



FC 2016-0019

**GUAM COASTAL MANAGEMENT PROGRAM
FEDERAL CONSISTENCY FORM APPLICATION:
REFURBISHMENT OF TRISTAR CARGO LINES A, B AND D,
FROM F-1 DOCK TO AGAT TERMINAL, GUAM
REVISION FOR SUBSEA REPAIRS IN PITI CHANNEL**

Prepared for



**Tristar Terminals Guam, Inc.
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Prepared by



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MAY 2016



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May 25, 2016

Mr. William Castro
Director
Bureau of Statistics & Plans
P.O. Box 2950
Hagatna, Guam 96932

Subject: Guam Coastal Management Program Consistency Certification for Refurbishment of Tristar Cargo Lines A, B And D, From F-1 Dock to Agat Terminal, Project No. GU-GP-13-35, Guam. Revision for Subsea Repairs in Piti Channel.

Dear Mr. Castro:

Tristar Terminals Guam, Inc. (Tristar) recently refurbished their Cargo Lines A, B and D under previous permits. Several repair areas are located in wetlands or other waters of the United States and have been repaired recently except for three subsea repair locations in Piti Channel, Apra Harbor. These final three subsea repair sites are the subject of this permit application. Tristar is seeking a Department of the Army permit for work in waters of the United States, and is providing its consistency certification for this project to the Bureau of Statistics and Plans, Guam Coastal Management Program, in accordance with the Coastal Zone Management Act section 307(c)(3) and 15 CFR part 930, subpart D. The cargo lines transport fuel between Commercial Port and the Tristar Agat Terminal (former Shell Tank Farm). Under the proposed action, Tristar would locate each repair site, excavate the pipeline, perform the repair, rebury the pipeline, and restore the disturbed area within the corridor. The proposed refurbishment is needed to address metal anomalies and corrosion that were detected during the inspection pigging of the fuel lines in 2013, and would provide preventive maintenance to reduce the potential for leaks in the future.

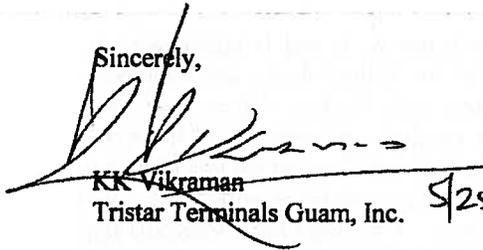
The proposed refurbishment would temporarily affect marine waters along the pipeline corridor, since the pipeline is submerged in Apra Harbor. The project would excavate and expose the affected section of pipe, perform the refurbishment using a composite wrap system, then rebury the pipe to the original grade. The refurbishment of the submerged pipeline in Apra Harbor would not affect live corals, based on a marine survey of the area of potential effect. The repair area will be delimited by a double-walled silt curtain to prevent siltation and an increase in turbidity of surrounding waters. The repair zone will then be excavated by means of air-lift (eduction) methods, where the overlying material including concrete slabs will be removed with onboard equipment (e.g., onboard excavator, crane or A-frame) operating from a work barge. The overlying sand and rubble material would be removed via air-lift suction dredging, which is the preferred method recommended by Guam EPA and Department of Agriculture based on project coordination. The equipment would be placed on a small barge and the excavated material would be stockpiled on the seabed and enclosed by double-walled turbidity curtains. All temporarily disturbed areas would be restored after construction. There would be no permanent loss of wetlands from this project.

Guam Oil and Refining Company (GORCO) built the Agat Terminal beginning in 1968 and installed the cargo lines in 1969. Shell Guam Inc. purchased the facility in 1988. Tristar Terminals Guam, Inc. acquired the facility from Shell Guam Inc. in 2009. As the new owners of the facility, Tristar Terminals Guam, Inc. now assumes responsibility for maintenance of the fuel lines. The proposed refurbishment of cargo lines A, B and D is a preventive maintenance action on these fuel lines to prevent impacts to wetlands and marine waters.

The repairs will be scheduled during low tides, to the extent practicable, and in a timeframe that avoids coral spawning (July 19-August 10, 2016). The Environmental Protection Plan (EPP) developed for the project describes the EPP measures that would be implemented to control discharges and manage spills from heavy equipment operating at the site. Containment booms and absorbent pads would be readily available on-site for cleaning up lubricant or petroleum spills. As part of the EPP, the contractor would implement an erosion control plan to control erosion and sedimentation effects during construction. Environmental protection measures will be installed prior to construction activities. These include monitoring for marine and migratory species and employing and maintaining double-walled silt fences or turbidity curtains to contain sediments to the work zone. Construction would be performed in accordance with specified best management practices to control erosion and minimize sedimentation.

