US Army Corps of Engineers

Defense Environmental Restoration Program
For
Formerly Used Defense Sites

PRELIMINARY ASSESSMENT

Naval Air Station Banana River Off-Base Disposal Area

South Patrick Shores, Brevard County, FL

FUDS Property Number – I04FL0027

FINAL REPORT

23 April 2020

Prepared by
U.S. Army Corps of Engineers, St. Louis District
for the
U.S. Army Corps of Engineers, Jacksonville District

TABLE OF CONTENTS

APPENDICES

Q REPORT DISTRIBUTION

R REPORT PLATES

1 **Naval Air Station Banana River Off-Base Disposal Area** – Vicinity Map

2 **Naval Air Station Banana River Off-Base Disposal Area** – Property Map

TABLE OF FIGURES

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (USACE) administers the Defense Environmental Restoration Program (DERP) Formerly Used Defense Site (FUDS) program. The St. Louis District of the Corps of Engineers prepared this Preliminary Assessment (PA) for **Property Number I04FL0027, Naval Air Station Banana River Off-Base Disposal Area** (NASBROBDA), in support of DERP-FUDS.

This PA compiles information obtained through historical research at various archives and records holding facilities. The investigation was primarily a textual, cartographic and photographic research and analysis effort. It also makes use of property visits and interviews to gather information concerning the property. The research team directed efforts towards determining presence of hazardous substances as a result of previous waste disposal activities at the site associated with the Navy. The research places emphasis on establishing, if any, the types, quantities and areas of Hazardous, Toxic and Radioactive Waste (HTRW), munitions and explosives of concern (MEC), and chemical warfare materiel (CWM) activities. This process obtains information for use in developing recommendations for further action at NASBROBDA.

The former Naval Air Station Banana River (NASBR), located in Brevard County, Florida, served as a secondary field to Naval Air Station Jacksonville until its deactivation on 1 August 1947, when the Navy declared it surplus. The Navy conducted solid waste disposal operations off base from 1942 through 1947 based on a verbal agreement and a written letter from the representative of the landowner. Naval operations of the offsite waste disposal area ended when the Navy completed restoration activities by February 1948. The Navy transferred the NASBR to the Air Force in September 1948, which reactivated the installation as the Joint Long Range Proving Ground. The Air Force renamed it Patrick Air Force Base (AFB) in 1950. The FUDS property remained undeveloped until homebuilders purchased the land and began constructing single-family residences in 1956 for the planned South Patrick Shores community. Homebuilders completed redevelopment of the former disposal area by 1961. In 1991, residents' health concerns led state and federal agencies to investigate the former disposal area. Those studies determined that there was no apparent public health hazard, and no action was warranted. Health concerns lingered in the community over the years, and in 2018 buried debris found in residential yards led to requests for reinvestigation of the area.

Even though 1991 and 1992 studies found no apparent public health hazard and resulted in a determination of no further remedial action, this investigation finds a HTRW potential at NASBROBDA, resulting from the Navy's disposal by burning and burying of military debris at the site. On the basis of the information in this Preliminary Assessment, further CERCLA investigation on the identified potential HTRW hazard by the Jacksonville District is warranted.

The FUDS-eligible property, according to the Findings and Determination of Eligibility, is 25 acres; however, according to the Army Geospatial Center's analysis, the Off-Base

Disposal Area may be larger (approximately 52 acres). Historic aerial photographic analysis indicates that following the Navy's "restoration" of the site in 1948, additional disposal activities may have occurred on site in the early 1950s by unknown parties, though there is no evidence that Patrick AFB or the military participated at that point. The residential developers that graded the land, installed roads and utilities, and constructed the homes found buried material and may have further dispersed it while grading the development tracts. The subsequent homeowners did not have mandatory solid waste collection until 1982, and there are accounts of burning and burial of residential wastes on site before that time. It is unknown if these activities may have contributed to potential contamination at NASBROBDA.

There is no definitive evidence of MEC within the boundaries of the NASBROBDA FUDS. NASBROBDA's use for solid waste disposal, probably included munitions debris (MD) based MD found at the site in the form of practice bombs (e.g., Mk 23 and Mk 43 miniature practice bombs and a concrete M85, 100-pound practice bomb). However, there is no clear, identifiable risk or remediation project associated with MEC or CWM. On the basis of the information in this Preliminary Assessment, further investigation by the Jacksonville District on MMRP is not warranted.

ACKNOWLEDGEMENTS

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1 INTRODUCTION

1.1 AUTHORITY

Under the authority of the Defense Environmental Restoration Program (DERP) [10 USC §§ 2701 et seq.], and its policies and procedures relating to Formerly Used Defense Sites (DERP-FUDS), including Department of Defense (DoD) Management Guidance for the DERP dated 9 March 2012, and Engineering Regulation 200-3-1, Environmental Quality, Formerly Used Defense Sites (FUDS) Program Policy, the U.S. Army Corps of Engineers (USACE) St. Louis District investigated the Naval Air Station Banana River Off-Base Disposal Area (NASBRODA) in Brevard County, FL. Completion of this investigation on the former military property supports several federal laws and rules, DoD Directives and Standards, and Army Regulations as outlined in the subsequent sub-paragraphs.

1.1.1 Laws

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), commonly known as Superfund, to respond to threats posed by historic releases of hazardous substances into the environment. CERCLA was amended in 1986 by the Superfund Amendments and Reauthorization Act (SARA), which established the process for undertaking remedial actions at inactive waste sites containing hazardous substances, as well as reporting requirements for releases of hazardous substances. SARA expanded the provisions of CERCLA and added major new authorities. These amendments included the addition of Section 120, Federal Facilities and Section 121, Cleanup Standards. Section 120 requires departments and agencies of the federal government to comply with the provisions of CERCLA as amended by SARA. Section 121 establishes the procedures for the selection of remedial actions and the determination of the degree of remediation.

In 1986, Congress established DERP in 10 USC §§ 2701 et seq. This program directed the Secretary of Defense to carry out a program of environmental restoration at "[e]ach facility or site which was under the jurisdiction of the Secretary and owned by, leased to, or otherwise possessed by the United States at the time of actions leading to contamination by hazardous substances." Executive Order 12580 (EO 12580, 23 January 1987), Superfund Implementation, delegated the DoD to be the lead agency and response authority for releases or threatened releases of hazardous substances, pollutants and contaminants from any facility or vessel under the jurisdiction, custody, or control of DoD, subject to Sections 120 and 121 of SARA. Under 40 Code of Federal Regulations (CFR) §300.120, DoD is identified as the lead agency and response authority for incidents involving DoD military weapons and munitions under the jurisdiction, custody and control of DoD.

1.1.2 Regulations and Guidance

The FUDS Charter designated the Army as the Executive Agent on behalf of DoD charged with meeting all applicable environmental restoration requirements at FUDS, regardless of which DoD component previously owned or used the property. The Secretary of the Army further delegated the program management and execution responsibility for FUDS to USACE. USACE – St. Louis District, began conducting historical research and analysis for environmental site characterization in 1992. This research and analysis was originally captured in Archive Search Reports (ASRs) at FUDS, active DoD installations, and installation transitions under Base Realignment and Closure (BRAC) recommendations. Engineering Regulation 200-3-1, *Environmental Quality, Formerly Used Defense Sites (FUDS) Program Policy* dated 10 May 2004, dictates requirements of the CERCLA process as outlined in the National Contingency Plan (NCP). As such, previous historical records research and analysis reports are incorporated into Preliminary Assessments (PA), which now include pathway and environmental hazard assessment.[1] The U.S. Army Corps of Engineers, St. Louis District, prepared this PA pursuant to ER 200-3-1 using *USACE Formerly Used Defense Sites (FUDS) Program Guidance for Performing Preliminary Assessments under FUDS*, September 2005 as a guide.[2]

1.2 SUBJECT

According to the Findings and Determination of Eligibility (FDE), the former solid waste disposal activities at NASBROBDA comprised approximately 25 acres in Brevard County, Florida. The former NASBR served as a secondary field to Naval Air Station Jacksonville until its deactivation on 1 August 1947, when the Navy declared it surplus. The Navy conducted solid waste disposal operations on site from 1942 through 1947 based on a verbal agreement and a written letter from the representative of the landowner. Naval operations of the offsite waste disposal area ended when the Navy completed restoration activities by February 1948. The Navy transferred the NASBR to the Air Force in September 1948, which reactivated the installation as the Joint Long Range Proving Ground. The Air Force renamed it Patrick Air Force Base (AFB) in 1950. The FUDS property remained undeveloped until homebuilders purchased the land and began constructing single-family residences in 1956 for the planned South Patrick Shores community. Redevelopment of the former disposal area was completed by 1961. In 1991, residents' health concerns led state and federal agencies to investigate the former disposal area. Those studies determined that there was no apparent public health hazard, and no action was warranted. Health concerns lingered in the community over the years, and in 2018 buried debris found in residential yards led to requests for reinvestigation of the area. Plates 1 and 2 in the Report Plates Appendix show the general location of the property.

1.3 PURPOSE

Remedial response actions are governed by 40 CFR §300.420-440, and the PA is the first step in the remedial process described in the NCP. The purpose of the PA is to:

1) Eliminate from further consideration those sites that pose no threat to public health or the environment;
2) Determine if there is any potential need for removal action;
3) Set priorities for site inspections (if warranted); and
4) Gather existing data to facilitate later evaluation of the release pursuant to the CERCLA Hazard Ranking System (HRS) if warranted and if the Environmental Protection Agency (EPA) elects to score the site.

The PA shall include:

i. A description of the release;
ii. A description of the probable nature of the release; and
iii. A recommendation on whether further action is warranted.

This PA compiles information obtained through historical research at various archives and records holding facilities. The investigation was primarily a textual, cartographic, and photographic research and analysis effort. No sampling or quantitative field assessment techniques were conducted to gather data. The research team directed efforts toward determining presence of hazardous substances as a result of previous DoD use, storage, and/or disposal. This process obtains information for use in developing recommendations for further action at NASBROBDA.

1.4 SCOPE

The investigation team focused on potential Hazardous, Toxic, and Radioactive Waste (HTRW) and Munitions and Explosives of Concern (MEC) contamination remaining on NASBROBDA. The DERP-FUDS property number is I04FL0027. This report presents the following:

- A review of related property investigations;
- Description and characteristics of the immediate surrounding area, including real estate information, past and present;
- A brief history of NASBR and the OBDA operations;
- Description of the operations potentially involving HTRW and/or munitions activities identified at the property;
- A map and aerial photographic analysis of the property;
- Findings of the visual property visit;
- Evaluation of potential contamination on the property;
- A pathway and environmental hazard assessment; and
- Conclusions regarding Military Munitions Response Program (MMRP), HTRW, Containerized Hazardous, Toxic, and Radioactive Waste (CON/HTRW), and

Building Demolition / Debris Removal (BD/DR) projects and recommendations for further action.

These factors represent the basis for the evaluation of potential contamination and associated risks at NASBROBDA.

A description of the sources researched and a detailed listing of records reviewed are presented in Appendix A. A full bibliography of the references is contained in Appendix B.

2 PREVIOUS INVESTIGATIONS

2.1 CORPS OF ENGINEERS INVESTIGATIONS

2.1.1 Inventory Project Report South Patrick Shores Subdivision I04FL0027, 21 October 1991[3]

In 1991, representatives of the Jacksonville District of the U.S. Army Corps of Engineers visited the South Patrick Shores and prepared an Inventory Project Report (INPR) in support of DERP-FUDS. The INPR noted several site visits that occurred between 23 July and 23 August 1991 with the purpose of gathering information to determine if DoD ever acquired or disposed of real estate interest in the property. The team conducted a review of the land title records, Navy and Air Force real estate records, and the history of the former NASBR. Interviews with 22 former Navy military and civilian personnel stationed at NASBR between 1941 and 1948 revealed only a single recollection of the Navy disposing of debris in the area south of base consisting of *"…old wood and items such as furniture…500 to 1000 feet south of fence line."*

Aerial photography from 1943 through 1958 showed ground disturbances or scarring of the land in the area where South Patrick Shores is now located. The analysis of the photos determined presence of ground scarring, pits, excavations, multi-toned debris, and possible drums.

The INPR concluded that although the Navy acquired a total of 1,822.55 acres of land for the development of NASBR, no records indicated that the Navy acquired title or leases of properties near South Patrick Shores during the period of 1939 to 1948 or after the station transferred to the Air Force in September 1948. After the development of the South Patrick Shores in the mid-late 1950s, individual lot owners uncovered debris of military origin, though without any records supporting DoD acquisition or direct use of the land within the South Patrick Shores, FUDS property eligibility could not be verified. On 23 October 1991, the Commander of the South Atlantic Division approved the Findings and Determination of Eligibility (FDE) for the property concluding it was ineligible for the FUDS program based on information available at the time.

2.1.2 Revised Findings and Determination of Eligibility South Patrick Shores Subdivision I04FL0027, 24 August 2019[4]

In October 2018, the Florida Department of Environmental Protection (FDEP) requested through a letter dated 30 October 2018, that the Jacksonville District conduct further investigation of South Patrick Shores and reconsider its 1991 FUDS ineligibility determination, based on concerns from local residents. The Jacksonville District tasked the Corps' Research and Technical Services Section of the St. Louis District (CEMVS-EC-ER), which specializes in locating historical records for the FUDS program, with trying to locate relevant documentation to confirm FUDS eligibility. The CEMVS-EC-ER team searched physical paper, photographic and microfilmed documents in boxes housed in a number of record repositories and warehouses including National Archives

and Records Administration (NARA) facilities in metropolitan Washington, DC and Atlanta (see Appendix A for complete of repositories searched for the revised FDE and this PA effort). The CEMVS-EC-ER team located primary source military documents showing that while the Navy never purchased or leased the Off-Base Disposal Area, there was a verbal agreement between the installation and the property owner's representative allowing the Navy to use the area (see Section 3.2.1).

On 24 August 2019, the Director of Regional Business of the South Atlantic Division, USACE, approved and signed the revised FDE for South Patrick Shores, Property Number I04FL0027. The FDE determined that the FUDS eligible area consists of approximately 25 acres based on ground disturbances and scarring discernable on 8 December 1947 historic aerial imagery.

On 16 September 2019, the Jacksonville District administratively revised the name for FUDS Property Number I04FL0027 from that of the unincorporated area to the more historically accurate and descriptive Naval Air Station Banana River Off-Base Disposal Area (NASBROBDA).

2.2 OTHER INVESTIGATIONS

The following paragraphs discuss the relevant information gained from other investigations performed at South Patrick Shores (NASBROBDA) and Patrick AFB.

2.2.1 Patrick Air Force Base Phase I Records Search, 1984[5]

In 1984, Patrick AFB conducted a Phase I Records Search to investigate past environmental operations on base including solid waste disposal sites or landfills. The Phase I report found that the installation disposed of solid waste in on-site landfills until 1972 when the Cape Canaveral Air Force Station (AFS) landfill opened (see *Figure 1*). The Phase I report found that the U.S. Navy operated the first landfill on the base, initially designated as LF-1, during the 1940s. The Phase I report found that the navy buried materials such as general refuse, wet garbage, and industrial-type wastes, such as waste oils in LF-1. In October 1983, construction personnel discovered 17 buried drums containing various quantities of waste motor oil and an inert WWII practice bomb. Landfill LF-2 served as a trench type landfill between 1950 and 1956 and landfills LF-3 and LF-4 also served as trench type landfills from 1956 to 1961. Two other landfills labeled LF-5A and LF-5B operated as modified trenches between the years 1962 to 1972.[6]

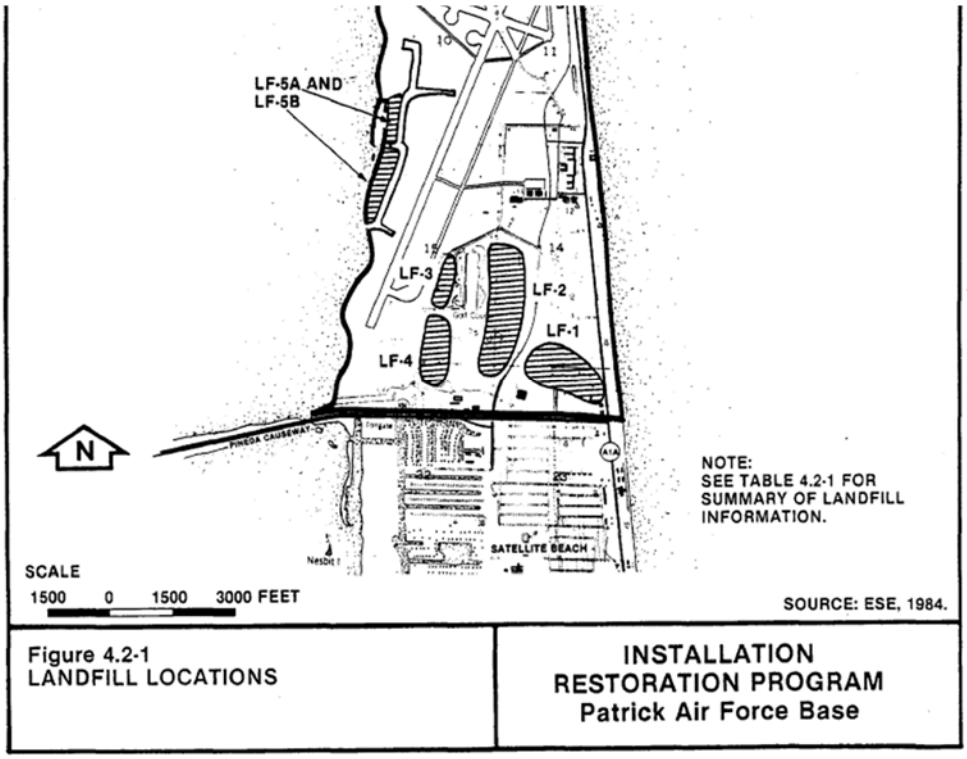

Figure 1 – *Patrick AFB Landfill locations, 1984*[7]

2.2.2 Patrick AFB Phase II Stage 2 Remedial Investigation/Feasibility Study, 1991[8]

Patrick AFB conducted groundwater sampling of landfill LF-1 as part of the Installation Restoration Program (IRP) Remedial Investigation/Feasibility Study (RI/FS). The Stage 2 RI/FS sampling found arsenic, lead, thallium, and chromium in groundwater at concentrations above criteria. Sampling also found lead, pesticides, polynuclear aromatic hydrocarbons (PAHs), and petroleum hydrocarbons evident in sediment and soil. The Phase II Stage 2 investigation also found low levels of petroleum hydrocarbon in surface water. During construction activity, drums of waste motor oil were excavated at LF-1, and base personnel subsequently removed and disposed of them and the adjacent visibly stained soils. The Stage 2 investigation recommended additional investigation of LF-1 (see Section 2.2.7 for subsequent studies).

2.2.3 Preliminary Assessment, South Patrick Shores, 15 October 1991[9]

The Florida Department of Environmental Regulation (FDER)[i] conducted a Preliminary Assessment (PA) for South Patrick Shores covering roughly 228 acres, including NASBROBDA. The 1991 PA relied on historic aerial imagery, interviews, newspaper accounts, correspondence, and contemporary written investigations but no primary source historical military documents from the period when disposal operations occurred. Items reported to have been found by residents and one of the construction contractors

[i] FDER merged with the Florida Department of Natural Resources to form the Florida Department of Environmental Protection (FDEP).

included: drums, barrels, paint cans, vehicles (e.g. Jeeps), vehicle and airplane parts, dishes and utensils, along with miscellaneous other items. During the home construction in the 1950s, a junk dealer removed several truckloads of items (See more details in Section 4.2.2.1).

Reporting on sampling by the Florida Department of Health and Rehabilitative Services (FHRS) from existing irrigation wells, the PA noted that none of the contaminants were linked with Hodgkin's disease, and the concentrations did not exceed safe levels for a lifetime of drinking water consumption. The PA recommended conducting a CERCLA Site Inspection.

2.2.4 Site Analysis of South Patrick Shores, December 1991[10]

In December 1991, the United States Environmental Protection Agency (EPA) Environmental Photographic Interpretation Center (EPIC) performed an aerial photographic analysis of South Patrick Shores covering the period from 1943 to 1958. The EPIC analysis aided in the assessment of disposal activity prior to construction of South Patrick Shores that began in 1956.

Aerial imagery from 14 February 1943 revealed a series of north-south parallel drainage channels south of the air station and an area of scattered ground scars of devegetated or sparsely vegetated areas in an otherwise vegetated environment. The analysis also noted the presence of a series of access roads and a shallow excavation containing a pit, a light-toned object, a probable vehicle, and light-toned material completely devoid of vegetation (see *Figure 2*).

Figure 2 – *EPA EPIC Analysis Aerial Imagery from 14 February 1943*[11ii]

Imagery from a year later on 26 February 1944 revealed an expanded excavation and a smoke plume from the pit indicating open burning of material along with possible vehicles present (see ***Figure 3***).

[ii] Resolution of EPA EPIC annotations and the aerial photo images from the 1991 analysis are poor on this the best available version of that report. Appendix O has the USACE interpretation of this imagery.

