has been made to provide soil cover over the waste. In 2005, the volume of waste in the open dump was estimated to be approximately 45,000 tons or 150,000 cubic yards (WCP, 2005).

The existing open dump site is not secure and there are no fences to limit access or control litter. The area was not designed as a municipal solid waste landfill and has no environmental protection or features associated with a modern landfill. As such, the existing open dump is not in compliance with regulatory guidelines for solid waste landfills. In order to become compliant with applicable environmental regulations, the existing open dump needs to be closed and replacement regulatory compliant waste disposal facility (i.e. a MSWL) constructed.

2.2 Future Landfill Demands

Solid waste generation is a function of numerous factors, including permanent resident population; transient (e.g., tourist) population; types and quantity of agriculture, commercial businesses, and industrial facilities; location; climate; and fuel use. Tinian has relatively few commercial and industrial waste generators, and therefore generates solid waste as if it were comprised merely of residences.

Based upon the above factors, population and waste generation projections were estimated over an initial 30-year planning period (i.e., 2005 to 2035). Based on a per capita waste generation rate of 4.06 pounds per person per day and an average resident, transient, and visitor population growth rate of 5 percent annually, the overall solid waste generated on Tinian by the year 2035 is estimated to total approximately 306,008 tons (WCP, 2005).

Table 2-1 lists the projected resident, transient, and visitor population, waste generation in tons per year, and cumulative waste generation in 5-year increments for Tinian between the years 2005 to 2035.

Table 2-1
Population and Waste Generation Projections

Year	Years After Landfill Opens	Growth Rate (percent)[1]	Forecast Resident Population	Forecast Transient Population[2]	Forecast Visitor Population[3]	Waste Generated (Tons/Year)[4]	Tons in Previous 5-Year Period	Cumulative Waste Generated (Tons)
1980			*866*			*642*		
1990		*9.35*	*2,118*			*1,569*		
2000		*5.27*	*3,540*	*884*		*2,623*		
2005	0	5.00	4,518	1,000	63,000	4,472		
2010	5	5.00	5,766	1,276	80,406	5,708	25,450	25,450
2015	10	5.00	7,359	1,629	102,620	7,285	32,482	57,932
2020	15	5.00	9,393	2,079	130,972	9,298	41,456	99,388
2025	20	5.00	11,988	2,653	167,158	11,866	52,909	152,297
2030	25	5.00	15,300	3,386	213,340	15,145	67,527	219,825
2035	30	5.00	19,527	4,322	272,282	19,329	86,184	306,008

Notes: Actual statistics are italicized. 1) Assumes a 5 percent annual resident, transient, and visitor population growth rate; 2) Non-resident workers; 3) Average per person stay of 3 days; 4) Constant waste generation rate of 4.06 pounds per person per day (equal to Saipan's 2003 rate)

Source: WCP,2005

2.3 Purpose and Need

Subtitle D of the Resource Conservation and Recovery Act of 1976 (RCRA) is codified as Part 258 (Criteria for Municipal Solid Waste Landfills) to CFR Title 40. The existing open dump is not in compliance with the regulations as prescribed under RCRA Subtitle D. There are no environmental protection features associated with the existing open dump when compared to a regulatory compliant MSWL. Thus, there is an immediate need for closure of the existing open dump and the construction of a new RCRA-compliant MSWL on Tinian Island.

In addition to regulatory compliance the existing open dump poses numerous environmental and health hazards to the general public. Municipal solid waste being deposited into the dump provides food and harborage for rodents, birds and flies, which are capable of transmitting disease organisms to humans and animals. There is also the potential for environmental degradation of the soil, surface and groundwater, air, and vegetation. Two other significant human risks associated with the open dump are its proximity to West Tinian Airport and injury associated with the lack of physical barriers and uncontrolled access. Having the dump located very near the airport runways presents a bird hazard for aircraft and its occupants. An uncontrolled open dump is also an attractive nuisance where individuals can sustain injury while scavenging.

In addition, the site of the existing dump is being considered for possible future development into a golf course. Therefore, there is a need on the part of the Tinian Municipality to permanently close the existing open dump site as expeditiously as possible.

2.4 Statement of Purpose and Need for the Proposed Action

The purpose of the proposed action is to provide appropriate and compliant solid waste disposal for the CNMI Department of Public Works. The need for the proposed action is the existing landfill is not compliant with current environmental regulations. Lack of compliance promotes environmental, public health and legal risks for the people and CNMI Department of Public Works. A new MSWL is needed in order meet environmental, public health and legal responsibilities.

3.0 PROJECT ALTERNATIVES INCLUDING THE PROPOSED ACTION

3.1 Background

3.1.1 MSWL Planning and Sizing Considerations

In 2005 a Comprehensive Study Report for the Tinian Landfill was prepared for the USACE and CNMI DPW. Among other objectives, this study evaluated potential sites for the siting of a new MSWL on Tinian Island. Alternative site locations were primarily based upon the findings of the comprehensive study and carried forward into this EA for environmental analysis.

Key factors or criteria associated with the planning and sizing of a new MSWL include:

- Location of a site large enough to allow for the projected life of the landfill and buffers. An area of approximately 30 acres (20 acres landfill and 10 acres buffer) would be required for siting of the proposed MSWL.
- Impacts to neighboring properties and nearby receptors
- Existing and forecasted daily, weekend, and annual waste quantities (tons or cubic yards)
- Current and forecasted population to be served
- Types of waste (e.g., municipal solid waste, demolition debris, asbestos, tires, wood waste, land-clearing waste, agricultural wastes, sewage sludge, appliances, etc.)
- Types of generators (residences, businesses, industries, farms, etc.)
- Types and quantity of vehicles delivering waste
- Quantity and types of recyclable materials if recycling is to be considered
- Business hours, (i.e., days of the week and hours of operation the station is open to receive waste).
- Access roads and distance from the largest location of waste generation
- The site meets RCRA Subtitle D siting requirements

As previously mentioned, the proposed action is presently in the conceptual stage and the design phase has not yet been initiated. During the design phase the proposed MSWL would be planned and constructed with sufficient capacity to handle waste stream growth, or with the ability to be expanded economically. CNMI and its agent shall be responsible for and implement all required and applicable RCRA Subtitle D design and performance standards in their final MSWL design.

3.1.2 MSWL Siting Considerations

RCRA Subtitle D is codified as Part 258 (Criteria for Municipal Solid Waste

Landfills) to Title 40 of the Code of Federal Regulations. Subpart B of 40 CFR Part 258 specifies federal landfill siting requirements. In siting a new landfill, the following criteria are typically considered:

- Environmental features of the proposed site (e.g., proximity to sensitive areas, ground and surface water resources, etc.)
- Size and topography (especially slope) of the proposed site
- Community acceptance

In the case of Tinian, potential locations for the new landfill are limited by the Exclusive Military Use Area and the presence of drinking water aquifers that underlie much of the island. According to Municipality of Tinian representatives, the Navy prefers the landfill not be sited north of a latitudinal line from Puntan Lamanibot Sampapa to Unai Dangkolo (approximately 15 degrees 2 minutes 10 seconds to 15 degrees 1 minute 59 seconds north latitude) as this area is to be set aside for military training. There is also a tacit agreement between the CNMI government and U.S. Navy (i.e., not yet made official or formalized in writing) not to construct any permanent facilities within a 2,000-foot buffer from the boundary line into the leaseback area. Similarly, Municipality of Tinian representatives have requested that the landfill not be sited east of Broadway nor south of the leaseback area southern boundary [from the existing open dump at the west end of the island to about Unai Masalok at the east end (approximately 14 degrees 59 minutes 54 seconds to 15 degrees 1 minute 3 seconds north latitude) see Figure 3-1].

Additionally, 40 CFR § 258.10 states that owners or operators of a new MSWL within a 5-mile radius of any airport runway end used by turbojet or piston-type aircraft must notify the affected airport and the Federal Aviation Administration of the proposed action. Additionally, a municipal solid waste landfill located within 10,000 feet of an airport runway end used by turbojet aircraft must demonstrate that the landfill is designed and operated so as not to pose a bird hazard to aircraft.

One of the most important considerations in siting of a MSWL is the characteristics of the underlying groundwater system. Landfills can not be located on lands where the underlying groundwater lens has been designated as a sole-source aquifer (USEPA, 1993). Siting of the proposed MSWL would ultimately be determined according to groundwater management zones promulgated under the CNMI Well Drilling and Well Operation Regulations for Saipan; for Tinian these requirements would be dependent on known geological and aquifer characteristics, lateral distances to nearby water wells, and general quality and vulnerability of existing ground water until specific groundwater quality management zones are developed. Based on published hydrogeological data, in particular, the fact that the proposed project site is not located above a sole-source aquifer indicate that underlying groundwater resources would not be adversely impacted by the Proposed Project ((Gingerich and Yeatts 2000; USDA 1989).

Other environmental considerations to landfill siting include, suitability of the soil for excavation and use in the landfill as daily cover, protected threatened or endangered species, conservation areas, critical habitats, and cultural sites. As an example, a 936-acre wildlife mitigation area has been established in the municipality of Bateha at the north end of the leaseback area to the Exclusive Military Use Area abutting the military exclusion area.

This wildlife mitigation area was set aside in September 1999 as a mitigation area for the protection of endangered and threatened wildlife, particularly the Tinian Monarch (*M. takatsukasae*). According to the agreement establishing the mitigation area, the land's status as a mitigation area shall remain in full force and effect for the maximum period of time allowed by the Covenant to Establish a Commonwealth of the Northern Mariana Islands in Political Union with the United States of America (US Public Law 94-241 [90 Stat. 263]). While the Tinian Monarch was removed from the federal list of threatened and endangered species recently, its delisting does not change the status of the mitigation site as a conservation area and its preclusion from MSWL siting or other development.

Among the alternatives addressed in this EA three potential locations for a new MSWL were evaluated. However, the above described siting constraints results in a relatively small area suitable for siting of a new MSWL. Figure 3-1 shows the locations of the three potential alternative MSWL sites in relation to the northern and southern demarcation boundaries (as prescribed by the Navy and Municipality of Tinian, respectively), the 2,000-foot military use and 10,000-foot airport buffer zones, and wildlife mitigation

3.2 No Action Alternative

Under the no action alternative a new landfill would not be constructed and disposal and burning of solid waste would continue to occur at the existing open dump site.

3.3 Alternative 1 (Preferred Alternative): Atgidon Site

<u>Landfill Site</u>

Under this alternative the proposed MSWL site would be located in the west Tinian district of Atgidon approximately four and two miles northwest of the West Tinian Airport and the village of San Jose, respectively. The Atgidon site is the Preferred Alternative and is hereafter referred to as the "Proposed Project". The site is presently undeveloped and is situated between Riverside Drive to the west, 10th Avenue to the East.

The overall site would be laid out on a parcel approximately 1,600 feet long (east-west) by 850 feet wide (north-south) covering approximately 30 acres. The landfill would be located in the center portion of the site with a minimum 100-foot buffer around the actual landfill area. The landfill would be 1,000 feet long (east-west) by 440 feet wide (north-south) and would cover just over 10 acres. The landfill would be divided into two equal size cells 220 feet wide by 1,000 feet long.

The Proposed Project would encompass a total area of approximately 30 acres. Approximately 20 acres of which would comprise the landfill facility and another 10 acres which would comprise a 100-foot buffer zone surrounding the facility. Figures 3-2 through 3-4 show the location of Proposed Project site and its immediate surrounding vicinity.

Landfill Features

The construction of a MSWL requires a staged approach. Landfill designers are primarily concerned with the viability of a site. To be commercially and environmentally viable a landfill must be constructed in accordance with specific requirements. MSWL have physical barriers such as liners and leachate collection systems, and procedures to protect the public from exposure to the disposed wastes.

A typical regulatory-compliant MSWL would be designed to incorporate the following components:

- Landfill liner system
- Leachate management/monitoring system
- Landfill gas management/monitoring system
- Groundwater management/monitoring system
- Surface water management/monitoring system
- Disposal material monitoring
- Landfill final cover system
- Contingency management
- Quality control/assurance

Figures 3-5 and 3-6 show a typical MSWL schematic and typical MSWL liner and leachate collection systems, respectively.

When proposing a new landfill the proposed site shall include provisions for a number of features associated with operations at typical regulatory-compliant MSWL that ensure potential impacts would be less than significant.

Operational features could include but not be limited to the following:

- Entrance Facilities - Current landfill standards include access control to prevent unauthorized entry and dumping. Vehicular access to the proposed landfill would include, commercial haulers (various types of trucks; or by commercial garbage haulers in compaction ["packer"] trucks and roll-off boxes). Residents in cars, pickup trucks, and trailers would have access to the landfill facility but would unload to conveniently located on-site roll-off containers that would be then hauled by the landfill operator to the active face.

- Office, Equipment Operator/Equipment Maintenance/Shop Building - An equipment maintenance and small office structure is recommended at the outset of operation and would provide a location for performing maintenance and repair on earthmoving equipment. Offices for a landfill manager of operations, a secretary/gate house attendant, and operations staff would be required when incoming waste volume justifies full-time landfill operation.

- Construction/Demolition/Disaster Clean-up Disposal Area (C/D/DCD) - An area at the landfill site shall be established for construction, demolition, and disaster cleanup waste disposal. Large quantities of these wastes are inorganic in nature and do not need to be disposed in the lined municipal solid waste landfill. Typically, these wastes can be buried in an excavated trench, backfilled, and capped after completion of fill.

- Wood Waste/Woody Debris Staging Area - A graded area outside the landfill operational area shall be considered for staging wood wastes and woody debris from land clearing and other natural clean vegetative wastes. These can be stockpiled and stored until a wood waste tub grinder can be barged to Tinian. The wood waste can be ground and used at the site or provided to the public as ground cover or mulch. Ground/processed wood waste or mulch can be used at the MSWL site for slope stabilization, erosion control, or sold as landscaping material.

- Asbestos Disposal Area - Like construction and demolition wastes, asbestos is inorganic and not a risk to groundwater or humans as long as it is handled and disposed appropriately. Asbestos-containing material (ACM) disposal regulations specify that the material be double bagged and promptly covered after disposal. Additionally the specific location of ACM burial sites must be posted with signs, and its location surveyed and recorded to avoid accidental excavation (40 CFR 61.152/66.545).

The east side of the site would include entrance facilities, a C/D/DCD area, and ACM disposal trenches. The north side along the landfill would include a wood waste storage and processing area, a mulch/compost storage area, and construction stockpiles for topsoil, and daily cover.

Excavated soil from MSWL construction would be stockpiled and utilized as daily cover material for landfill operations. Due to the hours of operation of the MSWL, and based on the small volume of generated waste relative to the anticipated construction excavation volume (approx. 137,000 cubic yards per cell), reliance upon on-island quarries for cover material is not anticipated. It is anticipated that daily cover and overall daily operations at the proposed Tinian MSWL will be similar to that of the Marpi Landfill on Saipan (S. Hiney, 2007). However, the Proposed Project would be less than half the size of the Marpi Landfill and is projected to require only 4,000 cubic yards of daily cover material annually,

The west side of site would include storm water ponds, a leachate pump station, and leachate treatment ponds. Figure 3-7 depicts a conceptual plan for a typical MSWL and shows how the above described operational features could be incorporated into the landfill design.

3.4 Alternative 2: Masalok Site

Landfill Site

Under this alternative the proposed MSWL site would be located in the east Tinian district of Masalok. The Alternative 2 site is a conceptual location and less defined than that of the Proposed Project. The site is presented as a broad/general area within which a MSWL could potentially be constructed.

As discussed in Section 3.1.2, the Municipality of Tinian requested that a new MSWL not be sited east of Broadway. However, due to limited available locations resulting from these highly restrictive siting requirements the Alternative 2 site was considered as an possible alternative based on remaining available lands outside of the airport and military buffer zones, but still within the required northern (military) and southern (municipality) siting boundary lines (see Figure 3-1).

Due to the siting restrictions placed on potential MSWL locations Alternative 2 site is situated within a relatively narrow stretch of land along the island's eastern shores between the coastal areas of Puntan Chigat to the north and Puntan Maslalok to the south. The site is undeveloped and encompasses an area approximately 60 acres in size. An unpaved 4-wheel-drive road traverses the entire site in a north-south direction, and this road is transected by another 4-wheel-drive roadway in the northern portion of the site which runs in a east-west direction

Figures 3-8 and 3-9 show the location of the Alternative 2 site and its surrounding vicinity.

Landfill Features

Under Alternative 2, the conceptual construction approach, design, and engineering details would be similar to those presented under the Proposed Project.

3.5 Alternative 3: Carolinas Site

Landfill Site

Under this alternative the proposed MSWL site would be located in the southern Tinian district of Carolinas. Like Alternative 2, the Alternative 3 site is a conceptual location, less defined than the Proposed Project, and presented as a broad/general area within which a MSWL could potentially be constructed.

As noted in Section 3.1.2, the Municipality of Tinian requested that a new MSWL not be sited south of a designated boundary line running from the existing open dump at the west end of the island to about Unai Masalok at the east end (approximately 14 degrees 59 minutes 54 seconds to 15 degrees 1 minute 3 seconds north latitude). However, due to limited remaining available lands resulting from these highly restrictive siting requirements the Alternative 3 site was considered as a possible alternative site based on its distance from the southern boundary line and available lands in the Carolinas region (see Figure 3-1). By contrast, the DOD lands north of the military exclusion zone boundary line were not considered because the lands are unavailable and reserved for future unspecified military use.

The location of the Alternative 3 site and its surrounding vicinity is shown in Figures 3-10 and 3-11. The Alternative 3 site shown in these figures comprises an overall area substantially larger than those presented under the Proposed Project and Alternative 2. Due to topographical and land use only the relatively gentle-sloping, central plateau lands comprised of undeveloped secondary forest and grassland areas (approximately 1,200 acres) would be suitable for MSWL construction. Lands located to the east, south, and west of this central plateau area havd been precluded from consideration due to their terrain consisting of steep hillsides and sheer cliffs.

Landfill Features

Under Alternative 3, the conceptual construction approach, design, and engineering details would be similar to those presented under the Proposed Project.

3.6 Alternatives Considered and Eliminated from Further Evaluation

Former Old Western Equipment Quarry Site

Quarries are often considered for conversion into landfills due to their inherent open pit features which functionally serves for the placement and disposal of solid waste. The site of the Old Western Equipment Quarry which is located in central Tinian was initially considered as a potential alternative site for the proposed MSWL. However, the quarry site was eliminated from further consideration as a feasible alternative site based upon the following considerations.

- Location – The quarry site is located approximately 1 mile southeast of the West Tinian Airport and is well within the restricted 10,000-foot airport buffer zone. In addition, the quarry site is situated upgradient and approximately 0.5 miles northwest of the Sisoyan Makpo wetland complex which provides all the domestic and agricultural water supply for the island of Tinian. In accordance with RCRA Subtitle D requirements Areas containing sole-source aquifers are precluded from consideration for MSWL siting.

- Area Requirements – An estimated minimum of 20 acres of land would be required to accommodate the proposed MSWL facility (and another 10 acres for the perimeter buffer zone). The proposed quarry site would only provide an area of approximately 10.5 acres which would be insufficient for construction and operation of an MSWL facility capable of accommodating the anticipated solid waste production of Tinian as described in Section 2.2.

Waste Relocation

As previously noted in Section 3.1.3, the relocation of waste in the existing open dump is a possible closure alternative to grading and capping. However, while the alternative was evaluated, it would constitute a significant additional cost above the open dump site closure. In addition, to excavating, loading, and hauling the existing waste, it would require a significant enlargement of the proposed first new landfill cell on the order of approximately 15 percent percent to accommodate the 45,000 tons of refuse from the existing open dump. Based on these logistical and economic considerations, relocation of waste from the open dump was not considered a feasible alternative

4.0 AFFECTED ENVIRONMENT

4.1 Physical Environment

4.1.1 Geology and Soils

Geology

The island of Tinian is about 12 miles long and as much as 6 miles wide and cover a total area of approximately 39 square miles. Tinian is dominated by flat terraces and plateaus separated by steeply sloping areas and escarpments. Land surface elevation is near sea level at wetland depressions in southeastern and northwestern Tinian. The coast of the island largely consists of steep cliffs, most ranging from 20 to 100 feet in height, separated by several small beaches and coves (Gingerich and Yeatts 2000; USDA 1989).

The surface landforms can be divided into five major physiographic areas, (i.e., northern lowland, north-central highland, central plateau, median valley, and southeastern ridge). The major physiographic areas of Tinian are shown in Figure 4-1.

The southeastern ridge is the southernmost and highest part of the island and consists of a north and south ridge, separated by a gap near its midpoint. Steep slopes and cliffs ascend as much as 500 feet from the southeast boundary of the ridge. The highest point on Tinian is Mount Kastiyu on the south ridge at 614 feet (Ibid.).

The central plateau extends northward and comprises all of central and some of the northern part of Tinian. The central plateau is broad and gently sloping with principal relief along its boundaries with the median valley and northern lowland. The north-central highland rises within the northern part of the central plateau, midway between the east and west coasts. The highest point of the north-central highland at 545 feet is exceeded in height only on the southeastern ridge. The northern lowland generally is flat and about 100 feet in altitude except at Hagoi Lake where the elevation is near sea level (Gingerich and Yeatts 2000).

Volcanic rock forms the foundation of Tinian predominantly below sea level, and coralline limestone dominates the lithology above sea level comprising 98 percent of the surface exposures. The composition and natural porosity of coralline limestone usually cause high permeability, whereas the texture and poor sorting of the volcanic material usually cause low permeability. Faults transect the island throughout complicating the structure and permeability of the rock units (Gingerich and Yeatts 2000; USDA 1994).

Four major geologic units make up the island of Tinian. These are Tinian

Pyroclastic Rocks, Tagpochau Limestone, Mariana Limestone, and Beach deposits. The geology of Tinian is depicted in Figure 4-2 and the four major geologic units are briefly described below.

Tinian Pyroclastic Rocks underlie all other exposed rock units and consist of fine to coarse-grained consolidated ash and angular fragments of volcanic origin. Outcrops usually are highly weathered and altered to clay. Tagpochau Limestone is exposed on about 15 percent of the surface on Tinian, principally in the north-central highland and the south part of the southeastern ridge. Tagpochau Limestone is composed of fine to coarse-grained, partially recrystallized broken limestone fragments, and about 5 percent reworked volcanic fragments and clays. Surface exposures are highly weathered (Gingerich and Yeatts 2000).

Mariana Limestone is of Pliocene origin and is the most extensive unit areally and volumetrically above sea level. It comprises about 80 percent of Tinian's surface area, forming nearly all of the northern lowlands, the central plateau, and the median valley. It is composed of fine to coarse-grained fragmented limestone, commonly coralliferous, with some fossil and algal remains, and lesser amounts of clay particles. Mariana Limestone differs from Tagpochau Limestone in its higher coral content and lesser incidence of recrystallization. The Proposed Project site is situated on Mariana Limestone.

Beach deposits, alluvium, and colluvium cover less than 1 percent of the surface of Tinian and are composed of poorly consolidated sediments, mostly calcareous sand and gravel thrown onto beaches by wave action, but also clays and silts deposited inland beside Hagoi Lake and Makpo marsh, and loose soil and rock material deposited at the base of slopes, especially in the north-central highlands (Ibid.).

Normal faults transect the island throughout. Faults in limestone rock exposed at the surface commonly show weathered gaps along the fault ranging from inches to feet in width, thus faults in limestone may represent narrow zones of relatively higher permeability than surrounding rock. Tinian Pyroclastic Rocks and Tagpochau Limestone are dissected by faults concealed by Mariana Limestone (Ibid.).

Soils

Major soil types for the island of Tinian are shown in Figure 4-3, and soil types underlying and in the vicinity of the Proposed Project are shown in Figure 4-4. As shown in Figure 4-4 soil types underlying the Proposed Project site are soils belonging to the Chinen-Rock Outcrop Complex and the Dandan-Chinen Complex.

The majority of the Proposed Project site is underlain by Dandan-Chinen

Complex soils of 5 percent - 15 percent slope. The lower southwest portion is underlain by Dandan-Chinen Complex soils of 0 percent - 5 percent slope, and a small portion of the northwest corner of the site is underlain by Chinen-Rock Outcrop Complex of 3 percent to 15 percent slope. The Dandan-Chinen Complex soils have a moderate permeability, low to moderate available water capacity, slow to medium runoff, and a slight to moderate water erosion hazard (USDA, 1989).

Prime farmlands as defined by the U.S. Department of Agriculture are soils best suited to producing food, seed, forge, fiber, and oilseed crops. These soils produce the highest yields with minimal energy input and economic resources, and results in the least damage to the environment. Less than four percent of the soils in the CNMI are classed as prime farmland. The three soil types that meet the criteria for this classification are Dandan-Saipan clay, 0 to 5 percent slopes; Kagman clay, 0 to 5 percent slopes; and Saipan clay, 0 to 5 percent slopes. Of the 3,355 acres of prime farmland in the CNMI, about 1,547 acres are located on Tinian primarily on the Carolinas plateau and in the central and western parts of the northern plateau (USDA 1994).

4.1.2 Natural Disasters

Floodways and Floodplains

Pertinent Federal regulations are associated with the National Flood Insurance Program. They affect construction-related activities that take place in areas designated as floodplains by Federal Emergency Management Agency (FEMA) and as defined by a Flood Insurance Rate Map (FIRM). In addition, construction activities in or on navigable waterways are regulated by the USACE.

Executive Order (E.O.) 11988 provides floodplain management direction to Federal Agencies for avoiding to the extent possible long-term and short-term adverse impacts of altering and occupying floodplain areas, and for avoiding direct and indirect support of floodplain development wherever practical. The E.O. requires that actions taken reduce the risk of flood loss, minimize the impacts of floods on human safety, health, and welfare, and to preserve and restore the natural and beneficial functions served by floodplains. Federal agencies are required to evaluate the potential effects of their actions which may occur in a floodplain to ensure that planning and budget considerations take into account flood hazards and floodplain management, and to prescribe procedures to implement polices and requirements of this E.O.

FEMA defines the 500-year floodplain as an area with a 0.2 percent chance of inundation in any given year. According to the FIRM prepared by the FEMA lands within the Proposed Project site are designated as being within Zone X, indicating that it is outside the 500-year floodplain (FEMA 1991).

Typhoons

The CNMI are seasonally affected by tropical storms, typhoons, and super typhoons that can deposit large amounts of rain with high winds, and contribute to localized flooding, high surf, and coastal storm surges. A search of Federal Emergency Management Agency's declared disaster archive identified fourteen typhoons in the CNMI that have resulted in a major disaster declaration between 1976 and 2006 (FEMA 2006).

Tsunamis

Tsunamis occur as a series of waves that strike a coastline, and the waves decrease in height over time. Tsunamis can cause serious damage to coastal areas. The degree of tsunami damage is dependent upon several factors including an area's topography, wave origin, and wave intensity.

Tsunamis are sea waves generated by rapid displacement of a large volume of sea water, resulting from submarine vertical faulting or warping of the sea floor, from large-scale submarine slides, or from volcanic eruptions in or near ocean basins. In the open ocean, these waves have a very long period and wavelength; (i.e., the waves are spaced far apart and travel at speeds of hundreds of miles per hour).

As a tsunami approaches the shoreline, the speed of the wave decreases and the wave height increases, resulting in potentially destructive effects. Historical records indicate that the severity of tsunami-generated damage varies greatly depending on factors such as coastal topography, the existence of offshore islands, and the direction of the incoming waves.

On average, two destructive tsunamis per year occur in the Pacific Basin, while rare Pacific-wide tsunamis occur an average of one every 10-12 years (NOAA 2003). Between June 1996 and October 2006, 31 tsunamis were measured and recorded in the Pacific Ocean basin (NOAA 2006). Guam, in the Marianas Islands, is the nearest location for which NOAA reports tsunami runup data. Fourteen tsunami runups have been reported for the island of Guam since 1950, all with an estimated runup height of less than or equal to 0.656 feet (NOAA 2005).

4.1.3 Water Resources

4.1.3.1 Groundwater

Tinian is underlain by a Ghyben-Herzberg lens of freshwater from which island inhabitants obtain their potable water. The water table reaches its highest points in the volcanic rocks that are above sea level. Groundwater flows from the north-central highlands and the southeastern ridge, where the water table elevation is highest, towards the coast. Over most of the island, the water table is relatively flat and water levels are less than 2 feet above mean sea level. The freshwater lens beneath the median (Makpo) valley is thickest—about 40 feet—in the interior of the island, thins slightly near the municipal well and Makpo marsh, and thins even more toward the coasts (Gingerich and Yeatts 2000; USDA 1994).

On Tinian, the shape of the water table can be used to infer directions and rates of groundwater flow as well as the movement of contaminants dissolved therein. Groundwater will flow from areas of higher water level to areas of lower water level, in directions roughly perpendicular to the water table contours. Groundwater appears to move radially from the north-central highland and the southeastern ridge, and flows generally seaward (Ibid.). The hydrology of Tinian Island is shown in Figure 4-5.

4.1.3.2 Surface Waters and Wetlands

In accordance with CNMI Water Quality Standards (WQS) as promulgated by the Division of Environmental Quality in accordance with the *Commonwealth Environmental Protection Act, (CEPA),* 1982, 2 CMC §§3101 to 3134, CNMI surface waters are divided into Class 1 and Class 2 waters. Objectives of Class 1 and 2 waters are as follows:

- Class 1 Waters - are to remain in their natural state as nearly as possible with an absolute minimum of pollution from any human-caused source. To the extent possible, the wilderness character of such areas shall be protected. Wastewater discharges and zone of mixing into these waters are prohibited.

- Class 2 Waters - are for recreational purposes, propagation of fish and other aquatic life, and agricultural and industrial water supply not to be limited in any way. A zone of mixing is permissible in these waters.

All surface waters on Tinian Island are delineated as Class 1 waters.

There are no perennial rivers or streams on Tinian and most non-torrential precipitation immediately evaporates or percolates into the substrata. Surface water nonetheless can be found at various locations on the island. The two largest surface water bodies are Hagoi Lake in the Puntan Tahgong Watershed along the northwestern edge of North Field, and Sisoyan Makpo (i.e., Makpo marsh) in the Makpo Watershed in the east-central portion of the median (Makpo) valley (Gingerich and Yeatts 2000; USDA 1994).

Wetlands on Tinian are protected under the CNMI WQS, which state that "point or non-point sources of pollution shall not cause destruction or impairment of wetlands. All wetlands are to remain in as near their natural state as possible and shall be protected to support the propagation of aquatic and terrestrial life".

Hagoi Lake, a fresh to brackish water body and the largest permanent wetland on Tinian, is located at the north end of the island. The area of open water may extend to 0.5 mile in length during the wet season, and decrease to a marsh with little open water during the dry season. Makpo marsh in the median valley is a wetland with a small area of shallow open water.

The Sisoyan Makpo wetland complex provides all the agricultural and domestic water supply for Tinian. Two hand-dug wells installed for sugar mill operations during the Japanese era still remain in the wetland with the larger well used as the main source of agricultural water. The domestic well is located approximately one-quarter of a mile north of the agricultural well.

The locations of Tinian's wetlands and surface water bodies are shown in Figure 4-6. As shown in Figure 4-6, no identified wetlands occur within or adjacent to the Proposed Project site, or the Alternative sites.

4.1.3.3 Coastal Waters

In accordance with CNMI WQS regulations as promulgated by the Division of Environmental Quality in accordance with the CEPA, 1982, 2 CMC §§3101 to 3134, CNMI coastal waters are divided into Class A and Class AA waters. Objectives of Class A and AA coastal waters are as follows:

- Class A Waters – Are for recreational purposes and aesthetic enjoyment and are to be protected. Any other use shall be allowed as long as it is compatible with the protection and propagation of fish, shellfish, and wildlife, and with compatible recreation with risk of water ingestion by either children or adults. Class A waters shall be kept clean of solid waste, oil and grease, and shall not act as receiving waters for any effluent which has not received the best degree of treatment of control practicable under existing technology and economic conditions and compatible with standards established for this class. A mixing zone is approvable in Class A waters.

- Class AA Waters – Are to remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-related source or actions. To the extent practicable, the wilderness character of such areas shall be protected. Class AA waters are to be protected for the support and propagation of shellfish and other marine life, conservation of coral reefs and wilderness areas, oceanographic research, and aesthetic enjoyment and compatible recreation with risk of water ingestion by people. Mixing zones for any other discharge are not permitted in Class AA waters.

All coastal and oceanic waters surrounding Tinian Island are delineated as Class AA waters, with the exception of the waters within the Tinian Harbor which are delineated as Class A waters. The Proposed Project site is located approximately 0.5 miles from the nearest Class AA coastal waters.

4.1.4 Noise Quality

As part of the EA effort, an acoustical study was prepared to characterize existing conditions and potential impacts to noise quality. The acoustical study is attached herein as Appendix B.

The impacts of sound on the environment are determined by several factors including, sound level (loudness), the duration of exposure to the noise, the frequencies involved, and the variation or fluctuations in noise levels during exposure. Loudness is measured in units called decibels (dB). Since the human ear is unable to perceive all sound frequencies equally, noise levels are adjusted to correspond to human hearing. This adjusted unit is known as the A-weighted decibel, or dBA.

The noise descriptor currently used by Department of Defense agencies to assess environmental noise is the Day-Night Average Sound Level (DNL or Ldn). This descriptor incorporates a 24 hour average of instantaneous dBA levels as read on a standard Sound Level Meter. By definition, the minimum averaging period for the DNL descriptor is 24 hours. Sound levels which occur during the nighttime hours between 10:00 PM and 7:00 AM are increased by 10 dB prior to computing the 24-hour average by the DNL descriptor.

A value of 65 DNL or lower is considered to be an acceptable exterior noise level for residential receptors. Table 4-1 presents current federal noise standards and acceptability criteria for residential land uses that are present within the general environs of the project site and which may be affected by noise from construction-related activities.

Table 4-1
Exterior Noise Exposure Classification
(Residential Land Use)

Noise Exposure Class	Day-Night Sound Level	Equivalent Sound Level	Federal (1) Standard
Minimal Exposure	Not Exceeding 55DNL	Not Exceeding 55Leq	Unconditionally Acceptable
Moderate Exposure	Above 55 Ldn But not above 65DNL	Above 55 Ldn But not above 65Leq	Acceptable (2)
Significant Exposure	Above 65 DNL But not above 75DNL	Above 55 Leq But not above 65Ldn	Normally Unacceptable
Severe Exposure	Above 75 DNL	Above 75 Leq	Unacceptable

Source: Ebisu, 2007

Notes:
(1) Federal Housing Administration, Veterans Administration, Department of Defense, and Department of Transportation.
(2) Federal Highways Administration (FHWA) uses the Leq instead of the Ldn descriptor. For planning purposes, both are equivalent if: a) heavy trucks do not exceed 10 percent of total traffic flow in vehicles per 24 hours, and b) traffic between 10:00 PM and 7:00 AM does not exceed 15 percent of average daily traffic flow in vehicles per 24 hours. The noise mitigation threshold used by FHWA for residences is 67 Leq.

Existing ambient noise level at the Proposed Project site are very low and are characterized by the natural sounds of birds and vegetation moving with the wind, with occasional sounds of motor vehicles, aircraft, and boats. Because the site is presently undeveloped secondary forest and grazing lands existing noise levels are estimated to be less than 45 DNL (Ebisu, 2007).

Along existing roadways which are expected to service the proposed landfill site (86th Street, Broadway, and 8th Avenue), existing traffic noise levels are estimated to be less than 59 DNL at 50 foot setback distance from the roadways' centerlines. These levels of traffic noise are considered to be very low, and are attributable to the relatively low (less than 41 vehicles per hour) peak hour traffic volumes along these three roadways (Ibid).

4.1.5 Air Quality

As part of the EA effort, an Air Quality Impact Report (AQIR) was prepared to characterize existing conditions and potential impacts to air quality resources. The AQIR is attached herein as Appendix C.

CNMI Air Pollution Control Regulations (APCR), require compliance with the U.S. national ambient air quality standards (NAAQS). The NAAQS are separated into primary and secondary standards. Primary standards are intended to protect public health with an adequate margin of safety while secondary standards are intended to protect public welfare through the prevention of damage to soils, water, vegetation, man-made materials, animals, wildlife, visibility, climate, and economic values. The federal NAAQS are summarized in Table 4-2 below.

Table 4-2
Summary of National Ambient Air Quality Standards[a]

Pollutant	Sampling Period	National AAQS Primary	National AAQS Secondary
Particulate Matter$_{10}$[b]	Annual	50	50
	24 hours	150	150
Particulate Matter$_{2.5}$[c]	Annual	15	15
	24 hours	65	65
Sulfur Dioxide	Annual	80	--
	24 hours	365	--
	3 hours	--	1,300

Pollutant	Sampling Period	National AAQS Primary	National AAQS Secondary
Nitrogen Dioxide	Annual	100	100
Carbon Monoxide	8 hour 1 hour	10 40	-- --
Ozone	1 hour 8 Hour	235 156	235 156
Hydrogen Sulfide	1 hour	--	--
Lead	Quarterly	1.5	--

Source: Morrow, 2007

[a] All standards represent the maximum allowable concentrations and are expressed in micrograms per cubic meter ($\mu g/m^3$) except CO in milligrams per cubic meter (mg/m^3)

[b] Particles are less than or equal to 10 microns aerodynamic diameter.

[c] Particles are less than or equal to 2.5 microns aerodynamic diameter.

The APCR require permitting of stationary sources, but with the exception of the new Tinian Power Plant and the International Broadcasting Bureau's (IBB) power plant, the older existing sources on Tinian do not yet have air permits. These include diesel engine generators, boilers, rock crushing equipment and an asphalt concrete plant. It should also be noted that the CNMI government is in the process of establishing an Alternate Title V Permitting Program pursuant to a U.S. EPA mandate.

While there are no air monitoring stations on Tinian, it can be assumed that general air quality is good and in compliance with air quality standards given the small number of sources on the island. The aforementioned Tinian Power Plant and IBB power plant both had to demonstrate compliance with ambient standards in order to receive their air permits. The compliance status in the immediate vicinity of other existing sources is currently uncertain and in the case of those with short exhaust stacks, may be problematic. As these sources are eventually permitted, their compliance status will be verified and those found not to be in compliance will be brought into compliance by physical modifications or operating limits in their permits.

The Northern Marianas climate is tropical marine, hot and humid, and moderated by northeast trade winds. The annual mean temperature is in the low 80s Fahrenheit with average minima and maxima in the mid-70s to the high 80s. Rainfall can be variable, ranging from 80 to over 100 inches per year. In general the "wet" season is from July through October with drier conditions prevailing during the other months. An analysis of the monthly temperature and rainfall data in accordance with Thornwalte's scheme for cllmatlc classiflcation, yields a precipitation/ evaporation index of 110 which also classifies the area as "humid" (Morrow, 2007)

On an annual basis, the prevalence of northeast trade winds in the region is clearly shown in the data from the National Weather Service's, Guam International Airport facility. A closer examination of the data, however, also indicates that low velocities (less than 10 mph) occur frequently and that these northeasterly winds do break down at times giving way to more light, variable wind conditions and a higher percentage of calm conditions (Ibid.)

4.2 Biological Environment

4.2.1 General

As part of the EA effort, a natural resources survey was conducted to characterize the biological resources present within the Proposed Project and alternate site areas. The natural resources survey is attached herein as Appendix D. Based upon the findings of the natural resources survey potential project-related impacts to biological resources were assessed.

4.2.2 Terrestrial Flora

Vegetation covering the island of Tinian consists primarily of secondary introduced species dominated by hedge acacia or *tangantangan* (*Leucaena leucocephala*) mixed with Formosan koa or *sosugi* (*Acacia confusa*) and Siris tree or *trongkon-kalskas* (*Albizia lebbeck*). *Tangantangan* growth is extremely dense, forming large thickets in some areas particularly at the northern end of the island (USDA 1994).

Native limestone forest patches are restricted to benched or terraced areas isolated from disturbance by steep escarpments in the Kastiyu and Pina plateaus on the southeastern side of Tinian. These native forests are unique complexes of species composed of large and small trees, shrubs and understory species including *umumu* (*Pisonia grandis*), *pahong* (screwpine) and *kafu* (*Pandanus sp.*), *lemai* and *dukduk* (seedless and seeded breadfruit, respectively) (*Artocarpus sp.*), and *paipai* (*Guamia mariannae*).

Coastal forest and beach strand vegetation consist of exotic, native, and rare endemic species including spurge (Euphorbiaceae fam.) (Raulerson and Rinehart 1991; USDA 1994; Wagner et al. 1990). None of the plant species on Tinian are listed as threatened or endangered by the CNMI or U.S. governments (USDA 1994).

The Proposed Project site is heavily overgrown with vegetation (see Figures 3-3 and 3-4). The vegetation type within the Proposed Project site would be classified as Disturbed Community: subtytpe Tangantangan Forest characterized generally by a low stature forest of several species, but largely dominated by tangantangan (*Leucaena leucocephala*) (Falanruw, Cole, & Ambacher, 1989).

As in many other areas of the world, tangantangan is invasive and is considered a pest species on Tinian. Tangantangan is a 'conflict tree' being widely promoted for tropical forage production and reforestation whilst at the same time it spreads naturally and is widely reported as a weed. It is a seedy thornless tree can form dense monospecific thickets and is difficult to eradicate once established, rendering extensive areas unusable and inaccessible, and threatening native plants. According to the International Union for Conservation of Nature and natural Resources (IUCN) Invasive Species Specialist Group's (ISSG) Global Invasive Species Database (GISD) "100 of the World's Worst Invasive Species" tangantangan is ranked at number 46 (IUCN, 2007a).

Prominent, larger trees present on site include niyok or coconut (*Cocos nucifera*), gagu or ironwood (*Casuarina equisetifolia*), hoda (*Ficus tinctoria*), and sosugi (*Acacia confusa*). Also, several shrubs or small trees: sumac (*Aidia cochinchinensis*), ahgao (*Premna serratifolia*), lodugao (*Clerodendrum inerme*), and agatelang (*Eugenia palumbis*), and the clamoring native shrub known as banagu (J*asminum marianum DC*) are all generally common within the tangantangan forest. In most places, the forest floor is densely covered with an unidentified herb (*Acanthaceae*), or in some places the fern, kahlao (*Phymatosorus grossus*). Over the entire project area are several different vines that are very abundant, including *Ipomoea spp.*, purple bushbean (*Macroptilium atropurpureum), Canavalia sp.*, and alalag (*Operculina ventricosa*).

The section of 10th Avenue which runs through the eastern portion of the project site (see Figure 3-2) is no longer passable by vehicle. However, 10th Avenue and other formerly used roads can still be discerned within the forest. In these locations, ironwood, gagu, or other trees line the roads. A variety of introduced, weedy species line the regularly used but unimproved track along the west side of the site.

Relatively small, open areas covered by elephant or Napier grass *(Pennisetum purpureum*) are scattered throughout the site, especially in the eastern half. Human influenced plantings, all presumably dating from the early half of the 20th century, are present. An example is an old road lined with African tulip trees (*Spathodea campanulata*) that have since blown down and resprouted from the horizontal trunks forming a copse. Other examples are patches of introduced species such as tigre *(Sanseviera trifasciata)* seen in association with various World War II period ruins, especially on the eastern edge of the site.

A total of 65 species of flowering plants and three fern species were observed on the Proposed Project site. Twenty five (37 percent) of the plant species present within the project site are considered native to Tinian. Table 4-3 below provides a list of native plant species identified and their relative abundance within the Proposed Project site. A complete listing of plant species identified can be found in Appendix D.

Table 4-3
Native Plant Species Found Within Proposed Project Area

Species (Scientific Name)	Species (Common Name)	Status	Abundance	
			Forest	Road
Ferns				
Nephroplepis hirsutula	*Amaru*	Ind.	O	
Phymatosorus grossus	*kahlao, sese*	Ind.	C	
Flowering Plants				
Achyranthes aspera	chichiton	Ind.	U	
Casuarina equisetifolia	*gagu*, ironwood	Ind.	O	C
Maytenus thompsonii	*luluhut*	End.	R	
Ipomoea indica (J. Burm.)		Ind.	O	
Operculina turpethum var. *ventricosa*	*alalag*	Ind.	O	
Melanolepis multiglandulosa	*alom*	Ind.	O	
Canavalia cf. *megalantha*		End.	C	
Intsia bijuga	*ifet, ifil*	Ind.	R	
Mucuna gigantean	*gayetan*	Ind.	U	
Ficus tinctoria var *neo-ebudarum*	*hoda, tagete*	Ind.	O	
Eugenia palumbis Merr.	*agatelang*	End.	O	
Eugenia reinwardtiana	*a'abang*	End.	U	
Jasminum marianum		End.	O	
Portulaca oleracea var. *granulato-stellulata*		Ind.	R	
Aidia cochinchinensis		Ind.	C	
Morinda citrifolia		Ind.	O	
Colubrina asiatica		Ind.	U	
Solanum americanum		Ind.	U	
Clerodendrum inerme		Ind.	A	
Pandanus tectorius		Ind.	U	
Digitaria ciliaris	Henry's crabgrass	Ind.		A
Oplismenus hirtellus		Ind.		U
Sporobolus sp	dropseed	Ind.		A

Source: AECOS, 2006

Notes: **End.** = endemic; native to the Mariana Islands and found naturally nowhere else. **Ind.** = indigenous; native to the Mariana Islands, but not unique to those Islands.

ABUNDANCE = Occurrence ratings for plants by area (ratings above provide an estimate of the likelihood of encountering a species within the specified survey area):

R – Rare seen in only one or perhaps two locations.
U - Uncommon-seen at most in several locations
O - Occasional seen with some regularity
C - Common observed numerous times during the survey
A -Abundant found in large numbers; may be locally dominant.
AA -Very abundant abundant and dominant; defining vegetation type .

Forest = Species abundance over majority of site (forested); Road = Species abundance along active or abandoned roads at or near the margins of the site.

The most abundant groundcover plant at the site is the non-native *Blechum pyramidatum* a species of the plant family Acanthaceae. There are no native Acanthaceae in the Marianas (AECOS, 2006).

4.2.3 Terrestrial Fauna

Tinian's wildlife resources are limited by the degradation of forest habitat due to sugar cane cultivation, World War II activities, and a relatively long history of cattle grazing. Avifauna include the recently de-listed Tinian Monarch or *chichirikan Tinian* (*Monarcha takatsukasae*), Rufous Fantail or *chichirika* (*Rhipidura ruffifrons*), and Bridled White-eye or *nosa* (*Zosterops conspicillatas saypani*). The federally and locally listed Marianas common moorhen or *pulattat* (*Gallinula chloropus guami*) is consistently found at Hagoi Lake. Native forest birds include the Mariana Fruit Dove or *totot* (*Ptilinopus roseicapilla*), White-Throated Ground Dove (*Gallicolumba xanthonura*), Micronesian Starling or *sali* (*Aplonis opaca*), Collared Kngfisher or *sihek* (*Halcyon chloris*), Cardinal Honeyeater or *egigi* (*Myzomela cardinalis saffordi*), and Yellow Bittern or *kakkak* (*Ixobrychus sinensis*). The introduced Eurasian tree sparrow or *ga'ga'pale'* (*Passer montanus*) and Philippine Turtle Dove (*Streptopelia bitorguata*) are well established on Tinian (USDA 1994).

Low numbers of the Mariana Fruit Bat or *fanihi* (*Pteropus mariannus*) may be seen on Tinian. The Fragile Micronesian Gecko (*Perochirus ateles*) is on the CNMI endangered species list and the Marianas Emoia Skink (*Emoia slevini*) is listed as a species of concern by the USFWS. The coconut crab (*Birgus latro*) is traditionally hunted on Tinian and its numbers have declined somewhat in recent years. The green sea turtle (*Chelonia mydas*), a federally listed species, reportedly nests on several of Tinian's beaches (USDA 1994).

Within the Proposed Project site two mammalian species were observed. Four musk shrews (*Suncus murinus)* were seen or heard within the project site. Though not observed during the field survey, considering the site location and previously disturbed nature other mammalian fauna which might exist within and around the project site include feral animals such as dogs *(Canis f. familiaris)*, cats (*Felix domesticus*), and rats (*Rattus spp.*),

One amphibian and seven terrestrial reptile species were observed within the study site. These included, giant (marine) toads (*Bufo marinus)*, island geckos

(Gehyra oceania), stump-toed gecko (*Gehyra mutilata)*, and mourning geckos (*Lepidodactylus lugubris*), curious skinks (*Carlia fusca*), blue-tailed skinks (*Emoia caeruleocauda)*, green tree skinks (*Lamoprolepis smaragdina)*, and monitor lizards (*Veranus indicus*).

A total of 454 individual birds of 12 species, representing 11 separate families, were recorded within the Proposed Project site. Ten of the species observed are native to CNMI. One of these, the Tinian Monarch *(Monarcha takatsukasae)*, is endemic to the Island of Tinian. Three of the remaining nine native species detected: White-tailed Tropicbird *(Phaethon lepturus dorothea)*, Yellow Bittern *(Ixobrychus sinensis)*, and White Tern *(Gygis alba candida)* are indigenous resident breeding species.

The remaining six native species detected: White-throated Ground-Dove *(Gallicolumba xanthonura xanthonura)*, Collared Kingfisher *(Halcyon chloris albicilla),* Rufous Fantail *(Rhipidura rufifrons saipanensis),* Bridled White-eye *(Zosterops conspicillata saypani),* Micronesian Honeyeater *(Myzomela rubratra saffordi)* and Micronesian Starling *(Aplonis opaca guami)* are all Mariana Islands endemic sub-species of more widely distributed species. The remaining two species detected: Red Junglefowl *(Gallus gallus)* and Island Collared Dove *(Streptopelia bitorquata dusumieri),* also known as Philippine Turtle Dove, are alien to the CNMI.

Two species, Bridled White-eye *(Zosterops conspicillata saypani)*, and White Tern *(Gygis alba candida)* accounted for 53 percent of the total number of all birds recorded during the survey of the project site. The most commonly recorded species was the Bridled White-eye, which accounted for 36 percent of the total number of individual birds recorded (AECOS, 2006).

The Tinian Monarch was the third most commonly recorded species during the avian survey of the proposed project site. This species is ubiquitous and they are distributed throughout the island in all forest types (Engbring et al., 1986). Based upon a 1982 survey, the USFWS estimated the population of the Tinian Monarch to be 39,338 birds. A 1996 replication of the USFWS 1982 forest bird surveys estimated the monarch population at 55,721 birds (Lusk et al., 2000)

Table 4-4 provides a list of bird species and their current status observed within the Proposed Project site.

Table 4-4
Bird Species Observed Within Proposed Project Area

Common Name	Scientific Name	Chamorro Name	ST
Red Junglefowl	*Gallus gallus*	*Mangnok halom tano*	A
White-tailed Tropicbird	*Phaethon lepturus dorothea*	*Fagpi apaka*	IB
Yellow Bittern	*Ixobrychus sinensis*	*Kakkak*	IB
White Tern	*Gygis alba candida*	*Chunge*	IB
Island Collared-Dove	*Streptopelia bitorquata dusumieri*	*Paluman apu*	A
White-throated Ground-Dove	*Gallicolumba xanthonura xanthonura*	*Paluman apaka / fachi*	Es
Collared Kingfisher	*Halcyon chloris albicilla*	*Sihek*	Es
Rufous Fantail	*Rhipidura rufifrons saipanensis*	*Chichirika*	Es
Tinian Monarch	*Monarcha takatsukasae*	*Chichirikan*	ET
Bridled White-eye	*Zosterops conspicillata saypani*	*Not'sa*	Es
Micronesian Honeyeater	*Myzomela rubratra saffordi*	*Egigi*	Es
Micronesian Starling	*Aplonis opaca guami*	*Sali*	Es

Source: AECOS, 2006

Notes: ST = Status, A = Alien Species – Not native to the Marianas Islands, introduced by humans, and now established, IB = Indigenous Breeding Species – Native to the Marianas, but also found elsewhere naturally, Es = Endemic Sub-species – Native and unique sub-species to the Marinas Islands, ET = Endemic Tinian Species – Native and unique to the Island of Tinian

4.2.4 Coastal Habitat and Biological Resources

As is the case with most tropical island environments the coastal areas of Tinian are rich in biological resources. Coastal habitats on Tinian are diverse and include, exposed and sheltered rocky shores, sandy and gravel beaches, vegetated low banks, salt and brackish marshes, and mangrove forests. Species which utilize these habitats include birds (e.g., Black-billed Plover, Common sandpiper, Pacific Golden Plover, Pacific Reef Heron, Red-Footed and Brown Booby, White Tern, Wandering tattler, and Pacific Reef Heron), reptiles (e.g., Green sea turtles), marine mammals (e.g., Spinner dolphins).

The Proposed Project site is located approximately 0.5 miles from the nearest coastal area. Habitat types and species utilizing these habitats in coastal areas in the vicinity of the Proposed Project, and Alternative sites 1 and 2, are shown in Figures 4-7 through 4-12.

4.2.5 Threatened or Endangered Species

With the exception of the Pacific sheath-tailed bat *(Emballonura semicaudata rotensis*), and the Federally listed threatened Marianas fruit bat *(Pteropus m. marianus),* all other terrestrial mammals currently found on the Island of Tinian are alien species, and most are ubiquitous.

The CNMI population of the Mariana fruit bat or fanihi *(Pteropus mariannus)* is listed as threatened under the Endangered Species Act (ESA) and has been proposed for listing as a threatened species under CNMI endangered species statutes. Low numbers of the Mariana fruit bat may be seen on Tinian. However, during the biological field survey no bat species, including the Marianas fruit bat, were observed.

One terrestrial reptile, the Micronesian Gecko *(Perochirus ateles),* is protected under CNMI law, but not under the ESA. The Slevin's skink (*Emoia slevini*) is found on Tinian and is listed as a species of concern by the USFWS. (DFW 2006, Federal Register 2005, USFWS 2005, 2006).

The coconut crab (*Birgus latro*) is traditionally hunted on Tinian and its numbers have declined somewhat in recent years. Three turtle species are known from CNMI waters, Hawksbill Sea Turtle (*Eretmochelys imbircata)*, Leatherback Sea Turtle (*Dermochelys coriacea*), and Green Sea Turtle *(Cheldonia mydas*). The Green Sea Turtle which reportedly nests on several of Tinian's beaches, are a federally listed species and are protected under federal and CNMI endangered species statutes. None of the plant species on Tinian are listed as threatened or endangered by the CNMI or U.S. governments (USDA 1994).

The only officially designated conservation area on Tinian is the marine environment along the island's west coast from Lasarino to Puntan Diablo. Hagoi Lake received protection from disturbance because it is a wetland, but it has not been designated as a conservation area. Land near the Makpo wetland and along the cliff line to the south to Suicide Cliff had been proposed for designation as a conservation area under a long-term lease but said lands were returned to the public domain in May 2004. (Deputy Commissioner, Tinian 2004, USDA 1994).

Tables 4-5 and 4-6 below provide a listing of Tinian's threatened or endangered plant and animal species, respectively.

Table 4-5
Threatened or Endangered
Plant Species Possibly Present on or
Offshore of Tinian[1]

English Common Name	Scientific Name	Chamorro Name	U.S. Status	CNMI Status
--	Lycopodium phlegmaria	Kotdon di San Francisco	--	E
--	Serianthes nelsonii	Hayon lagu or tronkon guafi	E	E
--	Nesogenes rotensis	Nanasa gaqifigo or fianiti	--	CS
Osmoxylon	Osmoxylon mariannense	--	--	CS
--	Tabernaemontane rotensis	Trongkon sumak	--	CS
--	Heritiera longipetiolata	Ufa-halomtano	--	CS

Source: AECOS, 2006

1 - Only ufa-halomtano of the six plant species is known from Tinian

Key: T = Threatened under respective endangered species statutes, E = Endangered under respective endangered species statutes, CS = Candidate for listing under CNMI endangered species statute, PT = Proposed as a threatened species under respective endangered species statutes

Table 4-6
Threatened or Endangered
Animal Species Possibly Present on or
Offshore of Tinian

English Common Name	Scientific Name	Chamorro Name	U.S. Status	CNMI Status
Sheath-tailed bat	Emballonura semicaudata rotensis	Fanihin liyang	--	CS
Marinas fruit bat	Pteropus mariannus marianus	Fanihi	T	PT
Micronesian Megapode	Megapodius laperouse	Sasangat	E	E
Common Moorhen	Gallinula chloropus guami	Ghereel bweel	E	E
Mariana Swiftlet	Aerodramus bartschi	Leghekeyang Chichirikan	E	E
Tinian Monarch	Monarcha takatsukasae	Tinian	--	T
Hawksbill Sea Turtle	Eretmochelys imbircata	Haggan karai	E	E
Leatherback Sea Turtle	Dermochelys coriacea	Haggan Tasi	E	--
Green Sea Turtle	Cheldonia mydas	Haggan bed'di	T	E
Micronesian gecko	Perochirus ateles	Gaali'ek	--	E

Source: AECOS, 2006

Key: Key: T = Threatened under respective endangered species statutes, E = Endangered under respective endangered species statutes, CS = Candidate for listing under CNMI endangered species statute, PT = Proposed as a threatened species under respective endangered species statutes

The Tinian Monarch

As previously noted in Section 4.2.3, the Tinian Monarch, a ubiquitous avian species distributed throughout the island in all forest types, was also observed within the Proposed Project site. The Monarch is listed as a threatened species under CNMI endangered species statutes (DWF, 2006). However, this species was formerly listed as threatened under the ESA, but was delisted in September 2004 (USFWS, 2004).

Following life history studies of the monarch conducted in 1994 and 1995 (USFWS, 1996) it was determined that monarchs forage and nest in native limestone forest, secondary forest, and tangantangan (*Leucaena leucocephala*), forest. The studies are preliminary but show some evidence indicating native limestone forest may be higher quality habitat for monarchs than secondary and tangantangan forests. Monarch population densities were higher in native limestone forest than in secondary forest or tangantangan forest. Native tree species may have been preferred for nesting, and nesting success may have been higher in native limestone forest than in secondary and tangantangan forests, however, additional information is required to confirm these patterns (AECOS, 2006).

With the exception of the Tinian Monarch, no plant or animal species currently protected, or proposed for protection under either CNMI endangered species statutes, or the ESA, were identified within the Proposed Project site (Federal Register 2005, USFWS 2005, 2006).

Species of Conservation Concern

In addition to listed threatened and/or endangered species under U.S. and CNMI law CNMI is home to species designated as "species of conservation concern" by the International Union for Conservation of Nature and Natural Resources (IUCN, 2007b). The Bridled White-eye (*Zosterops conspicillatus*) which is found within the Proposed Peoject site has been listed as a species of conservation concern by the IUCN. The Bridled White-eye is presently abundant throughout the CNMI and Tinian. However, there is a possibility that the species could potentially undergo a decline in population due to the recent establishment of the brown tree snake (*B. irregularis*) on Saipan, and reports of tree snake on Rota. Due to the potential for the decline and/or extirpation of White-Eye populations on these other two islands, the IUCN has recently uplisted the status of the Bridled White-eye as endangered (Ibid).

4.3 Social Environment

4.3.1 Land Use

Most public and residential land use activities on Tinian take place in the median valley and parts of the adjacent central plateau and southeastern ridge, occupying about 25 percent of the island. Public land accounts for about 60 percent of the rural area and land use includes an airport, a harbor, schools, a cemetery, agricultural cooperatives, Makpo marsh, parks and beaches, and unused grassland and secondary forest. Residential and commercial land covers about 40 percent of the rural area and land use includes a casino resort, small businesses, farming, grazing, and housing. The single village of San Jose is located on a southwestern exposure beside a deepwater harbor (Gingerich and Yeatts 2000).

About 75 percent of the island is grassland and secondary forest supporting minor land use activities. Approximately 40 percent of the grassland is reserved exclusively for military use (i.e., Exclusive Military Use Area) in the northern part of the island. Military activities usually consist of occasional military exercises. About 60 percent of the remaining grassland and secondary forest, mostly on the central plateau and southeastern ridge, is used for scattered grazing of cattle and horses (Ibid.).

With substantial new farm land available for leaseback in the Exclusive Military Use Area and emergence of its casino industry, Tinian Municipality plans to revitalize its agriculture industry. The municipality's first priority is to provide commercial farmers with an adequate and efficient water irrigation system extending directly to each individual farm—the majority of which are located in Makpo Valley—to reduce the cost of starting or expanding existing farms, increase crop productivity, and increase farm profitability (OEDPC 1997).

Over 7,500 acres in the Exclusive Military Use Area is available for cattle grazing. A Tinian Rancher's Water Reserve Project seeks to open an existing well centrally located in the northeast section of the island and construct a 50,000-gallon storage tank to provide water to area ranchers and relieve them of the need to transport as much as 6,000 gallons daily from Makpo Valley (OEDPC 1997).

Land uses within and in the vicinity of the Proposed Project and alternative sites predominantly consist of grazing and unused secondary forest/grasslands. The noteable exception would be the adjacent agricultural and multiple rural land uses in the Carolinas in southern Tinian. Figure 4-13 shows the major land use types and distribution relative to the Proposed Project and alternative sites.

4.3.2 Public Health and Safety

Solid Waste

All solid waste, including toxic materials and sewage from holding tanks, is dumped at the existing open dump located at the west end of the island. Tinian presently has no sewer facility and all residences and businesses use septic and seepage tanks, leaching fields, or holding tanks to dispose of sewage. A significant number of households within the proposed San Jose collection area do not have any septic system instead utilizing cesspools or pit latrines.

The existing dump area was not designed as a municipal solid waste landfill and has no environmental protection or features associated with a modern landfill. The unlined open dump allows leachate to seep into the surrounding porous soil, which may in turn contaminate surface waters and groundwater. Leachate contaminants can be transmitted to humans via ingestion or direct water contact. In groundwater, these contaminants can be transmitted to humans through downgradient drinking water systems. Transport of leachate contaminants toward coastal waters may present a public health risk to near shore users via direct water contact.

Risks to public health associated with the ongoing operation of the open dump includes providing food and harborage for rodents, birds and flies, which are capable of transmitting these disease organisms to humans and animals. In addition, the concrete loading platform at the existing open dump lacks a barricade to prevent individuals from falling or vehicles from rolling off. The lack of a properly secured facility could result in unauthorized access by scavengers increasing the risk of fatal accidents (e.g., scavengers buried under waste piles).

Unexploded Ordnance

During World War II, the Island of Tinian was an active battlefield. As a result, unexploded ordnance (UXO) has been periodically discovered throughout the island. Discovered items include unexploded shells, grenades and mortars. Battlefield munitions may also exist on submerged lands that occur off many of the beaches used during the amphibious landings. In this document, the term "unexploded ordnance" is used to address both military munitions and battlefield UXO.

The risk of UXO-related impacts is very low because much of Tinian Island has been cleared of UXO. However, due to Tinian's wartime and military history the potential for UXO occurrence remains. During technical field investigations, the Proposed Project site was surveyed to assess the presence and hazards associated with UXO at the site. No UXO was observed at the Proposed Project site nor were there any physical evidence of impact craters, targets or target debris, maneuver debris, or munitions dumps.

4.3.3 Historic and Cultural Resources

An archaeological investigation was conducted in support of this EA to locate and assess the historical significance of any cultural resources present within the project areas, and to assess potential adverse effects by the Proposed Project on such resources. The archaeological investigation is attached herein as Appendix F.

Proposed Project

A total of 18 historic resources were identified within the Proposed Project area including isolated artifacts, concrete pads, pits or depressions in the limestone surface, wooden poles, a coral wall, a coral mound, and a culvert. Most of the structural resources were probably associated with the American occupation of the island during WWII. Two of the resources were likely associated with the Japanese Period, and one of the resources was likely associated with the Prehistoric Period.

Of the 18 historic resources, seven were isolated artifacts. Only one of the artifacts was a prehistoric artifact, a portable basalt mortar fragment. Two artifacts, a tracked vehicle, and a brown beer bottle were probably associated with the pre-WWII Japanese occupation of the island. The remaining artifacts appear to have been associated with the WWII American occupation of the island -- a possible jeep transmission, a 55-gallon drum, a cube-shaped glass bottle, and a portable metal sprayer.

Eleven structural sites recorded within the Proposed Project area consisting of three pits or depressions, two concrete pads, two mounds, a culvert, a low coral cobble wall, a concrete wall foundation, and a roadway. All of these sites appear to be associated with the American occupation of the island during WWII.

Historic resources identified within the Proposed Project area are listed in Table 4-7 and their locations are shown in Figure 4-14,

Table 4-7
Historic Resources – Proposed Project

Site Designation	Description	Location
PL-01	Possible jeep transmission	O
PL-03	Rectangular pit with surrounding earthen berm	O
PL-04	Concrete pad with upraised water "trough" and associated sump pit	O
PL-05	Corrugated metal culvert associated with 10th Ave.	B

Site Designation	Description	Location
PL-06	Low coral wall	O
PL-07	Coral cobble mound	O
PL-08	Tracked vehicle	LF
PL-09	55-gal drum filled with coral boulders and cobbles	B
PL-10	Mound of concrete	O
PL-11	Cube shaped glass bottle	B
PL-12	Complex of concrete pads, coral alignment, and a cut limestone block wall previously recorded as Site TN-6-601, Feature B-15	O
PL-13	Cobble lined depression that may be a part of previously recorded Site TN-6-601, Feature B-14	O
PL-14	Remnant of upright wooden utility pole and a concrete wall foundation. May be part of previously recorded Site TN-6-601, Feature B-14	O
PL-15	Remnant of upright wooden utility pole and a rectangular pit. May be part of previously recorded Site TN-6-601, Feature B-12	O
PL-16	Portable metal sprayer	B
PL-17	Japanese beer bottle	B
PL-18	Portable basalt mortar fragment	O
PL-19	Remnant of a N-S trending roadway	O

LF – Landfill Footprint, B = 100 ft. Buffer Zone O = Outside Project Area Source: Pacific Legacy, 2006

A brief description of each of the identified historic resource within the Proposed Project area is provided below.

PL-01: Possible jeep transmission. Probably of American origin,

PL-03: A 3.0 by 4.5 meter rectangular pit lined with coral cobbles and boulders. And surrounded by a low berm on all sides measuring approximately 3 to 3.5 meters wide. The function of this pit is unknown

PL-04: A concrete pad measuring approximately 7.0 by 4.2 meters with a pedestaled trough and associated possible sump pit. This resource probably functioned as a bathing facility. The trough was probably a communal basin that was probably backed by a board with a large mirror. The east side of the pad probably had showers.

PL-05: Concrete block and corrugated metal culvert pipe associated with 10th St. The concrete block measures approximately. 1.2 x 0.5 x 0.20 meters. Accurate dimensions of the corrugated metal culvert could not be determined because it is compressed, but it was probably a 2-foot diameter pipe.

PL-06: Low coral cobble wall measuring approximately 8.0 x 0.5 x 0.3 meters high.

PL-07: Coral cobble mound approximately 1.5 meters in diameter and piled to a height of 0.3 meters.

PL-08: Small tracked vehicle, probably a four cylinder bulldozer likely associated with the Japanese Period. This is the only historic artifact located within the proposed landfill facility site.

PL-09: A 55-gallon metal drum filled with coral boulders and cobbles.

PL-10: Semi-circular shaped mound of concrete measuring approximately 2.5 x 1.3 x 1 meters high.

PL-11: Glass bottle roughly cube-shaped with a rounded mouth threaded for a metal cap.

PL-12: Complex of concrete pads, a coral alignment, and a cut limestone block wall. One of the concrete pads has a trough or gutter along its edge. The coral alignment is situated at the top of a localized slope and consists of at least 8 coral cobbles. One of the coral slabs contains steps leading on to it and cut limestone blocks were used in its construction. Several small ceramic electrical insulators were found nearby. Adjacent to the coral slab with the steps is a free standing wall approximately 8.0 x 0.5 x 1.6 meters high constructed of cut limestone blocks mortared in place.

This site was recorded and mapped during a previous archaeological investigation. The previous archaeological investigation identified this site as Component B15 of larger Site TN-6-601 interpreting the complex of concrete slabs and the spatially associated cut limestone block wall as being of Japanese construction and worthy of preservation (Dixon et al., 2000).

PL-13: Small coral cobble-lined depression approximately 1.5 meters in diameter. This site could possibly be a part of Site TN-6-601, Component B-14.

Site PL-14: Upright one meter high remnant of a wooden utility pole, and a concrete wall foundation. The rest of the pole lies on the ground just to the north of the upright remnant. Approximately 30 feet to the north is what appears to be the foundation of a concrete wall. This site may be a part of Site TN-6-601, Component B-14.

PL-15: Remnant of a wooden utility pole and a rectangular pit surrounded by a 0.6 meter high berm. The function of this pit is unknown.

PL-16: Metal sprayer. The sprayer is circular in cross section with a top diameter larger than the base diameter.

PL-17: Brown Japanese bottle. Japanese kanji is embossed on the top and bottom of the bottle and superimposed letters B and K are embossed on the shoulder and base of the bottle.