The proposed action to refurbish Tristar Cargo Lines A, B, and D is consistent with the policies of the Guam Coastal Management Program (GCMP), in accordance with the Guam Coastal Management Act of 1972 (P.L. 92-583). A consistency assessment package is enclosed that discusses each of the 16 enforceable policies with findings that the proposed action and its effects are consistent with these policies. Please contact Claudine Camacho of Duenas, Camacho & Associates, Inc. at 477-7991 if you need additional information.

Sincerely,



KK Vikraman
Tristar Terminals Guam, Inc. 5/25/2016

Enclosure: GCMP Federal Consistency Assessment package.

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EXHIBITS

Exhibit A. Department of Land Management Letter.

**Exhibit B. Department of the Army Permit Application for Refurbishment of
Tristar Cargo Lines A, B and D.**

**Exhibit C. 401 Water Quality Certification Application for Refurbishment of
Tristar Cargo Lines A, B and D.**

**GUAM COASTAL MANAGEMENT PROGRAM
ASSESSMENT FORMAT**

DATE OF APPLICATION: May 2016
NAME OF APPLICANT: Tristar Terminals Guam, Inc.
CONTACT PERSON: K.K. Vikraman, General Manager
ADDRESS: Agat Terminal Route 2A, Sta. Rita Industrial Drive
PO Box 8210, Agat, Guam 96928
TELEPHONE NUMBER: (671) + 565-2300 **CELL NO:** _____
E-MAIL ADDRESS: vikraman@tristar-guam.com
FAX NUMBER: (671) 565-3909
TITLE OF PROPOSED PROJECT: Refurbishment of Tristar Cargo Lines A, B, and D,
from F-1 Dock to Agat Terminal, Guam (Project No. GU-GP-13-35)

COMPLETE THE FOLLOWING PAGES

FOR BUREAU OF STATISTICS & PLANS ONLY

DATE APPLICATION RECEIVED: _____
ORCM NOTIFIED: _____ **LIC. AGENCY NOTIFIED:** _____
APPLICANT NOTIFIED: _____ **PUBLIC NOTICE GIVEN:** _____
PROJECT LOCATION: _____
OTHER AGENCY REVIEW REQUESTED: _____

DETERMINATION:

() CONSISTENT () NON-CONSISTENT () FURTHER INFORMATION REQUESTED

ORCM NOTIFIED: _____ **LIC. AGENCY NOTIFIED:** _____

APPLICANT NOTIFIED: _____

ACTION LOG:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

DATE REVIEW COMPLETED: _____

CATEGORY OF APPLICATION (check one only):

- I. Federal Activity
- II. Permit or License
- III. Grants & Assistance

TYPE OF STATEMENT (check one only):

- Consistency
- General Consistency (Category I only)
- Negative Determination (Category I only)
- Non-consistency (Category I only)

APPROVING FEDERAL AGENCY (Categories II and III only):

AGENCY U.S. Army Corps of Engineers
CONTACT PERSON Ms. Katy Damico
TELEPHONE DURING BUSINESS HOURS
A/C () 671-339-2108
A/C () _____

FEDERAL AUTHORITY FOR ACTIVITY

TITLE OF LAW Clean Water Act , Rivers and Harbors Act of 1889
SECTION Section 404 of CWA, Section 10 of Rivers and Harbors Act

OTHER TERRITORIAL APPROVALS REQUIRED

Agency	Type Of Approval	Date Of Application	Status
Guam Environmental Protection Agency	401 Water Quality Certification	May 2016	Pending
U.S. Army Corps of Engineers	Section 10/404 Permit	May 2016	Pending

PROJECT DESCRIPTION

Tristar Terminals Guam, Inc. (Tristar) recently refurbished their Cargo Lines A, B and D under previous permits. The cargo lines are part of a pipeline system constructed in the late 1960s by Guam Oil and Refining Company (GORCO). The pipeline is buried approximately three to four feet deep within a 30-foot wide corridor and transports petroleum fuel approximately 5.3 miles from F-1 Dock in Apra Harbor to the Tristar Fuel Terminal in Agat (Figure 1).