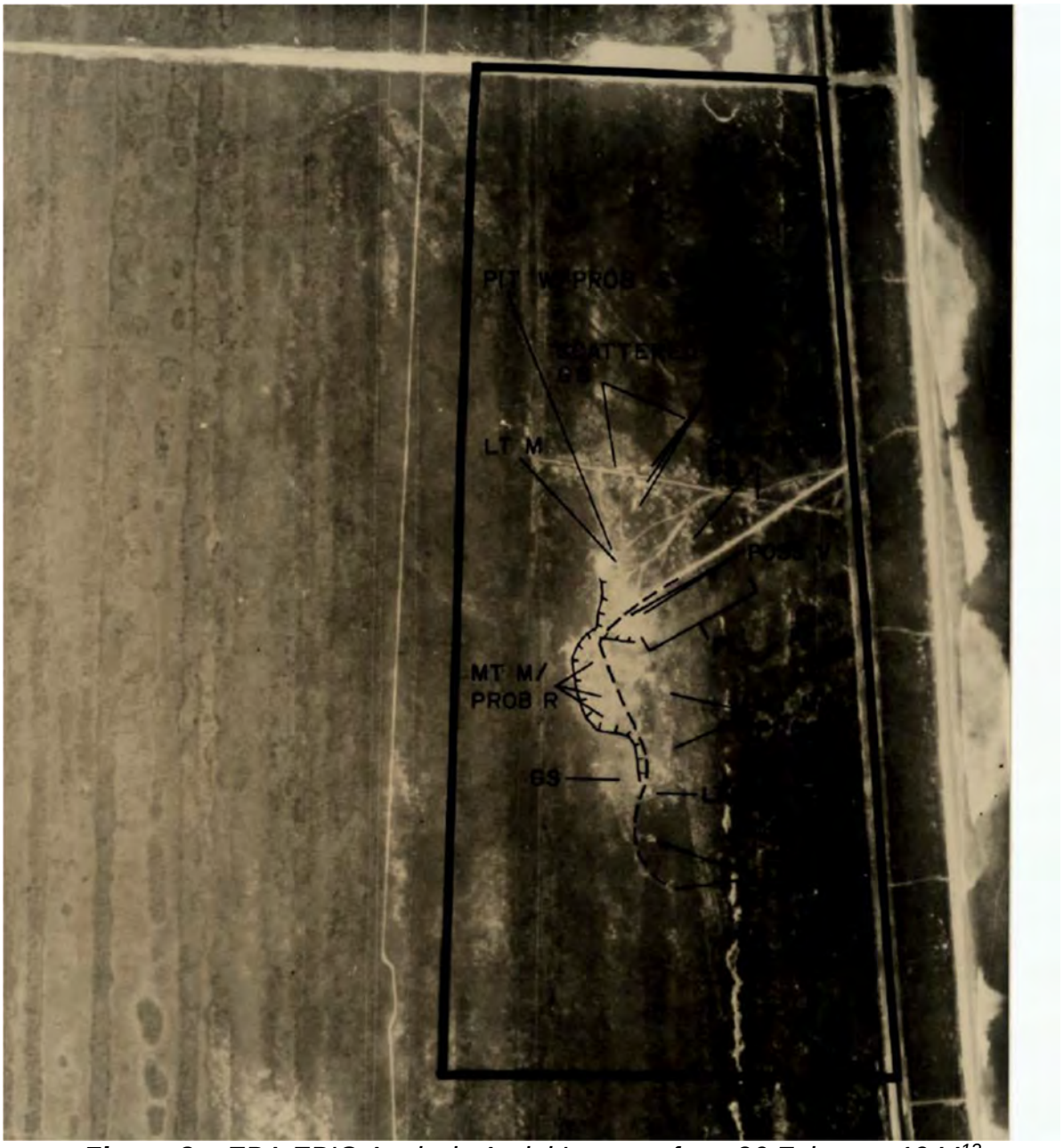

Figure 3 – *EPA EPIC Analysis Aerial Imagery from 26 February 1944*[12]

Ground disturbances and scarring discernable on 8 December 1947 aerial imagery indicate the apparent maximum extent of ground disturbances totaling approximately 25 acres (see ***Figure 4***)..

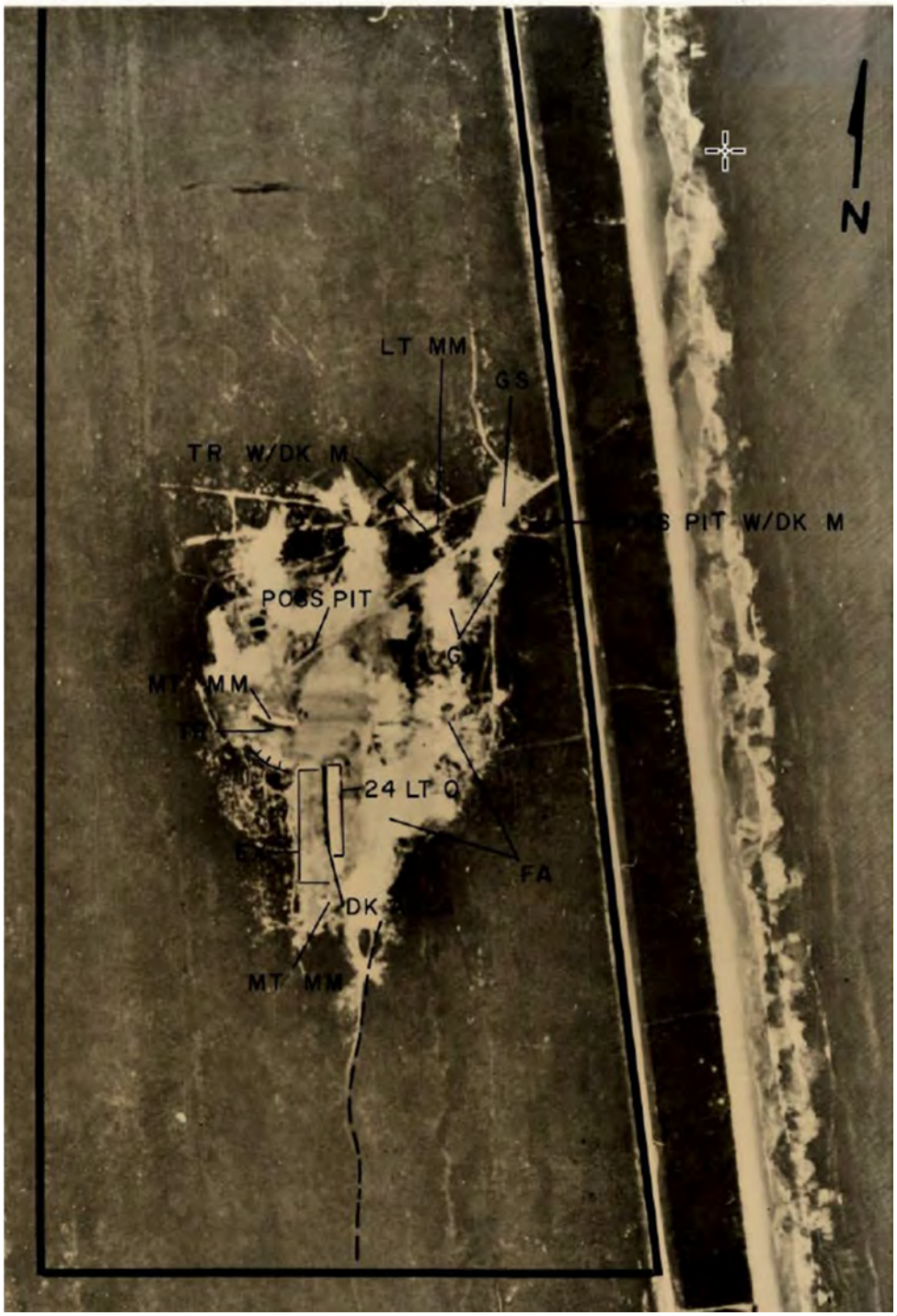

Figure 4 – *EPA EPIC Analysis Aerial Imagery from 8 December 1947*[13]

Imagery from 1951, 1953, and 1954 did not indicate an increase in the extent of the area. Analysis of the 7 November 1954 imagery revealed the presence of a vehicle, probably a truck, on an access road adjacent to a pit with dark toned material, along with approximately 14 possible drums near the access road and excavations (see ***Figure 5***). These features were not evident on earlier imagery and potentially indicate post-Navy activities.

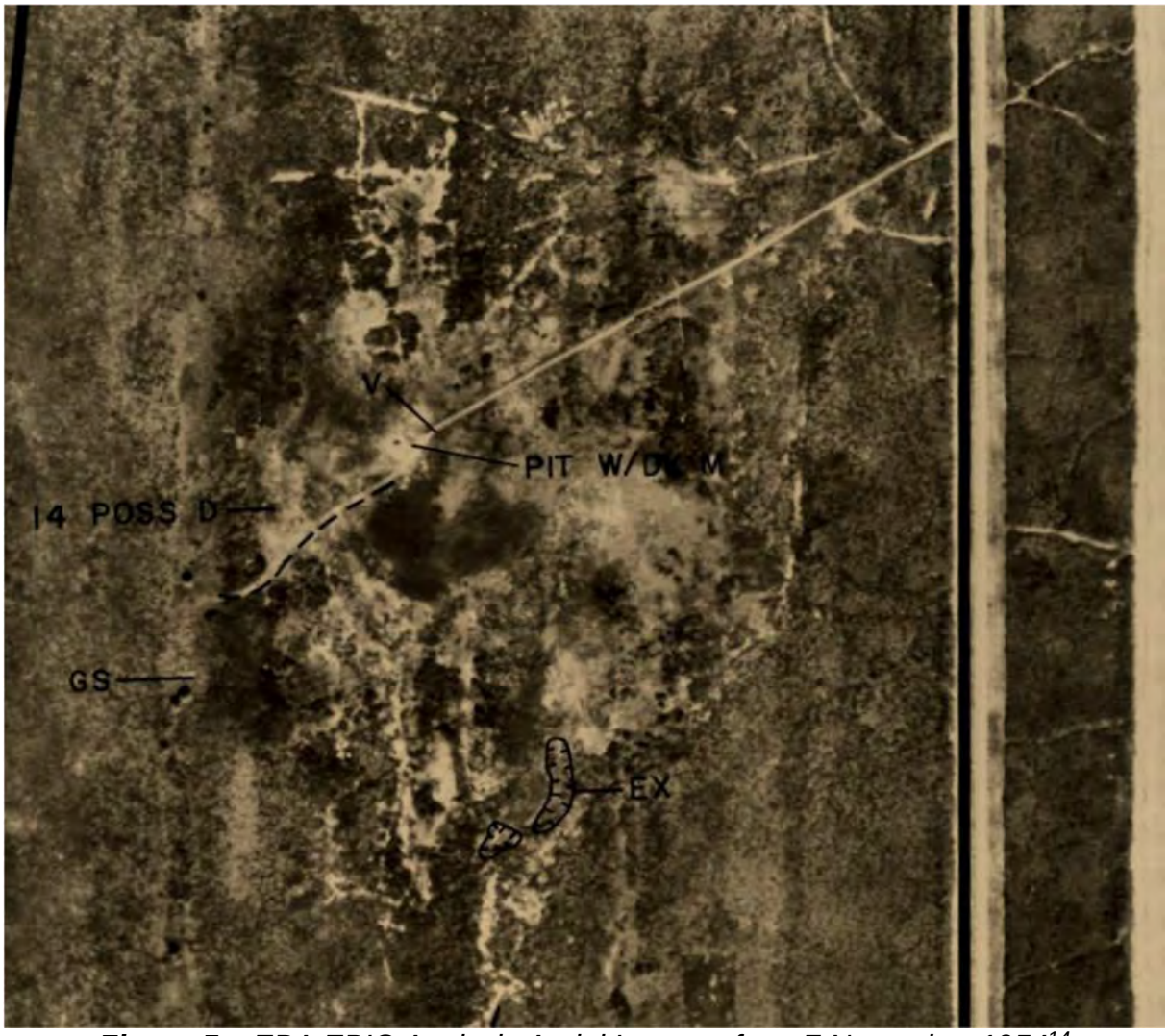

Figure 5 – *EPA EPIC Analysis Aerial Imagery from 7 November 1954*[14]

By 1958, a subdivision appears on the northern portion of the previous ground scarring, and the southern portion has revegetated, though the previous disturbances are still somewhat evident. Another pit is located south of a previous excavation, potentially indicating post-Navy use as well.

Figure 6 – *EPA EPIC Analysis Aerial Imagery from 23 April 1958*[15]

2.2.5 Screening Site Inspection (SI) Report for South Patrick Shores, 29 March 1992[16]

In November 1991, EPA conducted a field investigation to determine the nature of contaminants potentially present at the site and if any release of substances occurred or

may occur. During the field investigation, EPA collected 45 soil and groundwater samples from various locations including an area near the disturbance identified in historical aerial photographs, residences associated with Hodgkin's disease cases, and the neighborhood's elementary school. Analysis of a groundwater sample collected from one shallow temporary well showed polycyclic aromatic hydrocarbons (PAHs) and lead at levels that would pose a risk to human health if used as a potable water supply; however, since the water was not used as a potable water supply, the exposure to these contaminants likely would not occur. Atrazine, a widely used household herbicide, was present in three of the wells. The analytes detected were at levels associated with urban areas. Based on the sampling results, EPA designated the site as No Further Remedial Action Planned (NFRAP).

2.2.6 Agency for Toxic Substances and Disease Registry Report for South Patrick Shores, 8 April 1992[17]

Congressional Representative Jim Bacchus petitioned the Agency for Toxic Substances and Disease Registry (ATSDR)[iii] to conduct a health assessment on South Patrick Shores related to a citizen's concern about the number of cases of Hodgkin's disease in the neighborhood. ATSDR summarized the findings of the Florida Department of Health and Rehabilitative Services (FHRS) shallow groundwater sampling and EPA's soil and groundwater sampling from August 1991, which indicated a pattern consistent with local use and not a contaminated plume. ATSDR noted studies identifying two clusters of Hodgkin's disease, one in the late 1960s and one in the early 1980s but did not consider the occurrence unusual for Hodgkin's disease. ATSDR also did not find the incidence of Amyotrophic Lateral Sclerosis (ALS) to be elevated in the community. The study noted elevated rates of female breast and cervical cancer, but those cancers were not associated with chemical exposure. The available soil and groundwater sampling data did not indicate significant contamination; therefore, the report states, *"ATSDR considers this site to be of no apparent public health hazard."*

ATSDR also reviewed the title search performed for the developer of South Patrick Shores, which showed a succession of individuals and corporations owned the land between 1895 and 1940. The March 1992 ATSDR report found: "*There is no indication that the portion of the land in South Patrick Shores ever belonged to either the Navy or the Air Force"*

2.2.7 Patrick AFB Remedial Investigation/Feasibility Study Volume 11 A&B, March 1997[18]

By the time of this RI/FS study, Patrick AFB renamed the 1940s-era landfill on Patrick AFB as PLF-1 or LF-23, and in Phase II, Stage 3, the Air Force collected soil, groundwater, surface water, sediment, and biota samples. The RI/FS compared the analytical data to reference values, and after risk assessments, concluded that PLF-1 (LF-23) did not pose an unacceptable risk to the aquatic and terrestrial wildlife species

[iii] ATSDR is a federal public health agency within the United States Department of Health and Human Services.

modeled. The report concluded that exceedances exist at the site in surface soil, groundwater, surface water, and sediment. Based on the results of the Human Health Risk Assessment (HHRA), the FS evaluated potential remedial alternatives, and, with input from EPA and FDEP, Patrick AFB selected institutional controls with monitoring and natural attenuation for PLF-1 (LF-23). The institutional controls to prevent exposure to groundwater, surface water, and edible fish included posting "No Swimming" and "No Fishing" signs. Post RI monitoring of the constituents included the following.

- Shallow Groundwater: Arsenic, chromium, lead, thallium, vanadium, beta-BHC (β-Hexachlorocyclohexane) and carbolic acid (phenol)
- Deep Groundwater: Beta-BHC and delta-BHC
- Surface Water: Beryllium, lead, mercury and bis(2-ethylhexyl) phthalate
- Edible Fish: Aroclor 1254, 4,4-DDD, 4,4'-DDT, mercury, alpha-BHC, and bis(2-ethylhexyl) phthalate

In compliance with the selected remedy, the Air Force continues to maintain a monitoring program and institutional controls.

2.2.8 Removal Site Evaluation at the South Patrick Shores, July 2019[19]

EPA's Emergency Response, Removal, Prevention, and Preparedness Branch (ERRPPB) conducted a Removal Site Evaluation (RSE) at 165 Dorset Lane in South Patrick Shores for potential removal action eligibility under NCP. The RSE came in response to the resident's complaints to both FDEP and EPA about smelling a "sweet odor" emanating from buried wastes in the yard suspected of being Volatile Organic Compounds (VOCs). On 30 November 2018, FDEP's Office of Emergency Response personnel screened the yard and home for VOCs using a four-gas meter. No elevated VOCs were detected other than in a half-pint container reportedly dug up in the yard. An EPA On-Scene Coordinator (OSC) visited the residence on 5-6 December 2018, and in-follow-up to this visit the OSC developed a two-phase RSE sampling plan: collecting soil samples in February and soil-gas samples during the summer (June). In February 2019, the OSC sampled seven locations, selected by the property owner, at three different depths (0 - 6, 6 -12 and 12-24 inches). Analytical results of the soil samples showed no exceedances of the Removal Management Levels (RML). Arsenic and chromium were present above the Regional Screening Levels, but at concentrations consistent with background levels found in urban Florida. The OSC returned in June 2019 and sampled nine locations selected by the property owner. The OSC placed sampling rods into the ground approximately two feet below surface and left them overnight, collecting samples the following day via summa canisters. Two sampling locations had exceedances of Vapor Intrusion Screening Levels (VISL), but EPA personnel determined they were associated with the landowner's activities, and no human health risks were present. Screening for VOCs during both 2019 sampling events with a four-gas meter in the field resulted in no detects. Based on the information collected during the RSE, EPA recommended no further action for removal eligibility under EPA's Superfund Removal Program. EPA notified FDEP of these findings on 6 August 2019.[20]

On 8 October 2019, EPA notified FDEP that following USACE's notification of FUDS eligibility for the site, EPA was deferring investigation and remediation to USACE.[21] Similarly, on 26 November 2019, ATSDR deferred investigation and remediation to USACE.[22]

3 PROPERTY DESCRIPTION, ACREAGE AND LAND USE

3.1 LOCATION

South Patrick Shores is an unicorporated area consisting of nearly 900 acres and over ten neighborhood developments in Brevard County, Florida, directly south of Patrick AFB and the Pineda Causeway (Highway 513) and north of Satellite Beach. The irregularly shaped boundary of the FUDS-eligible portion of South Patrick Shores includes approximately 25 acres (see *Figure 7* and *Figure 8*) in the southern half of Section 23, Township 26 South, Range 37 East (T26S, R37E) of the Tallahassee Meridian. The approximate center of the property is at latitude N28º 12' 22" and longitude W80º 35' 58". The property is within EPA Region 4, Florida Congressional District 8 and ZIP code 32937. The FUDS lies roughly between Ocean Boulevard to the north, Clairbourne Avenue to the south, Pelican Drive to the west, and Highway A1A to the east (see *Figure 7*).