PL-18: Portable basalt mortar fragment measuring approximately 20 x 20 x 13 cm thick and appears to have been well used.

PL-19: Portion of a north-south trending roadway measuring approximately 7.3 meters wide and 0.2 meters high on the east side and 0.5 meters high on the west side. The length of this roadway could not be determined,

<u>Alternative 2</u>

Previous archaeological work conducted by Moore et al. (1986) and Allen et al. (2000) recorded numerous latte sets and human burials in the area of the Alternative 2 site. Existing conditions in this area are of relatively undisturbed lands suggesting that there is a high probability of the area containing potentially significant historic resources (Pacific Legacy, 2006)

<u>Alternative 3</u>

Previous archaeological investigations in the Carolinas and Kastiyu areas of southern Tinian have been conducted by Bodner and Welch (1992), Bodner (1994, 1997), and Simons and Farrell (1998). Over 180 archaeological sites dating to the Prehistoric, Japanese, and World War II periods have been recorded in this region. Similar to Alternative 2 this area appears to have a high potential to contain archaeological resources (Pacific Legacy, 2006).

4.3.4 Aesthetic and Recreational Resources

<u>Aesthetic Resources</u>

The visual quality of the landscape contributes to a community's sense of uniqueness, and views may add to the quality of life and to property values. In many cases, the landscape and its visual characteristics set it apart from other locations. Visual aesthetics is often analyzed in terms of "viewsheds," which is the entire area an individual can see from a given point. Visual aesthetic quality may vary based upon a combination of factors, including the number of viewers, the duration and purpose of the view, the distance between viewers, and the various points of interest within the viewshed.

Visual resources in the vicinity of the Proposed Project site is dominated by undeveloped lands consisting of a mixture of overgrown secondary forest dominated by *tangantangan*, and open patches of grassland. Viewsheds in the vicinity of Alternative site 2 include sweeping coastal views to the east and gently sloping hillsides to the west. The upland plateau areas in the general vicinity of Alternative site 3 offer scenic vistas of Tinian Island and San Jose and most of Tinian Island, as do most locations along the western side of the ridge.

Recreational Resources

Lands within and surrounding the Proposed Project site are not heavily used for recreational purposes. Recreational resources in the Proposed Project vicinity are primarily ocean-related activities (e.g., diving, fishing, and recreational beaches) scattered along the coast and located between 0.5 to 2.0 miles from the site.

By contrast, ocean-related recreational resources (consisting mainly of recreational beaches) are in the immediate vicinity of the Alternative 2 site due to its proximity to the shoreline. One such recreational beach is situated directly adjacent to the southern boundary of the proposed Alternative 2 site.

Due to its proximity to the village of San Jose many of the recreational resources in the vicinity are located to the west and northwest of the Alternative 3 site. In addition to the ocean-related recreational resources, in the general area of Alternative 3, there is a nature trail along the coast at the south end of the island and the road to the Peace Monument is located on the east side of Carolinas Ridge.

Figures 4-15 through 4-17 show existing recreational resources in the general vicinities of Alternatives 1 through 3, respectively.

4.3.5 Infrastructure and Utilities

4.3.5.1 Solid Waste

As previously discussed all solid waste, including toxic materials and sewage from holding tanks, is dumped at the existing open dump located at the west end of the island (see Figures 1-3 and 2-1). A description of the existing open dump, its features, and its operations can be referenced in Section 2.0.

4.3.5.2 Water and Wastewater

As previously mentioned, Tinian presently has no sewer facilities and all residences and businesses use septic and seepage tanks, leaching fields, or holding tanks to dispose of sewage. Additionally, a significant number of households within the proposed San Jose collection area do not have any septic system instead utilizing cesspools or pit latrines.

Tinian's public water system is operated and maintained by the CNMI Commonwealth Utilities Corporation (CUC). Water infrastructure serving the proposed project area includes two municipal horizontal wells, four deep vertical wells, two reservoirs with capacities of 0.25 and 0.50 million gallons, chlorine injection points, and water distribution lines serving the San Jose, Makpo Heights, and Carolinas Heights collection areas. Potable water is available to CUC customers 24-hours per day, 7-days per week (Belt Collins 2003).

4.3.5.3 Electrical Utilities

The electrical power generation and distribution system on Tinian is managed by the CNMI CUC. Electrical demand is not high on the island and the existing electrical infrastructure is adequate to serve current residential and business users. Tinian has a diesel generator based power system. The installed capacity is 5.0 Megawatt (MW), while peak loads are 2.7 MW (DOI OIA, 1999).

4.3.6 Traffic and Circulation

The main vehicular traffic routes on Tinian Island are 8th Avenue and Broadway which run parallel to each other and traverse the island in a north-south direction, and 86th Street which runs in an east-west direction from Masalok to Atgidon. A network of smaller paved and unpaved roadways provide vehicular traffic circulation in the southern point of the island (Carolinas), and the eastern part of the island is largely undeveloped with a single unpaved roadway running along the coast.

The primary circulation roadways in the vicinity of the Proposed Project site are Riverside Drive to the west, 86th Street to the south, and 10th Avenue to the east. Figure 4-18 shows the existing roadway network in the southern half of Tinian Island including the Proposed Project vicinity.

A *Traffic Impact Analysis Report* (TIAR) was prepared in support of this EA and is attached as Appendix H. The purpose of the TIAR was to identify and assess future impacts of the Proposed Project on local and regional roadway systems and to identify roadway improvements that may be necessary to provide adequate vehicular access after the Proposed Project has been implemented. Information in this section is based largely on the findings of the TIAR.

<u>Level-of-Service Concept</u>

The Level-of-Service (LOS) is a qualitative measure to describe the flow or operational characteristics of traffic as perceived by the level of congestion or delays experienced by motorists. There are six grades of LOS measured from "A" to "F". In general, LOS A is considered best, representing free-flow conditions with no congestion. LOS F is considered worst, representing severe congestion with stop-and-go conditions. For peak hour traffic conditions in rural areas the minimum acceptable LOS is D. Table 4 - 8 summarizes LOS grades A through F.

Table 4-8
Levels-of Service Descriptions and Time Delays

Level-of-Service	Description	Time Delay (in seconds)
A	Little or no delay	<10.0
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	Extreme traffic delays(2)	>50.1

Source: Rowell, 2007

Notes:
(1) For unsignalized intersections
(2) When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. LOS F conditions usually warrant improvement of the intersection.

Traffic within the Proposed Project area currently operate at acceptable conditions as all movements operate at a LOS of A. Existing LOS conditions within the Proposed Project area are summarized in Table 4-9 below.

Table 4-9
Existing Levels-of Service in Proposed Project Area (2006)

Intersection and Movement	AM Peak Hour		PM Peak Hour	
	Delay(1)	LOS	Delay(1)	LOS
86th Street at Broadway				
Northbound Left and Thru	7.2	A	7.3	A
Eastbound Left and Right	8.5	A	8.7	A
8th Avenue at Broadway				
Northbound Left, Thru and Right	7.2	A	7.2	A
Southbound Left, Thru and Right	7.2	A	7.2	A
Westbound Left, Thru and Right	9.0	A	8.8	A
Eastbound Left, Thru and Right	9.0	A	9.0	A

Source: Rowell, 2007

Notes: (1) Delay in seconds per vehicle

4.3.7 Socioeconomic Considerations

4.3.7.1 Population and Economy

The majority of Tinian's population resides in the rural village of San Jose located in the median valley and parts of the adjacent central plateau and southeastern ridge. The populated areas of Tinian occupy about 25 percent of the island (Baldwin 1995 in Gingerich and Yeatts 2000).

Tinian's resident population grew from 364 in 1949 to 800 in 1960, 866 in 1980, 2,118 in 1990, and 2,631 in 1995. Results of the 2000 census of population and housing within Tinian Municipality reveal an on-island resident population of 3,540. Total households number 790 and the average size per household is 3.62 individuals. The average family size is 4.34 individuals and the average family household size is 4.69 individuals (OEDPC 1997; USDA 1994; USDC 2003). The ethnic makeup and income characteristics of Tinian's population are summarized in Tables 4-10 and 4-11, respectively.

Table 4-10
Tinian Population - Ethnic Origin and Race

	San Jose		Tinian Municipality	
	No.	Percent	No.	Percent
Total Population	3,018		3,540	
Ethnic Origin				
Asian	1,421	47	1,593	45
Pacific Islander	1,188	39	1,477	42
Black or African American	3	<1	4	<1
Caucasian	63	2	73	2
Other Ethnicity	31	1	33	<1
More than 1 Ethnic Group	312	10	360	10
Total Minority Population	2,612	87	3,074	87

Source: U.S. Census Bureau, 2000

Table 4-11
Tinian Population - Income Characteristics

Characteristic	San Jose	Tinian Municipality
Income (1999)		
Median Earnings (Population 16 Years and over w/earnings)	$9,042	$9,354
Median Household Income	$24,276	$23,542

Poverty Status (1999)		
Percent of Population with Income Below Poverty Level	42	41

Source: U.S. Census Bureau, 2000

4.3.7.2 Environmental Justice

On February 11, 1994, Executive Order 12898 entitled *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* was issued. E.O. 12898 requires Federal agencies to identify and address disproportionately high and adverse human health and environmental effects of Federal programs, policies, and activities on minority and low-income populations. A Presidential memorandum that accompanied E.O. 12898 specified that federal agencies "shall analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities, when such analysis is required by the National Environmental Policy Act of 1969, 42 U.S. Code Section 4321 et seq.".

The majority of Tinian's population would be categorized as a minority population, because it is largely comprised of peoples of Pacific Island (namely Chamorro) and Asian ethnicity. As shown in Table 4-10 the Pacific Islander and Asian ethnic groups comprise 42 percent and 45 percent of Tinian's total population, respectively. Furthermore, as shown in Table 4-11 above, almost one half (41 percent) of Tinian's residents live below the poverty level. Therefore, in compliance with E.O. 12898 on Environmental Justice, it is determined that a minority and low-income population is present which could potentially be disproportionately affected by the Proposed Project.

However, Environmental Justice guidance and case law require that minority be defined based on the national population not on the regional population. The reason for this is an unwanted project (such as a nuclear waste disposal area) could be unfairly targeted to a region where the majority of the population is in the national minority (such as a reservation for Native Americans). This would place a "disproportionate" impact on that ethnicity. Therefore, the EA identifies/determines the presence of a "minority" population is based on ethnicity.

It should also be noted, that the Proposed Project would be an overall improvement to the existing conditions for the entire island of Tinian. Furthermore, t he Proposed Project is at a sufficient distance from any residences to result in a disproportionate impact to any of the people of Tinian.

5.0 ENVIRONMENTAL CONSEQUENCES

5.1 Physical Environment

5.1.1 Geology and Soils

5.1.1.1 No Action Alternative

Under the No Action Alternative an MSWL would not be constructed and all solid waste including toxic substances would continue to be disposed of at the existing open dump. As previously discussed the open dump is not equipped with any environmental control systems (e.g. liner, leachate collection system) to prevent contamination of the surrounding environment. Therefore, contamination of the soils underlying the existing open dump and in the immediate vicinity would continue.

Under the No Action Alternative, the proposed alternative MSWL sites would remain undisturbed and geology and soil resources would not be affected by construction-related or operational activities.

5.1.1.2 Preferred Alternative (Atgidon Site)

Existing soils within the Proposed Project areas would be disturbed as a result of construction activities such as clearing, grading, and excavation. The topography of the area would also be altered to accommodate the MSWL facility.

Exposed soils are susceptible to erosion, especially if it rains heavily during site work periods. Wind erosion may result in some unavoidable soil loss, and silt runoff is also a potential impact. Some open areas would be covered with impermeable surface area, and some bare subsoil areas would be covered with a layer of topsoil and landscaped. Soils could potentially be contaminated by leachate (i.e., water contaminated by contacting waste) produced during active MSWL operations and by residual contaminants after landfill closure.

Based upon soil types present and current site uses, and required MSWL active operational and post-closure monitoring procedures, significant impacts to soils underlying the Propose Project site are not anticipated.

Mitigation Measures:

During construction, temporary and permanent erosion control measures will be employed by the construction contractor to minimize both short and long term impacts resulting from minor alteration of the topography. Typical erosion control measures applied during construction may include the use of berms, cut-off ditches, temporary ground cover vegetation, and the application of water and/or soil stabilization and protection materials. If necessary, silt fences shall be constructed and continuously inspected and repaired to prevent silt runoff from the project site.

As previously noted, when proposing a new regulatory-compliant MSWL the proposed facility shall include provisions or other measures that ensure potential impacts would be less than significant. Contamination of underlying soils due to landfill leachate would be prevented by the design and installation of a regulatory-compliant impermeable liner and leachate collection system. CNMI and its agent shall be responsible for and implement all required and applicable RCRA Subtitle D design and performance standards in their final MSWL design.

5.1.1.3 Alternative 2 (Masalok Site)

Potential impacts and mitigation measures to geology and soil resources under Alternative 2 would be similar to those discussed under the Proposed Project. Mitigation measures to minimize potential impacts to geology and soil would be similar to those presented under the Proposed Project.

5.1.1.4 Alternative 3 (Carolinas Site)

Potential impacts and mitigation measures to geology and soil resources under Alternative 3 would be similar to those discussed under the Proposed Project. However, soils underlying the Alternative 3 site consist largely of Kagman-Saipan clay complex. Kagman-Saipan soils are classified as prime farmlands by the U.S. Department of Agriculture. These soils are best suited to producing food, seed, forge, fiber, and oilseed crops, and they produce the highest yields with minimal energy input and economic resources, and results in the least damage to the environment. Construction and operation of a MSWL at the Alternative 3 site would result in the permanent loss of these prime farmlands for agricultural use.

5.1.2 Natural Disasters

5.1.2.1 No Action Alternative

Under the No Action Alternative the construction and operation of a new MSWL would not occur. Potential impacts resulting from natural hazards would not increase from existing conditions. Due to its proximity to the shoreline and its elevation, the existing open dump would be susceptible to substantial damage in the event of a significant natural disaster event such as destructive tsunami or a category 4 typhoon. Such an event could potentially result in substantial release of deposited solid waste and associated contaminants into the surrounding environment. Therefore, under the No Action Alternative adverse impacts could potentially occur.

5.1.2.2 Preferred Alternative (Atgidon Site)

Assessing impacts resulting from natural disasters such as typhoons, earthquakes or tsunami are difficult to estimate because of their inherent unpredictable frequency and intensity. Under worst case conditions any of these natural disaster scenarios could potentially result in adverse impacts not only to the proposed MSWL but to Tinian Island as a whole. However, the proposed MSWL facility would be designed and engineered to be prepared for and withstand possible natural disasters such as typhoons and earthquakes (tsunami are unlikely due to the elevation of the project site) and significant adverse impacts are not anticipated.

Mitigation Measures

Due to the unpredictable occurrence and intensity of natural disasters specific mitigation measures are difficult to identify. However, CNMI and its agent would be responsible for constructing the proposed MSWL to meet applicable regulatory and industry standards to withstand natural disaster events to varying degrees. In addition, during the occurrence of a natural disaster event existing emergency response plans would be implemented by the appropriate authorities.

5.1.2.3 Alternative 2 (Masalok Site)

Potential impacts and mitigation measures resulting from natural disasters under Alternative 2 would be similar to those discussed under the Proposed Project. However, due to the proposed coastal location of the Alternative 2 site potential adverse impacts to a MSWL and the surrounding environs could result from a destructive tsunami.

5.1.2.4 Alternative 3 (Carolinas Site)

Potential impacts and mitigation measures resulting from natural disasters under Alternative 3 would be similar to those discussed under the Proposed Project.

5.1.3 Water Resources

5.1.3.1 No Action Alternative

Under the No Action Alternative water resources within the Proposed Project area or alternative locations would not be affected by construction-related or operational activities of a MSWL. However, the existing open dump would not close and it would continue to accept solid waste. Due to the lack of engineering controls (e.g. liners, leachate collections systems, etc.) at the open dump the increased risk of environmental contamination (including contamination of groundwater and/or coastal waters) would remain, and could potentially increase over time. Consequently, there is a potential for water resources to be adversely impacted under the No Action Alternative

5.1.3.2 Preferred Alternative (Atgidon Site)

Groundwater

Leachate is water that becomes contaminated by contacting wastes. Groundwater underlying the Proposed Project site could potentially become contaminated by leachate from the MSWL operations. The proposed MSWL would be equipped with a leachate collection system which would capture any contaminated water as it accumulates preventing it from entering the groundwater system.

In addition, leachate would continue to be generated after the landfill is closed and could potentially contaminate groundwater. However, the quantity would diminish provided the landfill were properly capped (i.e., a structurally sound cover is placed over the landfill). After landfill closure, the chemical composition of the leachate would also change as the landfill becomes more biologically stable with pollutant concentrations slowly diminishing.

Surface Water

There are no surface water bodies or wetlands in the Proposed Project area which can be adversely impacted by MSWL operations. However, potential contamination of the surrounding environment (including groundwater) could occur from the discharge of surface waters generated from the MSWL facility.

Mitigation Measures

As previously noted, when proposing a new regulatory-compliant MSWL the proposed facility shall include provisions or other measures that ensure potential impacts would be less than significant. Adverse impacts to groundwater due to leachate are not anticipated provided the leachate collection system (e.g. pumps, leachate collection equipment, leachate lines, etc.) is subject to proper management, operation, and regular maintenance. In addition, the proposed MSWL would have appropriate leachate and groundwater management systems/plans in place. Components of typical leachate and groundwater management systems/plans that would effectively minimize potential adverse impacts to groundwater systems are presented below:

Leachate Management System

The leachate management system would consist of infrastructure and monitoring systems designed to monitor, control, treat and discharge treated leachate into the surrounding environment. Typically, the leachate management system would include the following components:

- Have a leachate collection and removal network from the waste burial portion of the landfill (separated from the facility's storm water system);
- Function year round;
- Function effectively during the lifespan of the landfill;
- Monitor all leachate flow (i.e., instantaneous and total flow).
- Have adequate storage capacity.

Groundwater Management System

Groundwater would be carefully monitored to avoid contamination by leachate discharges. The distribution of groundwater monitoring wells would be landfill specific and dependent on site hydrogeological conditions. The groundwater monitoring system would consist of a sufficient number of wells capable of providing locations to retrieve groundwater samples which would detect potential contaminant release pathways and which would provide background level samples. The monitoring well system would also serve to measure water levels, determine horizontal and vertical gradients, and determine groundwater flow directions and velocities.

Typically, the groundwater monitoring system would include the following components:

- Monitoring well(s) installation hydraulically above the gradient of the landfill and hydraulically below the gradient direction;
- Sufficient number of multi-level well nests for measurement of vertical gradients;
- Locations of the monitoring wells sufficiently close to the active disposal area to allow early detection of contamination and implementation of remedial measures; and,
- Retention of monitoring wells throughout the lifespan of the MSWL facility.

Surface Water Management System

A regulatory-compliant drainage system in conjunction with an appropriate surface water management plan/system would effectively minimize the potential for such impacts. Typically, the surface water management system would be designed to accomplish the following objectives:

- Divert surface and storm water from the disposal areas of the landfill
- Control run-off discharge from the facility
- Control erosion, sedimentation, siltation, and flooding
- Minimize the generation of leachate
- Be hydraulically separate from the facility's leachate management systems.

In summary, significant adverse impacts to water resources are not anticipated as a result of the proposed MSWL. CNMI and its agent shall be responsible for and implement all required and applicable RCRA Subtitle D design and performance standards in their final MSWL design.

Groundwater beneath the landfill would be regularly monitored during both the operational and post-closure care period. In the event that contamination is detected, RCRA Subtitle D regulations set forth procedures for more intensive monitoring and corrective action.

5.1.3.3 Alternative 2 (Masalok Site)

Potential impacts and mitigation measures to water resources under Alternative 2 would be similar to those discussed under the Proposed Project. However, under Alternative 2 there is a greater potential for adverse impact to coastal waters due to the site's proximity to the shoreline.

Mitigation measures to minimize potential impacts to water resources would be similar to those presented under the Proposed Project.

5.1.3.4 Alternative 3 (Carolinas Site)

Potential impacts and mitigation measures to water resources under Alternative 3 would be similar to those discussed under the Proposed Project. Mitigation measures to minimize potential impacts to water resources would be similar to those presented under the Proposed Project.

5.1.4 Noise Quality

5.1.4.1 No Action Alternative

Under the No Action Alternative there would be no adverse impacts resulting from noise-related impacts. No MSWL construction or operational activities would occur. Therefore, noise quality would not exceed existing levels and significant impacts are not anticipated.

5.1.4.2 Preferred Alternative (Atgidon Site)

<u>Construction-Related Impacts</u>

Construction noise would be inaudible in the population center of San Jose (approximately 4 miles away) during the entire project construction period. Adverse impacts from construction noise are not expected to occur due to the large buffer distances from the project site to San Jose, and construction noise mitigation measures should not be required.

Operational Impacts.

Predictions of the noise levels associated with future landfill operations were based on a reference noise level of 83 dBA at 100 feet distance for the operating bulldozer. Spherical spreading plus molecular absorption and excess ground attenuation were used to calculate bulldozer sound levels at large distances from the landfill. Estimates of the noise values associated with bulldozer operations at the landfill were based on one bulldozer operating 4 hours per day from 7:00 am to 5:00 pm, 4 days per week, and 52 weeks per year.

The net result of these modeling assumptions was that landfill noise levels associated with bulldozer operations would not exceed 55 DNL at 605 feet distance from the perimeter of the landfill. Since 55 DNL is the most stringent published criteria for acceptable environmental noise exposure levels for noise sensitive land uses, and since the populated areas of Tinian are in the order of 4 miles away from the landfill, noise associated with landfill operations should not exceed or approach levels which are considered to be unacceptable or incompatible for noise sensitive land uses. At 4 miles from the landfill, the noise from bulldozer operating at the landfill should be inaudible. For this reason, there should be no need for community noise mitigation measures at the landfill site (Ebisu, 2007).

Traffic Noise Impacts

Without the proposed landfill project, future traffic noise levels along existing roadways (86th Street, Broadway, and 8th Avenue) are predicted to increase by 6 DNL units between 2006 and 2035. Future traffic noise levels along these three existing roadways are predicted to be less than 65 DNL at 50 feet setback distance from these roadways' centerlines.

Along the future landfill entrance road, project traffic noise levels are predicted to be 57 DNL and 55 DNL at posted speed limits of 45 or 35 miles per hour, respectively, at 50 feet setback distance from the roadway's centerline. These noise levels are relatively low, and well below current traffic noise impact criteria for noise sensitive land uses. The increases in future traffic noise levels along the existing roadways (86th Street, Broadway, and 8th Avenue) due to project traffic were calculated to range from 0.03 to 0.31 DNL, which would be difficult to perceive and would be considered insignificant. Therefore, with or without the proposed landfill project, future traffic noise levels along these existing roadways would be less than 65 DNL at 50 feet setback distance from these roadways (Ibid).

In summary, the increases in noise levels attributable to project traffic in the year 2035 are predicted to be difficult to perceive and not significant along the existing roadways which would service the proposed landfill. Because of the remoteness of the landfill site, project related traffic noise levels along the future Landfill

Entrance Road should not cause traffic noise levels to exceed the 65 DNL criteria at existing noise sensitive buildings in San Jose.

Risks of potential noise impacts from the Proposed Project are considered to be very low at existing noise sensitive receptors because of the large buffer distances between the noise sensitive buildings and the proposed landfill location, and because of the very low increases in traffic noise expected from project traffic along existing roadways. For these reasons, existing noise sensitive buildings in the San Jose area should not require sound attenuation measures as a result of the proposed project.

Mitigation Measures

With the exception of requiring the use of properly muffled construction, heavy equipment and portable generators on the Proposed Project site, no noise mitigation measures are anticipated to be necessary. The construction contractor shall be responsible for operating and maintaining properly muffled construction, heavy, equipment and portable generators on site.

5.1.4.3 Alternative 2 (Masalok Site)

Potential impacts to noise quality under Alternative 2 would be similar to those discussed under the Proposed Project. Mitigation measures to minimize potential noise-related impacts would be similar to those presented under the Proposed Project.

5.1.4.4 Alternative 3 (Carolinas Site)

Potential impacts to noise quality under Alternative 3 would be similar to those discussed under the Proposed Project. However, the Alternative 3 site is situated nearer to the population center of San Jose than either of the other two alternative sites. Consequently, noise sensitive human receptors would be in closer proximity to the proposed landfill. However, the landfill would likely be located in the larger undeveloped secondary forest/grazing lands in the southern Carolinas. It is also assumed that siting of the landfill would take into consideration required distances to populated areas. Therefore, significant adverse noise-related impacts are not anticipated.

Mitigation measures to minimize potential noise-related impacts would be similar to those presented under the Proposed Project.

5.1.5 Air Quality

5.1.5.1 No Action Alternative

As mentioned in Section 2.1, waste pile burning at the existing open dump occurs on a regular basis. This practice is uncontrolled and includes the burning of both organic and combustible inorganic wastes (e.g., plastics, lumber, rubber, and synthetics). Under the No Action Alternative regular burning of the disposed refuse at the open dump would continue as would the associated adverse impacts to air quality.

5.1.5.2 Preferred Alternative (Atgidon Site)

Construction Impacts

It is anticipated that there would be negligible short-term, localized air quality impacts as a result of construction activities. In the short-term, air quality would be impacted primarily by construction activities at the project site. Construction activities would generate fugitive dust emissions resulting in an increase of particulate matter levels in the project area. Construction vehicular activity would also increase automotive pollutant concentrations at the project site and adjacent areas.

Mitigation Measures

During the construction period, fugitive dust control measures would be implemented to reduce the amount of particulate matter emissions. On-site dust control would be accomplished through erecting dust screens around the construction site and frequent watering of unpaved roadways and areas of exposed soil. The EPA estimates that twice daily watering can reduce fugitive dust emissions by as much as 50 percent (U.S. EPA, 2004). To further minimize fugitive dust emissions, the paving and/or landscaping of bare earth areas would be implemented as soon as practicable. Dust screens would also reduce impacts on adjacent areas of human activity in the immediate project environs (Morrow, 2007).

Additional mitigation measures could include:

- Minimizing the amount of dust-generating materials and activities, centralizing material transfer points and on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact.
- Limiting the area that might be disturbed at any given time.
- Application of chemical soil stabilizers.
- Road cleaning and/or tire washing as practical.

Operational Impacts

Daily operations at the landfill site would include vehicle activity involved in moving solid waste and cover material. These activities have the potential of generating fugitive dust. This impact is naturally mitigated by the humid climate and relatively high rainfall rates which contribute to higher moisture content of the soils and thus less potential for dust entrainment in the air.

In addition to fugitive dust, landfill operations would also generate gases and vapors as a result of the normal decomposition of deposited solid waste. The principal gases produced are methane and carbon dioxide (CO_2), both of which are odorless and nontoxic at ambient concentrations. In addition to methane and CO_2, landfill operations would also generate nonmethane organic compounds (NMOC), many of which are listed hazardous air pollutants (HAP) under the Clean Air Act (CAA), 42 U.S.C.A., 7412(b).

The quantities of gases and vapors that would be generated at the proposed landfill were estimated using the latest EPA emissions model. Figure 5-1 depicts projected landfill gas production as a time series, while Table 5-1 presents gas and vapor composition estimates during the peak year (2035) of landfill gas production.

Table 5-1
Landfill Gas and Vapor Estimates
Peak Year (2035)

Gas/Pollutant	Emission Rate		
	Mg/yr	Ft^3/yr	Tons/yr
Total landfill gas	42.9	9,386,757	57.1
Methane	87.6	72,818	1.09
Carbon dioxide	17.0	72,818	22.4
NMOC	4.02	974	4.42

Source: Morrow, 2007

Mg = Megagram (1 Million Grams)
NMOC = Nonmethane organic compound

The NMOC quantities are well below the 10 ton/yr threshold for individual HAPs or 25 tons/yr total HAP threshold that would trigger air permitting requirements (Morrow, 2007).

The operation of landfill gas control and monitoring systems would continue for many years after the landfill is closed. Failure to operate and maintain the system may result in damage to the vegetative cover of the landfill and off-site migration of landfill gases. RCRA Subtitle D requirements specify that gas monitoring probes around the landfill be tested on a quarterly basis each year. Where landfill gas migration is detected near occupied structures, more frequent monitoring is recommended. If regulatory standards for migration are exceeded, improved migration control and landfill gas recovery facilities may be necessary. An MSWL may need to be retrofitted for gas control if a system is not already in place.

By their nature any landfill operation would result in the production of odorous emissions. However, odorous components comprise a very small fraction of the landfill gas and vapors that would be produced, and would be well below any emission threshold that would require air permitting. During routine operation, mixing and daily covering of deposited waste material would reduce ambient odors. The Proposed Project site is also well situated to disperse any odors that may occur away from populated areas due to the prevailing northeasterly trade winds.

Mitigation Measures

During operations landfill gas production will be managed to control the discharge of potentially dangerous gases into the atmosphere. Venting and/or gas collection systems will be installed to control and monitor the gas production in the landfill. Upon eventual landfill closure, a gas collection system designed for energy recovery would further reduce any odorous emissions.

Mobile Emission Sources

Under worst case conditions of meteorology and traffic, the federal 1-hour and 8-hour carbon monoxide (CO) standards will be met at receptor locations ten meters and beyond the edge of roadways expected to be affected by Proposed Project-related traffic. The changes in CO levels are insignificant due to the very low traffic volumes both currently and in the future, and the offsetting effect of the federal motor vehicle emissions control program.

Mitigation Measures

Vehicle emissions standards for motor vehicles get progressively more stringent over time; thus, older, higher emitting vehicles lost by attrition, are replaced by newer, lower-emitting vehicles which comply with the more stringent standards. Thus, mobile vehicular CO emissions require no special mitigation measures as emission levels associated with the Proposed Project would be negligible and well in compliance with federal air quality standards.

5.1.5.3 Alternative 2 (Masalok Site)

Potential impacts to air quality under Alternative 2 would be similar to those discussed under the Proposed Project. Mitigation measures to minimize potential air-related impacts would be similar to those presented under the Proposed Project.

5.1.5.4 Alternative 3 (Carolinas Site)

Potential impacts to air quality under Alternative 3 would be similar to those discussed under the Proposed Project. Mitigation measures to minimize potential air-related impacts would be similar to those presented under the Proposed Project.

5.2 Biological Environment

5.2.1 Terrestrial Flora

5.2.1.1 No Action Alternative

Under the No Action Alternative the construction and operation of a new MSWL would not occur. Potential adverse impacts to terrestrial flora would not increase from existing conditions. Therefore, under the No Action Alternative significant impacts are not anticipated.

5.2.1.2 Preferred Alternative (Atgidon Site)

The Proposed Project would require the clearing of approximately 20 acres of mostly secondary forest (dominated by *tangantangan*) and scattered areas of open grassland. Though relatively minimal, the Proposed Project site does contain some native plants within vegetation that is mostly dominated by non-native, alien plant species. The native plants found within the Proposed Project site are not presently protected by US or CNMI laws and are not species under any threat of extinction.

The Proposed Project would result in the physical removal of the existing floral resources within the project site and immediate vicinity. Removal of the existing flora could encourage the spread of ruderal weeds into the area.

<u>Mitigation Measures</u>

As a mitigation measure a concerted planting effort by the construction contractor utilizing native trees and shrubs would offset the conversion of much of the periphery and ancillary support and access areas to a vegetation of all non-native species.

5.2.1.3 Alternative 2 (Masalok Site)

Potential impacts to terrestrial floral resources under Alternative 2 would be similar to those discussed under the Proposed Project. Mitigation measures to minimize potential impacts to terrestrial flora would be similar to those presented under the Proposed Project.

5.2.1.4 Alternative 3 (Carolinas Site)

Potential impacts terrestrial floral resources under Alternative 3 would be similar to those discussed under the Proposed Project. Mitigation measures to minimize potential impacts to terrestrial flora would be similar to those presented under the Proposed Project.

5.2.2 Terrestrial Fauna

5.2.2.1 No Action Alternative

Under the No Action Alternative the construction and operation of a new MSWL would not occur. Potential adverse impacts to terrestrial fauna would not increase from existing conditions. Therefore, under the No Action Alternative significant impacts would not occur.

5.2.2.2 Preferred Alternative (Atgidon Site)

The Proposed Project would require the clearing of approximately 20 acres of mostly secondary forest (dominated by *tangantangan*) and scattered areas of open grassland which provide habitat to terrestrial fauna. Terrestrial fauna found in the Proposed Project site would be displaced to adjacent similar habitats which are relatively abundant in this area of the island.

Significant adverse impacts to terrestrial fauna is not anticipated and implementation of mitigation measures would not be necessary as the majority of the terrestrial fauna identified within the project site were common non-native and native species with no special U.S. or CNMI status. The noteable exception, being the known presence of the threatened Tinian Monarch. Potential impacts to the Tinian Monarch are addressed in further detail in Section 5.2.4 below.

5.2.2.3 Alternative 2 (Masalok Site)

Potential impacts to terrestrial fauna resources under Alternative 2 would be similar to those discussed under the Proposed Project. Mitigation measures to minimize potential impacts to terrestrial fauna are not anticipated to be necessary.

5.2.2.4 Alternative 3 (Carolinas Site)

Potential impacts to terrestrial fauna resources under Alternative 3 would be similar to those discussed under the Proposed Project. Mitigation measures to minimize potential impacts to terrestrial fauna are not anticipated to be necessary.

5.2.3 Invasive Species

With the exception of the No Action Alternative each of the remaining alternatives would involve construction activities. Like other construction projects on Tinian, construction of a new MSWL would involve the import of construction materials from off-islands sources. All incoming shipments of goods to the island could potentially increase the risk of non-indigenous invasive species (NIS) introduction such as the brown tree snake into Tinian from Guam.

The potential that the brown tree snake (*Boiga irregularis*) will become established on the island is one of the most significant threats to the Tinian Monarch population. According to the IUCN ISSG Global Invasive Species Database the brown tree snake is listed at number 15 among the World's 100 Worst Invasive Species (IUCN, 2007)

Brown tree snakes eat a wide variety of vertebrate and invertebrate prey items, and if it they reach Tinian, would face no predators, an ample food supply, and no significant competition for those resources. Potential NIS introductions could occur as a result of material shipments between Tinian, Saipan or Guam and the establishment of an incipient brown tree snake population on Saipan (USFWS, 2005b; David, 2006).

In summary, the risk of NIS introduction as a result of MSWL construction exists. However, it should be noted that because it is an island, the risk of NIS introduction exists with any form of maritime shipment and/or transport operation (e.g., cargo, military, passenger, etc.) to and from Tinian. To more fully address the issue of NIS introduction the CNMI Division of Fish and Wildlife (DFW) Brown Tree Snake Quarantine Program (BTSQP) was consulted.

Mitigation Measures

To mitigate the accidental introduction of the brown tree snake from Guam into Tinian the construction contractor shall work with DFW BTSQP Manager to coordinate the shipment of supplies and equipment to Tinian and the work site to ensure that all shipments have been first inspected on Guam (if that is the origin) and then re-inspected on Tinian with certified brown tree snake Canines. In addition, all construction contractor personnel working at the proposed MSWL project site would attend the brown tree snake Identification and Capture (BTSIC) Training prior to commencement of construction activities. The BTSIC Training would be provided by the DFW BTSQP and could be held on either Saipan or Tinian.

Furthermore, existing protocol and procedures for the quarantining of the brown tree snake (and other NIS introductions) from cargo vessels operations at Tinian

Harbor would also apply to material shipments for the proposed project. Therefore, significant adverse impacts from NIS introduction is not anticipated

5.2.4 Coastal Habitat and Biological Resources

5.2.4.1 No Action Alternative

Under the No Action Alternative coastal habitat and biological resources would not be affected by construction-related or operational activities of a MSWL. However, the existing open dump would remain open and continue to accept all of Tinian's solid waste including toxic materials.

Due to the proximity of the open dump to coastal waters (approximately 1,200 feet from the shoreline) and the lack of environmental engineering controls (i.e. liners, leachate collections systems, etc.) the potential for adverse environmental impacts (i.e., contamination) of coastal waters and habitat would remain, and likely increase over time. It should be noted that reports by local fishermen of declining fishstocks in the adjacent nearshore waters suggest that the open dump may be contributing to the environmental degradation of the marine waters. Consequently, there is a potential for coastal habitat and biological resources to be adversely impacted under the No Action Alternative.

5.2.4.2 Preferred Alternative (Atgidon Site)

The Proposed Project site is located approximately 0.5 miles from the nearest coastal areas. Significant adverse impacts to coastal habitat and biological resources is not anticipated based upon the proposed MSWL's physical distance from coastal areas in conjunction with regulatory compliant construction, operations, management, and monitoring systems to be implemented.

<u>Mitigation Measures</u>

Mitigation measures described in Section 5.1.1.2 would ensure that soil erosion and sediment do not migrate offsite during construction activities. During construction, temporary and permanent erosion and sedimentation control measures would be implemented by the construction contractor to insure compliance with all applicable federal and local regulations. Typical erosion control measures applied during construction may include the use of berms, cut-off ditches, temporary ground cover vegetation, and the application of water and/or soil stabilization and protection materials. As required, silt fences shall be constructed and continuously inspected and repaired to prevent silt runoff from the project site. As previously noted, when proposing a new regulatory-compliant MSWL the proposed facility shall include provisions or other measures that ensure potential impacts would be less than significant. During MSWL operations the leachate management system described in Section 5.1.3.2 would be implemented by CNMI and its agent to control potential contamination of water resources.

In addition to the engineering controls described above, coral reef ecosystems are also protected through administrative controls set forth in Executive Order 13089 which states that "all Federal agencies whose actions may affect U.S. coral reef ecosystems shall: (a) identify their actions that may affect U.S. coral reef ecosystems; (b) utilize their programs and authorities to protect and enhance the conditions of such ecosystems; and (c) to the extent permitted by law, ensure that any actions they authorize, fund or carry out will not degrade the conditions of such ecosystems.

In summary, coastal resources, including coral reefs are not anticipated to be impacted by the Proposed Project.

5.2.4.3 Alternative 2 (Masalok Site)

Because the Alternative 2 site is essentially located on Tinian's eastern shoreline potential impacts to coastal habitat and biological resources would be far greater than that of the Proposed Project. Coastal habitat that could be potentially impacted as a result of both MSWL construction and operational activities is primarily comprised of coral reef habitat (see Figure 4-9)

Mitigation measures to minimize potential impacts to coastal habitat and biological resources would be similar to those presented under the Proposed Project.

5.2.4.4 Alternative 3 (Carolinas Site)

Potential impacts to coastal habitat and biological resources under Alternative 3 would be similar to those discussed under the Proposed Project. Mitigation measures to minimize potential impacts to coastal habitat and biological resources would be similar to those presented under the Proposed Project.

5.2.5 Threatened or Endangered Species

5.2.5.1 No Action Alternative

Under the No Action Alternative the construction and operation of a new MSWL would not occur. Potential adverse impacts to threatened or endangered species would not increase from existing conditions. Therefore, under the No Action Alternative significant impacts are not anticipated.

5.2.5.2 Preferred Alternative (Atgidon Site)

As previously noted, the Tinian Monarch is currently listed as threatened by the

CNMI government (DFW, 2006), but no longer by the Federal government (USFWS, 2004, 2006). The Proposed Project would require the clearing of approximately 20 acres of mostly secondary forest (dominated by *tangantangan*) which provide habitat to a number of bird species including the threatened Tinian Monarch.

Life history studies of the Tinian Monarch conducted in 1994 and 1995 (USFWS, 1996) show that monarchs forage and nest in native limestone forest, secondary forest, and tangantangan, forest. However, the preliminary data suggest that native limestone forest may be higher quality habitat for monarchs than either secondary and/or tangantangan forests. Tinian Monarch population densities are higher in native limestone forest than in secondary forest or tangantangan forest. Native tree species may be preferred by monarchs for nesting, and nesting success may be higher in native limestone forest than in secondary and tangantangan forests (AECOS, 2006).

As a result of the Proposed Project the clearing, grubbing and construction of the proposed facilities would result in the displacement of individual birds and possibly the loss of one or more nests, eggs and young. Additionally, the clearing of approximately 20 acres of moderately dense forest would reduce the available foraging, and nesting habitat for this species by approximately 20 acres. However, considering the availability of secondary and tangantangan forest in the immediate project vicinity, and the Tinian Monarch's preference for native limestone forest for nesting, suggest that no likely significant adverse impacts to the Tinian Monarch population would occur.

The clearing of vegetation on the Proposed Project site and the construction and operation of a sanitary landfill could also potentially displace individual Marianas fruit bats and reduce fruit bat foraging habitat. However, there is no current evidence that there is usage of this site by this species, and given their paucity on the Island, these potential risks appear to be extremely low (Ibid).

<u>Mitigation Measures</u>

Consultation with the USFWS was initiated pursuant to Section 7 of the Endangered Species Act of 1973 [16 U.S.C. 1531-1544; 87 Stat. 884], as amended, regarding potential adverse impacts of the Proposed Project on threatened or endangered species. The USFWS concurs with the implementing the Proposed Project at the Atgidon site would not affect listed ESA species. ESA consultation correspondence are attached as Appendix E.

In the event that a Tinian Monarch nest is encountered during construction activities the construction contractor will cease all construction activities in the immediate vicinity of the tree containing the nest. The appropriate authorities at the CNMI DFW and/or USFWS will be immediately notified of the find by the construction contractor. Subsequent consultation with the CNMI DFW will be undertaken to determine the best course of action with regard to resuming construction activities.

The Tinian Monarch breeds year round and does not have a specific breeding season. However, there are periods of low breeding activity. Construction activities will be scheduled during low breeding activity periods to reduce the probability of encounters with and disruption of Tinian Monarchs.

5.2.5.3 Alternative 2 (Masalok Site)

The Alternative 2 site is vegetated similar to the Proposed Project site at Atgidon, but gives way to a native dominated flora on the limestone cliffs behind the shore and boasts a series of coves and beaches that must be regarded as important public resources (AECOS, 2006).

Due to the lack of a specific site proposed for MSWL development, a detailed biological assessment for the Alternative 2 site was not conducted. However, due the site's proximity to coastal resources, including known green sea turtle nesting areas, significant adverse impacts to ESA listed species would likely result.

Construction of a MSWL would likely result in an increase in rat (*Rattus spp.*), feral cat (*Felis catus*), and dog (*Canis familiaris*) populations in the area. These animals are all potential predators of green sea turtle eggs, hatchlings, and/or adults. Additionally, the presence of native dominated limestone forest, potential adverse impacts to threatened and endangered terrestrial species utilizing these forests, such as the Tinian Monarch and Marianas fruit bat, would likely be greater than under the Proposed Project.

5.2.5.4 Alternative 3 (Carolinas Site)

Similar to Alternative 2, the Carolinas Ridge area is a mixture of highly disturbed and some less disturbed environments too large and varied to assess without narrowing down on a more specific site. The eastern side of the ridge is steep and likely harbors native flora and fauna. Like Alternative 2 the presence of native dominated flora suggests the potential for greater adverse impacts to threatened and endangered species which utilize such habitats.

5.3 Social Environment

5.3.1 Land Use

5.3.1.1 No Action Alternative

Under the No Action Alternative there would be no adverse impacts to existing surrounding land uses at each of the proposed alternative sites. No MSWL construction or operation would occur and surrounding land uses would not be disrupted in either the short or long-term.

However, it should be noted that the eventual conversion of the existing open dump site into a golf course is being considered by the municipality. Therefore, under the No Action Alternative the existing dump would remain on the site resulting in a potential adverse impacts in the form of conflicting planned and existing land use.

5.3.1.2 Preferred Alternative (Atgidon Site)

Existing land use at the Proposed Project site and the surrounding area are classified as grazing and unused secondary forest and grassland. Under this alternative land use at the Proposed Project site would change from undeveloped secondary forest/grassland to use for a MSWL. At the present time, there are no known current or future planned uses on the Proposed Project site or adjacent parcels that could potentially be adversely impacted by the siting of a MSWL. Therefore, no adverse impacts to land use are anticipated as a result of MSWL construction and operation.

Mitigation Measures

No mitigation measures are anticipated to be necessary to address potential land use-related impacts.

5.3.1.3 Alternative 2 (Masalok Site)

Existing land use at the Alternative 2 site and the surrounding area are classified as grazing and unused secondary forest and grassland. Like the Proposed Project, land use at the Alternative 2 site would also change from undeveloped secondary forest/grassland to use for a MSWL. At the present time, there are no known current or future planned uses on the Alternative 2 site that could potentially be adversely impacted by the siting of a MSWL. However, on the lands immediately east of Alternative site 2 coastal recreational land use (i.e., namely recreational beaches) does occur (see Figure 4-16). Therefore, siting of a MSWL in such close proximity to recreational land use activities could result in potential adverse impacts.

5.3.1.4 Alternative 3 (Carolinas Site)

Existing land use at the Alternative 3 site and are largely classified as grazing and unused secondary forest and grassland. Land use comprising the western and southern portions of the site are classified as multiple rural use and agricultural lands, respectively. Siting of a MSWL would likely not be considered on rural use or agricultural lands. Therefore, similar to the Proposed Project, land use at the Alternative 3 site would also likely change from undeveloped secondary forest/grassland to use for a MSWL.

Presently, lands that could be considered for siting of a MSWL within the Alternative 3 site are vacant and unused. However, some of the lands within the Alternative 3 area are slated for development into residential neighborhoods or resort and casino developments. As a result, siting of a MSWL could potentially result in adverse impacts in the form of conflicting existing and planned land use.

5.3.2 Public Health and Safety

5.3.2.1 No Action Alternative

Under the No Action Alternative no MSWL would be constructed and the existing open dump would continue to function as the island's only source for solid waste disposal. As previously mentioned, the continued operation of a non-regulatory compliant open dump, without any environmental engineering controls, poses numerous environmental and health hazards to the general public.

Municipal solid waste being deposited into the dump provides food and harborage for rodents, birds and flies, which are capable of transmitting disease to humans and animals. Other significant public health risks associated with the open dump are potential contamination of groundwater, and nearshore waters, and contamination of air quality from the open burning of wastes.

In addition, existing operations at the open dump pose numerous safety risks, namely the sites' proximity to the West Tinian Airport and injury associated with the lack of physical barriers and uncontrolled access. Having the dump located very near the airport runways presents a bird hazard for aircraft and its occupants. The concrete loading platform lacks a barricade to prevent individuals from falling or vehicles from rolling off. An uncontrolled open dump is also an attractive nuisance where individuals can sustain injury while scavenging.

In Summary, due the lack of environmental engineering controls (e.g. liners, leachate collections systems, etc.) at the open dump, its continued operation results in the risk of adverse impact to public health and safety, and these risks could potentially increase over time.

5.3.2.2 Preferred Alternative (Atgidon Site)

Solid Waste

As with other waste disposal facilities, under the Proposed Project there is always the possibility of associated risks to public safety and health. These potential risks are the same as many of the risks described under the No Action Alternative (e.g., disease, environmental contamination, safety hazards) but to a lesser degree. However, with regulatory-compliant landfill design, management, and operations these potential risks would be minimized if not eliminated all together.

Overall the construction of a regulatory-complaint MSWL would result in direct positive impacts on public health and safety. The proposed MSWL will be equipped with environmental engineering controls such as impermeable liners and leachate collection systems, and procedures to protect the public from exposure to the disposed wastes.

Additionally, the proposed MSWL would have a contingency plan which identifies all reasonably foreseeable emergencies or problems, such as vector control, fire, explosion, leachate leakage, spills and the like and describes appropriate remedial measures required to prevent damages to the landfill and the surroundings.

In summary, the Proposed Project is anticipated to result in overall direct positive impacts on solid waste management and overall public health and mitigation measures are not anticipated to be necessary.

Unexploded Ordnance

Although there are no verified accounts of UXO within the Proposed Project area, Tinian's wartime and military history provides the potential for UXO occurrence within the project area. Consequently, potential UXO-related impacts also exists.

Mitigation Measures

To mitigate potential UXO related impacts, the construction contractor would address possible UXO occurrence in their construction management plan. In the unlikely event that UXO is encountered during construction activities they will be treated in accordance with the UXO hazard prevention and response protocol identified in the construction management plan. Subsequently, appropriate authorities will be notified and the UXO transported from the site and destroyed following established protocols.

Homeland Security

Based on recent court guidance the potential of a terrorist attack to affect or be affected by a proposed project are required to be addressed during the environmental impact review process[a]. The degree to which a given project can be impacted by a terrorist attack varies depending on the nature of the project. Therefore, analysis of potential terrorist attack-related impacts in the environmental review process is addressed to the extent practicable.

Mitigation Measures

The potential of a terrorist attack to target a MSWL on Tinian Island is very remote. However, since the MSWL is an infrastructural improvement it could be considered a potential target for such an attack. In the unlikely case of a terrorist-related security incident, existing emergency management plans would be implemented and support would be provided by appropriate Federal and Territorial agencies.

5.3.2.3 Alternative 2 (Masalok Site)

Potential impacts on public health and safety under Alternative 2 would be similar to those discussed under the Proposed Project. Mitigation measures to minimize potential impacts on public health and safety would be similar to those presented under the Proposed Project.

5.3.2.4 Alternative 3 (Carolinas Site)

Potential impacts on public health and safety under Alternative 3 would be similar to those discussed under the Proposed Project. Mitigation measures to minimize potential impacts on public health and safety would be similar to those presented under the Proposed Project.

5.3.3 Historic and Cultural Resources

5.3.3.1 No Action Alternative

Under the No Action Alternative there would be no impact to existing historical or cultural resources in the project area. No MSWL construction or operational activities would occur and existing potential historic and/or cultural resources would not be disrupted in either the short-term or long-term. This alternative would result in no impact to historic and cultural resources.

a) Requirement is based on rulings from the 9th Circuit in June 2006 (Pacific Gas & Electric Co. v. San Luis Obispo Mothers For Peace , 449 F.3d 1016 , 62 ERC 1801 (9th Cir. 2006); 108 DEN A-6, 6/6/06)

5.3.3.2 Preferred Alternative (Atgidon Site)

A total of 18 historic resources (11 remains of structures and 7 artifacts) were recorded in the Proposed Project vicinity. All of the18 historic resources (11 remains of structures and 7 artifacts) have been previously recorded as part of the site TN-6-601, which consists primarily of the remains of the 444th Bomb Group Camp dating from the American occupation of the island during World War II. Most of these sites appear to be relatively insignificant and will not be a concern in developing this property into a solid waste disposal facility.

Of the 18 historic resources recorded during the current investigations, 12 are located in the immediate vicinity, but outside of, the Proposed Project area, 5 are located within the 100-foot buffer that surrounds the landfill site. Only one of the 18 identified historic resource (PL-08) is located within the land fill site. The 6 historic resources identified within the landfill site and/or 100-foot buffer zone are:

PL-05 – Corrugated metal culvert
PL-08 – Tracked vehicle
PL-09 – 55-gal drum filled with coral rocks
PL-11 – Cube shaped glass bottle
PL-16 – Portable sprayer
PL-17 – Japanese beer bottle

None of these resources appear to be significant and would not be a concern in developing this parcel.

The most important of the identified sites is Site PL-12 which consists of a semicircular concrete pad with several staircases and an adjacent cut limestone wall. The construction of Site PL-12 is atypical of the U.S. Military during WWII and may have originally been built by the Japanese.

The significance of Site PL-12 has been evaluated according to significance criteria promulgated by the National Register of Historic Places in 36 CFR 60.4. Site PL-12 is considered significant under significance Criterion C, in that it is an excellent or representative example of its site type (Pacific Legacy, 2006, Dixon et al. 2000).

Mitigation Measures

In accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, the USACE has completed consultation with the CNMI Department of Community and Cultural Affairs Division of Historic Preservation (DHP) regarding the Proposed Project. The DHP concurs with the determination that the Proposed Project will result in "no effect" to any significant historic properties eligible for listing on the National Register of Historic Places (NRHP). NHPA Section 106 Consultation findings are attached as Appendix G.

It is recommended that Site PL-12 be preserved and interpreted. The site is located outside of the buffer zone on the south side of the proposed landfill foot print. However, care shall be excercised during land clearing and construction activities, so that Site PL-12 can be protected for long term preservation and possible future interpretation. To ensure its protection temporary markings (flagging tape or construction fencing) would be placed around this component feature by the construction contractor during construction activities.

5.3.3.3 Alternative 2 (Masalok Site)

A detailed archaeological investigation of the Alternative 2 site was not undertaken. However, previous archeological investigations of Masalok in the general area of Alternative site 2 indicate that there is a high probability of potentially significant sites being present in these areas. If the Alternative 2 site is considered further and precise locations for the proposed landfill are decided upon, archaeological surveys of the site would need to take place in order to determine the potential for significant impacts to historic and archaeological resources.

5.3.3.4 Alternative 3 (Carolinas Site)

A detailed archaeological investigation of the Alternative 3 site was not undertaken. However, previous archeological investigations of Masalok in the general area of Alternative site 3 indicate that there is a high probability of potentially significant sites being present in these areas. If the Alternative 3 site is considered further and precise locations for the proposed landfill are decided upon, archaeological surveys of the site would need to take place in order to determine the potential for significant impacts to historic and archaeological resources.

5.3.4 Aesthetic and Recreational Resources

5.3.4.1 No Action Alternative

Under the No Action Alternative the construction and operation of a new MSWL would not occur. Potential adverse impacts to aesthetic and recreational resources would not increase from existing conditions. Therefore, under the No Action Alternative significant impacts will not occur.

5.3.4.2 Preferred Alternative (Atgidon Site)

Under the Proposed Project, the visual characteristics of the Proposed Project site and immediate vicinity would be altered as a result of MSWL construction. However, significant adverse impacts to visual resources are not anticipated as there are no exceptional scenic viewsheds of or from the proposed site.

As previously noted, lands within and surrounding the Proposed Project site are not heavily used for recreational purposes. Recreational resources in the Proposed Project vicinity are primarily ocean-related activities (e.g., diving, fishing, and recreational beaches) scattered along the coast and located between 0.5 to 2.0 miles from the site. Therefore, adverse impacts to recreational resources are not anticipated and mitigation measures would not be required.

5.3.4.3 Alternative 2 (Masalok Site)

The visual characteristics of the Alternative 2 site and immediate vicinity would be altered as a result of MSWL construction. However, because of its location adverse impacts to aesthetic resources, which include viewsheds of gently sloping limestone hillsides to the west and sweeping coastal views to the east, could potentially occur as a result of MSWL siting at this location. Similarly, the proximity of the Alternative 2 site to recreational beaches would likely result in adverse impacts to these resources (see Figure 4-16)

5.3.4.4 Alternative 3 (Carolinas Site)

The visual characteristics of the Alternative 3 site and immediate vicinity would be altered as a result of MSWL construction. However, the upland plateau areas in the general vicinity of Alternative site 3 offer some of the most scenic vistas of Tinian Island and San Jose and most of Tinian Island, as do most locations along the western side of the ridge. Additionally, due to its high elevation, a MSWL sited at Alternative 3 site would be clearly visible from San Jose. For these reasons, it is likely that adverse impacts to visual resources would occur under this alternative.

Among the recreational facilities known to exist within the Alternative site 3 area are a nature trail along the coast at the south end of the island and the road to the Peace Monument located on the east side of Carolinas Ridge. Therefore, under this alternative recreational resources could potentially be adversely impacted by the siting of a MSWL in this area.

5.3.5 Infrastructure and Utilities

5.3.5.1 No Action Alternative

Under the No Action Alternative the construction and operation of a new MSWL would not occur. Potential adverse impacts to infrastructure and utility systems would not increase from existing conditions. Therefore, under the No Action Alternative significant impacts are not anticipated.

5.3.5.2 Preferred Alternative (Atgidon Site)

Minimal impacts to utility services such as relocation or temporary disruption of electric, water, or communication services could be expected during construction activities. However, these types of impacts are normal and would be temporary in nature. Impacts to utility services resulting from MSWL operations would include the use of electricity, water, and communications. However, utility services to the proposed MSWL facility would not be excessive and the municipal utility systems should be able to provide the required services. Therefore, The Proposed Project is not anticipated to result in significant adverse impacts to Tinian's infrastructure and utilities.

The Proposed Project would result in direct positive impacts to utilities related to solid waste. As previously noted, the MSWL would be regulatory-compliant and equipped with state-of-the-art engineering controls to protect against environmental contamination. In addition, the new MSWL would have systems in place to both monitor and control the material buried in the landfill.

The MSWL would likely have an inspection station and weigh scales at the entrance to the landfill. The scales shall provide for accurate estimation of the material to be buried and/or separated. Monitoring stations would provide for inspection of material to be buried before it is unloaded, where possible operating procedures at the MSWL would allow for a method of recovering improperly discarded materials for removal from the landfill.

All of the previously mentioned features are not available at the existing uncontrolled open dump site and their inclusion would result in direct positive impacts to solid waste management on Tinian.

Finally, it should also be noted, that the proposed MSWL could, in the long-term, result in potential indirect positive impacts to energy resources of Tinian Island. Upon eventual closure of the MSWL, the methane generated by the decomposing waste could be beneficially used by collection and use for its energy value. In the peak year of gas production (2035), the energy value of the methane produced is equivalent to over 350,000 gallons of diesel fuel (Morrow, 2007). However, before this could occur, the proposed MSWL would first need to be assessed for the viability of energy recovery from the gas production.

5.3.5.3 Alternative 2 (Masalok Site)

Potential impacts and mitigation measures to utilities and infrastructure under Alternative 2 would be similar to those discussed under the Proposed Project.

5.3.5.4 Alternative 3 (Carolinas Site)

Potential impacts and mitigation measures to utilities and infrastructure under Alternative 3 would be similar to those discussed under the Proposed Project.

5.3.6 Traffic and Circulation

5.3.6.1 No Action Alternative

Under the No Action Alternative the construction and operation of a new MSWL would not occur. Therefore, traffic projections under this alternative would be equivalent to the 2035 future background traffic projections as described below and would not result in significant impacts.

5.3.6.2 Preferred Alternative (Atgidon Site)

The distribution and number of trips generated by the Proposed Project during the AM and PM peak-hour periods were based on the available approach and departure routes at the proposed project site. The total AM and PM peak hour traffic volumes the proposed project would generate is estimated to be 11 and 9 trips respectively.

Table 5-2 summarizes the overall projected trip generation rates resulting from the proposed project.

Table 5-2
Future Vehicular Trip Generation Rates
at the Proposed Project site

Period and Direction		Trip Generated By: Employees	Refuse Trucks	Septic Disposal	Total
AM Peak Hour	Total	5	4	2	11
	Inbound	5	2	1	8
	Outbound	0	2	1	3
PM Peak Hour	Total	5	4	0	9
	Inbound	0	2	0	2
	Outbound	5	2	0	7

Source: Rowell, 2007

Using the traffic generation data, a LOS analysis was performed taking into account the construction and operation of the Proposed Project. Table 5-3 summarizes the LOS in the Proposed Project area projected through the year 2035.

Table 5-3
Future Levels-of Service in Proposed Project Area (2035)

Intersection and Movement	AM Peak Hour				PM Peak Hour			
	Delay[1]	LOS	Delay	LOS	Delay	LOS	Delay	LOS
86th Street at Broadway								
Northbound Left and Thru	7.3	A	7.1	A	7.5	A	7.5	A
Eastbound Left and Right	9.1	A	9.1	A	9.9	A	9.9	A
8th Avenue at Broadway								
Northbound Left, Thru and Right	7.3	A	7.4	A	7.3	A	7.3	A
Southbound Left, Thru and Right	7.4	A	7.4	A	7.3	A	7.3	A
Westbound Left, Thru and Right	10.8	B	10.9	B	10.1	B	10.2	B
Eastbound Left, Thru and Right	10.8	B	11.0	B	10.6	B	10.8	B

Source: Rowell, 2007

Notes: (1) Delay in seconds per vehicle

In addition to the level-of-service analysis, change in traffic volumes along the adjacent roadway segments and the percentage of traffic growth between 2006 and 2035 as a result of the Proposed Project were analyzed to further assess potential impacts of project-generated traffic. Changes in total approach and departure traffic volumes through the year 2035 at the intersections of 86th Street at Broadway and 86th Street at 8th Avenue were analyzed and are presented in Table 5-4.

Table 5-4
Future Traffic Volume Changes [1]
(Proposed Project Area)

Intersection	Peak Period	Existing (2006)	2035 without Project	2035 with Project	percent Total Traffic (without Project)		percent Total Traffic (with Project)	
					Volume	Percent Increase	Volume	Percent Increase
86th Street at Broadway	AM	35	140	147	105	300 percent	7	4.8 percent
	PM	45	180	186	135	300 percent	6	3.2 percent

86th Street at 8th Ave.	AM	65	260	267	195	300 percent	7	2.6 percent
	PM	70	280	289	210	300 percent	9	3.1 percent

Notes: Source: Rowell, 2007
(1) Volumes shown are total intersection approach volumes

As shown in Table 5-4 above, future background growth (without the Proposed Project) represents 300 percent of the total 2035 traffic projections. Whereas, Proposed Project generated traffic would represent less than 5 percent of the total peak hour traffic at the study intersections.

The Proposed Project's share of traffic growth between the years 2006 and 2035 was also assessed. The peak hourly projections for existing conditions, 2035 conditions without, and 2035 conditions with the Proposed Project were compared, in terms of percentage of traffic growth. The Proposed Project's share of traffic growth between the years 2006 and 2035 at 86th and Broadway is estimated to be 6.3 percent and 4.3 percent during the A.M. and P.M. peak hours, respectively. The Proposed Project's share of traffic growth at 86th Street and 8th Avenue is estimated to be 3.5 percent and 4.1 percent during the A.M. and P.M. hours, respectively.

The overall traffic growth in the Proposed Project area through the year 2035 is summarized in Table 5-5 below.

Table 5-5
Future Traffic Growth(1)
(Proposed Project Area)

Intersection	Peak Period	Existing (2006)	2035 without Project	2035 with Project	Future Growth (without Project)(2)		Future Growth (with Project)(3)	
					Volume	Percent Increase	Volume(4)	Percent Increase
86th Street at Broadway	AM	35	140	147	105	300 percent	7	6.3 percent
	PM	45	180	186	135	300 percent	6	4.3 percent
86th Street at 8th Ave.	AM	65	260	267	195	300 percent	7	3.5 percent
	PM	70	280	289	210	300 percent	9	4.1 percent

Notes: Source: Rowell, 2007
(1) Volumes shown are total intersection approach volumes, 2006 through 2035
(2) Compared to existing (2006) conditions
(3) Compared to Future Change without Proposed Project
(4) Project generated traffic

Based on the results of the TIAR, the Proposed Project would generate 8 inbound and 3 outbound trips during the morning peak hour, the project will generate 2 inbound and 7 outbound trips during the and afternoon peak hour.

Based on estimated 2035 traffic volumes, Proposed Project generated traffic would represent between 2.6 percent and 4.8 percent of the total peak hour traffic at the study intersections. Background growth would represent 300 percent of the total 2035 traffic projections. Overall the Proposed Project generated traffic would represent 6.3 percent or less of the total growth in traffic at the study intersections between 2006 and 2035.

The level-of-service analysis concluded that all movements at the study intersections would operate at Level-of-Service B, or better. Level-of-Service D is typically considered the minimum acceptable level-of-service for peak hour conditions. Accordingly, no mitigation measures are required.

5.3.6.3 Alternative 2 (Masalok Site)

The Alternative 2 site and its immediate vicinity is undeveloped and traffic and circulation in this area is minimal. An unpaved 4-wheel-drive road traverses the entire site in a north-south direction, and this roadway is transected by another 4-wheel-drive roadway in the northern portion of the proposed site which runs in a east-west direction (see Figure 3-9). Traffic volumes in the vicinity of the Alternative 2 site are even lower than those of the Proposed Project. Consequently, significant adverse impacts to traffic and circulation resources would not be anticipated.

5.3.6.4 Alternative 3 (Carolinas Site)

The Alternative 3 site and its immediate vicinity is undeveloped and traffic and circulation in this area is minimal. However, the Alternative 3 site is situated much closer to the population center of San Jose village than either the Proposed Project or Alternative 2. The more heavily traveled roadways of San Jose are located approximately 0.5 miles northwest of the Alternative 3 site. Though not anticipated, and highly unlikely, due to the proximity to San Jose adverse impacts to traffic and circulation patterns in the vicinity of Alternative 3 site could potentially result from MSWL siting at this location.

5.3.7 Socioeconomic Considerations

5.3.7.1 No Action Alternative

Under the No Action Alternative the construction and operation of a new MSWL would not occur. Potential impacts to socioeconomic conditions on Tinian would not change from existing conditions. Therefore, under the No Action Alternative adverse impacts would not occur.

5.3.7.2 Preferred Alternative (Atgidon Site)

In the short-term socio-economic impacts would result during construction of the Proposed Project in the form of creation of jobs, local purchases of goods and services, and procurement expenditures associated with supplying and maintaining the new MSWL facility. The largest direct expenditures, estimated to be $2,258,000 over the 12 to 18-month construction period, would come from locally procured supplies, equipment, materials, and services.

Money in the form of construction payroll would enter the regional economy thereby increasing the disposable incomes of workers, households, and businesses directly or indirectly affected by the Proposed Project. Additional jobs would also be created as a result of construction-related expenditures and payrolls filtering through the economy.

Construction of the Proposed Project would therefore have a direct positive impact on the socio-economic environment by generating new construction-related jobs which would also stimulate a corresponding decrease in unemployment rates over the short-term.

In the long-term, socio-economic impacts would result in the form of employment of MSWL staff and facility operations. However, the proposed MSWL operation would be relatively small compared to most new and existing facilities meeting RCRA Subtitle D regulations.

It is estimated that initially only 17 tons of waste would be generated on a daily basis; this volume would not justify having the landfill open on a daily basis. The operational requirements of Subtitle D require waste be compacted and covered daily. However, covering the emplaced solid waste on a daily basis would result in the landfill being filled with more cover material than waste. Therefore, initially the landfill would only be open 3 to 4 days a week or 2 to 3 weekdays and 1 weekend day. Actual scheduling would be accomplished by coordinating with trash haulers and the transfer station to limit deliveries to specific days (WCP, 2005).

As previously noted in Section 3.3, excavated soil from MSWL construction would be stockpiled and utilized as daily cover material for landfill operations. Due to the hours of operation of the MSWL, and based on the small volume of generated waste relative to the anticipated construction excavation volume (approx. 137,000 cubic yards per cell), reliance upon on-island quarries for cover material is not anticipated.

Assuming a full-time operational work week consisting of four 10-hour days, the proposed MSWL would require a staff of four employees constituting combined salaries and benefits of approximately $119,000 annually. In addition, to employee salaries and benefits the operational costs of the proposed MSWL are estimated at approximately $36,000 annually (Ibid.).

In Summary, over the long-term the Proposed Project is not anticipated to result in adverse significant impacts on employment, income, or demographics of Tinian. And would instead result in, albeit minimal, positive socioeconomic impacts in the form of facility staffing and operations.

5.3.7.3 Alternative 2 (Masalok Site)

Under Alternative 2 potential short and long-term socioeconomic impacts would be similar to those presented under the Proposed Project, and significant socioeconomic impacts are not anticipated.

5.3.7.4 Alternative 3 (Carolinas Site)

Under Alternative 3 potential short and long-term socioeconomic impacts would be similar to those presented under the Proposed Project, and significant socioeconomic impacts are not anticipated.

5.4 Comparison of Alternatives and Potential Impacts

This section presents a summary table of the environmental consequences associated with environmental resources for each of the reasonable alternatives assessed in this EA. Comparison of impacts is presented in Table 5-6 below.

Table 5-6
Comparison of Alternatives and Potential Impacts

Environmental Resource	No Action Alternative	Proposed Project	Alternative 2 (Masalok)	Alternative 3 (Carolinas)
Geology and Soils	AI/LSI	NSI	NSI	AI/LSI
Natural Disasters	NSI	NSI	AI/LSI	NSI
Groundwater	AI/LSI	NSI	NSI	NSI
Surface Waters and Wetlands	NSI	NSI	NSI	NSI
Coastal Waters	AI/NSI	NSI	NSI	NSI
Noise Quality	NSI	NSI	NSI	NSI
Air Quality	AI/NSI	NSI	NSI	NSI
Terrestrial Flora	NSI	AI/NSI	AI/NSI	AI/NSI
Terrestrial Fauna	NSI	AI/NSI	AI/NSI	AI/NSI

Environmental Resource	No Action Alternative	Proposed Project	Alternative 2 (Masalok)	Alternative 3 (Carolinas)
Coastal Habitat and Biological Resources	AI/NSI	NSI	AI/NSI	NSI
Threatened and Endangered Species	NSI	AI/NSI	AI/LSI	AI/NSI
Land Use	AI/NSI	PI/NSI	AI/NSI	AI/NSI
Public Health and Safety	AI/NSI	PI/NSI	BI/NSI	BI/NSI
Historic and Cultural Resources	NSI	NSI	NSI	NSI
Aesthetic/Recreational Resources	NSI	NSI	AI/NSI	AI/NSI
Infrastructure and Utilities	NSI	PI/NSI	PI/NSI	PI/NSI
Traffic and Circulation	NSI	NSI	NSI	NSI
Socioeconomics	NSI	PI/NSI	PI/NSI	PI/NSI
Environmental Justice	NSI	NSI	NSI	NSI

(AI) = Adverse Impact
(PI) = Positive Impact
(NSI) = No (less than) Significant Impact
(LSI) = Likely Significant Impact

5.5 Cumulative Effects

5.5.1 Introduction

The Council on Environmental Quality's (CEQ) regulations for implementing the NEPA define cumulative effects as:

> "...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." (40 CFR part 1508.7)

Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time. Effects can include both direct effects, which are caused by an action and occur at the same time and place as the action, and indirect effects which are caused by an action and occur later in time and are farther removed in distance, but can still be considered to be reasonably foreseeable. The cumulative impacts of implementing the Proposed Project along with past and reasonably foreseeable future projects proposed were assessed based upon available information.