Background/History

An assessment of the integrity of the cargo lines revealed 139 areas of non-leaking metal anomalies along the pipeline that require refurbishment. Several repair areas are located in wetlands or other waters of the United States and have been repaired except for three subsea repair locations in Piti Channel, Apra Harbor. These final three subsea repair sites are the subject of this permit application. Under the proposed action, Tristar would locate each repair site, excavate the pipeline, perform the repair, rebury the pipeline, and restore the disturbed area within the corridor. The purpose of the proposed action is to refurbish the cargo lines as a preventive maintenance measure against potential leaks.

Proposed Action

Tristar Terminals Guam, Inc. will hire a marine contractor to repair the submerged pipeline along Piti Channel in Apra Harbor. These submerged marine repairs will be performed by a contractor who specializes in underwater construction. The sites of actual excavation are rectangular "trench boxes" that are ten (10) feet wide and vary by the length of the repair on the pipe. These excavation areas have been grouped within larger "construction boxes" that define the limit of construction (i.e., area of potential effect or APE) and staging or movement of equipment around the trench boxes. The construction boxes are 30 feet wide (the width of the pipeline corridor) and numbered from 1 to 40; the last remaining repairs are located within "Box 40" in Piti Channel at Apra Harbor.

Marine Repair Sites.

All in-water work will be recommended to be carried out during minus tides and outside of coral spawning periods (July 19-August 10, 2016).

PITI CHANNEL (APRA HARBOR). Box 40 encompasses the submerged repair sites in marine waters in the eastern section of Apra Harbor just north of Piti Channel. Sea Engineering, Inc. (SEI) was contracted by DCA to provide design support for these ocean engineering repairs. There are four pipes, of which only three are active (A, B, D) and in this site, only pipes B and D have anomalous, non-leaking flaws that require repairs. A total of three areas (i.e., one on Pipe B and two on Pipe D) require repairs.

Towards the western end of the Harbor, the pipes are intermittently covered by concrete anchor blocks submerged in approximately two to three feet of water, whereas the water

depth in the middle of the channel reaches ten feet. The pipelines are completely buried in unconsolidated sediment consisting of coarse grained sand, coral rubble and limestone rocks. The conservatively estimated embedment depths of the repairs are six feet on Pipe B, and two and nine feet on Pipe D. An additional maximum of two feet must be cleared below the pipeline to enable repairs around each pipe.

Prior to construction, a “no-wake” zone will be coordinated with the U.S. Coast Guard to minimize disturbance to the site in form of large waves caused by passing boat traffic and prevent possible harm to the contractor carrying out the repairs. Then, the contractor will demarcate the exact repair locations and relocate any sessile marine organisms.

The repair area will be delimited by a double-walled silt curtain to prevent siltation and an increase in turbidity of surrounding waters. The repair zone will then be excavated by means of air-lift (eduction) methods, where the overlying material including the concrete slabs will be removed with onboard equipment (e.g., onboard excavator, crane or A-frame) operating from the work barge. The overlying sand and rubble material would be removed via air-lift suction dredging, which is the preferred method recommended by Guam EPA and Department of Agriculture based on project coordination. The equipment would be placed on a small barge and the excavated material would be stockpiled on the seabed and enclosed by double-walled turbidity curtains.

After marking and measuring the length of repairs, the marine contractor would use the specialized SplashGard™ coating for wet conditions, which was recommended by Tristar’s pipeline engineering consultant, Coffman Engineers, Inc. SplashGard™ consists of a SplashBond™ Adhesive and Splash Wrap™, which is a fiberglass cloth impregnated with moisture cured urethane (MCU) resin. The benefits of this corrosion barrier system are that it can be applied underwater, and it easily adheres to submersed steel surfaces while resisting wave action.

For the basecoat, the underwater epoxy adhesive SplashBond™ will be used, which consists of a two-component epoxy system that requires mixing prior to application. After the epoxy has been mixed, it would be uniformly applied to the pipe and rubbed down to remove any entrapped air or water. Once this has been achieved, the Composite Repair Wrap would be directly applied (A+ wrap™ needs to be hydrated first), followed by an application of Pipe Wrap, which also needs to be hydrated prior. After the layers have been applied, the final wrap will need to cure for 30 minutes prior to the SplashBond™ epoxy top coat application. Then the entire excavation trenches of all three repair sites will be backfilled with the embedment material via the lift eductor and the concrete blocks will be replaced.