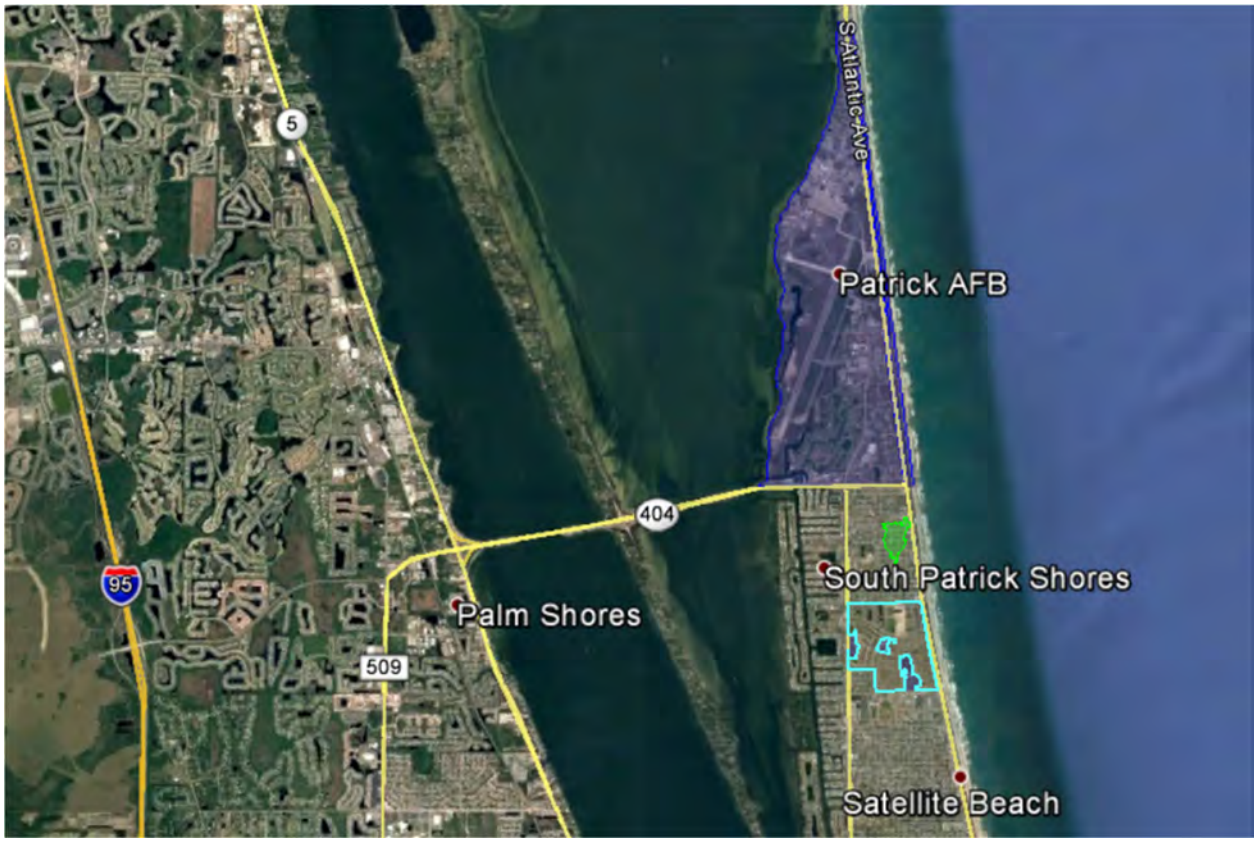

Figure 7 *– NASBROBDA Vicinity Map, 20 March 2017 imagery*

Legend

- FUDS Property Number I04FL0027, NASBROBDA (approximately 25 acres)
- Patrick AFB
- Former Patrick AFB South Housing area (only 36.48 acres retained)[23]

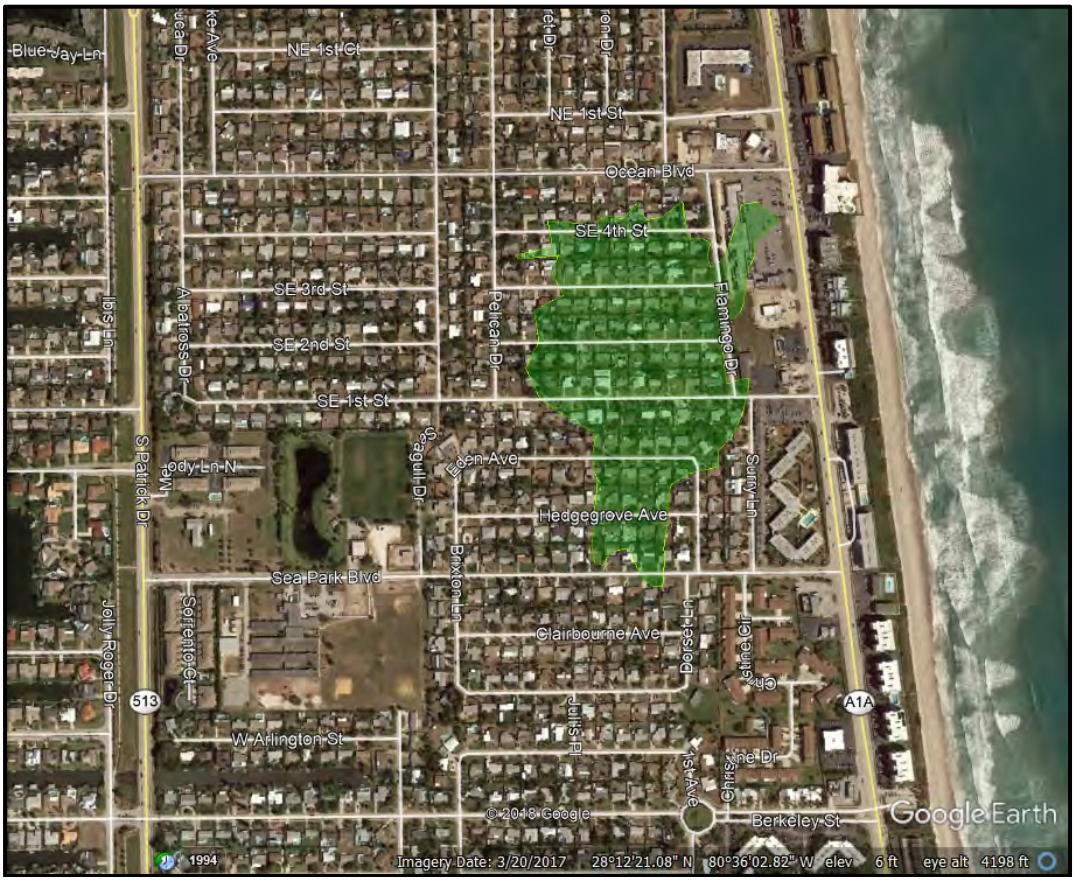

Figure 8 *– FUDS Property Number I04FL0027, NASBROBDA*

Legend

FUDS Property Number I04FL0027, NASBROBDA (approximately 25 acres)

3.2 FORMERLY USED DEFENSE SITE ELIGIBLE PROPERTY

3.2.1 Confirmed Formerly Used Defense Site

The FDE FUDS-eligible NASBROBDA property is approximately 25 acres. The irregular shaped FUDS boundary is atypical and is based on the footprint of use discernable on historic aerial imagery rather than defined, written real estate agreements. The Navy used the land based on a verbal agreement and unspecific written correspondence in October 1942 with a real estate broker on behalf of the private landowner (see section 4.1.2 for detailed discussion). The FUDS lies within the southern half of Section 23, T26S, R37E of the Tallahassee Meridian in Brevard County, Florida. For the former NASBR and the current Patrick AFB, the United States only acquired the land portion of the northern quarter of Section 23, T26S, R37E (see **Figure 11**).

3.2.2 United States Acquisition of Naval Air Station Banana River / Patrick Air Force Base

The government acquired the land for NASBR through a series of land condemnation cases/Declaration of Takings filed in 1930 and 1940 at the United States District Court for the Northern District of Florida, Orlando Division, through Civil Action Number 44 (original 749.43 ± acres), Civil Action Number 61 (52.48 ± acres, northern addition), and Civil Action Number 80 (1,052.00 ± acres, southern addition). The judgments for those Civil Actions granted title for the land to the United States (see *Figure 9* from September 1940 depicting the Proposed Southern Addition acquired by Civil Case Number 80, versus the land already acquired by Civil Case Numbers 44 and 61). The United States' use of eminent domain to facilitate acquisition of private property for the public use of establishing military installations was common practice during the military expansion for World War II. Ultimately, the United States acquired 1,822.55 acres for NASBR that the Navy transferred to the Air Force effective 1 September 1948.[24]

The military (United States) did not acquire fee title interest to the southern three-quarters of Section 23, which remained with private interests; however, more than two decades later, the U.S. did acquire height restriction easements on selected tracts within Section 23, as discussed in Section 3.2.3).[25]

The March 1992 ATSDR health assessment on South Patrick Shores came to a conclusion regarding military ownership based on ATSDR Reference 3, "Brevard Title & Abstract Company, Abstract of Title to certain Lands in Brevard County Florida, Prepared for Jack Taylor and Leonard Wolf, certified May 29, 1956" which states the following.

> "[*T]he title search performed for the developer of the project showed that a succession of private owners and corporations from 1895 to 1940 owned the land in question. A review of the judgment rendered in the government's petition on taking, granted the northern half of Lot 1, Section 23 to the United States. The southern half of Lot 1 remained in* ***private hands****. The corporation that developed South Patrick Shores later purchased this southern half.* ***The boundary of the property does not appear to have been moved. There is no indication that the portion of the land in South Patrick Shores ever belonged to either the Navy or the Air Force (3).****"* [26] (bolding added for emphasis)

ATSDR did not find any evidence that the Navy or Air Force had a titled land interest in South Patrick Shores. However, the ATSDR statement is not exactly correct. The United States only acquired the land portion of the **northern fourth** of Section 23, Township 26 South Range 37 East for NASBR, **not the northern half** as stated. The military obtained the northern fourth of the land (non-water) of Section 23 by Civil Action Number 80. The legal description of the acquisition through the Civil Case judgment is *"that part of Government Lot 1 lying in the North quarter of Section 23; and the North half of the Northwest quarter of Section 23 of Township 26 South Range 37 East.*" This

is reflected in the title papers Brevard Title & Abstract Company completed for the Navy's Bureau of Yards and Docks and provided to USACE to support managing Patrick AFB's real estate holdings. [27]

The acquisition of land for NASBR which later became PAFB has no bearing on the eligibility for the Off-Base Disposal Area. The military did not own or lease the property known as the Off-Base Disposal Area.

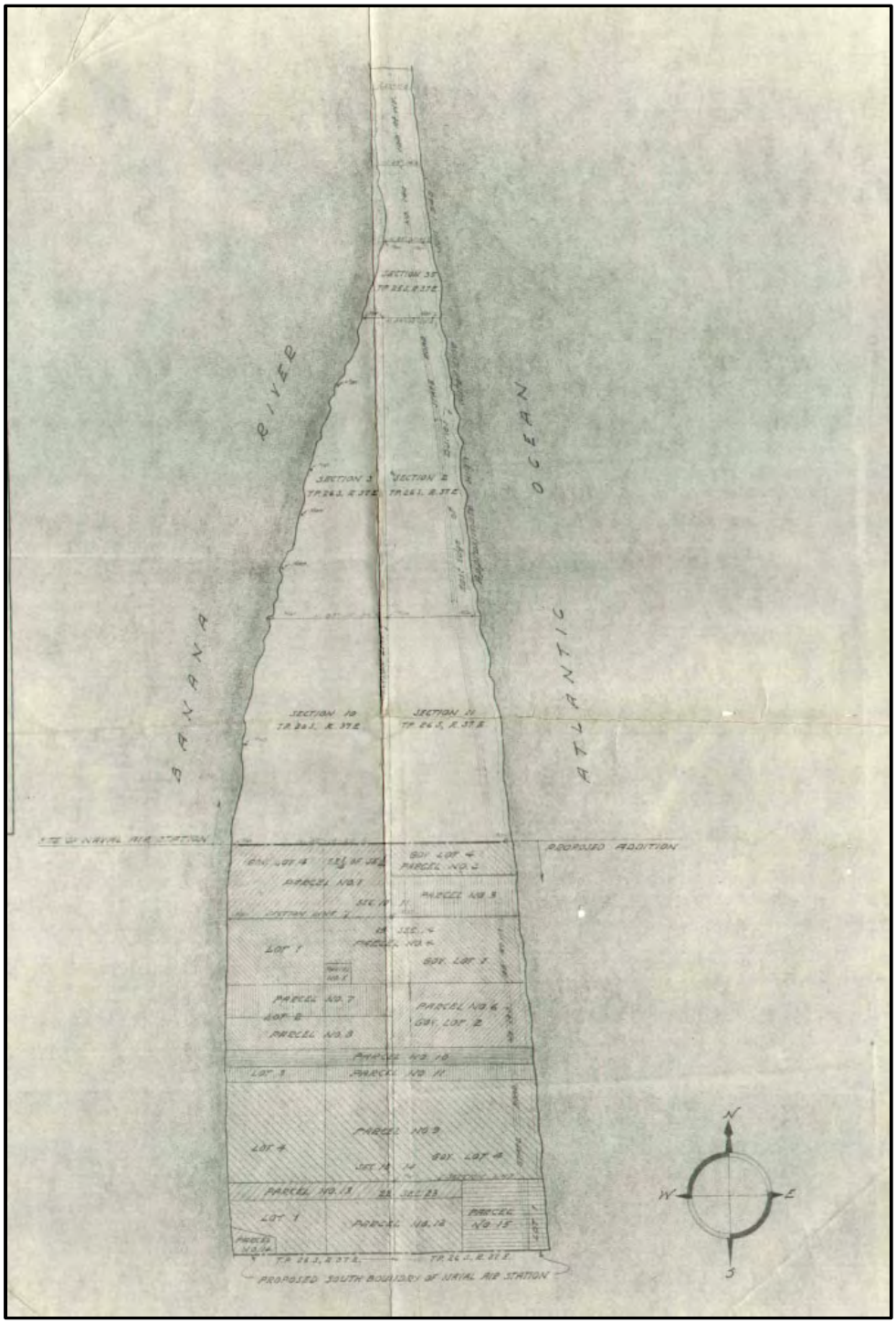

Figure 9 *– NASBR Proposed Southern Addition, 28 August 1940*[28]

3.2.3 Additional Areas of Use

The investigation team found no additional areas of undocumented military ownership or land use associated with NASBROBDA other than the area identified by historical aerial photo analysis (see Appendix O NASBROBDA HPA). However, in 1965 and

1970-71, Patrick AFB acquired perpetual restrictive height easements on a few dozen tracts of property in South Patrick Shore, including Tract 307E, limiting items on the tract to 65 feet above mean sea level. This easement partially overlaps the FUDS eligible property (see *Figure 10*). While these easements represent a real estate interest by the military, it does not affect FUDS eligibility either positively or negatively, as it does not indicate the DoD is exercising jurisdictional control over the land or indicate a ground based use.

Figure 10 – Perpetual Restrictive Height Easements NASBROBDA Real Estate Tracts – September 1974[29]

Legend

FUDS Property Number I04FL0027, NASBROBDA

Patrick AFB (active)

3.3 LAND USE AND OWNERSHIP HISTORY

3.3.1 Prior Land Use

Based on analysis of aerial imagery, NASBROBDA was undeveloped and unimproved prior to World War II. The title search peformed for the developer of South Patrick Shores showed a succession of individuals and corporations owned the land between 1895 and 1940.

3.3.2 Current Land Use and Ownership

The public has unrestricted access to NASBROBDA, and there are no known land use restrictions or restrictive covenants limiting property development. In the mid-to-late 1950s, developers constructed housing on the former NASBROBDA, redeveloping the area primarily into single-family, 2 to 3 bedroom residential housing with some commercial use. There are approximately 150 privately owned parcels within the FUDS, which are primarily residential with a few commercial buildings. Properties near the FUDS include places of worship, local supermarkets, stores, and restaurants. Local government/community facilities located within a half-mile radius of the FUDS include Brevard County Fire and Rescue, South Patrick Park, and Sea Park Elementary School. The future land use will likely remain the same.

3.3.3 Condition of Facilities Constructed for the Military

The Navy did not construct any facilities on the FUDS during the time of use. Aerial photographs indicate that prior to the construction of the residential homes in the mid-to-late 1950s, NASBROBDA served as a solid waste disposal area, and no buildings were present.

3.3.4 Population Demographics

The U.S. Census Bureau provided the general county and state demographics of where the property is located.

TABLE 3.3.4
U.S. Census Bureau General County and State Demographics [30]

Census Quick Facts	Brevard County	Florida
Population Estimates, July 1, 2018	596,849	21,299,325
Population Estimates Base, April 1, 2010	543,372	18,804,580
Persons under 5 years, percent	4.7%	5.4%
Persons under 18 years, percent	18.5%	20.0%
Persons 65 years and over, percent	23.3%	20.1%
Female persons, percent	51.2%	51.1%
White alone, percent	83.4%	77.4%
Black or African American Alone, percent	10.7%	16.9%

TABLE 3.3.4 U.S. Census Bureau General County and State Demographics [30]		
Census Quick Facts	**Brevard County**	**Florida**
American Indian and Alaska Native alone, percent	0.5%	0.5%
Asia alone, percent	2.6%	2.9%
Native Hawaiian and Other Pacific Islander alone, percent	0.1%	0.1%
Two or more races, percent	2.7%	2.1%
Hispanic or Latino, percent	10.4%	25.6%
White alone, not Hispanic or Latin, percent	74.5%	54.1%
Veterans, 2013-2017	65,306	1,454,632
Foreign born persons, percent, 2013-2017	8.6%	20.2%
Housing Units, July 1, 2018	280,398	9,547,305
Owner-occupied housing unit rate, 2013-2017	72%	64.8%
Median value of owner-occupied housing units, 2013-2017	$162, 400	$178,700
Median Gross Rent, 2013-2017	$971	$1,077
Building Permits, 2017	2,753	122,719
Households, 2013-2017	227,223	7,510,882
Persons per household, 2013-2017	2.47	2.64
With a disability, under age 65 years, percent, 2013-2017	10.0%	8.6%
Persons without health insurance, under 65 years, percent	13.0%	15.9%
Median Household Income (In 2017 dollars) 2013-2017	$51,536	$50,883
Persons in poverty, percent	12.4%	14.0%
Population per Square Mile, 2010	535	350.6
Land Area in Square Miles, 2010	1,015.66	53,624.76

3.4 PHYSICAL PROPERTY CHARACTERISTICS

This section presents information regarding general property geology, hydrogeology, terrain features, and climatic data. Threatened and endangered species, sensitive environments, and places of historical significance (e.g., archeological sites, cemeteries, national historical landmarks, etc.) are also identified.

3.4.1 Climatic Data

Climatological data from the National Oceanic and Atmospheric Administration (NOAA) weather station located in Melbourne, approximately 9.4 miles southwest of the NASBROBDA property provided representative temperature and precipitation data (see following table). The nearest source of wind gust data came from the National Weather Station in Melbourne.

TABLE 3.4.1
National Oceanic and Atmospheric Administration (NOAA)
Average Climatic Data from 2000 to 2019[31]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average High Temperature (degrees F)	71.8	74.6	77.6	81.6	85.4	88.6	89.8	90.0	88.0	83.9	78.2	74.6	82.0
Average Low Temperature (degrees F)	33.0	37.0	41.0	49.0	59.0	68.0	70.0	72.0	69.0	53.0	44.0	38.0	32.0
Average Temperature (degrees F)	61.2	64.7	67.9	72.5	77.3	81.0	82.2	82.6	81.2	76.4	69.4	65.4	73.5
Precipitation (inches)	2.37	2.02	2.26	2.13	3.71	7.35	6.69	6.61	7.86	4.52	2.06	2.38	49.81
Snowfall (inches)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

For the period from 2000 to 2019, the average maximum temperature for Brevard County has been 82.0°F, and the average minimum temperature has been 32.0°F. The average total annual precipitation is 49.81 inches. In the summer, the average maximum temperature is 90.0°F with an extreme high of 100.0°F. In the winter, the average minimum temperature is 33.0° F with a recorded extreme low of 25.0°F.[32]

3.4.2 Topography

The general topography of South Patrick Shores is flat, sandy lands adjacent to the ocean. South Patrick Shores is located on a barrier island in Brevard County. Barrier islands are linear islands of sand that parallel many gently sloping coastlines around the world. The site lies approximately 0 to <20 feet above Mean Sea Level (MSL) with the Banana River to the west and the Atlantic Ocean to the east (see *Figure 11*). The highest elevation at South Patrick Shores corresponds to the sand dunes along the Atlantic Ocean.[33] The primary vegetation type of South Patrick Shores is turf and landscaping, beach dunes, estuarine wetlands, mangrove communities, and salt marsh communities. The natural vegetation is saw-palmetto, scrub live oak, runner oak, cactus, and sea grape.