The cumulative effects analysis in this EA was organized by issue and resource categories. Where possible and/or practical, a quantitative analysis has been used as a basis for determining cumulative effects to the resources addressed in this EA. Where this was not been possible, the cumulative effects have been presented in qualitative terms. Cumulative effects have also been evaluated considering specific geographic boundaries and time frames, as well as considering magnitude and significance.

The resources addressed in the EA, encompass a range of geographic areas where potential cumulative effects could occur. Depending upon the resource geographical areas assessed ranged from the proposed project site and its immediate vicinity to the entire island of Tinian.

To the extent possible, the time frame for the cumulative effects assessment for this EA was based on the 30-year planning period between the years 2005 to 2035. This time period extends beyond the practical limits of predictability for some topics, such as air quality and acoustical issues, but is used for consistency with the planning time frame set forth in the Tinian Landfill Comprehensive Study (WCP, 2005).

5.5.2 Present and Reasonably Foreseeable Future Actions

Identified present and reasonable foreseeable future projects that could have a potential cumulative effect when considered together with the Proposed Project are listed in Table 5-7 below.

Table 5-7
Summary of Present and Reasonably Foreseeable Future Projects on Tinian[1]

Project Name	Project Type	Location	Status
Tinian Waste Water Treatment Facility	Public Utility	San Jose/Atgidon	Planning
Makpo Heights I &II Subdivisions	Housing	San Jose	In Progress
Carolina Heights Subdivision	Housing	Carolinas	In Progress
Bridge Hotel and Casino	Hotel/Casino/Golf	Carolinas	In Progress
Matua Bay Golf Course & Resort	Hotel/Casino/Golf	West Tinian (open dump site)	Planning
Additional Resort/Casino Developments (4)	Hotel/Casino/Golf	Unknown	Exploratory or Planning
Additional Golf Courses (2)	Hotel/Casino/Golf	Unknown	Exploratory

Project Name	Project Type	Location	Status
Modular Passive Nuclear Energy Project	Public Utility	Unknown	Exploratory
Port Facility Improvements	Transportation	Tinian Harbor & West Tinian Airport	In Progress

1) Based on best available/current information

5.5.3 Potential Cumulative Effects

5.5.3.1 Geology and Soils

There are no past, present, or future planned actions that, when taken into consideration with the Proposed Project, would contribute to cumulative impacts to geology and soil resources.

5.5.3.2 Natural Disasters

There are no past, present, or future planned actions that, when taken into consideration with the Proposed Project, would contribute to cumulative impacts related to natural disasters.

5.5.3.3 Water Resources

Another planned action with direct impacts to water resources is a proposed Waste Water Treatment Facility (WWTF). The Commonwealth Utilities Corporation (CUC) proposing the construction of a WWTF in Atgidon which is proposed to be co-located on a parcel directly adjacent to the Proposed Project site. When taken into consideration with the proposed WWTF, the Proposed Project would likely result in positive cumulative impacts to groundwater resources. Cumulative effects of the proposed MSWL and the WWTF would eventually eliminate the adverse impacts of groundwater contamination from residential cesspools and the existing open dump operations.

5.5.3.4 Noise Quality

There is always the potential for future development to contribute to increased vehicular and air traffic which could in turn contribute to increases in noise quality. However, there are no past, present, or future planned actions that, when taken into consideration with the Proposed Project, would contribute to cumulative impacts to noise quality.

5.5.3.5 Air Quality

There is always the potential for future development to contribute to increased vehicular and air traffic which could in turn contribute to increases in air quality. However, there are no past, present, or future planned actions that, when taken into consideration with the Proposed Project, would significantly contribute to cumulative impacts to air quality.

5.5.3.6 Biological Resources

There are no past, present, or future planned actions that, when taken into consideration with the Proposed Project, would significantly contribute to cumulative impacts to biological resources.

5.5.3.7 Land Use

The Proposed Project has the potential to result in cumulative effects on land use. A modern MSWL (especially taken into consideration with the proposed WWTF) would result in induced secondary growth within San Jose and/or areas outside of San Jose. The upgrade of existing solid waste and wastewater infrastructure could make development of lands on Tinian more attractive. However, development of undeveloped lands on Tinian would likely continue regardless of whether MSWL construction occurs or not. Therefore, in light of past, present and reasonably foreseeable future actions, the Proposed Project would not result in significant adverse cumulative effects on land use.

5.5.3.8 Public Health and Safety

When taken into consideration with the proposed WWTF, the Proposed Project would likely result in positive cumulative impacts to public health and safety. The co-located waste disposal/treatment facilities would both be equipped with environmental engineering controls which would protect the public from the adverse effects of exposure to untreated liquid and solid wastes.

5.5.3.9 Aesthetic and Recreational Resources

There are no past, present, or future planned actions that, when taken into consideration with the Proposed Project, would contribute to cumulative impacts to aesthetic and recreational resources.

5.5.3.10 Historic and Cultural Resources

There are no past, present, or future planned actions that, when taken into consideration with the Proposed Project, would contribute to cumulative impacts to historic and cultural resources.

5.5.3.11 Infrastructure and Utilities

The Proposed project taken into consideration with other reasonably foreseeable future projects on Tinian would result in a cumulative increase of utilities (e.g., power, water, and communications). However, utility services to the proposed MSWL facility would not be excessive, and the municipal utility systems should be able to provide the required services to the proposed MSWL and other future projects. Therefore, The Proposed Project is not anticipated to result in significant adverse cumulative impacts to Tinian's infrastructure and utilities.

This proposed WWTF taken into consideration with the Proposed Project would likely result in positive cumulative impacts for utilities and infrastructure by substantially improving both the regulatory and environmentally deficient solid waste and wastewater infrastructure systems currently available on Tinian. In addition, co-locating the WWTF adjacent to the proposed MSWL would also result in positive cumulative impacts on utilities and infrastructure, as the WWTF could function to treat leachate from the MSWL, eliminating the need for a separate wastewater treatment system for MSWL operations.

Improvement of the Tinian's solid waste and wastewater infrastructure would also result in positive cumulative impacts by providing a system more readily able to accommodate waste streams from proposed new developments such as residential subdivisions and resorts.

An example of positive cumulative impacts resulting from improved solid waste infrastructure can be seen when looking at the future Makpo Heights (284 lots) and Carolina Heights (140 lots) subdivision projects and the Matua Bay Resort (2000 guest capacity) project. Based on the capacities of these projects and established solid waste generation rates for Tinian, these three projects combined would produce an estimated 2,461 tons of solid waste annually. Which is a volume the proposed MSWL could readily accommodate.

In summary, when taking into consideration past, present, and reasonably foreseeable future actions, the Proposed Project would not result in significant adverse cumulative impacts on infrastructure and utilities.

5.5.3.12 Traffic and Circulation

Vehicular movements during operations of the Proposed Project could incrementally add to the future increased regional vehicular traffic movements (i.e., solid waste transport from new developments to the MSWL). These incremental effects would likely be more noticeable along major roadways and at major intersections (i.e., 86th Street and Broadway) and in the San Jose population center. However, it is anticipated roadway improvement projects would eventually be implemented in future years, and would help reduce the cumulative effects associated with the Proposed Project facilities and overall projected growth trends.

Many of the projects (e.g., subdivisions, resorts, casinos) in Table 5-6 would directly result in additional vehicular traffic onto Tinian's roadways. In addition, these projects would result in the generation solid wastes which in turn would result in increased waste disposal vehicles (both private and municipal trucks) traveling to and from the proposed MSWL.

Potential traffic congestion, and/or safety impacts could occur as a result of the increased traffic volumes. However, it is anticipated that as part of the other proposed development projects, traffic studies and necessary improvements (i.e., proper designed and upgraded roadways) would be undertaken to adequately plan for project-related increases in traffic volumes.

In light of historic, ongoing and reasonably foreseeable future actions, the Proposed Project would not have a significant adverse cumulative effect on traffic and circulation.

5.5.3.13 Socioeconomic Considerations

There are no past, present, or future planned actions that, when taken into consideration with the Proposed Project, would contribute to cumulative socioeconomic-related impacts.

5.5.4 Summary of Potential Cumulative Effects

This section summarizes the potential cumulative effects associated with the construction and operation of the Proposed Project, taking into consideration reasonably foreseeable future activities that may occur on Tinian. As discussed, the Proposed Project, when considered in the context of past, present, and future activities, can be expected to contribute, in a small yet incremental way, to the overall cumulative effects on specific resources.

In summary, the construction and operation of the Proposed Project would affect in a cumulative fashion, some in a positive way and some in a negative way, the resources addressed in this EA. Overall, the potential cumulative effects associated with the Proposed Project are not expected to be significant.

6.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Approximately 20 acres of secondary forest and wildlife habitat would be permanently lost as a result of construction of the Proposed Project. Additionally, during the construction phase, resources such as fossil fuels and construction materials such as concrete, steel, asphalt, wood, and rock would be irrevocably committed. In addition to the fuels and construction materials involved, approximately $5.6 million would be committed to the Proposed Project. Labor would be required for construction, planning, engineering design, landscaping, purchasing, and services. Once used, the labor is irretrievable. However, labor effort is also monetarily compensated, thereby supporting the municipality's economy.

7.0 REGULATORY CONSIDERATIONS

As part of the EA process, alternatives considered were evaluated for consistency with regulations governing the management and disposal of solid waste. This section summarizes and discusses applicable regulations pertaining to solid waste management and the Proposed Project.

7.1 Commonwealth of the Northern Mariana Islands

7.1.1 Division of Environmental Quality

The Office of the Governor, Division of Environmental Quality (DEQ) is the lead regulatory agency for solid waste management within the Commonwealth of the Northern Mariana Islands. Solid Waste Management Regulations (SWMR) have been promulgated pursuant to the Commonwealth Solid Waste Management Act of 1989 (2 CMC §§ 3511 to 3521), the Commonwealth Environmental Protection Act of 1982 (2 CMC §§ 3101 to 3134), and the Commonwealth Environmental Amendments Act of 1999 (Public Law 11-103).

The purpose of the regulations is to establish the requirements and criteria for new and existing solid waste management activities and solid waste management facilities (SWMFs) including MSWLs and other landfilling operations, incineration, solid waste collection and transfer, materials processing, recycling, composting, and salvage.

Solid waste management regulations require a municipal solid waste landfill to be permitted by DEQ prior to operation. And the regulations further require a MSWL to comply with Part 258 (Criteria for Municipal Solid Waste Landfills) of Title 40 of the Code of Federal Regulations (40 CFR) which the CNMI SWMR have adopted and incorporated by reference.

7.1.2 Coastal Resources Management

Public Law 3-47 established the Coastal Resources Management (CRM) Office within the Office of the Governor on February 11, 1983. The CRM program promotes the conservation and wise development of coastal resources. One of the office's functions is to coordinate the major siting permit process thereby ensuring permit decisions are consistent with coastal resources management policies and regulations.

Additionally, an environmental assessment is required for all CRM major sitings. Six CNMI agencies partner with CRM to review each major siting permit application and attendant environment assessment. The agencies are Commonwealth Utilities Corporation, Department of Commerce, Department of

Land and Natural Resources, Department of Public Works, Historic Preservation Office, and DEQ.

Section 1500 of the CRM rules and regulations (Title 15, Chapter 10) defines consistency requirements when federal activities and development projects directly affect the coastal zone or when federally licensed or permitted activities and the provisions for federal financial assistance for activities affect land or water uses of the coastal zone. These activities and projects must be conducted or supported in a manner which is, to the maximum extent practicable, consistent with the CRM program. Furthermore, any federal agency proposing to undertake any development project in the coastal zone shall insure that the project is, to the maximum extent practicable, consistent with the CRM program. A federal development project includes any federal activity involving the planning, construction, modification, or removal of public works, facilities, or other structures, and the acquisition, utilization or disposal of land or water resources. Federal activities include those federal agency actions, which are either development projects or licenses, permits, or assistance actions. Examples include federal agency activities requiring a federal permit and federal assistance to entities other than the local government. Although federal lands in the CNMI are excluded from the CRM program jurisdiction, federal activities occurring on federal lands which result in spillover impacts which directly affect the Commonwealth's coastal zone must be consistent, to the maximum extent practicable, with the CRM program.

7.1.3 Division of Fish and Wildlife

The Division of Fish & Wildlife (DFW) is one of several agencies under the CNMI Department of Land and Natural Resources. Through research, monitoring, regulation, enforcement, planning, and management, DFW seeks to ensure the long-term survival and sustainability of CNMI's natural resources. Development proposals (e.g., major siting permit applications and attendant environmental impact assessments) submitted to CRM and/or DEQ are reviewed by DFW to ensure that negative impacts to endangered or threatened species are minimized, mitigated, or avoided. Additionally, DFW would be involved with consultation with the U.S. Fish and Wildlife Service pursuant to the federal Endangered Species Act as warranted.

7.1.4 Historic Preservation

The Historic Preservation Office (HPO) was established by the CNMI Historic Preservation Act of 1982 (Public Law 3-39) to ensure the identification and protection of significant archaeological, historic, and cultural resources in the Commonwealth; to educate the public concerning matters relating to local history, archaeology, culture, and historic preservation; and to develop historic and cultural properties.

Under Public Law 3-39, HPO is mandated to perform a review of proposed developments pursuant to Section 106 of the federal Historic Preservation Act of 1966. A Section 106 review must be performed for projects that involve a direct, indirect, or an adverse impact on a property that is on or is eligible for inclusion in the National Register of Historic Places. The responsibility of initiating and completing the Section 106 review lies with the proponent of a Proposed Project. Also stated above, HPO assists CRM with the evaluation of major siting permit applications and environmental assessments oftentimes during which Section 106 review is initiated. HPO's input would ensure that significant prehistoric, historic, and cultural resources at or in proximity of a proposed MSWL are either protected from damage or there is sufficient site data compiled prior to alteration or destruction.

7.2 U.S. Federal Government

7.2.1 Environmental Protection Agency

Subtitle D of the Resource Conservation and Recovery Act of 1976 (RCRA) uses a combination of design and performance standards for regulating municipal solid waste landfills and solid waste management facilities in general. It also establishes facility design and operating standards, groundwater monitoring corrective action measures, and conditions (including financial requirements) for landfill closure and post-closure care as enforced by the U.S. Environmental Protection Agency.

RCRA creates a framework for federal, state, and local government cooperation in controlling the disposal of municipal solid waste. While the federal landfill rule establishes national minimum standards for protecting human health and the environment, implementation of solid waste programs remains largely the responsibility of local, state, or tribal governments.

7.2.2 Fish and Wildlife Service

Section 7 of the Endangered Species Act outlines the procedures for interagency cooperation to conserve federally listed species and designated critical habitats. Applicable regulations codified in 50 CFR Part 402 (Joint Regulations on Endangered Species) establishes the procedural requirements to initiate the consultation process. The U.S. Fish and Wildlife Service has a policy with state and local agencies for gathering information during implementation of the consultation process. By law, section 7 consultation is a cooperative effort involving affected parties analyzing effects posed by a Proposed Project on listed species or critical habitats.

Consequently, the SWMF proponent must complete a biological assessment prior to construction to determine if a proposed project may affect any listed species or designated critical habitat at or in the vicinity of the site. A determined effect to a listed species or critical habitat will require Fish and Wildlife Service consultation.

7.2.3 Department of Commerce, Office of Coastal Resources Management

CNMI Coastal Resources Management Rules and Regulations are consistent with the federal Coastal Zone Management Act and applicable rules and regulations.

7.2.4 Advisory Council for Historic Preservation

HPO is mandated to comply with all federal laws and regulations governing the protection and preservation of historic and cultural resources pursuant to 36 CFR Part 800.

7.3 Environmental Permits and Approvals

Environmental permits and approvals that may be required for implementation of the Proposed Project are listed in Table 7-1 below.

Table 7-1
Summary of Environmental Permits and Approvals

PERMIT/APPROVAL	ADMINISTERING AGENCY
CWA Section 402 NPDES Permit(s)	US EPA
CZM Federal Consistency Determination	CNMI CRM
ESA Section 7 Consultation	USFWS, NMFS
NHPA Section 106 Consultation	CNMI HPO
Solid Waste Management Permit	CNMI DEQ
Major Siting Permit	CNMI CRM
Earth Moving and Erosion Control Permit	CNMI DEQ
Leachate Collection, Storage, and Treatment Permit	CNMI DEQ
Well Drilling Permit	CNMI DEQ
Wastewater Treatment Permit	CNMI DEQ
Fuel Storage Permit	CNMI DEQ
Air Emissions Permit	CNMI DEQ

7.4 Other Applicable Federal Regulatory Requirements

In addition to the above discussed regulations a number of other Federal statutes, rules and regulations, executive orders, and guidance documents were considered during the EA process. A summary listing of these regulations is provided below.

7.4.1 Statutes

Clean Air Act of 1990, Pub. L. No. 101-549, 104 Stat. 2399 (1990) (codified as amended at 42 U.S.C. §§ 7401-7671q (2000)).

Clean Water Act of 1992, Pub. L. No. 107-303 (codified as amended at 33 U.S.C. §§ 1251 et seq. (2002)).

Coastal Zone Management Act of 1972, (16 U.S.C. 1451 et seq.) as amended through Pub. L. No. 104-150, The Coastal Protection Zone Act of 1996

Comprehensive Environmental Response, Compensation, and Liability Act, (42 U.S.C. §§ 9601 et seq.).

Endangered Species Act of 1973, Pub. L. No. 93-205, 87 Stat. 884 (1973) (codified as amended at 16 U.S.C. §§ 1531-1544 (2000)).

Fish and Wildlife Coordination Act, Pub. L. No. 85-624, 48 Stat. 401 (1934) (codified as amended at 16 U.S.C. § 667-b-d (2000)).

Migratory Bird Treaty Act of 1918, Chap. 128, 40 Stat. 755 (1918) (codified as amended at 16 U.S.C. §§ 703-712 (2000)).

Marine Mammal Protection Act of 1972, Pub. L. No. 92-522, 86 Stat. 1027 (1972), (codified as amended at 16 U.S.C. §§ 1361-1407 (2002)).

Marine Protection, Research, and Sanctuaries Act of 1972, Pub. L. No. 92-532, 86 Stat. 1052 (1972), (codified as amended at 16 U.S.C. §§ 1431 et seq., 1447 et seq., 33 U.S.C. §§ 1401 et seq., 2801 et seq. (2000)).

National Environmental Policy Act of 1969, Pub. L. No. 91-190, 83 Stat. 852 (1970) (codified as amended at 42 U.S.C. §§ 4321-4374 (2000)).

National Historic Preservation Act of 1966, Pub. L. No. 89-665, 80 Stat. 915 (1966) (codified as amended at 16 U.S.C. §§ 470 et seq. (2000)).

Occupational Safety and Health Act of 1970, Pub. L. No. 91-596, 84 Stat. 1590 (1970) (codified as amended at 29 U.S.C. § 1A651 [2000]).

Pollution Prevention Act (42 U.S.C. §§ 13101-13102).

Resource Conservation and Recovery Act (RCRA) of 1976, Pub. L. No. 94-580,

90 Stat. 2795 (1976) (codified as amended at 42 U.S.C. §§ 6901-6992 (2000)).

Toxic Substances Control Act of 1976, Pub. L. No. 94-469, 90 Stat. 2003 (1976), (codified as amended at 15 U.S.C. §§ 2601-2671 (2000)).

7.4.2 Executive Orders

Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations, EO No. 12898, 59 Fed. Reg. 7629 (1994), 3 C.F.R. p. 859 (1994).

Floodplain Management, EO 11988, 42 Fed. Reg. 26951 (1977). Protection of Wetlands, EO 11990, 42 Fed. Reg. 26961 (1977).

Protection of Wetlands. EO 11990. 42 Fed. Reg. 26961 (1977).

Responsibilities of Federal Agencies to Protect Migratory Birds, EO No. 13186, 66 Fed. Reg. 3853 (2001), 3 C.F.R. p. 719 (2001).

7.4.3 Rules and Regulations

CEQ, NEPA Regulations, 40 C.F.R. Parts 1500-1508 (1992).

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8.0 PUBLIC INVOLVEMENT

Proactive public and agency involvement are vital to the success of a project that could potentially impact the human environment. Public Involvement ensures that community concerns and technical issues are identified and addressed in the environmental analyses of project-related actions. Information obtained through public and agency meetings ensure the analysis addresses community needs and preferences and satisfies local and federal environmental requirements. Upon publication, the general public will have an opportunity to review and comment on the final iteration of this EA.

It should be noted, that a public meeting is not required for an environmental assessment document effort under NEPA. However, for the Proposed Project the OIA/USACE and DPW made an extra effort to initiate public and governmental agency participation in the environmental assessment process by holding a public project information meeting on the findings of the draft EA. The project information meeting was held at the Tinian Mayor's Office conference room on April 12, 2007, and meeting materials (i.e., public meeting summary notes, meeting attendees, informational handouts, presentation materials, etc.) can be found in Appendix I.

9.0 LIST OF PREPARERS AND REVIEWERS

LIST OF PREPARERS

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11.0 APPENDICES

Appendix A – Figures

Appendix B – Acoustical Study

Appendix C – Air Quality Impact Report

Appendix D – Natural Resources Survey

Appendix E – Endangered Species Act – Section 7 Consultation

Appendix F – Archaeological Investigation Report

Appendix G – National Historic Preservation Act Section 106 Consultation

Appendix H – Traffic Impact Assessment Report

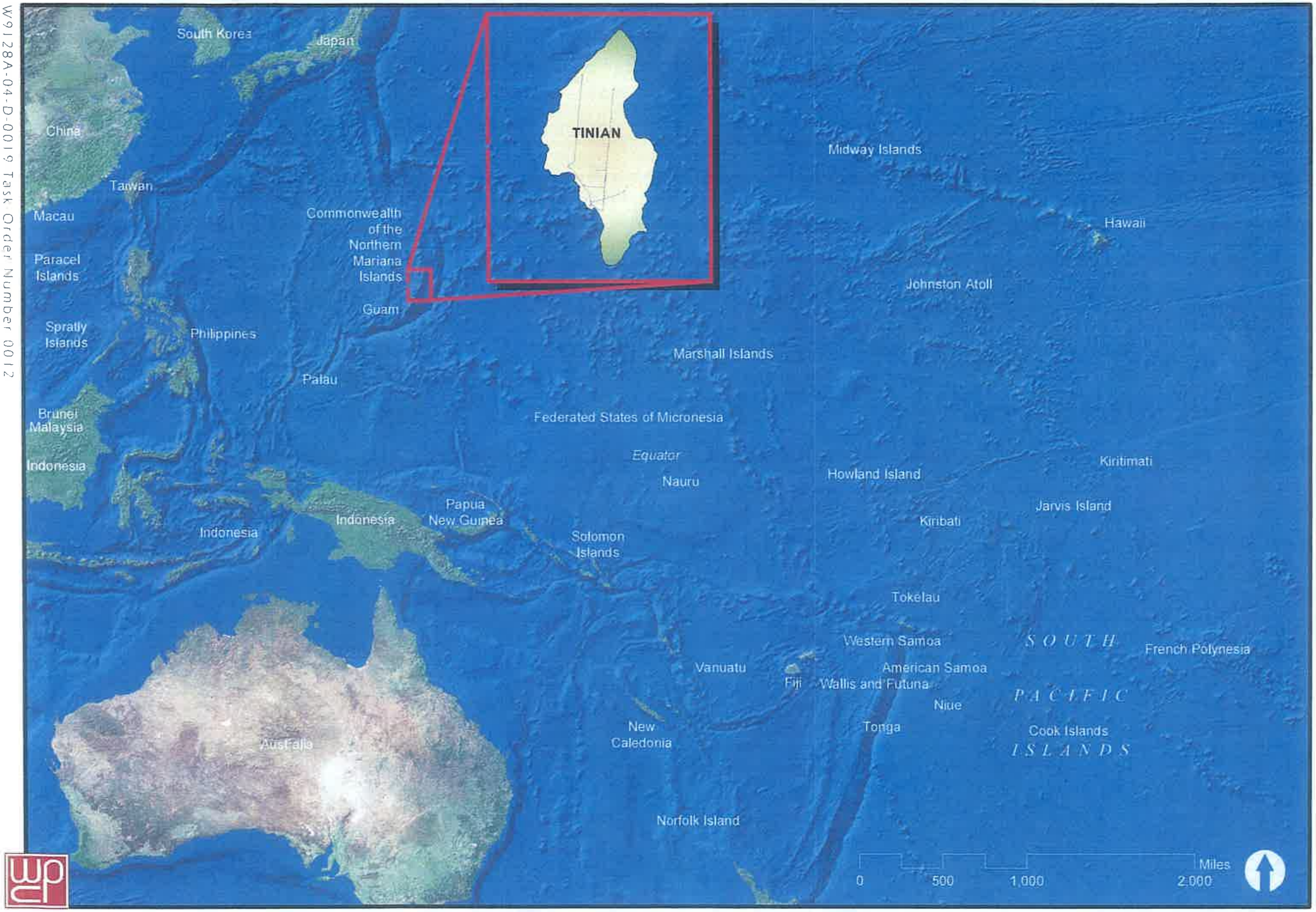
Appendix I – Draft EA Public Informational Meeting Minutes and Materials

Appendix J – Draft Environmental Assessment Distribution List and Comment Letters

Appendix K – Final Environmental Assessment Comments and Responses

APPENDIX A

Figures

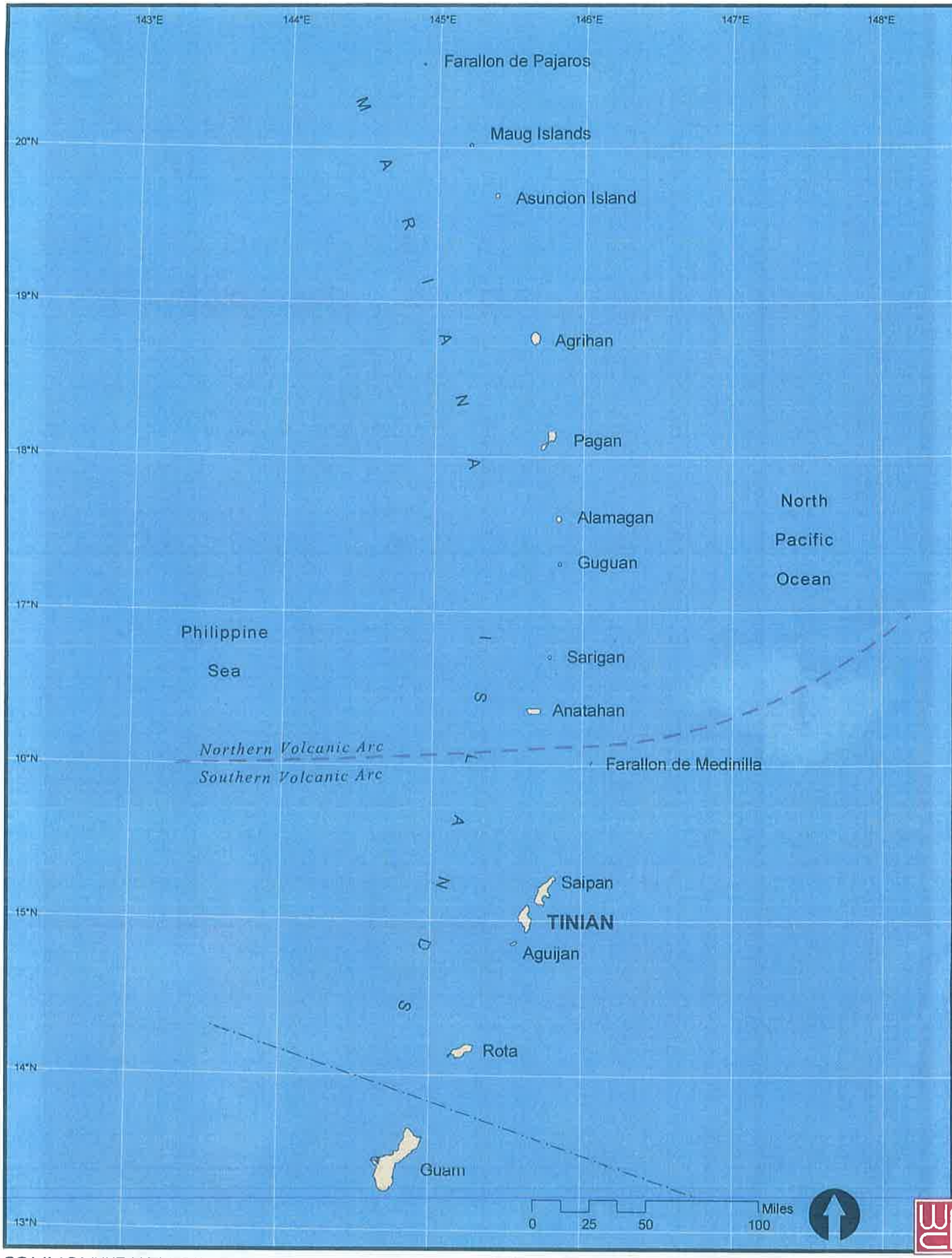


LOCATION MAP

FIGURE 1-1

Environmental Assessment for Landfill at Tinian

Tinian, Commonwealth of the Northern Mariana Islands



COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS

FIGURE 1-2

Environmental Assessment for Landfill at Tinian

Tinian, Commonwealth of the Northern Mariana Islands

W9128A-04-D-0019, Task Order 0012

W9128A-04-D-0019, Task Order 0012

TINIAN ISLAND

FIGURE 1-3

EXISTING DUMP

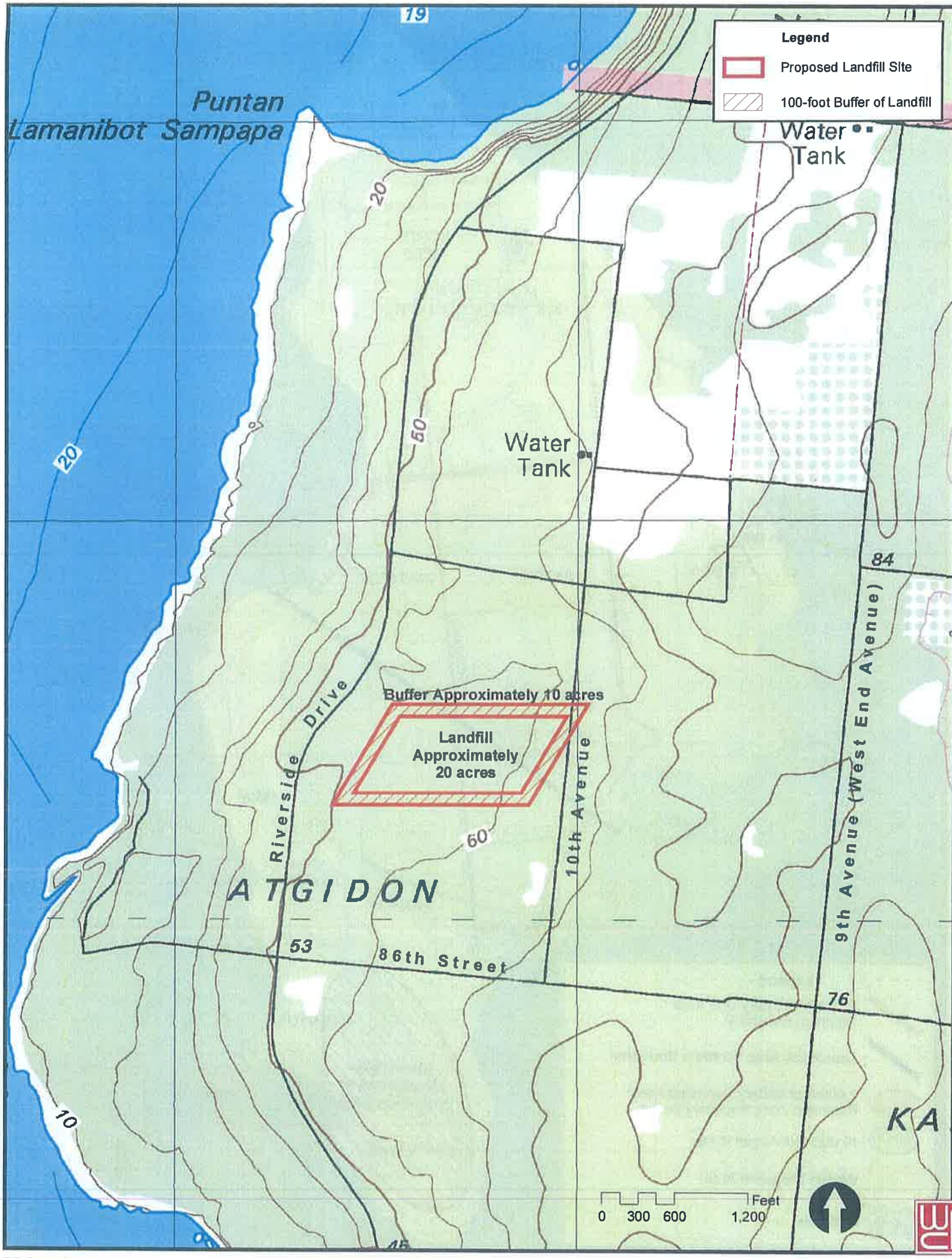
FIGURE 2-1

Environmental Assessment for Landfill at Tinian

Tinian, Commonwealth of the Northern Mariana Islands

ALTERNATIVE LANDFILL SITES

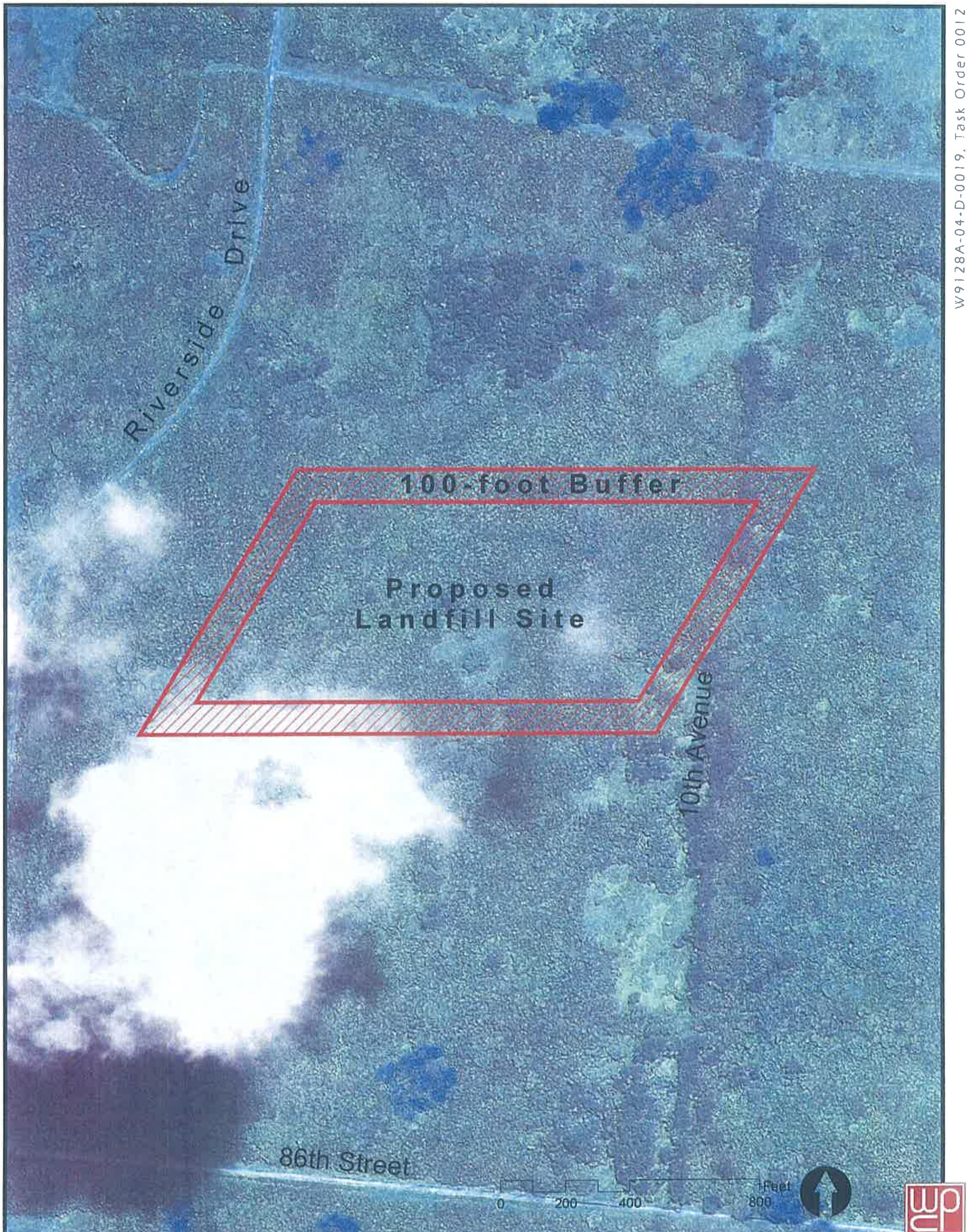
FIGURE 3-1



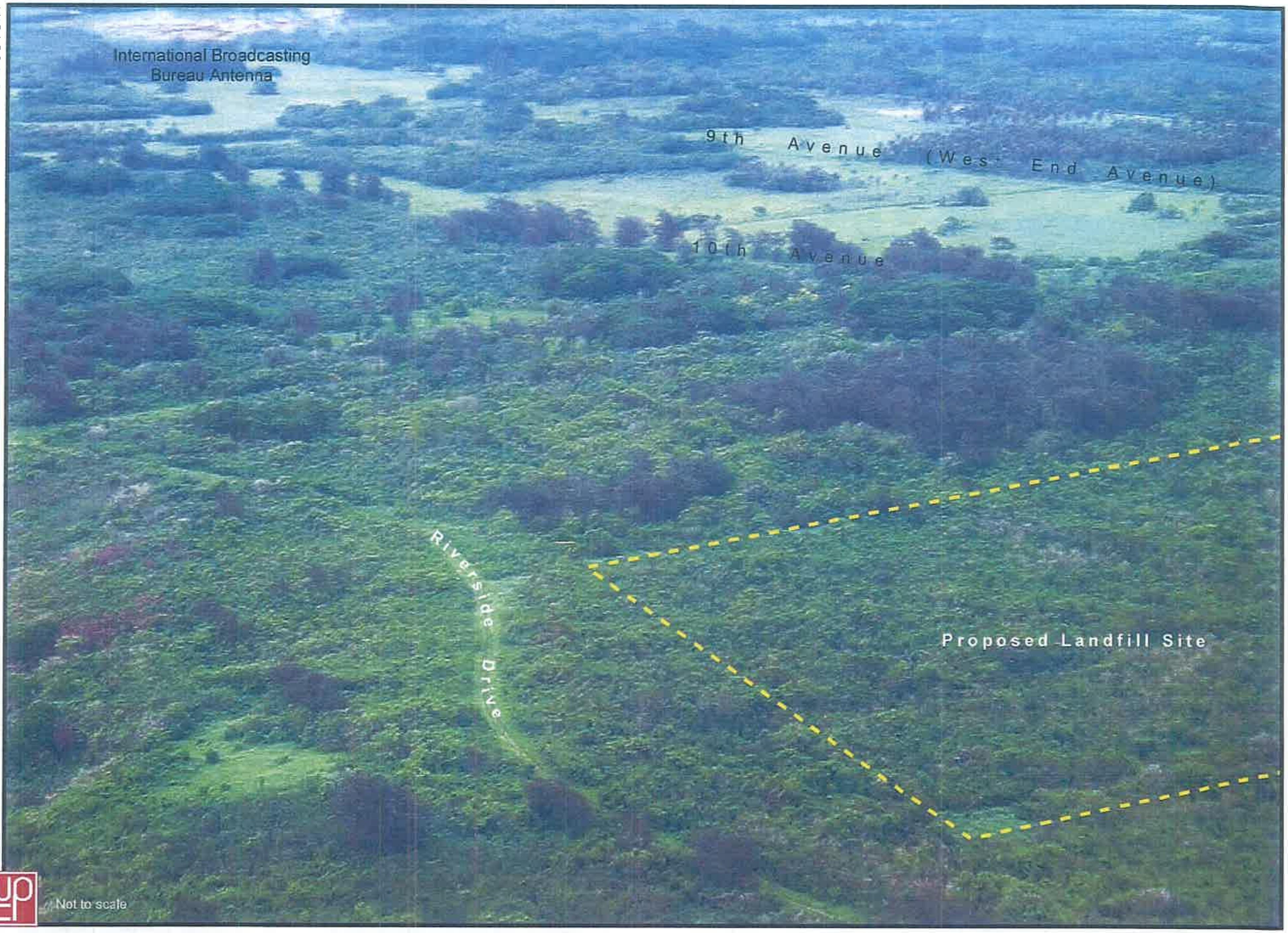
PROJECT VICINITY - PREFERRED ALTERNATIVE (ATGIDON SITE)

FIGURE 3-2

W3128A-04-D-0019, Task Order 0012

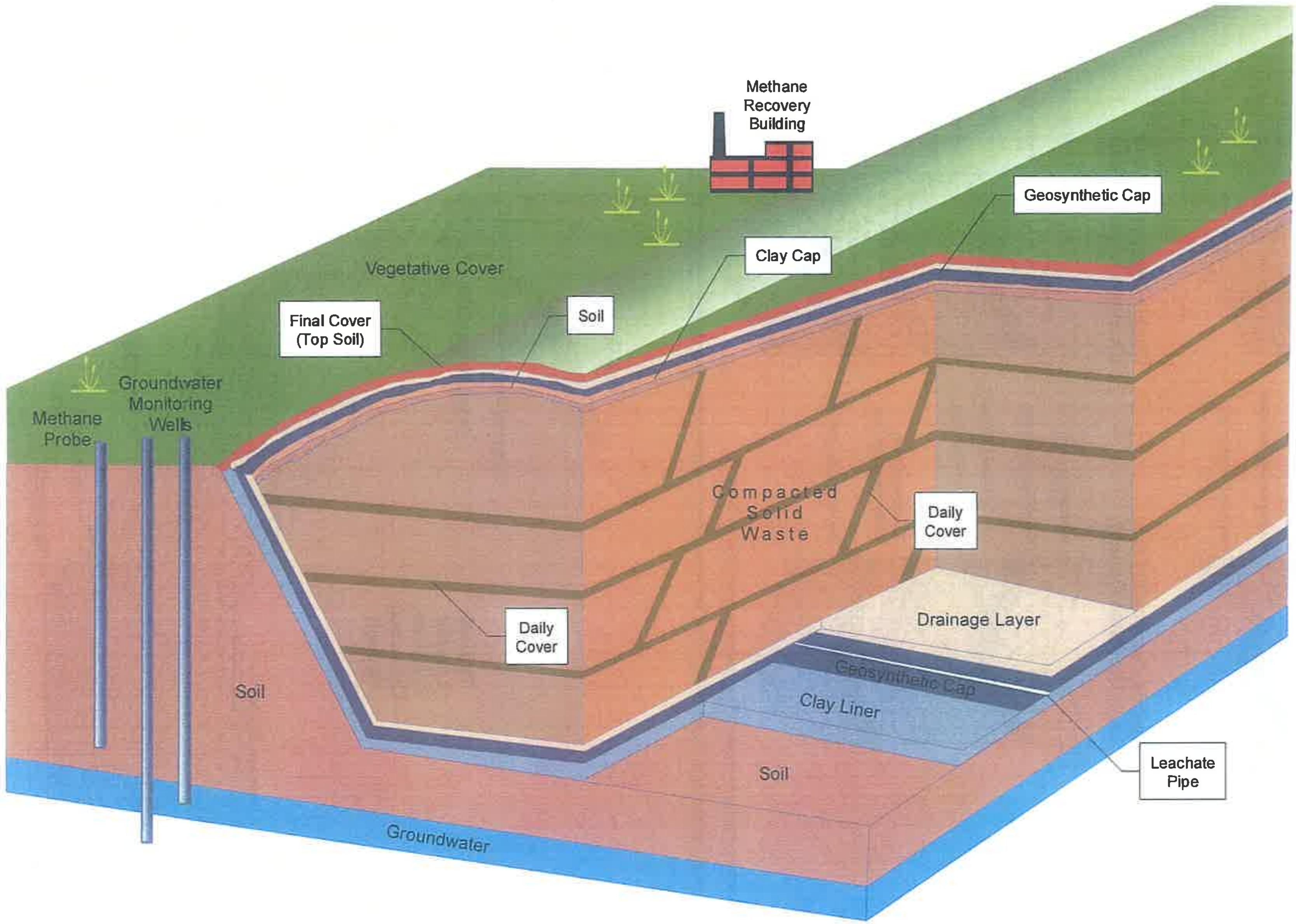


PROJECT VICINITY - PREFERRED ALTERNATIVE (ATGIDON SITE AERIAL) FIGURE 3-3



PROJECT VICINITY - PREFERRED ALTERNATIVE (ATGIDON SITE OBLIQUE)

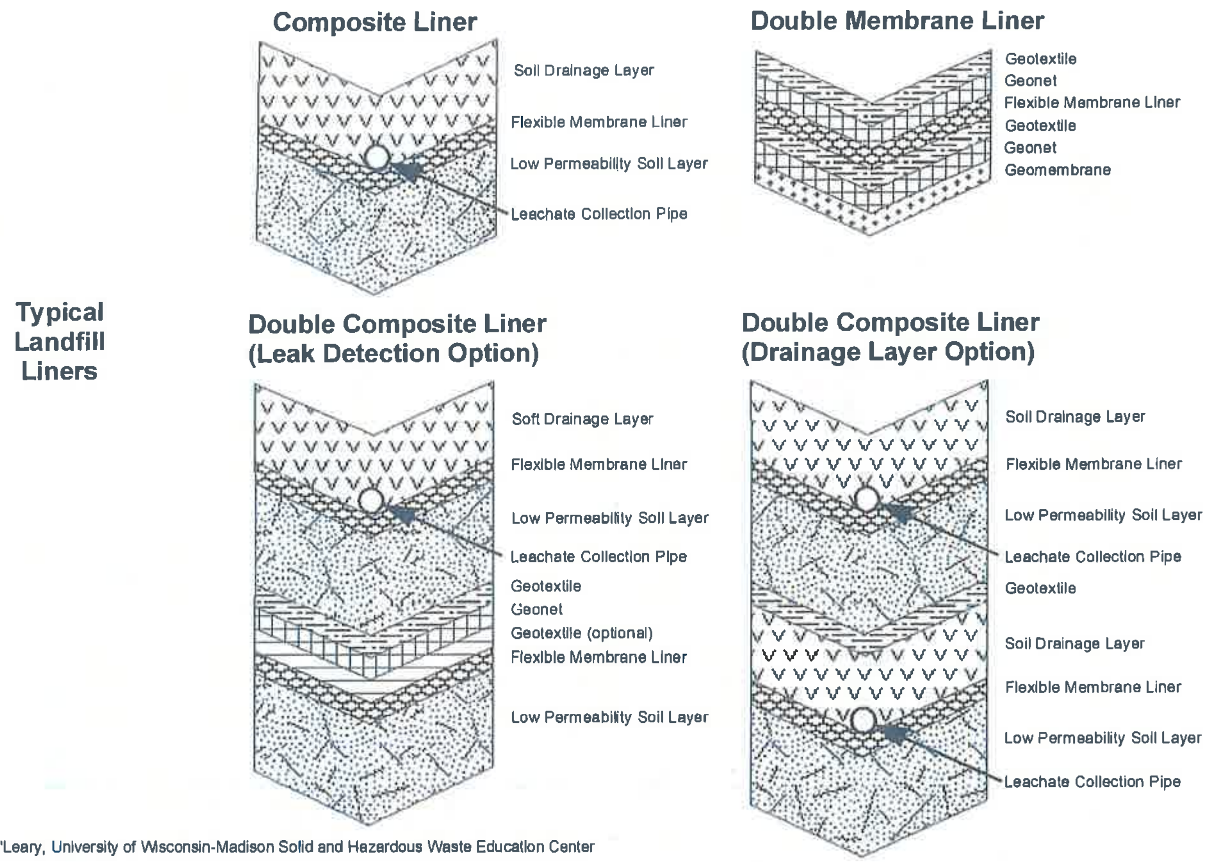
FIGURE 3-4



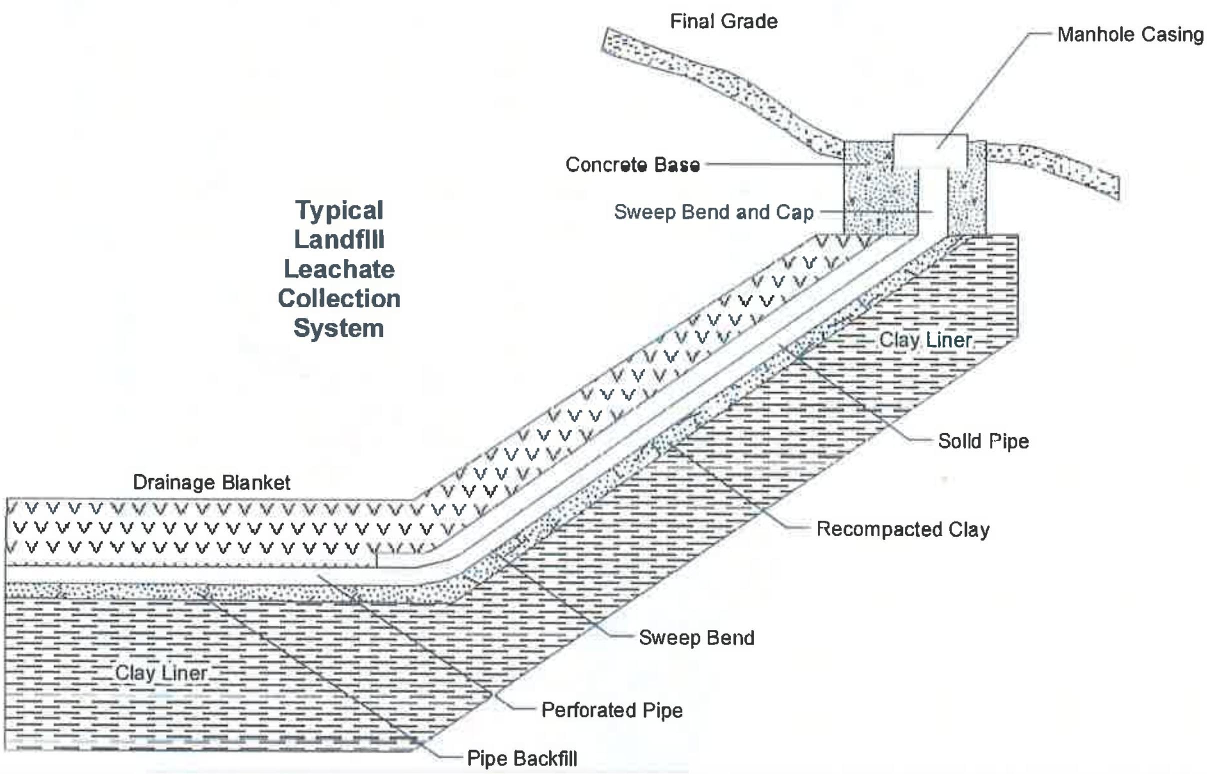
Source: P. O'Leary and P. Walsh, University of Wisconsin-Madison Solid and Hazardous Waste Education Center

TYPICAL MUNICIPAL SOLID WASTE LANDFILL SCHEMATIC

FIGURE 3-5



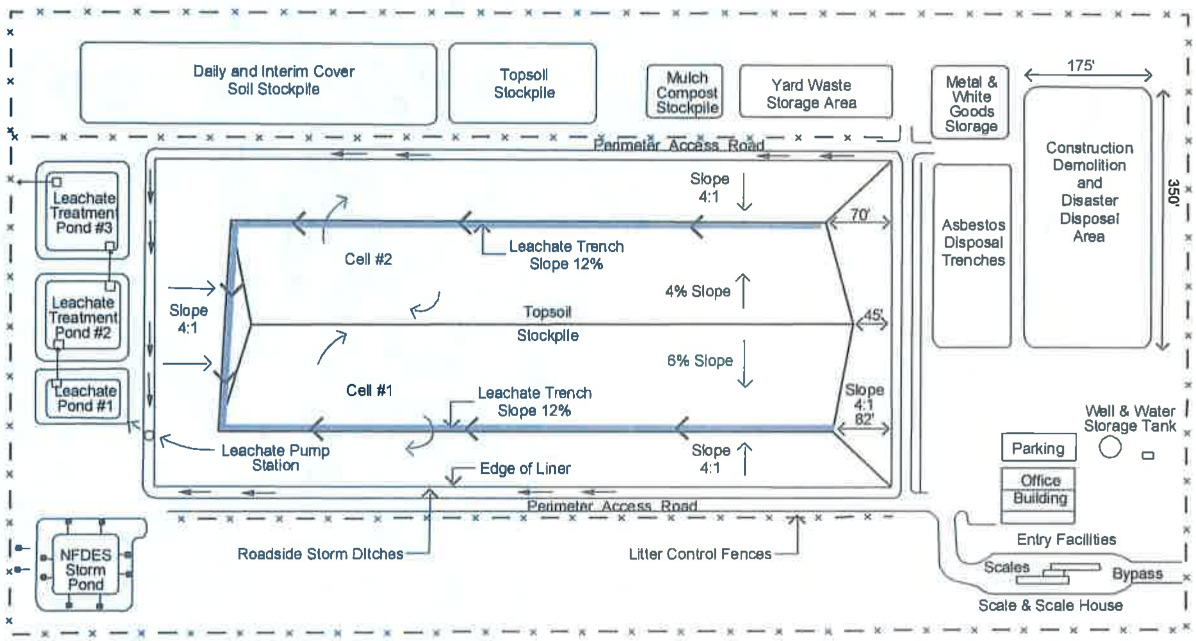
Source: P. O'Leary, University of Wisconsin-Madison Solid and Hazardous Waste Education Center



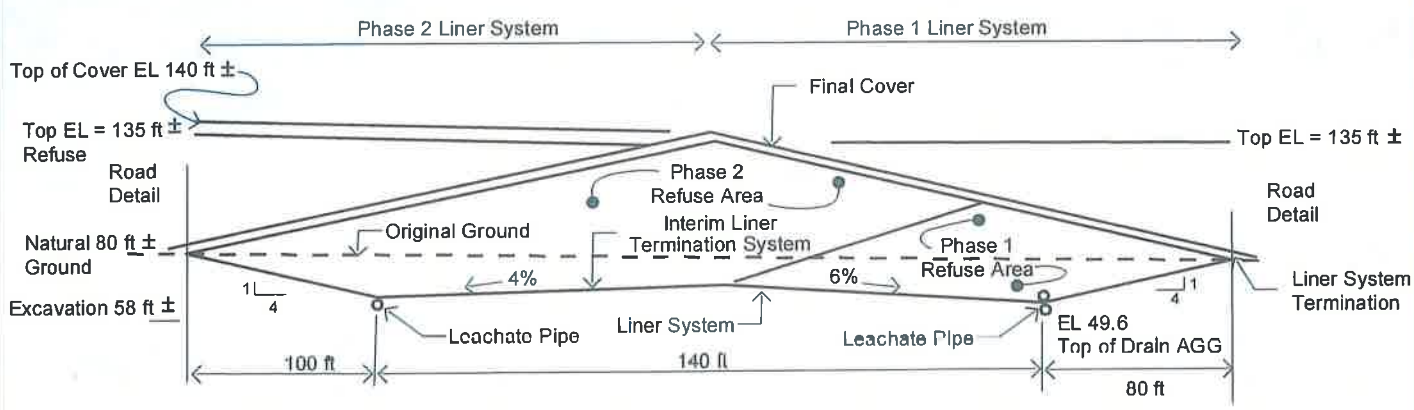
Source: P. Kmet, 1994

TYPICAL LANDFILL LINER AND LEACHATE COLLECTION SYSTEMS

FIGURE 3-6



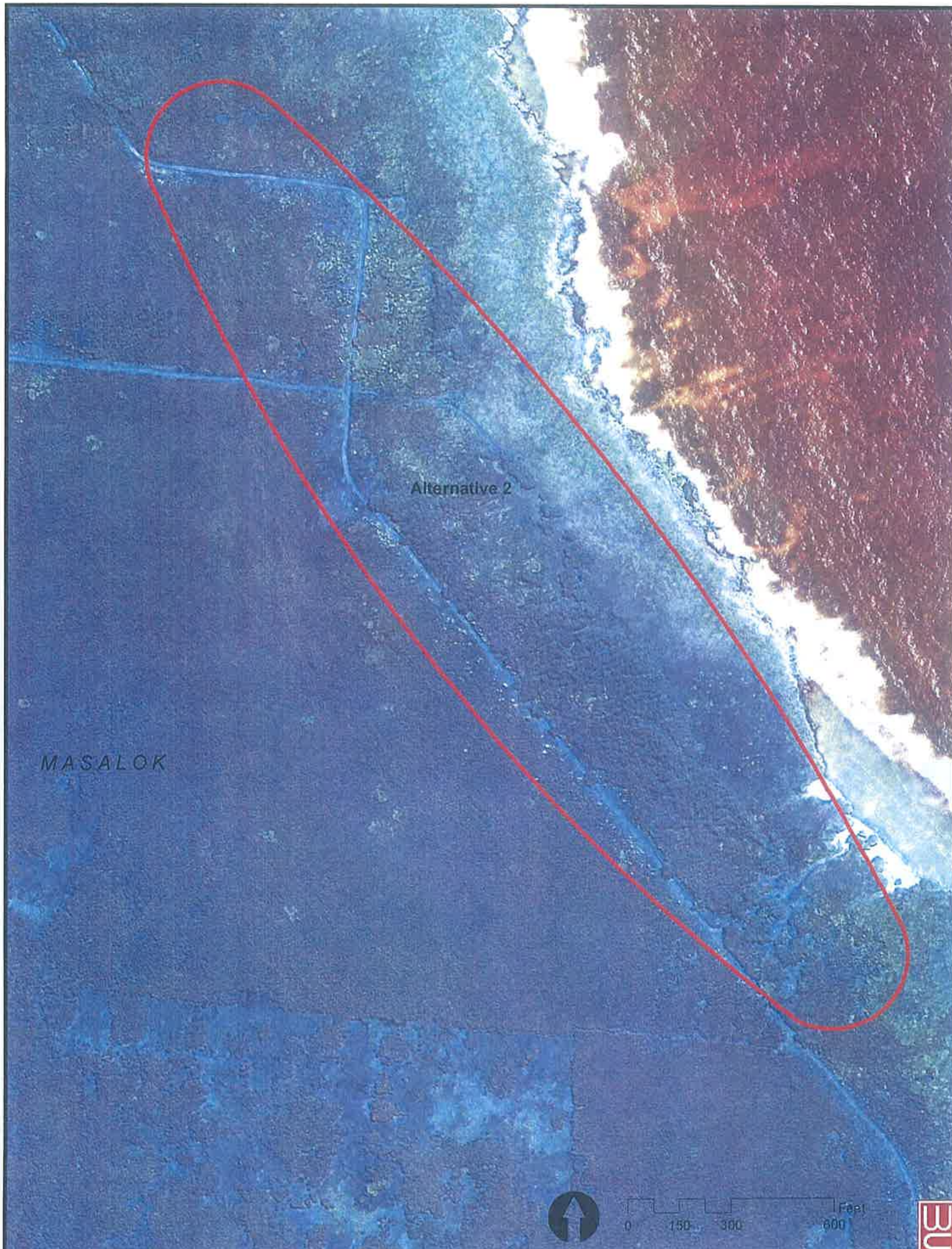
Municipal Solid Waste Landfill
Conceptual Plan View



Municipal Solid Waste Landfill
Conceptual Section View

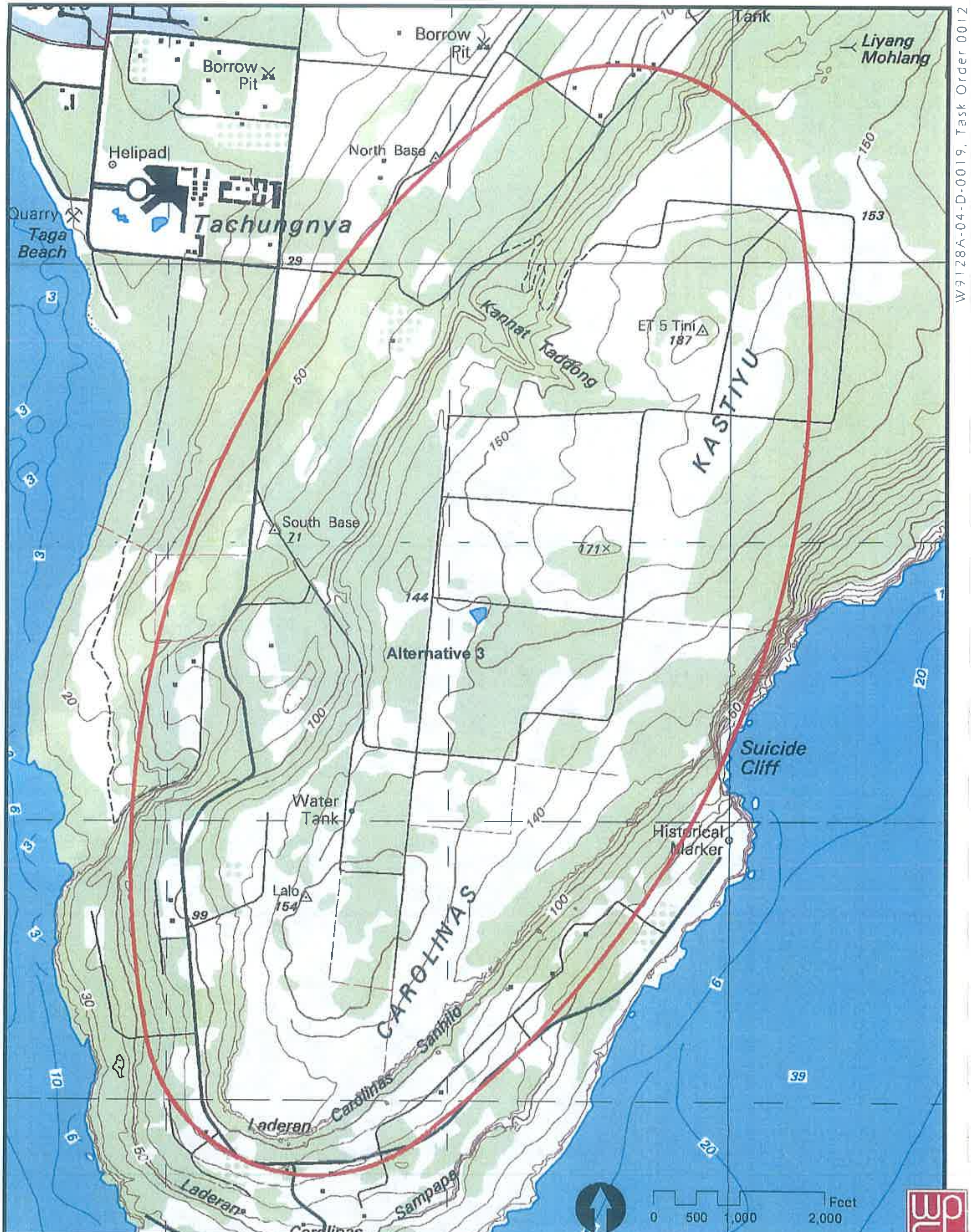
PROJECT VICINITY - ALTERNATIVE 2 (MASALOK SITE)

FIGURE 3-8



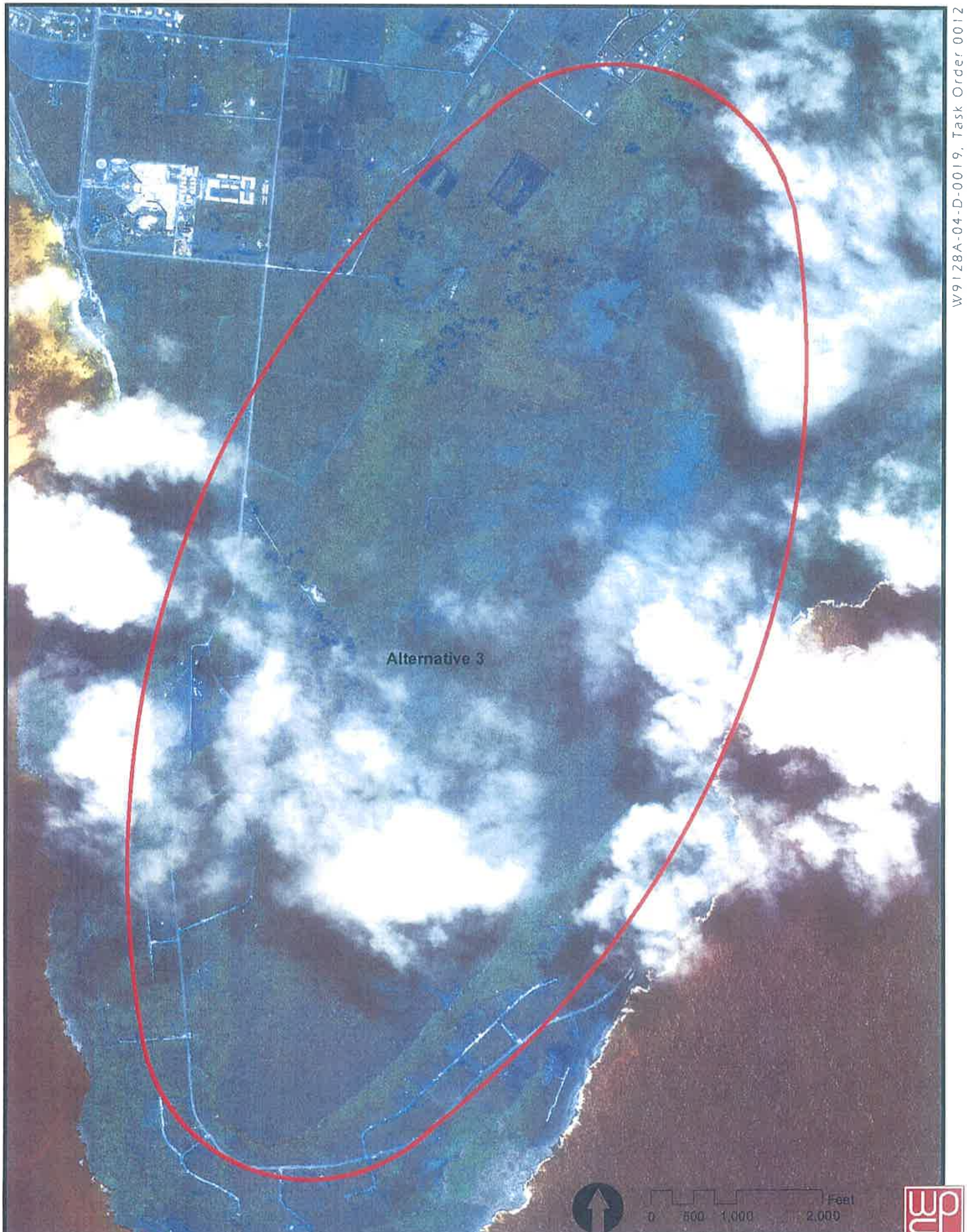
PROJECT VICINITY - ALTERNATIVE 2 (MASALOK SITE AERIAL)

FIGURE 3-9



PROJECT VICINITY - ALTERNATIVE 3 (CAROLINAS SITE)