Best management practices (BMPs) for marine waters and endangered species will be implemented to the maximum practicable extent throughout the course of the project. These include monitoring for marine and migratory species; working during low tides; and employing and maintaining double-walled silt fences or turbidity curtains to contain sediments to the work zone.

**GUAM COASTAL MANAGEMENT PROGRAM
ASSESSMENT FORMAT**

DEVELOPMENT POLICIES

1. Shore Area Development

- Intent:** To ensure environmental and aesthetic compatibility of shore area land uses.
- Policy:** Only those uses shall be located within the Seashore Reserve which:
- enhance, are compatible with or do not generally detract from the surrounding coastal area's aesthetic and environmental quality and beach accessibility; or
 - can demonstrate dependence on such a location and the lack of feasible alternative sites.
- Discussion:** Consistent. The subsea repair sites are located within the Seashore Reserve, but since these pipelines have been in use since the late 1960s there will be no new development or construction of permanent structures in navigable waters. The project areas will be restored after the repairs are completed. Since the pipeline is an existing use, the proposed action would not require a Seashore Clearance Permit, per the enclosed letter from Guam Department of Land Management (Exhibit A).

2. Urban Development

- Intent:** To cluster high impact uses such that coherent community design, function, infrastructure support and environmental compatibility are assured.
- Policy:** Commercial, multi-family, industrial and resort-hotel zone uses and uses requiring high levels of support facilities shall be concentrated within urban districts as outlined on the Land Use Districting Map.
- Discussion:** Not applicable.

3. Rural Development

- Intent:** To provide a development pattern compatible with environmental and infrastructure support suitability and which can permit traditional lifestyle patterns to continue to the extent practicable.
- Policy:** Rural districts shall be designated in which only low-density residential and agricultural uses will be acceptable. Minimum lot size for these uses should be one-half acre until adequate infrastructure including functional sewer lines are provided.

Discussion: Not applicable.

4. Major Facility Siting

Intent: To include the national interest in analyzing the siting proposals for major utilities, fuel and transport facilities.

Policy: In evaluating the consistency of proposed major facilities with the goals, policies, and standards of the Comprehensive Development and Coastal Management Plans, the Territory shall recognize the national interest in the siting of such facilities including those associated with electric power production and transmission, petroleum refining and transmission, port and air installations, solid waste disposal, sewage treatment, and major reservoir sites.

Discussion: Not applicable. The cargo lines are part of an existing pipeline system that has been in place since the late 1960s. The proposed action is not a new major facility siting but only involves repairs to an existing system.

5. Hazardous Areas

Intent: Development in hazardous areas will be governed by the degree of hazard and the land use regulations.

Policy: Identified hazardous lands, including floodplains, erosion-prone areas, air installations, crash and sound zones and major fault lines shall be developed only to the extent that such development does not pose unreasonable risks to the health, safety or welfare of the people of Guam, and complies with the land use regulations.

Discussion: Consistent. The pipeline repair sites are not considered as hazardous lands in terms of air installations, crash and sound zones, and major fault lines.

Floodplains

Executive Order 11988 (Floodplain Management) requires all federal agencies to evaluate the likely effects of their actions located in floodplains. Federal agencies shall reduce the risk of flood loss, minimize the impact of floods on human safety, health and welfare, and restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities, including providing federally undertaken, financed, or assisted construction and improvements.

The Federal Emergency Management Agency (FEMA) Flood Rate Insurance Maps designates the project sites in Apra Harbor as Flood Zone A. Zone A encompasses those areas for which no base flood elevation has been determined. The sites lie in areas susceptible to the 1% annual flood, meaning that for any given year, there is a 1 in 100 chance for the area to experience the effects of a 100-year flood (FEMA, 2007) (Figures 2 and 3).

The floodway is the area that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. The coastal area off Apra Harbor encompassing the subsea repair sites (Box 40) is located within Zone A, which designates areas with a 1% chance of flooding. Pursuant to 23 CFR Section 650.111(e), the project was evaluated relative to the risks associated with implementation, impacts on natural and beneficial floodplain values, support of probable incompatible floodplain development, measures to minimize floodplain impacts associated with the action, and measures to restore and preserve the natural and beneficial floodplain values impacted by the action.