The 1949 U.S. Geologic Survey (USGS) Tropic Quadrangle covering the FUDS (see *Figure 11*) shows the topographic details of natural sand dune elevations rising over 15 feet MSL along the coast line and varying from <4 to 10+ feet MSL through the rest of Section 23. The 1949 topographic map, based on 1947 aerial imagery, depicts a devegetated area in white, among the vegetated green, essentially matching the extent of the NASBROBDA FUDS.[34] A series of Navy topographic maps of the installation circa 1940 provided more detail elevations. The sheet for the southeastern part of NASBR (see *Figure 12*) shows the dunes that continue southward onto the southern ¾ of Section 23 denoting the north-south trending savanna depressions and pre-existing trail road west of NASBROBDA.[35] Other sheets show these features continuing both northward and southward and predate NASBR development of the area.[36]

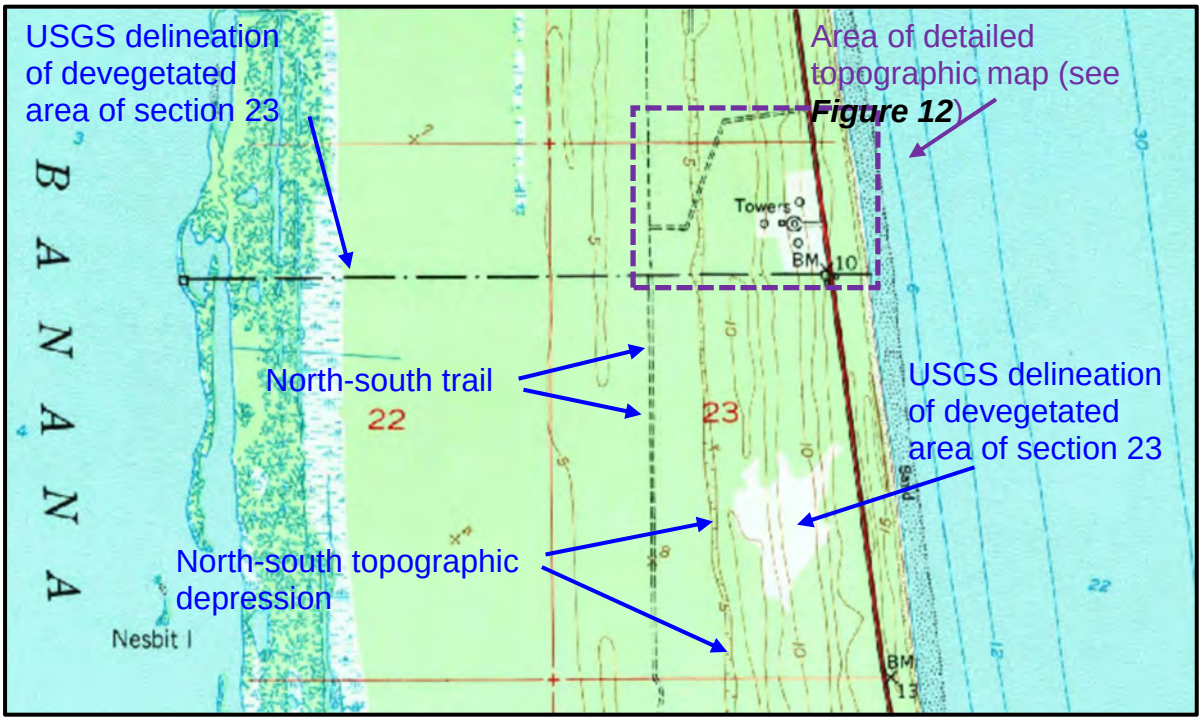

Figure 11 *– FUDS Property in Section 23, T26S, R37E on Extract of USGS Topographic Quadrangle Tropic, FLA - 1949*[37]

Note: purple and blue annotations added for clarity.

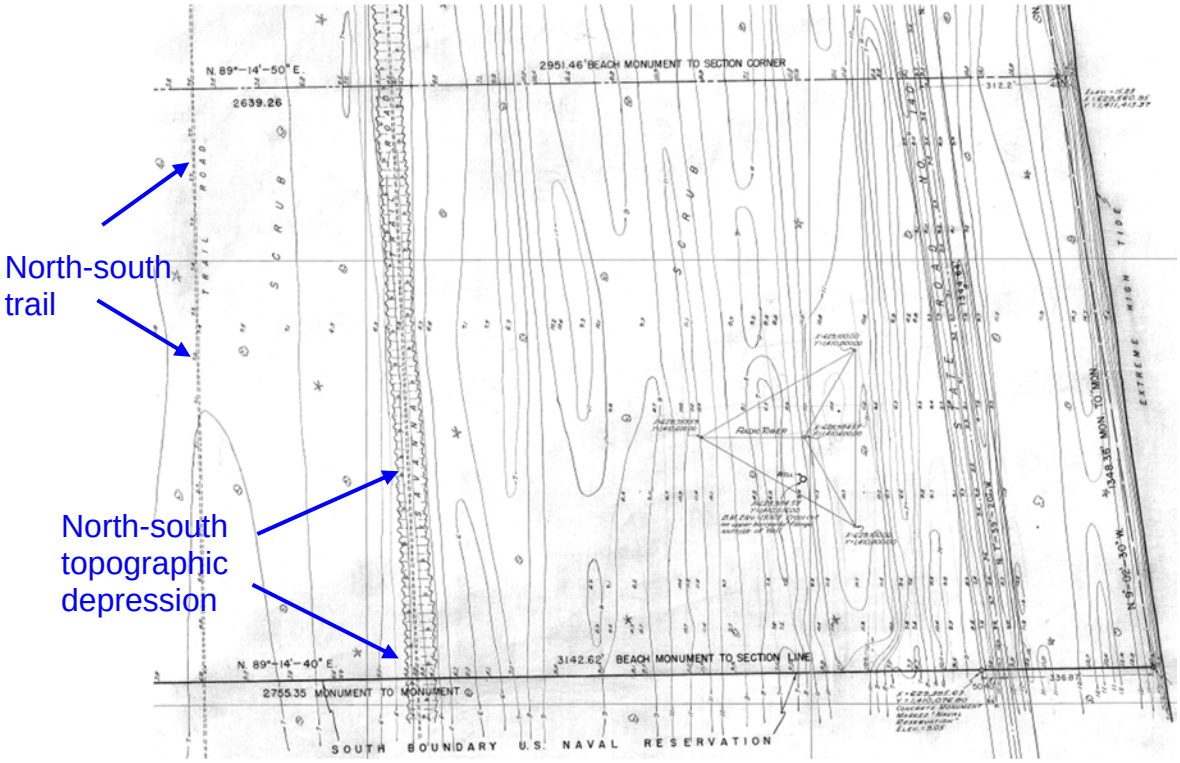

Figure 12 *– Detailed Topographic detail of North ½ Section 23, T26S, R37E - 1940*[38]

Note: blue annotations added for clarity.

The 2012 USGS Tropic Quadrangle covering the FUDS (see *Figure 13*) does not show any topographic details, indicating the land is very flat.

Figure 13 *– USGS Topographic Quadrangle of Naval Air Station Banana River Off-Base Disposal Area and vicinity area, 2012*[39]

Note: Approximate FUDS boundary in green added for clarity.

3.4.3 Regional Geology and Physiology

In Florida, Mesozoic and Cenozoic sediments overlie an eroded basement rock complex ranging from Precambrian to Jurassic. The Peninsular Arch, which is the main structural feature of Florida, is a northwest-southeast trending positive basement element cored by a large block of Precambrian rock covered by Paleozoic strata. Several different lithostratigraphic units from different epochs exist in the vicinity area of NASBROBDA. The Cedar Keys formation is the sole formation from the Paleocene. This sequence of interbedded dolostones and evaporites underlie the Oldsmar formation, which is one of the three formations that constitute the Eocene Epoch. The Avon Park Formation and the Ocala Limestone Group are the two other strata

comprising the Eocene layer. Overlying the aforementioned strata is the Suwannee Limestone, which characterizes the Oligocene Epoch. The Hawthorn Group, which overlies the Suwannee Limestone, constitutes the Miocene Series. The Pleistocene to the most recent sedimentation is characterized by undifferentiated sediments. The geologic boundaries for areas within and in the vicinity of South Patrick Shores can be grouped by their respective epochs (see ***Figure* 14**).[40]

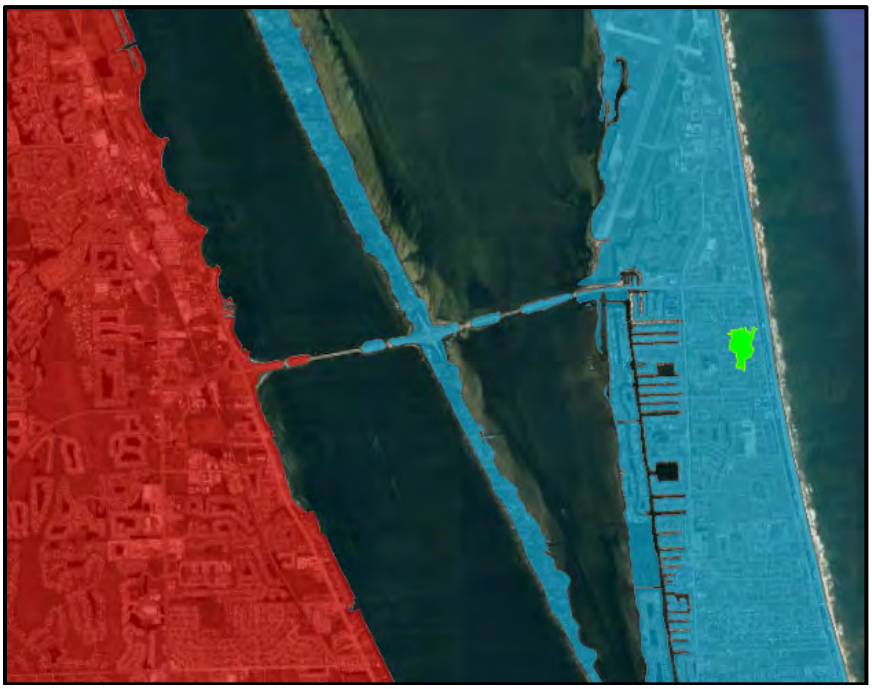

Figure 14 – Geologic Boundaries by Epoch in Vicinity of South Patrick Shores[41]

Legend

- FUDS Property Number I04FL0027, NASBROBDA)
- Pleistocene/Holocene
  - Rock type 1: Beach sand
  - Rock type 2: Clay/mud
- Pleistocene
  - Rock type 1: Calcarenite
  - Rock type 2: Sand

3.4.4 Regional Soils

The primary soil type at NASBROBDA is sand containing limestone fragments, fine sandy loam, gravelly sand, and mucky loamy fine sand. The soils are of the Canaveral-Palm Beach-Welaka association. Characteristics of the soil include being nearly level to gently sloping, moderately well-drained to excessively drained, and sandy throughout. Canaveral soils are on moderately low ridges. They consist of a mixture of light-colored quartz sand grains and multi-colored shell fragments. Welaka soils have a light-colored subsurface layer and a yellowish subsoil. The subsoil reaches a depth of approximately

40 to 60 inches, and below the subsoil there is a mixture of quartz sand and shell fragments (see *Figure 15*).

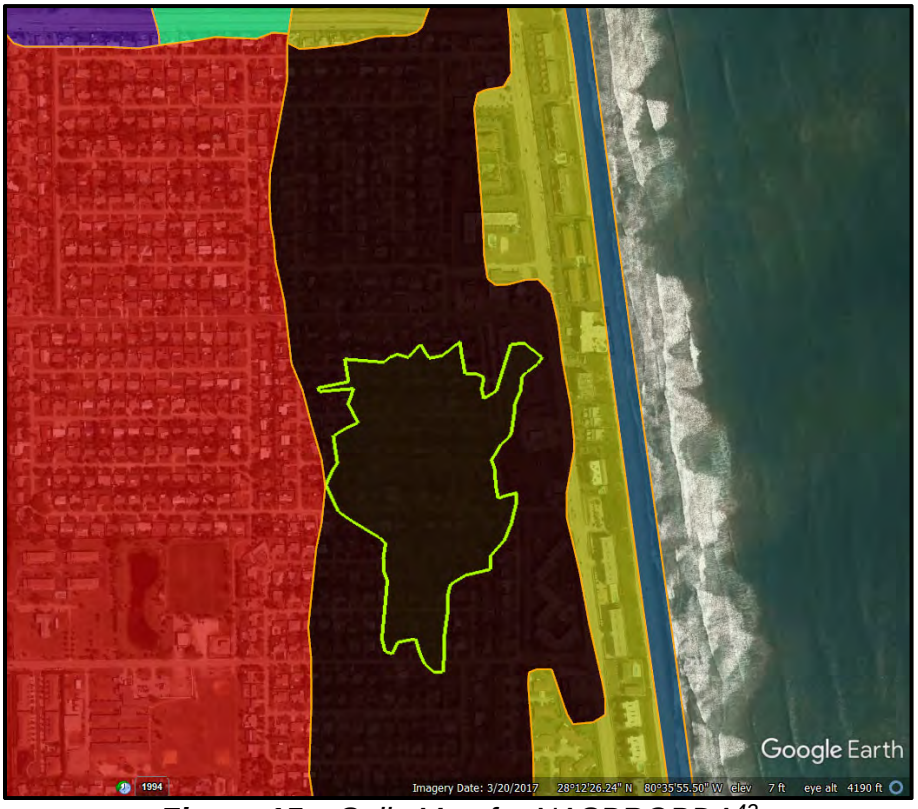

Figure 15 *– Soils Map for NASBROBDA*[42]
Note: Approximate FUDS boundary in green added for clarity.

Legend:
- Beaches
- Canaveral-Palm Beach-Urban land complex
- Immokalee sand, 0 to 2 percent slopes
- Palm Beach sand
- Pomello-Urban land complex
- Welaka sand

3.4.5 Surface Water Hydrology

NASBROBDA is located within the Indian River Lagoon watershed, bordered to the east by the Atlantic Ocean and to the west by the Banana River. These two water bodies constitute the main surface water resources at South Patrick Shores. The Fish and Wildlife Service National Inventory of Wetlands identified a surface water pond approximately 1,000 feet to the west of NASBROBDA (see *Figure 16*). This pond was formerly the sewage lagoon for the Brevard County Utilities South Beaches Waste Water Treatment Plant (WWTP) (see Section 4.2.2).

Figure 16 *– Wetland Map of NASBROBDA*[43]

Legend

FUDS Property Number I04FL0027, NASBROBDA

Freshwater pond

The Banana River is an integral part of the Indian River Lagoon Estuary, which includes the Mosquito Lagoon, Banana River Lagoon, and North and South Indian River Lagoons. The Banana River is a designated Aquatic Preserve, and therefore there are substantial regulations regarding various activities including effluent discharges and drilling. *Figure 17* depicts the 100-year flood hazard areas along the shoreline of NASBROBDA, as determined on the FEMA Flood Insurance Rate Maps. The 100-year flood, also known as the 1% annual chance flood or the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE, however, only Zones VE and AE are found within the boundaries of NASBRODA. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

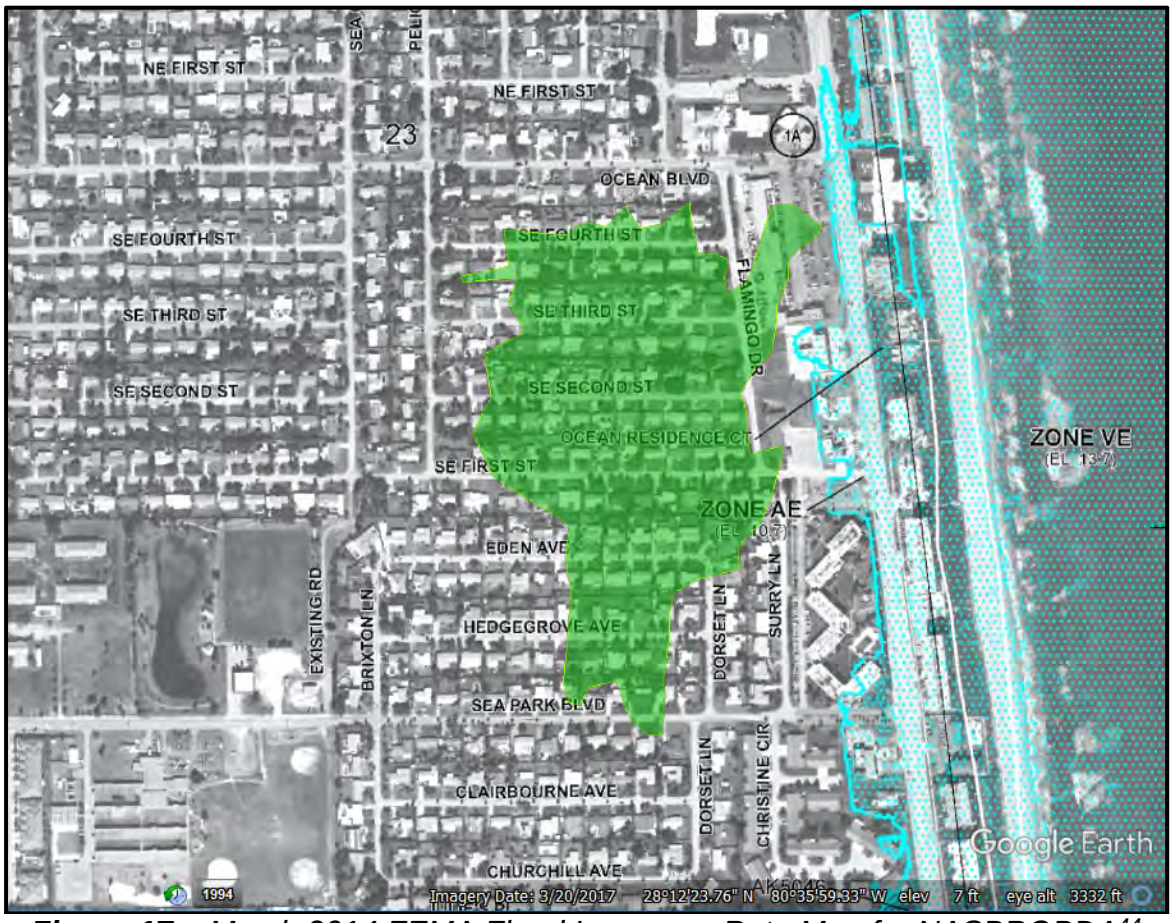

Figure 17 *– March 2014 FEMA Flood Insurance Rate Map for NASBROBDA[44]*
Note: Approximate 25 Acre FUDS boundary in green added for clarity.

Legend

Zone VE: Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined

Zone AE: Base Flood Elevations determined

Special flood hazard areas subject to inundation by the 1% annual chance flood[iv]

3.4.6 Ground Water Hydrology

The hydro-geologic system in the South Patrick Shores area is composed of three, variably interconnected aquifers: the shallow and unconfined water table aquifer; the composite, laterally discontinuous, semi-confined, Intermediate aquifer; and the confined upper, Floridan aquifer. The shallow water table aquifer occurs in the sandy shelly deposits of Pleistocene and Holocene age and is always found within a few feet (0-8 feet) of the land surface. Recharge to the shallow aquifer is primarily dominated by

[iv] The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

rainfall, although some upward leakage from underlying aquifers could occur. The shallow aquifer discharges along all margins of the island, which are at or near sea level. The topography of the area controls the direction of water flow, which slopes westward from the primary dune along the Atlantic shore (15-20 feet MSL) to the Banana River. Water in the shallow aquifer mainly flows to the west and discharges into the Banana River. The shelly sands comprising the shallow aquifer have relatively high porosities and permeability, and the rate of water flow is relatively rapid (360 feet/day).

The Intermediate aquifer occurs in thin, discontinuous sands and limestones at depths of 50 to 110 feet below sea level. Although the aquifer is semi-confined, recharge occurs as upward leakage from the underlying Floridian Aquifer, and the potentiometric surface is 20-30 feet above MSL. Potable water supply for the South Patrick Shores area is from the city of Melbourne and the City of Cocoa municipal well fields, which are interconnected in this vicinity

Water in the shallow aquifer follows the local topography and flows from areas of higher elevation to areas of lower elevation. Island topography and water flow slopes from east to west with discharge occurring in the Banana River and contiguous canals and creeks. The shallow aquifer's surface is always within a few feet of the land surface, and hydraulic conductivities are relatively high. Contaminants that are disposed in the shallow subsurface are subject to rapid volatilization and/or leaching. Contaminants in the shallow aquifer are unlikely to migrate into deeper confined and semi-confined aquifers due to the upward pressure gradient in both of the deeper aquifer systems.[45]

3.4.7 Natural Resources (Threatened and Endangered Species)

According to the U.S. Fish and Wildlife Service (USFWS), 16 federally listed threatened or endangered species may inhabit Brevard County on or near NASBROBDA (see Table 3.4.7). Determining an accurate accounting of the threatened or endangered species within NASBROBDA would take extensive fieldwork which is beyond the scope of this PA. Federal law protects these listed endangered and threatened species, and they must be considered prior to project development.

TABLE 3.4.7
Federally Listed, Threatened, or Endangered Species [46]

Species Common Name	Scientific Name	Status
West Indian (Florida) Manatee	*Trichechus manatus latirostris*	Endangered
Southeastern Beach Mouse	*Peromyscus polionotus nineiventris*	Threatened
Audubon's Crested Caracara	*Polyborus plancus audubinii*	Threatened
Florida Scrub-jay	*Aphelocoma coeruluscens*	Threatened
Piping Plover	*Charadrius melodus*	Threatened
Wood stork	*Mycteria americana*	Endangered

TABLE 3.4.7 Federally Listed, Threatened, or Endangered Species [46]		
Species Common Name	**Scientific Name**	**Status**
Red-cockaded Woodpecker	*Picoides borealis*	Endangered
Atlantic Salt Marsh Snake	*Nerodia clarkii taeniata*	Threatened
Eastern Indigo Snake	*Dymarchon corais couperi*	Threatened
Green Sea Turtle	*Chelonia mydas*	Endangered
Hawksbill Sea Turtle	*Eremochelys imbricata*	Endangered
Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered
Kemp's ridley Sea Turtle	*Lepidochelys kempii*	Endangered
Loggerhead Sea Turtle	*Caretta caretta*	Threatened
Gopher Tortoise	*Gopherus polyphemus*	Candidate
Carter's Mustard	*Warea carteri*	Endangered

Candidate species are those the USFWS is reviewing for consideration for federal listing. Candidate species should be considered in the planning process in the event that they become listed or proposed for listing prior to project completion. Candidate species receive no statutory protection under the Endangered Species Act (ESA).