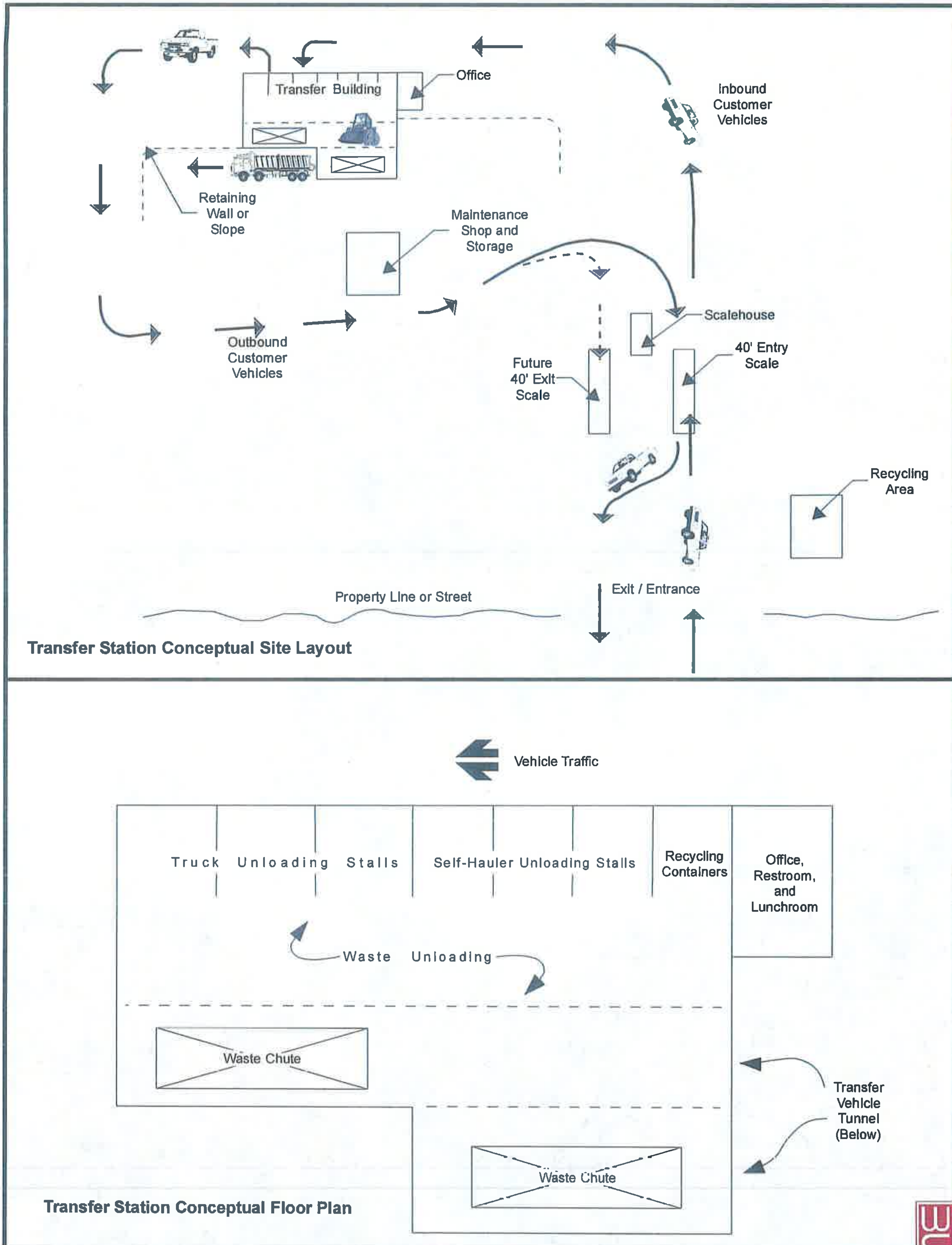
FIGURE 3-10



PROJECT VICINITY - ALTERNATIVE 3 (CAROLINAS SITE AERIAL)

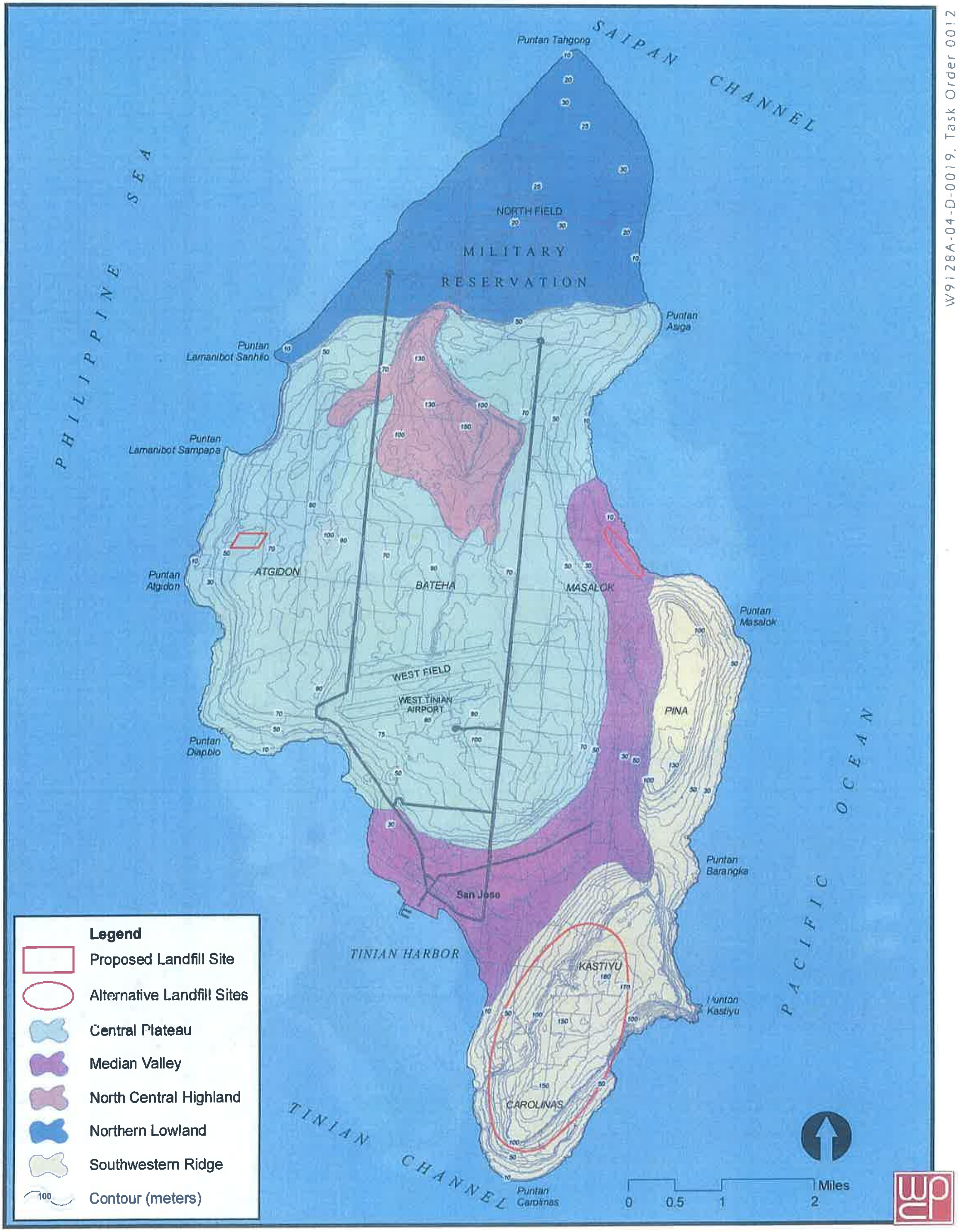
FIGURE 3-11

W9128A-04-D-0019, Task Order 0012



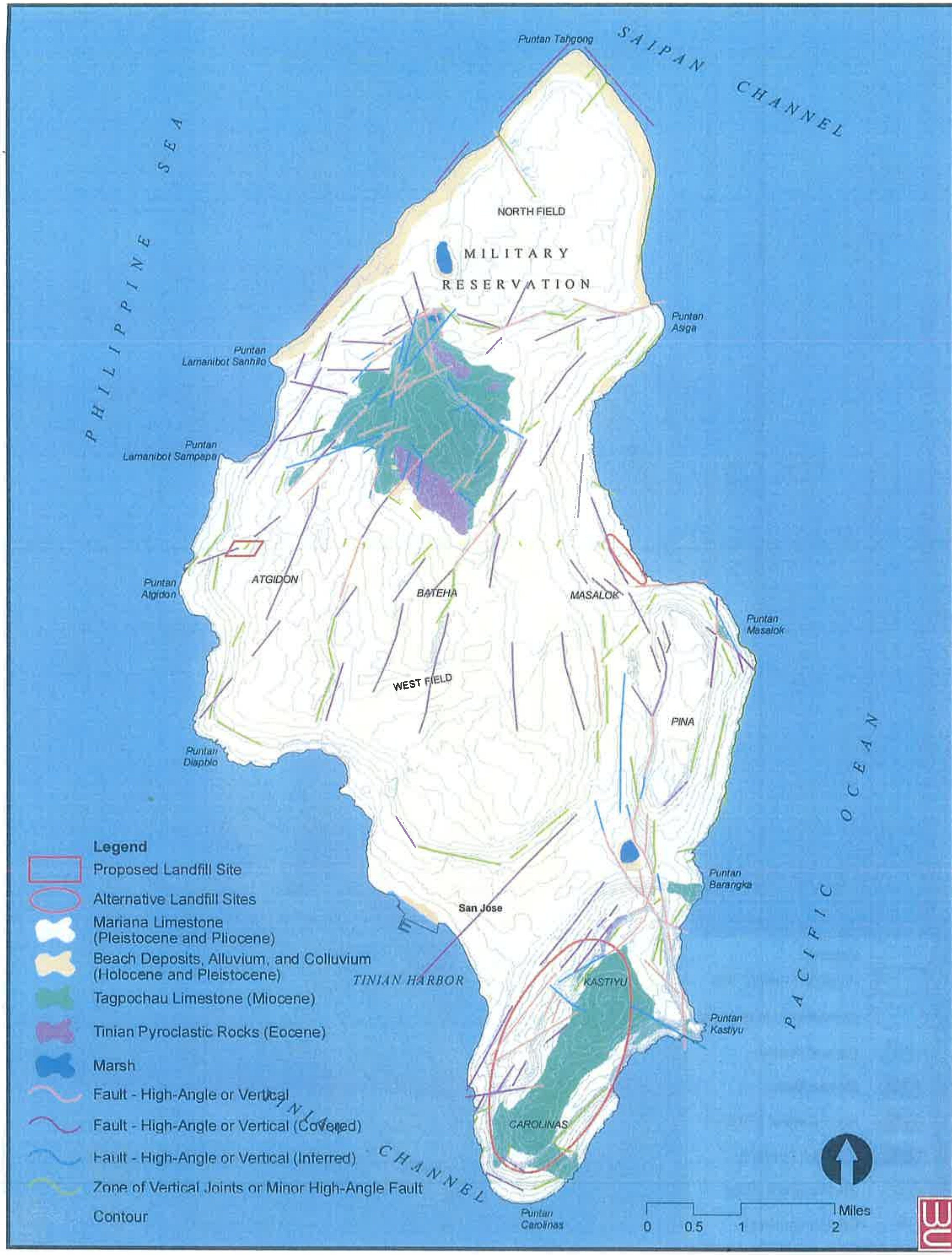
TRANSFER STATION CONCEPTUAL SITE LAYOUT AND FLOOR PLAN

FIGURE 3-12



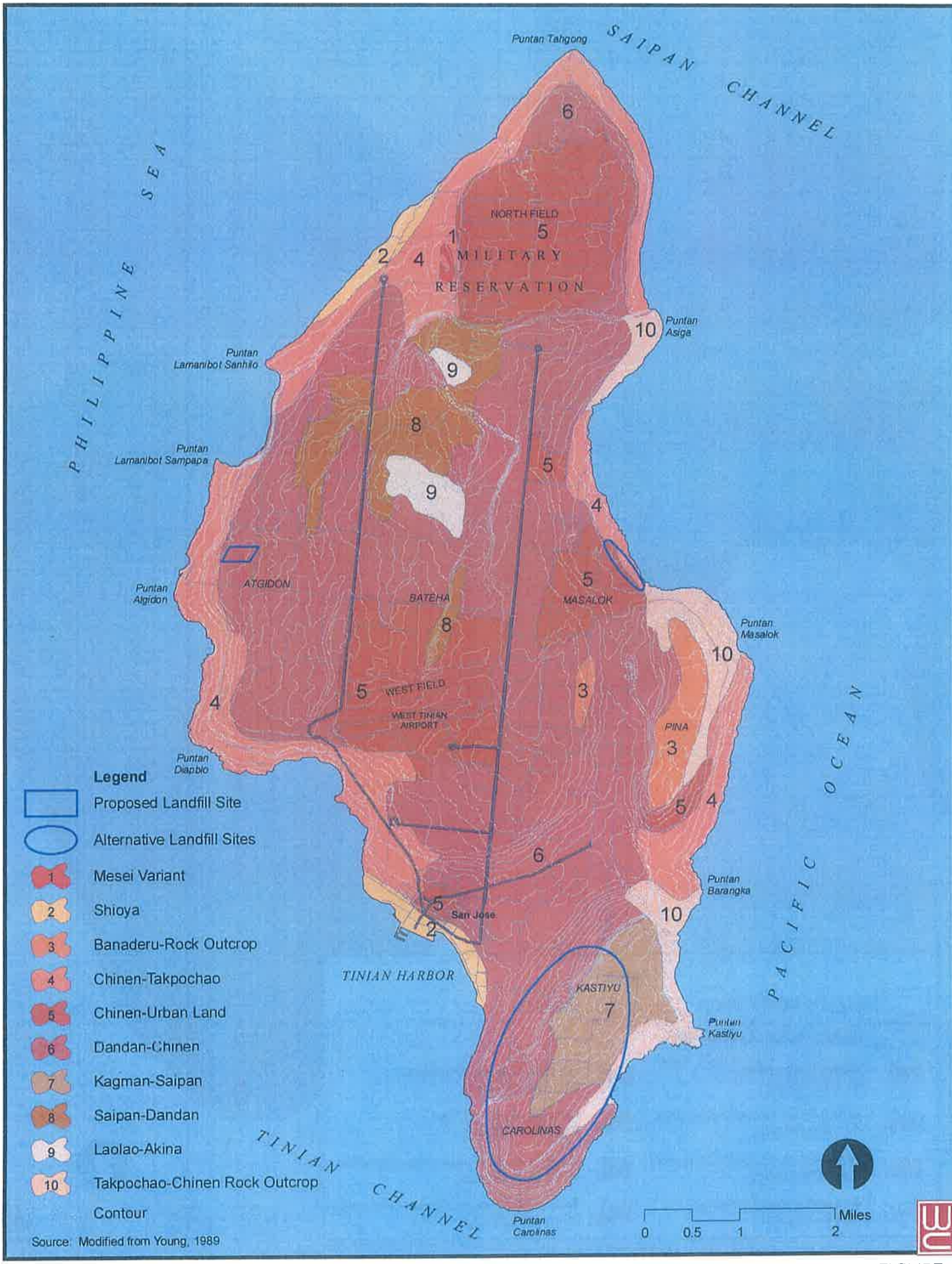
TINIAN PHYSIOGRAPHY AND TOPOLOGY

FIGURE 4-1



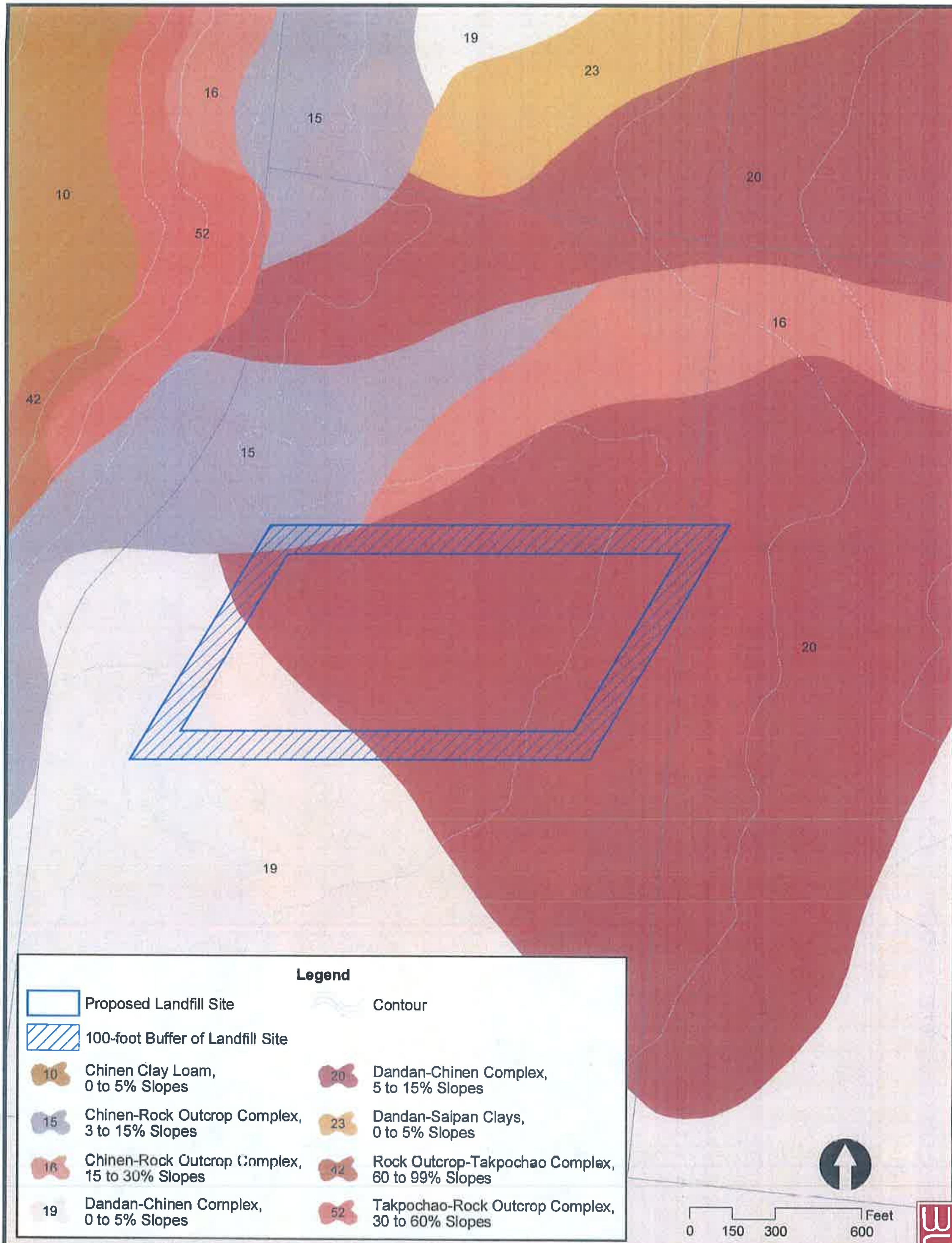
TINIAN GEOLOGY

FIGURE 4-2



TINIAN SOILS

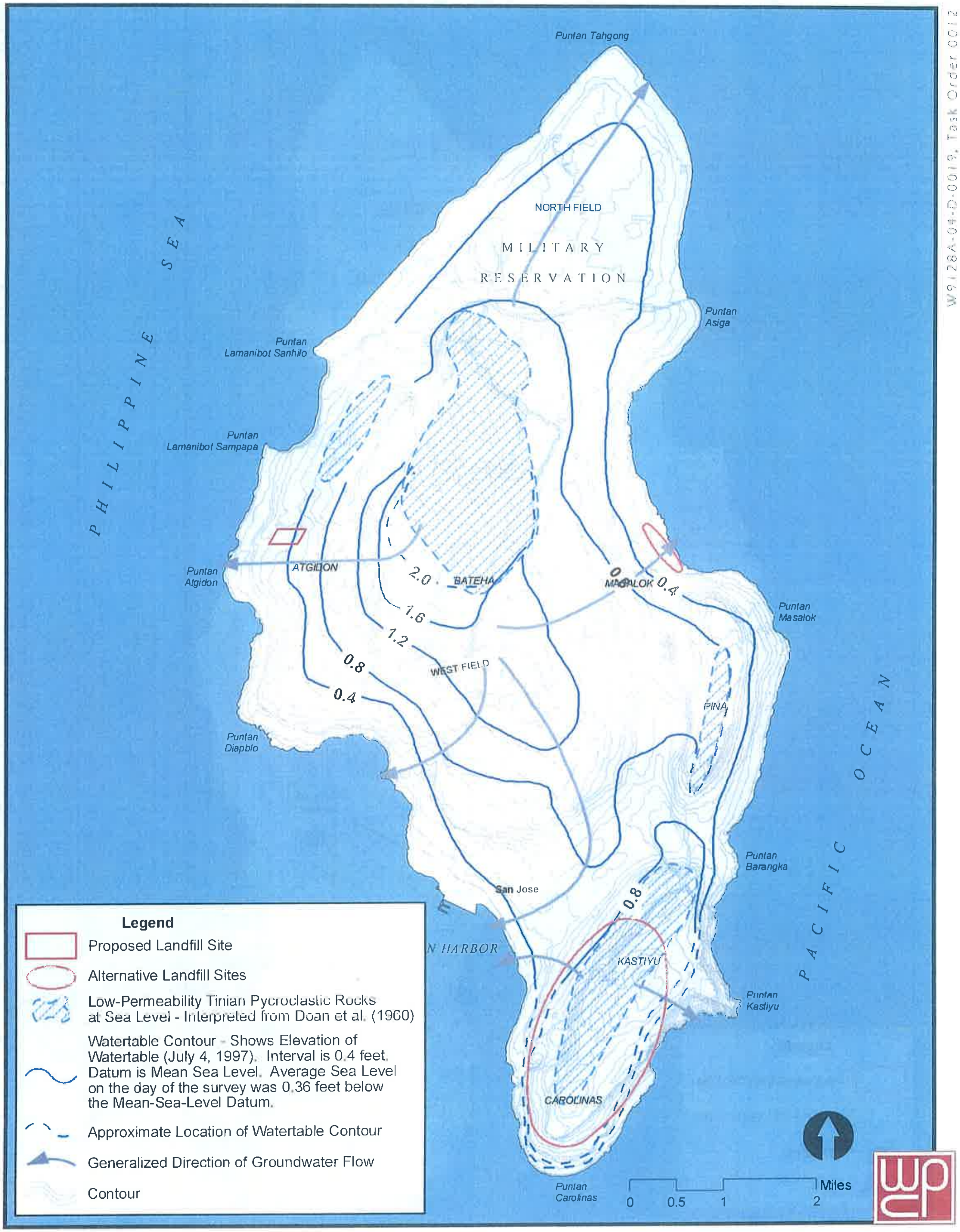
FIGURE 4-3



W9128A-04-D-0019, Task Order 0012

AREA SOILS - PREFERRED ALTERNATIVE (ATGIDON SITE)

FIGURE 4-4



TINIAN HYDROLOGY

FIGURE 4-5

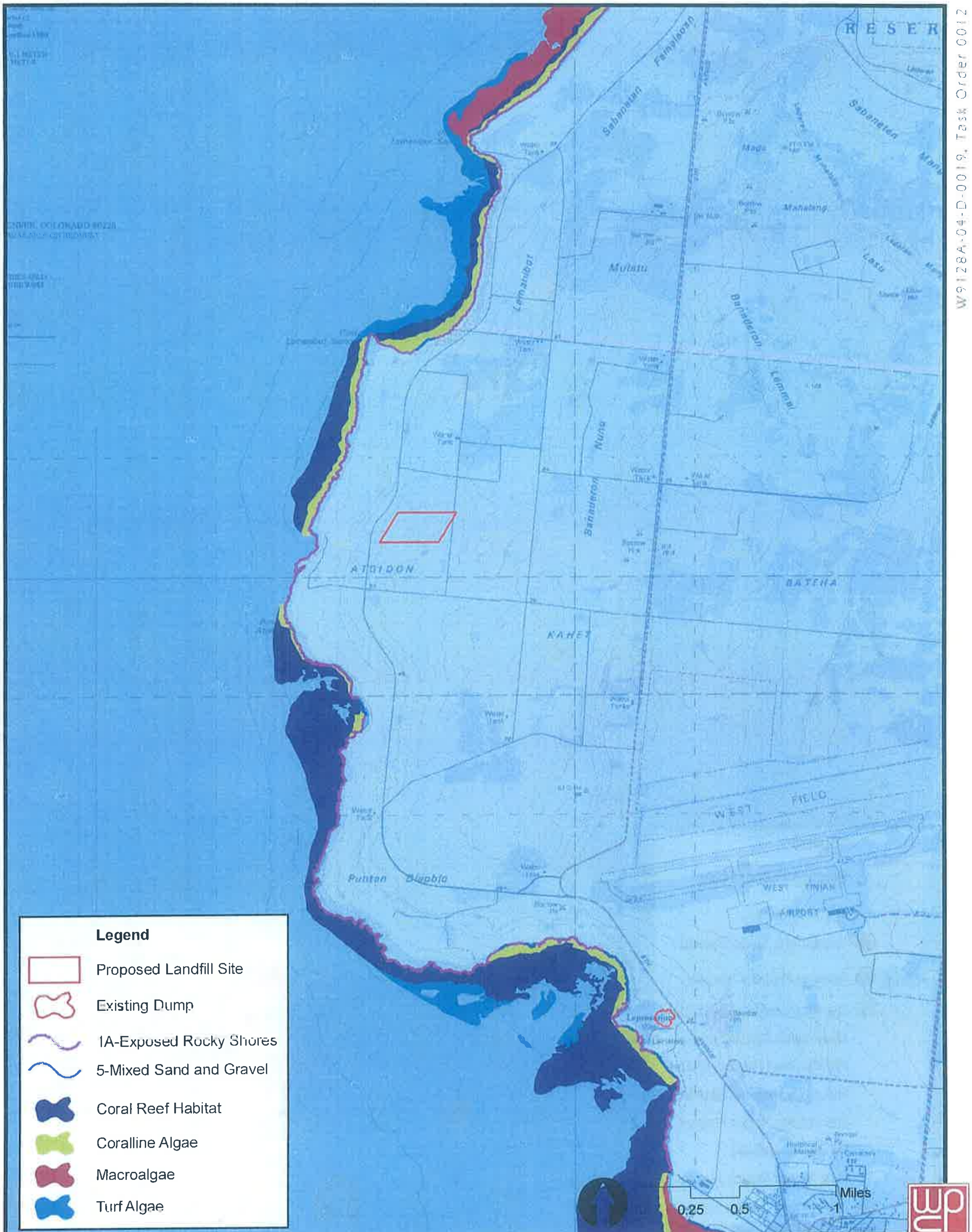
W9128A-04-D-0019, Task Order 0012

SURFACE WATER AND WETLANDS

FIGURE 4-6

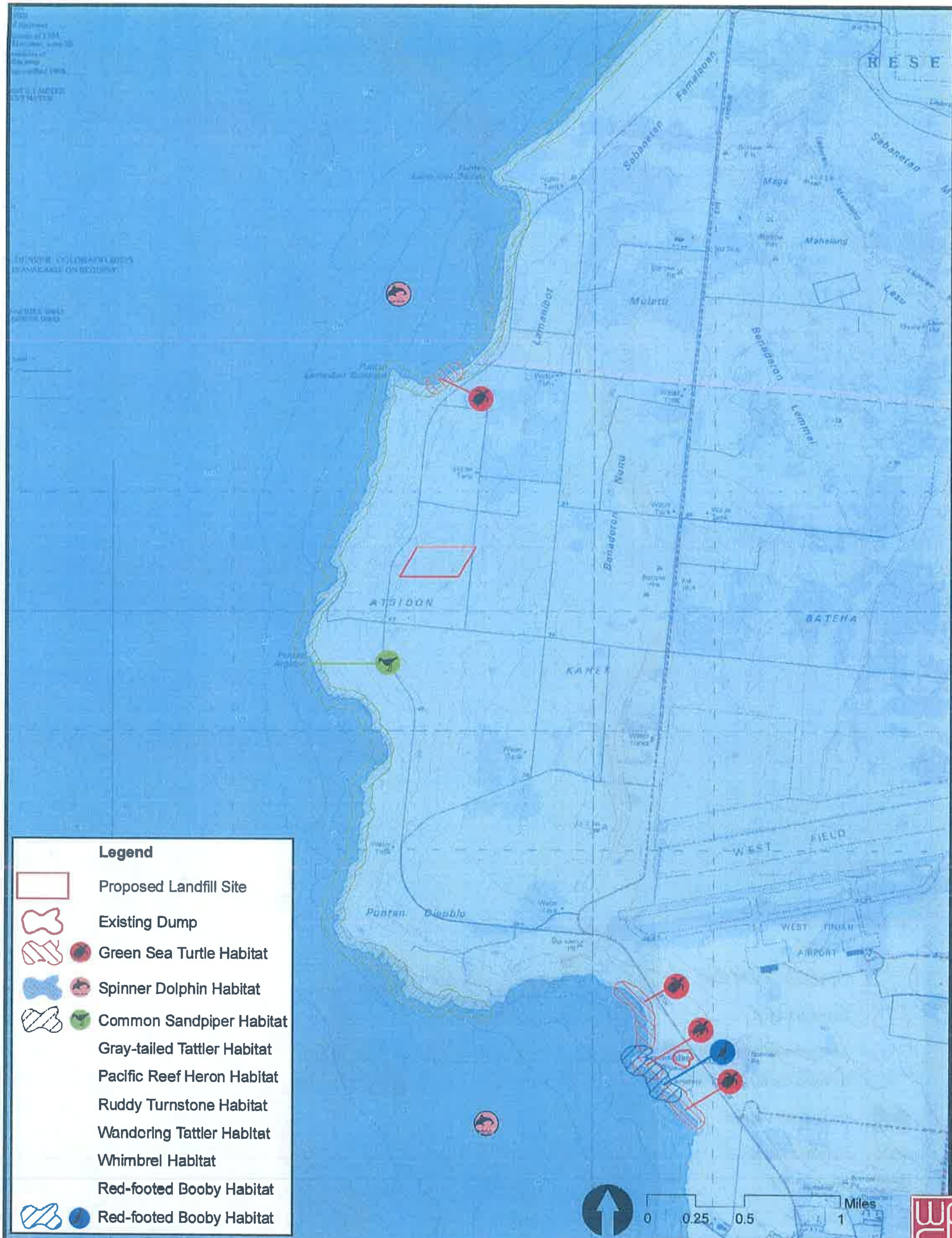
Environmental Assessment for Landfill at Tinian

Tinian, Commonwealth of the Northern Mariana Islands



COASTAL HABITAT - PREFERRED ALTERNATIVE (ATGIDON SITE)

FIGURE 4-7



COASTAL BIOLOGICAL RESOURCES - PREFERRED ALTERNATIVE (ATGIDON SITE)

FIGURE 4-8

Environmental Assessment for Landfill at Tinian

Tinian, Commonwealth of the Northern Mariana Islands

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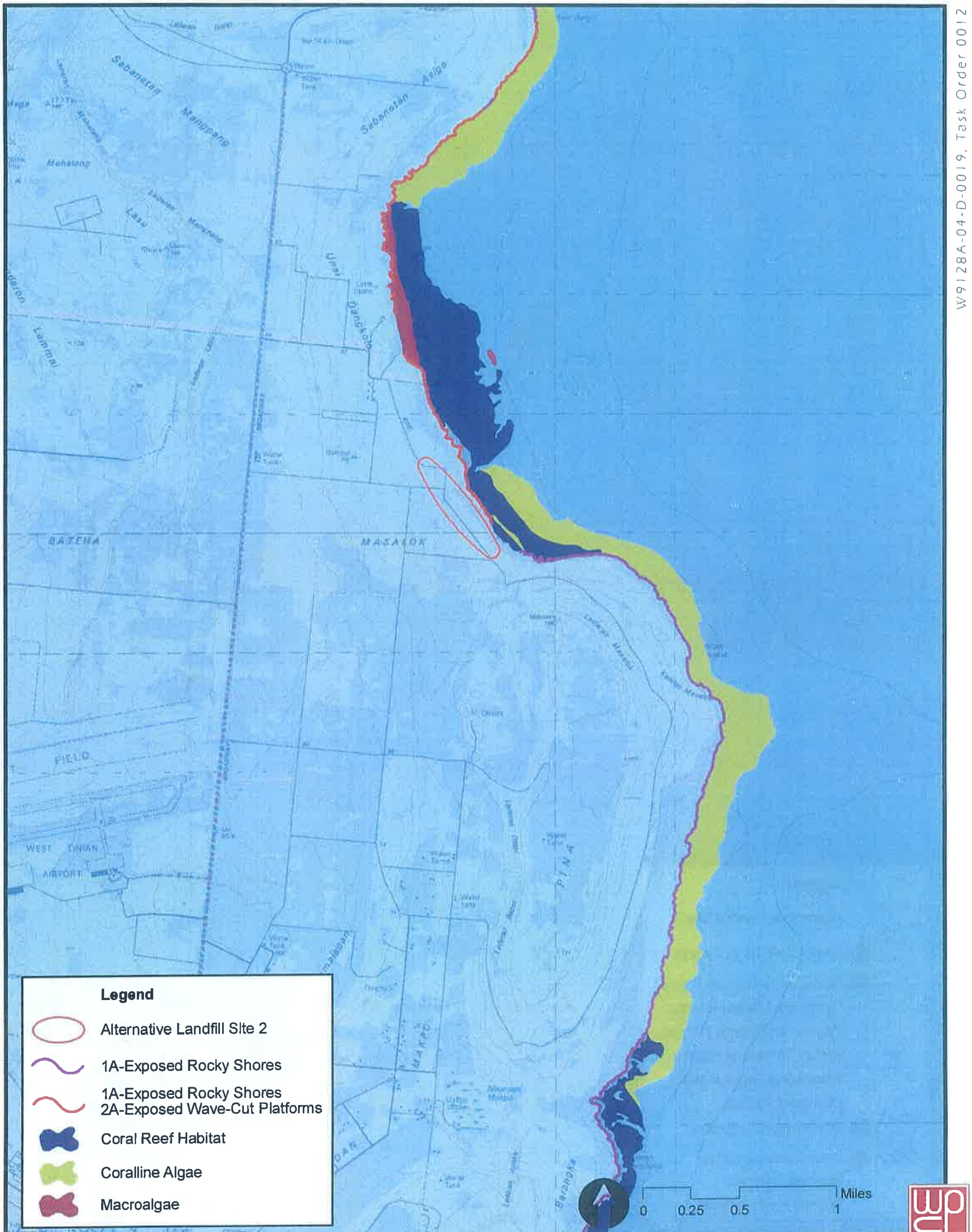
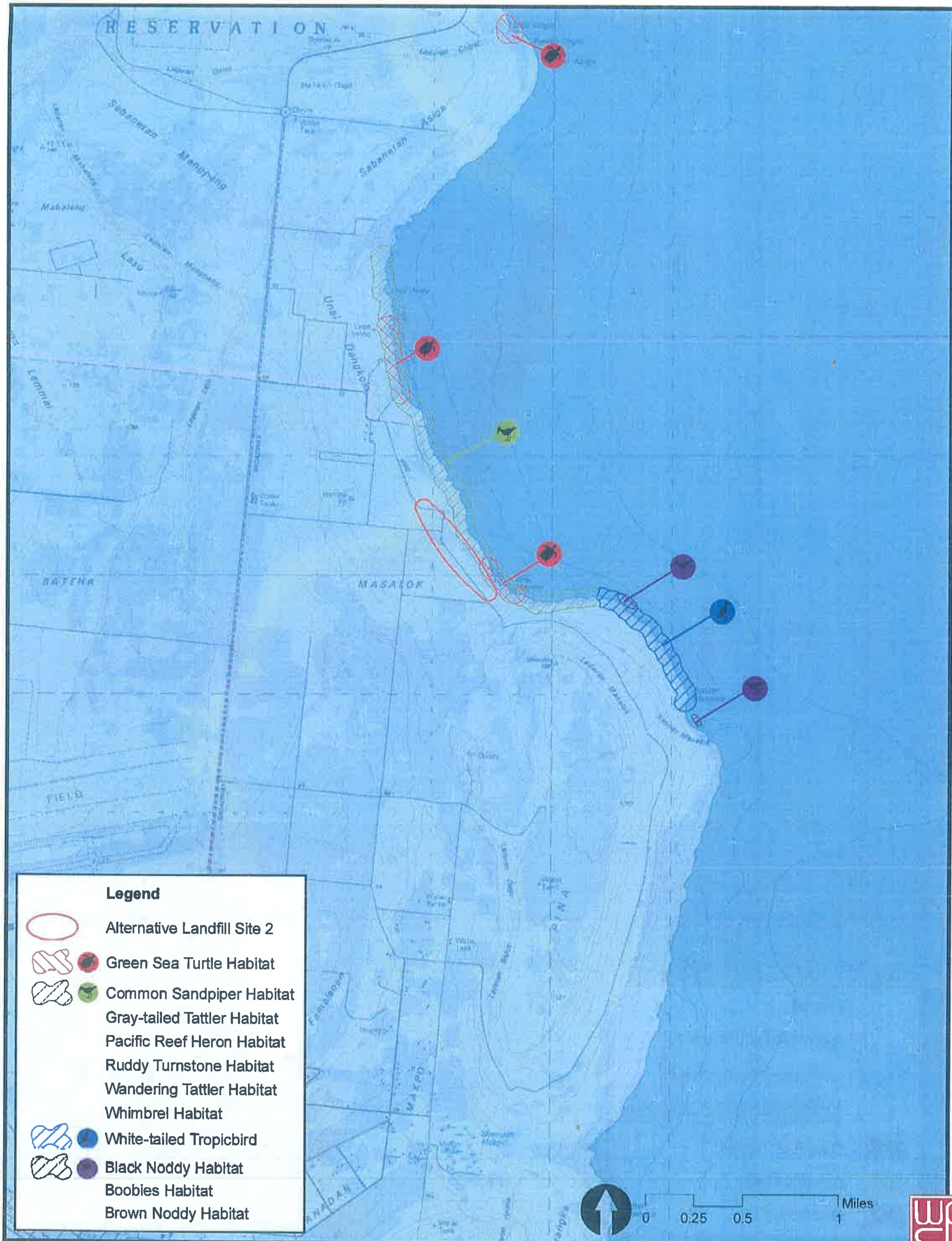


COASTAL HABITAT - ALTERNATIVE 2 (MASALOK SITE)

FIGURE 4-9

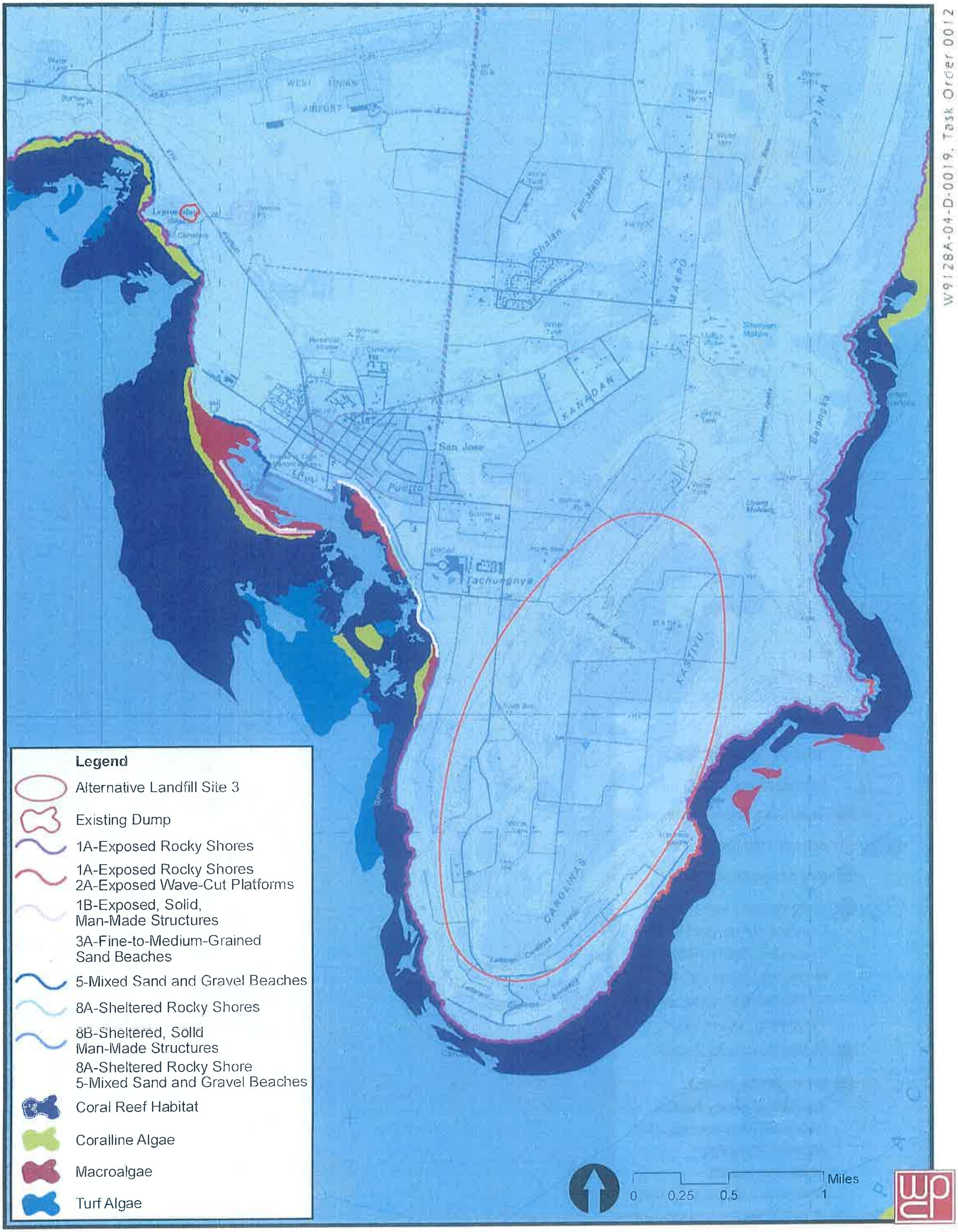


COASTAL BIOLOGICAL RESOURCES - ALTERNATIVE 2 (MASALOK SITE) FIGURE 4-10

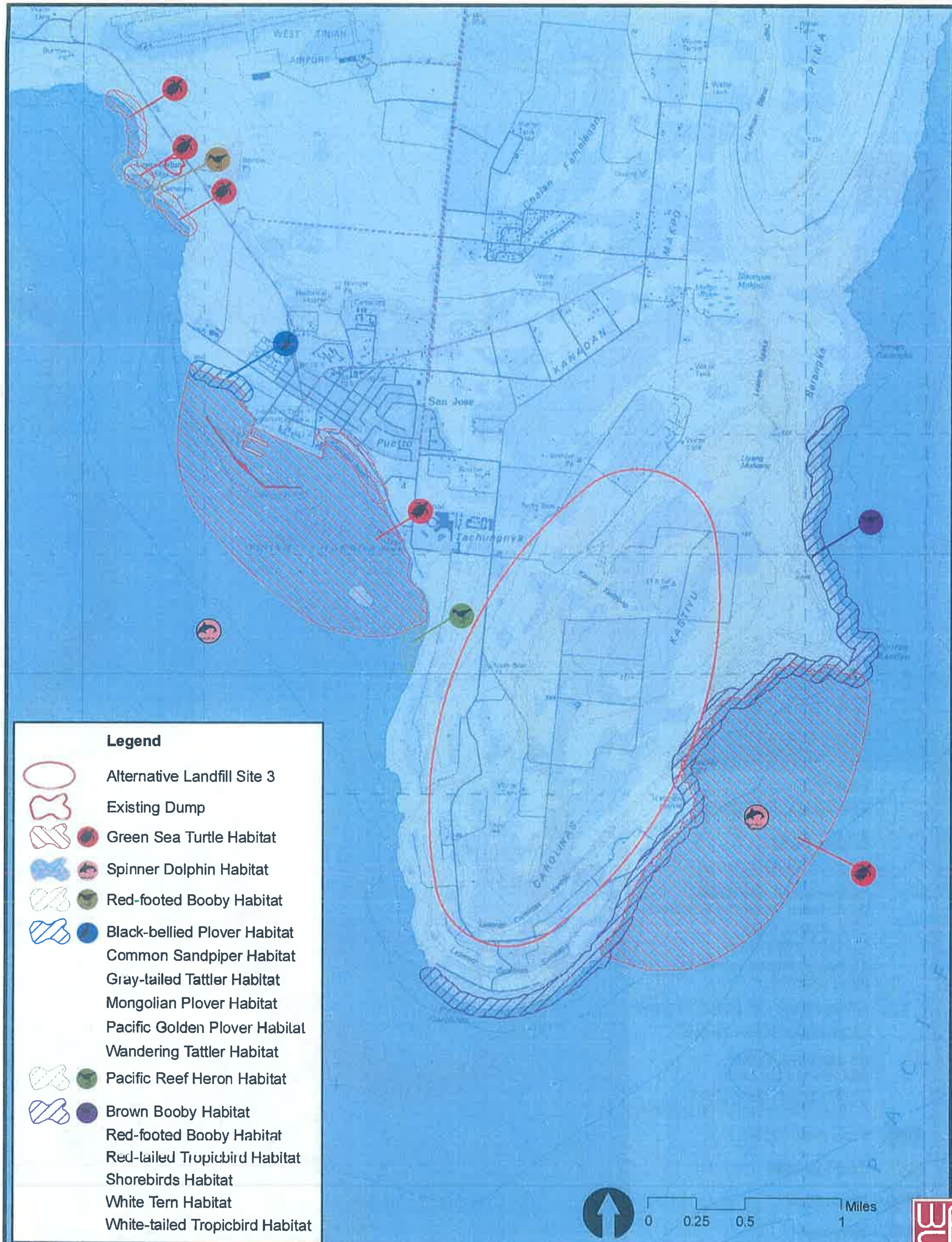
Environmental Assessment for Landfill at Tinian

Tinian, Commonwealth of the Northern Mariana Islands

W9128A-04-D-0019, Task Order 0012

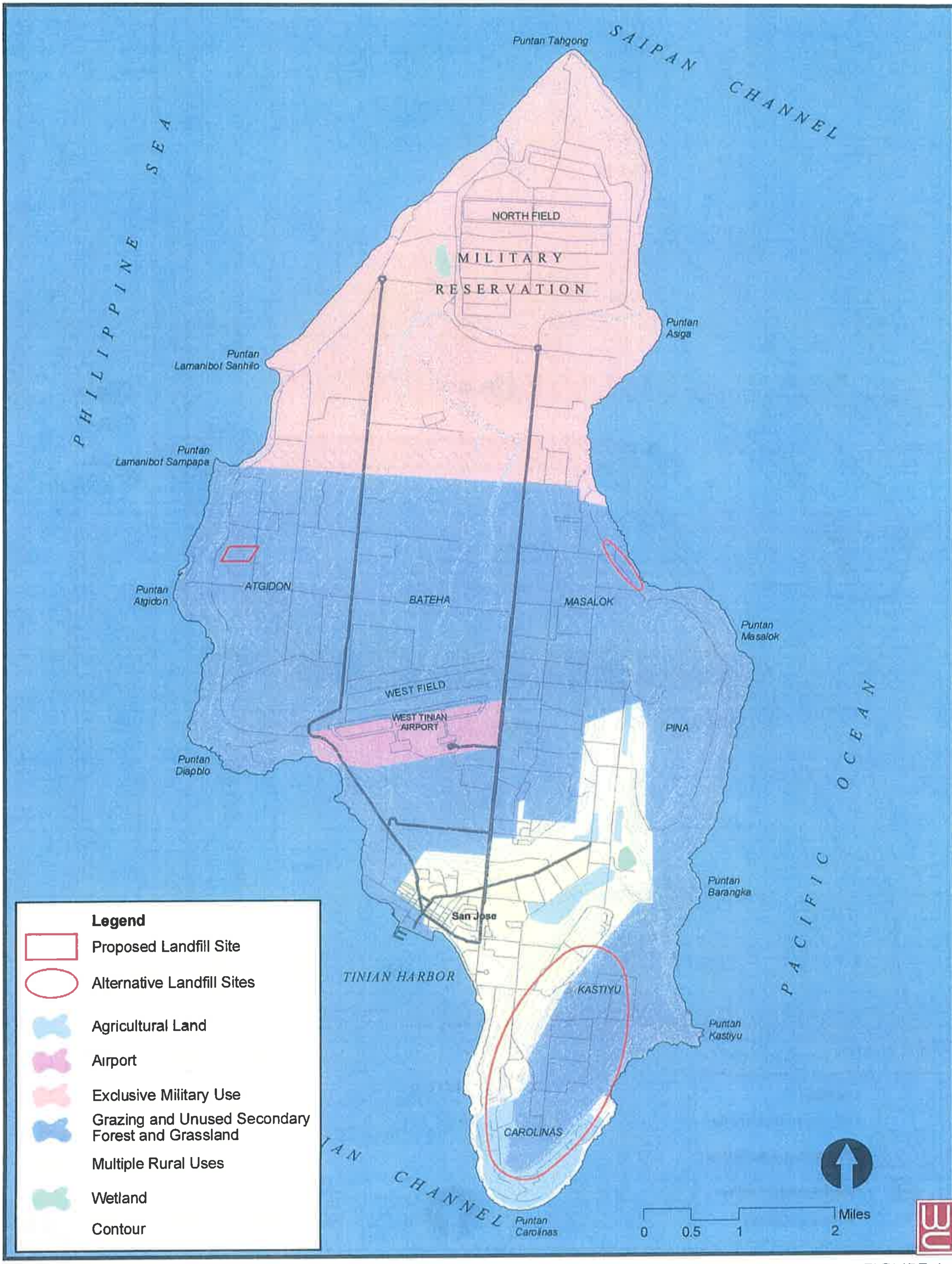


COASTAL HABITAT - ALTERNATIVE 3 (CAROLINAS SITE) FIGURE 4-11



COASTAL BIOLOGICAL RESOURCES - ALTERNATIVE 3 (CAROLINAS SITE)

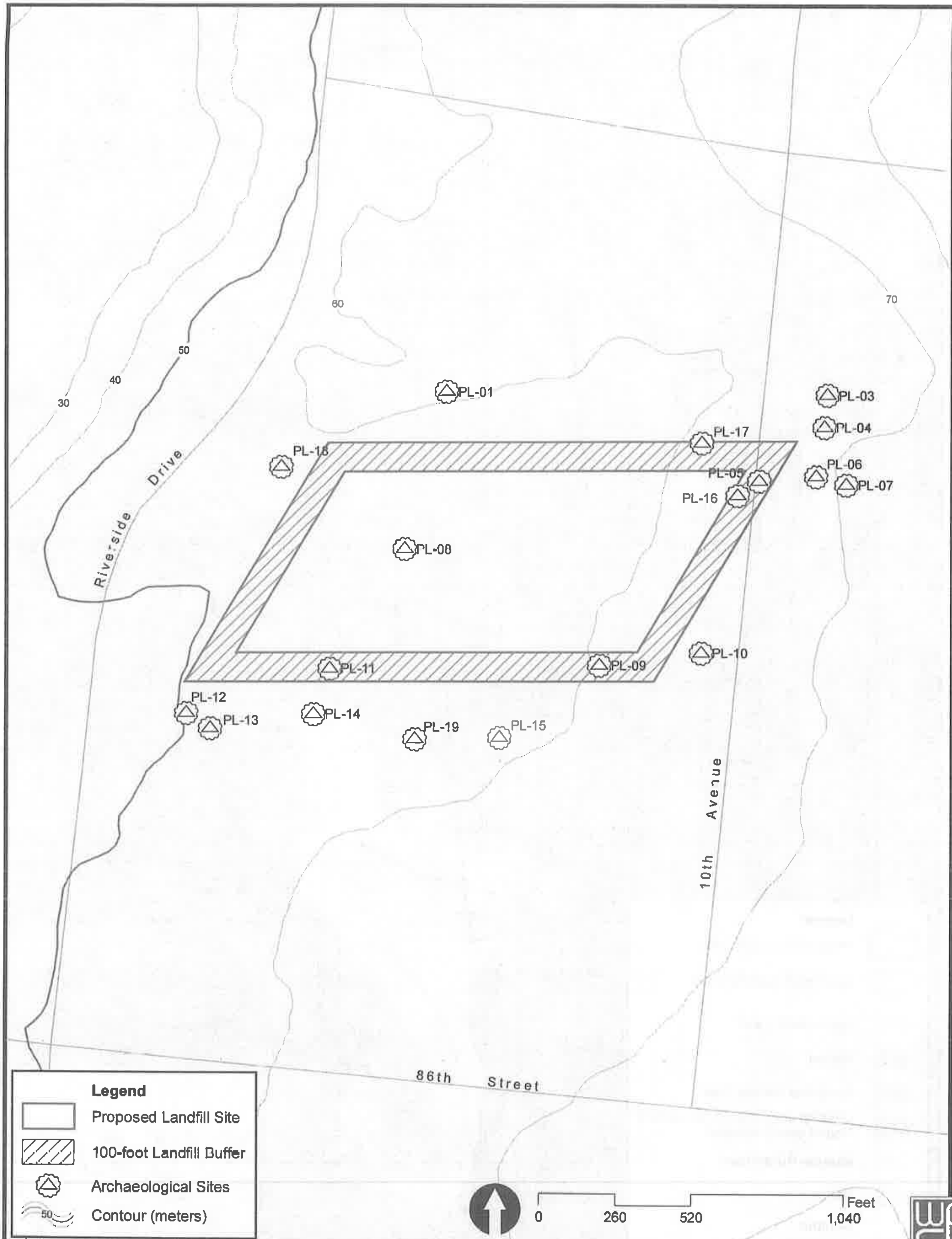
FIGURE 4-12



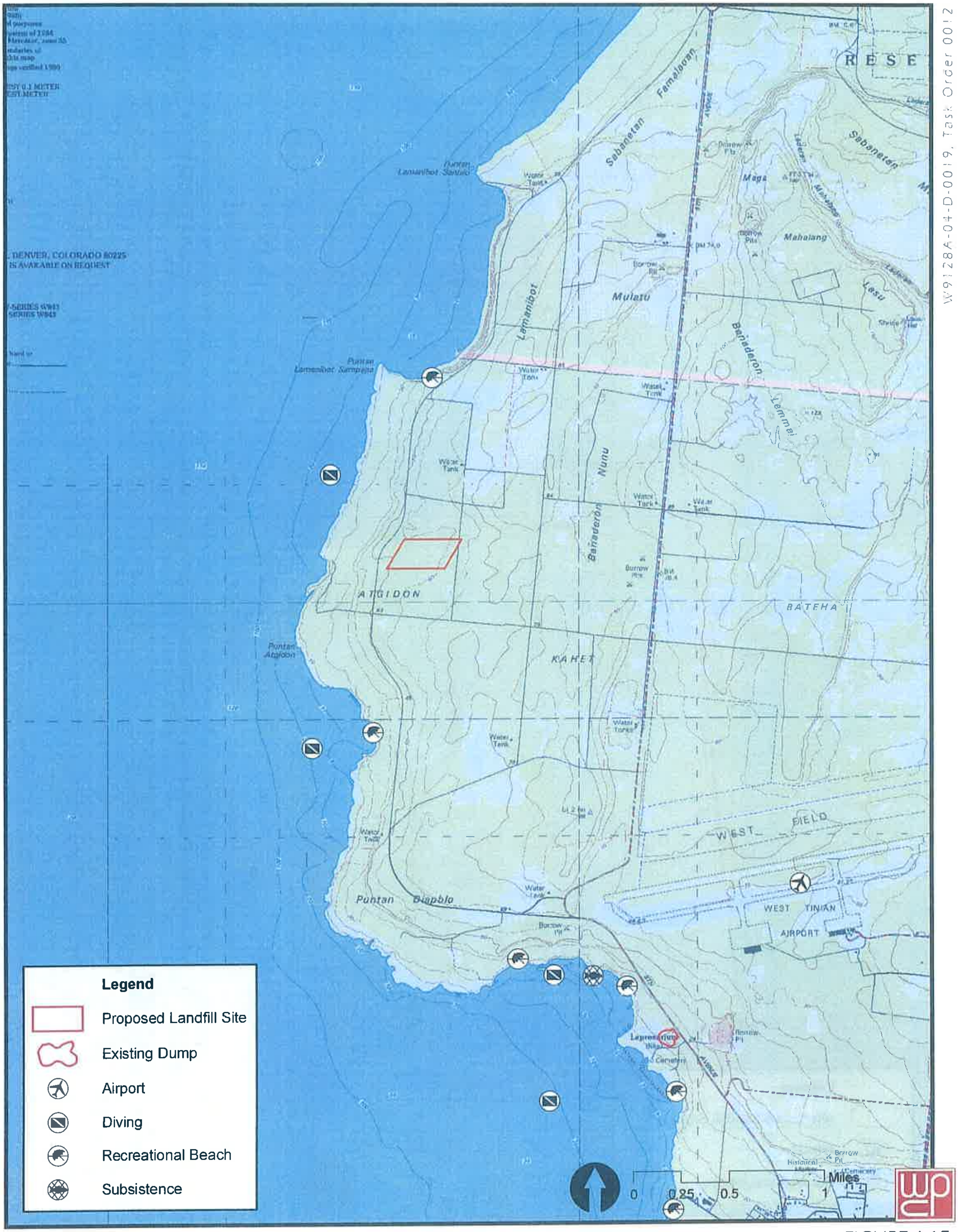
W9128A-04-D-0019, Task Order 0012

LAND USE

FIGURE 4-13



ARCHAEOLOGICAL RESOURCES - PREFERRED ALTERNATIVE (ATGIDON SITE) FIGURE 4-14

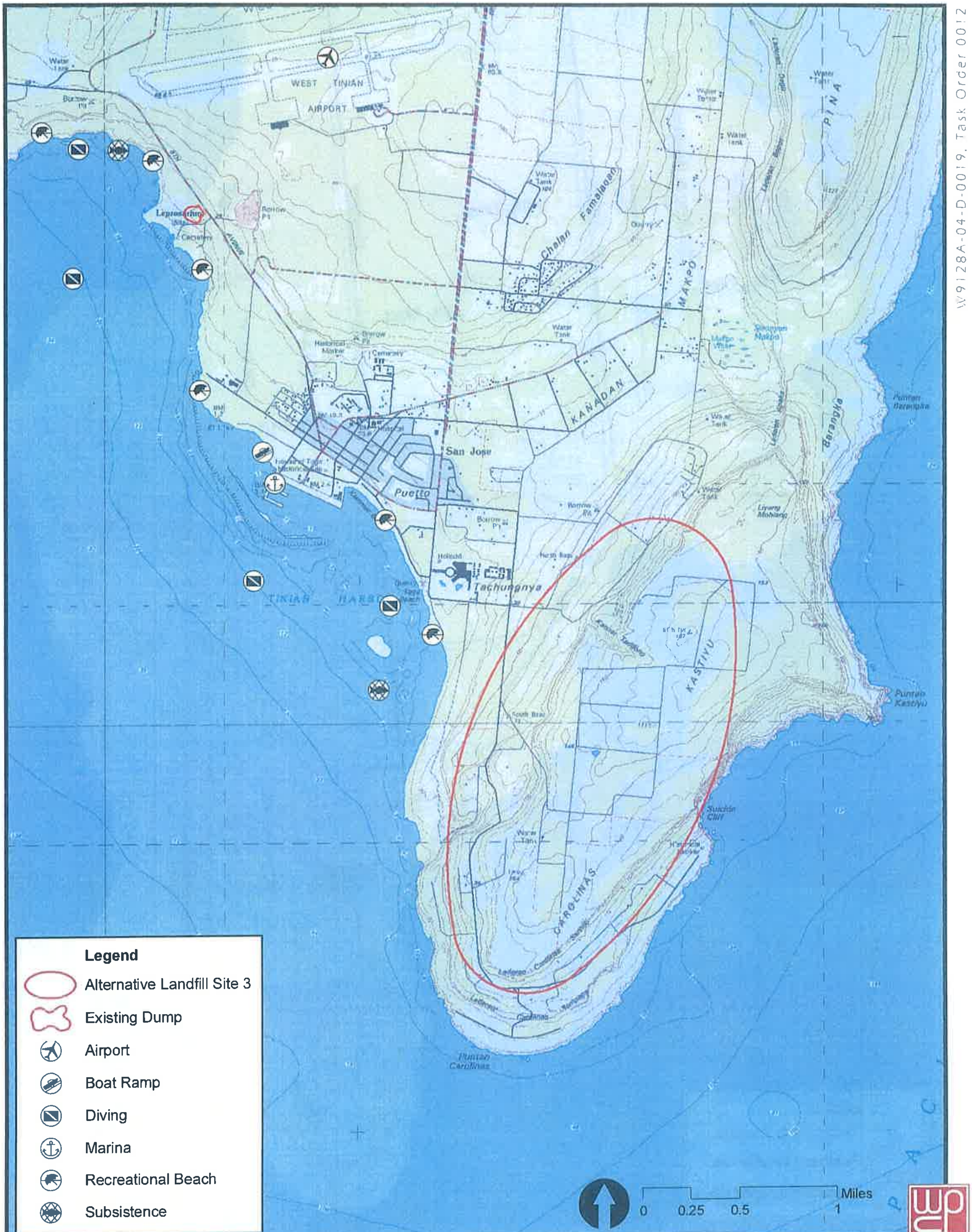


RECREATIONAL RESOURCES - PREFERRED ALTERNATIVE (ATGIDON SITE)

FIGURE 4-15

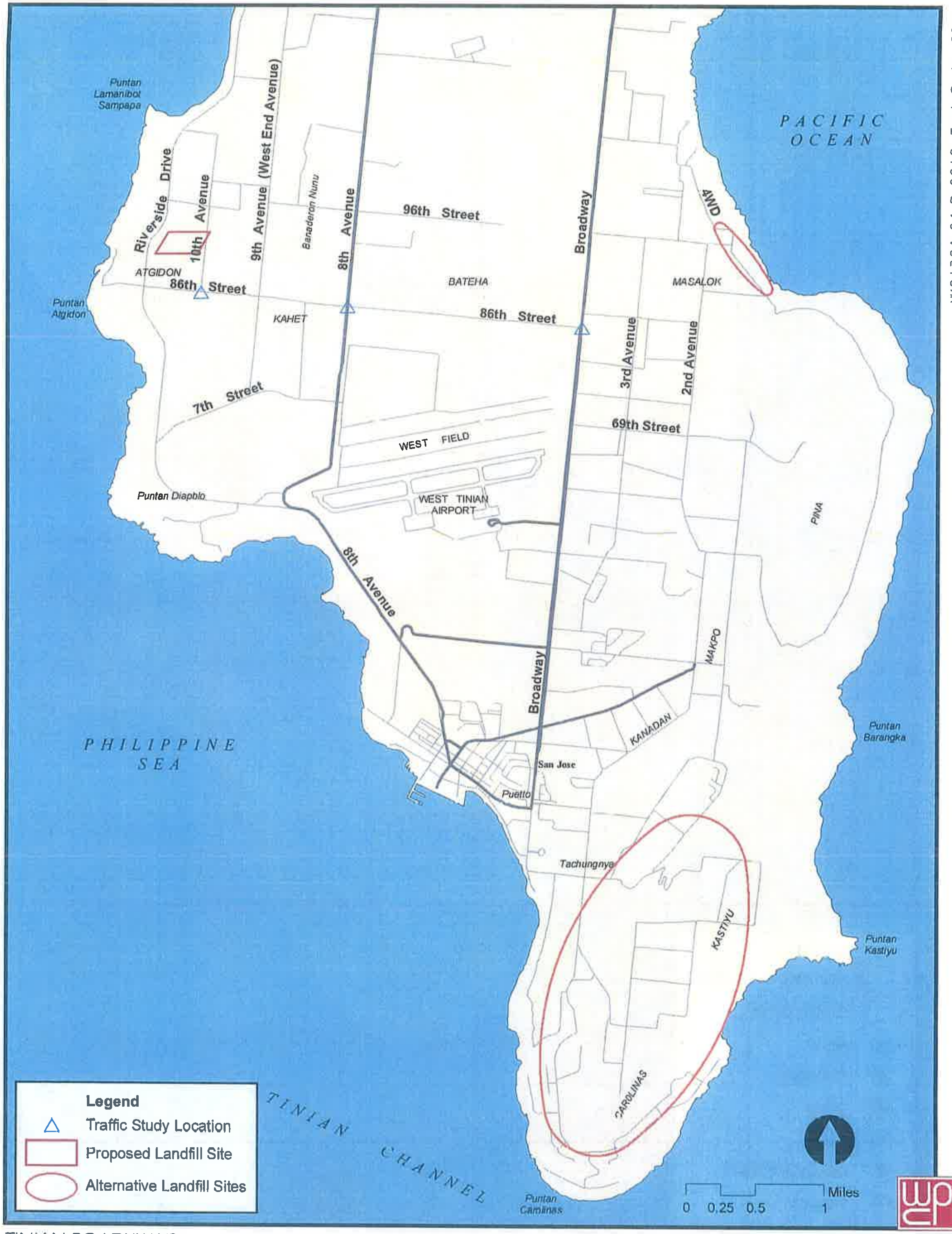
RECREATIONAL RESOURCES - ALTERNATIVE 2 (MASALOK SITE)

FIGURE 4-16



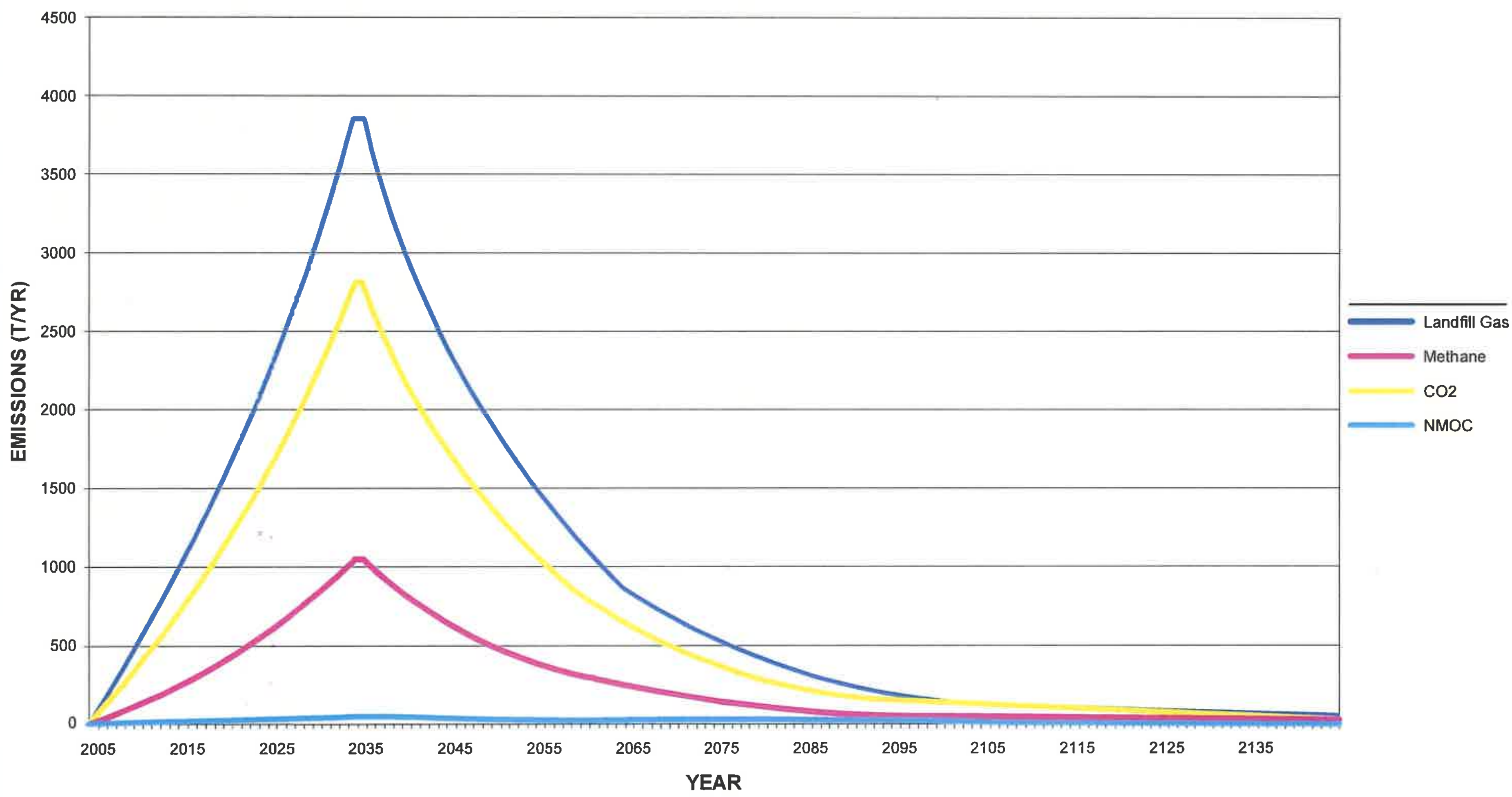
RECREATIONAL RESOURCES - ALTERNATIVE 3 (CAROLINAS SITE)

FIGURE 4-17



TINIAN ROADWAYS

FIGURE 4-18



Source: Morrow 2007

PROJECTED LANDFILL GAS EMISSIONS

FIGURE 5-1

Environmental Assessment for Landfill at Tinian

Tinian, Commonwealth of the Northern Mariana Islands

APPENDIX B

Acoustical Study

ACOUSTIC STUDY FOR THE LANDFILL AT TINIAN COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS

Prepared for:

WILL CHEE - PLANNING & ENVIRONMENTAL, INC.