Since these are repairs of existing completely submerged pipelines, they will not have an adverse impact on the floodway or floodplain. The proposed action, therefore, would not result in a significant encroachment.

6. Housing

Intent: To promote efficient community design placed where the resources can support it.

Policy: The government shall encourage efficient design of residential areas, restrict such development in areas highly susceptible to natural and man-made hazards, and recognize the limitations of the island's resources to support historical patterns of residential development.

Discussion: Not applicable.

7. Transportation

Intent: To provide transportation systems while protecting potentially impacted resources.

Policy: The Territory shall develop an efficient and safe transportation system while limiting adverse environmental impacts on primary aquifers, beaches, estuaries and other coastal resources.

Discussion: Not applicable.

8. Erosion and Siltation

Intent: To control development where erosion and siltation damage is likely to occur.

Policy: Development shall be limited in areas of 15% or greater slope by requiring strict compliance with erosion, sedimentation, and land use districting guidelines, as well as other related land use standards for such areas.

Discussion: Consistent. Erosion and siltation are potential concerns during most construction activities on Guam. For the pipeline repairs, these concerns will be addressed by the deployment and maintenance of sediment control structures such as turbidity curtains and sandbags. The careful placement and monitoring of these silt control devices for breaches is an effective means of minimizing erosion and controlling sedimentation during construction. The contractor would be required to implement best management practices (BMPs) during construction to control turbidity and sedimentation. These will include double-walled turbidity curtains, which are the most widely used and available measures.

In-water construction work would be restricted to periods of low tides (to the extent practicable) and when corals are not spawning; spawning lasts from July 19 to August 10, 2016 for hard coral and May 20-June 11 for soft coral.

RESOURCE POLICIES

1. Air Quality

Intent: To control activities to insure good air quality.

Policy: All activities and uses shall comply with all local air pollution regulations and all appropriate Federal air quality standards in order to ensure the maintenance of Guam's relatively high air quality.

Discussion: Consistent. The repair sites at Box 40 are located in Piti within a 3 1/2 km radius of the Piti Power Plant, which is a non-attainment area for sulfur dioxide under the National Ambient Air Quality Standards (NAAQS). None of the proposed Tristar pipeline repair construction activities are expected contribute sulfur dioxide to the environment.

The contractor will be required to operate and maintain construction vehicles per the applicable regulations governing air pollutant emissions. All vehicles used in construction shall have properly functioning and maintained air emission controls.

2. Water Quality

Intent: To control activities that may degrade Guam's drinking, recreational, and ecologically sensitive waters.

Policy: Safe drinking water shall be assured and aquatic recreation sites shall be protected through the regulation of uses and discharges that pose a pollution threat to Guam's waters, particularly in estuarine, reef and aquifer areas.

Discussion: Consistent. The Tristar subsea repair sites are not located over an aquifer recharge area, nor any of the respective rivers considered a surface water supply source. The construction work would employ sufficient sandbags and double-

walled silt curtains around the in-water activities. The selected contractor for the in-water construction activity will be responsible for implementing adequate sedimentation controls in the marine channel. All construction related equipment and vehicles to be used during construction will be inspected before the beginning of each day's activities to ensure that all vehicles are fully functional and have no oil leakage.

3. Fragile Areas

Intent: To protect significant cultural areas, and natural marine and terrestrial wildlife and plant habitats.

Policy: Development in the following types of fragile areas shall be regulated to protect their unique character.

- historical and archaeological sites
- wildlife habitats
- pristine marine and terrestrial communities
- limestone forests
- mangrove stands and other wetlands

Discussion: Consistent.

Historic and archaeological sites. There would be no adverse effect on historic or archaeological sites, since the construction and repair work will be limited to the existing disturbed pipeline corridor. Since these lines have been installed since 1969 and repairs have occurred in the past, it is unlikely that historic or cultural resources will be affected.

Wildlife Habitat. The Tristar pipeline area at Box 40 supports habitat for crustaceans, mollusks, fish and various native, introduced and migratory birds.