3.4.8 Historical and Cultural Resources

The National Park Services' Cultural Resources Geographic Information System does not identify any National Register of Historic Places locations within the boundaries of NASBROBDA and its immediate vicinity.[47] USACE contacted the Florida Office of Cultural and Historical Preservation and the State Archeologist's Office regarding the NASBROBDA. At this time, there are no known culturally significant historic or archeological properties in the immediate vicinity of the FUDS; however, this should not be construed to mean that no culturally significant sites exist. Both the State Historic Preservation Office (SHPO) and the State Archeologist's Office requested USACE contact them prior to any ground-penetrating work in the area.

4 HISTORICAL PROPERTY SUMMARY

4.1 CHRONOLOGICAL PROPERTY HISTORY

4.1.1 1939 - 1950: Naval Air Station Banana River to Patrick Air Force Base

In December 1938, the Navy reported the need for additional shore facilities for the expansion of the U.S. Naval Air program. On 25 April 1939, Congress and the President of the United States authorized and signed the base program, consisting of the establishment of new naval bases in the United States. One month later, the President signed the 1940 appropriation act, which included appropriation of $17,000,000 for the construction of bases at Jacksonville and Banana River.[48]

On 6 June 1939, the Navy approved the construction of NASBR. Clearing and dredging work begun on 18 December 1939, and construction of NASBR started on 28 February 1940. NASBR started operations on 1 October 1940 as a secondary field to the main 7th Naval District Naval Air Station at Jacksonville.[49] By December 1940, the Neutrality Patrol Station at NASBR was 98 percent complete and primarily served to support seaplane patrol operations (see *Figure 18*).[50]

***Figure 18** – NASBR Aerial of Seaplane Base, 27 September 1940[51]*

For several months during the summer of 1941, NASBR had only one qualified pilot who used the base's only plane for inspection flights.[52] The Navy initially planned that NASBR's seaplane base would serve as an auxiliary operating base as part of the defense system of the Atlantic coast.[53] However, in July of 1941, the Naval Air Force Atlantic Division determined the Norfolk seaplane area was too crowded for primary instruction and sent six Patrol Bomber, Martin (PBM) Mariners to NASBR.[54] This action, somewhat inadvertently, established Banana River as a training base, as opposed to its original function as an operating base and seaplane service station. In February of 1942, the Gulf Sea Frontier ordered the establishment of a scouting squadron at Banana River, formally establishing it on 12 March 1942.[55] The Transition Training Squad Atlantic (TTSA) detachment reorganized and expanded its training program in the fall of 1942.[56] The training regime up until this point had been sporadic, but new regulations helped establish a regular routine for training entire squadrons.[57] This expansion lead to overcrowding on the base and delayed the landplane airfield (see *Figure 19*), which was not opened until January of 1943.[58]

***Figure 19** – NASBR Landplane Airfield - 6 June 1943*[59]

The Navy Department and the Bureau of Aeronautics transferred "Project Baker," an experimental program that field-tested instrument landing devices, radar and other electronic aids, to NASBR in March of 1942.[60] In the summer of 1943, TTSA crews began training as units, and in the fall of 1943, the 7th Naval District relocated the PBM Pre-Flight School to Banana River.[61] This action consolidated all PBM training to NASBR. September of 1943 brought the Air Bomber Training Unit (ABTU) to NASBR, and with it, nearly 200 more men.[62] By 31 October 1944, the ABTU had graduated 175 enlisted bombardiers for a total of more than 500 students turned out since the founding

of the unit.[63] On 6 September 1943, the Free French Naval Aviation group arrived from Jacksonville to partake in a training course under TTSA, with a second group following shortly thereafter.[64] By October 1943, NASBR had set up a portable mooring mast, which allowed a detachment of Blimp Squadron 21 to make regular stops at Banana River.[65]

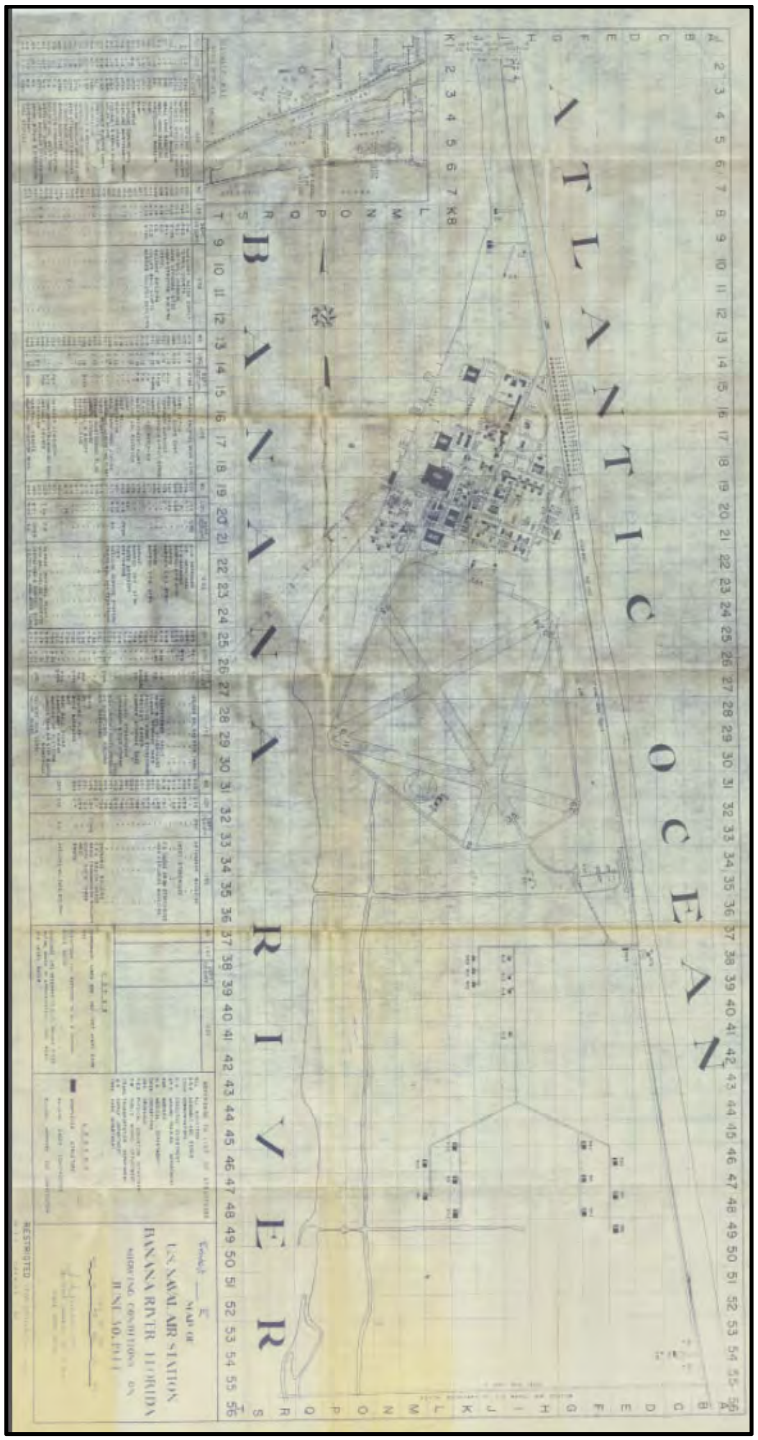

Figure 20 *– NASBR Site Plan - 30 June 1944*[66]

In January of 1944, the Navy commissioned Titusville Boat Facility to serve as a crash/rescue/salvage unit.[67] The 7th Naval District transferred the Titusville boat facility to NASBR a year later in January 1945.[68] In the spring of 1944, Gruman F6F Hellcat training planes from Melbourne NAS began using the NASBR landing field for refueling and rearming.[69] Other training sites located on NASBR included a machine gun range

and a skeet range.[70] Crews training at NASBR also utilized bombing targets outside the boundaries of NASBR, such as four located at Lake Okeechobee[71] Beginning on 21 December 1944, NASBR used an area approximately two miles south of the base intermittently as a 50-caliber turret training range with crews firing eastward toward the Atlantic Ocean.[72]

Following the end of the war in August 1945, NASBR continued to function as much as possible as before, but within a year, the peacetime demobilization and personnel strength reductions impacted NASBR as well. In May 1946, the Navy planned on placing NASBR on reduced operational status on 1 July. On 30 June, NASBR completed the first civilian reduction in force with reductions occurring in military units during this period as well.[73]

The War Assets Administration (WAA) used NASBR for sales of surplus items. The WAA did not warrant the used surplus material, which was typically sold "*as is, where is,*" varying in condition from essentially unused to salvage. Sales included furniture, office supplies, heaters, oxygen and acetylene cylinders, spare parts, and miscellaneous items. In September 1946 and April 1947, the WAA offered 524 of 40 different types of military vehicles for sale, giving veterans first choice. The WAA sale continued at NASBR through at least February and September 1948.[74]


I'VE DECIDED TO BUY
AT WAR ASSETS ADMINISTRATION
for Extra Profit!
THESE SALES SHOW WHY
COMING ATTRACTION!
FEB. 24 - 25
NAVAL AIR STATION
Bldg. No. 133
Banana River, Fla.
WORLD WAR II VETERANS—Fixed Price sale Feb. 24—9 A. M., to 4 P. M.
Typewriters; Calculator; Desks; Chairs; Grinders; Blankets; Household Refrigerator.
Most present honorable discharge. Residue will be sold to veteran dealers 1 P. M. to 4 P. M.
PRIORITY BUYERS—Fixed Price Sale Feb. 24 — 1 P. M. to 4 P. M.
$125,000 inventory includes Plumbing Fittings & Fixtures; Fire Fighting Equipment; Refrigerators (Reach-in Type); Hardware (Tools, Ovens, Ranges, Cages, Fire Hose, Sheet Packing, Wire Rope, Welding Flux, Tackle Blocks, Chain Hoists, Brake Shoes & Lining, Twine, Strap Hinges, Window Springs, Door Locks, Door Closers, Chest Handles); Electrical (Fittings, Screws, Terminals, Lights, Generators, Cartridge Fuses, Switches); Office and Household Furniture (Metal Folding Chairs, Metal Beds, Cots, Bedside Tables, Pillows, Cot Covers); Air Conditioning and Galley Equipment; Machinery (Cleaning Machine, Mixing Machine, Meat Slicer, Pumps, Blower); Miscellaneous.
ALL TRADE LEVELS—Spot Bid Sale Feb. 25 — 10 A. M.
Residue of above property will be sold in lots without regard to priority.
For details contact Property Disposal Officer at Naval Air Station, Banana River.
MIAMI
CUSTOMER SERVICE CENTER
901 N. E. Second Ave.
For Veterans, Priority and Commercial Buyers
FEB. 20 - MAR. 1
(See Listing Below)
2-Pool Tables; 2-Barber Chairs; 12-Pneumatic Truck Tires (700 x 16); 1-Sound Projector; 2-Drill Presses; 1-Shaper; 1-Saw, metal cutting; 1-Lathe, tool room; 2-Sinks and Drainboard; 17-Space Heaters; 1-Bake Oven; 1-Electric Range; 1-Food and Dough Mixer; 1-Food Slicer; 1-Meat Slicer; 1-Floor Polisher; 1400 Ft. Fire Hose, 50' lengths.
All Property is sold "as is, where is," and must be picked up by purchaser at its location, Coast Guard Repair Base, Ft. Lauderdale. No packing or crating by WAA.
Property will be sold in priority sequence listed below on a "first come, first served" basis, within the scheduled dates:
Federal Agencies—FEB. 20
Veterans of World War II (to establish own small business or Veteran Dealer)—FEB. 23 & 24
FWA & RFC—FEB. 25
State & Local Govt's.—FEB. 26
Non-Profit Institutions—FEB. 27
Commercial Buyers—MAR. 1—Continuous
TAMPA
CUSTOMER SERVICE CENTER
Bldgs. 16A08 & 16C01,
Drew Field
O A FEB. 18
2-Tables; 9-Lockers; 3-Berths
Available on a "first come, first served" basis without regard to priorities.
JACKSONVILLE
CUSTOMER SERVICE CENTER
Florida Ave. & Adams St.
Available to World War II Veterans FEB. 19:
BLANKETS
Available to All Buyers this week:

Figure 21 *– WAA Government Surplus Sale at NASBR Advertisement, 16 February 1948*[75]

On 18 July 1947, the Chief of Naval Operations directed NASBR be placed in an *"inactivated status, i.e., in a non-operating, non-active condition requiring no personnel (except as demanded for fire protection) and no maintenance"* effective 1 August 1947, or as soon thereafter as practicable. In addition, no aircraft could be attached or operated from the NASBR, although it would remain under the control of the Chief of

Naval Air Advanced Training.[76] On 4 September 1947, all operations at NASBR ceased, and the Navy assigned the base to the 7th Naval District for disposal.[77] In the late summer of 1948, the Navy transferred NASBR property to the Air Force[78], and on 10 June 1949, the Air Force reactivated NASBR facilities as the Joint Long Range Proving Ground. The base supported a joint Army, Air Force, and Navy project to test their long-range rockets and missiles from Cape Canaveral. The Air Force renamed the facility Patrick Air Force Base on 1 August 1950.[79]

4.1.2 1942-1947: Solid Waste Disposal activities at Naval Air Station Banana River Off-Base Disposal Area

According to documentation the Navy compiled 11 March 1948, during the initial phases of construction of NASBR, the Navy began using "*a portion of a tract of land of approximately twenty acres"* immediately south of the southern boundary of the installation in Section 23 as a "*dump and destroy*" area.[80] The documents state that in the fall of 1942, the newly assigned Public Works Officer (PWO) determined the Navy had not negotiated with the owner or real estate agent about the use of the property. The PWO contacted a local Cocoa, Florida, real estate agent, Gus C. Edwards, who represented the absentee landowner, for permission. In a letter dated 15 October 1942 (included in the documentation the Navy compiled in 1948), Mr. Edwards indicated as long as the Navy cleaned up the premises to prevent fire hazards, burned destructible materials in a limited area, and left indestructible materials, such as concrete, in piles, he saw *"no reason why there can be any objection to this."*[81] Mr. Edwards agreed with the PWO that the Navy could dig furrows with a bulldozer to deposit and bury non-flammable materials. After this non-specific agreement, the station received no other correspondence regarding the use of the property. Since the disposal area was already in use at the time that the NASBR PWO requested permission to Mr. Edwards, the station considered Mr. Edward's letter from 15 October 1942 as a *"license which permitted the Navy to use the property."*[82] The reason given for this off-base disposal area was the Navy's desire to burn wooden crates further away from ammunition stored at the southern end of NASBR, about a mile to the north.[83]

According to documentation the Navy compiled 11 March 1948, following the inactivation of NASBR in the summer of 1947, the Public Works Department began work to *"clean up and restore"* the off-base disposal area.[84] According to the NASBR PWO, during the time of inactivation "*the restoration of the privately owned dump property became a matter of major concern as literally anything and everything had been dumped in the area violating the conditional consent of Mr. Edwards which restricted dumping to burnable materials only.*"[85] The *"cleaning up process consisted of burning and burying all rubble, trash, etc. to a depth of eight to ten feet and covering it with six feet of soil. The surface was restored to a comparative level by bulldozing the eight acres more or less."*[86]

On 13 August 1947, NASBR sent a letter to Mr. Edwards requesting him to join them for an inspection of the property to determine the measures necessary to restore the property to his satisfaction. On 5 February 1948, Mr. Edwards and the alleged owner,

Vernon C. Fry, visited the property for a visual inspection of the completed *"restoration"* of the site. They both expressed their satisfaction; however, Mr. Fry later requested the Navy compensate him for the use of the property. The Navy took photographs of the site a month later (see *Figure 22*, *Figure 23, Figure 24, Figure 25, and Figure 26)*.[87]

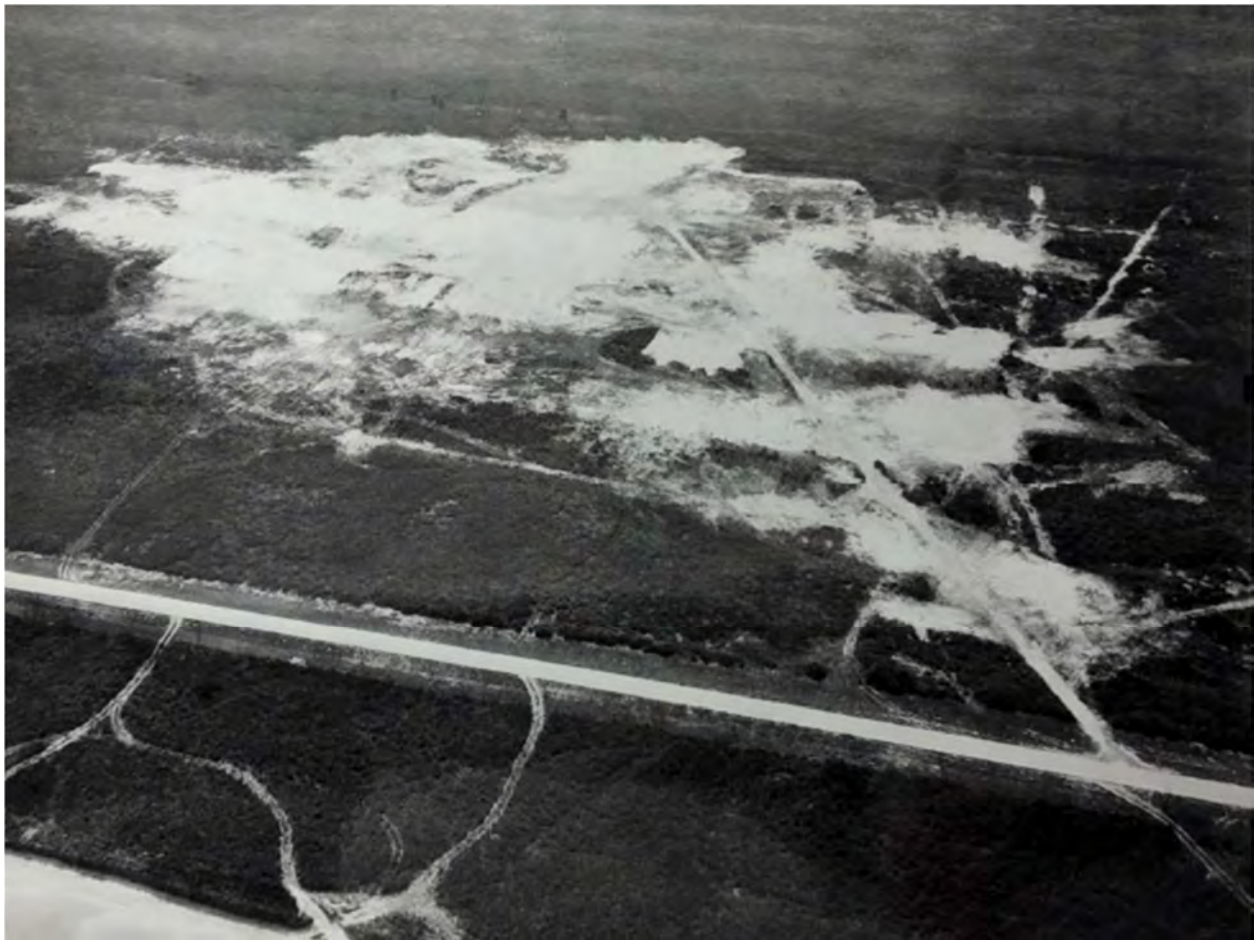

Figure 22 *– Aerial Oblique looking southwest at solid waste disposal area, 13 March 1948*[88]

Figure 23 *– Looking northeast from solid waste disposal area; 13 March 1948*[89]

Figure 24 *– Looking northwest from solid waste disposal area; 13 March 1948*[90]

Figure 25 *– Looking east from solid waste disposal area; 13 March 1948*[91]

***Figure 26** – Looking southeast from solid waste disposal area; 13 March 1948*[92]

On 24 February 1948, the former PWO for NASBR wrote that the Navy agreed with Mr. Edwards that the Navy would only dig shallow furrows and would place a reasonable soil cover on top of the disposed material. Other than additional soil to cover the disposed material, Mr. Edwards stated no additional remediation activities were necessary. In addition, Mr. Edwards expressed satisfaction that the disposal activities and soil coverage raised the elevation of the land, thus increasing the property's value. Consequently, the restoration of the property by disposing the trash at a depth of 8 to 10 feet and covering it with 6 feet of soil exceeded the agreed restoration requirements, thus benefiting the landowner, according to the former NASBR PWO. He further recounted that Mr. Edwards never mentioned the matter of monetary compensation for the use of the land.[93] A subsequent claim on June 1948, stated that upon further examination, Mr. Fry noticed that *"long trenches 15 feet deep had been dug over an estimated 20 acres, and that these trenches had been filled with all kinds of material, wrecked planes, motors, flying jackets, lime, cement, tin cans, and every kind of rubbish except lumber."*[94]

During the claim for compensation investigation, the Navy learned that while Mr. Fry, as President of Florida Beaches, owned the property prior to a 1938 tax foreclosure proceeding, Kumprop, Inc., purchased the property on 5 May 1944 and had owned it since.[95] A June 1948 property appraisal determined the property had increased at least $5.00 per acre in value between the time the Navy used the property to dispose of materials and the time the Navy released the property.[96] Also in 1948, Florida Beaches filed a lawsuit against Kumprop, Inc. to recover title to the property.[97] The outcome of

that litigation is unknown, and no subsequent agreement or payment to the owners by the Navy is known to have occurred.