Prepared by:

Y. EBISU & ASSOCIATES
1126 12th Avenue, Room 305
Honolulu, Hawaii 96816

JANUARY 2007

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CHAPTER I. SUMMARY

The future noise levels associated with the proposed Landfill at Tinian, Commonwealth of the Northern Mariana Islands (CNMI) were evaluated for their potential impact on noise sensitive receptors in the project environs. Future noise levels and potential impacts associated with landfill operations and refuse vehicles were evaluated using available forecast data.

Along the Landfill Entrance Road which is expected to service the project traffic, noise levels are expected to be less than 52 DNL (Day-Night Average Sound Level) at 100 foot distance from the roadway centerline as a result of project traffic. Surrounding the landfill site, noise levels are expected to range from 9 to 26 DNL at 1 mile distance as a result of bulldozer operations at the landfill.

Because of the remote location of the proposed landfill site (approximately four miles from the island's population center of San Jose), the noise associated with the landfill operations should not be audible and should be well below present standards for environmental noise. Along the primary access roadways to the landfill site, where concentrations of refuse vehicle traffic are expected to be highest, adverse noise impacts are not expected due to the undeveloped nature of the lands surrounding the landfill site. Along these existing roadways (such as 86th Avenue, Broadway, and 8th Avenue), increases in future traffic noise levels between 2006 and 2035 are expected to range between 6.0 and 6.3 DNL. Non-project traffic is expected to raise future noise levels by 6.0 DNL, and project traffic is expected to raise future noise levels by less than 0.4 DNL. Therefore, adverse traffic noise impacts are not expected to result from the project.

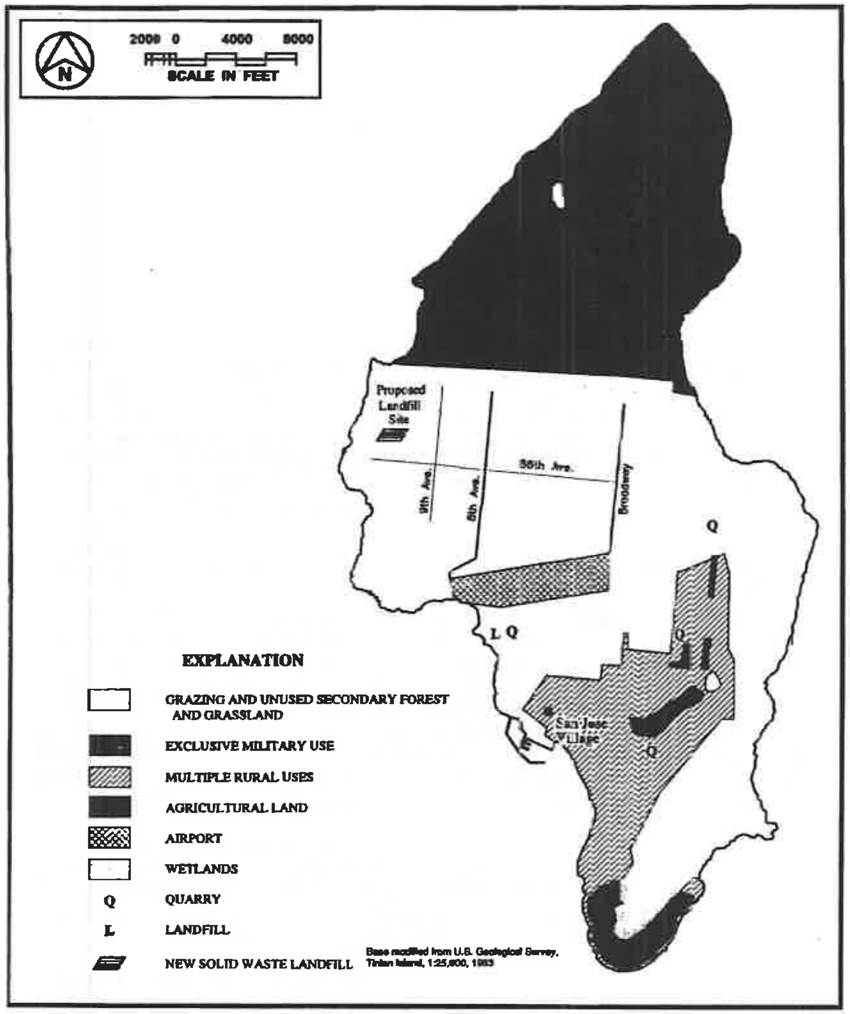
Adverse noise impacts are not anticipated during the construction of the proposed project. Large buffer distances of approximately four miles to the nearest noise sensitive building exist around the proposed landfill site. Adverse impacts from construction noise are not expected to be in the "public health and welfare" category due to the temporary nature of the work and due to the administrative controls available for its regulation. Instead, these impacts will probably be limited to the temporary degradation of the quality of the acoustic environment in the immediate vicinity of the construction work sites.

CHAPTER II. PURPOSE

The primary objective of this study was to describe the future noise levels and potential noise impacts associated with the proposed Landfill at Tinian, CNMI. The location of the project site is shown in Figure 1. The project site is located on undeveloped grazing lands approximately 4 miles north of the island's population center of San Jose.

Roadway traffic noise levels and impacts associated with the proposed project were to be determined along the primary access roadways which are expected to service the project traffic. Traffic forecasts for 2035 with and without the project were used. A specific objective was to determine future traffic noise levels associated with project traffic, and the potential noise impacts associated with project traffic. Recommendations for minimizing traffic noise impacts were to be provided as required.

Assessments of possible noise impacts from short term construction noise were also included in the noise study objectives. Recommendations for minimizing these noise impacts were to be provided as required.



PROJECT LOCATION MAP
ISLAND OF TINIAN

FIGURE 1

CHAPTER III. NOISE DESCRIPTORS AND THEIR RELATIONSHIP TO LAND USE COMPATIBILITY

The noise descriptor currently used by United States of America's federal agencies to assess environmental noise is the Day-Night Average Sound Level (DNL or Ldn). This descriptor incorporates a 24-hour average of instantaneous A-Weighted sound levels as read on a standard Sound Level Meter. The maximum A-Weighted sound level occurring while a noise source such as a heavy truck or aircraft is moving past a listener (i.e., the maximum sound level from a "single event") is referred to as the "Lmax value". The mathematical product (or integral) of the instantaneous sound level times the duration of the event is known as the "Sound Exposure Level", or Lse, which is analogous to the energy of the time-varying sound levels associated with a single event.

The DNL values represent the average noise during a typical day of the year. DNL exposure levels of 55 or less are typical of quiet rural or suburban areas. DNL exposure levels of 55 to 65 are typical of urbanized areas with medium to high levels of activity and street traffic. DNL exposure levels above 65 are representative of densely developed urban areas and areas fronting high volume roadways.

By definition, the minimum averaging period for the DNL descriptor is 24 hours. Additionally, sound levels which occur during the nighttime hours of 10:00 PM to 7:00 AM are increased by 10 decibels (dB) prior to computing the 24-hour average by the DNL descriptor. Because of the averaging used, DNL values in urbanized areas typically range between 50 and 75 DNL. In comparison, the typical range of intermittent noise events may have maximum Sound Level Meter readings between 75 and 105 dBA. A more complete list of noise descriptors is provided in Appendix B to this report. In Appendix B, the Ldn descriptor symbol is used in place of the DNL descriptor symbol.

Table 1, extracted from Reference 1, categorizes the various DNL levels of outdoor noise exposure with severity classifications. Table 2, also extracted from Reference 1, presents the general effects of noise on people in residential use situations. Figure 2, extracted from Reference 2, presents suggested land use compatibility guidelines for residential and nonresidential land uses. A general consensus among federal agencies has developed whereby residential housing development is considered acceptable in areas where exterior noise does not exceed 65 DNL. This value of 65 DNL is used as a federal regulatory threshold for determining the necessity for special noise abatement measures when applications for federal funding assistance are made.

As a general rule, noise levels of 55 DNL or less occur in rural areas, or in areas which are removed from high volume roadways. In urbanized areas which are shielded from high volume streets, DNL levels generally range from 55 to 65 DNL, and are

TABLE 1

EXTERIOR NOISE EXPOSURE CLASSIFICATION (RESIDENTIAL LAND USE)

NOISE EXPOSURE CLASS	DAY–NIGHT SOUND LEVEL	EQUIVALENT SOUND LEVEL	FEDERAL (1) STANDARD
Minimal Exposure	Not Exceeding 55 DNL	Not Exceeding 55 Leq	Unconditionally Acceptable
Moderate Exposure	Above 55 DNL But Not Above 65 DNL	Above 55 Leq But Not Above 65 Leq	Acceptable(2)
Significant Exposure	Above 65 DNL But Not Above 75 DNL	Above 65 Leq But Not Above 75 Leq	Normally Unacceptable
Severe Exposure	Above 75 DNL	Above 75 Leq	Unacceptable

Notes: (1) Federal Housing Administration, Veterans Administration, Department of Defense, and Department of Transportation.

(2) FHWA uses the Leq instead of the Ldn descriptor. For planning purposes, both are equivalent if: (a) heavy trucks do not exceed 10 percent of total traffic flow in vehicles per 24 hours, and (b) traffic between 10:00 PM and 7:00 AM does not exceed 15 percent of average daily traffic flow in vehicles per 24 hours. The noise mitigation threshold used by FHWA for residences is 67 Leq.

TABLE 2

EFFECTS OF NOISE ON PEOPLE (Residential Land Uses Only)

EFFECTS[1] / DAY-NIGHT AVERAGE SOUND LEVEL IN DECIBELS	Hearing Loss: Qualitative Description	Speech Interference, Indoor: %Sentence Intelligibility	Speech Interference, Outdoor: Distance in Meters for 95% Sentence Intelligibility	Annoyance[2]: % of Population Highly Annoyed[3]	Average Community Reaction[4]	General Community Attitude Towards Area
75 and above	May Begin to Occur	98%	0.5	37%	Very Severe	Noise is likely to be the most important of all adverse aspects of the community environment.
70	Will Not Likely Occur	99%	0.9	25%	Severe	Noise is one of the most important adverse aspects of the community environment.
65	Will Not Occur	100%	1.5	15%	Significant	Noise is one of the important adverse aspects of the community environment.
60	Will Not Occur	100%	2.0	9%	Moderate to Slight	Noise may be considered an adverse aspect of the community environment.
55 and below	Will Not Occur	100%	3.5	4%		Noise considered no more important than various other environmental factors.

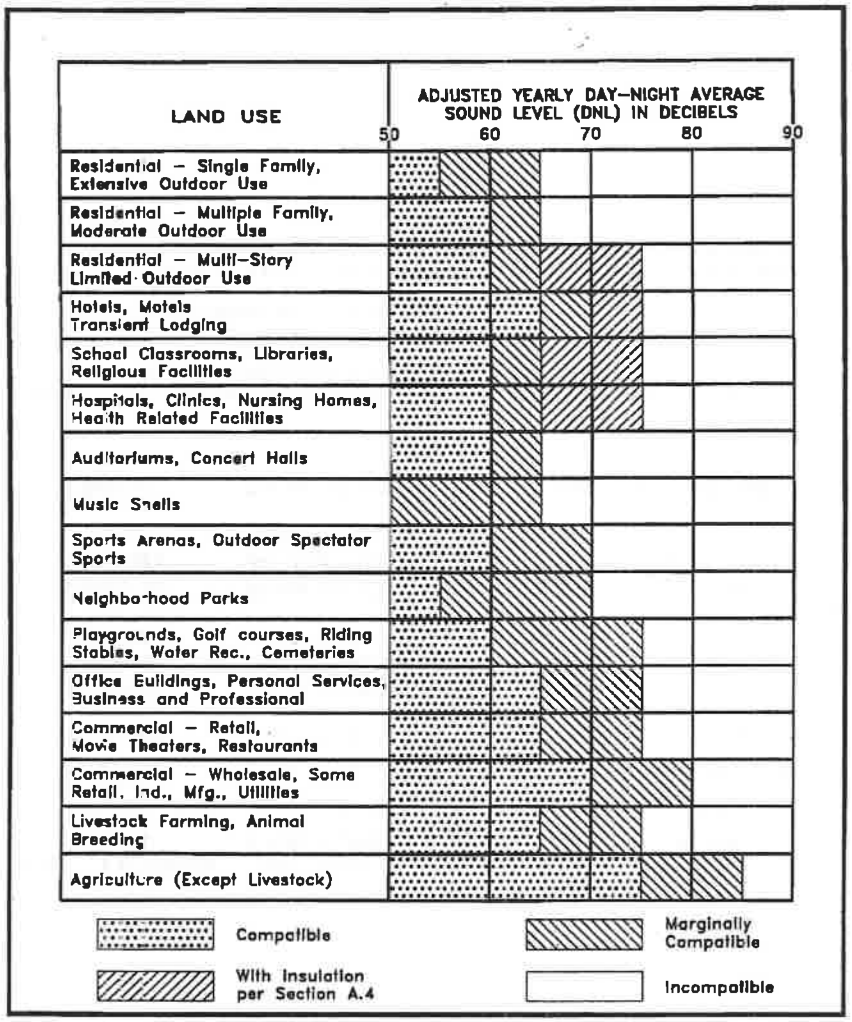
1. "Speech Interference" data are drawn from the following tables in EPA's "Levels Document": Table 3, Fig. D-1, Fig. D-2, Fig. D-3. All other data from National Academy of Science 1977 report "Guidelines for Preparing Environmental Impact Statements on Noise, Report of Working Group 69 on Evaluation of Environmental Impact of Noise."

2. Depends on attitudes and other factors.

3. The percentages of people reporting annoyance to lesser extents are higher in each case. An unknown small percentage of people will report being "highly annoyed" even in the quietest surroundings. One reason is the difficulty all people have in integrating annoyance over a very long time.

4. Attitudes or other non-acoustic factors can modify this. Noise at low levels can still be an important problem, particularly when it intrudes into a quiet environment.

NOTE: Research implicates noise as a factor producing stress-related health effects such as heart disease, high-blood pressure and stroke, ulcers and other digestive disorders. The relationships between noise and these effects, however, have not as yet been quantified.



LAND USE COMPATIBILITY WITH YEARLY AVERAGE DAY-NIGHT AVERAGE SOUND LEVEL (DNL) AT A SITE FOR BUILDINGS AS COMMONLY CONSTRUCTED.
(Source: American National Standards Institute S12.9-1998/Part 5)

FIGURE 2

usually controlled by motor vehicle traffic noise. Residences which front major roadways can be exposed to levels of 65 DNL. Due to noise shielding effects from intervening structures, interior lots are usually exposed to 3 to 10 DNL lower noise levels than the front lots which are not shielded from the traffic noise.

For the purposes of determining an acceptable level of exterior noise for residences, federal agencies have determined that an exterior noise level of 65 DNL or lower is considered acceptable. These federal agencies include the Federal Aviation Administration (FAA), Department of Defense (DOD); Federal Housing Administration, Housing and Urban Development (FHA/HUD), and Veterans Administration (VA). This standard is applied nationally (see Reference 3).

For office, commercial, industrial, and other non-noise sensitive land uses, exterior noise levels as high as 70 to 75 DNL are generally considered acceptable. Exceptions to this occur when naturally ventilated office and other commercial establishments are exposed to exterior levels which exceed 65 DNL.

Due to the large buffer distances between the landfill site and noise sensitive receptors, a need to regulate noise levels during construction of the landfill is not anticipated. If deemed necessary, noise levels during construction can be regulated as in done by the Hawaii State Department of Health (Reference 4) by limiting construction noise levels at the project boundaries and/or by limiting the periods of construction. Specific federal criteria and standards relating to construction noise levels are not available.

CHAPTER IV. GENERAL STUDY METHODOLOGY

General. Computer noise modeling as used to describe future noise levels in the project environs. The noise from bulldozer operations at the landfill and refuse vehicle traffic noise along the primary access roads servicing the landfill were evaluated. Risks of adverse noise impacts from landfill operations, traffic, and short term construction noise were determined, and possible noise mitigation measures were provided as applicable.

Landfill Noise Levels. Existing background ambient noise levels are expected to be very low because the proposed landfill site is presently undeveloped grazing lands. Existing noise levels are probably less than 45 DNL, and are probably controlled by the natural sounds of birds and vegetation moving with the wind, with occasional sounds of aircraft and boats. Future noise levels associated with the landfill operations were assumed to be controlled by bulldozer operations at the landfill site, with anticipated noise levels of 83 dBA at 100 feet from an operating bulldozer. The noise modeling was performed using inverse square law for hemispherical spreading of a sound from a source at or near the ground, with inclusion of molecular absorption and anomalous excess attenuation effects. The modeling equation used to predict sound levels at any given distance from a bulldozer noise source was:

$$L_p = L_w - 20 \times \mathrm{Log}\,(d) - [d \times a(f)] / 100 - 8$$

where:

L_p = Sound pressure level in decibels (re 2×10^{-5} Pa) at distance d (in meters),
L_w = Sound power level of noise source in decibels (re picowatt), and
a(f) = Molecular absorption plus anomalous excess attenuation in decibels per 100 meters. For the 9 standard Octave Bands from 31.5 Hz to 8,000 Hz, the a(f) values used were 0.1, 0.16, 0.27, 0.39, 0.66, 1.08, 1.9, 3.47, and 5.2.

For converting the bulldozer sound levels to DNL, it was assumed that one bulldozer would be operating for 4 hours per day between 7:00 am and 5:00 pm, 4 days per week, and 52 weeks per year. The net result of the modeling efforts was that the noise from landfill operations would not exceed 55 DNL at approximately 605 feet from the operating bulldozer.

Traffic Noise Levels. Traffic noise predictions for the future conditions (2035) were performed using the Federal Highway Administration (FHWA) Traffic Noise Model (Reference 5). Traffic data entered into the noise prediction model were: roadway and receiver locations; hourly traffic volumes, average vehicle speeds; estimates of traffic mix; and "Loose Soil" propagation loss factor. The traffic data and forecasts for the project (Reference 6) were the primary sources of data inputs to the model. The peak hour traffic volumes for 2035, which were used to model future traffic noise along the

primary access roadways in the project environs were obtained from Reference 6 and are shown in Appendix C. For existing and future traffic along the roadways servicing the project site, it was assumed that the average noise levels, or Leq(h), during the peak traffic hour were approximately equal to the 24-hour DNL along those roadways.

Traffic noise calculations for the future conditions in the project environs were developed for ground level receptors without the benefit of shielding from natural or man made obstructions. Non-project and project related traffic noise levels for future conditions in 2035 were calculated along the future Landfill Entrance Road, and along 88th Street, Broadway, and 8th Avenue.

Construction Noise. Evaluations of potential construction noise impacts at properties adjacent to the landfill site were also provided. Because of the large buffer distances to the nearest population center, expected construction noise levels were not significant at the nearest noise sensitive receptors.

CHAPTER V. EXISTING NOISE LEVELS

Existing background ambient noise levels are expected to be very low because the proposed landfill site is presently undeveloped grazing lands. Existing noise levels are probably less than 45 DNL, and are probably controlled by the natural sounds of birds and vegetation moving with the wind, with occasional sounds of motor vehicles, aircraft, and boats.

Along existing roadways which are expected to service the proposed landfill site (86th Street, Broadway, and 8th Avenue), existing traffic noise levels are estimated to be less than 59 DNL at 50 foot setback distance from the roadways' centerlines. These levels of traffic noise are considered to be very low, and are attributable to the relatively low (less than 41 vehicles per hour) peak hour traffic volumes along these three roadways.

CHAPTER VI. FUTURE NOISE ENVIRONMENT

Landfill Operations. Predictions of the noise levels associated with future landfill operations were based on a reference noise level of 83 dBA at 100 feet distance for the operating bulldozer. Spherical spreading plus molecular absorption and excess ground attenuation were used to calculate bulldozer sound levels at large distances from the landfill. Estimates of the DNL values associated with bulldozer operations at the landfill were based on one bulldozer operating 4 hours per day from 7:00 am to 5:00 pm, 4 days per week, and 52 weeks per year. The net result of these modeling assumptions was that landfill noise levels associated with bulldozer operations would not exceed 55 DNL at 605 feet distance from the perimeter of the landfill. Since 55 DNL is the most stringent published criteria for acceptable environmental noise exposure levels for noise sensitive land uses, and since the populated areas of Tinian are in the order of 4 miles away from the landfill, noise associated with landfill operations should not exceed or approach levels which are considered to be unacceptable or incompatible for noise sensitive land uses. At 4 miles from the landfill, the noise from bulldozer operating at the landfill should be inaudible.

Refuse Vehicle Traffic. Predictions of future traffic noise levels were made using the traffic volume assignments of Reference 6 for CY 2035 with and without the proposed project. Without the proposed landfill project, future traffic noise levels along existing roadways (86th Street, Broadway, and 8th Avenue) are predicted to increase by 6 DNL units between 2006 and 2035. Future traffic noise levels along these three existing roadways are predicted to be less than 65 DNL at 50 feet setback distance from these roadways' centerlines.

Along the future Landfill Entrance Road, project traffic noise levels are predicted to be 57 DNL and 55 DNL at posted speed limits of 45 or 35 miles per hour, respectively, at 50 feet setback distance from the roadway's centerline. These noise levels are relatively low, and well below current traffic noise impact criteria for noise sensitive land uses.

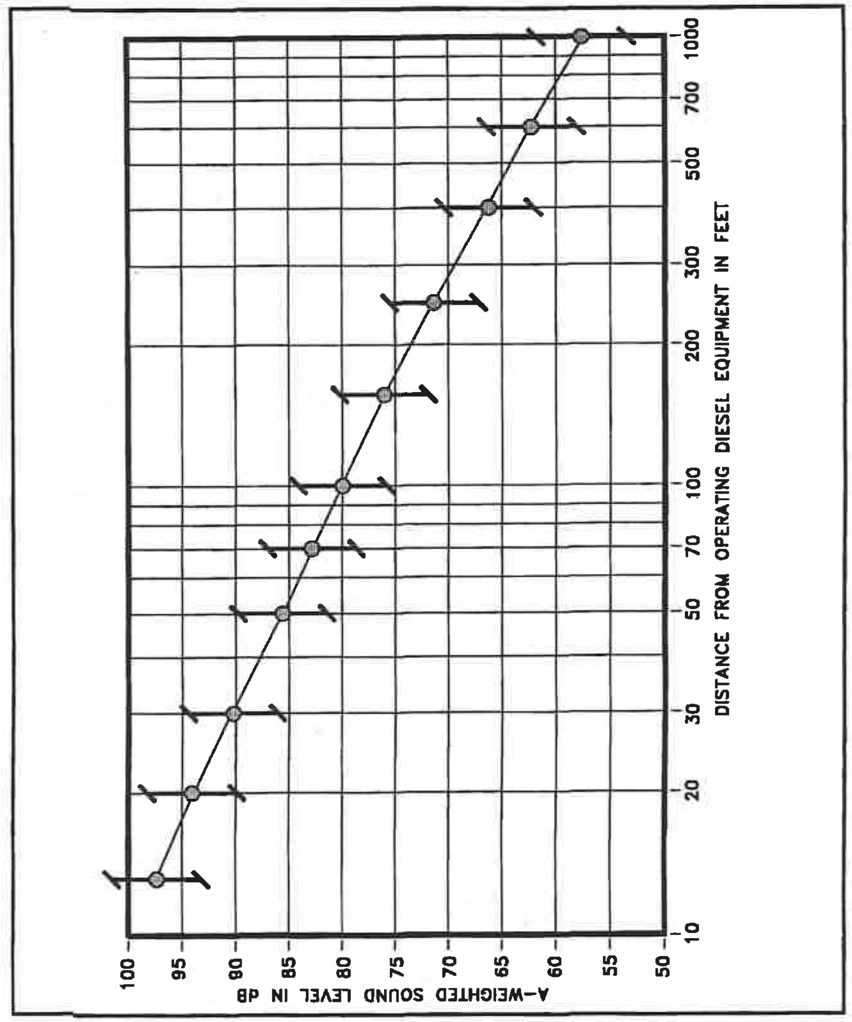
The increases in future traffic noise levels along the existing roadways (86th Street, Broadway, and 8th Avenue) due to project traffic were calculated to range from 0.03 to 0.31 DNL, which will be difficult to perceive and which are considered to be insignificant. Therefore, with or without the proposed landfill project, future traffic noise levels along these existing roadways will be less than 65 DNL at 50 feet setback distance from these roadways.

CHAPTER VII. POTENTIAL NOISE IMPACTS ASSOCIATED WITH THE PROPOSED PROJECT AND POSSIBLE MITIGATION MEASURES

Landfill Noise Impacts. Potential impacts resulting from the noise of bulldozer operations at the proposed landfill are expected to be minimal due to the large buffer distance of 4 miles between the landfill and the nearest population center of San Jose. For this reason, there should be no need for community noise mitigation measures at the landfill site.

Traffic Noise Impacts. The increases in noise levels attributable to project traffic in CY 2035 are predicted to be difficult to perceive and not significant along the existing roadways which would service the proposed landfill. Because of the remoteness of the landfill site, project related traffic noise levels along the future Landfill Entrance Road should not cause traffic noise levels to exceed the 65 DNL FHA/HUD criteria at existing noise sensitive buildings in San Jose. Risks of potential noise impacts from project traffic are considered to be very low at existing noise sensitive receptors because of the large buffer distances between the noise sensitive buildings and the Landfill Entrance Road, and because of the very low increases in traffic noise expected from project traffic along existing roadways. For these reasons, existing noise sensitive buildings in the San Jose area should not require sound attenuation measures as a result of the proposed project.

Construction Noise Impacts. Construction noise will probably be inaudible in the population center of San Jose during the entire project construction period. Typical levels of noise from construction activity (excluding pile driving activity) are shown in Figure 3. Adverse impacts from construction noise are not expected to occur due to the large buffer distances from the project site to San Jose, and construction noise mitigation measures should not be required.



ANTICIPATED RANGE OF CONSTRUCTION NOISE LEVELS VS. DISTANCE

FIGURE 3

APPENDIX A. REFERENCES

(1) "Guidelines for Considering Noise in Land Use Planning and Control;" Federal Interagency Committee on Urban Noise; June 1980.

(2) American National Standard, "Sound Level Descriptors for Determination of Compatible Land Use," ANSI S12.9-1998/ Part 5; Acoustical Society of America.

(3) "Environmental Criteria and Standards, Noise Abatement and Control, 24 CFR, Part 51 Subpart B;" U.S. Department of Housing and Urban Development; July 12, 1979.

(4) "Title 11, Administrative Rules, Chapter 46, Community Noise Control;" Hawaii State Department of Health; September 23, 1996.

(5) "FHWA Highway Traffic Noise Model User's Guide;" FHWA-PD-96-009, Federal Highway Administration; Washington, D.C.; January 1998 and Version 2.5 Upgrade (April 14, 2004).

(6) "Draft Traffic Impact Assessment Report for Proposed Tinian Landfill;" Phillip Rowell and Associates; January 4, 2007.

APPENDIX B

EXCERPTS FROM EPA'S ACOUSTIC TERMINOLOGY GUIDE

Descriptor Symbol Usage

The recommended symbols for the commonly used acoustic descriptors based on A-weighting are contained in Table I. As most acoustic criteria and standards used by EPA are derived from the A-weighted sound level, almost all descriptor symbol usage guidance is contained in Table I.

Since acoustic nomenclature includes weighting networks other than "A" and measurements other than pressure, an expansion of Table I was developed (Table II). The group adopted the ANSI descriptor-symbol scheme which is structured into three stages. The first stage indicates that the descriptor is a level (i.e., based upon the logarithm of a ratio), the second stage indicates the type of quantity (power, pressure, or sound exposure), and the third stage indicates the weighting network (A, B, C, D, E.....). If no weighting network is specified, "A" weighting is understood. Exceptions are the A-weighted sound level and the A-weighted peak sound level which require that the "A" be specified. For convenience in those situations in which an A-weighted descriptor is being compared to that of another weighting, the alternative column in Table II permits the inclusion of the "A". For example, a report on blast noise might wish to contrast the LCdn with the LAdn.

Although not included in the tables, it is also recommended that "Lpn" and "LepN" be used as symbols for perceived noise levels and effective perceived noise levels, respectively.

It is recommended that in their initial use within a report, such terms be written in full, rather than abbreviated. An example of preferred usage is as follows:

The A-weighted sound level (LA) was measured before and after the installation of acoustical treatment. The measured LA values were 85 and 75 dB respectively.

Descriptor Nomenclature

With regard to energy averaging over time, the term "average" should be discouraged in favor of the term "equivalent". Hence, Leq, is designated the "equivalent sound level". For Ld, Ln, and Ldn, "equivalent" need not be stated since the concept of day, night, or day-night averaging is by definition understood. Therefore, the designations are "day sound level", "night sound level", and "day-night sound level", respectively.

The peak sound level is the logarithmic ratio of peak sound pressure to a reference pressure and not the maximum root mean square pressure. While the latter is the maximum sound pressure level, it is often incorrectly labelled peak. In that sound level meters have "peak" settings, this distinction is most important.

"Background ambient" should be used in lieu of "background", "ambient", "residual", or "indigenous" to describe the level characteristics of the general background noise due to the contribution of many unidentifiable noise sources near and far.

With regard to units, it is recommended that the unit decibel (abbreviated dB) be used without modification. Hence, DBA, PNdB, and EPNdB are not to be used. Examples of this preferred usage are: the Perceived Noise Level (Lpn was found to be 75 dB. Lpn = 75 dB). This decision was based upon the recommendation of the National Bureau of Standards, and the policies of ANSI and the Acoustical Society of America, all of which disallow any modification of bel except for prefixes indicating its multiples or submultiples (e.g., deci).

Noise Impact

In discussing noise impact, it is recommended that "Level Weighted Population" (LWP) replace "Equivalent Noise Impact" (ENI). The term "Relative Change of Impact" (RCI) shall be used for comparing the relative differences in LWP between two alternatives.

Further, when appropriate, "Noise Impact Index" (NII) and "Population Weighed Loss of Hearing" (PHL) shall be used consistent with CHABA Working Group 69 Report Guidelines for Preparing Environmental Impact Statements (1977).

APPENDIX B (CONTINUED)

TABLE I

A-WEIGHTED RECOMMENDED DESCRIPTOR LIST

TERM	SYMBOL
1. A-Weighted Sound Level	L_A
2. A-Weighted Sound Power Level	L_{WA}
3. Maximum A-Weighted Sound Level	L_{max}
4. Peak A-Weighted Sound Level	L_{Apk}
5. Level Exceeded x% of the Time	L_x
6. Equivalent Sound Level	L_{eq}
7. Equivalent Sound Level over Time (T) (1)	$L_{eq(T)}$
8. Day Sound Level	L_d
9. Night Sound Level	L_n
10. Day-Night Sound Level	L_{dn}
11. Yearly Day-Night Sound Level	$L_{dn(Y)}$
12. Sound Exposure Level	L_{SE}

(1) Unless otherwise specified, time is in hours (e.g. the hourly equivalent level is $L_{eq(1)}$). Time may be specified in non-quantitative terms (e.g., could be specified a $L_{eq(WASH)}$ to mean the washing cycle noise for a washing machine).

SOURCE: EPA ACOUSTIC TERMINOLOGY GUIDE, BNA 8-14-78,

APPENDIX B (CONTINUED)

TABLE II

RECOMMENDED DESCRIPTOR LIST

TERM	A-WEIGHTING	ALTERNATIVE(1) A-WEIGHTING	OTHER(2) WEIGHTING	UNWEIGHTED
1. Sound (Pressure)(3) Level	L_A	L_{pA}	L_B, L_{pB}	L_p
2. Sound Power Level	L_{WA}		L_{WB}	L_W
3. Max. Sound Level	L_{max}	L_{Amax}	L_{Bmax}	L_{pmax}
4. Peak Sound (Pressure) Level	L_{Apk}		L_{Bpk}	L_{pk}
5. Level Exceeded x% of the Time	L_x	L_{Ax}	L_{Bx}	L_{px}
6. Equivalent Sound Level	L_{eq}	L_{Aeq}	L_{Beq}	L_{peq}
7. Equivalent Sound Level (4) Over Time(T)	$L_{eq(T)}$	$L_{Aeq(T)}$	$L_{Beq(T)}$	$L_{peq(T)}$
8. Day Sound Level	L_d	L_{Ad}	L_{Bd}	L_{pd}
9. Night Sound Level	L_n	L_{An}	L_{Bn}	L_{pn}
10. Day-Night Sound Level	L_{dn}	L_{Adn}	L_{Bdn}	L_{pdn}
11. Yearly Day-Night Sound Level	$L_{dn(Y)}$	$L_{Adn(Y)}$	$L_{Bdn(Y)}$	$L_{pdn(Y)}$
12. Sound Exposure Level	L_S	L_{SA}	L_{SB}	L_{Sp}
13. Energy Average Value Over (Non-Time Domain) Set of Observations	$L_{eq(e)}$	$L_{Aeq(e)}$	$L_{Beq(e)}$	$L_{peq(e)}$
14. Level Exceeded x% of the Total Set of (Non-Time Domain) Observations	$L_{x(e)}$	$L_{Ax(e)}$	$L_{Bx(e)}$	$L_{px(e)}$
15. Average L_x Value	L_x	L_{Ax}	L_{Bx}	L_{px}

(1) "Alternative" symbols may be used to assure clarity or consistency.

(2) Only B-weighting shown. Applies also to C,D,E,....weighting.

(3) The term "pressure" is used only for the unweighted level.

(4) Unless otherwise specified, time is in hours (e.g., the hourly equivalent level is Leq(1). Time may be specified in non-quantitative terms (e.g., could be specified as Leq(WASH) to mean the washing cycle noise for a washing machine.

APPENDIX C

SUMMARY OF BASE YEAR AND CY 2035 WEEKDAY TRAFFIC VOLUMES IN PROJECT ENVIRONS

ROADWAY LANES	**** CY 2006 *****		CY 2035 (NO BUILD)		CY 2035 (BUILD)	
	AM VPH	PM VPH	AM VPH	PM VPH	AM VPH	PM VPH
86th Ave Between Broadwy and 8th Ave. (EB)	18	13	70	50	72	55
86th Ave Between Broadwy and 8th Ave. (WB)	13	25	50	100	53	101
Two-Way	30	38	120	150	125	156
86th Ave West of 8th Ave. (EB)	15	15	60	60	63	67
86th Ave West of 8th Ave. (WB)	15	15	60	60	64	62
Two-Way	30	30	120	120	127	129
86th Ave Near Landfill Access Rd. (EB)	N/A	N/A	20	20	23	27
86th Ave Near Landfill Access Rd. (WB)	N/A	N/A	20	20	28	22
Two-Way	N/A	N/A	40	40	51	49
Landfill Entrance Road (NB)	N/A	N/A	N/A	N/A	8	2
Landfill Entrance Road (SB)	N/A	N/A	N/A	N/A	3	7
Two-Way	N/A	N/A	N/A	N/A	11	9
Broadway North of 86th Street (NB)	10	10	40	40	40	41
Broadway North of 86th Street (SB)	10	10	40	40	41	40
Two-Way	20	20	80	80	81	81
Broadway South of 86th Street (NB)	10	25	40	100	44	101
Broadway South of 86th Street (SB)	15	10	60	40	62	44
Two-Way	25	35	100	140	106	145
8th Avenue North of 86th Street (NB)	15	25	60	100	61	101
8th Avenue North of 86th Street (SB)	20	15	80	60	82	60
Two-Way	35	40	140	160	143	161
8th Avenue South of 86th Street (NB)	15	15	60	60	61	61
8th Avenue South of 86th Street (SB)	15	15	60	60	60	61
Two-Way	30	30	120	120	121	122

APPENDIX C

Air Quality Impact Report

AIR QUALITY IMPACT REPORT (AQIR)

PROPOSED TINIAN LANDFILL
ISLAND OF TINIAN
COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS

26 JANUARY 2007

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5	Landfill Gas Emissions

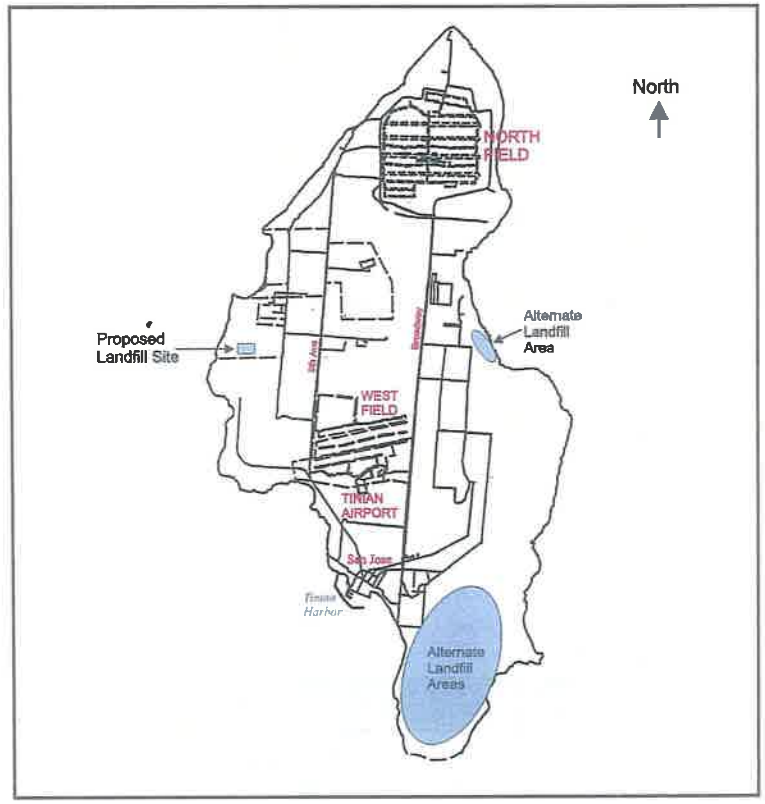
1. INTRODUCTION

A new sanitary landfill is being proposed to replace an existing open dump on the island of Tinian in the Commonwealth of the Northern Mariana Islands (CNMI).[1] Located in the western Pacific, Tinian is located in the western Pacific Ocean at 15.083 degrees north latitude and 145.750 degrees east longitude. The proposed landfill site is on the west side of the island, but other potential areas have been identified (Figure 1).

The purpose of this report is to assess the short and long-term impacts of the proposed landfill on air quality. The project can be considered both a direct source and an "indirect source" of air pollution because it will generate some onsite emissions as well road traffic in the area. It is the inherent attraction for mobile sources, i.e., motor vehicles, that makes it an "indirect source" as defined in the federal Clean Air Act.[2] The focus of this analysis, therefore, will be both on the direct emissions and the project's ability to generate additional traffic in the area with the resultant impact on air quality. Air quality impact was evaluated for current (2006) and long-term (2035) conditions with the proposed new landfill.

Finally, during initial development of the landfill site, pollutant emissions will be generated both onsite and offsite by vehicular movement, grading, and general dust-generating construction activities. These impacts have also been addressed.

FIGURE 1
ISLAND OF TINIAN



2. AIR POLLUTION CONTROL REGULATIONS

The CNMI Air Pollution Control Regulations [3] (CNMI APCR) require compliance with the U.S. national ambient air quality standards (NAAQS), a summary of which is presented in Table 1.[4,5]

Primary standards are intended to protect public health with an adequate margin of safety while secondary standards are intended to protect public welfare through the prevention of damage to soils, water, vegetation, man-made materials, animals, wildlife, visibility, climate, and economic values.[6] Note that in the case of the principal automotive pollutants [CO, NO_2, and O_3], the primary and secondary standards are identical.

The APCR require permitting of stationary sources, but with the exception of the new Tinian Power Plant and the International Broadcasting Bureau's (IBB) power plant, the older existing sources on Tinian do not yet have air permits. These include diesel engine generators, boilers, rock crushing equipment and an asphalt concrete plant. It should also be noted that the CNMI government is in the process of establishing an Alternate Title V Permitting Program pursuant to a U.S. EPA mandate.[7]

3. EXISTING AIR QUALITY

While there are no air monitoring stations on Tinian, it can be assumed that general air quality is good and in compliance with air quality standards given the small number of sources on the island. The aforementioned Tinian Power Plant and IBB power plant both had to demonstrate compliance with

TABLE 1

SUMMARY OF NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

POLLUTANT	AVERAGING PERIOD	NAAQS PRIMARY	NAAQS SECONDARY
PM_{10}	Annual 24-hr	50 150	50 150
$PM_{2.5}$	Annual 24-hr	15 65	15 65
SO_2	Annual 24-hr 3-hr	80 365 —	— — 1,300
NO_2	Annual	100	100
CO	8-hr 1-hr	10 40	— —
O_3	1-hr 8-hr	235 156	235 156
H_2S	1-hr	—	—
Pb	Calendar Quarter	1.5	1.5

KEY: PM_{10} - particulate matter ≤ 10 microns
$PM_{2.5}$ - particulate matter ≤ 2.5 microns
SO_2 - sulfur dioxide
NO_2 - nitrogen dioxide
CO - carbon monoxide
O_3 - ozone
H_2S - hydrogen sulfide
Pb - lead

All concentrations in micrograms per cubic meter ($\mu g/m^3$) except CO which is in milligrams per cubic meter.

ambient standards in order to receive their air permits. The compliance status in the immediate vicinity of other existing sources is currently uncertain and in the case of those with short exhaust stacks, may be problematic. As these sources are eventually permitted, their compliance status will be verified and those found not to be in compliance will be brought into compliance by physical modifications or operating limits in their permits.

4. CLIMATE AND METEOROLOGY

4.1 Climate The Guam and Northern Marianas climate is tropical marine, hot and humid, and moderated by northeast trade winds.[8,9] The annual mean temperature is in the low 80's Fahrenheit with average minima and maxima in the mid-70's to the high 80's. Rainfall can be variable, ranging from 80 to over 100 inches per year. In general the "wet" season is from July through October with drier conditions prevailing during the other months. An analysis of the monthly temperature and rainfall data in accordance with Thornwaite's scheme for climatic classification, yields a precipitation/ evaporation (P/E) index of 110 which also classifies the area as "humid".[10]

4.2 Surface Winds On an annual basis, the prevalence of northeast trade winds in the region is clearly shown in the data from the National Weather Service's, Guam International Airport facility (Figure 2). A close examination of the data, however, also indicates that low velocities (less than 10 mph) occur frequently (Table 2) and that these northeasterly winds do break down at times giving way to more light, variable wind conditions and a higher percentage of calm conditions (Figure 3 and Table 3).

FIGURE 2

ANNUAL WIND ROSE
GUAM INTERNATIONAL
AIRPORT

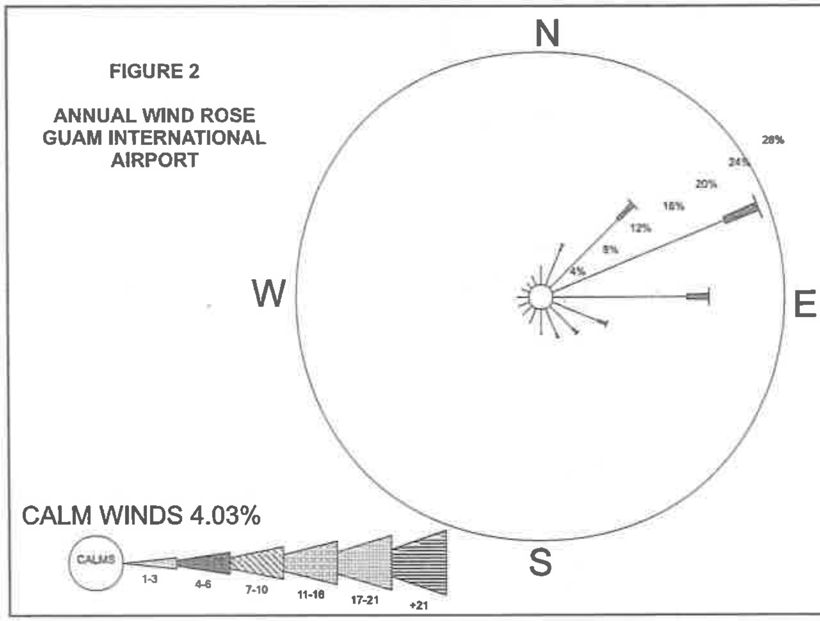


TABLE 2

ANNUAL FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION
GUAM INTERNATIONAL AIRPORT

Direction	Speed (MPH) 1 - 4	5 - 7	8 - 12	13 - 18	20 - 24	>24	Total
N	0.02156	0.00060	0.00000	0.00000	0.00000	0.00000	0.02216
NNE	0.04598	0.00822	0.00012	0.00000	0.00000	0.00000	0.05432
NE	0.11709	0.02585	0.00048	0.00012	0.00000	0.00000	0.14354
ENE	0.22597	0.04360	0.00024	0.00024	0.00000	0.00000	0.27304
E	0.16224	0.02668	0.00036	0.00012	0.00000	0.00000	0.18940
ESE	0.05956	0.01167	0.00012	0.00012	0.00000	0.00000	0.07147
SE	0.03991	0.00560	0.00119	0.00036	0.00000	0.00000	0.04705
SSE	0.03431	0.00429	0.00012	0.00000	0.00000	0.00000	0.03871
S	0.02942	0.00107	0.00000	0.00000	0.00000	0.00000	0.03049
SSW	0.01834	0.00107	0.00000	0.00000	0.00000	0.00000	0.01942
SW	0.01501	0.00060	0.00000	0.00000	0.00000	0.00000	0.01561
WSW	0.01382	0.00048	0.00000	0.00000	0.00000	0.00000	0.01429
W	0.01263	0.00083	0.00000	0.00000	0.00000	0.00000	0.01346
WNW	0.00965	0.00036	0.00000	0.00000	0.00000	0.00000	0.01001
NW	0.00715	0.00072	0.00000	0.00000	0.00000	0.00000	0.00786
NNW	0.01179	0.00012	0.00000	0.00000	0.00000	0.00000	0.01191
Total	0.82442	0.13175	0.00262	0.00095	0.00000	0.00000	0.95974

FREQUENCY CALM WINDS 0.04026

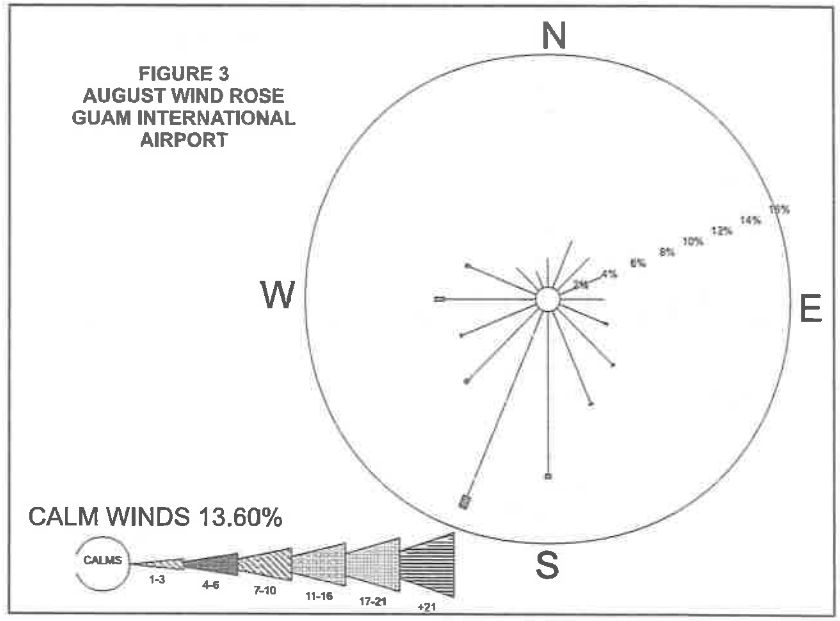


FIGURE 3
AUGUST WIND ROSE
GUAM INTERNATIONAL
AIRPORT

TABLE 3

AUGUST FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION
GUAM INTERNATIONAL AIRPORT

Direction	SPEED (MPH) 1 - 4	5 - 7	8 - 12	13-18	20 - 24	>24	Total
N	0.01964	0.00000	0.00000	0.00000	0.00000	0.00000	0.01964
NNE	0.03506	0.00000	0.00000	0.00000	0.00000	0.00000	0.03506
NE	0.03226	0.00000	0.00000	0.00000	0.00000	0.00000	0.03226
ENE	0.03226	0.00000	0.00000	0.00000	0.00000	0.00000	0.03226
E	0.03086	0.00000	0.00000	0.00000	0.00000	0.00000	0.03086
ESE	0.03366	0.00281	0.00000	0.00000	0.00000	0.00000	0.03647
SE	0.05470	0.00140	0.00000	0.00000	0.00000	0.00000	0.05610
SSE	0.06872	0.00140	0.00000	0.00000	0.00000	0.00000	0.07013
S	0.11220	0.00281	0.00000	0.00000	0.00000	0.00000	0.11501
SSW	0.13885	0.00842	0.00000	0.00000	0.00000	0.00000	0.14727
SW	0.07013	0.00281	0.00000	0.00000	0.00000	0.00000	0.07293
WSW	0.05610	0.00140	0.00000	0.00000	0.00000	0.00000	0.05750
W	0.06311	0.00701	0.00000	0.00000	0.00000	0.00000	0.07013
WNW	0.05049	0.00281	0.00000	0.00000	0.00000	0.00000	0.05330
NW	0.02244	0.00000	0.00000	0.00000	0.00000	0.00000	0.02244
NNW	0.01262	0.00000	0.00000	0.00000	0.00000	0.00000	0.01262
Total	0.83310	0.03086	0.00000	0.00000	0.00000	0.00000	0.86396

FREQUENCY CALM WINDS 0.13505

5. SHORT-TERM IMPACTS

The principal source of short-term air quality impact will be construction-related activity. Construction vehicle activity can at times increase automotive pollutant concentrations along adjoining existing streets as well as on the project site itself.. The site preparation and earth moving will create particulate matter (PM) emissions as will construction of new buildings and roadways themselves. Construction vehicle movement on unpaved on-site areas will also generate PM

emissions. EPA studies on fugitive dust emissions from construction sites indicate that about 1.2 tons/acre per month of activity may be expected under conditions of medium activity, moderate soil silt content (30%), and a precipitation/ evaporation (P/E) index of 50 [10, 11]

6. LONG TERM IMPACTS

6.1 Mobile Source Impacts

6.1.1 Mobile Source Activity. The traffic analysis report [12] prepared for the proposed project served as the basis for this mobile source impact analysis. Existing and projected future peak-hour traffic volumes for the principal intersection serving the project site were obtained from that report.

6.1.2 Emission Factors. Automotive emission factors for carbon monoxide (CO) were generated for calendar years 2006 and 2035 using EPA's Mobile Source Emissions Model (MOBILE-6.2)[13]

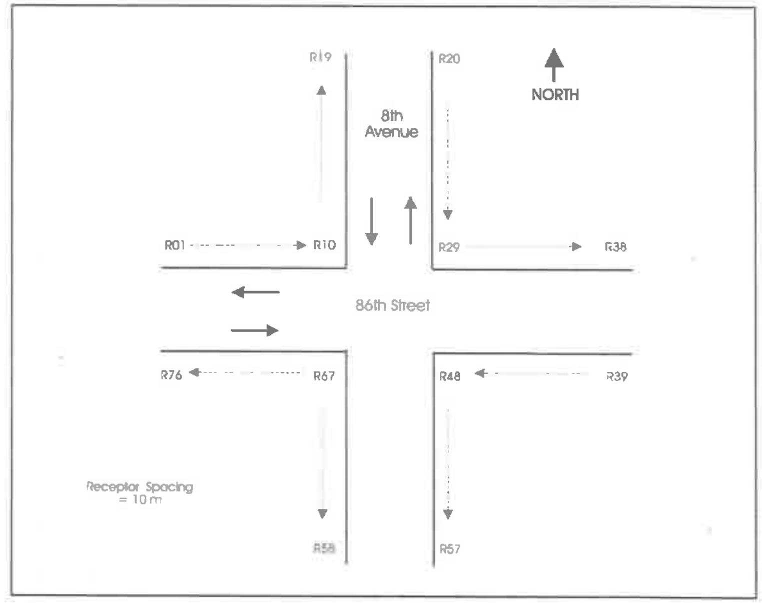
6.1.3 Modeling Methodology. Mobile source air quality modeling has historically focused on estimating concentrations of non-reactive pollutants, primarily carbon monoxide (CO). This has been the case because CO is relatively stable in the atmosphere having a half-life on the order of about one (1) month,[14] and it comprises the largest fraction of automotive emissions. [13]

Using the traffic data provided, modeling was performed for the for the years 2006 and 2035 with and without the project. The EPA guideline model CAL3QHC[15,16] was employed to estimate near-intersection carbon monoxide concentrations. CO concentrations were estimated at an array of 76 receptor sites, spaced at a distance of 10 meters along each leg of the 8th Avenue - 86th Street intersection. A CO level of 0.6 mg/m^3 was assumed as the background concentration in the modeling.

6.1.4 Results. The results of this modeling are summarized in Figure 4. Maximum estimated 1-hour and 8-hour CO concentrations in milligrams per cubic meter (mg/m^3) for each of the evaluated scenarios are presented along with the particular receptor location at which they were predicted. The results suggest that, under *worst case* conditions of meteorology and traffic, both the federal and state 1-hour and 8-hour CO standards would be met at receptor locations 10 meters and beyond the edge of roadways expected to be affected by project-related traffic. The changes in CO levels are insignificant due to the very low traffic volumes both currently and in the future, and the offsetting effect of the federal motor vehicle emissions control program. Vehicle emissions standards for motor vehicles get progressively more stringent over time; thus, older, higher emitting vehicles lost by attrition, are replaced by newer, lower-emitting vehicles which comply with the more stringent standards

FIGURE 4

ESTIMATES OF MAXIMUM 1- AND 8-HOUR CARBON MONOXIDE CONCENTRATIONS
8th Avenue at 86th Street
Peak Traffic Hours
2006 - 2035



Estimated Maximum
CO Concentration (mg/m^3)

Averaging Time	2006	2035 with project
1-hr AM	0.6 @ all	0.7 @ R06 & R39
1-hr PM	0.6 @ all	0.6 @ all
8-hr	0.6	0.6

6.2 Landfill Emissions

6.2.1 Fugitive Dust Daily operations at the landfill site will include vehicle activity involved in moving solid waste and cover material. These activities have the potential of generating fugitive dust. This impact is naturally mitigated by the humid climate and relatively high rainfall rates which contribute to higher moisture content of the soils and thus less potential for dust entrainment in the air.

6.2.2 Gases and Vapors. The quantities of gases and vapors that will be generated at the proposed Tinian Landfill have been estimated using the latest EPA emissions model [17] Figure 5 depicts a time series of gas production, while Table 4 presents estimate of the gas and vapor composition in the peak year (2035) of landfill gas production.

6.2.3 Odors A properly operated sanitary landfill is not a significant source of foul odors. While decomposition of the waste material will result in generation of gases and vapors, some of which do have inherent odors, the primary components of landfill gas, methane and carbon dioxide, are odorless. Even during the peak year of landfill gas production, the nonmethane organic compounds (NMOC) with distinct odors are emitted at very low levels. See Figure 5 and Table 4.

FIGURE 5

LANDFILL GAS EMISSIONS

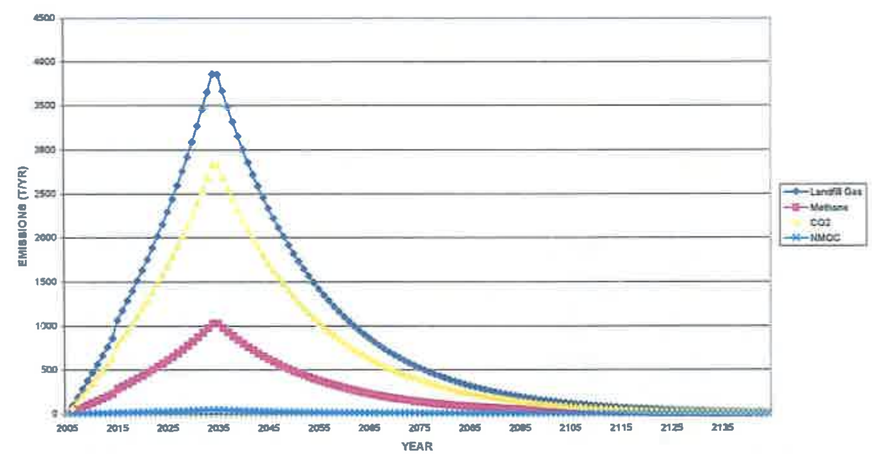


TABLE 4

PEAK YEAR (2035)
LANDFILL GAS INVENTORY

Gas/Pollutant	Emission Rate		
	Mg/yr	Ft³/yr	T/yr
Total landfill gas	3.50E+03	9.91E+07	3.85E+03
Methane	9.36E+02	4.95E+07	1.03E+03
Carbon dioxide	2.57E+03	4.95E+07	2.82E+03
NMOC	4.02E+01	3.96E+05	4.42E+01
1,1,1-Trichloroethane (methyl chloroform) - HAP	7.47E-03	4.75E+01	8.22E-03
1,1,2,2-Tetrachloroethane - HAP/VOC	2.15E-02	1.09E+02	2.37E-02
1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.77E-02	2.38E+02	3.05E-02
1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	2.26E-03	1.98E+01	2.49E-03
1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	4.73E-03	4.06E+01	5.21E-03
1,2-Dichloropropane (propylene dichloride) - HAP/VOC	2.37E-03	1.78E+01	2.61E-03
2-Propanol (isopropyl alcohol) - VOC	3.51E-01	4.35E+03	3.86E-01
Acetone	4.74E-02	6.93E+02	5.22E-02
Acrylonitrile - HAP/VOC	3.90E-02	6.24E+02	4.29E-02
Benzene - No or Unknown Co-disposal - HAP/VOC	1.73E-02	1.38E+02	1.90E-02
Benzene - Co-disposal - HAP/VOC	1.00E-01	1.09E+03	1.10E-01
Bromodichloromethane - VOC	5.93E-02	3.07E+02	6.52E-02
Butane - VOC	3.39E-02	4.95E+02	3.73E-02
Carbon disulfide - HAP/VOC	5.15E-03	5.75E+01	5.67E-03
Carbon monoxide	4.58E-01	1.39E+04	5.03E-01
Carbon tetrachloride - HAP/VOC	7.18E-05	3.96E-01	7.90E-05
Carbonyl sulfide - HAP/VOC	3.43E-03	4.85E+01	3.78E-03
Chlorobenzene - HAP/VOC	3.28E-03	2.48E+01	3.61E-03
Chlorodifluoromethane	1.31E-02	1.29E+02	1.44E-02
Chloroethane (ethyl chloride) - HAP/VOC	9.79E-03	1.29E+02	1.08E-02
Chloroform - HAP/VOC	4.18E-04	2.97E+00	4.60E-04
Chloromethane - VOC	7.07E-03	1.19E+02	7.78E-03
Dichlorobenzene - (HAP for para isomer/VOC)	3.60E-03	2.08E+01	3.96E-03
Dichlorodifluoromethane	2.26E-01	1.59E+03	2.48E-01
Dichlorofluoromethane - VOC	3.12E-02	2.58E+02	3.43E-02
Dichloromethane (methylene chloride) - HAP	1.39E-01	1.39E+03	1.53E-01
Dimethyl sulfide (methyl sulfide) - VOC	5.65E-02	7.73E+02	6.22E-02
Ethane	3.12E+00	8.82E+04	3.43E+00
Ethanol - VOC	1.45E-01	2.67E+03	1.60E-01
Ethyl mercaptan (ethanethiol) - VOC	1.67E-02	2.28E+02	1.83E-02
Ethylbenzene - HAP/VOC	5.70E-02	4.56E+02	6.27E-02
Ethylene dibromide - HAP/VOC	2.19E-05	9.91E-02	2.41E-05
Fluorotrichloromethane - VOC	1.22E-02	7.53E+01	1.34E-02
Hexane - HAP/VOC	6.64E-02	6.54E+02	7.30E-02
Hydrogen sulfide	1.43E-01	3.57E+03	1.57E-01
Mercury (total) - HAP	6.79E-06	2.87E-02	7.47E-06

TABLE 4

PEAK YEAR (2035)
LANDFILL GAS INVENTORY
(Continued)

Gas/Pollutant	Emission Rate		
	Mg/yr	Ft³/yr	T/yr
Methyl ethyl ketone - HAP/VOC	5.97E-02	7.03E+02	6.57E-02
Methyl isobutyl ketone - HAP/VOC	2.22E-02	1.88E+02	2.44E-02
Methyl mercaptan - VOC	1.40E-02	2.48E+02	1.54E-02
Pentane - VOC	2.78E-02	3.27E+02	3.06E-02
Perchloroethylene (tetrachloroethylene) - HAP	7.16E-02	3.67E+02	7.87E-02
Propane - VOC	5.66E-02	1.09E+03	6.22E-02
t-1,2-Dichloroethene - VOC	3.17E-02	2.77E+02	3.48E-02
Toluene - No or Unknown Co-disposal - HAP/VOC	4.19E-01	3.86E+03	4.61E-01
Toluene - Co-disposal - HAP/VOC	1.83E+00	1.68E+04	2.01E+00
Trichloroethylene (trichloroethene) - HAP/VOC	4.29E-02	2.77E+02	4.72E-02
Vinyl chloride - HAP/VOC	5.32E-02	7.23E+02	5.86E-02
Xylenes - HAP/VOC	1.49E-01	1.19E+03	1.64E-01

Mg = megagram = 1 million grams
NMOC = nonmethane organic compound
HAP = hazardous air pollutant
VOC = volatile organic compound

7. CONCLUSIONS AND MITIGATION

7.1 Short-Term Impacts. Since, as noted in Section 4, the project area is considered to be "humid" by Thornwaite's climatic classification system with a P/E index much higher than that associated with the EPA fugitive dust emission factor, there appears to be a reduced potential for fugitive dust. Nevertheless, it will still be important to employ adequate dust control measures, particularly if construction occurs during the drier months. Dust control can be accomplished by frequent watering of unpaved roadways and areas of exposed soil. The EPA estimates that twice daily watering can reduce fugitive dust emissions by as much as 50% [10].

7.2 Long-Term Impacts

7.2.1 Mobile Source Impacts. As reported in Section 6.1, compliance with federal and state carbon monoxide standards is demonstrated under *worst case* conditions of meteorology and peak hour traffic; thus, no special mitigative measures are required.

7.2.2 Landfill Emissions

7.2.2.1 Fugitive Dust. As noted in Section 6.2, there is a potential for fugitive dust during normal landfill operations, to some extent mitigated by the humid climate. Just as during the construction period, however, during droughts or other periods of low rainfall, an onsite water truck may be needed

to wet down cover material prior to movement. Timely covering of solid waste may also be necessary to prevent light materials, e.g., paper, from being blown off site.

7.2.2.2 Gases and Vapors. Generation of gases and vapors are a normal result of waste decomposition, and the principal gases, methane and carbon dioxide, are odorless and nontoxic at ambient concentrations. The nonmethane organic compounds (NMOC), many of which are listed hazardous air pollutants (HAP), [18] are emitted in quantities well below the 10 T/yr threshold for individual HAPs or 25 T/yr total HAP threshold that would trigger permitting requirements.[19]
It should also be noted that upon eventual closure of the landfill, the methane generated by the decomposing waste can be collected and used for its energy value. In the peak year of gas production (2035), the energy value of the methane produced is equivalent to over 350,000 gallons of diesel fuel.

7.2.2.3 Odors. Odorous components comprise a very small fraction of the landfill gas and vapors, well below any emission threshold that would require air permitting. During routine operation, mixing and daily covering of deposited waste material may reduce ambient odors. The proposed landfill site is also well situated to disperse any odors that may occur away from populated areas due to the prevailing northeasterly trade winds. Upon eventual landfill closure, a gas collection system designed for energy recovery would further reduce any odorous emissions and provide additional, albeit small, additional energy value.

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17. U.S. Environmental Protection Agency. *Landfill Gas Emissions Model (LandGEM) Version 3.02 User's Guide*, EPA-600/R-05-047, May 2005

18. Clean Air Act, 42 U.S.C.A., § 7412(b)

19. 40 CFR §70.2, July 2006

APPENDIX D

Natural Resources Survey

Natural resources surveys for a proposed new Tinian sanitary landfill, Tinian Island, CNMI [1]

June 5, 2007 *AECOS* No. 1118

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INTRODUCTION

The primary purpose of this natural resources survey of a proposed municipal landfill site on Tinian Island in the Commonwealth of the Northern Marianas (CNMI) was to determine if there exist plant or animal species currently listed, or proposed for listing under either U.S. Endangered species act of 1973, as amended (ESA), or the Commonwealth of Northern Marianas (CNMI) endangered species statutes within or adjacent to the proposed site. The U.S. Federal and CNMI listed species presented here in Table 1; species status is from one or more of the following referenced documents: CNMI (1991a, 1991b), Division of Fish and Wildlife, Commonwealth of the Northern Marianas (DFW, 2006) Federal Register (2005), and U. S. Fish & Wildlife Service (USFWS, 2005a, 2006).

Biological survey efforts were concentrated on the preferred site, a 30-acre area (with an additional 30-acre buffer surrounding the site and included in the surveys) located on the west side of Tinian at Atgidon approximately 4.5 miles from the port and only significant town of San Jose, located on the southwest side of the Island. Three other sites were visited for the purpose of making comparisons with the preferred site. However, only a very cursory biological inventory was undertaken at these locations, which were 1) the existing landfill just north of San Jose town ("open dump" in Fig. 1), 2) a broadly defined area on the uplands (Carolinas Ridge) southeast of town, and 3) a location at the east coast of the island. These areas are shown in Fig. 1.

[1] Prepared for Wil Chee Planning Inc. to be included or utilized in the preparation of the *Environmental Assessment for Landfill at Tinian, Commonwealth of the Northern Mariana Islands*, a public document.
[2] Vertebrate biologist from Rana Productions Ltd., Kailua-Kona, Hawaii.

Table 1 . Threatened or endangered plant and animal species possibly present on or offshore of Tinian.

English Common Name	*Scientific Name*	Chamorro Name	US	CNMI
PLANTS*				
---	*Lycopodium phlegmaria*	*Kotdon di San Francisco*	---	E
---	*Serianthes nelsonii*	*Hayon lagu* or *tronkon guafi*	E	E
---	*Nesogenes rotensis*	*Nanasa gaqifigo* or *fianiti*	—	CS
Osmoxylon	*Osmoxylon mariannense*	---	—	CS
---	*Tabernaemontane rotensis*	*Trongkon sumak*	—	CS
---	*Heritiera longipetiolata*	*Ufa-halomtano*	—	CS
ANIMALS				
Pacific Sheath-tailed bat	*Emballonura semicaudata rotensis*	*Fanihin liyang*	---	CS
Marinas fruit bat	*Pteropus mariannus marianus*	*Fanihi*	T	PT
Micronesian Megapode	*Megapodius laperouse*	*Sasangat*	E	E
Common Moorhen	*Gallinula chloropus guami*	*Ghereel bweel*	E	E
Mariana Swiftlet	*Aerodramus bartschi*	*Leghekeyang Chichirikan*	E	E
Tinian Monarch	*Monarcha takatsukasae*	*Tinian*	---	T
Hawksbill Sea Turtle	*Eretmochelys imbircata*	*Haggan karai*	E	E
Leatherback Sea Turtle	*Dermochelys coriacea*	*Haggan Tasi*	E	---
Green Sea Turtle	*Cheldonia mydas*	*Haggan bed'di*	T	E
Micronesian gecko	*Perochirus ateles*	*Gaali'ek*	---	E

* - Only *ufa-halomtano* of the six plant species is known from Tinian

Key to Table 1

US	Status, if any under US endangered Species Act of 1973, as amended
CNMI	Status, if any under Commonwealth of Northern Marianas Endangered Species List
T	Threatened under respective endangered species statutes
E	Endangered under respective endangered species statutes
CS	Candidate for listing under CNMI endangered species statute
PT	Proposed as a threatened species under respective endangered species statutes

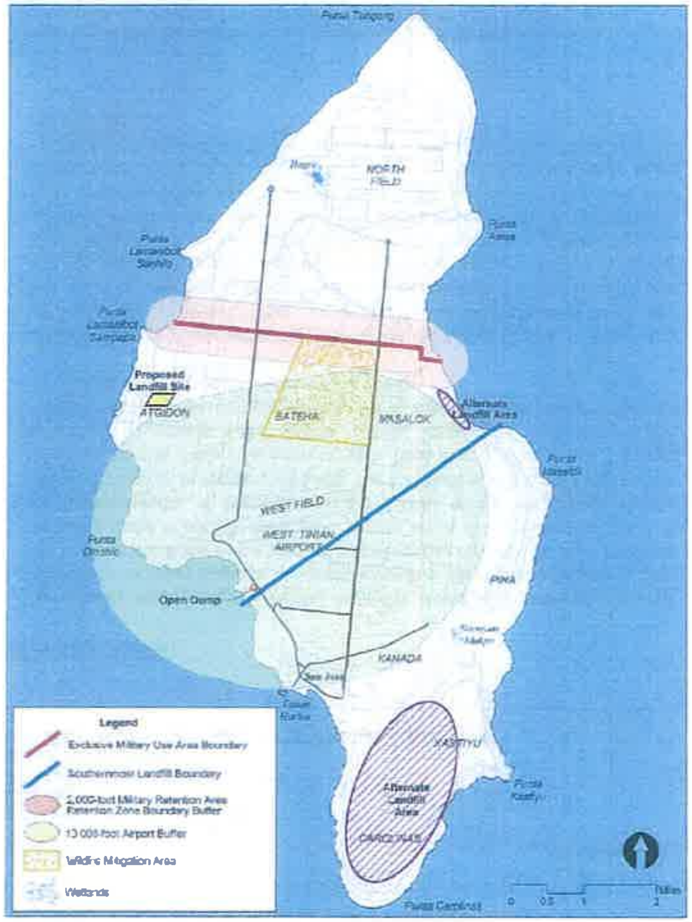

Figure 1. Map of the island of Tinian showing various locations described in the text (taken from WCP, 2006).