There is no designated or proposed critical habitat in the vicinity of the Tristar pipeline repair sites, although according to NOAA (2009), the Sasa Bay Marine Preserve is a hawksbill foraging area. Based on coordination with Mr. Donald Hubner, National Marine Fisheries Service (NMFS) on March 29, 2014, the threatened green and endangered hawksbill sea turtles are the only species listed under the Endangered Species Act (ESA) that are expected to occur within the action area at the Apra Harbor Box 40 repair site. Mr. Hubner recommended the use of full-depth silt curtains to completely contain the excavation work, since excavation to expose the buried pipelines would likely result in elevated turbidity and sedimentation of the nearby substrate. The implementation of these and other best management practices would minimize impacts to the existing marine life in Guam's coastal waters.

As of August 2014, NOAA has listed 22 coral species as threatened under the Endangered Species Act (ESA) of 1973, of which three species occur in Guam

waters. These species are *Acropora globiceps*, *Acropora retusa* and *Seriatopora aculeata*. None of these species are located within Box 40 repair site since no living corals were found during the marine survey (Kerr and Burdick, 2014).

4. Living Marine Resources

- Intent:** To protect marine resources in Guam's waters.
- Policy:** All living resources within the territorial waters of Guam, particularly corals and fish, shall be protected from overharvesting and, in the case of marine mammals, from any taking whatsoever.
- Discussion:** Consistent. Work in marine waters is planned for Box 40. Kerr and Burdick (2014) surveyed the APE of Box 40 in March 2014 and did not find any threatened or endangered species during their study. Fleshy algae were recorded, but there were no sea grasses or living coral within the APE.

Double-walled turbidity curtains will be employed as a means to contain sediment movement so as to protect corals beyond the APE. Additionally, a no-wake zone will be coordinated with the U.S. Coast Guard to prevent disturbance to the site in the form of large waves caused by passing boats. This should also protect other marine organisms that could indirectly be affected by repairs outside of the APE. Work will proceed at one repair site at a time to provide additional site control. The material overlying the pipelines will be stockpiled on the seabed within double-walled turbidity curtains. Upon repair completion, the excavated area of each repair site will be backfilled with the original embedment material and the concrete anchor blocks will be replaced.

5. Visual Quality

- Intent:** To protect the quality of Guam's natural scenic beauty.
- Policy:** Preservation and enhancement of, and respect for the island's scenic resources shall be encouraged through increased enforcement of and compliance with sign, litter, zoning, subdivision, building and related land-use laws. Visually objectionable uses shall be located to the maximum extent practicable so as not to degrade significant views from scenic overlooks, highways and trails.
- Discussion:** Consistent. The project would not permanently obstruct or degrade natural scenic views. The pipeline repair sites do not provide a significant view corridor or vista. Following the necessary removal of concrete blocks, coral rubble and sand for pipeline repairs, the sites will be reverted to their pre-construction status and the pipelines will be reburied after repairs are completed.

6. Recreational Areas

- Intent:** To encourage environmentally compatible development.

Policy: The Government of Guam shall encourage development of varied types of recreational facilities located and maintained so as to be compatible with the surrounding environment and land uses, adequately serve community centers and urban areas and protect beaches and such passive recreational areas as wildlife and marine conservation areas, scenic overlooks, parks and historical sites.

Discussion: Consistent. The proposed pipeline improvements would not permanently change or restrict public access to potential nearby recreational areas in Apra Harbor or elsewhere. The public access to Piti Channel would be temporarily inconvenienced by the creation of a “no wake” zone during the marine repairs which should last approximately 7 to 14 days for each repair site. Access would still be guaranteed during the entire repair process.

7. Public Access

Intent: To ensure the right of public access.

Policy: The public’s right of unrestricted access shall be ensured to all non-federally owned beach areas and all territorial recreation areas, parks, scenic overlooks, designated conservation areas and their public lands; and agreements shall be encouraged with the owners of private and federal property for the provision of releasable access to and use of resources of public nature located on such land.

Discussion: Consistent. The proposed pipeline improvements would only slightly change or restrict public access to the nearby coastal areas of Apra Harbor by having a “no wake” zone established near Box 40. Aside from that, public access will be guaranteed during the construction phases. Since the repairs are estimated to take approximately 7 to 14 days each, public access would only be temporarily restricted.

8. Agricultural Lands

Intent: To stop urban types of development on agricultural land.

Policy: Critical agricultural land shall be preserved and maintained for agricultural use.

Discussion: Not applicable.