In the late summer of 1948, the Navy transferred the NASBR property to the Air Force[98], and on 10 June 1949, the Air Force reactivated the NASBR facilities, renaming it Patrick AFB in 1950.[99]

4.1.3 1950s-1960s Residential Redevelopment

By January 1956, Taylor Made Homes purchased 200 acres south of Patrick AFB with a plan to build 650, 2 and 3 bedroom concrete block structure homes in a planned community to be known as South Patrick Shores (see *Figure 27* and *Figure 28*). Street paving was underway at that time.[100] By the end of February 1956, the Regency Group by Taylor-Made Homes ran advertisements in the *Orlando Sentinel* for homes one-half mile south of Patrick AFB off of highway A1A (see *Figure 29*). The advertisement offered five models of three bedroom homes with water and sewage systems and *"Free Sprinkling System with Well and Pump"* [101] The first South Patrick Shores homes were occupied on 1 June 1956. In June 1957, Woolf Development Company joined the South Patrick Shores development with Driftwood Manor comprising 138 homes. Ultimately, Taylor-Made Homes constructed 400 houses in South Patrick Shores.[102]

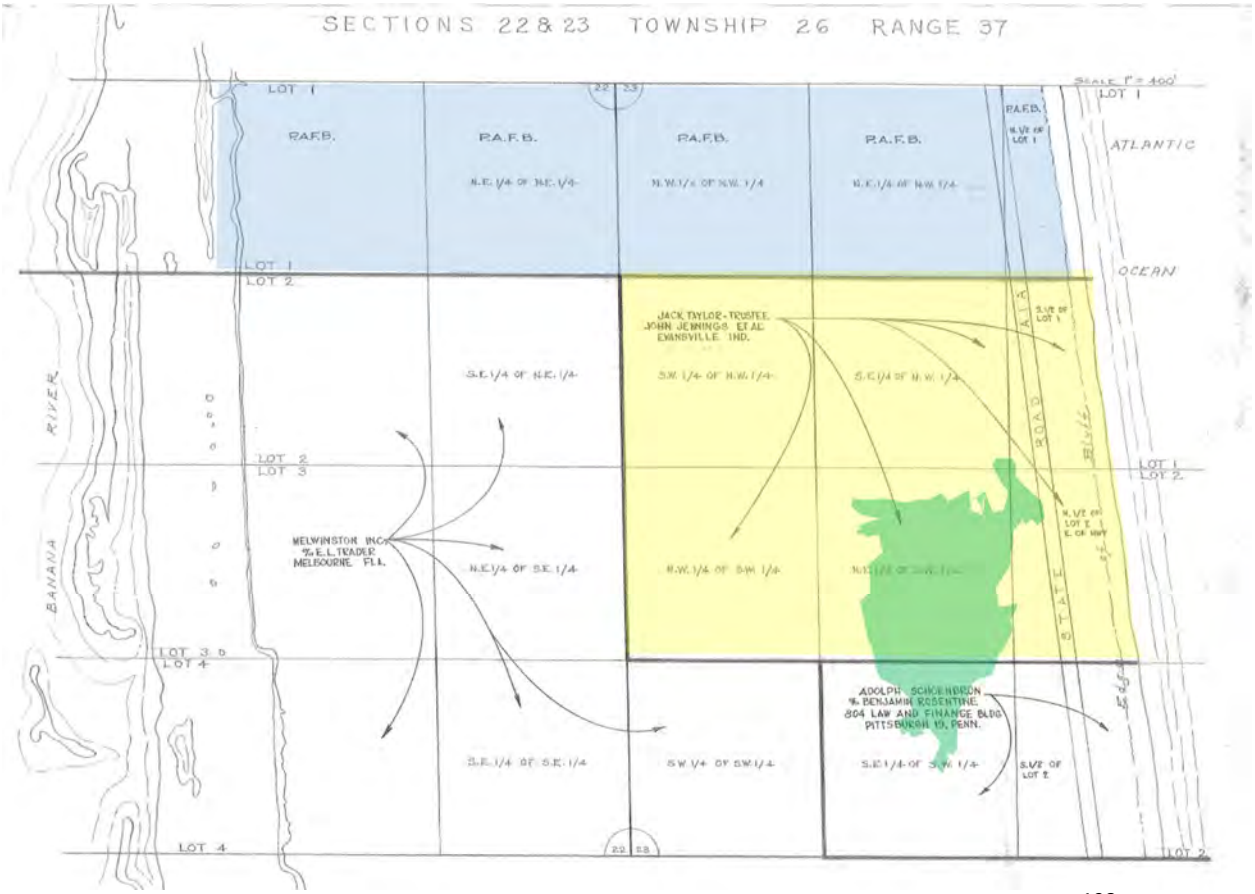

Figure 27 *– Plate Sheet Sections 22 and 23, T26, R37, circa 1956*[103]
Note: shading added for clarity: blue for Patrick AFB, yellow for John Taylor Trustee tract, and approximate FUDS boundary in green

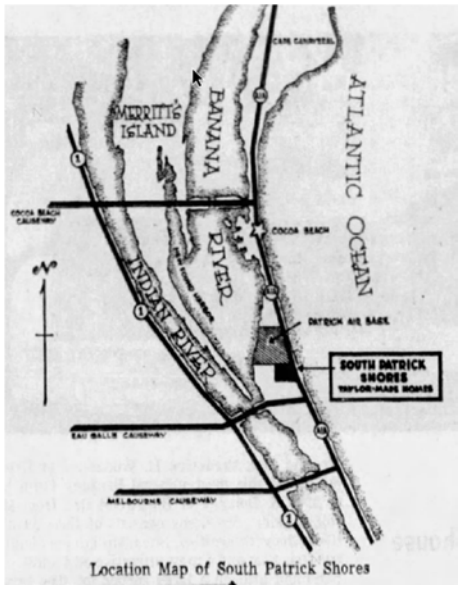

Figure 28 *– Location Map of South Patrick Shores. 22 January 1956*[104]

Figure 29 *– Advertisement for homes ½ mile south of Patrick AFB. 22 February 1956*[105]

Built-In Luxuries, Easy Terms

Regency Group Homes Open Today

BREVARD EDITION Sunday, April 20, 1958 1—B

Jack Taylor, president of Taylor Made Homes, Brevard County's first development, announced yesterday the grand opening today of the Regency Group, a new group of homes priced between $14,000 to $18,000 and featuring down payments for veterans starting with nothing down to $450 down.

SAID TAYLOR: "This group includes the finest, biggest, most luxurious homes ever built in Brevard County, yet we are able to offer to any veteran an $18,000 home for only $450 down, and monthly payments of $105. Unbelievable as it may seem, this is the most astounding value we have ever been able to offer."

He continued: "We have obtained mortages from banking sources that allow full unlimited mortages to missilemen enabling them to buy a Regency Group home with only $500 to $1,450 down including closing costs. . . which, incidently, are the same approximate mortgages available under the FHA plan for civilians."

HARRY FARBMAN, recently appointed sales manager, revealed that, included in the price of every home, are such things as G.E. built-in range and oven and dish washer, complete sprinkler system offered during the month of May, glass tub enclosures, sunken Florida rooms, fully painted interiors and exteriors, and stucco finished exteriors. Also built in area hood, kitchen fan and radio [a feature never seen in Brevard County], breakfast areas and — as Farbman opined — "a burst of features."

According to the blue prints, these new models go from 1552 square feet up to 1905 square feet and the price for these three bedroom homes range from $13,950 to $17,950.

Taylor voiced this opinion: "Our faith in the future of this country has never been greater. We feel that this new group of luxurious homes available under this new FHA and VA terms will not only sell most quickly, but will force other builders to start offering comparable values."

Crown Three bedrooms, two baths, 1,522 sq. ft., price is $14,950, with VA nothing down and monthly payments of $88; or FHA down of $650.

Tiara Three bedrooms, two baths, 1,777 sq. ft. price is $16,950, with VA down of $450 and monthly payments of $98; or FHA down of $1,150.

Coronet Three bedrooms, one and a half baths, 1,718 sq. ft., price is $15,500, with VA down of $325 and monthly payments of $93; or FHA down of $950.

Imperial Three bedrooms, two baths, 1,905 sq. ft., price is $17,950, with VA down of $450 and monthly payments of $105; or FHA down of $1,450.

Medallion Three bedrooms, two baths, 1,836 sq. ft., price is $17,500, with VA down of $350 and monthly payments of $102; or FHA down of $1,300.

Figure 30 *– Regency Group of Taylor Homes Grand Opening, 20 April 1958*[106]

Aerial images show developers constructed residential homes on the southern portion of NASBROBDA (i.e., SE ¼ of SW ¼ and S ½ of Lot 2 of Section 23, T26, R37, see *Figure 27*) between April 1958 and October 1961 (see Appendix O NASBROBDA HPA, pp. 45-50). Concurrently, the Air Force acquired 316.56 acres in 1957 for the South Military Family Housing area. Patrick AFB developed additional base housing (i.e., 550 buildings for 999 living units) in Section 26, about ½ mile south of NASBROBDA, completing them in February 1959.[107]

4.1.4 1991-1992 Environmental Investigations of South Patrick Shores

In mid-July 1991, FHRS began investigating the number of Hodgkin's lymphoma (Hodgkin's disease) cases (~10 between 1967 and 1988), a rare form of cancer, over a seven block area of South Patrick Shores. Two reported cases were from residents within the NASBROBDA footprint (see *Figure 31*). Residents and former residents reported finding military related debris in their yards (e.g. airplane fuselage, a mortar shell) and drinking the well water until the homes were connected to city water in 1958. At that time, those researching Navy and Air Force records did not locate any written evidence to suggest the military had previously owned or leased the property.[108]

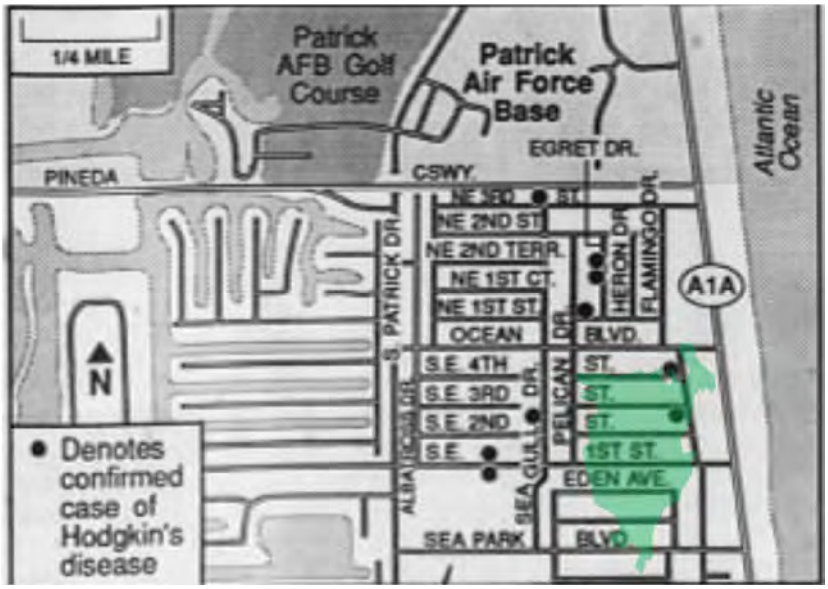

Figure 31 *– Florida Today – Cases of Hodgkin's disease in South Patrick Shores, 21 July 1991*[109]

Note: Approximate FUDS boundary in green added for clarity.

On 7- 8 August 1991, FHRS along with several federal agencies including ATSDR, EPA, USACE Jacksonville District, and Patrick AFB, participated in a public meeting and availability sessions.[110] As a result, several of those agencies and Florida Department of Environmental Regulation (FDER) completed investigations and reported their finding between October 1991 and April 1992 (see Section 2.2 for summaries of these investigations). USACE determined NASBROBDA was not eligible for the FUDS program; ATSDR found no apparent public health hazard, and EPA designated the site as No Further Remedial Action Planned (NFRAP). Even so, in subsequent years, health concerns lingered, as reported in the press and expressed by residents.[111]

4.2 MILITARY OPERATIONS

4.2.1 Summary of Munitions Activities

Although the former NASBR conducted military operations that included both storage and use of conventional ordnance as part of training areas, gunnery ranges, and storage facilities, there is no evidence that these activities occurred within the boundaries of the Navy's off-site solid waste disposal area. Residents within the Off-Base Disposal Area of South Patrick Shores have reported finding military munitions debris buried on their property (see Section 4.2.1.3), likely associated with the Navy's disposal activities. Historic records indicate the designated use of the Navy's off-site solid waste disposal area only included burning of *"destructible materials"* and burying *"non-inflammable materials",*[112] and not a munition open burn / open disposal site.

4.2.1.1 Summary of Chemical Warfare Activities

The investigation team did not locate any documentation or evidence relating to Chemical Warfare (CW) activities at NASBROBDA, including training, storage, or disposal of CW material at this property. Furthermore, the mission of NASBR does not imply the presence of toxic warfare gases or specifically Chemical Warfare Material (CWM) (see Appendix D for lengthier definition).

4.2.1.2 Certificates of Clearance

This investigation did not reveal any certificates of ordnance clearance, decontamination, or dedudding associated with NASBROBDA.

4.2.1.3 Explosive Ordnance Disposal (EOD) Incidents

Residents of South Patrick Shores have reported finding military munitions buried on their property, based on verbal accounts, EOD incident reports, and newspaper accounts. The most authoritative source for these incidents is the Explosive Ordnance Disposal Information Management System (EODIMS) Unexploded Ordnance (UXO) incident response. EODIMS is a joint database of military EOD reports, which the Air Force maintains. EODIMS includes response actions by the 45th Civil Engineer Squadron (45 CES) EOD unit at Patrick AFB. The database goes back as far as 1986, but the database is not comprehensive for all accounts, especially further back. For example, there is a five-year gap in incident reports from 1995 to 2000.[v] The public has referred to items as "mortars," but skilled munitions personnel have indicated the "mortars" appear to have been Mk 23 or Mk 43 miniature practice bombs, roughly similar in shape to a mortar. There were also reports of finding an M85, 100-pound practice bomb (concrete filled), an Mk 25 marine marker, and expended small arms casings. There are at least two accounts from residents of finding "live ammo" from belts of small arms. Many of these accounts were not corroborated from other sources.[113] The following are the most verifiable accounts available of items found within or contiguous to NASBROBDA.

As reported in *Florida Today*, a resident of SE First Street recalled finding a metal item with fins in a telephone line trench in a neighbor's yard while having a dirt clod fight when he was 9 years old in 1971. His father told him it was a "mortar."[114] Specific munition identification of this item is not possible.

In April 1988, the *Orlando Sentinel* reported that a man found a shell while cleaning out his father-in-law's garage on Heron Drive. Seven homes were evacuated, and a stretch of A1A was closed as the Army's 66th EOD responded, taking the item to a remote location of Patrick AFB to detonate.[115] It does not appear that the 45 CES EOD retained records of this incident, and the specific size and type of shell is unknown.

[v] EOD records retention guidance required keeping incident reports for only 2 years until fairly recently.

Furthermore, the newspaper account does not indicate if the homeowner found the shell buried on their property or if it was a "souvenir" from another source.

In May 2003, Brevard County Sherriff's Office responded to an incident in West Melbourne when an item was found in soil excavated from a backyard on Second Street in South Patrick Shores. The Sheriff's office speculated it was a "*1950s-era mortar.*"[116] From the photo accompanying the newspaper article, specific munition identification is not possible; however, the item more closely resembles a Mk 23 practice bomb than a mortar, which would be an aberration at a Navy facility (see ***Figure 32***). It does not appear that the 45 CES EOD responded to this incident.

Figure 32 *– Munition found in soil from a pool excavation on Second Street, May 2003*[117]

The 45th CES EOD unit responded on 24 September 2009 to St. Lucie County Sheriffs' Office Bomb Squad when it was reported that someone had dug up an old bomb at a property on Dorset Lane within the NASBROBDA boundaries. The county bomb squad performed an explosive test on the item, and it tested positive for TNT. The EOD team transported the item to the Cape Canaveral Air Force Station (CCAFS) Range and disposed of the item they identified as an Mk 25 marine marker (i.e., not a bomb).[118]

During excavation for a swimming pool in a yard on SE First Street, workers found a large, cylindrical object that reportedly weighed more than 100 pounds. On 26 September 2009, Patrick Air Base bomb squad identified the item as a "*harmless*" "training bomb."[119] The 45 CES EOD reported it as *"a practice concrete filled bomb"* and did not denote a spotting charge associated with it.[120]

***Figure 33** – Practice Concrete Bomb found on SE First Street, September 2009*[121]

On 30 September 2018, the 45th CES EOD unit identified an Mk 43 Mod 1 bomb (i.e., miniature practice bomb made of lead-antimony alloy) found in a yard on SE First Street within the boundaries of NASBROBDA (see *Figure 34*). The EOD unit determined the item was non-hazardous and removed the item for disposal.[122]

***Figure 34** – Mk 43 Miniature Practice Bomb found in yard on SE First Street, September 2018*[123]

Also in the fall of 2018, a resident on SE First Street posted a picture of expended cartridge cases (see *Figure 35*), and a resident on Dorset Lane posted on social media finding a "mortar" shell (see *Figure 36*). The former appear to be expended .50 caliber small arms casings, and the later item appears to be an Mk 23, 8¼ inch long, miniature practice bomb made of iron.

Figure 35 *– Expended small arms cartridge cases from a yard on SE First Street, September 2018*[124]

Figure 36 *– Mk 23 Miniature Practice Bomb found in yard on Dorsett Lane, circa September 2018*[125]

4.2.2 Operations Involving Hazardous Toxic Waste

The Navy used the FUDS for solid waste disposal operations for burning destructible materials and burying non-flammable materials. Review of the inventory of buildings and facilities of the former NASBR does not indicate that the Navy ever erected any buildings or facilities at this location.[126] Operations at the FUDS indicate the potential disposal of hazardous materials and a potential release of those substances into the environment. A general summary of the types of operations and activities the Navy conducted at the former solid waste disposal area and/or subsequent users that may have caused the release of hazardous substances, pollutants, or contaminants to the environment is discussed below.

4.2.2.1 Waste Disposal Areas / Landfills

None of the contemporary available site plans of NASBR, including the annual site plans showing conditions as of 30 June for 1942, 1943, 1944, 1945, 1946 and 1947, denote a landfill or salvage yard on base or off base (see *Figure 37* for an example from 1945 of NASBR southern boundary).[127] As noted in Section 2.2, Patrick AFB has done investigations that have identified a landfill location on the southeastern portion of the base in operation during the 1940s (i.e., LF-1/PLF-1/LF-23).

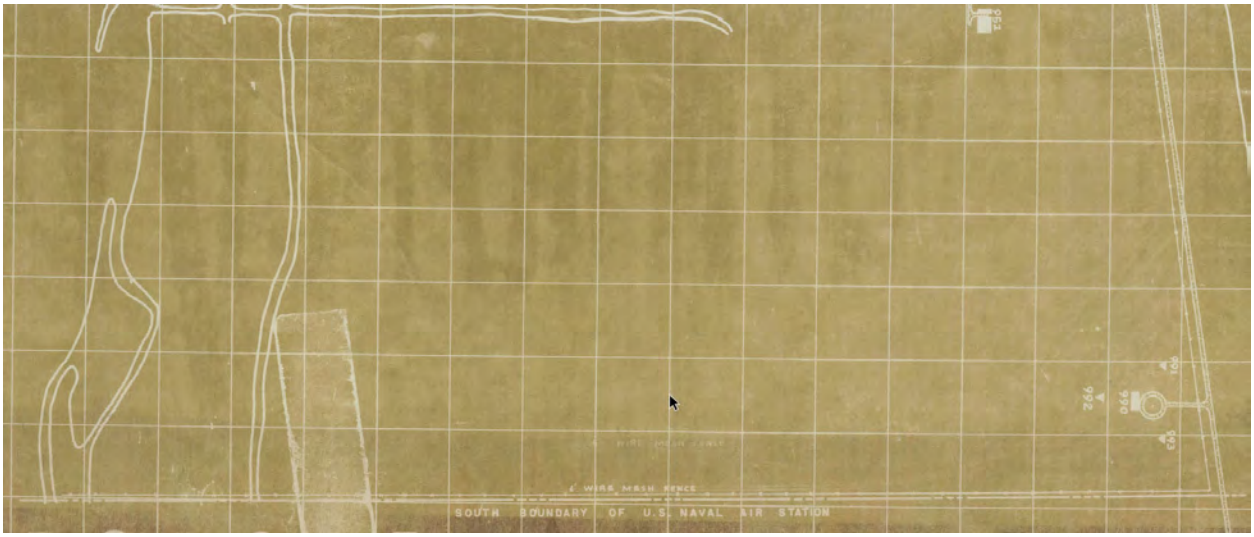

Figure 37 *– NASBR Southern Boundary, 30 June 1945*[128]
Note: "6' Wire Mesh Fence" along "South Boundary of U.S. Naval Air Station" and no other features except the radio tower cluster (i.e., buildings 990-992)

By 1952, Patrick AFB site plans denote the location of a salvage yard along the southern border of the installation with road access to the southern perimeter road (see *Figure 38*).