METHODS

Vegetation Survey

The plants extant on the proposed landfill site were surveyed by making repeated wandering transects across the proposed landfill site. Because the survey needed to be conducted in the accompaniment of an EXO Specialist (WCP, 2006), it was decided that this could accomplished most efficiently by undertaking the botanical survey in concert with the archaeology survey, with the botanist (Guinther) serving as part of the sweep team looking for historical artifacts, while generally wandering from side to side along each transect line as they were laid out across the site from west to east or east to west and taking notes on the vegetation and plant species as they were encountered. This resulted in a very thorough exploration of the area, as the demands for searching for archaeological and historical artifacts in the moderately dense vegetation required closer coverage of the site than might be typical for discovering plant species. The 60-acre survey site was covered by 8 transects conducted over 5 days (June 6-10, 2006).

Plant names mostly follow Raulerson (2006). Local names are taken from Stone (1970) and other sources on the internet.

Terrestrial Vertebrate Survey

With the exception of the Pacific sheath-tailed bat (*Emballonura semicaudata rotensis*), and the Marianas fruit bat (*Pteropus m. marianus*), all other terrestrial mammals currently found on the Island of Tinian are alien species, and most are ubiquitous. The CNMI population of the Marianas fruit bat is listed as threatened under the ESA and has been proposed for listing as a threatened species under CNMI endangered species statutes. The survey of terrestrial vertebrate was limited to visual and auditory detection, coupled with visual observation of scat, tracks, and other animal sign. A running tally was kept of all vertebrate species observed and heard within the project area. Although beyond the scope of this survey, incidental observation records were kept of all amphibian and reptilian species encountered during the course of the avian and mammalian surveys. Three turtle species known from CNMI waters, Hawksbill Sea Turtle (*Eretmochelys imbircata*), Leatherback Sea Turtle (*Dermochelys coriacea*), and Green Sea Turtle (*Cheldonia mydas*), are protected under federal and CNMI endangered species statutes. One terrestrial reptile, the Micronesian Gecko (*Perochirus ateles*), is protected under CNMI law, but not under the ESA (DFW 2006, Federal Register 2005, USFWS 2005a, 2006).

The avian phylogenic order and nomenclature used in this report follows *Birds of The World: A Checklist*. Fifth Edition (Clements 2000), and supplements to *Birds of* *the World: A Checklist* (Clements 2000 – 2005).Mammal scientific names follow *The Mammals of Tinian, Marianas Islands* (Wiles et al. 1990). Reptile and amphibian identification and range reference *Non-technical Key for the Reptiles and Amphibians of the Marianas Islands* (Rodda 1988), and *Notes on the Herpetofauna of Tinian, Mariana Islands* (Wiles et al. 1989).

Avian Survey Transects

Nineteen avian count stations were established along three transects running from west to east through the property. These corresponded with three of the archaeological transects that had been established and flagged. Stations were sited at approximately 150-meter intervals along these three linear transects. Eight-minute point counts were made at each station. Stations were each counted once. Field observations were made with the aid of Leitz 10 X 42 binoculars and by listening for vocalizations. Counts were concentrated between 6 and 10 a.m., the peak of daily bird activity. Time not spent counting was used to search the area for species and habitats not detected during count sessions.

RESULTS

Vegetation

The vegetation of Tinian and its changes over historical time is well described in Mueller-Dombois and Fosberg (1998). Accounts date back to Anson (1748) and reflect over time horrendous impacts on the vegetation from the early Spanish forced removal of the native Chamorros population and use of the island as pasture for herds of wild cattle to the Japanese occupation period in the early 1920s when every square foot of the island with level soil was cleared for agriculture. The Japanese, and later the Americans, developed extensive military facilities across the island in the years leading up to, during, and after World War II.

The vegetation on rough limestone surfaces, and especially sea cliffs, is characterized by native species, but the vegetation on soil-covered surfaces holds "not a trace of the original forest" (Mueller-Dombois and Fosberg, 1998). The highly permeable limestone that comprises most of the island does not support stream development of any kind. However, two wetlands (Hagoi Marsh or Lake Hagoya and Sisoyan Makpo or Makpo Marsh) occur on the island (Wil Chee Planning, 2005). Neither is close to the project area or the alternative sites briefly investigated by us.

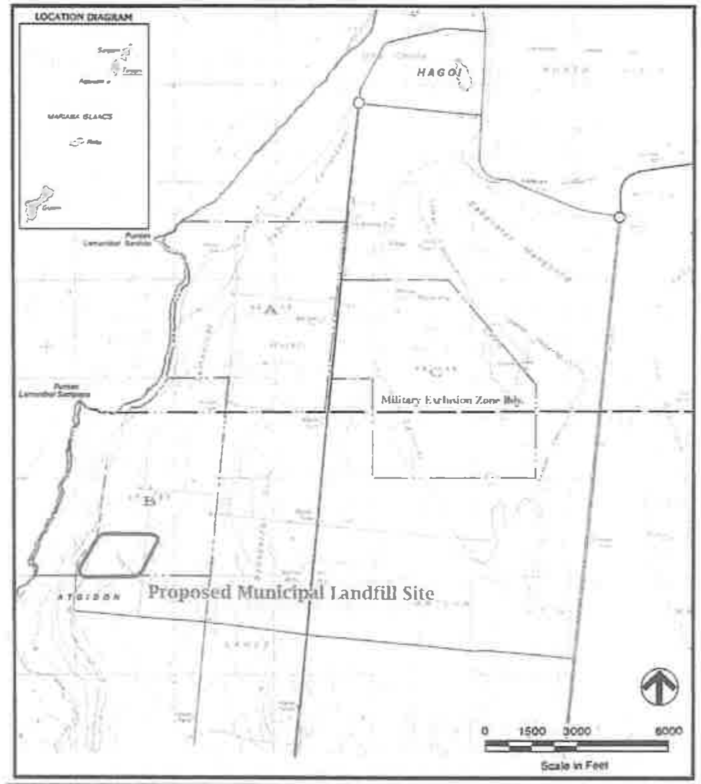

Figure 2. Western central Tinian Island showing proposed Municipal Landfill Site (biological survey area outlined in red). Areas "A". "B", and "C" are from 1994 surveys of biota for the VOA project (base map redrawn from David, 1994).

The proposed landfill site is characterized generally by a low stature forest of several species, but largely dominated by tangantangan (*Leucaena leucocephala*), a species that Fosberg noted in 1980 as covering the central and southern plateau and lower western slopes of the ridges as a dense, monospecific forest (Mueller-Dombois and Fosberg, 1998). Prominent, larger trees found at the survey site include *niyok* or coconut (*Cocos nucifera*), *gagu* or ironwood (*Casuarina equisetifolia*), *hoda* (*Ficus tinctoria*), and *sosugi* (*Acacia confusa*). Also. several shrubs or small trees: *sumac* (*Aidia cochinchinensis*), *ahgao* (*Premna serratifolia*), *lodugao* (*Clerodendrum inerme*), and *agatelang* (*Eugenia palumbis*), and the clamoring native shrub known as *banagu* (*Jasminum marianum* DC) are all generally common within the *tangantangan* forest. In most places, the forest floor is densely covered with the herb, *yerbas babui* (*Blechum pyramidatum*), or in some places the fern, *kahlao* (*Phymatosorus grossus*). Noteworthy over the entire area are several different vines that are very abundant (Fig. 3), including *Centrosema pubescens*, *Mikania scandens*, *Ipomoea* spp., *Macroptilium atropurpureum*, *Canavalia* sp., and *alalag* (*Operculina turpethum* var. *ventricosa*).

Figure 3. Vines (here, *Mikania scandens*) dominate much of site, especially wherever the *tangantangan* canopy is somewhat open. .

The vegetation type would be classified as Disturbed Community: subtype Tangantangan Forest (Falanruw, Cole, & Ambacher, 1989). In some areas, the subtype might be better classified as Secondary Forest, although the general impression is that many of the taller trees, especially the *gagu* or ironwood and African tulip (*Spathodea campanulata*) at the site are there owing to deliberate plantings over half a century before.

Deviation from the description above was most evident at the more extreme east and west sides of the survey site where roadways are present (the north-south road through the eastern edge of the site is no longer passable by vehicle, but it and other roads can still be discerned within the forest). In these locations, ironwood

(or other) trees line the road. The eastern road has long been abandoned, but the route can be seen clearly from the air and on the ground by the rows of tall *gagu*. A variety of introduced, weedy species line the regularly used but unimproved track along the west side of the site.

Relatively small, open fields covered by elephant or Napier grass (*Pennisetum purpureum*) are scattered throughout the site, especially in the eastern half. Human influenced plantings, all presumably dating from the early half of the 20th century, are present. An example is an old road lined with African tulip trees that have since blown down and resprouted from the horizontal trunks forming a copse. Other examples are patches of introduced species such as *tigre* (*Sanseviera trifasciata*) seen in association with various World War II period ruins, especially on the eastern edge of the site.

Flora

Table 2 is a listing of all the plant species identified from the proposed landfill site. The status (mostly as given in Raulerson, 2006) of the plants identified show a mix of native (status in bold lettering) and non-native species.

Table 2. Listing of vascular plants at the proposed Tinian landfill site, June 2006

Species listed by family	Common names	Status	Abundance FRST	Abundance RD	Notes
FERNS AND FERN ALLIES					
NEPHROLEPIDACEAE					
Nephrolepis hirsutula (Forst.) Presl.	*amaru*	**Ind.**	O3		
POLYPODIACEAE					
Phymatosorus grossus (Langsd. & Fisch.) Brownlie	*kahlao, sese*	**Ind.**	C2		
Pyrrosia lanceolata (L.) Farw	—	Nat.	O3		
FLOWERING PLANTS **DICOTYLEDONES**					
ACANTHACEAE					
Barleria cristata L.	Philippine violet	Nat.	R2		
Blechum pyramidatum (Lam.) Urb.	*yerbas babui*	Nat.	AA		
Odontonema cuspidatum (Nees) O. Kunze	—	Nat.	O		
AMARANTHACEAE					
Achyranthes aspera L.	*chichiton*	**Ind.**	U		
ASTERACEAE (COMPOSITAE)					
Bidens alba L.	beggar tick	Nat.		A	(1)
Chromolaena odorata (L.) King & Rob	Siam weed	Nat.		C	(1)
Mikania scandens (L.) Willd.	climbing hempvine	Nat.	A		

Table 2 (continued).

Species listed by family	Common name	Status	Abundance FRST	Abundance RD	Notes
BIGNONIACEAE					
Spathodea campanulata P. Beauv.	African tulip tree	Nat.	U2		
CARICACEAE					
Carica papaya L.	papaya	Nat.	O		
CASUARINACEAE					
Casuarina equisetifolia L.	*gagu*, ironwood	**Ind.**	O	C	
CELASTRACEAE					
Maytenus thompsonii (Merr.) Fosb.	*luluhut*	**End.**	R		
CONVOLVULACEAE					
Ipomoea cf. *alba* L.	---	Nat.	A		(2)
Ipomoea indica (J. Burm.) Merr.	blue morning glory	**Ind.**		O	
Ipomoea obscura (L.) Ker-Gawl.	---	Nat.	R		
Operculina turpethum var. *ventricosa* (Bert.) Staples & Austin	*alalag*	**Ind.**	O2		
CUCURBITACEAE					
Momordica charantia L.	*atmagosu*, balsam pear	Nat.	U		
EUPHORBIACEAE					
Melanolepis multiglandulosa (Reinw. Ex Bl.) Reichb. F. & Zoll.	*alom*	**Ind.**	O		
FABACEAE					
Abrus precatorius L.	*kolales halomtano*	Nat.	O		
Acacia confusa Merrill	*bofuring, sosugi*	Nat.	O		
Canavalia cf. *megalantha* Merrill	---	**End.**	C		(2)
Centrosema pubescens Benth.	---	Nat.	A		
Cynometra ramiflora L.	*gulos*	**Ind.**	R		
Desmanthus pernambucanus (L.) Thellung	virgate mimosa	Nat.		O	(1)
Leucaena leucocephala (Lam.) deWit	*tangantangan*	Nat.	AA	O	
Macroptilium cf. *atropurpureum* (DC) Urb.	---	Nat.	C		(2)
Mimosa invisa Martius	sensitive plant	Nat.	U	U	
Mucuna gigantea (Willd.) DC	*gayetan*, sea bean	**Ind.**		U	
Pithecellobium dulce (Roxb.) Benth.	*kamachile*	Nat.	R		
MALVACEAE					
Sida ciliaris L.	---	Nat.		C	(1)
Sida rhombifolia L.	Cuba jute	Nat.	O		(1)
MORACEAE					
Ficus tinctoria var. *neo-ebudarum* (Summerh.) Fosb.	*hoda, tagete*	**Ind.**	O		

Table 2 (continued).

Species listed by family	Common name	Status	Abundance FRST	Abundance RD	Notes
MYRTACEAE					
Eugenia palumbis Merr.	*agatelang*	**End.**	O		
Eugenia reinwardtiana DC	*a'abang*	**End.**	U		
Eugenia uniflora L.	*pitanga*, Surinam cherry	Nat.	R		
OLEACEAE					
Jasminum marianum DC	*banago*, Marianus jasmine	**End.**	O		
PASSIFLORACEAE					
Passiflora foetida L.	love-in-the-mist	Nat.	O		(1)
PLUMBAGINACEAE					
Plumbago zeylanica L.	---	**Ind.**	R		(3)
POLYGONACEAE					
Antigonon leptopus H. & A.	Mexican creeper	Nat.	U3		
PORTULACACEAE					
Portulaca oleracea var. *granulato-stellulata* v. Poelln.	*botdo lagas*	**Ind.**	R		
RUBIACEAE					
Aidia cochinchinensis Lour.	*sumak*	**Ind.**	C		
Morinda citrifolia L.	*lada*, Indian mulberry	**Ind.**	O		
Spermacoce assurgens Ruiz & Pav.	buttonweed	Nat.		U	(1)
RHAMNACEAE					
Colubrina asiatica (L.) Brongn.	*gasoso*	**Ind.**	U		
SAPINDACEAE					
Cardiospermum halicacabum L.	balloon vine	Nat.	R	U	
SOLANACEAE					
Capsicum frutescens L.	*doni-sali*, chili pepper	Nat.	O		
Solanum americanum Mill.	nightshade	**Ind.**	U		
VERBENACEAE					
Clerodendrum inerme (L.) Gaertn.	*lodugao*	**Ind.**	A		
Lantana camara L.	lantana	Nat.		C	(1)
Premna serratifolia L.	*ahgao*	**Ind.**	C	O	
Stachytarpheta jamaicensis (L.) Vahl	---	Nat.		O	(1)
Stachytarpheta cayennensis (Rich.) Vahl	---	Nat.		O	(1)
MONOCOTYLEDONS					
AGAVACEAE					
Sanseviera trifasciata Prain	*tigre*, bowstring hemp	Nat.	U3		
ARECACEAE					
Cocos nucifera L.	*niyok*, coconut	Nat.	U2		
COMMELINACEAE					
Commelina diffusa N.L. Burm.	*semprebiban-damalong*	Nat.	R2		

Table 2 (continued).

Species listed by family	Common name	Status	Abundance FRST	Abundance RD	Notes
CYPERACEAE					
Kyllinga nemoralis Rottb.	---	Nat.	R		
PANDANACEAE					
Pandanus tectorius Parkinson ex Z	*kafo, akgak*	Ind.	U		
POACEAE					
Cenchrus echinatus L.	sandbur	Nat.		R	(1)
Cynodon dactylon (L.) Pers.	Bermuda grass	Nat.		A	
Digitaria ciliaris (Retz.) Koel.	Henry's crabgrass	Ind.		A	(1)
Digitaria insularis (L.) Mez ex Ekman	sourgrass	Nat.	R2		
Eragrostis tenella (L.) P. Beauv. ex Roem. & Schult.	lovegrass	Nat.		U	(1)
Oplismenus hirtellus (L.) Beauv.	basketgrass	Ind.		U3	
Paspalum paniculatum L.	---	Nat.		A	(1)
Pennisetum polystachion (L.) Schult.	feathery pennisetum	Nat.		C	(1)
Pennisetum purpureum Schumach.	elephant grass	Nat.	O3	O	
Sporobolus sp.	dropseed	Ind.		A	(1)
indeterminable grass	---	???		O	(1)

Key to Table 2

STATUS = distributional status for the Mariana Islands
- **end.** = endemic; native to the Mariana Islands and found naturally nowhere else
- **Ind.** = indigenous; native to the Mariana Islands, but not unique to these Islands
- **nat** = naturalized, exotic plant introduced to theMarianas, and now established outside of cultivation

ABUNDANCE = occurrence ratings for plants by area
- R – Rare: seen in only one or perhaps two locations
- U - Uncommon: seen at most in several locations
- O - Occasional: seen with some regularity
- C - Common: observed numerous times during the survey
- A - Abundant: found in large numbers; may be locally dominant
- AA - Very abundant: abundant and dominant; defining vegetation type

Numbers following an occurrence rating indicate clusters within the survey area. The ratings above provide an estimate of the likelihood of encountering a species within the specified survey area; numbers modify this where abundance, where encountered, tends to be greater than the occurrence rating:
- 1 – several plants present
- 2 - many plants present
- 3 – locally abundant

FRST – Abundance over majority of site (forested); RD – Abundance along active or abandoned roads at or near the margins of the site

NOTES:
- (1) — Typically found in roadside disturbed areas (east and west ends)
- (2) — Specimen(s) observed lacked a key feature (flower, fruit, etc.) needed for positive identification
- (3) — Not reported from Tinian by Raulerson (2006)

Three ferns were observed, all seen occasionally (or commonly in the case of *kahlao* (*Phymatosorus grossus*), but each also numerous where encountered. The *Pyrrosia* was observed in dense concentrations on *sosugi* trunks, especially dead trunks and

seemed to prefer open canopy situations. Raulerson (2006) lists the species of *Pyrrosia* found on Tinian as *Pyrrosia lanceolata*.

A total of 67 species of flowering plants (and additionally, three fern species) were observed over the proposed landfill site. Slightly more than one-third (36%) of these species are considered species native to Tinian. Possibly five species are endemics (found only in the Mariana Islands). The vine-like *banago* (*Jasminum marianum*) was seen occasionally and is apparently relatively common throughout the islands. Another vine, *Canavalia* sp. lacked identifying flowers or fruit and could not be confirmed to species, but could be the native *C. megalantha Eugenia palumbis* and *E. reinwardtiana* were both photographed and differentiated in the field using the key in Stone (1970), although uncertainty exists as to whether both species were actually present as vouchers were not collected. Another Mariana endemic, *Maytenus thompsonii*, was seen only twice during the survey, whereas *Eugenia* plants were widespread over the area. *Maytenus thompsonii* is the preferred host of the candidate species, *Vagrans egestina* (Mariana wandering butterfly), presently found only on Rota, but once common on Guam.

Terrestrial Vertebrate Survey

Two mammalian species were detected during the course of this survey. Four musk shrews (*Suncus murinus*) were seen or heard within the project site. Several dogs (*Canis f. familiaris*) were heard barking from areas outside of the study area. No mammalian species currently protected, or proposed for protection under either CNMI endangered species statutes, or the ESA, were detected during the course of this survey

We recorded one amphibian and seven terrestrial reptile species while conducting natural resources surveys within the study site. Dead giant (marine) toads (*Bufo marinus*) were seen on all of the roads in and around the site, as were several live animals within the site. Island geckos (*Gehyra oceania*), stump-toed gecko (*Gehyra mutilata*), and mourning geckos (*Lepidodactylus lugubris*) were both seen and heard within the study site. Both curious skinks (*Carlia fusca*) and blue-tailed skinks (*Emoia caeruleocauda*) were seen on numerous occasions in leaf litter and sunning themselves. Guinther reported seeing two green tree skinks (*Lamprolepis smaragdina*), a species he is familiar with from previous work in the Republic of Belau. Two monitor lizards (*Veranus indicus*) were seen running along roads in or adjacent to the study site, one of which was quite large.

Avian Survey Results

A total of 454 individual birds of 12 species, representing 11 separate families, were recorded during station counts (Table 3). No additional species were recorded while transiting between count stations. Ten of the species detected are native to the Commonwealth of the Northern Marianas. One of these, Tinian Monarch (*Monarcha takatsukasae*), is endemic to the Island of Tinian. Tinian Monarchs are also listed as an endangered species under CNMI endangered species statutes (DWF, 2006). This species was formerly listed as threatened under the ESA, but was delisted in September 2004 (USFWS, 2004). Three of the remaining nine native species detected: White-tailed Tropicbird (*Phaethon lepturus dorothea*), Yellow Bittern (*Ixobrychus sinensis*), and White Tern (*Gygis alba candida*) are indigenous resident breeding species. The remaining six native species detected: White-throated Ground-Dove (*Gallicolumba xanthonura xanthonura*), Collared Kingfisher (*Halcyon chloris albicilla*), Rufous Fantail (*Rhipidura rufifrons saipanensis*, Bridled White-eye (*Zosterops conspicillata saypani*), Micronesian Honeyeater (*Myzomela rubratra saffordi*) and Micronesian Starling (*Aplonis opaca guami*) are all Mariana Islands endemic sub-species of more widely distributed species. The remaining two species detected: Red Junglefowl (*Gallus gallus*) and Island Collared Dove (*Streptopelia bitorquata dusumieri*), also known as Philippine Turtle Dove, are alien to the CNMI (Table 3).

Table 3. . Avian species detected at the proposed Tinian Landfill site

Common name	Scientific name	Chamorro name	ST	RA
	GALLIFORMES			
	PHASIANIDAE – Pheasants & Partridges			
	Phasianinae – Pheasants & Allies			
Red Junglefowl	*Gallus gallus*	*Mangnok halom tano*	A	0.37
	PELECANIFORMES			
	PHAETHONTIDAE – Tropicbirds			
White-tailed Tropicbird	*Phaethon lepturus dorothea*	*Fagpi apaka*	IB	0.05
	CICONIIFORMES			
	ARDEIDAE – Herons, Bitterns & Allies			
Yellow Bittern	*Ixobrychus sinensis*	*Kakkak*	IB	0.1
	LARIDAE – Gulls, Terns & Skimmers			
	Sterninae – Terns			
White Tern	*Gygis alba candida*	*Chunge*	IB	4.05

Table 3 (continued).

Common name	Scientific name	Chamorro name	ST	RA
	COLUMBIFORMES			
	COLUMBIDAE – Pigeons & Doves			
Island Collared-Dove	*Streptopelia bitorquata dusumieri*	*Paluman apu*	A	1.79
White-throated Ground-Dove	*Gallicolumba xanthonura xanthonura*	*Paluman apaka / fachi*	Es	0.16
	CORACIIFORMES			
	ALCEDINIDAE - Kingfishers			
Collared Kingfisher	*Halcyon chloris albicilla*	*Sihek*	Es	1.84
	PASSERIFORMES			
	RHIPIDURIDAE - Fantails			
Rufous Fantail	*Rhipidura rufifrons saipanensis*	*Chichirika*	Es	2.11
	MONARCHIDAE - Monarchs			
Tinian Monarch	*Monarcha takatsukasae*	*Chichirikan Tinian*	ET	2.11
	ZOSTEROPIDAE - White-eyes			
Bridled White-eye	*Zosterops conspicillata saypani*	*Not'sa*	Es	8.63
	MELIPHAGIDAE - Honeyeaters			
Micronesian Honeyeater	*Myzomela rubratra saffordi*	*Egigi*	Es	0.95
	STURNIDAE - Starlings			
Micronesian Starling	*Aplonis opaca guami*	*Sali*	Es	1.74

Key To Table 3

ST	Status
A	Alien Species – Not native to the Marianas Islands, introduced by humans, and now established
IB	Indigenous Breeding Species – Native to the Marianas, but also found elsewhere naturally
Es	Endemic Sub-species – Native and unique sub-species to the Marinas Islands
ET	Endemic Tinian Species – Native and unique to the Island of Tinian
RA	Relative Abundance – the number of birds detected divided by the number of count stations (19)

Avian diversity and densities were in keeping with the location of the study site and the habitat present on the site. Two species, Bridled White-eye (*Zosterops conspicillata saypani*), and White Tern (*Gygis alba candida*) accounted for 53% of the total number of all birds recorded during station counts. The most commonly recorded species was the Bridled White-eye, which accounted for 36% of the total number of individual birds recorded. An average of 24 birds was detected per station count.

No avian species currently protected, or proposed for protection under the ESA were detected during the course of this survey (Federal Register 2005, USFWS 2005a, 2006).

DISCUSSION

Previous Biological Surveys

A previous botanical survey of the general area of the proposed landfill by Herbst (1994) describes the vegetation and flora in three areas selected for potential siting of the Voice of America Mariana Relay Station (now International Broadcasting Station). The survey covered Areas "A", "B", and "C" as shown on our Fig. 2, Area B including the proposed landfill site surveyed here. Herbst mentions two earlier botanical surveys in Area B by Funk (1989a, 1989b). Although Herbst surveyed several community types over the much larger area than that of the present survey, the Disturbed Community, Tangantangan Forest comprised the far greatest area. His plant listing includes recorded abundance by community type. A total of 124 taxa (including 4 fern species) were recorded, 95 (including 2 fern species) of which were associated with the Tangantangan Forest subtype.

The nature of the forest seems to differ in a number of ways from that described by Herbst (1994). In both surveys, the over-story of tangantangan was mostly a closed canopy, but in the landfill survey several shrubs (*sumac, ahgao, lodugao*), vines, and a hebaceous ground cover are all prominent within the forest. Tangantangan is dense, but generally easy to traverse, except where the numerous vines entangle and impede progress, or various shrubs form dense thickets. David (pers. comm.) conducted vertebrate surveys at the same time as the Herbst survey, and recalls that the tangantangan forest was more open beneath the canopy, a fact that might be attributed to the cattle and goats that were seen regularly in the area in 1994 and not at all in 2006, or possibly seasonal or longer term differences in the rainfall received by the island (see also USFWS, 1996, 2005b).

The first systematic surveys of the avifauna of the Island of Tinian were started in 1982. During that year the CNMI-DFW, in concert with the USFWS, designed and undertook the first comprehensive forest bird survey of the Islands of Saipan, Tinian, Agiguan and Rota (Engbring et al., 1986). Their transect No. 4 passed mere meters from the southern boundary of the proposed landfill site. That survey was then replicated in 1996 (Lusk et al. 2000). In 1985 Hawaiian Agronomics, Inc. conducted an extensive multi-disciplinary biological survey of the Military Retention Area on the Island. Their surveys addressed distribution and relative abundance not only of birds but also of bats and reptiles within the area they surveyed. Many of the findings generated by that survey were later published in various scientific journals which laid the foundation of knowledge on the makeup, distribution and densities of various natural resources on the Island.

In 1994 a complete flora and fauna survey was conducted as part of the preparation of an Environmental Assessment for the then proposed Voice of America, Mariana

Relay Station project. The current proposed landfill site is wholly contained within that projects Area "B" (see Fig. 2; David, 1994). Having this additional data from these previous surveys greatly enhances the value of the data gathered during the course of this survey. Most of the ornithological and mammalian literature that predates these fairly recent surveys predominantly represented the cataloging of species seen and collected by various groups of visitors to the Island, rather than any attempts to systematically study population densities and relative abundance of the wildlife (Engbring et al., 1984; Baker, 1951).

Botanical Resources

The findings of this survey are consistent with previous surveys (Funk 1989a, 1989b; Herbst, 1994) of the area that describe a *tangantangan*-dominated forest of generally low stature supporting a mixture of Tinian native plants and introduced or alien, naturalized species.

The most abundant groundcover plant in the *tangantangan* forest is *Blechum pyramidatum* (=*B. brownei* Juss.). It's characteristics as noted in 2006[3] suggested a species of Acanthaceae, although Herbst (1994) only recorded the distinctive *Barlaria cristata* from this family. There are no native Acanthaceae in the Marianas.

Herbst (1994) included as Table 1 in his report a breakdown of the flora observed by major grouping and status. Table 4 is modified from Herbst, using only those species listed in 1994 as occurring in the Secondary Forest, Tangantangan Forest, and/or Open Field subtypes of the Disturbed Communities Vegetation Type. The results are compared with the findings of our survey. Overall, the present survey suggests that recovery within the Tangantangan forest in the intervening decade has favored native species, which now comprise a greater percentage of the species present. This result does not necessarily translate into a greater abundance of native species. We can obtain a very rough estimate of native abundance by considering only those plant species recorded as common or abundant over the survey area. For Herbst (1994) this number is 18 species (secondary and

[3] Originally unidentified, with the following description provided: Sprawling or decumbent herbaceous plant mostly 3-4 dm high with grooved, slightly angular stems rooting at the nodes, leaves opposite, mostly ovate to rhomboid, 2-4 cm long, displaying prominent cystolith streaks on both surfaces, all parts of stem and leaves strigulose to some degree, leaves especially so on the veins, leaf margins entire, tips acuminate, bases attenuate to flattened petioles up to 1 cm long; leaves smaller and hirsute on flowering stems which also bear paired, villous, linear to subulate bracts in two sizes (8-9 mm and 2-3 mm long) subtending axilary cymes of one to three flowers on very short pedicels; sepals five, short-villous, connate at base of fruit, open corolla not seen, but appears tubular in bud; fruit a puberulent, hyaline, bivalvate capsule, ovoid, 4-6 mm long, beaked at distal end and containing 5-6 brown, compressed orbicular seeds each about 2 mm across. A subsequent return visit to Tinian in March 2007 confirmed that the plants seen in June 2006 were immature *B. pyramidatum*.

tangantangan forest only) with 4 (22%) native; for the 2006 survey it is 7 species ("forest" only) with 3 or 4 (>43%) probably native.

Table 4. Status of Species 1994 compared with 2006 from the same general area and vegetation sub-types on Tinian.

	Native	Non-native	Total
Herbst (1994)			
PTERIDOPHYTA	4 (100%)	0 (0%)	4
GYMNOSPERMAE	0 (0%)	0 (0%)	0
MONOCOTYLEDONEAE	2 (8%)	23 (92%)	25
DICOTYLEDONEAE	19 (26%)	55 (74%)	74
TOTAL	25 (24%)	78 (76%)	103
Present report (2006)			
PTERIDOPHYTA	2 (67%)	1 (33%) ?	3
GYMNOSPERMAE	0 (0%)	0 (0%)	0
MONOCOTYLEDONEAE	4 (25%)	12 (75%)	16
DICOTYLEDONEAE	17 (34%)	32 (64%)	50
TOTAL	23 (33%)	44 (64%)	69

Note: The 1994 survey covered a much larger area than the 2006 survey (see Fig. 2).

Mammalian Resources

The findings of the mammalian survey are consistent with the results of one other faunal survey conducted on the subject property (David, 1994), and with at least one other extensive faunal survey conducted on Tinian (Hawaiian Agronomics, Inc., 1985). The findings of this survey are less extensive than those recorded by the aforementioned surveys, which is in keeping with the much smaller scale of this effort when compared to those other surveys.

As previously mentioned we did not record bats of any species during the course of this, or the previous survey conducted on this site (David, 1995). Anecdotal information gathered during the course of the 1994 survey indicated that there is some limited usage of areas in the northern and central parts of the Island by small numbers of Mariana fruit bats in May and June, when animals are attracted to flowering kapok trees (*Ceiba pentandna*). Within historic times, fruit bats were very common on Tinian. At the turn of the twentieth century, Fritz commented on the large number of these bats that were to be seen on the Island (Fritz, 1901). He further mentioned that fruit bat were a favorite food of the local Chamorros (Fritz 1904). By the end of the Second World War there were at least two large colonies remaining: one at Makpo of approximately 500 bats and another at Mt. Lasu of 100 or so (Wiles et al., 1990). The onset of commercial hunting in the 1970's wiped out

the bulk of the remaining bats. Between 1975 and 1986, an average of 210 fruit bats was shipped from Tinian to Guam each year (Wiles et al., 1986). By 1984 Wiles estimated that the Tinian population of fruit bats was no greater than 25 animals (Wiles et al., 1989). Recent surveys on Tinian have had little success in recording this diminishing species. Over hunting clearly was the leading cause of the rapid decline of this species. Although there have been a series of moratoriums on hunting fruit bats since 1987, they are still being killed. Poaching is a major cause of the continuing decline of this species (Wiles et al., 1990). The few fruit bats that are occasionally sighted on Tinian are quite possibly animals from Agiguan, where a small population exists, or possibly from Saipan where this species still persists in small numbers (Wiles et al., 1990; David, 2006).

The Sheath-tailed bat (*Emballonura semicaudata*) has never been documented from the Island of Tinian (Lemke, 1986). The only known extant population of this formerly wide spread bat in the Marianas is located on Agiguan, south of Tinian (Stinson, 1994). It is probable that this species did inhabit Tinian in the past. What caused the decline and extirpation of this bat from its former range is not known. However, it can be surmised that human disturbance in the form of wholesale clearing of native habitat for the sugar cane industry in the 1920's and 30's, coupled with the destruction of many of the naturally occurring caves during the war, culminating with the extensive use of pesticides following the war are plausible reasons for the extirpation of this insectivorous bat from most of the Mariana Islands (Baker, 1946; Wiles et al., 1990).

As previously mentioned we only recorded two mammalian species during the course of this survey: musk shrew and dog, both alien species on Tinian. Although no rodents were detected during this survey, it is likely that roof rats (*Rattus rattus*) use resources on the site, as they are a common, widespread species on the Island and were recorded during the 1994 faunal survey of this site (Wiles et al., 1990; David, 1994). It is likely that following build-out of this proposed sanitary landfill there will be an increase in commensal mammalian species such as mice, rats, dogs, and cats in the general area.

Avian Resources

The findings of the avian survey are consistent with the results of one other ornithological survey conducted on the subject property (David, 1994), and with several other avian surveys conducted on lands immediately adjacent to the subject property (Hawaiian Agronomics, Inc., 1985; Engbring et al., 1986; Lusk et al., 2000). The species list generated during this survey is the same as that generated during the 1994 survey with the exception that we did not record the native Mariana Fruit-Dove (*Ptilinopus roseicapilla*) in 2006, but did record it on the same site during the 1994 survey (David, 1994). This result is likely because this relatively small proposed landfill site had no fruiting trees to attract fruit-doves on it at the time we conducted the latest survey.

There are currently three resident avian species listed under the Federal ESA that have historically been recorded on the Island of Tinian (Table 1). A fourth species, Mariana Mallard (*Anas platyrhynchos oustaleti*), a Mariana endemic sub-species of the cosmopolitan Mallard (*Anas platyrhynchos*), was formerly listed under both the ESA and the DFW endangered species statutes. The last documented sighting of a Mariana Mallard in the wild was that of a lone female seen on Lake Susupe, Saipan on June 1, 1979; and the last known Mariana Mallard in captivity died at Sea World, San Diego in 1981. The Mariana Mallard was listed as endangered in 1977. The USFWS removed the Mariana Mallard from the Federal List of Endangered and Threatened Wildlife in 2004, due to it's extinction (USFWS, 1977, 2004; Engbring et al., 1986). The Tinian Monarch was also formerly listed as an endangered species under the federal ESA, but was down-listed to threatened status in 1987 and then delisted in September 2004 (USFWS, 1970, 1987, 2004). This species is still listed as a threatened species under CNMI endangered Species statutes (DFW. 2006).

The remaining three federally listed avian species are the Micronesian Megapode (*Megapodius laperouse*), Common Moorhen (*Gallinula chloropus guami*), and Mariana Swiftlet (*Aerodramus bartschi*). We did not detect any of these species during the present or 1994 (David, 1994) surveys of the site. These findings are not surprising as the Micronesian Megapode has rarely been recorded on Tinian; in fact the last confirmed sighting of a megapode on Tinian was documented by Gary Wiles in the Maga area in 1985 (Wiles et al., 1987). There are however numerous anecdotal accounts of this species occurring on Tinian, most of them are of birds purported to have been seen in the Mt. Lasu area. This area with its small limestone cliffs and uneven limestone substratum is a logical area to suspect as habitat for this species. Given the conspicuous nature of this species it is hard to mesh the lack of documented sightings with the anecdotal record. Numerous attempts have been made to locate this species on Tinian over the past 30 years. Several scientists have attempted to verify some of these anecdotal sightings, so far to no avail (Glass, and Aldan, 1988; Engbring et al. 1986; T. Sutterfield, 1994; T. K. Pratt, 1994; H. D. Pratt, 1994; David, 2006) It has been suggested that birds may occasionally visit Tinian from Agiguan or Saipan, the two nearest Islands that support resident populations of megapodes, or possibly either birds or eggs of this species are periodically transported to the Island by local residents. At least one documented case of this scenario has been reported from Saipan (Wiles et al., 1987; Engbring et al., 1986).

The Mariana Common Moorhen is the Mariana endemic sub-species of this cosmopolitan waterbird species. Common Moorhens are wetland obligate species. The study site does not contain any wetlands or standing water, thus it was not surprising that this species was not recorded during this survey or on the 1994

survey either (David, 1994). There is a resident population of this species present on Lake Hagoi which is located some six kilometers northeast of the site (Fig. 2). There is at least one published record and much anecdotal information to suggest that during the rainy season some of these birds may make use of standing water in other areas on the Island, especially in Sabanetan Manpang plateau and in other areas in the eastern half of the Island (Engbring et al., 1986; Sanchez, 1994), It is also possible that some of the Hagoi birds occasionally may move between Lake Hagoi and Lake Susupe on the Island of Saipan (Engbring et al., 1986).

As previously mentioned we did not detect Mariana Swiftlet during the course of this or the 1994 survey of the site (David, 1994). This also is not surprising as this species appears to be nomadic on Tinian. The swiftlet seems to prefer forests on limestone ridges rather than the limited habitat offered by the predominantly flat Tinian plateau (Engbring, 1994; David, 2006). There have been numerous records of flocks of this species having been seen on Tinian for short periods of time, especially after typhoons (Engbring et al., 1986; Sanchez, 1994). There are resident populations on both Agiguan and Saipan, and both islands are close enough that the birds seen on Tinian in all probability come from one or both of these populations.

Which brings us back to the Tinian Monarch, which as previously discussed is currently listed as threatened by the CNMI government (DFW, 2006), but not by the Federal government (USFWS, 2004, 2006). This species is the only Tinian endemic avian species; it was first described by Yamashina in 1931 (Takatsukasa et al., 1931). The monarch currently is found only on the Island of Tinian, but examination of museum specimens by Peters (1996) suggested a now extirpated population may have occurred on the Island of Saipan. The monarch also was reported from the Island of Agiguan in the early 1950s, but some authorities discount this report (Engbring et al., 1986).

This species is ubiquitous; it was the third most commonly recorded species during our survey and the second most frequently recorded species during the 1982, 1994, and 1996 surveys (Engbring et al., 1985; David, 1994; Lusk et al.. 2000). Following the 1982 surveys, the USFWS estimated the population of this species to be 39,338 birds and that they were distributed throughout the island in all forest types (Engbring et al., 1986). Following life history studies of the monarch conducted in 1994 and 1995 (USFWS, 1996) it was determined that monarchs forage and nest in native limestone forest, secondary forest, and *tangantangan* (*Leucaena leucocephala*), forest, but found some evidence indicating native limestone forest may be higher quality habitat for monarchs than secondary and *tangantangan* forests. Monarch home ranges were four to five times smaller in native limestone forest than in secondary forest, and *tangantangan* forests, and population densities were higher in native limestone forest than in secondary forest or *tangantangan* forest. Native tree species may have been preferred for nesting, and nesting success may have been higher in native limestone forest than in secondary and *tangantangan* forests, but additional information is required to confirm these patterns. Based on the results of that study, the island-wide monarch population was estimated to be approximately 52,904 birds. The 1996 replication of the USFWS 1982 forest bird surveys estimated the monarch population at 55,721 birds (Lusk et al., 2000), which was significantly higher than the estimate of 39,338 birds from 1982 found by Engbring et al. (1986). The 1996 survey also found that vegetation density had increased significantly in all forest types since 1982. Lusk et al. (2000) hypothesized that the increase in the monarch population was related to increases in density of vegetation in both native and introduced forest habitats, which may have been related to a decrease in grazing pressure (USFWS, 2005b).

The two most significant threats to the Tinian Monarch are the loss of suitable forested habitat, and the potential that the brown treesnake (*Boiga irregularis*) will become established on the island. This nocturnal Australian and New Guinea species became established on Guam following WWII, and in the intervening years it has been responsible for the extinction of 10 of the 13 native forest birds on Guam (Savidge, 1987; Conry, 1988; Rodda et al., 1999; Wiles et al., 2003). The brown treesnake, in the words of herpetologists that have studied its impacts on Guam, is a "serious predator." Brown treesnakes eat a wide variety of vertebrate and invertebrate prey items, and if it they reach Tinian, would face no predators, an ample food supply, and no significant competition for those resources. This species also can reach population densities of up to 80-120 snakes per hectare (Rodda et al., 1999). There have been at least seven reports of snakes found on Tinian between May 1994, and November 2003 (USFWS, 2005b). None of these snakes were captured to confirm identification, but several of the descriptions were consistent with an identification of this species. Cargo shipments from Guam associated with military training activities, development and resort construction, could accidentally introduce this species to Tinian. The suspected establishment of an incipient population on Saipan provides another potential source from which snakes could reach Tinian, especially since there are multiple daily high speed ferry runs between Saipan and Tinian operated by Tinian Shipping & Transportation, Inc. in association with the Tinian Dynasty Hotel & Casino (USFWS, 2005b; David, 2006).

Fortunately the USFWS in concert with the CNMI DFW, the U.S. Geological Survey, Biological Resources Division (USGS-BRD), the U.S. Department of Agriculture, Wildlife Services (USDA-WS), and the U.S. Department of the Navy are actively monitoring not only the Tinian Monarch, but the forest cover and brown treesnakes as part of a Section 4 consultation of the ESA, which requires that the Service monitor any species delisted for a period of no less than five years following delisting due to recovery, to insure that the species remains secure from risk of extinction after it has been removed from the protections of the ESA. This Post

Delisting Monitoring (PDM) fulfils the final process of species recovery as defined under the ESA. The USFWS published the PDM for this species in 2005 (USFWS, 2005b). As part of that plan the USFWS will monitor the status of the Tinian monarch, in cooperation with the CNMI DFW, USGS-BRD, USDA-WS, and US Navy, through regular field surveys of the distribution and abundance of the monarch, regular field surveys for brown treesnakes on Tinian, and tracking of land use and development on Tinian. If data from these monitoring efforts, or from some other sources, indicate that the Tinian monarch is experiencing significant declines in abundance or distribution, that its survival or territory occupancy are declining significantly, or that it requires protective status under the ESA for some other reason, the USFWS can initiate procedures to re-list the monarch.

Herpetofaunal Resources

We recorded eight of the 14 terrestrial amphibian and reptile species currently documented from Tinian Island (Rodda et al., 1991) during the time spent at the proposed landfill site. Nine of the 14 terrestrial amphibians and reptiles documented from the Island are native species and we detected four of these: island gecko, stump-toed gecko, mourning gecko, and blue-tailed skink (Wiles et al., 1989; Rodda et al., 1991). The remaining four species detected—giant toad, curious skink, green tree skink and monitor lizard—are considered to be alien to the Mariana Islands (Rodda et al., 1991). Our findings are similar to those made during the 1994 survey of the same area (David, 1994). We did not encounter the CNMI listed Micronesian gecko (*Perochirus ateles*) during this or the 1994 survey. This finding is not surprising since the last documented specimen recorded from Tinian was collected on Mt. Lasu in 1946. Herpetofaunal surveys and searches conducted since then have also failed to document this species from the Island (Wiles et al., 1989; Rodda et al., 1991; McCoid and Hensley, 1994; Pregill, 1998).

Identification of the above discussed species was done in the field with the aid of a key to the reptiles and amphibians of the Mariana Islands (Rodda, 1988). No specimens were collected for more intensive study, and no effort was made to find all species previously documented from the Island.

Alternate Landfill Sites

This survey considered in detail only one location on Tinian for a landfill site. Numerous external constraints exist that limit where on the Island a landfill can be sited (see WCP, 2005). Clearly, there are many areas that simply cannot be considered: any location north of the military exclusion line, within the wildlife mitigation area, and within the more densely populated parts of San Jose. Remaining locations are roughly indicated in our Fig. 1, and include the existing landfill located just northwest of San Jose (essentially a no action alternative), a narrow strip along the east side of the island just outside of the military exclusion boundary, and an uplands ridge called Carolinas to the southeast of San Jose. The north end of Carolinas Ridge and the area northeast of town are close to the island's main source of drinking water at Makpo and were eliminated from consideration.

The existing landfill is located just outside of town within the 10,000-feet airport buffer. From a strictly environmental resources point of view, this area probably has the fewest natural resources of any of the "potential" sites given the changes that have occurred here over the centuries. The Carolinas Ridge area is a mixture of highly disturbed and some less disturbed environments too large and varied to assess without narrowing down on a more specific site. A nature trail is present along the coast at the south end of the island and the road to the Peace Monument located on the east side of Carolinas Ridge offers many very scenic views. Yet, just as the uplands offer vistas of the island and San Jose, so must any location on the western side of this ridge be clearly visible from town were it to be developed into a landfill. The eastern side of the ridge is steep and likely harbors native flora and fauna that would need to be carefully assessed if a site were chosen in this area.

The narrow available land on the east side of Tinian south of the Military Exclusion boundary and outside of the 10,000-feet airport buffer is vegetated similar to the landfill site at Atgidon assessed above, but gives way to a native dominated flora on the limestone cliffs behind the shore and boasts a series of coves and beaches that must be regarded as important public resources. It would be difficult to justify converting any of this land so close to the ocean and coastal limestone cliffs to a landfill for solid waste.

IMPACTS ASSESSMENTS

Botanical Resources

Although the proposed landfill site harbors a number of native plants within vegetation types mostly dominated by non-native, naturalized species, these natives are not presently protected by US or CNMI laws and are not species under any threat of extinction. It does seem evident from our observations regarding the nature of the flora along active and abandoned roads compared with the interior of the site, that development of a landfill will not only physically remove much of the forest but will encourage the spread of ruderal weeds into the area. Only a concerted planting effort utilizing native trees and shrubs will offset the conversion of much of the periphery and ancillary support and access areas to a vegetation of all non-native species.

Mariana fruit bats

The potential exists that the clearing of vegetation on this site and the construction and operation of a sanitary landfill could potentially displace individual bats or reduce the foraging habitat available to this species on Tinian. There is no current evidence that there is usage of this site by this species, and given the paucity of this species on the Island, these potential risks appear to be extremely low.

Tinian Monarch

The clearing, grubbing and construction of the proposed facilities may result in the displacement of individual birds and possibly the loss of one or more nests, eggs and young. Additionally, the clearing of 30 acres of moderately dense forest will reduce the available foraging, and nesting habitat for this species by 30 acres.

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APPENDIX E

Endangered Species Act Section 7 Consultation

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

TAKE PRIDE IN AMERICA

In Reply Refer To:
2007-B-0027
2007-I-0209

Mr. Todd C. Barnes, P.E.
Chief, Engineering and Construction Division
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Subject: Informal Section 7 Consultation on a Draft Environmental Assessment for the Tinian Landfill, Tinian, Commonwealth of the Northern Mariana Islands

Dear Mr. Barnes:

We have reviewed your letter dated May 23, 2007, and your March 2007, draft Environmental Assessment (DEA) for the Tinian Landfill, Tinian Island, Commonwealth of the Northern Mariana Islands, both received on May 31, 2007. According to your letter, you are the authorized representative for the Department of Interior's Office of Insular Affairs for this project. You requested our concurrence that implementation of the proposed construction of a landfill at the Atgidon preferred alternative site will have no effect on listed species, pursuant to section 7 of the Federal Endangered Species Act (ESA) of 1973, as amended. In addition, a request was made for our concurrence that implementation of the Masalok alternative site is not likely to adversely affect the threatened green sea turtle (*Chelonia midas*) pursuant to section 7 of the ESA. Both the preferred Atgidon site and the alternative Masalok site are located on the island of Tinian, Commonwealth of the Northern Mariana Islands. The proposed action includes closing the existing dump site in San Jose and the construction of a new landfill covering approximately 30 acres.

We have reviewed the information provided along with information from our files and find that although we agree that implementing the proposed action at the Atgidon site will not affect listed species since none occur at or near the site, we cannot concur with your determination that implementing the proposed action at the Masalok site is not likely to adversely affect the green sea turtle. We are concerned that the presence of a landfill near sea turtle nesting beaches is likely to increase rat (*Rattus spp.*), cat (*Felis catus*), and dog (*Canis familaris*) populations in the immediate area of the dump. These animals are all potential predators of green sea turtle eggs, hatchlings, and adults (in the case of dogs) Currently, there is a known green sea turtle nesting beach immediately adjacent to the proposed Masalok site and any of these green sea turtles may be adversely affected by the construction of a new landfill.

If the determination is made to implement the proposed project at the Masalok site, we recommend that the Office of Insular Affairs enter into formal consultation to address the adverse effects that are likely to occur to green sea turtles.

Thank you for your ongoing efforts to conserve endangered species. If you have any questions or comments, please contact Patrice Ashfield (phone: 808/792-9400; fax: 808/792-9581).

Sincerely,

for Patrick Leonard
Field Supervisor

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, HONOLULU
FORT SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF:

March 9, 2007

Environmental Technical Branch
Engineering and Construction Division

Mr. Patrick Leonard
U. S. Fish and Wildlife Service
Pacific Islands Ecoregion
300 Ala Moana Blvd., Room 3-122
Box 50088
Honolulu, Hawaii 96850

Dear Mr. Leonard:

The U S. Army Corps of Engineers, Honolulu District, is assisting the Commonwealth of the Northern Marianas Islands (CNMI) with the development of planning documents including environmental evaluation for the proposed construction of the Tinian Landfill on the island Tinian, CNMI. The proposed construction will be funded by the Department of Interior Office of Insular Affairs. The study area as depicted in the enclosed map is located at approximately UTM coordinates Northing 1660838.81 and Easting 349377.45.

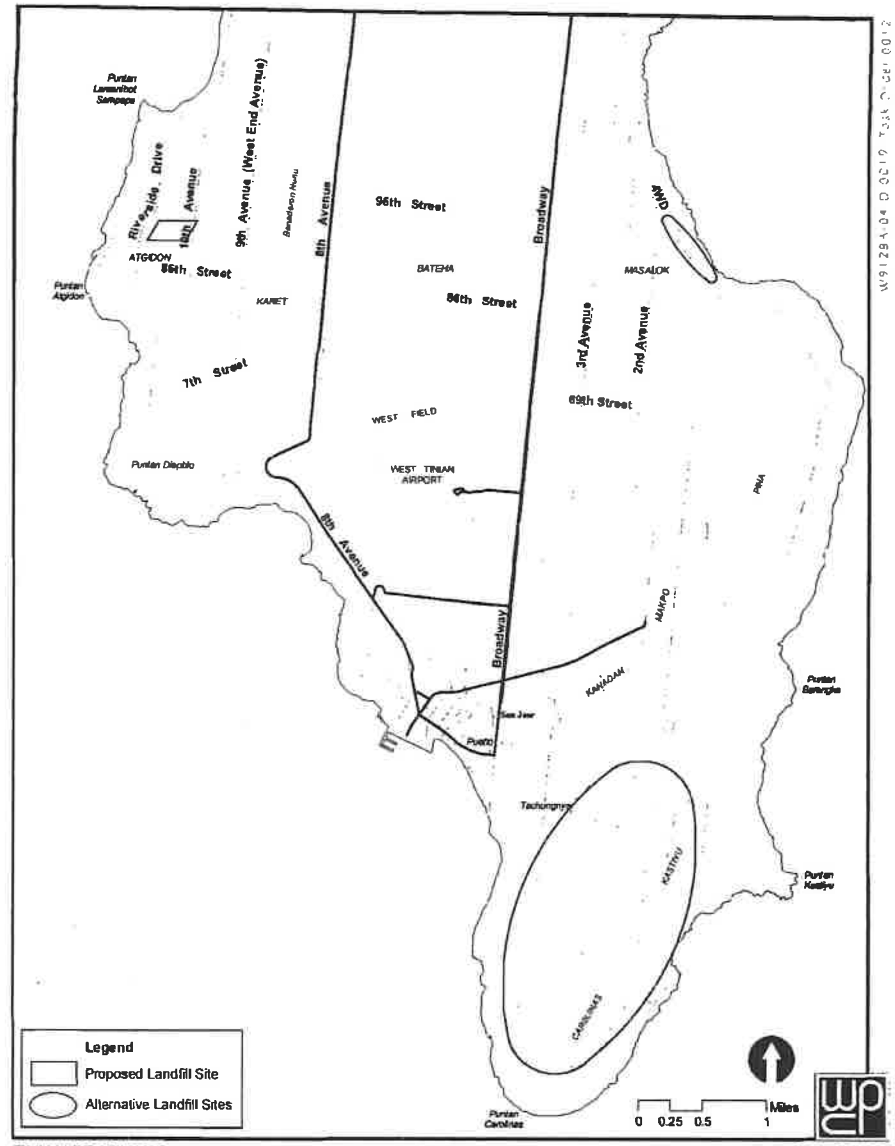
We request a list of species and critical habitat under your jurisdiction as designated under the Endangered Species Act of 1973 as amended, which may be affected by this project. Should you have any questions please contact Mr. James Hatashima, Project Manager, at telephone (808) 438-2264, email james.k.hatashima@usace.army.mil or Ms. Cindy Barger, Biologist, at telephone (808) 438-1232, e-mail cindy.s.barger@usace.army.mil.

Sincerely,

Todd C. Barnes

Todd C. Barnes, P.E.
Chief, Engineering & Construction Division

Enclosure



TINIAN ROADWAYS
FIGURE 4-18
Environmental Assessment for Landfill at Tinian
Tinian, Commonwealth of the Northern Mariana Islands

APPENDIX F

Archaeological Investigation

Pacific Legacy

Incorporated

Cultural Resources Consultants

ARCHAEOLOGICAL INVESTIGATIONS FOR THE PROPOSED LANDFILL ON TINIAN COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS (CNMI)

Prepared By:
Paul Cleghorn
and
Solomon Kailihiwa
Pacific Legacy, Inc.

Pacific Legacy: Exploring the past, informing the present, enriching the future

DRAFT REPORT

ARCHAEOLOGICAL INVESTIGATIONS FOR THE PROPOSED LANDFILL ON TINIAN COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS (CNMI)

Prepared by

Paul L. Cleghorn, Ph.D.
and
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Pacific Legacy, Inc.
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Phone 263-4800
Fax 263-4300

Prepared for

Wil Chee – Planning and Environmental, Inc.
1018 Palm Drive
Honolulu, HI 96814

Revised
30 May 2007

ABSTRACT

Pacific Legacy, Inc., under contract to Wil Chee – Planning and Environmental, Inc. (WCP), conducted a one week pedestrian survey for the proposed new solid waste disposal facility on the island of Tinian in the Commonwealth of the Northern Mariana Islands (CNMI). This work was conducted for the U.S. Army Corps of Engineers. The project area or Area of Potential Effect (APE) covers approximately 60 acres in the western central portion of the island. The primary purpose of the archaeological investigations was to determine whether or not potentially significant archaeological resources are present within the APE. This purpose was achieved by conducting two tasks: (1) a review of previous archaeological investigations in the vicinity of the project area; and (2) conducting a thorough pedestrian survey of the project area.

A total of 18 historic resources were found within the survey area. All of these resources were part of the 444th Bomb Group Camp that has been recorded as Site TN-6-601. The historic resources recorded included isolated artifacts, concrete pads, pits or depressions in the limestone surface, wooden poles, a coral wall, a coral mound, and a culvert. Most of the resources were probably associated with the American occupation of the island during WWII. Two of the resources (isolate artifacts) were probably associated with the Japanese Period, and one of the resources (an isolated artifact) was probably associated with the Prehistoric Period.

Of the 18 historic resources recorded during the current investigations, 13 are located in the 200 foot buffer that surrounds the Landfill site. The five resources that are located within the land fill site area are a corrugated metal culvert), a Tracked vehicle, a 55-gal drum filled with coral rocks, a cube shaped glass bottle, and a portable metal sprayer. None of these resources appear to be significant and should not be a concern in developing this parcel.

One resource (PL-12) was previously recorded at TN-6-601-B15 and was evaluated as significant under criteria C and D. It has been recommended that this resource be preserved and interpreted; this recommendation is agreed upon by the Historic Preservation Office on Tinian. This resource is located within the buffer zone on the south side of the subject property. With care during land clearing and construction activities, this site can be protected for long term preservation and possible future interpretation.

The results of the current investigations have shown that the entire project area was probably within the limits of the 444th Bomb Group Camp. It seems extremely likely that additional historic resources may be present, albeit cloaked in the dense vegetation of the area. It is recommenced that all vegetation clearing and excavations be archaeologically monitored, so the presence of potentially significant historic resources can be documented.

Two alternative landfill sites are also being considered as locales for the proposed municipal landfill site – Masalok and Carolinas. The current investigations indicate that there is a high probability of potentially significant sites being present in these areas. If these sites are considered further and precise locations for the proposed landfill are decided upon then archaeological surveys need to take place in these areas.

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1.0 INTRODUCTION

Pacific Legacy, Inc., under contract to Wil Chee – Planning and Environmental, Inc. (WCP), conducted a one week pedestrian survey for the proposed new solid waste disposal facility on the island of Tinian in the Commonwealth of the Northern Mariana Islands (CNMI). The CNMI Department of Public Works (DPW) with the assistance of the U.S. Army Corps of Engineers, Honolulu District, and in cooperation with the United States (U.S.) Department of the Interior (DOI), Office of Insular Affairs (OIA), propose the closure of an existing open dump site, and the siting, construction, and operations of a new municipal solid waste landfill (MSWL) on Tinian Island in the CNMI.

The proposed project would be partially funded through a DOI OIA Capital Improvement Program (CIP) grant. As part of the CIP grant DPW is required to comply with all applicable federal and territorial laws and regulations including compliance with the NEPA process (13 CFR Part 316). Via the Intergovernmental Cooperation Act (31 USC 6505), the Corps may provide assistance to state and local governments on a reimbursable basis. Under this program, DPW has requested the Corps of Engineers, Honolulu District, Program and Project Management Division to conduct the NEPA evaluation process for this project.

This work was conducted for the U.S. Army Corps of Engineers (USACE) (Contract No. W9128A-04-D-0019, Task Order No. 0012), who requires the development of an environmental assessment (EA) with pertinent studies and application packages for the proposed new solid waste disposal facility.

The project area or Area of Potential Effect (APE) covers approximately 60 acres in the western central portion of the island (Figures 1 and 2). Approximately 30 acres of this total make up a buffer zone around the West, East, and South sides of the proposed site. The proposed landfill area is situated north of 86th street, immediately west of the existing Riverside Avenue, and east of 10th Avenue, which is totally overgrown and only partially recognizable. This area was the locus of a thorough archaeological pedestrian survey. The "Comprehensive Study Report of Tinian Landfill, Tinian, CNMI" depicts two alternative landfill sites (see Figure 1). These sites were also briefly assessed.

The development of this EA is considered a Federal undertaking as defined in 36 CFR 800.16. The purpose of the archaeological investigations is to assist the USACE in the identification of historic properties, potential impacts to these resources, and coordination with the CNMI Historic Preservation Office as per the National Historic Preservation Act of 1966, as amended, and specifically with Section 106 of the Act (36 CFR 800).

The primary purpose of the archaeological investigations was to determine whether or not potentially significant archaeological resources are present within the APE. This purpose was achieved by conducting two tasks: (1) a review of previous archaeological investigations in the vicinity of the project area; and (2) conducting a thorough pedestrian survey of the project area.

Fieldwork was conducted from 5 – 10 June 2006. Pacific Legacy staff conducting the investigations consisted of Paul Cleghorn, Ph.D. (Principal Investigator) and Solomon Kailihiwa, B.A. (Archaeologist). We were ably assisted in the field by Derek Yasaka of WCP, Eric Guinther of AECOS, and Dan Paul of Zapata Engineering. Dan Paul provided UXO support and was present during all field investigations.

1.1 Environmental Setting

The island of Tinian is part of the Mariana Island archipelago located to the east of the Philippines. Tinian is located about 200 km (c. 125 miles) north of Guam and 6,000 km (3,728 miles) west-southwest of Hawaii. It is separated from Saipan by about 5 km (3 miles). Tinian has an area of approximately 10,176 hectares (c. 39.3 square miles) and is composed of a series of limestone terraces that formed on a core of volcanic peaks and slopes. The volcanic core is exposed in two places on the island. The highest point on the islands is approximately 187 m (613.5 feet) above sea level (Young 1989:1).

The climate of the Mariana Islands is warm and humid throughout the year. Afternoon temperatures are usually about 30 degrees Celsius (36°F) with night time temperatures of around 10 degrees Celsius (68°F). The relative humidity ranges from about 70 percent in the afternoons to about 90% at night Young 1989:4).

There are two main seasons in the Mariana Islands – the dry season (December – June) and the wet season (July – November), when about two thirds of the mean annual rainfall of ca. 200 mm (7.9 inches) is received. The dry season is when typhoons mostly occur, though typhoons have been recorded during every month of the year (ibid.)

1.2 Field Methods

1.2.1 Proposed Landfill Area

The proposed landfill area was thoroughly covered by pedestrian survey. On the first day of fieldwork, the NW and SW corners of the survey area were located using a GPS instrument (Thales Mobile Mapper Pro). A shape file depicting the project area had been downloaded into the GPS instrument, which allowed precise determination of the project area boundaries, location of transects, and accurate plotting of historic resources.

Pedestrian survey transects originated along Riverside Avenue and proceeded east to the eastern edge of the buffer zone; this eastern boundary (as well as the northern and southern boundaries) was unmarked and the survey team relied on the GPS instrument on the location of the boundary. The survey team consisted of four persons with 10 -15 m spacing between team members

When a historic resource was encountered, it was cleared and the immediate vicinity was inspected. The resources were described and digitally photographed. Sketch mapping was

performed when warranted. The resource was flagged with pink surveyor's ribbon and aluminum tags were affixed to the resource. Resources were assigned consecutive numbers and were prefaced by PL (Pacific Legacy) T- (temporary) Tags also showed the recording date. Finally, GPS coordinates were recorded.

1.2.2 Alternative Landfill sites

The two alternative land fill areas at Masalok and Carolinas were briefly inspected. Investigations were limited to what could be seen from existing roads. Digital photographs were taken of the general areas.

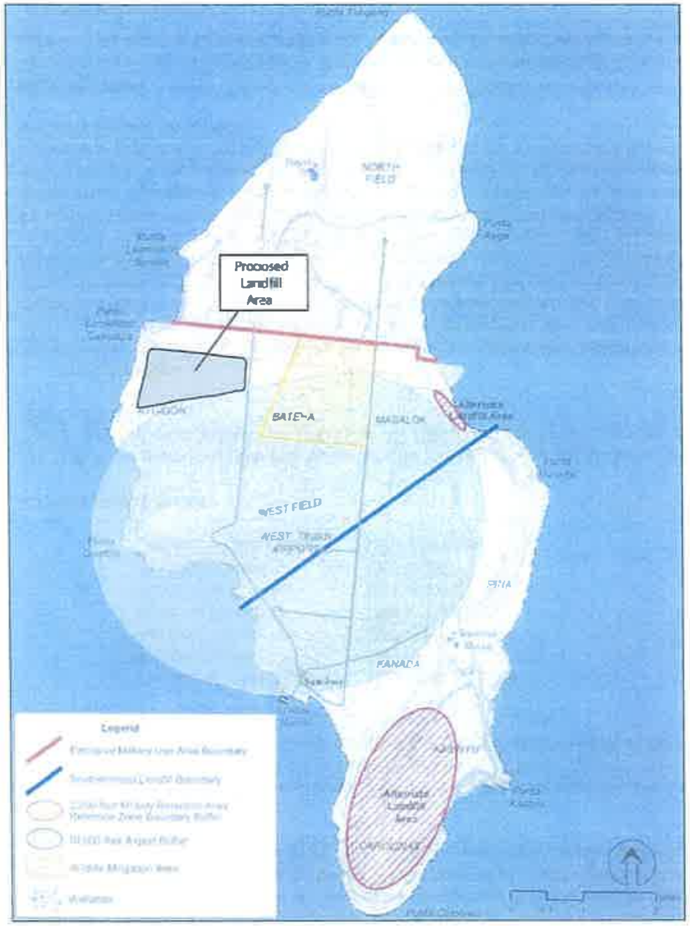

Figure 1. Generalized Location of Proposed Landfill Area (after WCP 2006: Figure 10)

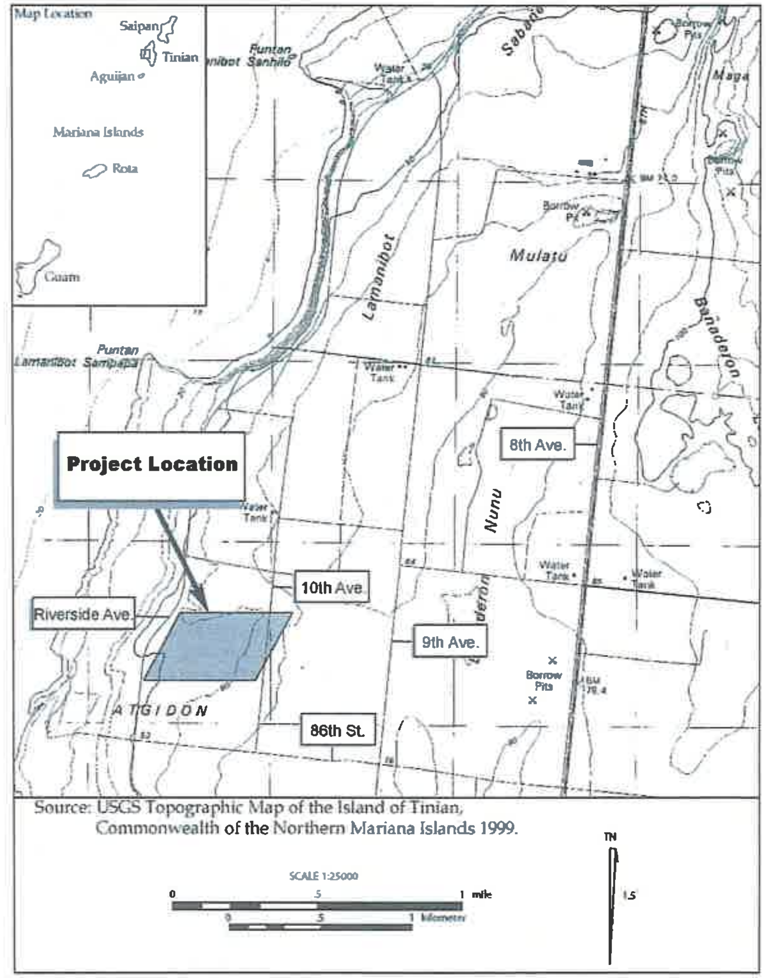

Figure 2. Detail of Surveyed Area for the Proposed Landfill Site

2.0 HISTORICAL BACKGROUND

An excellent expose of the history and culture of the Marina Islands has been written by historian Scott Russell (Russell 1998). Excellent summaries of the history of Tinian and how this history fits into the overall history of the Mariana Islands have been prepared by Allen et al. (2000) and Dixon et al (2000). The following is a summary of pertinent aspects of Tinian's history as it applies to the current project area. The interested reader is referred to the above references for more details.