REFERENCES CITED

- Federal Emergency Management Agency (FEMA). 2007. Flood Insurance Rate Maps. Panel 0181D (Map Revised September 28, 2007).
- Guam Environmental Protection Agency (GEPA). 2002. Guam Water Quality Standards, 2001 Revision. 60 pp. + Appendix A-H.
- Kerr, A.M and Burdick, D.R. 2014. Marine Biological Survey for the Tristar Terminals Guam, Inc. Refurbishment of Cargo Lines A, B, and D, Piti Channel, Guam. 1 pp.
- National Oceanic and Atmospheric Administration. 2009. Coral Reef Habitat Assessment for the U.S. Marine Protected Areas: U.S. Territory of Guam. 7

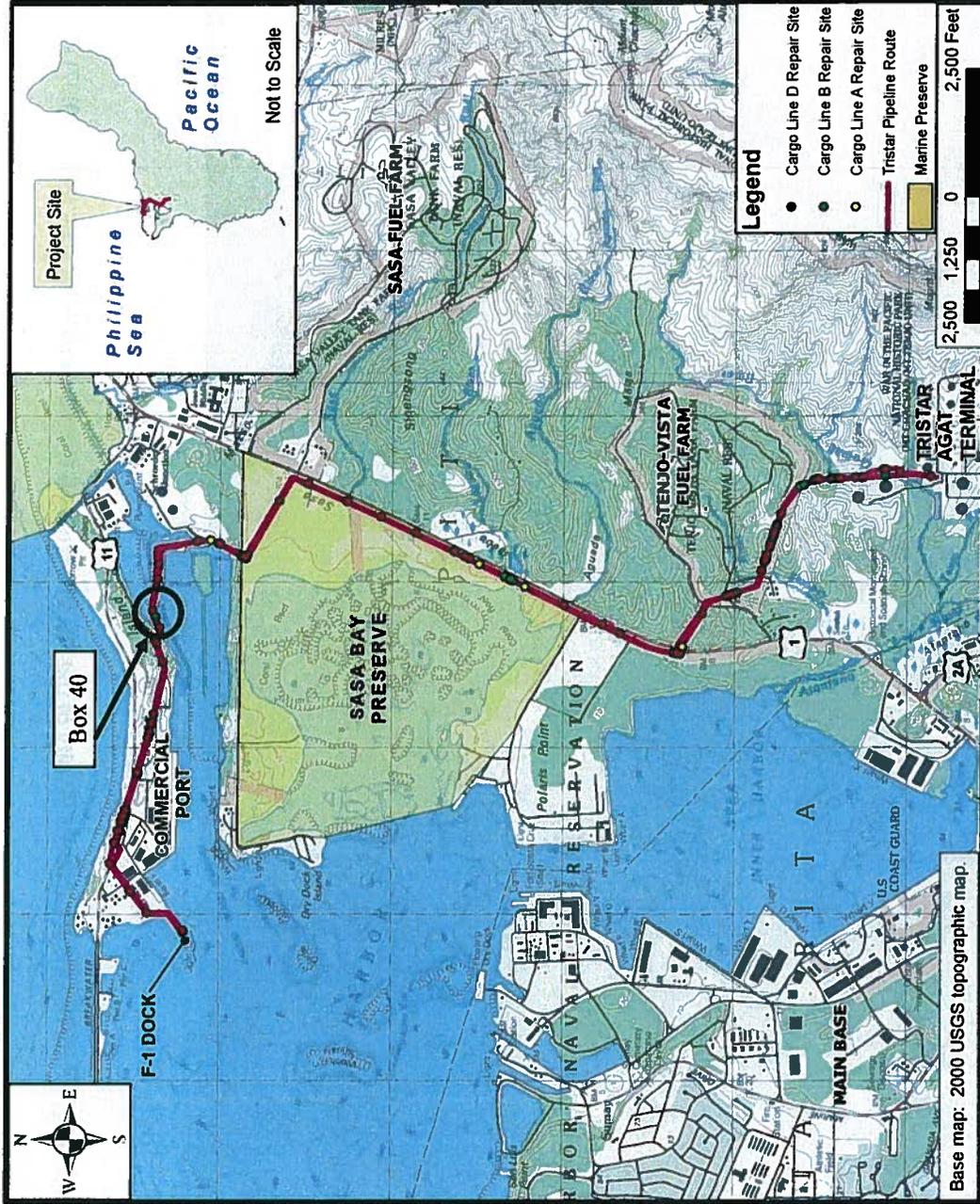


Figure 1. Site location map of proposed Tristar pipeline refurbishment sites, Guam.