Figure 38 *– Patrick AFB Salvage Yard, 13 March September 1952*[129]

Review of aerial imagery indicates that operations of a salvage yard, or something else, began at this location between April and October 1945 (see Appendix O NASBROBDA HPA).

The NASBR off-site solid waste disposal operations occurred about half a mile south of the NASBR southern boundary (see ***Figure 39***). Section 4.1.2 discusses additional details regarding use and operation. The Navy used the FUDS for the disposal of "*wrecked planes, motors, flying jackets, lime, cement, tin cans and every kind of rubbish except lumber, which had been disposed of by fire*"[130] by 1942. The NASBR Public Works Department cleared and restored the area in 1947. The restoration *"process consisted of burning and burying all rubble, trash, etc. to a depth of 8-10 feet and covering it with 6 feet of soil. The surface was restored to a comparative level by bulldozing the eight acres more or less."*[131] During that clean up, "*junk wagons*" hauled "*considerable material"* from the area.[132]

Figure 39 *– Aerial Oblique looking east at solid waste disposal area, 13 March 1948*[133]

Aerial imagery shows additional but limited disposal or ground working activities at NASBROBDA in the early 1950s by undetermined agents that potentially increased the area of disposal material beyond the 25 acres noted in the FDE (see Appendix O NASBROBDA HPA, pp. 31 and 32).

Solid waste disposal during construction of the South Patrick Shores residential neighborhoods in the mid-to-late 1950s is uncertain. The 1991 INPR reported that a contractor involved with clearing the land prior to residential construction reported encountering large quantities of buried items including Jeeps, oil barrels, and unspecified fluids. Central Iron and Salvage Company of Orlando removed some of the buried debris. Reportedly, most of the materials were found in the first phase of the development, but aircraft parts were found during construction of Sea Park Elementary School.[134] The first phase of residential development shows the northern portion of NASBROBDA graded by July 1956 as various stages of construction is evident on several dozen homes. Construction of the southern portion of NASBROBDA occurred between April 1958 and October 1961 (see Appendix O NASBROBDA HPA). The residential developers that graded the land, installed roads and utilities, and constructed the homes found buried material.[135] This grading and earth moving may have shifted waste material beyond the NASBROBDA footprint discernable on aerial imagery from the time of military operations.

Initial homeowner solid waste disposal practices used on-site once residential housing occupies the former NASBROBDA varied house to house as mandatory residential solid waste (a.k.a. trash) collection did not occur until 1982, based on communications with the Brevard County Solid Waste Director[136]. Residents living in the area indicate that prior to mandatory solid waste collection, individuals disposed of waste by burning or burying it on site. According to conversations with residents, this method, along with

personally contracting for trash collection services, personally transporting material to other locations (dumps), or combinations of all these methods, appears likely to have occurred.[137]

In 1971, Brevard County Solid Waste Disposal System developed a map of the "Existing Disposal Sites and Collection Areas" of the county that depict an active landfill on Patrick AFB (feature 10) and a collection location on Satellite Beach associated with Gentilquore Sanitation Service (feature 8). It is not a landfill as would be denoted by a shaded polygon on the map (see *Figure 40*). The scale of the map is not detailed enough to determine a specific location, but it appears to be approximately two miles south of NASBROBDA.[138] As noted in Section 2, Patrick AFB has conducted analysis and investigations of landfills within the boundaries of that installation.

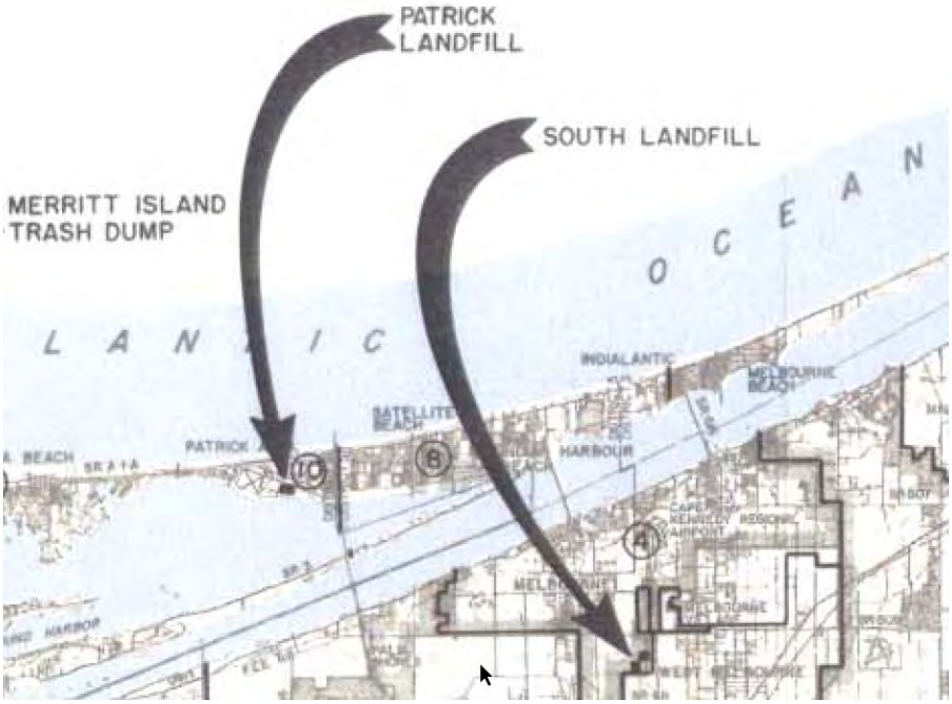

Figure 40 *– excerpt of Brevard County "Existing Disposal Sites and Collection Areas," 1971*[139]

The 1991 FDER Preliminary Assessment reported that items found by residents and one of the construction contractors included the following.

- 55-gallon drums
- paint cans
- *"Piper Cubs"* (i.e., small airplanes)
- stripped 4-engine bomber
- vehicles (e.g. Jeeps, military ambulances)
- spools of electrical wire
- airplane parts

- mess hall trays
- china (some with Navy insignias)
- automobile batteries
- crushed drums
- partially filled oil and hydraulic fluid drums
- miscellaneous automobile parts (wheel assembly, mufflers and clevis pins)
- ammunition ("*a mortar shell*" and practice bomb, discarded machine gun belt with ammunition)
- airplane parts (canopy and wing fragments, a horizontal tail stabilizer and fuselage) possible evidence of a buried fuel tank

In the recent decades, local homeowners have reported finding a variety of items that include "*munitions, NAS cutlery, a dog tag, a cockpit, bombs, and many other materials in their yards.*"[140] A resident also reported discovering plane parts and pieces, instrument panels, a practice bomb, munitions, radio equipment, and wires,[141] along with diesel cylinder heads and incinerated material.[142] Residents reported finding WWII .50 caliber bullets, an engine mount, large pieces of metal, an old icebox, glass, and construction material[143]. A resident reported finding part of an oil barrel with oil in the bung.[144] During the summer of 2019, Brevard County was in the process of installing gas lines in the neighborhood of NASBROBDA. A secondhand account claimed the construction personnel dug up .50 caliber bullets, a Coca-Cola bottle dated between 1937 to 1948, U.S. Navy cutlery and dishware, helicopter parts, and metal.[145] Contact with a representative from Florida City Gas indicted that crews have not found any *"military surplus items"* but did find some Coke bottles, beer cans, etc., but it was what they normally see.[146] A resident who described finding a buried 55-gallon drum in his yard, went on to clarify he only found the partial rusted remains. Interviews with a number of homeowners for this investigation indicates solid waste material exists beyond, but in proximity to the NASBROBDA footprint.

Local television news and social media in the fall of 2018 included a number of accounts of material dug up by local homeowners. Although cutlery, glass dishware, and bottles are recognizable, ferrous items found in the ground in 2018 are heavily corroded without a clear indication of their original shape and purpose (see ***Figure 41***).

Figure 41 *– Heavily corroded material found in a yard on SE First Street within NASBROBDA, September 2018*[147]

***Figure 42** – Heavily corroded material found in yard on Dorset Lane within NASBROBDA, 30 September 2019*

4.2.2.2 Sanitary Sewer and Treatment

No sanitary sewers or sewage treatment facilities are directly associated with the Navy's operations at the NASBROBDA. In March 1956, Taylor Made Homes and Sea Park Homes announced plans to build a $2 million sewer system and disposal plant, constructed in phases, in association with the housing developments at South Patrick Shores.[148] Historic aerial imagery shows construction of this treatment plant about a thousand feet west of NASBROBDA coincident with the residential housing development of South Patrick Shores (see Appendix O NASBROBDA HPA). Eventually this would become the Brevard County Utilities South Beaches Waste Water Treatment Plant (WWTP) and sewage lagoon. Brevard County planned on closing the WWTP in 1982 and by 1993 converted much of it into soccer fields while retaining a portion for storm water retention.[149]

4.2.2.3 Water Supply

No water supply is associated with the Navy's operations at NASBROBDA. In early 1956 as homebuilders (i.e., Taylor Made Homes and Sea Park Homes) developed the area, there was no municipal water line to South Patrick Shores, though the developers were in negotiations with the cities of Melbourne and Cocoa to extend the water lines there. In the interim*, "an area has been set aside for shallow wells from which water will be pumped to a treatment plant for purification before being pumped to houses."*[150] Advertising in 1956 for the homes described them as having *"Free Sprinkling System with Well and Pump"* for irrigation of the lawns and gardens.[151]

By July 1958, the South Patrick Shores development finally had "*city water"* provided by the city of Melbourne. That November, Melbourne disconnected a number of homeowners from city water until they removed their connection to their private water well supplies. Their failure to disconnect from the private wells caused intrusion of the private well water into the municipal lines. The State Board of Health sanitary engineer *"found rust and oil had crept into the public lines from these wells."*[152]

According to interviews with numerous homeowners, most homes retained use of the shallow domestic water wells for lawn, fruit trees, and garden irrigation following connection to the Melbourne water supply, and many remain in use currently.

4.2.2.4 Storm Water Drainage

No man made ditches or storm drains existed during the Navy's operations at the NASBROBDA, and the area drainage followed the natural sand dunes (see Appendix O NASBROBDA HPA). There are currently curbs along many, but not all, of the roadways through NASBROBDA that hold the surface drainage off the road crest. There are limited storm water drain grates to catch and drain excess water.

4.3 MAP ANALYSIS

The investigation team located a few maps depicting the boundary of a de-vegetated area at the former disposal area in NASBROBDA but did not find specific layout plans nor maps depicting the area as a Navy disposal area. The relevant information from the maps is discussed elsewhere in this PA.

4.4 AERIAL PHOTOGRAPHIC INTERPRETATION

The U.S. Army Geospatial Center (AGC), Warfighter Geospatial Support & Production Directorate, Hydrologic & Environmental Analysis Branch (CEAGC-TO-H) provided a Historical Photographic Analysis (HPA) of NASBROBDA completed in conjunction with this PA effort and included as Appendix O.

AGC is a major subordinate command center under the Army Corps of Engineers organized on 1 October 2009 to support the Army's LandWarNet/Battle Command concepts, capabilities, and systems. Their mission is to provide timely, accurate, and relevant geospatial information, capabilities and domain expertise for Army Geospatial Enterprise implementation in support of unified land operations. Their Hydrologic & Environmental Analysis Branch has long supported the FUDS program, previously as the former US Army Corps of Engineers, Engineer Research and Development Center Topographic Engineering Center (ERDC-TEC).

According to AGC's analysis, the impacted area may be larger than the 25 acres noted in the FDE (see **Figure 43** – FUDS Property Number I04FL0027, NASBROBDA Appendix O NASBROBDA HPA, pp. 59).

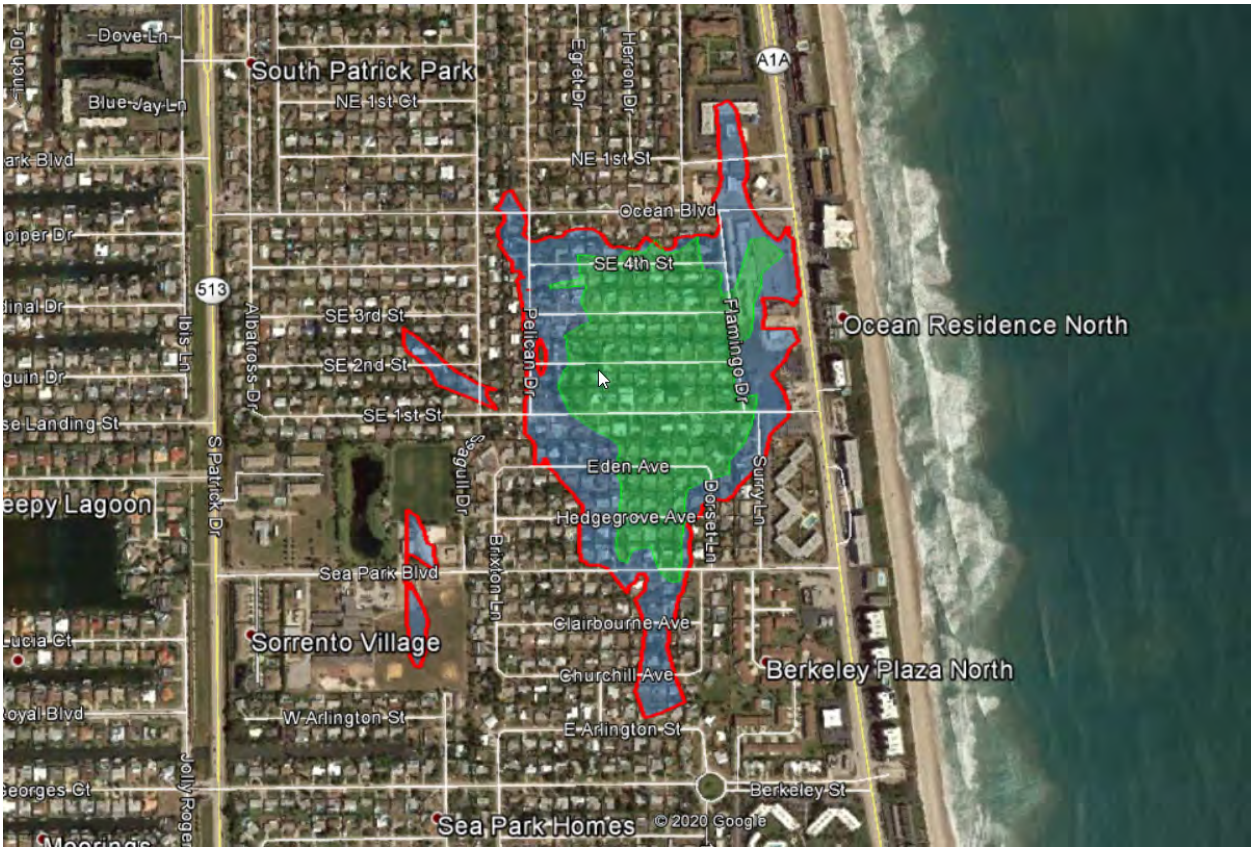

Figure 43 *– FUDS Property Number I04FL0027, NASBROBDA*

Legend

FDE Approved FUDS Property NASBROBDA (approximately 25 acres)

Extent of disposal activities 1943-47 (approximately 52 acres)

5 EVALUATION OF MILITARY MUNITIONS PRESENCE

5.1 GENERAL EVALUATION OF THE PRESENCE OF MUNITIONS AND EXPLOSIVES OF CONCERN

5.1.1 Evaluation of Munitions and Explosives of Concern Presence

The Navy's use of the land as an off-site solid waste disposal area for the burning of *"destructible materials"* and burying *"non-inflammable materials"*[153] does not imply MEC presence, and there is no definitive evidence of MEC at the NASBROBDA FUDS. However, EOD incident reports, news accounts, and verbal recollections over the last five decades reveal that residents of South Patrick Shores have reported finding possible military munitions on their property (see Section 4.2.1.3). Most of the items seem to be munitions debris (MD). There are at least two accounts of residents finding small arms ammunition.

In the fall of 2018, residents dug up an Mk 23 and an Mk 43 miniature practice bomb (one each). There have been at least two earlier accounts in 1971 and in 2003 of items the public described as "mortars." It is more likely the items were miniature practice bombs that have a similar shape as a mortar. This conclusion is based on photographs of the 2003 item (see *Figure 32*) and that mortars are not standard munitions for the Navy. During construction of a pool in 2009, a resident located a concrete M85, 100-pound practice bomb. Other residents have found expended small arms casings, and there are at least two accounts of small arms ammunition.

During World War II, the Navy used miniature practice bombs and 100-pound practice bombs, for low altitude horizontal or dive bombing practice, though there is no evidence to indicate NASBROBDA was used as an air-to-ground or bombing target. Miniature practice bombs used the AN-Mk 4 practice bomb signal that consisted of a blank 10-gauge shotgun shell that contained a black powder expelling charge and a red phosphorous pyrotechnic mixture (see Appendix F-1). The item found in November 2018 appears to consist of only the inert Mk 43 body (see *Figure 34*) and did not include the signal charge (i.e., MD). It is unclear if the other practice items found had spotting charges present, so confirmation of an MD assessment for all of them is not possible. The M85 100-pound practice bomb (see Appendix F-2) can have a spotting charge that may contain 3 pounds of black powder (see Appendix F-3), but the EOD report did report one as being present.

In September 2009, a person found an Mk 25 marine marker. While the county bomb squad identified it as containing TNT, it appears that explosives test result is a false positive. The Mk 25 marine marker (or flare) is a pyrotechnic smoke-producing device dropped from aircraft to mark a location in the water and contains red phosphorus but no TNT (see Appendix F-4). The 45th CES EOD unit records indicate that marine markers are relatively commonly found washed onshore,[154] and it is unlikely an Mk 25 would be misidentified as a munition that did contain TNT. As the Mk 25 was fielded more than a decade after WWII, it is an anachronism for that period and considered an

anomaly associated with marking operations in the nearby Atlantic Ocean and not part of the NASBROBDA operations.

5.1.2 Munitions Technical Data

The investigation team compiled the following list of military munitions associated with EOD incidents at NASBROBDA. Technical data, including munitions constituents, of the following military munitions are provided in Appendix F-Ordnance Technical Data Sheets**.**

Page Number	Ordnance Technical Data Sheets
F-1	Miniature Practice Bombs, AN-Mk 5 Mod 1, AN-Mk 23, AN-Mk 43
F-2	Practice Bomb, 100 pound, M85
F-3	Spotting charges, M1A1, M3 M5 for M38A2 Practice Bomb
F-4	Marker, Location, Marine, Mk 25

5.2 GENERAL EVALUATION OF CHEMICAL WARFARE MATERIEL (CWM) PRESENCE

The PA investigation uncovered no evidence of CWM storage, usage, or disposal at NASBROBDA. The mission of NASBR or NASBROBDA does not indicate that CWM would have been present, and the research team discovered no historical records associating CWM with the property.

5.3 GENERAL EVALUATION OF MUNITIONS CONSTITUENTS PRESENCE

The Ordnance Technical Data Sheets listed in Section 5.1.2 and included in Appendix F provide information regarding the munitions constituents (MC) on the items identified at the NASBROBDA FUDS. There is no evidence of MEC within NASBROBDA and based on the limited amount of MD found to date, there is no reason to suspect that a MC risk is present.

5.4 PROPERTY-SPECIFIC LOCATIONS

Analysis of the information gathered during the PA investigation did not identify any other non-range munition-related facilities or sites, such as a gas chamber, ordnance storage area, or indoor range at NASBROBDA.

6 EVALUATION OF HAZARDOUS, TOXIC, RADIOLOGICAL WASTE PRESENCE

Operations and activities conducted at the NASBROBDA FUDS may have caused the release of hazardous substances, pollutants, or contaminants to the environment. Historic records indicate that the Navy's off-site solid disposal area included burning *"destructible materials,"* burying *"non-flammable materials,"* and "*literally anything and everything had been dumped in the area*."[155] Details of potential HTRW related to military operations on the FUDS are discussed in Sections 4.1.2 and 4.2.2.1.