The history of Tinian, as well as for the rest of the Mariana Islands is generally divided into six periods. A seventh period, which we term the Commonwealth Period, appears to be warranted. This period signifies Tinian becoming part of the Commonwealth of the Northern Mariana Islands in 1977 and continues to the present day:

Prehistoric Period 1000	1500 BC to AD 1521
Spanish Period	1521 to 1899
German Period	1899 to 1914
Japanese Period	1914 to 1941
World War II	1941 to 1945
American Period	1945 to 1977
Commonwealth Period	1977 to present

2.1 PREHISTORIC PERIOD

The prehistoric period has been subdivided into the Pre-Latte Phase and the Latte Phase. The Pre-Latte Period extended from ca. 1500 BC to AD 1000. The Latte Period extended from ca. AD 1000 to 1521.

2.1.1 Pre-Latte Phase

The people associated with the Pre-Latte Period made stone adzes, shell beads, bracelets made of *Trochus* and *Conus* shell rings, and a thin walled red pottery that often exhibited a red slipping. This thin walled pottery has been termed Marianas Redware and is the most diagnostic artifact type associated with the Pre-Latte Period. The early settlements in the Mariana Islands were located along the coast in areas adjacent to estuaries and embayments, which were rich in natural resources (Russell 1998:91). Details regarding the physical layouts of these early settlements are lacking because of poor preservation and post deposition disturbances. Cultigens of the early inhabitants probably included taro, bananas, and yams, as well as breadfruit and coconut. Interestingly, there is no evidence of pigs, dogs, or chickens; protein was supplied by the rich marine resources found in these islands such as reef fish and shell fish (Russell 1998:: 94-95).

2.1.2 Latte Phase

Commencing about 1000 years ago, pronounced changes in the archaeological record begin to appear. This phase of Chamorro culture has been termed the Latte Phase by archaeologists

after the distinctive stone pillars and cap stones that begin to appear throughout the Mariana Islands. These stone pillars were erected in two parallel rows of three to seven pillars, for a total of six to fourteen pillars; the most common total number of pillars is eight and the most uncommon is fourteen (Russell 1998:105). Latte Phase settlements expanded along the coasts of the various islands and expanded inland as well. Information from European visitors suggests that the parallel rows of latte stones supported residences as well as other specialized house that were grouped together into small villages (Russell 1998:105-106).

Features associated with Latte structures include fire pits, earth ovens, post holes, ash lenses, shell middens, and human burials. A common feature of Latte sites was the presence of a large stone mortar. It is thought that these mortars may have been used to process the toxic nut of the cycad tree or possibly to de-husk rice, which apparently was now being grown in the Mariana Islands

Artifacts associated with this Phase include items of warfare (slingstones and human bone spear points), fish gorges, basalt or limestone mortars, and a thicker pottery termed Mariana Plain ware. This pottery type was thicker and lacked the decorative motifs associated with the Mariana Redware. The most common vessel form was a large globular pot that apparently was used for cooking on open fires.

2.2 SPANISH PERIOD

The prehistoric period ends with Magellan's "discovery" of the Mariana Islands in A.D. 1521, but over 100 years elapsed before the Spanish influence in the Mariana Islands began to accelerate with the arrival of the Jesuit priest Diego Luis de Sanvitores in 1668. The main task of Sanvitores and several other priests was to convert the Chamorro to Christianity, which was ultimately accomplished with the aid of armed Spanish soldiers. During the first several decades of this period, violent skirmishes between the Spanish and the Chamorro occurred and the Chamorro population was decimated due to the warfare as well as introduced diseases.

The population of Tinian was drastically reduced during the Spanish Period. By 1690 virtually all of the Chamorro of the Northern Mariana Islands had been killed or taken to Guam, where many more died of disease. By this time, the estimated total Chamorro population was only about 1800, down considerable from the prehistoric population estimate of 40,000 (Abella 1962, as cited in Dixon et al. 2000:31).

In 1742, an Englishman, Commodore George Anson, visited Tinian and wrote of the fertile soil on the island and the wild cattle, pigs, and goats that roamed the island. He learned that occasionally Spaniards from Guam would travel to Tinian to kill animals, salt the meat, and transport it back to the garrison on Guam (Farrell 1992:16). When Captain Louis de Freycinet visited Tinian in 1818, he estimated the total population to be under 20 individuals (Farrell 1992:16-17).

In the mid 1800s, the Spanish Governor established a colony for Hansen's disease patients. The colony lasted for two years and ended because a smallpox epidemic eliminated the entire population of Tinian (Farrell 1992:17).

In 1869, the entire island of Tinian was leased by George Johnson who transported 230 Carolinians to Tinian to work on the island. He produced salted dried beef and live hogs for the Spanish, sea slugs for the Japanese, and sweet potatoes and tobacco for American and British whalers on Guam (ibid.).

The Spanish Period, lasting more than 200 years, ended in 1899 when Spain sold her Micronesian land holdings, including the Northern Mariana Islands to Germany.

2.3 German Period

The German period was short lived, only lasting 15 years, and did not contribute much to the history of Tinian. The German administration was located on Saipan, and interaction with Tinian revolved around exploiting the feral animal populations on the island. The German administration did record census figures for Tinian. In 1899 there were a total of 69 people on Tinian (30 Chamorro and 30 Carolinians) (Spennemann (1999:40). By 1912, the total population had dropped to 27 people (Spennemann 1999:41).

2.4 Japanese Period

The Japanese took control of the Northern Mariana Islands, including Tinian, from Germany in 1914. In 1921, the League of Nations granted Japan a mandate over the islands. Japan exercised her control and economically developed Tinian, through the efforts of Haruji Matsue, president and owner of Nanyo Kahatsu Kaisha (South Seas Development Company), who leased the entire island in 1926. By 1935, Matsue had settled over 14,000 Japanese, Okinawan, and Korean workers on the island (Farrell 1992:35).

Matsue set up fields, railroads, factories, and villages on the island. The principal town had a sugar refinery warehouse, hospital, post office, and wharf. It also had stores, schools, hairdressing parlors, a cinema, a photography shop, hardware stores, fish markets, a Buddhist temple, restaurants, and geisha houses (Farrell 1992:35). A 1944 Japanese map, showing the layout of agricultural plots indicates that the current project area was under intensive cultivation by the Japanese (Figure 3).

Prosperity on Tinian was about to cease. In the mid-1930s, it was recognized that war was likely to occur. In 1934 the Asilito Airfield was completed on Saipan. In 1939, work on military projects commenced on Tinian. Airfields and defensive works were constructed.

2.5 World War II

After American forces secured Saipan on 9 July 1944, plans for the invasion of Tinian began. Intensive bombardment of Tinian began on 11 July and intensified on 22 and 23 July in preparation for the 24 July invasion (Farrell 1992:39). After a fake landing on the southern end of the island, American Forces landed on the northwest coast at Unai Babui and Unai Chulu beaches. After nine days of fighting, the battle for Tinian was over and the American Forces completely occupied the island (Russell 1995:13).

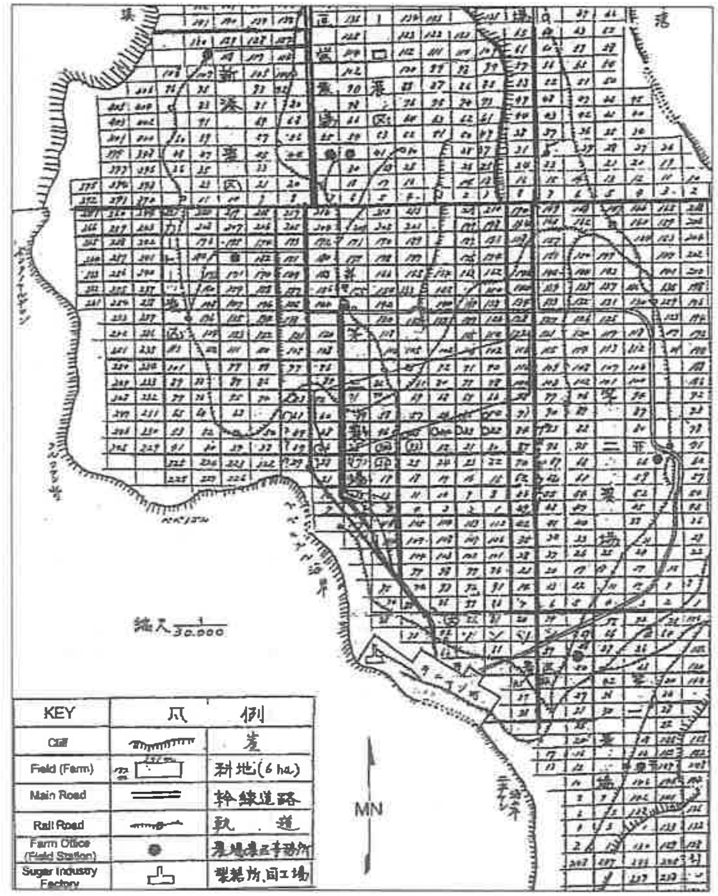

Figure 3. 1944 Map, showing location of Japanese agricultural plots (from Allen et al. 2000: Figure 12)

Almost as soon as Tinian was secured Naval Construction Battalions (Seabees) began work on airfields needed to accommodate the newly developed B-29 Superfortress bombers. The B-29 was capable of carrying 10 tons of bombs to targets in Japan and returning to bases in the Mariana Islands without re-fueling (Russell 1995:17). Runways 8,500 feet long were needed for these long range bombers. The Seabees quickly began to transform the Japanese Airfield on the northern end of the island into four parallel runways, each 8,500 feet long, "and all the needed infrastructure to support hundreds of the giant bombers and their aircrews" (Russell 1995:17). This airfield, designated North Field and the nearby West Field transformed Tinian into the largest operational airbase in the world (Dixon et al. 2000:35).

By August-September 1944, the American Military population on Tinian rose to 55,743, though housing capacity had been built for 127,376 individuals (Allen et al. 2000:24-25, Table 3). The current project area was part of the camp development and was the area constructed for the 444th Bomber Group (see Section 3 below).

Tinian's North Field was to become the launch pad for the most important attacks during World War II. On August 6, 1945, the B-29 Enola Gay took off from North Field and dropped the first Atomic Bomb on the city of Hiroshima in Japan; three days later on August 9th, the B-29 Bock's Car dropped the second Atomic bomb on the city of Nagasaki. As a result of these two bombings, Emperor Hirohito ordered the surrender of Japan, thus ending World War II in the Pacific.

2.6 American Period

The thirty-two year period from 1945 to 1977 saw the end of World War II and the demilitarization of Tinian, the re-population of the island by Chamorro, and becoming a part of the United Nations Trust Territory of the Pacific administered by the United States. Ranching and farming were the main economic pursuits on the island. In the 1970s, negotiations between the United State and the Northern Mariana Islands resulted in the establishment of the Commonwealth of the Northern Mariana Islands, which formed a political union between the entities. The agreement included the lease of 17,799 acres of land on the northern half of Tinian for use by the U.S. military (Farrell 1992:79)

2.6 Commonwealth Period

Since 1977, Tinian has been a part of the Commonwealth of the Northern Mariana Islands. The Commonwealth is a self governing entity that is in political union with the United State. Ranching and agricultural pursuits still dominate the economy on Tinian. However, tourism and the developing gambling industry are rising in economic significance.

3.0 PREVIOUS ARCHAEOLOGY

Considerable archaeological work has been conducted on Tinian. Archaeological investigations started with the earliest European visitors to the island in the 19th century, who described some of the more impressive remains, notably the House of Taga in San Jose. Two recent archaeological studies (Dixon et al. 2000; and Allen et al. 2000) devote considerable effort in describing the previous archaeological investigations that have taken place on Tinian. No purpose could be served by repeating such a review here and the interested reader is referred to these works for comprehensive reviews of the archaeological literature. What follows is a selective review of previous archaeological work that specifically pertains to the current project area.

Only three prehistoric archaeological sites have been recorded in the vicinity of the project area. These were recorded by Moore et al. (1986) and Eble et al. (1997). All of these sites were located along the low coastal fringe below the escarpment to the west of the project area. These prehistoric sites consisted of a complex of at least nine *latte* sets, a *latte* quarry, mortars, pottery, lithics, and shell midden (Site TN-1-591); a scatter of pottery and basalt artifact fragments (Site TN-1-596); and a *latte* set with a pottery scatter and a rockshelter (Site TN-1-588).

Most importantly for our purposes is the fact that the current project area was part of a larger area surveyed by Dixon et al. (2000). Part of this area was subjected to a limited reconnaissance sample by Eble et al (1997) as well. Dixon's survey recorded the 444th Bomber Group Camp as Site TN-6-691 that had only been known previously from historic maps and documents (Figures 4 and 5).

Dixon described the 444th Bomb Group Camp as "extending over an area ca. 3.5 hectares, and includes a sidewalk surrounding a former theater, bathing facilities, cobble landscaping, concrete pad foundations, a large complex of probable pre-war Japanese construction, and a bridge/road alignment" (Dixon et al. 2000:81).

Historian Colt Denfeld stated that the 444th Bomb Group Camp:

> "... had six blocks. The headquarters area was in the center. There were living areas with Quonset huts and prefabricated barracks." (Denfeld 2000:8)

Denfeld also provides a plan map showing the standard layout for Bomb Group camps. His sketch is reproduced as Figure 6 and matches very well with the 1944 map of the 444th Bomb Group Camp shown in Figure 4. It also matches quite well with a 1945 aerial photograph that is presented in Allen et al. (2000: Figure 27). The central core of the camp consisted of Headquarter Offices, Mess Halls, and a large Operations Briefing Building. Surrounding the central core were Quonset huts and tents for barracking members of the Bomb Group, and latrines and bathing areas.

Dixon et al. (2000: 69, Figure 14) state that camps for 6th and 444th Bob Groups were constructed in 1945 between 86th and 97th streets, east of Riverside Drive. A large borrow pit for the extraction of limestone was excavated between the 6th and 444th camps. Each camp facility included headquarters, Quonset hut and wooden barracks, mess halls, dispensaries, theaters, basketball courts, softball diamonds, portable libraries, service clubs, etc.

3.1 Site Predictions

Prior to conducting our field investigations, brief background research allowed us to predict that the following types of sites might be present in the project area:

- Prehistoric Resources (latte sets, shell midden scatters, potter scatters, bedrock mortars, habitation rockshelters, etc.)
- Pre-WWII Japanese Sites (farm features, railroad remnants, a Shinto Shrine, etc.
- Japanese WWII Sites (defensive fortifications, refuge caves, field hospital, etc.)
- WWII American Sites (military camps, hospitals, radio facilities, refuse dumps, etc. (Wil Chee – Planning, Inc. 2005:21)

The more detailed review of the previous archaeological research conducted in the area indicates that these predictions were probably fairly accurate, though it seems less likely that prehistoric resources would be found in the project area.

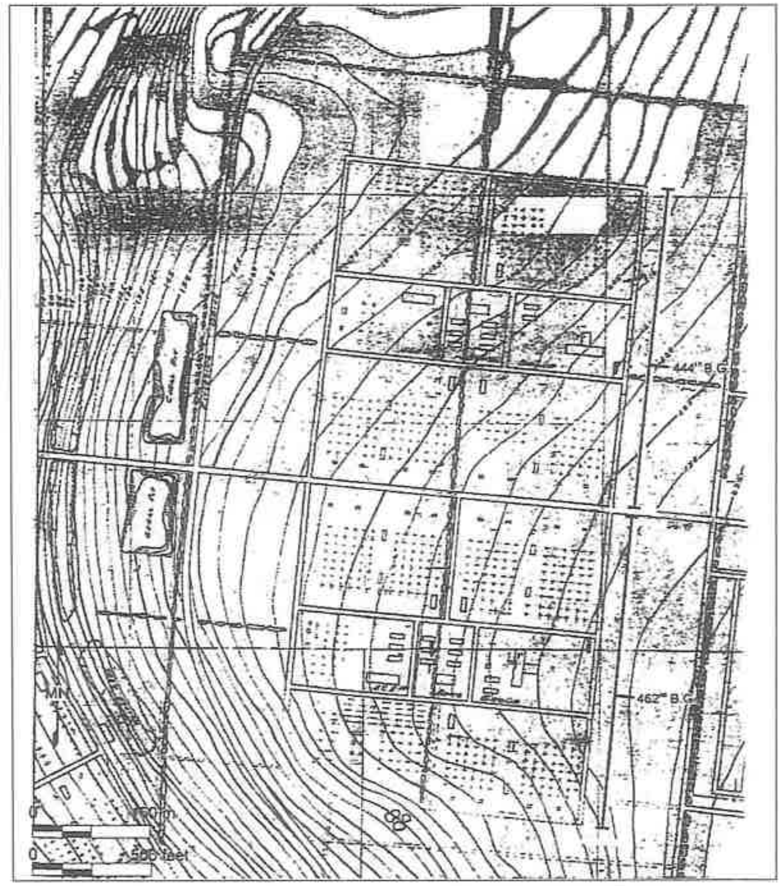

Figure 4. 1944 Map showing the location of the 444th and 462nd Bomb Group Camp (From Allen et al. 2000: 26)

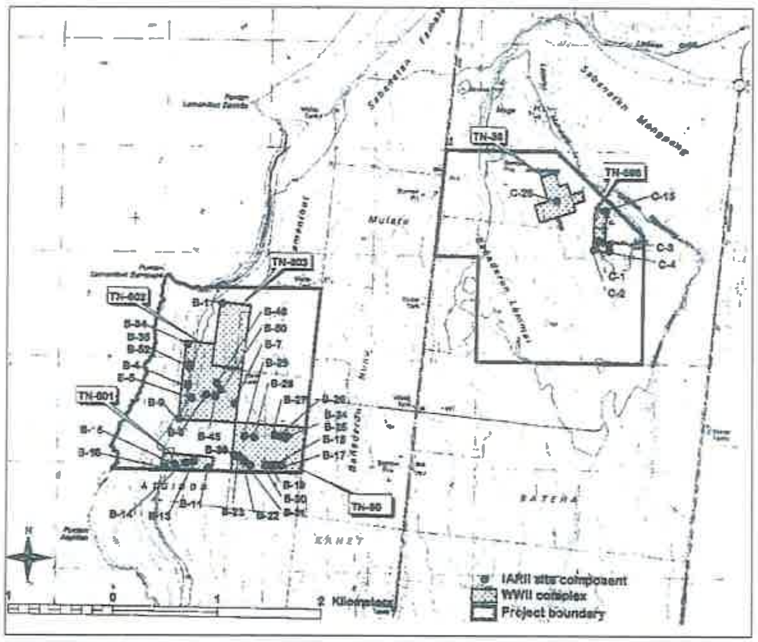

Figure 5. Location of IARII Survey Areas and Recorded sites

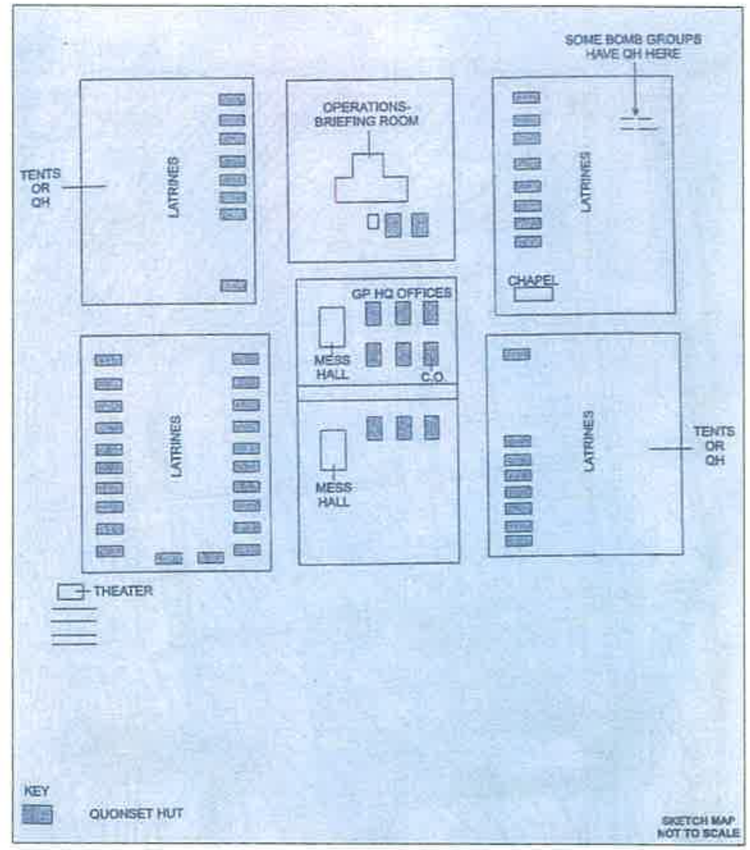

Figure 6. Standard Plan for Bomb Group Camp (from Allen et al. 2000; Figure 19)

4.0 RESULTS OF FIELD INVESTIGATIONS

This section presents the results of the field investigations. Most of the investigations were conducted in the proposed landfill area that has been described above and depicted in Figure 2. Brief assessments of the two alternative landfill locations (see Figure 1) were limited to drive through inspections of the areas with limited photographic documentation.

4.1 PROPOSED LANDFILL AREA

A total of 18 historic resources were found within the survey area (Figure 7). These resources are listed and briefly described in Table 1. More detailed descriptions and illustrations of these resources are presented below after a brief summary of the findings.

Careful examinations of previous maps and aerial photographs provided by Allen et al. (2000: Figures 17, 18, 26, 27, 28, 42) and Dixon et al. (2000: Figures 14, 16) indicate that all of the historic resources recorded in the proposed land fill area were part of the 444th Bomb Group Camp. Since Dixon et al. (2000) assigned one site number (TN-6-601) for this camp, all of the resources recorded during the current investigations are part of Site TN-6-601. Component features recorded by Dixon et al were prefaced with the letter B (e.g., Component B-15). The historic resources recorded during the current investigations will be prefaced with the letters PL (Pacific Legacy) so that there will be no confusion as to who recorded various resources. Correlations with previous feature designations will be made where possible.

The historic resources recorded included isolated artifacts, concrete pads, pits or depressions in the limestone surface, wooden poles, a coral wall, a coral mound, and a culvert. Most of the structural resources were probably associated with the American occupation of the island during WWII. Two of the resources were probably associated with the Japanese Period, and one of the resources was probably associated with the Prehistoric Period.

Of the 18 historic resources, seven were isolated artifacts. Only one of the artifacts was a prehistoric artifact, a portable basalt mortar fragment. Two artifacts, a tracked vehicle, and a brown beer bottle were probably associated with the pre-WWII Japanese occupation of the island. The remaining artifacts appear to have been associated with the WWII American occupation of the island – a possible jeep transmission, a 55-gallon drum, a cube-shaped glass bottle, and a portable metal sprayer.

The 11 structural sites recorded in the project area consisted of three pits or depressions, two concrete pads, two mounds, a culvert, a low coral cobble wall, a concrete wall foundation, and a roadway. All of these sites appear to be associated with the American occupation of the island during WWII.

The following pages present descriptions and illustrations of the archaeological resources found in the proposed land fill area.

Figure 7. Aerial Photograph, Showing the Locations of Recorded Archaeological Resources

Table 1. Summary of Recorded Archaeological Resources

Designation	Description
PL-01	Possible jeep transmission
PL-02	Site number deleted
PL-03	Rectangular pit with surrounding earthen berm
PL-04	Concrete pad with upraised water "trough" and associated sump pit
PL-05	Corrugated metal culvert associated with 10th Ave.
PL-06	Low coral wall
PL-07	Coral cobble mound
PL-08	Tracked vehicle
PL-09	55-gal drum filled with coral boulders and cobbles
PL-10	Mound of concrete
PL-11	Cube shaped glass bottle
PL-12	Complex of concrete pads, coral alignment, and a cut limestone block wall previously recorded as Site TN-6-601, Feature B-15
PL-13	Cobble lined depression that may be a part of previously recorded Site TN-6-601, Feature B-14
PL-14	Remnant of upright wooden utility pole and a concrete wall foundation. May be part of previously recorded Site TN-6-601, Feature B-14
PL-15	Remnant of upright wooden utility pole and a rectangular pit. May be part of previously recorded Site TN-6-601, Feature B-12
PL-15	Portable metal sprayer
PL-17	Japanese beer bottle
PL-18	Portable basalt mortar fragment
PL-19	Remnant of a N-S trending roadway

4.1.1 Descriptions of Archaeological Resources

PL-01: Possible jeep transmission found along Transect 1. Probably of American origin,

PL-02: Site number deleted.

PL-03: A 3.0 by 4.5 m rectangular pit that is lined with coral cobbles and boulders The pit is surrounded on all sides by a low berm that measures ca. 3 to 3.5m wide. The function of this pit is unknown

PL-04: A concrete pad with a pedestaled trough and associated possible sump pit (Figures 8, 9, and 10). The concrete pad measures ca. 7.0 by 4.2 m and is has a perimeter curb that measures 0.1 m wide by 0.1 m high; there is a 0.9 m (3-feet) opening in the SW corner and a trough or gutter that extends along the E side of the pad on the inside of the curb. The pad is divided in half with a 0.1 m wide by 0.1 m high concrete curb. The concrete trough is pedestaled along the center of the pad, on the W side of the dividing curb. The five pedestals

Figure 8. PL-4: Pedestaled Concrete Trough (view to NW)

Figure 9. PL-4: Detail of Concrete Trough (view to N)

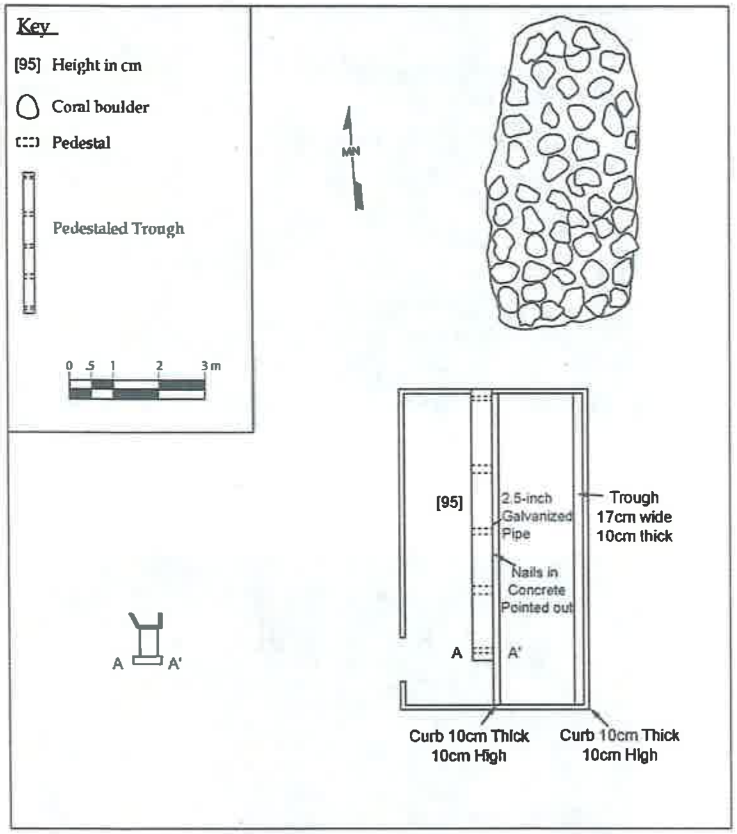

Figure 10. Plan map of PL-4

that support the trough are ca. 0.6m high; the trough is 6.0 m long, 0.46 m wide, and 0.35 m deep. The W side of the trough is angled inward, with the top wider than the base, and the E side is vertical and has numerous nail points sticking out of the cement presumably to hold a wooden board. A single galvanized pipe (2 ½-inch) at the center of the trough probably functioned to drain water out of the trough. A rectangular pit filled with coral boulders and cobbles is located 1.5 m N of the concrete pad. The pit measures ca. 6.7m x 2.4m, and presumably served as a sump pit for water coming from the pad.

This resource probably functioned as a bathing facility. The trough was probably a communal basin that was probably backed by a board with a large mirror. The E side of the pad probably had showers.

PL-05: Concrete block (Figure 11) and corrugated metal culvert pipe (Figure 12) associated with 10th St. The concrete block measures ca. 1.2 x 0.5 x 0.20 m. Accurate dimensions of the corrugated metal culvert could not be determined because it is compressed, but it was probably a 2-foot (ca. 60 cm) diameter pipe.

Figure 11. PL-5: Concrete Block (View to SW) (photograph courtesy of Derek Yasaka)

Figure 12. PL-5: Metal Culvert (view to E)

PL-06: Low coral cobble wall (Figure 13) that measures ca. 8.0 x 0.5 x 0.3 m high. The wall follows a bearing of 60 degrees.

Figure 13. PL-6: Coral Wall (view to S)

PL-07: Coral cobble mound ca. 1.5m in diameter and piled to a height of 0.3 m.

PL-08: Small tracked vehicle (Figures 14 and 15), probably a four cylinder bulldozer that probably was associated with the Japanese Period. The overall measurements of the vehicle are ca. 2.7m x 1.4m x 1.2m. The letters "NGK" are engraved on a piece of porcelain (spark plug ?) on the engine.

Figure 14. PL-8, Tracked Vehicle (photograph courtesy of Derek Yasaka)

Figure 15. PL-8, Tracked Vehicle (view to S)

PL-09: A metal 55-gal drum filled with coral boulders and cobbles (Figure 16).

Figure 16. PL-9, Metal drum filled with coral (view to W)

PL-10: Semi-circular shaped mound of concrete (Figure 17) that measures ca 2.5 x 1.3 x 1 m high.

Figure 17. PL-10, Concrete Mound (view to S) (Dan Paul standing atop mound)

PL-11: Glass bottle roughly cube-shaped (Figure 18) that measures 4 x 4 x 5 cm. The mouth of the bottle is round and threaded for a metal cap.

Figure 18. PL-11, Cube-shaped Glass Bottle

PL-12: Complex of concrete pads, a coral alignment, and a cut limestone block wall. One of the concrete pads has a trough or gutter along its edge (Figure 19). The coral alignment is situated at the top of a localized slope and consists of at least 8 coral cobbles (Figure 20). One of the coral slabs contains steps leading on to it and cut limestone blocks were used in its construction (Figure 21). Several small ceramic electrical insulators were found nearby (Figure 22) Adjacent to the slab with the steps is a free standing wall constructed of cut limestone blocks (Figure 23). This wall is ca. 8.0 x 0.5 x 1.6 m high with the cut blocks mortared in place.

This site was previously recorded and mapped by Dixon et al. (2000: A113-A115, Figure A-43) as Component B15 of Site TN-6-601. Dixon et al. interpreted the complex of concrete slabs (including the one with the stairs) and the spatially associated cut limestone block wall as being of Japanese construction and worthy of preservation.

PL-13: Small coral cobble-lined depression ca. 1.5 m in diameter. May possibly be a part of Site TN-6-601, Component B-14.

Figure 19. PL-12, Concrete Pad with Gutter or Trough

Figure 20. PL-12, Coral Alignment

Figure 21. PL-12, Concrete Slab with Stairs (note cut blocks in construction)

Figure 22. PL-12, Ceramic Insulator

Figure 23. PL-12, Cut Limestone Wall (view to E)

Site PL-14: Upright remnant of a wooden utility pole (Figure 24), and a concrete wall foundation. The utility pole remnant is ca. 1m in height and 28 cm in diameter. The center of the pole has been eaten by termites. The rest of the pole lies on the ground just to the N of the upright. Approximately 10m to the N is what appears to be the foundation of a concrete wall. No details were recorded on this wall foundation. This site may be a part of Site TN-6-601, Component B-14.

Figure 24. PL-14, Wooden Utility Pole

PL-15: Remnant of a wooden utility pole and a rectangular pit (Figure 25). The rectangular pit measures c. 3.0 x 2.0 x 0.6 m deep, with a 1.8 to 2.8 m wide and 0.6 m high berm surrounding the pit. The function of this pit is unknown.

Figure 25. Site PL-15, Rectangular Pit

PL-16: Metal sprayer (Figure 26). The sprayer is circular in cross section and stands ca. 50 cm high. The top diameter (27 cm) is larger than the base diameter (10 cm).

PL-17: Brown Japanese beer (?) bottle (Figure 27). Japanese kanji is embossed on the top and bottom of the bottle and superimposed letters B and K are embossed on the shoulder and base of the bottle

Figure 26. PL-16, Metal Sprayer

Figure 27. PL-17, Brown Glass Bottle (photograph courtesy of Derek Yasaka)

PL-18: Portable basalt mortar fragment (Figures 28 and 29). This basalt mortar fragment measures ca. 20 x 20 x 13 cm thick and appears that is was well used before it broke.

PL-19: Portion of a N-S trending roadway. The length of this road way could not be determined, but it is ca 7.3 m wide and 0.2 m high on the E side and 0.5 m high on the W side..

Figure 28. PL-18, Portable Basalt Mortar Fragment (photograph courtesy of Derek Yasaka)

Figure 29. PL-18, Portable Basalt Mortar Fragment (photograph courtesy of Derek Yasaka)

4.2 Alternative Sites

The two alternative land fill areas at Masalok and Carolinas were briefly inspected. Investigations were limited to what could be seen from existing roads.

4.2.1 Masalok

Previous archaeological work in this area by Moore et al. (1986) and Allen et al. (2000) recorded numerous latte sets and human burials. The current conditions of this area indicate that it is relatively undisturbed (see Figures 30-32) suggesting that there is a high probability of the area containing potentially significant historic resources.

Figure 30. Unai Masalok (view to S)

Figure 31. Unai Masalok (view to N)

Figure 32. Masalok Area

4.2.2 Carolinas

Previous archaeological investigations in the Carolinas and Kastiyu areas of southern Tinian have been conducted by Bodner and Welch (1992), Bodner (1994, 1997), and Simons and Farrell (1998). Numerous (over 180) archaeological sites dating to the Prehistoric, Japanese, and World War II periods have been recorded in this region. This area appears to have a high potential to contain archaeological resources. Presently, this area is being developed into residential areas with many relatively new homes and improved roads (Figures 33-35).

Figure 33. Carolinas Homesteads (view to NW)

Figure 34. Carolinas Homesteads (view to S)

Figure 35. Carolinas Homesteads (view to SW)

5.0 SUMMARY AND RECOMMENDATIONS

A total of 18 historic resources (11 remains of structures and 7 artifacts) were recorded in the survey area. All of these resources are recorded as part of the previously recorded site TN-6-601, which consists primarily of the remains of the 444th Bomb Group Camp dating from the American occupation of the island during World War II. Most of these sites appear to be relatively insignificant and should not be a concern in developing this property into a solid waste disposal facility.

Of the 18 historic resources recorded during the current investigations, 13 are located in the 200 foot buffer that surrounds the Landfill site (see Figure 7). The five resources that are located within the land fill site area are:

PL-05 – Corrugated metal culvert
PL-08 – Tracked vehicle
PL-09 – 55-gal drum filled with coral rocks
PL-11 – Cube shaped glass bottle
PL-16 – Portable sprayer

None of these resources appear to be significant and should not be a concern in developing this parcel.

The most important of these sites is Site PL-12, which was recorded by Dixon et al. (2000: A-113 – A-115) as Site TN-6-601-B15. This site consists of a semicircular concrete pad with several staircases and an adjacent cut limestone wall. Dixon argues that the construction is atypical of the U.S. Military during WWII and may have originally been built by the Japanese; we agree with these thoughts.

In evaluating the significance of the archaeological resources recorded by Dixon et al (2000), site TN-6-601 was evaluated according to criteria promulgated by the National Register of Historic Places in 36 CFR 60.4. Site TN-6-601 was evaluated as being significant based on its ability to yield information important in prehistory or history (Criterion D). Component B-15 (PL-12) was also evaluated as being significant under Criterion C, in that it is an excellent or representative example of its site type (Dixon et al. 2000:182). Dixon et al. go on to recommend that Site Component B-15 (PL-12) be preserved and interpreted; this recommendation is agreed upon by the Historic Preservation Office on Tinian (Carmen Sanchez, personal communication June 2006). This feature complex is located within the buffer zone on the south side of the subject property. With care during land clearing and construction activities, this site can be protected for long term preservation and possible future interpretation. To ensure its protection we recommend that temporary markings (flagging tape or construction fencing) be placed around this component feature.

One of the factors that hindered the current investigations was the density of the vegetation. Given that the analyses of historic maps and aerial photographs have clearly shown that the

entire project area was probably within the limits of the 444th Bomb Group Camp, it seems extremely likely that additional historic resources may be present. It is recommenced that all vegetation clearing and excavations be archaeologically monitored, so the presence of potentially significant historic resources can be documented and the record of these resources be preserved.

Two alternative landfill sites are also being considered as locales for the proposed municipal landfill site – Masalok and Carolinas. Previous archaeological investigations in these general areas indicate that there is a high probability of potentially significant sites being present in these areas. If these sites are considered further and precise locations for the proposed landfill are decided upon, then archaeological surveys need to take place in these areas.

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APPENDIX G

National Historic Preservation Act Section 106 Consultation Findings

(action ?) Kanalei
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file

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June 18, 2007

Serial No.: 25921
File: Sec. 106/USACOE

Mr. Todd C. Barnes, P.E.
Chief, Engineering and Construction Division
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Re: Proposed Tinian Landfill

Dear Mr. Barnes,

CNMI HPO has reviewed the draft archaeological report, Archaeological Investigations for the Proposed Landfill on Tinian Commonwealth of the Northern Mariana Islands (CNMI) by Pacific Legacy, Inc. HPO comments are provided to assist the Federal Agency with its compliance with Section 106 of the National Historic Preservation Act.

Based on our review of the evaluations of Pacific Legacy regarding cultural resources discovered within the APE, and the proposed plan for protection of the significant features of the previously recorded site, TN-6-601, CNMI HPO concurs with the Corps' determination that the proposed project will have no effect on any significant historic properties.

HPO offers the following technical comments on the draft report:

Page1, final paragraph: Mariana Islands is spelled incorrectly
Page 2, third paragraph: Decimal is placed incorrectly in rainfall amount
Page 5, cultural periods: Prehistoric Period 1000 ?
Pages 16 and 17: Caption and figure are on separate pages

The Consultant should include an updated site form for TN-6-601 in the final report.

Pedro (Roy) C. Sablan
Director

cc: Secretary DCCA

APPENDIX H

Traffic Impact Assessment Report

Phillip Rowell and Associates
47-273 'D' Hui Iwa Street Kaneohe, Hawaii 96744 Phone: (808) 239-8206 FAX: (808) 239-4175 Email: prowell@hawaiiantel.net

June 12, 2007

Wil Chee - Planning & Environmental, Inc.
1018 Palm Drive
Honolulu, Hawaii 96814

Attn: Richard Stook

Re: **Traffic Impact Assessment Report**
Proposed Tinian Landfill

Dear Richard:

Phillip Rowell and Associates have completed the following Traffic Impact Assessment Report for the proposed landfill on the island of Tinian. The report is presented in the following format:

A. Project Location and Description
B. Purpose and Objective of Study
C. Methodology
D. Description of Existing Streets and Intersection Controls
E. Existing Peak Hour Traffic Volumes
F. Level-of-Service Concept
G. Existing Levels-of-Service
H. 2035 Background Traffic Projections
I. Project Trip Generation
J. 2035 Background Plus Project Traffic Projections
K. Impact Analysis of 2035 Conditions
L. Mitigation
M. Other Issues
N. Summary and Conclusions

A. Project Location and Description

The proposed project is located in the western area of Tinian. A copy of the location map provided in the Request for Proposal is attached as Attachment A.

Access to and egress from the project will be via a driveway along the north side of 86th Street. For purposes of this traffic assessment, it is assumed that the driveway will consist of one lane inbound and one lane outbound. If this configuration is insufficient, appropriate improvements are recommended.

B. Purpose and Objective of Study

1. Quantify and describe the traffic related characteristics of the proposed project.

2. Identify potential deficiencies adjacent to the project that will impact traffic operations in the vicinity of the proposed project.

C. Methodology

1. *Define the Study Area*

The first step in defining the study area was to estimate the number of peak hour trips that the proposed project will generate. It was estimated that the project will generate less than 20 trips during either the morning or afternoon peak hour. Because of the small number of peak hour trips, the traffic study is categorized as an "access location and design review."[1] Therefore, the study area is limited to the major intersections that project trips will use to access the main highway, which is 86th Street. Thus, the study area includes the following intersections:

- 86th Street at Broadway
- 86th Street at 8th Avenue
- 86th Street at the Landfill Entrance

2. *Analyze Existing Traffic Conditions.*

Existing traffic volumes at the study intersections were obtained from traffic counts completed during the week of June 5, 2006. These counts were continuous 24-hour counts from Monday through Friday. Existing traffic operating conditions were assessed using the methodology described in the 2000 *Highway Capacity Manual* (HCM)[2].

3. *Estimate Horizon Year Background Traffic Projections*

Background traffic conditions are defined as future traffic conditions without the proposed project and were estimated by superimposing background growth onto existing traffic volumes.

The year 2035 was used as the horizon year. This year was used to be consistent with the data provided in the *Comprehensive Study Report* [3]

4. *Estimate Project-Related Traffic Characteristics*

The number of peak-hour trips that the proposed project will generate was estimated using standard trip generation procedures outlined in the *Trip Generation Handbook*[4], data provided in *Trip Generation*[5] and data provided in recently completed traffic studies for several projects in the area. These trips were distributed and assigned based on the available approach and departure routes and trip distribution data from other recently completed traffic studies in the area.

[1] Institute of Transportation Engineers, *Transportation and Land Development*, Washington, D.C., 2002, p.3-6.

[2] Institute of Transportation Engineers, *Highway Capacity Manual*, Washington, D.C., 2000

[3] Wil Chee - Planning and Environmental, Inc., *Comprehensive Study Report of Tinian Landfill*, Honolulu, HI., March 2005

[4] Institute of Transportation Engineers, *Trip Generation Handbook*, Washington, D.C., 1998

[5] Institute of Transportation Engineers, *Trip Generation*, Washington, D.C., 2003

5. *Analyze Project Related Traffic Impacts*

The project-related traffic was then superimposed on 2035 background traffic volumes at the study intersections. The traffic impacts of the project were assessed by analyzing the changes in traffic volumes and levels-of-service at the study intersections. The purpose of this analysis was to identify potential operational deficiencies in the vicinity of the proposed project.

D. Description of Existing Streets and Intersection Controls

A schematic diagram indicating the existing lane configurations and right-of-way controls of the study intersections is presented as Attachment B.

Kua Highway is a two-lane, two-way State highway with a north-south orientation. Holopuni Road and Naalae Road are both two-lane, two-way County roads. All intersections are unsignalized. All approaches are one-lane. There are no separate turn lanes at any of the study intersections.

E. Existing Peak Hour Traffic Volumes

The existing traffic volumes are based on traffic counts completed in May 2006 and July 2006. The morning and afternoon peak hour traffic volumes are summarized in Attachment B.

1 The traffic counts include buses, trucks and other large vehicles. Mopeds and bicycles were not counted.

2 All intersections were counted from 6:30 AM to 9:00 AM and from 3:30 PM to 6:00 PM on weekdays.

3 The traffic volumes shown are the peak hourly volume of each movement rather than the peak sum of all approach volumes.

4 All volumes are rounded to nearest five (5). A minimum volume of five (5) is shown for each movement in order to have a basis for projecting future traffic volumes and to satisfy input requirements of the *Highway Capacity Software*.

5 Pedestrian activity was negligible.

6 The traffic counts were taken along Broadway south of 86th Street. The remaining volumes were estimated using descriptions of roadway conditions and development characteristics of the island.

F. Level-of-Service Concept

"Level-of-Service" is a term which denotes any of an infinite number of combinations of traffic operating conditions that may occur on a given lane or roadway when it is subjected to various traffic volumes. Level-of-service (LOS) is a qualitative measure of the effect of a number of factors which include space, speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience.

There are six levels-of-service, A through F, which relate to the driving conditions from best to worst, respectively. The characteristics of traffic operations for each level-of-service are summarized in Table 1. In general, LOS A represents free-flow conditions with no congestion. LOS F, on the other hand, represents severe congestion with stop-and-go conditions. Level-of-service D is typically considered acceptable for peak hour conditions in urban areas.

Table 1 Level-of-Service Definitions for Unsignalized Intersections(1)

Level-of-Service	Expected Delay to Minor Street Traffic	Delay (Seconds)
A	Little or no delay	<10.0
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	See note (2) below	>50.1

Notes:
(1) Source: *Highway Capacity Manual*, 2000.
(2) When demand volume exceeds the capacity of the lane, extreme delays will be encountered with cueuing which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvement of the intersection.

G. Existing Levels-of-Service

The existing levels-of-service were assessed using the methodology described in the *Highway Capacity Manual*. The results of the level-of-service analysis of existing conditions are summarized in Table 2.

Table 2 Existing (2006) Levels-of-Service

Intersection and Movement	AM Peak Hour Delay [1]	AM Peak Hour LOS [2]	PM Peak Hour Delay	PM Peak Hour LOS
86th Street at Broadway				
Northbound Left & Thru	7.2	A	7.3	A
Eastbound Left & Right	8.5	A	8.7	A
8th Avenue at Broadway				
Northbound Left, Thru & Right	7.2	A	7.2	A
Southbound Left, Thru & Right	7.2	A	7.2	A
Westbound Left, Thru & Right	9.0	A	8.8	A
Eastbound Left, Thru & Right	9.0	A	9.0	A

NOTES:
(1) Delay in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay.

The conclusion of the level-of-service analysis is that traffic currently operates at acceptable conditions at the study intersections as all movements operate at Level-of-Service A.

H. 2035 Background Traffic Projections

2035 background traffic projections are defined as future background traffic conditions without the proposed project. These projections are typically calculated by adding background growth to existing traffic volumes described previously in this report.

Based on data in the Comprehensive Study Report, it was assumed that traffic growth will be consistent with population and visitor growth, which is 5% per year between 2006 and 2035. Therefore, the growth factor was calculated using the following formula:

$$F = (1 + i)^n$$

where F = Growth Factor
i = Average annual growth rate, or 0.05
n = Growth period, or 29 years

This growth factor was applied to all traffic movements at the study intersections and rounded to the nearest five (5) and added to existing volumes. The resulting projections are shown in Attachment C.

I. Project Trip Generation

Future traffic volumes generated by the project were estimated using the procedures described in the *Trip Generation Handbook*[6]. This method typically uses trip generation rates to estimate the number of trips that the project will generate during the morning and afternoon peak hours. However, the Institute of Transportation Engineers trip generation rates for landfill projects. Therefore, the number of trip generated during the morning and afternoon peak hours had to be estimated from data provided in the *Comprehensive Study Report*. Traffic will be generated by three activities at the proposed landfill. Each is discussed separately.

Employees

The *Comprehensive Study Report* indicated that there will be between four and six employees[7]. Therefore, it was assumed that there will be five employees and that all five employees will arrive during the morning peak hour and depart during the afternoon peak hour.

[6] Institute of Transportation Engineers, *Trip Generation Handbook*, Washington, D.C., 1998, p. 7-12

[7] Will Chee - Planning and Environmental, Inc., Comprehensive Study Report for Tinian Landfill, March 2005, pages 37 & 40

Refuse Trucks

The *Comprehensive Study Report* indicated at that in 2035, 19,329 tons of waste will be transported to the landfill[8]. The number of peak hour trucks to accommodate this amount of waste was estimated using the following assumptions:

1. One (1) cubic yard of waste equals 0.3 ton of waste. This was calculated from data in Table 2 (page 21) of the *Comprehensive Study Report*.
2. Each truck has capacity for 15 cubic yards. Therefore, each truck has the capacity to haul 4,5 tons of waste.
3. The landfill will operate eight hours per day five days per week.
4. The arrival and departure of refuse trucks will be distributed evenly over the eight hour work day.

Using the above assumptions, it was estimated that there will be 16 refuse truck deliveries per day, which equates to two deliveries per hour. Therefore, there will be two inbound trips per hour and two outbound trips per hour.

Septic Disposal

There will be one septic disposal delivery per week. This delivery is included in the trip generation analysis and it was assumed that this delivery will be made during the morning peak hour.

Trip Generation Totals

The trip generation totals are shown in Table 4.

Table 4 Trip Generation Totals

Period & Direction		Trip Generated By: Employees	Refuse Trucks	Septic Disposal	Totals
AM Peak Hour	Total	5	4	2	11
	Inbound	5	2	1	8
	Outbound	0	2	1	3
PM Peak Hour	Total	5	4	0	9
	Inbound	0	2	0	2
	Outbound	5	2	0	7

As shown the proposed project will generate 8 inbound and 3 outbound trips during the morning peak hour. During the afternoon peak hour, the project will generate 2 inbound and 7 outbound trips.

The project generated traffic was distributed and assigned based on the existing approach and departure pattern of traffic at the study intersections. The project trip assignments are shown in Attachment D.

[8] Will Chee - Planning and Environmental, Inc., Comprehensive Study Report for Tinian Landfill, March 2005, page 17

J. 2035 Background Plus Project Projections

2035 background plus project traffic projections were estimated by superimposing the peak hourly traffic generated by the proposed project on the 2035 background (without project) peak hour traffic projections. This assumes that the peak hourly trips generated by the project coincide with the peak hour of the adjacent street. This represents a worse-case condition. The resulting 2035 background plus project peak hour traffic projections are shown in Attachment E.

K. Impact Analysis of 2035 Conditions

Based on criteria recommended by the Institute of Transportation Engineers, a traffic impact study is not warranted because the project will generate only 11 inbound trips per hour during the morning peak hour, which is less than the 100 trips per hour required to warrant a traffic impact analysis. However, an analysis of the changes in peak hourly traffic at the study intersections and a level-of-service was performed to quantify the impacts of project generated traffic and to identify operational deficiencies adjacent to the project for 2035 background plus project conditions.

Analysis of Project's Share of Total Intersection Approach Volumes

An analysis of the project's share of 2035 background plus project intersection approach volumes at the study intersections is summarized in Table 5. The table summarizes the project's share of total 2035 peak hour approach volumes at the study intersections. Also shown are the percentages of 2035 background plus project traffic that is the result of background growth. The conclusion of this analysis is that project generated traffic will represent less than 5% of the total peak hour traffic at the study intersections. Background growth and related projects' traffic will represent between 71.4% and 73.0% of the total 2035 traffic projections.

Table 5 Analysis of Project's Share of Total Intersection Approach Volumes [1]

					Background Growth		Project Traffic	
Intersection	Period	Existing	2035 Background	2035 Background Plus Project	Trips	Percent of Total Traffic [2]	Trips	Percent of Total Traffic [2]
86th Street at Broadway	AM	35	140	147	105	71.4%	7	4.8%
	PM	45	180	186	135	72.6%	6	3.2%
86th Street at 8th Avenue	AM	65	260	267	195	73.0%	7	2.6%
	PM	70	280	289	210	72.7%	9	3.1%

Notes:
(1) Volumes shown are total intersection approach volumes or projections.
(2) Percentage of total 2035 background plus project traffic.

Analysis of Project's Pro Rata Share of Intersection Traffic Growth

An analysis of the project's pro rata share of the increase of traffic volumes between 2006 and 2035 is summarized in Table 6. This table summarizes the growth between 2006 and 2035 and indicates the percentage of growth resulting from background growth and the percentage growth resulting from project generated traffic. The conclusion of this analysis is that the project's share of traffic growth is between 3.5% and 6.3%, which is significantly less than the increases as a result of background traffic growth, which is over 93% of the total growth.

Table 6 Analysis of Project's Share of Total Intersection Approach Volumes Growth [1]

					Background Growth [2]		Project Trips [3]	
Intersection	Period	Existing	2035 Background	2035 Background Plus Project	Volume	% of 2006 to 2035 Growth	Volume [4]	% of 2006 to 2035 Growth
86th Street at Broadway	AM	35	140	147	105	93.8%	7	6.3%
	PM	45	180	186	135	95.7%	6	4.3%
86th Street at 8th Avenue	AM	65	260	267	195	96.5%	7	3.5%
	PM	70	280	289	210	95.9%	9	4.1%

Notes:
(1) Volumes shown are total intersection approach volumes or projections.
(2) Background versus existing.
(3) Background plus project versus background.
(4) Project generated traffic.

Level-of-Service Analysis

The results of the level-of-service analysis for 2035 conditions are summarized in Table 7. Shown in the table are the average vehicle delays and the levels-of-service of the controlled movements. The level-of-service analysis for 2035 conditions was performed using the following assumptions:

1. The existing lane configurations will be maintained.
2. Level-of-Service D is the minimum acceptable level-of-service.
3. All intersections are STOP sign controlled.
4. There are no separate turn lanes at any of the intersections.

Table 7 Level-of-Service Analysis Results for 2035 Conditions

Intersection, Approach and Movement	AM Peak Hour				PM Peak Hour			
	Without Project		With Project		Without Project		With Project	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
86th Street at Broadway								
Northbound Left & Thru	7.3	A	7.4	A	7.5	A	7.5	A
Eastbound Left Right	9.1	A	9.1	A	9.9	A	9.9	A
8th Avenue at Broadway								
Northbound Left, Thru & Right	7.3	A	7.4	A	7.3	A	7.3	A
Southbound Left, Thru & Right	7.4	A	7.4	A	7.3	A	7.3	A
Westbound Left, Thru & Right	10.8	B	10.9	B	10.1	B	10.2	B
Eastbound Left, Thru & Right	10.8	B	11.0	B	10.6	B	10.8	B

NOTES:
1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.

The conclusions of the level-of-service analysis is that all movements will operate at Level-of-Service B, or better, without and with the proposed project. This implies good operating conditions without and with project generated traffic.

L. Mitigation

Level-of-Service D is generally considered to be the minimum acceptable peak hour level-of-service.[9] As all movements will operate at Level-of-Service B, or better, no mitigation is recommended.

M. Summary and Conclusions

The conclusions of the traffic impact assessment are:

1. The proposed project will generate 8 inbound and 3 outbound trips during the morning peak hour. During the afternoon peak hour, the project will generate 2 inbound and 7 outbound trips.

2. The Institute of Transportation Engineers recommends that a traffic impact study should be performed if, in lieu of another locally preferred criterion, development generates an additional 100 vehicle trips in the peak direction (inbound or outbound) during the site's peak hour. Based on the criterion, a traffic impact analysis is not warranted.

[9] Institute of Traffic Engineers *Transportation Impact Analyses for Site Development, A Recommended Practice*, Washington, D.C., 2006, p 60.

3. An analysis of the estimated 2035 traffic volumes at the study intersections concluded:

   a. Project generated traffic will represent between 2.6% and 4.8% of the total peak hour traffic at the study intersections. Background growth will represent between 71.4% and 73.0% of the total 2035 traffic projections.

   b. Project generated traffic will represent 6.3% or less of the total growth in traffic at the study intersections between 2006 and 2035.

4. The level-of-service analysis for background plus project conditions concluded that all movements at the study intersections will operate at Level-of-Service B, or better. Level-of-Service D is typically considered the minimum acceptable level-of-service for peak hour conditions. Accordingly, no mitigation is recommended.

Respectfully submitted,
PHILLIP ROWELL AND ASSOCIATES

P J Rowell

Phillip J. Rowell, P.E.
Principal

List of Attachments

A. Project Location Map
B. Existing (2006) Peak Hour Traffic Volumes and Lane Configurations
C. 2035 Background Peak Hour Traffic Projections
D. Project Trip Assignments
E. 2035 Background Plus Project Peak Hour Traffic Projections

Attachment A

PROJECT LOCATION MAP

(Provided by Wil Chee - Planning and Environmental, Inc.)

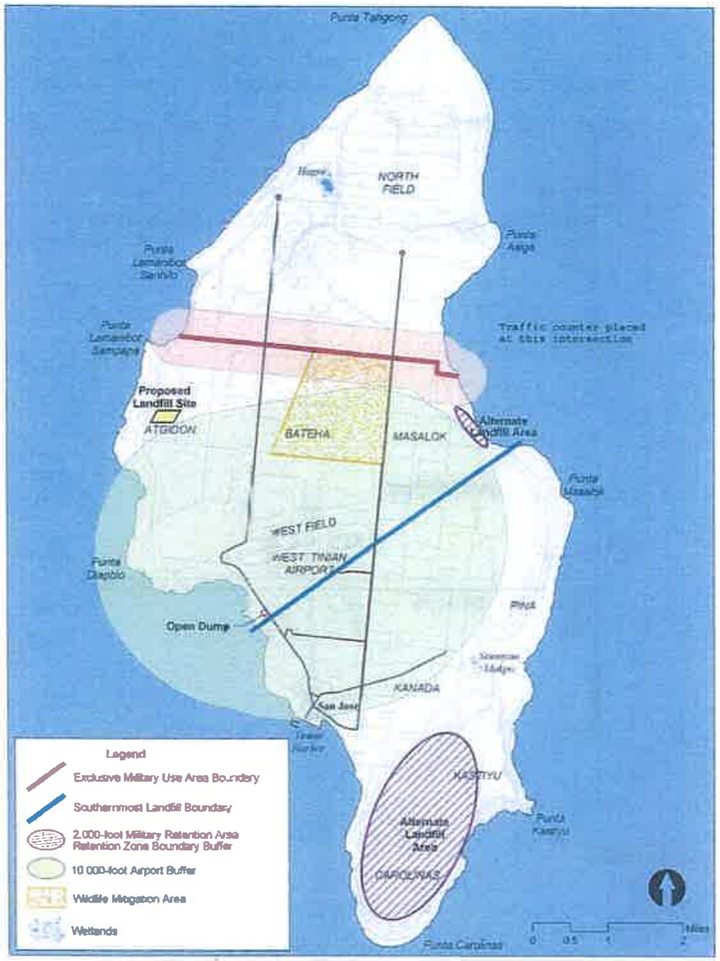
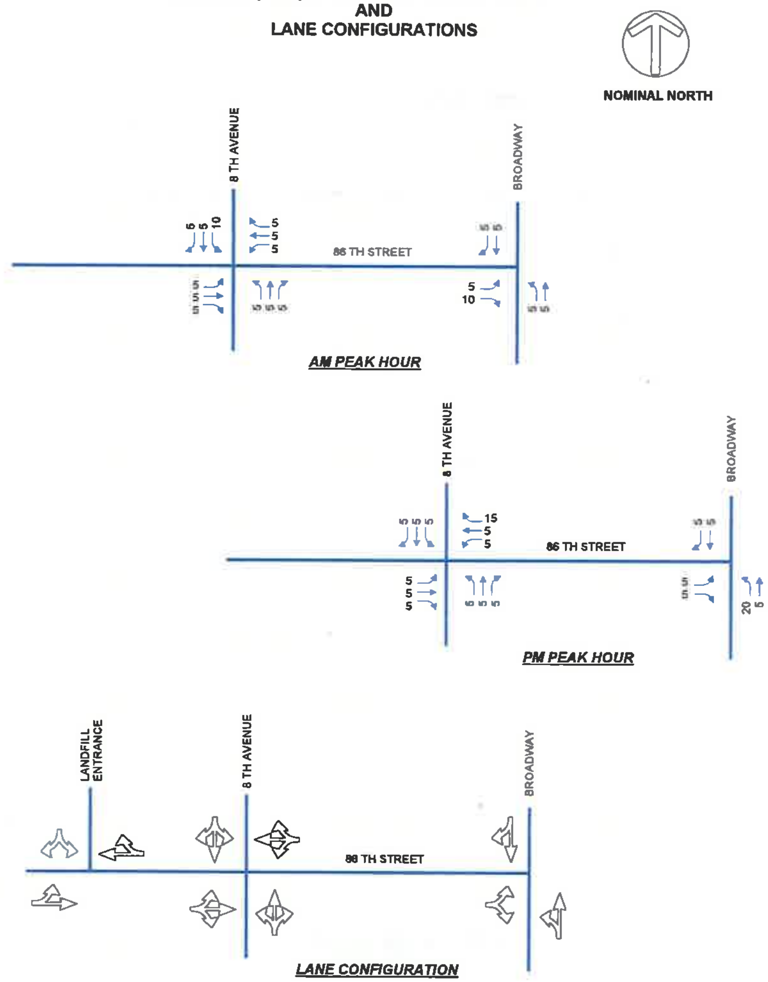
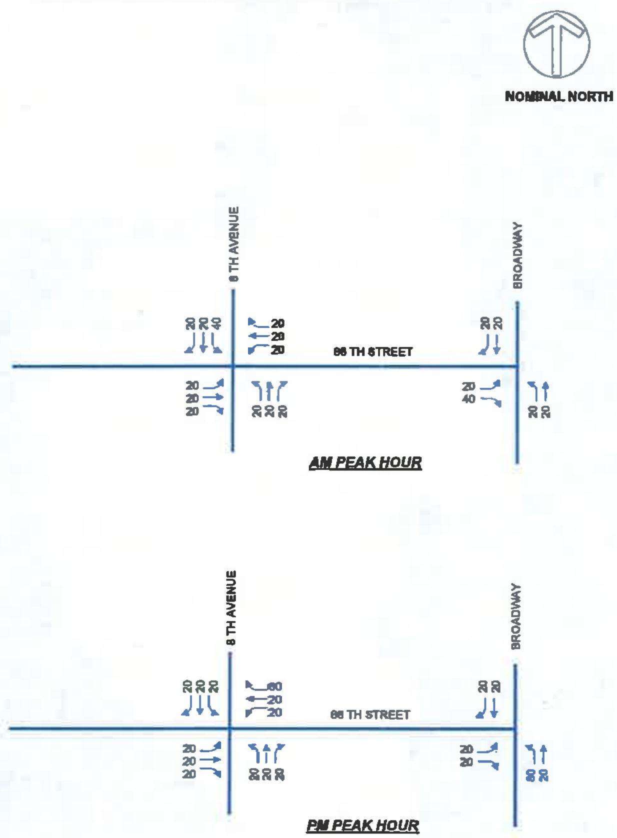


Figure 2: Tinian Island

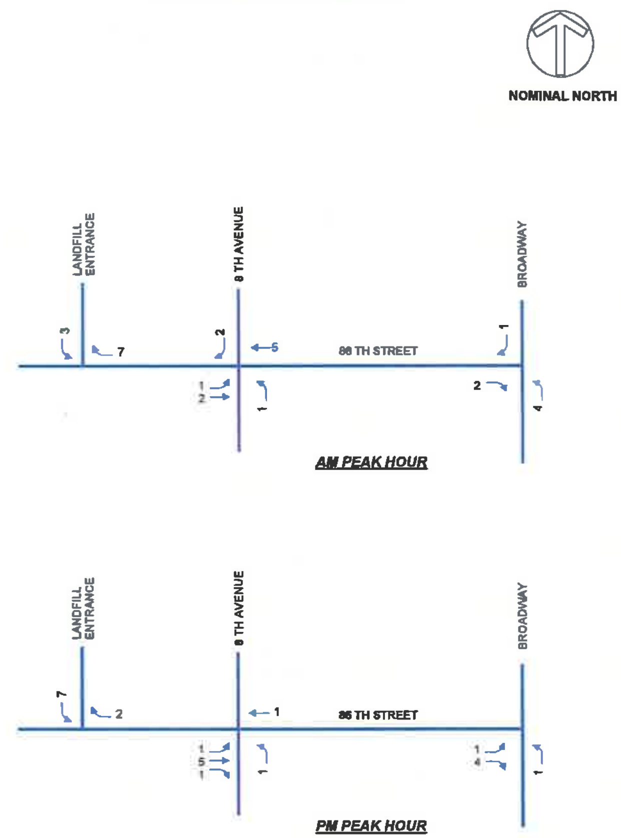
Attachment B
EXISTING (2006) PEAK HOUR TRAFFIC VOLUMES
AND
LANE CONFIGURATIONS



Attachment C
2035 BACKGROUND PEAK HOUR TRAFFIC PROJECTIONS



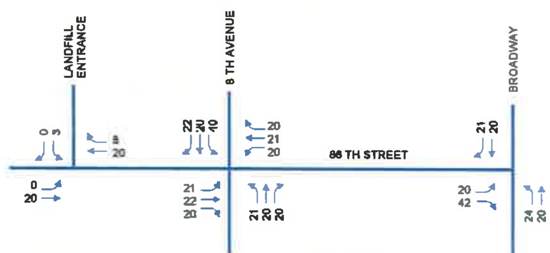
Attachment D
PROJECT TRIP ASSIGNMENTS



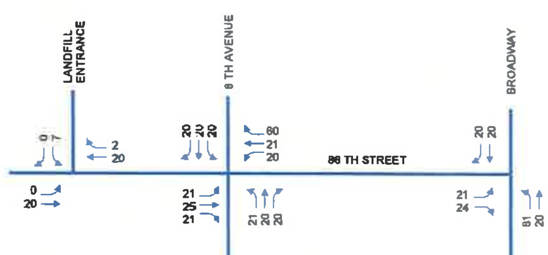
Attachment E

2035 BACKGROUND PLUS PROJECT PEAK HOUR TRAFFIC PROJECTIONS

NOMINAL NORTH



AM PEAK HOUR



PM PEAK HOUR

APPENDIX I

Draft Environmental Assessment Public Informational Meeting Minutes and Materials

SUMMARY

PUBLIC INFORMATIONAL MEETING

DRAFT ENVIRONMENTAL ASSESSMENT
TINIAN LANDFILL, TINIAN ISLAND, CNMI

April 17, 2007

Meeting Date: April 12, 2007

Meeting Location: Tinian Mayor's Office - Conference Room

The meeting was convened at 6:20 p.m. by James Hatashima of the U.S. Army Corps of Engineers, Honolulu Engineer District (POH). Handouts distributed during the meeting included the following:

- Project Fact Sheet
- Comment Form

Ike Quichocho, senior advisor to the Mayor of Tinian, expressed his disappointment with the lack of turnout and interest for the public information meeting.

J. Hatashima commenced with his PowerPoint presentation by explaining that though it is not required under the National Environmental Policy Act (NEPA), the meeting is being held to convey information presented in the subject draft environmental assessment as a public courtesy. He stated that the draft environmental assessment follows the Tinian landfill comprehensive study that was initiated in February 2004 and completed in March 2005. Wil Chee - Planning, Inc.—who performed the landfill comprehensive study—has also been tasked with preparation of the environmental assessment through a POH task order issued to the firm in April 2006. J. Hatashima noted that environmental assessment preparation is on schedule. He further stated that one calendar year is a relatively short period to prepare a draft environmental assessment given the time and effort necessary to adequately address a proposed action.

I Quichocho questioned why there was a time delay between completion of the comprehensive study report and issuance of the environmental assessment task. Steve Hiney, solid waste consultant to the CNMI Department of Public Works, replied that it was in part due to delays internal to the CNMI government and lack of timely action on the proposed landfill.

I. Quichocho opined that CNMI government leaders must decide on a suitable site for the proposed solid waste landfill on Tinian before too long other. Design and construction of the landfill cannot progress until property for the facility is secured. S. Hiney concurred. I. Quichocho added that another site outside the leaseback area on Tinian Island may need to be assessed if the U.S. Department of Defense is unwilling to approve the preferred landfill site in Atgidon or approval does not occur on a timely basis. He would also consider utilizing CNMI funds if available to contract the municipality's own assessment of an alternative site to expedite the process rather than rely upon federal funding that would also trigger the NEPA process.

I. Quichocho inquired about the construction period for a new MSWL. S. Hiney estimated it should take up to 18 months. I. Quichocho suggested a temporary landfill in the interim to enable closure of the open dump as quickly as possible so the property can be developed. He said the former Western Quarry was recently proposed by the CNMI Department of Public Lands for conversion to a solid waste landfill, though cautioned the Tinian Mayor against it. S. Hiney stated that the draft environmental assessment addresses the site and concurs with the document's finding that the former quarry is not suitable as a landfill if only because the site resides proximal to Tinian Island's sole source aquifer. That alone would preclude consideration of the site under the federal Resource Conservation and Recovery Act, Subtitle D landfill siting requirements. He added that, while constructing a temporary landfill is feasible, Tinian Municipality leaders must realize that such a facility would be subject to the same requirements as a permanent (i.e., long-term) landfill. An environmental assessment would still be required for the proposed site as would compliance with applicable design, operating, closure, and post-closure regulations.

J. Hatashima turned the PowerPoint presentation over to R. Stook who described the NEPA process, elements of an environmental assessment, and findings of the subject draft environmental assessment that addresses the proposed Tinian Island landfill.

I. Quichocho said that three conditional casino permits were recently issued that may lead to a significant population increase on Tinian Island over the next few years, mostly from the visitor industry, should casino development come to fruition as a result of said permits,. He asked how a sudden population increase would affect the proposed on-island landfill design and life span, and recommended it be considered in waste volume projections for design purposes. S. Hiney noted that in his opinion, even with substantial population growth the proposed MSWL would still be able to accommodate Tinian's solid waste for 20 to 25 years. During landfill design and engineering phase population and waste volume projections would need to be taken into consideration.

S. Hiney asked question on U.S. Coast Guard requirements to ship solid waste by inter-island vessel. R. Stook replied that he is unaware of any specific requirements, but that the matter can be looked into further.

Reiterating what he stated earlier, I. Quichocho said Tinian Municipality is unable to proceed with the proposed Atgidon landfill site within the island's leaseback area until U.S. Department of Defense approval is granted. He noted that although there is an interim memorandum of agreement in place between the U.S Department of Defense and the CNMI Government for the leaseback area, lease negotiations have not progressed with the current administration. Resumption of talks with the Department of Defense regarding the leaseback area must be initiated by the CNMI Governor.