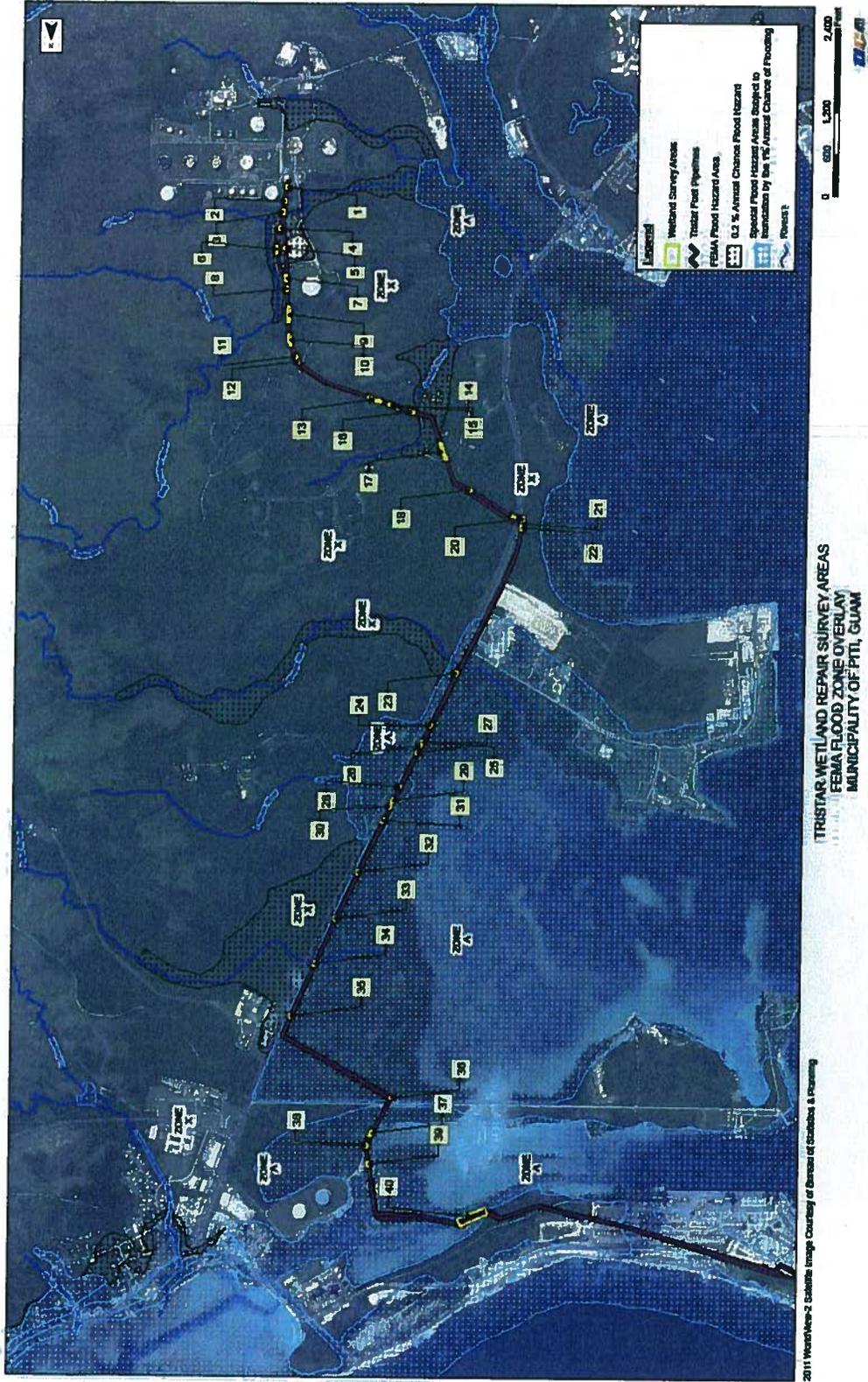


Figure 2. Flood hazard areas in the vicinity of the Tristar Terminals Guam, Inc. project sites (FEMA, 2007).



Figure 3. Flood hazard areas in the vicinity of the Tristar Terminals Guam, Inc. project sites (FEMA, 2007) (continued).