Citing a desire to improve and develop the land at and proximal to the existing open dump, I. Quichocho asked if an investigation is required to permanently close the dump or can it just be capped. S. Hiney and Derek Yasaka , an environmental consultant, both replied that the open dump footprint would need to be determined and any surface/subsurface contamination identified. S. Hiney recommended the land developer's engineers be involved with closure of the existing dump to facilitate the process consistent with proposed parcel improvements.

Don Power, FPA Pacific Corporation, opined that site characterization should not require much effort as most if not all waste in the existing open dump has been burned so all that is left is metallic debris. D. Yasaka replied that there may still be environmental issues to address, e.g., incomplete combustion of some materials can produce toxic compounds that the CNMI Division of Environmental Quality may require be investigated and, if necessary, remediated prior to capping. S. Hiney opined that a portion of the open dump could conceivably be investigated and closed while a regulatory-compliant solid waste landfill is being designed and constructed. Doing so may help to expedite permanent closure of the dump by preventing its footprint from increasing in size.

R. Stock informed attendees that this public meeting initiates a 30-day public comment period which allows anyone with questions or concerns regarding the draft environmental assessment to convey them to POH. The end of the comment period is May 12, 2007. Questions and comments regarding the draft environmental assessment, or the environmental assessment process in general, can be faxed or mailed using the pre-addressed form included as a handout, or e-mailed to J. Hatashima as follows:

U.S. Army Corps of Engineers, Honolulu District
Civil and Public Works Branch
Attn: CEPOH-PP-C (James Hatashima)
Building 230
Fort Shafter, HI 96858-5440
Fax: 011-808-438-0430/1184
E-Mail: James.K.Hatashima@ usace.army.mil

General landfill-related questions and comments can be directed to:

Mr. Steve Hiney
CNMI Department of Public Works
Solid Waste Division
GualoRai, Joeten Commercial Building, 2nd Floor
Saipan, MP 96950
Telephone: 670-322-2745
Fax: 670-322-2762
E-Mail: dpwsolidwaste@pticom.com

The meeting adjourned 8:05 p.m.

Attachments

1) Fact Sheet
2) Comment Form
3) Slide Presentation
4) Meeting Attendance Sign-In Sheet

Proposed Tinian
Municipal Solid Waste Landfill
Draft Environmental Assessment

April 12, 2007

PUBLIC MEETING INFORMATION SHEET

Project Background

The Commonwealth of the Northern Mariana Islands (CNMI) Department of Public Works (DPW) with the assistance of the U.S. Army Corps of Engineers, Honolulu District (POH), and in cooperation with the United States Department of the Interior (DOI), Office of Insular Affairs (OIA) propose the closure of an existing open dump site, and the siting, construction, and operation of a new municipal solid waste landfill (MSWL) on Tinian Island, CNMI.

The proposed project would be partially funded through a DOI OIA Capital Improvement Program (CIP) grant. As part of the CIP grant, DPW is required to comply with all applicable federal and territorial laws and regulations including compliance with the National Environmental Policy Act (NEPA) process. POH is assisting DPW in the preparation of an Environmental Assessment (EA) to comply with the NEPA evaluation process pursuant to the Intergovernmental Cooperation Act.

Elements of Proposed Project

The proposed project addressed in the draft EA consists of the following elements:

1) Siting for a new MSWL. The proposed facility would be approximately 30 acres in size.
2) Construction and operation of the new MSWL.
3) Closure of the existing open dump presently being used for solid waste disposal on Tinian.

A preferred MSWL site and two alternative sites are evaluated in the draft EA (shown in the figure on reverse).

NEPA & the Environmental Assessment Process

The National Environmental Policy Act is a federal law that was created to establish policies and goals for the protection of the environment. The process implemented by NEPA is intended to help federal agencies make decisions on projects based on an understanding of environmental consequences of the proposed action. Agencies are required to look at the potential impacts of a proposed action and identify reasonable alternatives to the action.

The intent of the subject EA is to ensure that full consideration is given to potential impacts of the proposed MSWL and open dump closure on the human environment. The EA serves as a disclosure document that identifies the purpose and need of both actions, reasonable alternatives thereto, existing environmental conditions, potential environmental impacts (both adverse and beneficial), and mitigation measures to avoid or minimize any potential impacts. The findings presented in the EA provide the basis to determine whether an Environmental Impact Statement (EIS) or Finding of No Significant Impact (FNSI) is appropriate.

Copies of the draft EA are available for viewing at Tinian and Joeten-Kiyu Public Libraries.

How to Submit Comments

Written comments on the draft EA should be submitted no later than May 12, 2007. A mail-in or fax comment form has been provided for your convenience.

SUBMIT COMMENTS TO:

U.S. Army Corps of Engineers, Honolulu District
Civil and Public Works Branch
(CEPOH-PP-C), Rm. 312, Bldg. 230
Fort Shafter, HI 96858-5440
ATTN: Mr. James Hatashima, Project Manager

E-mail: james.k.hatashima@usace.army.mil
Fax: (808) 438-0430

Proposed Tinian Municipal Solid Waste Landfill
Draft Environmental Assessment

Alternative Landfill Sites and Existing Open Dump Site

Proposed MSWL Site (Preferred Alternative)

PUBLIC COMMENT MAIL-IN FORM

PUBLIC INFORMATIONAL MEETING
FOR THE

DRAFT ENVIRONMENTAL ASSESSMENT FOR THE TINIAN MUNICIPAL SOLID WASTE LANDFILL

This form offers a convenient way for you to provide comments regarding the Draft Environmental Assessment for the proposed Tinian Landfill project. Please write your comments in the space below, fold the form, tape, stamp, and postmark by May 12, 2007. Thank you.

To: James Hatashima, U.S. Army Corps of Engineers, Honolulu District, Civil & Public Works Branch, CEPOH-PP-C, Rm. 312, Bldg 230, Ft. Shafter, Hawaii, 96858-5440

Subject: Draft Environmental Assessment for the Tinian Municipal Solid Waste Landfill

Signature: ______________________ Date: ______________

Name & Address (please print): ______________________

Draft Environmental Assessment
Public Meeting
April 12, 2007

Proposed Tinian Landfill
Tinian Island, CNMI

1

Fold top portion down and stamp

Stamp

Mr. James Hatashima, Project Manager
U.S. Army Corps of Engineers, Honolulu District
Civil and Public Works Branch
CEPOH-PP-C
Rm. 312, Bldg. 230
Fort Shafter, Hawaii 96858-5440.

Fold here, tape and mail

Agenda

- Purpose of Public Meeting
- Project Background
- Purpose and Need for the Project
- Alternatives Evaluated
- Environmental Analysis
- Public Involvement
- Project Schedule
- Points of Contact
- Questions and Answers

Purpose of Public Meeting

- Inform government agencies and public on the results of the Draft Environmental Assessment (EA)
- Solicit public input into the Environmental Assessment process

Project Background

1 — Comprehensive Study Report — 2 — Environmental Assessment — 3 — Design and Construction — 4

- Comprehensive Study Report
  - Completed: March 2005
  - Objective:
    - Closure of Existing Open Dump
    - Siting and Conceptual Layout of New Landfill
- Environmental Assessment
  - Initiated: April 2006
  - Objective:
    - Assess Impacts
- Design and Construction

- U.S. Dept. of the Interior – Office of Insular Affairs
  - Capital Improvement Project (CIP) Grant
  - Project compliance with National Environmental Policy Act (NEPA)
- U.S. Army Corps of Engineers (USACE)
  - Intergovernmental Cooperation Act
  - USACE conducts the NEPA evaluation
  - WCP, Inc.

- 2005 Comprehensive Study Report
  - Evaluated potential sites for a new Municipal Solid Waste Landfill (MSWL) on Tinian
  - Siting considerations for a MSWL
    - Resource Conservation and Recovery Act – Subtitle D
    - Local siting constraints
      - Exclusive military use area and buffer zone
      - Tinian Airport buffer zone
      - Municipality of Tinian
  - Conceptual layouts for a new MSWL

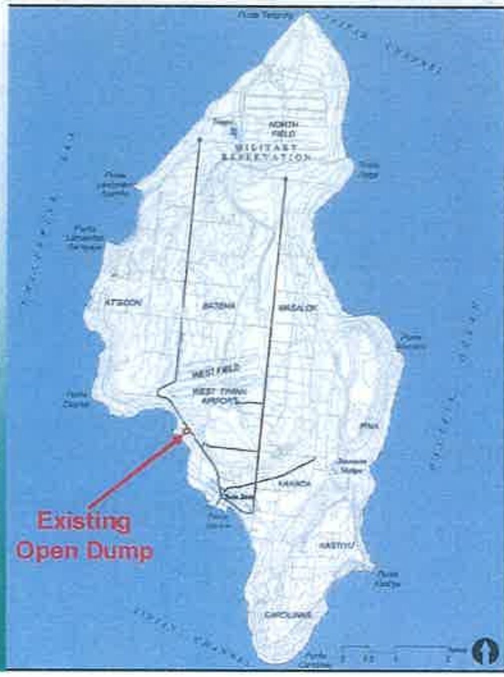
MSWL Siting Considerations

Proposed Action

- Construction and operation of a new regulatory compliant MSWL
- Closure of the existing Open Dump
  - Open Dump will be closed in compliance with federal regulations
  - EA examines Open Dump closure in terms of timing (i.e., early vs. post-MSWL construction closure)

Project Purpose and Need

- Existing Conditions
  - Open Dump
    - Approximately 4 acres in size
    - Presently accepts all of Tinian's solid waste
    - Total volume of waste in dump is approximately 45,000 tons (150,000 cubic yards) in 2005.


NORTH FIELD
MILITARY RESERVATION
WEST FIELD
Existing
Open Dump

10


Borrow Pit

- Future Landfill Demands
  - Waste generation projections over 30-year period (from 2005 through 2035)
  - 2005 = 4,472 tons/year
  - 2020 = 9,298 tons/year; 99,388 tons (cumulative)
  - 2035 = 19,329 tons/year; 306,008 tons (cumulative)
- Regulatory Compliance
  - Existing open dump NOT in compliance with regulations as prescribed under RCRA Subtitle D
  - Environmental and public health hazards

Summary of Project Purpose and Need:

- Purpose is to provide an appropriate and regulatory **compliant** solid waste disposal facility for the island of Tinian
- Need to close an existing dump which is not in compliance with current environmental regulations
- Lack of compliance promotes environmental, public health, and legal risks for the public and CNMI Department of Public Works
- New MSWL needed in order to meet environmental, public health, and legal responsibilities

Alternatives Evaluated

- 8 alternatives considered including No Action
- 3 alternative eliminated from further evaluation
- 5 alternatives carried forward for further evaluation
  - No Action – (No new MSWL, no closure of existing open dump)
  - Alternative 1 (Proposed Project) – Atgidon Site
  - Alternative 2 – Masalok Site
  - Alternative 3 – Carolinas Site
  - Alternative 4 – Early closure of existing Open Dump
- Impacts of Proposed Project and alternatives are similar

Alternative 1 (Preferred Alternative)

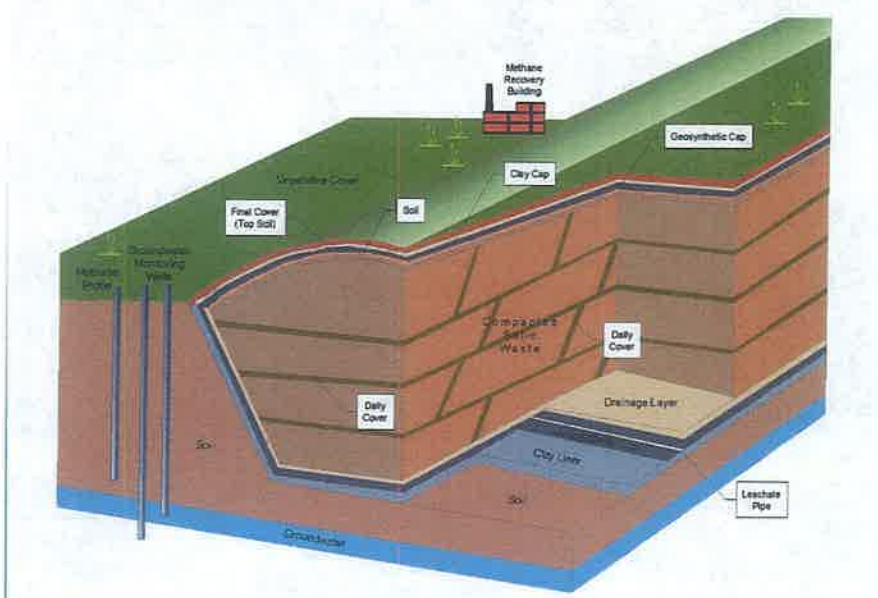
- Atgidon Site (Western Tinian)
  - Site located between 10th Avenue and Riverside Drive
  - Site presently undeveloped
  - Site encompasses total area of 30 acres
    - 20 acres for landfill facility
    - 10 acres for 100-foot wide buffer zone
- Open Dump closure after MSWL operational

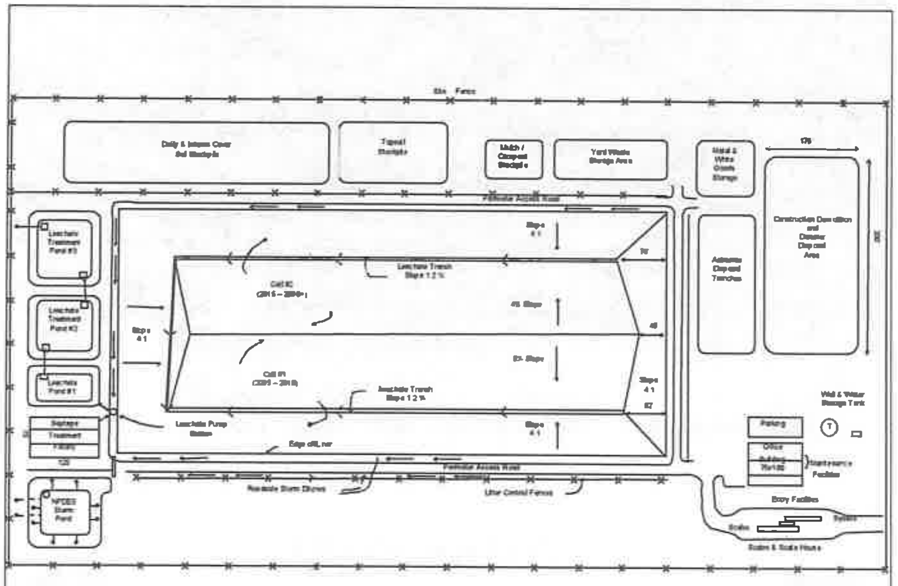
Preferred Alternative

Preferred Alternative

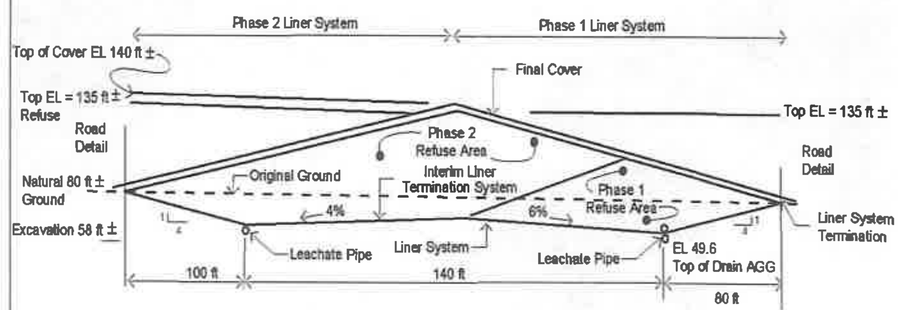
Alternative 1 (Preferred Alternative)

- Project in Conceptual Stage
- Typical regulatory compliant MSWL features:
  - Landfill liner system
  - Leachate and landfill gas management/monitoring systems
  - Ground/surface water management/monitoring systems
  - Disposal material monitoring
  - Landfill final cover system
  - Contingency management
  - Quality control/assurance
  - Closure/Post-Closure fund





Municipal Solid Waste Landfill
Conceptual Plan View



Municipal Solid Waste Landfill
Conceptual Section View

Alternative 2

- Masalok Site (Eastern Tinian)
  - Site location is a conceptual footprint (less defined than Proposed Project area)
  - Site presently undeveloped
  - Site encompasses total area of 60 acres
  - Masalok site is located in a narrow strip of coastal lands (siting constraints)
- MSWL design similar to Proposed Project
- Open Dump closure after MSWL operational

Alternative 2
(Masalok Site)

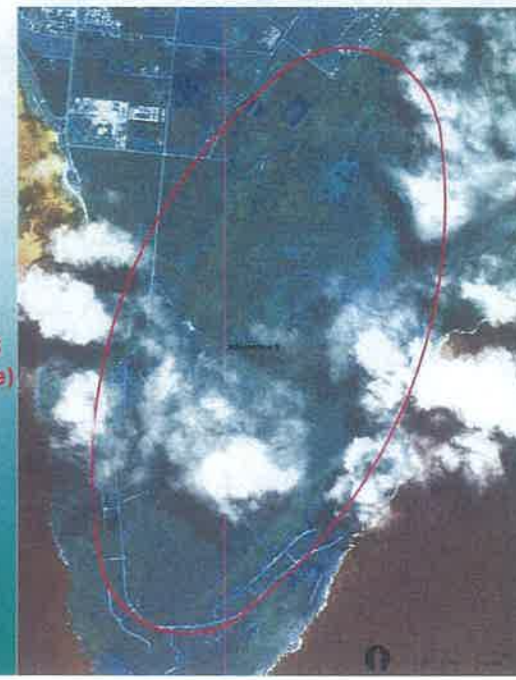
Alternative 2
(Masalok Site)

Alternative 3

- Carolinas (Southern Tinian)
  - Site location is a conceptual foot print (less defined than Proposed Project area)
  - Site presently undeveloped (forest/grassland)
  - Site encompasses total area of 1,200 acres
  - Carolinas site is located south of Municipality's boundary line
- MSWL design similar to Proposed Project
- Open Dump closure after MSWL operational

Alternative 3
(Carolinas Site)

Alternative 3
(Carolinas Site)



Alternative 4

- Early closure of existing Open Dump
  - Closure concurrent with the siting, design, construction, and operation of new MSWL
- Interim Waste Export
  - Export of solid waste to off-island facility (Marpi Landfill on Saipan)
- Transfer Station
  - Consolidation and transport of waste

- Siting of transfer station
  - Convenience and distance to population center (San Jose)
  - Distance to transport destination (harbor)
  - Site features (e.g., size, topography, proximity to sensitive areas, ground and surface water resources, residential neighborhoods, hospitals, schools, etc.)
  - Access roads
  - Community acceptance
- Site not yet identified
  - Preference to municipal properties
- Waste export contingent upon:
  - Intergovernmental cooperation
  - Political expediency
  - Project timing
  - Economics

Environmental Analysis

- Environmental Assessment (EA)
  - Identifies reasonable alternatives to the action
  - Identifies potential environmental impacts of action
  - Identifies mitigation measures
- Technical Studies Conducted
  - Acoustical
  - Air Quality
  - Biota
  - Archaeology
  - Traffic

Analysis Approach

- Current conditions investigated and baseline established
- Criteria developed to determine significance of potential impacts
- Potential impacts identified and evaluated against significance criteria
- Mitigation measures developed for potential impacts determined to be adverse

Attributes of Environmental Analysis

Physical Environment
- Geology and Soils
- Water Resources
  - Groundwater
  - Surface Water
  - Wetlands
  - Coastal Waters
- Air Quality
- Noise Quality
- Natural Disasters

Biological Environment
- Terrestrial Fauna
- Terrestrial Flora
- Coastal Biological Resources
- Threatened and Endangered Species

Social Environment
- Land Use
- Public Health and Safety
- Traffic & Circulation
- Historic & Cultural Resources
- Recreational and Aesthetic Resources
- Infrastructure
  - Solid Waste
  - Water/Wastewater
  - Energy
- Socio-Economics

Construction Impacts

Secondary and Cumulative Impacts

Overview of Draft EA Conclusions

- Total of 40 potential impacts identified
  - 14 Positive
  - 26 Adverse
- Positive impacts (14)
  - No Action = 0
  - Preferred Alternative (Atgidon) = 4
  - Alternative 2 (Masalok) = 3
  - Alternative 3 (Carolinas) = 3
  - Alternative 4 (Early dump closure) = 4

Overview of Draft EA Conclusions

- Adverse impacts (26)
  - No Action = 7
  - Preferred Alternative (Atgidon) = 3
  - Alternative 2 (Masalok) = 7
  - Alternative 3 (Carolinas) = 6
  - Alternative 4 (Early dump closure) = 3

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Potential Impacts
No Action Alternative

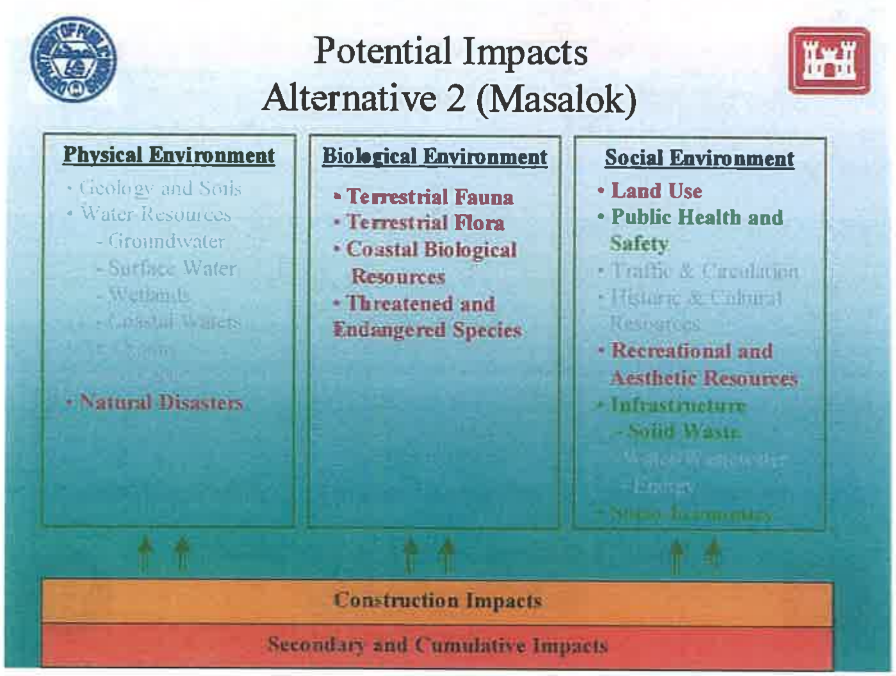
Physical Environment
- Geology and Soils
- Water Resources
  - Groundwater
  - Surface Water
  - Wetlands
  - Coastal Waters
- Air Quality

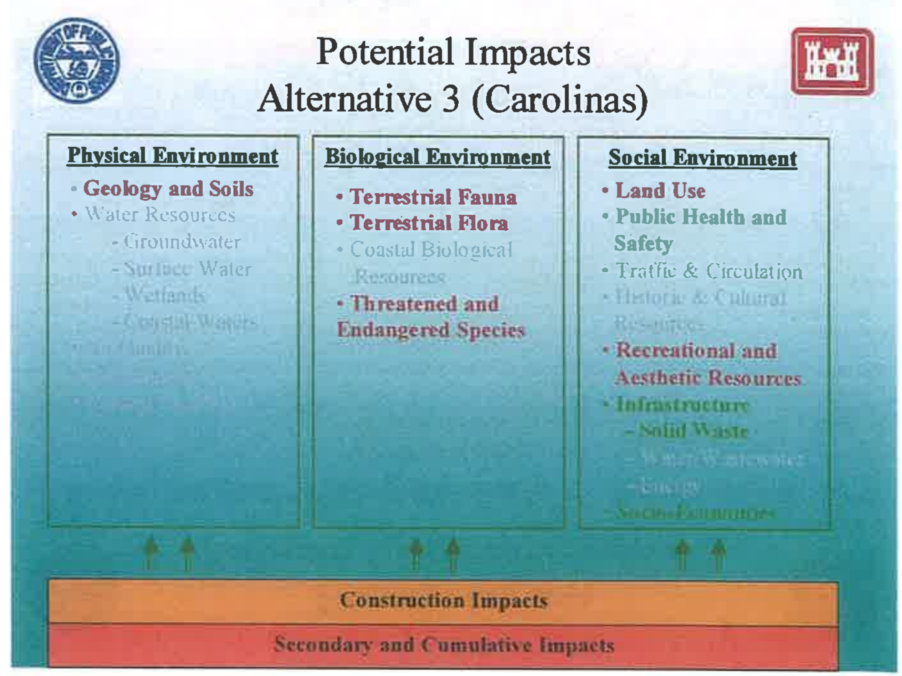
Biological Environment
- Terrestrial Fauna
- Terrestrial Flora
- Coastal Biological Resources
- Threatened and Endangered Species

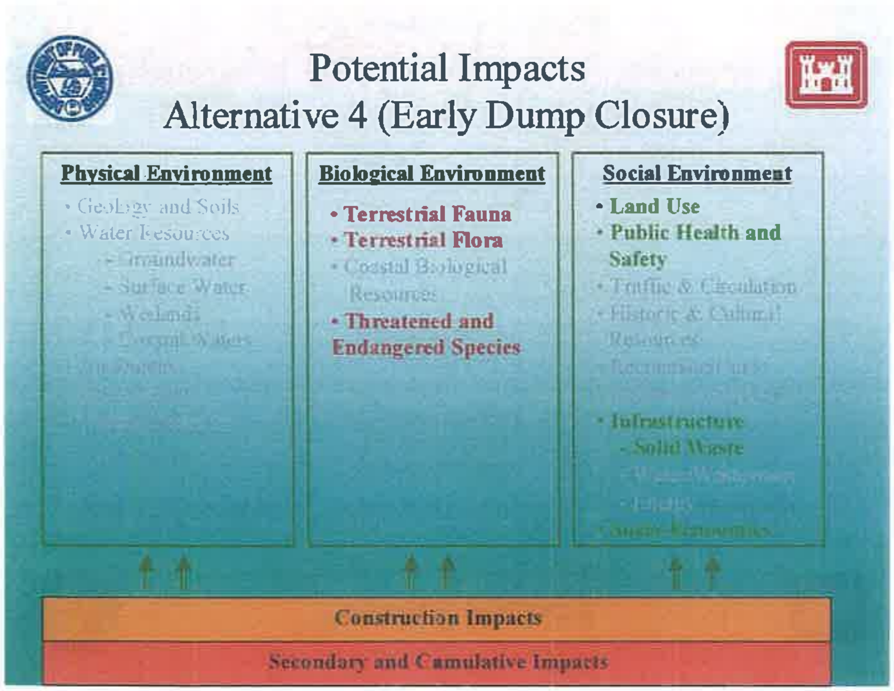
Social Environment
- Land Use
- Public Health and Safety
- Traffic & Circulation
- Historic & Cultural Resources
  - Water/Wastewater
  - Energy
- Socio-Economics

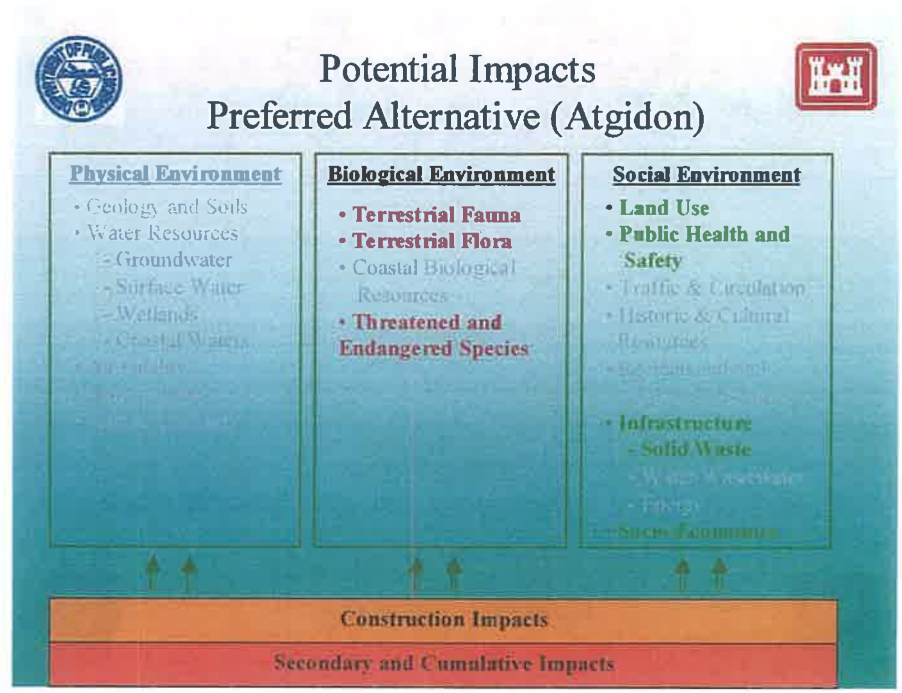
Construction Impacts

Secondary and Cumulative Impacts


Potential Impacts
Alternative 2 (Masalok)
Physical Environment
• Geology and Soils
• Water Resources
- Groundwater
- Surface Water
- Wetlands
- Coastal Waters
• Natural Disasters
Biological Environment
• Terrestrial Fauna
• Terrestrial Flora
• Coastal Biological Resources
• Threatened and Endangered Species
Social Environment
• Land Use
• Public Health and Safety
• Traffic & Circulation
• Historic & Cultural Resources
• Recreational and Aesthetic Resources
• Infrastructure
- Solid Waste
- Energy
Construction Impacts
Secondary and Cumulative Impacts


Potential Impacts
Alternative 3 (Carolinas)
Physical Environment
• Geology and Soils
• Water Resources
- Groundwater
- Surface Water
- Wetlands
- Coastal Waters
Biological Environment
• Terrestrial Fauna
• Terrestrial Flora
• Coastal Biological Resources
• Threatened and Endangered Species
Social Environment
• Land Use
• Public Health and Safety
• Traffic & Circulation
• Historic & Cultural Resources
• Recreational and Aesthetic Resources
• Infrastructure
- Solid Waste
- Water/Wastewater
- Energy
• Socio-Economics
Construction Impacts
Secondary and Cumulative Impacts


Potential Impacts
Alternative 4 (Early Dump Closure)
Physical Environment
• Geology and Soils
• Water Resources
- Groundwater
- Surface Water
- Wetlands
Biological Environment
• Terrestrial Fauna
• Terrestrial Flora
• Coastal Biological Resources
• Threatened and Endangered Species
Social Environment
• Land Use
• Public Health and Safety
• Traffic & Circulation
• Historic & Cultural Resources
• Infrastructure
- Solid Waste
Construction Impacts
Secondary and Cumulative Impacts


Potential Impacts
Preferred Alternative (Atgidon)
Physical Environment
• Geology and Soils
• Water Resources
- Groundwater
- Surface Water
- Wetlands
- Coastal Waters
Biological Environment
• Terrestrial Fauna
• Terrestrial Flora
• Coastal Biological Resources
• Threatened and Endangered Species
Social Environment
• Land Use
• Public Health and Safety
• Traffic & Circulation
• Historic & Cultural Resources
• Infrastructure
- Solid Waste
Construction Impacts
Secondary and Cumulative Impacts

Preferred Alternative Impacts

- Terrestrial Flora
  - 30 acres of vegetation would be removed
    - Secondary forest and scattered grassland (dominated by tangantangan)
    - Some native plants
    - No Federal or CNMI listed threatened or endangered plant species present
  - Spread of Ruderal and/or Alien Species
  - Mitigation
    - Plant native vegetation to offset conversion of periphery, ancillary support, and access areas to all non-native species

Preferred Alternative Impacts

- Terrestrial Fauna
  - Removal of 30 acres of secondary forest/grassland habitat)
    - Majority of fauna common/non-native species
    - Utilized by mammals, reptiles, amphibians, birds
    - Mammals (2+), Amphibians (1), Reptiles (7)
    - Birds most abundant (12 species/454 individuals)
    - No Federally listed threatened or endangered animal species present
  - Displacement of fauna utilizing habitat
  - Mitigation
    - Significant impacts not anticipated. Displaced species would migrate to relatively abundant, adjacent similar habitats.

Preferred Alternative Impacts

- Threatened and Endangered Species
  - Removal of 30 acres of secondary forest/ grassland habitat)
    - Tinian Monarch (Threatened – CNMI Govt.)
    - Species ubiquitous throughout island forests
  - Displacement of Tinian Monarch utilizing habitat
  - Loss of habitat
  - Potential loss of nests, eggs, and/or young
  - Mitigation
    - Construction Schedule (avoid breeding season)
    - Avoidance & Consultation – If encountered, immediate notification and coordination with CNMI DFW (and USFWS)
    - Displaced Tinian Monarchs would migrate to relatively abundant, adjacent similar habitats
    - Secondary/tangantangan forest NOT preferred habitat

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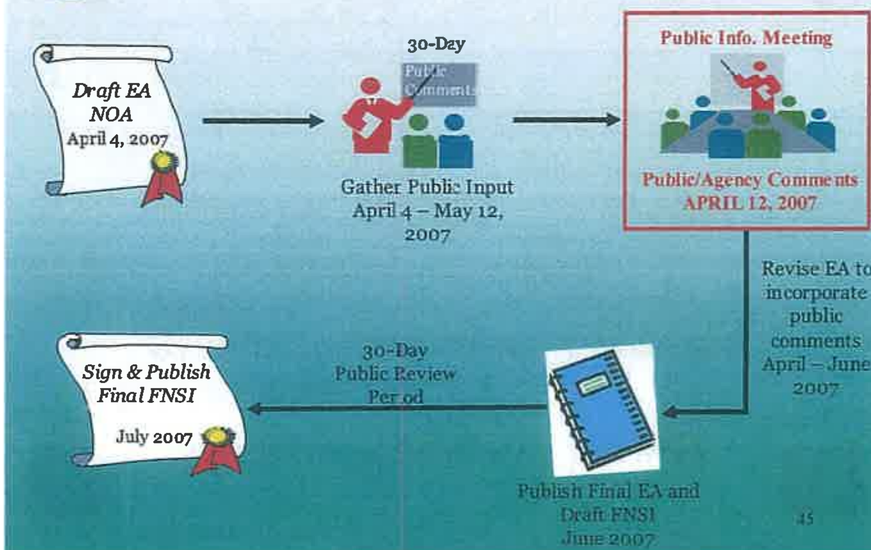
Public Involvement in the EA Process



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PROJECT SCHEDULE
(EA Flow Chart and Projected Dates)

	EA Process Initiated	April 2006
	Notice of Availability	April 4, 2007
You are here	Public Informational Meeting	April 12, 2007
	Agency/Public Comment Period	April 4 - May 12, 2007
	Revise EA Document	April – June 2007
	Publish draft FNSI	June 2007
Additional opportunity to comment	30-Day Public Comment Period	June - July 2007
	Sign and Publish Final FNSI	July 2007

Submitting Comments on Draft EA

- Use written comment sheet provided (submit tonight or mail in)
- Mail written comments to:

  U.S. Army Corps of Engineers, Honolulu District
  Civil and Public Works Branch, (CEPOH-PP-C)
  Rm. 312, Bldg. 230
  Fort Shafter, HI 96858-5440
  ATTN: Mr. James Hatashima, Project Manager
  Re: Tinian Landfill EA
- Submit comments via Email or Fax

  Email: **James.K.Hatashima@usace.army.mil**
  Fax: **(808) 438-0430/1184**
- Submit comments by **May 12, 2007**

Points of Contact

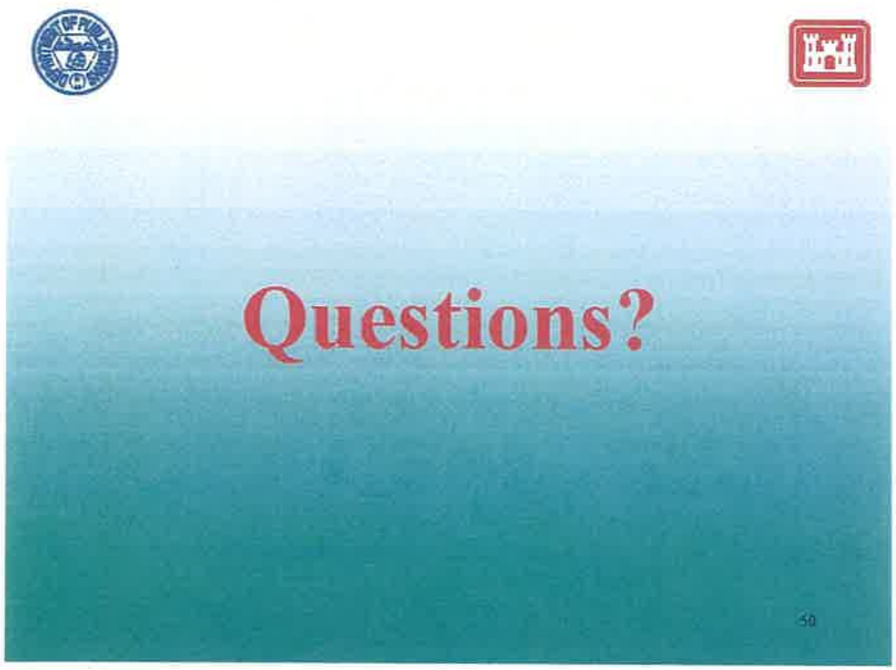
EA-Related Issues:

Mr. James Hatashima, Project Manager
U.S. Army Corps of Engineers, Honolulu District
Civil and Public Works Branch, (CEPOH-PP-C)
Fort Shafter, HI 96858-5440
Phone: (808) 438-2264
Fax: (808) 438-0430/1184
Email: James.K.Hatashima@usace.army.mil

General Project-Related Issues:

Mr. Steve Hiney
CNMI Department of Public Works, Solid Waste Division
Gualo Rai, Joeten Commercial Building, 2nd Floor
Saipan, MP 96950
Phone: (670) 322-2745
Fax: (670) 322-2762
Email: dpwsolidwaste@pticom.com

Thank You!



PUBLIC INFORMATIONAL MEETING FOR THE TINIAN MUNICIPAL SOLID WASTE LANDFILL
DRAFT ENVIRONMENTAL ASSESSMENT
12 April 2007 - Tinian Mayor's Conference Room

NAME	ORGANIZATION	ADDRESS	PHONE	E-MAIL ADDRESS
IKE K. QUICHOCHO	TINIAN MAYOR'S OFFICE	P.O. BOX 59, TINIAN MP 96952	(670) 433-1809	[illegible]@yahoo.com
Steve Hiney	CNMI - DPW	[illegible] 7177 SVRB, Saipan, MP 96950	(670) 322-[illegible]	[illegible]@[illegible]
Jim Hatashima	Gipsy Engineers	Bldg 2220 Ft. Shafter, HI 96858	(808) 438-[illegible]	james.k.hatashima@usace.army.mil
RICHARD STOOK	WIL CHEE - PLANNING, INC	1018 PALM DRIVE Honolulu, HI 96814	(808) 242-[illegible]	WCPMAUI@LAVA.NET
FREDDY U HOFSCHNEIDER	Tinian Municipal Council	P.O. Box 109 Tinian, MP 96952	(670) 433-3490 / 2002	[illegible]@[illegible]
MARTIN SanNicolas		P.O. Box 635 Tinian, MP 96952	671-898-9426	[illegible]@yahoo.com
DON J POWER	F.P.A. PACIFIC CORP	PO BOX 10 TINIAN	433-0422	[illegible]power96952@yahoo.com
Derek Yasaka	WCP, Inc.	1018 Palm Dr., Honolulu, HI 96814	808-596-4688	wcpderek@lava.net

APPENDIX J

Draft EA Distribution List and Comments Letters

Distribution List

The following information repositories, government officials and agencies, commercial and non-profit organizations, and other interested parties received a copy of this draft EA for public review and comment.

US Fish and Wildlife Service
Pacific Islands Ecoregion
300 Ala Moana Blvd., Room 3-122
Box 50088
Honolulu, Hawaii 96850

CNMI Governor's Office
Benigno R. Fitial, Governor
Box 10007
Capitol Hill
Saipan, MP 96950

CNMI Department of Land and Natural Resources
Division of Fish and Wildlife
DFW Lower Base
P.O. Box 10007
Saipan, MP 96950

CNMI Division of Environmental Quality
1st Floor Gualo Rai Center
P.O. Box 501304
Saipan, MP 96950

CNMI Department of Community & Cultural Affairs
Division of Historic Preservation
P.O. Box 500090 Airport Road
Saipan, MP 96950

CNMI Coastal Resources Management Office
P.O. Box 1007
2nd Floor Morgan Building, San Jose
Saipan, MP 96950

Tinian Office of the Mayor
CNMI - Municipality of Tinian and Aguiguan
P.O. Box 59
Tinian, MP 96952

Joeten Kiyu Public Library
P.O. Box 501092
Saipan, MP 96950

Tinian Municipal Public Library
P.O. Box 704
Tinian, MP 96952

Commonwealth of the Northern Mariana Islands
Department of Lands and Natural Resources
Division of Fish and Wildlife
P.O. Box 10007, Saipan, MP 96950
Telephone: (670) 664-6000/664-6001

FW-07-L-085

October 15, 2007

WCP, Inc
P.O. Box 1202
Wailuku, Hawaii 96793

Dear Mr. Stook:

The CNMI Division of Fish and Wildlife is very supportive of the construction of a Tinian Landfill. The DFW Wildlife Section has reviewed the *Draft Environmental Assessment (EA) for the Tinian Landfill* and we have the following comments.

The DFW Wildlife Section Biologists have reviewed the information provided regarding the impacts. There appears to be a discrepancy on the total area to be cleared. In section 4.2.2 line 22 it states that Alternative 1 (Preferred Alternative and referred to as the Proposed Project) is 30 acres, 10 acres will be a buffer zone. It is not clear if this buffer zone is to remain vegetated and if it is currently vegetated with forest and of what type. In Section 5.2.4.2 (Preferred Alternative under Threatened and Endangered Species section 5.2.4) pg. 67 line 1 it states that in the Preferred Alternative will necessitate clearing 31 acres. Clarification is needed on the exact area to be cleared and the nature of the buffer zone.

The Draft EA reports that there are an average of 2.11 Monarchs per station (RA=Relative abundance; Appendix D) surveyed in the Preferred Alternative site. The mean territory size (n=13) documented by USFWS for the Tinian Monarch in March 2007 was 0.12 ha ± 0.01 (VanderWerf et al 2007). Therefore, the Preferred Alternative site that is 30 acres (12 ha) potentially has 100 Tinian Monarchs on the site if it is all forested.

The Tinian Monarch is listed as threatened and endangered in Part 2, Section 10. of CNMI DFW regulations. As such, under DFW regulations Part 2. Section 10.2 Tinian Monarchs cannot be harmed or harassed. There may be provisions for obtaining a permit with mitigation Conditions. The Division of Fish and Wildlife will need to be consulted in regards to the harm and harassment of Tinian Monarchs through this project. Additionally, the Tinian Monarch was delisted as endangered by the USFWS in 2004 and is subject to annual and quarterly monitoring by the USFWS and the CNMI DFW through 2010. If Tinian monarch populations significantly decrease, the USFWS does have emergency listing authority under section 4(7)(b) of the Endangered Species Act.

Finally, Section 5.5.3.6 (pg 88 lines 8-10) addresses the cumulative Biological effects. There currently are other projects being proposed by the Army Corp and by private individuals that cumulatively will most definitely impact the Tinian Monarch. In July 2007 this office commented on the Draft EA for the Tinian Wastewater Treatment Facility, an Army Corp project, and the preliminary analysis is that at a minimum of 40 Tinian Monarch pairs could be impacted. Additionally, there are several private developments currently under review for cattle grazing and clearing in forested areas occupied Tinian Monarchs. The cumulative impacts of these two large developments will certainly affect the population should be mitigated to ensure that the population remains stable.

The Division of Fish and Wildlife is very concerned with the accidental introduction of the Brown Treesnake from Guam. We therefore recommend that a representative from the selected contractor for this project work with the Division's Brown Treesnake Program Manager to coordinate the shipment of supplies and equipment to Tinian and the work site to ensure that all shipments have been first inspected on Guam (if that is the origin) and the re-inspected on Tinian with certified Brown Treesnake Canines. We would also recommend that the selected contractor allow each of the employees working at the project site to attend the Brown Treesnake Identification and Capture Training before the project commences. This training could be held at a site on Saipan or Tinian and will be provide by the Division's Brown Treesnake Program.

VanderWerf, E., F A. Amidon and A.P. Marshall. Tinian monarch post-delisting monitoring draft progress report and trip report for 7-17 March 2007.

Sincerely,

Sylvan O. Igisomar

cc: CNMI-DPW
USFWS
CNMI- DLNR

APPENDIX K

Final Environmental Assessment Comments and Responses

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, HONOLULU
FORT SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF:

June 16, 2008

Civil and Public Works Branch
Programs and Project Management Division

Ms. Laura Williams
Commonwealth of the Northern Mariana Islands
Department of Land and Natural Resources
Division of Fish and Wildlife
P.O. Box 10007
Saipan, MP 96950

Dear Ms. Williams:

This is in response to your letters dated October 15, 2007 and March 8, 2008 regarding your review comments on the Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for the Tinian Landfill project. Responses to your comments are provided as an enclosure to this letter. Please note that any figures, tables and appendices referenced in the responses are referred to the applicable sections in the EA.

Your participation in the environmental review process for the Tinian Landfill project is greatly appreciated. We request that you provide any concerns that you may have on our responses by June 27, 2008. If you have any questions regarding this matter, please do not hesitate to contact Jim Hatashima, Project Manager, of my Civil and Public Works Branch staff at (808) 438-2264.

Sincerely,

for Anthony J. Paresa, P.E.
Deputy District Engineer for
Programs and Project Management

Enclosure

Responses to Comments
Tinian Landfill Project Environmental Assessment (EA) and Finding of No Significant Impact (FONSI)

1) COMMENT: *The CNMI Division of Fish and Wildlife is very supportive of the construction of a Tinian Landfill. The Wildlife Section of the Division of Fish and Wildlife agrees that the preferred site for the landfill (Alternative I) is the best option and that the no action alternative is not a feasible option.*

RESPONSE: It is noted that the Wildlife Section of the Division of Fish and Wildlife agrees that the preferred site for the proposed landfill (Alternative I) is the best option and the no action alternative is not a feasible option.

2) COMMENT: *There appears to be a discrepancy on the total area to be cleared. In section 4.2.2 line 22 it states that Alternative 1 (Preferred Alternative and referred to as the Proposed Project) is 30 acres, 10 acres will be a buffer zone. It is not clear if this buffer zone is to remain vegetated and if it is currently vegetated with forest and of what type. In Section 5.2.4.2 (Preferred Alternative under Threatened and Endangered Species section 5.2.4), pg. 67, line 1, it states that in the Preferred Alternative will necessitate clearing 31 acres. Clarification is needed on the exact area to be cleared and the nature of the buffer zone.*

RESPONSE: Thank you for noting in Section 5.2.5.2 which incorrectly stated that the Proposed Project would require the clearing of 31 acres of forest. The approximate total area of clearing is 20 acres. As noted in Section 3.3, the Proposed Project would encompass a total area of approximately 30 acres, approximately 20 acres of which would comprise the landfill facility and another 10 acres which would comprise a 100-foot buffer zone surrounding the facility. The buffer zone would remain undeveloped and vegetated. Thus, the total area that would be developed would be 20 acres (see Figures 3-2 through 3-4).

3) COMMENT: *The EA also does not adequately survey for or address impacts to locally and federally protected or regulated species*

The Tinian Monarch is listed as threatened and endangered in Part 2, Section 10 f CNMI DFW regulations. As such, under DFW regulation Part 2, Section 10.2 Tinian Monarchs cannot be harmed or harassed. There may be provisions for obtaining a permit with mitigation Conditions. The Division of Fish and Wildlife will need to be consulted in regards to the harm and harassment of Tinian Monarchs through this project. Additionally, the Tinian Monarch was delisted as endangered by the USFWS in 2004 and is subject to annual and quarterly monitoring by the USFWS and the C MI DFW through 2010. If Tinian monarch populations significantly decrease, the USFWS does have emergency listing authority under section 4(7)(b) of the Endangered Species Act.

The Draft EA reports that there are an average of 2.11 Monarchs per station (RA=Relative abundance; Appendix D) surveyed in the Preferred Alternative site. The mean territory size (n=13) documented by USFWS for the Tinian Monarch in March 2007 was 0.12 ha ± 0.01 (VanderWerfet al2007). Therefore, the Preferred Alternative

site that is 30 acres (12 ha) potentially has 100 Tinian Monarchs on the site if it is all forested.
The three regulated wildlife species present in the project area are the Tinian Monarch (Monarcha takatsukasae), the Micronesian Megapode (Megapodius laperouse) and the White Tern (Gygas alba). The Tinian Monarch is designated as a threatened and endangered species by DFW Regulation Part 2 and in Section 10.2 Prohibition 'may not be harvested, captured or harassed'. The EA does not recognize that the Tinian Monarch is covered by CNMI DFW Regulations. The Tinian Monarch was previously listed as an endangered species by the United States Fish and Wildlife Service (USFWS) and was only delisted in 2004 and is subject to annual and quarterly monitoring by the USFWS and the CNMI DFW through 2010.

The impact to the Tinian Monarch population and key habitat species is a significant impact contrary to the suggestions in section 5.2.2.2 of the EA. The Tinian landfill project is 12.15 ha which will affect 93.5 pairs of Tinian Monarchs based on an average territory size of 0.13 ha (Wanderer et al 2007). There will be a total of 134.5 pairs lost when combined with the adjacent proposed Tinian Waste Water Plant which is 4.94 ha and will affect 41 pairs of Tinian Monarchs. Additionally, while the EA reports the proposed landfill is primarily secondary forest there are trees in the proposed development site that are known Tinian Monarch nesting trees such as: Ficus spp., Intisa bijuga, Melanolepis multiglandulosa, Eugenia spp., Pandanus sp. If the population is continually impacted and significantly decreases the USFWS have emergency listing authority under 4(7)(b) of the Endangered Species Act. Therefore, this species is still of concern as it is endemic to only Tinian and nowhere else in the world, it is protected under CNMI DFW regulation and is being closely monitored in the event emergency relisting is necessary. Therefore, it is incumbent on all federal and local projects to minimize impact to this unique and endangered species through increasing habitat and or providing conservation areas for the Tinian Monarch to ensure that the population is conserved at sustainable level.

The USFWS should be consulted in regards to the possible presence of the Micronesian Megapode and the confirmed presence of the White Tern. The White Tern is protected under the Migratory Seabird Treaty Act and was one of the two most abundant species found on the development site. The Micronesian Megapode is a federally and locally listed endangered species. The methods used to survey birds were not adequate to detect Micronesian Megapodes and confirm their absence from the development site. Surveys should be conducted after consultation with the USFWS to ensure proper methods are performed. These surveys should incorporate greater coverage of the areas to detect Micronesian Megapodes by sight and recorded songs to determine presence in the proposed development area.

RESPONSE: You recommended that the U.S. Fish & Wildlife Service (USFWS) should be consulted with regard to the presence of threatened and endangered species. The Endangered Species Act (ESA) Section 7 consultation with the

USFWS was initiated and has been completed (Appendix E). The USFWS has concurred that the Proposed Project would not have significant impacts on any listed threatened and/or endangered species.

With regard to habitat loss, for the Tinian Monarch in particular, the entire site is considered secondary forest which "primarily" indicates there are areas that are not forest. The fact that trees useful to the Monarch are present is not surprising as observations of the Tinian Monarch have been reported at the site.

The assertion that a large number of breeding pairs of Tinian Monarchs would be lost due to the development of the landfill is true only if the entire 20 acres of the site are to be cleared at once. As noted in the EA, the proposed landfill (like most landfills) would be developed in stages, and land is cleared as needed. The EA also notes that the present and near-future landfill needs on the island are relatively small (see Table 2-1), and therefore, the actual "loss" of habitat at any given time would be fairly small as well. Although landfill areas retired (covered) with time may not necessarily revert back to prime Tinian Monarch habitat, we noted that the existing habitat at the project site is not prime Monarch habitat. Furthermore, the staged development of the landfill would allow ample time to further develop more suitable Monarch habitat by planting desirable species of trees in areas (such as the buffer zone, access roads, planting 'islets' etc.) around the active and retired landfill cells.

The survey methodology for the Tinian Monarch utilized protocols intended to determine the relative abundance and not population density. The project site is too small to use the standard Variable Circle Plot methodology, which requires one station to be no less than 150 meters apart placed along a linear transect at least 1 kilometer apart, to model the potential number of monarchs that may use the site. The use of USFWS population density methodology is a possible option. However, given the species is ubiquitous, is found in almost all habitats present on the island, considering the low quality of the habitat present on site and only a few Monarchs recorded during our survey, an estimated loss of 93.5 pairs appears too high.

As noted in the biological survey (Appendix D) the Micronesian Megapode has rarely been recorded on Tinian. The last confirmed sighting of a megapode on Tinian was documented by Gary Wiles in the Maga area in 1985 (Wiles et al. 1987). There are, however, numerous anecdotal accounts of this species occurring on Tinian, most of them are of birds purported to have been seen in the Mt. Lasu area. This area with its small limestone cliffs and uneven limestone substrate is a logical area to suspect as habitat for this species. Given the conspicuous nature of this species it is hard to mesh the lack of documented sightings with the anecdotal record. Numerous attempts have been made to locate this species on Tinian over the past 30 years. Several scientists have attempted to verify some of these anecdotal sightings, so far to no effect.

Based on the above, undertaking a multi day playback survey for this species in the habitat present on the site was not warranted given the historical information on the species occurrence on Tinian.

With regards to the White Tern, it is not a listed species and therefore was not given special attention. White Terns are widespread through the tropical and sub-tropical areas of the Pacific, are not territorial birds, and do not build nests. The only potential threat, if any, that the clearing of the project site may pose to this species are to birds incubating eggs or raising un-flighted chicks. This is a ubiquitous species on the island and there is nothing special about the habitat on the site from this species' perspective.

The entire site is a secondary forest which "primarily" indicates there are areas that are not forest. The fact that trees useful to the Monarch are present is not surprising; this bird is reported at the site and the two observations fit together. Thus, there exists an opportunity for reasonable success in limiting or mitigating impacts to this species by incorporating desirable tree species plantings within the landfill site as it slowly develops over time. An approach of slow expansion of the site clearing efforts in response to need and plantings of Monarch habitat tree species as part of the gradual development process, should mitigate impacts to this locally listed bird species.

In summary of the above, we believe that the mitigation measures identified in the EA (i.e., standard Best Management Practices regarding active bird nesting) should adequately address potential adverse impacts to the avian species of concern. In addition, we are willing to work together with your office to cooperatively developing additional measures to the Tinian Monarch (and other avian species) by incorporating desirable tree species plantings within the landfill site as it slowly develops over time. An approach of slow expansion of the site clearing efforts in response to need and plantings of Monarch habitat tree species as part of the gradual development process, should effectively mitigate impacts to the Tinian Monarch.

4) COMMENT: *The EA does not adequately address the cumulative impacts of this project combined with the Tinian Waste Water Treatment Plant (WWTP) which is adjacent to the proposed landfill.*

RESPONSE: Cumulative effects are the impacts on the environment that result from the incremental impact of a given action when added to other past, present, and reasonably foreseeable future actions. In other words, the effects of individual minor/insignificant disturbances and other changes to the environment by humans would accumulate when the frequency of such disturbances becomes so high that

the ecosystem would not be able to fully rebound before another stressful event is introduced.

As noted above, a landfill is typically developed in stages, and land is cleared more or less as needed. The entire 20 acres for the proposed landfill would not be cleared at one time but would be cleared over time to meet the projected need. As noted in the EA, the present landfill needs on the island would be relatively small, and therefore, the actual "loss" of habitat at any given time would be fairly small.

Section 5.5 of the EA addresses potential cumulative impacts of the Proposed Project relative to nine reasonably foreseeable future and/or ongoing actions including the proposed wastewater treatment plant project. As noted in the EA, the Proposed Project when considered in the context of past, present, and future activities, can be expected to contribute, in a small/insignificant yet incremental way, to the overall cumulative effects on specified environmental resources.

The Proposed Project and the other projects identified in the EA would not result in the spatial and/or temporal crowding of individual disturbances that would result in significant cumulative impacts to the environment. Therefore, the potential cumulative effects associated with the Proposed Project are not expected to be significant.

5) COMMENT: *The Division of Fish and Wildlife is very concerned with the accidental introduction of the Brown Treesnake from Guam. We therefore recommend that a representative from the selected contractor for this project work with the Division's Brown Treesnake Program Manager to coordinate the shipment of supplies and equipment to Tinian and the work site to ensure that all shipments have been first inspected on Guam (if that is the origin) and the re-inspected on Tinian with certified Brown Treesnake Canines. We would also recommend that the selected contractor allow each of the employees working at the project site to attend the Brown Treesnake Identification and Capture Training before the project commences. This training could be held at a site on Saipan or Tinian and will be provide by the Division's Brown Treesnake Program*

Guam currently has been invaded by several invasive frog species, numerous invasive plants and the Brown Treesnake. Further consultation with the Division and the USFWS need to made to ensure that invasive species are not introduced to Tinian while transporting construction equipment and materials. A Brown treesnake control plan will have to be developed, approved, and implemented at least 10 days before the start of the proposed activity which will fulfill Condition V under the CNMI Coastal Resources Management Earthmoving Permit.

RESPONSE: The CNMI DFW was consulted regarding the introduction of alien species and the Brown Tree snake in particular. Section 5.2.3 of the EA included the mitigation recommendations made by the DFW Brown Tree snake Quarantine Program (BTSQP) including close contractor cooperation with the BTSQP

Manager. Per consultation with the DFW BTSQP Manager, the EA incorporated the following verbiage:

> "... the construction contractor shall work with DFW BTSQP Manager to coordinate the shipment of supplies and equipment to Tinian and the work site to ensure that all shipments have been first inspected on Guam (if that is the origin) and then re-inspected on Tinian with certified brown tree snake Canines. In addition, all construction contractor personnel working at the proposed MSWL project site would attend the Brown Tree Snake Identification and Capture (BTSIC) Training prior to commencement of construction activities. The BTSIC Training would be provided by the DFW BTSQP and could be held on either Saipan or Tinian."

It is believed that the above recommended mitigation measures in conjunction with the other best management practices noted in Section 5.2.3 would adequately address possible adverse impacts from the introduction of invasive species. We are open to working closely with DFW to incorporate any additional mitigation measures you think may be required.

Final Environmental Assessment and Draft Finding of No Significant Impact for the Tinian Landfill
U.S. Department of the Navy Comments: Dated January 2008 (Responses April 2008)

#	Reviewer	Chapter	Page	Para/line	Comment	Response
1	R. Wescom, N40	2	3		The discussion on future landfill demands does not appear to take into account any Department of Defense generated solid waste.	Noted. Solid waste projections are based on those presented in the Tinian Landfill Comprehensive Study (2005). The comprehensive study did account for DoD-generated waste but not explicitly. The landfill engineer considered DoD would manage its own solid waste and ship it off Tinian rather than utilize an on-island, municipality-managed solid waste facility. At the time the study was prepared, there were no plans that we were made aware of regarding any DoD build-up on the island or changes in on-island training frequency. It was therefore presumed that DoD-generated solid waste would be minimal and would not entail significant effort for DoD to manage and transport off the island.
2	R. Wescom, N40	3	8	15	Last word on line should read "United"	Text revised accordingly
3	R. Wescom, N40	3	11	6	"more than 50% smaller" is awkward	Text revised accordingly
4	R. Wescom, N40	4	19		Section on Coastal Waters should include discussion on Tinian's Coastal Management Zone	Noted. The subject EA will be incorporated as part of the Major Siting Permit process promulgated by the Costal Resources Management (CRM) Office. The CRM Office will coordinate the major siting permit process thereby ensuring permit decisions are consistent with coastal resources management policies and regulations. Section 7.1.2 of the EA discusses coastal resources management if further detail.
5	R. Wescom, N40	4	23	22	What about the native limestone forest in the Masalok subarea west of Unai Dankulo?	Noted. We recognize limestone forests exist in various parts of the island. This section provides a broad/general overview of terrestrial flora on Tinian. Mainly noting that native limestone forest is not present in the Proposed Project area.
6	R. Wescom, N40	4	23	26	Artocarpus should be italized	Text revised accordingly

7	R. Wescom, N40	4	23-24		Should only refer to scientific name once for each species.	Text revised accordingly
8	R. Wescom, N40	4	24	31	Need scientific name for African tulip.	Text revised accordingly
9	R. Wescom, N40	4	29	21	Coconut crab is not listed by either the CNMI or ESA as threatened or endangered, therefore why mentioned in this section?	Noted. The coconut crab is mentioned in the context of a species on the decline. Tables 4-5 and 4-6 identify all listed T&E species.
10	R. Wescom, N40	4	31	34	Need space between "theInternational"	Text revised accordingly
11	R. Wescom, N40	4	31	39	Need to provide source for stating that a population of brown treesnakes is established on Saipan.	Source noted in paragraph (IUCN)
12	R. Wescom, N40	4	32	21	What new farm land is available for leaseback in the Exclusive Military Use Area?	This information was obtained from *The Commonwealth of the Northern Mariana Islands Overall Economic Development Plan, 1996-1997*. And this section refers to the farm land and grazing within the leaseback area. Regarding where these areas are within the leaseback area, no locations were specified as the statements in the economic development plan were general in nature.
13	R. Wescom, N40	4	32	28	What acres are available for cattle grazing in the Exclusive Military Use Area?	Please see response to comment #12
14	R. Wescom, N40	4	34		The Area of Potential Effect (APE) for the analysis does not include any impacts along the roadway needed to access the site.	As stated in Section 3.3 access to the site will be from the 10th Avenue (to the east of site) and potential impacts along this route have been addressed (Please see sections 5.14, 5.15, 5.3.3., and 5.3.6)
15	R. Wescom, N40	4	39	15	The traffic section doesn't not clearly identify the route the site is going to accessed, especially during periods when military is conducting training.	As stated in the EA the landfill is currently in the conceptual stage and specific access and egress facilities have not yet been designed. However, the vehicular traffic analysis (sections 4.3.6 and 5.3.6) take into account traffic and circulation patterns on a regional basis. Should the Atgidon site be approved by the Navy it would not be within the military use area and operations should not interfere with military trainging activitiews. However, as is other instances where military training exercises may conflict with activities occurring in civilian areas contingency traffic management plans would be developed with the Navy to address any operational conflicts. (See also response to comment #14)

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16	R. Wescom, N40	4	41		The Economy Section does not mention military training contributions.	At the time of the writing of the EA figures for military training contributions to Tinian's economy were unavailable. If such figures are now available they could be incorporated into the economic analysis. However, inclusion of projected military contributions would likely not change the overall beneficial economic impacts the proposed landfill construction would have on the local economy.
17	R. Wescom, N40	5	57		The coastal habitat section does not mention if Coastal Management Zone consistency determination was required.	As stated in section 7.1.2 the proposed project will be required to undergo the Major Siting Permit process under the the Coastal Resource Management (CRM) Office. Section 1500 of the CRM rules and regulations (Title 15, Chapter 10) defines consistency requirements when federal activities and development projects directly affect the coastal zone or when federally licensed or permitted activities and the provisions for federal financial assistance for activities affect land or water uses of the coastal zone. These activities and projects must be conducted or supported in a manner which is, to the maximum extent practicable, consistent with the CRM program. Furthermore, any federal agency proposing to undertake any development project in the coastal zone shall insure that the project is, to the maximum extent practicable, consistent with the CRM program.

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18	R. Wescom, N40	5	58	32	The Section 7 consultation does not appear to have taken into account all potentially affected species (megapodes, etc.)?	ESA Section 7 Consultation with the USFWS was completed (see Appendix E). The USFWS concluded that based on information provided along with information from USFWS files the Proposed Project would not affect listed species. In addition, the natural resources survey (Appendix D) states that "the Micronesian Megapode has rarely been recorded on Tinian, in fact the last confirmed sighting of a megapode on Tinian was documented by Gary Wiles in the Maga area in 1985 (Wiles et al. 1987). There are however numerous anecdotal accounts of this species occurring on Tinian, most of them are of birds purported to have been seen in the Mt. Lasu area. This area with its small limestone cliffs and uneven limestone substrate is a logical area to suspect as habitat for this species. Given the conspicuous nature of this species it is hard to mesh the lack of documented sightings with the anecdotal record. Numerous attempts have been made to locate this species on Tinian over the past 33 years. Several scientists have attempted to verify some of these anecdotal sightings, so far to no effect (Glass, and Aldan 1988, Engbring et al. 1986, T. Sutterfield 1994, T. K. Pratt 1994, H. D. Pratt 1994, David 2006) It has been suggested that birds may occasionally visit Tinian from Aguiguan or Saipan, the two nearest Islands that support resident populations of megapodes, or possibly either birds or eggs of this species are periodically transported to the Island by local residents. At least one documented case of this scenario has been reported from Saipan (Wiles et al. 1987, Engbring et al. 1986)". Based upon the above we feel that undertaking a multi day playback survey for this species in the habitat present on the site was not warranted given the historical information on the species occurrence on Tinian.

19	R. Wescom, N40	5	64	30	The APE appears to be overly limited.	Comment noted. The APE for the Proposed Project combined with alternative locations (including the existing open dump) encompasses the majority of Tinian Island south of the northern Military Reservation (see figure 3-1).
20	R. Wescom, N40	5	76	20	Since the Tinian Waste Water Treatment Facility is proposed to be located in the vicinity of the landfill more detailed discussion of the cumulative impacts is needed.	We believe that the cumulative impacts (including potential cumulative impacts resulting from the construction of a new WWTF) have been adequately addressed in the EA. We feel that, potential cumulative impacts from possible placement of a WWTP near the proposed landfill site would not result in cumulative impacts. The two projects are separate in every respect and their proximity (or not) would not change the impacts either would have in isolation (either isolation in time or space). In the event that the two projects are situated adjacent to each other it would result in the development of a greater area of land in the project area. However, any cumulative impacts would not be significant to environmental resources evaluated. It should also be kept in mind that a landfill is typically developed in stages, and land is cleared more or less as needed. Present landfill needs on the island would seem to be small, and therefore actual "loss" of habitat at any given time would be fairly small. Although landfill areas retired (covered) with time may not revert back to Tinian Monarch habitat, there should be plenty of time to develop good habitat by planting desirable species of trees in areas (such as the buffer zone, access roads, planting 'islets' etc.) around the active and retired landfill cells.
21	R. Tsutsui	1			Access will need to be along the Riverside Road which will require expansion and upgrading which should be analyzed. Access controlled by the military needs to be considered in the EA.	Please see response to comment #14
22	R. Tsutsui	1			The Atgidon site is still in the process of being approved by the military but is not yet approved and is not guaranteed yet.	Noted. It is understood that use of the land at the proposed Atgidon site is contingent upon final approval by the military.

23	R. Tsutsui	1			Recommend IBBS/VOA provide comments since the site is within influence range.	IBBS/VOA were consulted about the proposed project and they had no opposition to or comments to submit regarding the Proposed Project.
24	R. Tsutsui				Although rough size and location is mentioned, since it is planned to be co-located with the WWTP the co-location drawing and analysis is best to include to demonstrate a coordinated analysis.	Noted. We understand your viewing the WWTP and MSWL as co-located projects. However, we note that the siting of the WWTP adjacent to the MSWL is only one possible option. It has not yet been determined that the WWTP would be located as such. The WWTP and the MSWL are not dependent on one another. Therefore, the proposed MSWL would be a stand-alone facility that would operate independently of the proposed WTTP regardless of the WWTP location. In addition, as mentioned in the EA the MSWL is still in the conceptual satge and detailed-design drawing have not het been completed.
25	R. Tsutsui				Concept should probably avoid locating it over a fault line since you have freedom to locate it anywhere in that general area.	Noted. As noted in the USGS geohydrology study (report no. 02-4077), there are numerous *normal* faults transecting Tinian Island throughout (and are shown in Figure 4-2). RCRA prohibits the siting of a landfill over *active* faults. The faults beneath the proposed project site are not known *active* faults. In addition, as part of the CRM Major Siting permit process further geotechnical studies would be condincted to further address the nature of subsurface geologic conditions.
26	R. Tsutsui				Squatters in the general area and relocation or otherwise addressing the current cattle grazing and farmers that may be impacted from the landfill or access road improvements should be better addressed.	The area covering the footprint for te proposed MSWL would become unavailable for either cattle grazing and/or squatters. However, we note that though the use of this undefveloped/vacant land would be lost for squatters and/or cattle grazing would no longer exist, impacts of such a loss would not be significant in context of the small proposed project area relative to the abundance of undeveloped/vacant lands in its direct proximity.
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28						