6.1 PROPERTY SPECIFIC LOCATIONS

This investigation uncovered documentation related to the Navy's disposal of materials by burning or burying them at an off-site location approximately a half a mile south of the former NASBR (i.e., current Patrick AFB). Analysis of the recovered documentation indicates that the Navy operated the solid waste disposal operations from approximately 1942 through 1947, based on a verbal agreement and one written letter from the real estate agent representing the landowner (see Sections 4.1.2 and 4.2.2.1). Aerial photographic interpretation of historic imagery revealed the apparent maximum extent of ground disturbances at NASBROBDA resulting from NASBR operations is likely greater than the 25 acres noted in the FDE. Operation of the disposal area is discussed in Section 4.2.2.1. After the termination of the Navy's operations at the FUDS, in the early 1950s limited disposal or ground working activities at NASBROBDA by undetermined agents is discernable, potentially increasing the area of disposal material. Residential housing construction occurred on the NASBROBDA FUDS between 1956 and 1961. Interviews with a number of residents indicate solid waste material exists beyond, but in proximity to the NASBROBDA footprint. Earth moving and grading for roads, utilities, and home construction found buried material, and that may have dispersed waste material beyond the NASBROBDA footprint discernable on aerial imagery from the time of military operations. These residential homes remain, and the future land use is expected to remain the same.

Although there is subsurface waste present at NASBROBDA, it is not at hazardous or toxic levels, based on sampling completed by agencies. The samples EPA and the State of Florida collected in 1991 (see Section 2.2.5 and Section 2.2.3) revealed contaminants in groundwater from one shallow temporary well at levels that would pose a risk to human health if used as a potable water supply. Since the well water was not used for drinking water, EPA designated the site as No Further Remedial Action Planned (NFRAP).

In 2018 and 2019, EPA conducted a Removal Site Evaluation (RSE) at 165 Dorset Lane (see Section 2.2.8). In November 2018, FDEP screened the yard and home for VOCs using a four-gas meter; FDEP did not detect elevated VOCs except for a half-pint container reportedly dug up in the yard. The EPAs RSE soil sampling in February in 2019 and soil-gas sampling in June found no exceedances of the Removal Management Levels (RML). Arsenic and chromium were detected above the Regional

Screening Levels, but the concentrations were consistent with background levels found in urban Florida. The soil-gas sampling in June 2019 had two exceedances of Vapor Intrusion Screening Levels (VISL), but EPA personnel determined they related to landowner activities, and no human health risks were present. Screening for VOCs during both 2019 sampling events with a four-gas meter in the field resulted in no detects. The EPA recommended no further action for this RSE.

7 EVALUATION OF CON/HTRW AND BD/DR PRESENCE

7.1 EVALUATION OF CON/HTRW PRESENCE

Based on the findings of this assessment, there is not a Containerized/Hazardous, Toxic and Radiological Waste (CON/HTRW) potential on the NASBROBDA FUDS related to the military's previous use of the property. Historical documents did not indicate that the Navy placed above ground storage tanks (AST) or underground storage tanks (UST) for petroleum, oils, and lubricants (POL) on the FUDS.

The photographic interpretation of the 1954 aerial imagery indicates the presence of *"approximately 14 possible drums"*[156] at the FUDS, and there are a number of credible accounts of residents finding 55-gallon drums, or at least the remains of them, on site. While this indicates the potential of thin-walled, ferrous vessels being disposed of on site, the high corrosion levels noted in 2018 and 2019 and verbal accounts of only portions of rusted 55-gallon drums being found (see Section 4.2.2.1), indicate that no thin-walled ferrous containers, such as a 55-gallon drum, would remain intact to hold containerized waste. Therefore, no FUDS action is recommended related to CON/HTRW.

7.2 EVALUATION OF BD/DR PRESENCE

There is no evidence that the Navy erected any type of structures or buildings at NASBROBDA. In addition, the entire footprint of the FUDS has been developed into a residential housing; therefore, no action related to BD/DR is necessary.

8 PATHWAY AND ENVIRONMENTAL HAZARD ANALYSIS

HTRW resulting from disposal of military debris associated with the operations of the former NASBR could potentially result in contamination of groundwater and soil at NASBROBDA.

8.1 GROUNDWATER PATHWAY

8.1.1 Hydrogeological Setting

The local stratigraphy of NASBROBDA (see Section 3.4.6) is characterized by undifferentiated marine sands of Holocene to Pleistocene age, discontinuous coquinoid limestone, sand and shell of the Anastasia formation, sandy shell marl, fine sand and silty shell of the Caloosahatchee Marl formation, limestone of the Tamiami formation, sandy marl and thin beds of sandy limestone of the Hawthorn formation; Ocala limestone of the Eocene-age, and alternating limestone and dolomite beds of the Avon Park Limestone. An unconfined surficial aquifer occupies the uppermost stratum of Pleistocene to Holocene sands and shell, the coquina conglomerates of the Anastasia formation, and the upper sands of the Caloosahatchee Marl formation.

The Screening Site Inspection report for NASBROBDA found approximately four potable surficial aquifer or shallow wells within one-fourth of a mile of the former solid waste disposal. The nearest of the four wells is within 200 to 300 feet of the former solid waste disposal area. Several shallow irrigation wells are also located throughout NASBROBDA. The only potable Floridian aquifer wells identified within a four-mile radius of the site are four standby wells situated approximately three miles north of the site, on Patrick AFB. The primary sources of drinking water at the base are the Cocoa and Melbourne Municipal Water Systems. The latter system also supplies drinking water to the coastal communities of South Patrick Shores, Satellite Beach, Indian Harbor Beach, and Eastern Melbourne.[157]

The U.S. EPA's Safe Drinking Water Information System (SDWIS) indicates that there are multiple groundwater drinking wells within a 20-mile radius of NASBROBDA. There are three types of groundwater systems: the Community Water Systems, which serve the same people all year-round, the Non-Transient Non-Community, which serve the same people, but not year-round (e.g. schools that have their own water system); and the Transient Non-Community, which do not consistently serve the same people (e.g. rest stops, campgrounds, and gas stations).

NASBROBDA is located south of the surface water system located at Patrick AFB, which serves a population of 7,500 people. Additionally, a surface water system situated in the City of Melbourne serves a population of 165,940, including residents of the NASBROBDA FUDS.[158] The U.S. Geologic Survey (USGS), National Water Information System (NWIS) indicates that there are several USGS observation and monitoring wells within a 5-mile radius of the FUDS; however, all of the former supply wells near the property are inactive.

This assessment did not identify any private groundwater wells within 5 miles of the property (i.e., ones not included in the SDWIS or the NWIS). Although the SDWIS contains drinking water information for populations as few as 1, the Safe Drinking Water Act that is the impetus for the database applies to drinking water supplies serving populations of 25 or greater.

8.1.2 Groundwater Receptors

Since 1958, residences in South Patrick Shores receive water from the city of Melbourne's municipal water supply. Reportedly, most homes retained use of the shallow domestic water wells for irrigation which continue to be used.

Ecological receptors may come in contact with groundwater that is released to surface water (e.g. wetlands and permanent surface water features) or by plant uptake of shallow groundwater.

8.1.2.1 Analytical Results Summary (1991-1992)

On 13-14 August 1991, the Florida Department of Health and Rehabilitative Services (FDHRS) collected water samples from 2 deep and 10 shallow, existing irrigation wells operated by subdivision residents. Testing revealed the presence of atrazine, a widely used household herbicide first commercially sold in 1958, in three of the wells. The testing indicated the highest concentration of atrazine to be about twice the safe level for lifetime exposure in drinking water. However, personnel concluded that the use of this water for irrigation or air conditioning did not pose any health risk. The FDHRS determined that the results from the 12 wells in South Patrick Shores did not indicate the presence of any contaminants that could be hazardous to human health.[159]

During the EPA's field investigation conducted the week of 18 November 1991, organic contaminants were not detected at the private wells and the temporary well installed at the Sea Park Elementary School. Hazardous levels of Polynuclear Aromatic Hydrocarbons (PAHs) were detected in temporary well TW-12. Laboratory results for well TW-12 also revealed concentrations of lead at 30 ppb and aluminum at 620 ppm. Well TW-12 exhibited elevated levels for several of the parameters analyzed when compared to the other wells sampled.[160]

8.1.3 Groundwater Conclusions

The disposal of military debris at NASBROBDA could potentially result in contamination of the groundwater given the relatively shallow depth to the aquifer at NASBROBDA. Additionally, as previous investigations mentioned, the primary direction of surficial groundwater migration is westward. Hence, the groundwater migration of potential contaminants could affect areas to the west of NASBROBDA. Previous investigations revealed concentrations of PAHs, lead, and aluminum in temporary groundwater wells that could pose a risk to human health if used as a potable water supply. However, since groundwater supply wells are not in use for drinking water, this pathway is not complete.

8.2 SURFACE WATER PATHWAY

8.2.1 Hydrologic Setting

The major surface water resources at NASBROBDA are the Atlantic Ocean within 450 feet east of portions of the site and the Banana River about a mile to the west of NASBROBDA. There are also a series of interconnected canals and lagoons discharging to the Banana River, about a half mile to the west in the residential communities west of South Patrick Drive.

The South Patrick Shores and NASBROBDA area is very flat, however topographic maps from the 1940s indicate that the Banana River was slightly down gradient to NASBROBDA. Another major surface water resource is the Indian River, about two miles due west of the Banana River. The Indian River is about 4.5 miles south of the FUDS. Banana River is part of the Indian River Lagoon, which connects to the Atlantic Ocean about 77 miles further south. A FEMA flood insurance rate map of South Patrick Shores indicates that some portions near the property are under the 100-year flood zone. Zones identified included AE[vi] and VE[vii] along the shores of the property.

NASBROBDA and the surrounding area is very flat, and rainfall is generally absorbed into the sandy ground or evaporates. There are currently curbs along many, but not all, of the roadways through NASBROBDA that hold surface drainage off the road crest. There are limited stormwater drain grates to catch and drain excess water on the roadways. A stormwater pond is present approximately 1,000 feet west of NASBROBDA, which formerly served as the sewage lagoon beginning in 1956 for the Brevard County Utilities South Beaches Waste Water Treatment Plant (WWTP).

EPA's SDWIS Drinking Water Mapping Application (DWMA) indicates that there are 2 surface drinking water intakes within 20 miles of the property, both west of the Indian River on the mainland of Florida. About 9 miles to the southwest of the property, there is a surface water supply, City of Melbourne, which supplies water for 162,434 people.

[vi] Zone AE: Base Flood Elevations determined
[vii] Zone VE: Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined

Lastly, approximately 15 miles to the northwest of the FUDS is the City of Cocoa surface water system, serving a population of 294,039.[161]

8.2.2 Surface Water Receptors

The nearest surface drinking water intake supplying water to NASBROBDA is the City of Melbourne's John A. Buckley Surface Water Treatment Plant, pumped from Lake Washington nine miles away.[162] As it is on the other side of the Banana and Indian Rivers, surface water runoff from NASBROBDA would not reach the lake.

The Indian River Lagoon is 156 miles long and makes up 40 percent of Florida's eastern coast. The lagoon is home to various species of plants and animals that depend on its water quality for their existence. Humans are also dependent on the lagoon for the many recreational and commercial opportunities that it provides.[163] Since the primary direction of groundwater migration at the FUDS is westward, there is a potential release of the groundwater to surface water.

The USFWS Wetland Inventory maps indicate that there are wetlands located in the vicinity of the FUDS and along the surface water migration path from this property. One wetland is the stormwater pond, encompassing approximately 1.56 acres, situated approximately 1,000 feet west of NASBROBDA and north of Sea Park Elementary School. The pond is a part of the Palustrine System, which includes all non-tidal wetlands dominated by trees, shrubs, persistent emergents, and emergent mosses or lichens. Other wetlands are the canals and lagoons, comprising approximately 209.28 acres, among the residential housing about one-half mile west of the FUDS. This wetland is part of the Estuarine System and consists of deep-water tidal habitats and adjacent tidal wetlands that are typically semi-enclosed by land but have sporadic access to the Indian River Lagoon. These wetlands could be considered a primary target.[164]

Potentially complete human exposure pathways are ingestion of surface water and dermal contact with water and sediment. Ecological receptors include plants, terrestrial organisms utilizing surface water as a drinking water source, and aquatic organisms living in the surface water and sediment.

8.2.3 Surface Water Conclusions

While the Navy operated NASBROBDA as a burn and solid waste disposal area, surface water could have potentially come into contact with this material, and surface water contamination may have occurred seven decades ago. However, following burial of the material and redevelopment of the area, there is limited to negligible potential for surface water to contact any potential contamination, except as migration through groundwater westward toward the residential canals about a half mile away or the Banana River a mile away. Therefore, the pathway for surface water is not complete.

8.3 SOIL EXPOSURE AND AIR PATHWAYS

8.3.1 Physical Conditions

NASBROBDA has been developed for a mixture of uses including single family residential housing and commercial buildings. Records reviewed indicate the current parcels in the vicinity include numerous private residences, places of worship, supermarkets, stores, and restaurants. The primary vegetation types of NASBROBDA include saw palmetto, scrub live oak, runner oak, cactus, and sea grape. The general topography of South Patrick Shores can be described as a barrier island encompassing flat, sandy lands adjacent to the ocean. Originally, the topography gently sloped westward from coastal dunes along the Atlantic Ocean toward the Banana River but is essentially flat now.

The public has unrestricted access to NASBROBDA, and there are no barriers or security systems barring access to the property. The active installation of Patrick AFB, formerly known as NASBR, is located approximately half a mile north of the FUDS.

8.3.2 Soil and Air Receptors

There is human and ecological exposure to soil (surface and subsurface) through dermal contact or by ingestion. If soils are disturbed, exposure may also occur through dust inhalation. The human receptors considered include residents, visitors, and construction workers. Ecological receptors (plants and animals) are also considered given the viable habitat that exists near and within the FUDS boundaries.

8.3.3 Soil Exposure and Air Pathway Conclusions

During the field investigation conducted during the week of 18 November 1991, EPA collected 32 surface and subsurface soil samples from 16 locations in the residential area of South Patrick Shores. A team collected surface soil samples at a depth of 0 to 6 inches below land surface (bls) and subsurface soil samples at a depth of 18 to 24 inches bls. The EPA team also collected 13 groundwater samples at most of the residences where soil sampling had occurred. The soil samples contained low levels of organic contaminants. Sample area SPS-12 differentiated from the other areas as it had levels of Polynuclear Aromatic Hydrocarbons (PAHs) at concentrations of 12-25 ppm. However, according to the ATSDR Toxicological Profile on PAHs, these levels are consistent with background levels seen in urban areas.[165] This sampling data indicates the exposure pathway is incomplete.

When the Navy deposited debris at NASBROBDA from 1942 to 1947, they potentially released substances into the atmosphere, which would have been detectable at the time; however, that material has long since dispersed, and there is not a recent suspected release to the air. There is no evidence at this time to indicate a complete exposure pathway to the air from material associated with the Navy's disposal activities.

Direct contact of military debris remaining in surface soil by persons residing on site is possible. Although the potential exposure is lessened by the development of the property with homes, roads and lawns, a potentially complete exposure pathway remains possible.

Using LandView6 Census 2000 Population Estimator[166], the populations within various radii and rings around the approximate center of the NASBROBDA (N28º 12' 22", W80º 35' 58") are included in **Table 8.3.3** below.

Table 8.3.3 – Total Population on or Within[167]

Radius from center	Population within a Radius	Ring Radii	Population within a Ring
¼ Mile	779	0 – ¼ Mile	779
½ Mile	2,614	> ¼ - ½ Mile	1,835
1 Mile	6,160	> ½ - 1 Mile	3,546
2 Miles	10,675	> 1 – 2 Miles	4,515
3 Miles	16,960	> 2 – 3 Miles	6,285
4 Miles	24,602	> 3 – 4 Miles	7,642

9 SUMMARY AND CONCLUSIONS

9.1 AREAS THAT MAY WARRANT NO FURTHER ACTION BY DOD

The boundaries of NASBROBDA FUDS resulted from a determination of the extent of the Navy's waste disposal operation on site. Therefore, there are no areas of the FUDS property that may not warrant further action by DoD.

9.2 POTENTIAL HAZARDS THAT MAY WARRANT FUDS PROJECTS

9.2.1 HTRW

Sampling conducted in 1991 and 1992 identified limited HTRW, but ATSDR found no apparent public health hazard as a result, and EPA designated the site as No Further Remedial Action Planned (NFRAP). Even so, there is a HTRW potential at the NASBROBDA, resulting from the Navy's disposal by burning and burying military debris at the site. On the basis of the information in this Preliminary Assessment, further CERCLA investigation on the identified potential HTRW hazard by the Jacksonville District is warranted.

9.2.2 MMRP

There is no definitive evidence of MEC within the boundaries of the NASBROBDA FUDS; however, there are clear cases of MD within and/or near the NASBROBDA boundary and at least two accounts of small arms ammunition. The MD is associated with Mk 23 and Mk 43 miniature practice bombs. There was also MD from a concrete M85, 100-pound practice bomb. The September 2009 find of a Mk 25 marine marker, is an anachronism for the WWII time frame and considered an anomaly associated with naval marking operations in the nearby Atlantic Ocean and not part of the NASBROBDA operations.

NASBROBDA's use for solid waste disposal, probably included MD, but there is no clear, identifiable risk or remediation project associated with MEC or CWM. On the basis of the information in this Preliminary Assessment, further investigation by the Jacksonville District on MMRP is not warranted.

9.2.3 Potential Responsible Party (PRP)/HTRW Considerations

Historic aerial photographic analysis indicates that additional activities, potential including disposal activities, may have occurred on site in the early 1950s following the Navy's "restoration" of the site in 1948. It is unknown if those activities occurred with the approval and knowledge of the property owner at the time or occurred surreptitiously. There is no evidence that Patrick AFB or the military participated at that point. The residential developers that graded the land, installed roads and utilities, and constructed the homes found buried material and appear to have further dispersed it while grading the development tracts. The subsequent homeowners did not have

mandatory solid waste collection until 1982, and there are accounts of burning and burying of residential wastes on site before that time. It is unknown if these activities may have contributed to potential contamination at NASBROBDA. Previous investigations and interviews with homeowners indicate buried solid waste material exists beyond, but in proximity to the NASBROBDA footprint.

9.2.4 PRP/MMRP Considerations

This assessment did not identify any previous or subsequent use of the property relating to munitions or explosives; therefore, there are no PRP considerations regarding MMRP at the NASBROBDA.

9.2.5 CON/HTRW

There are credible accounts of residents finding 55-gallon drums, or at least the remains of them, on site. High corrosion levels noted on material uncovered in 2018 and 2019 indicates minimal potential of thin walled ferrous vessels, such as 55-gallon drums, remaining intact. On the basis of the information in this Preliminary Assessment, further investigation by the Jacksonville District on CON/HTRW is not warranted.

9.2.6 BD/DR

This assessment did not identify any unsafe structures or debris remaining from the military's previous use of NASBROBDA. On the basis of the information in this Preliminary Assessment, further investigation by the Jacksonville District on BD/DR is not warranted.

APPENDIX A

REFERENCE SOURCES AND RECORDS REVIEWED

APPENDIX A

A REFERENCE SOURCES AND RECORDS REVIEWED

The research team searched at the following locations for records relating to munitions, chemical warfare, and HTRW activities at the NASBROBDA. At these repositories, the research team used finding aids and records managers to assist in locating documents relevant to the research topic. The investigation team also accumulated complementary documents reviewed on the NASBROBDA, but not specifically used. These complementary documents are stored with the original PA back-up documents. Appendix B contains the References of all in text endnote citations. All back-up references gathered for this investigation whether directly cited in this report or not have been digitized and are available with the digital files. The following subparagraphs described the research team's efforts at the noted archival repositories:

A.1 TEXTUAL AND CARTOGRAPHIC REPOSITORIES

The following repositories were consulted primarily for textual and cartographic information regarding the NASBROBDA.

A.1.1 Air Force Historical Research Agency (AFHRA)

600 Chennault Circle
Maxwell AFB, AL 36112-6424
334-953-5834, Front desk
Tammy Horton
334-953-2960
Archie Difante
334-953-2447
http://airforcehistoryindex.org/

The research team used the online research search engine to identify potentially relevant material for review based on the following key words: NASBROBDA and Patrick AFB. As a result they requested and reviewed the following material.

- Reel M2344
- Reel M2345

The two reels of microfilm included unit histories for January 1951 through December 1952. The histories do not mention the Air Force contributing to the landfill at NASBROBDA.

A.1.2 Brevard County Government
2725 Judge Fran Jamieson Way
Viera, FL 32940
Virginia Barker, Director Natural Resources Management
321-633-2016
Euripides Rodriguez, Director of Solid Waste Management
321-633-2042
https://www.brevardfl.gov/Government

The research team contacted the Natural Resources Management office for assistance in locating information regarding drinking water, well water, storm water and sewage water systems in the area and how they changed over time, along with solid waste disposal practices.

The Brevard County Director of Solid Waste Management stated that mandatory collection of solid wastes started in 1982 and provided the team with a map of the landfills within Brevard County from 1971. In the vicinity of the subject FUDS and Satellite Beach, there appears to be a collection location (feature 8) noted as Gentilquore Sanitation Service but the map wasn't detailed enough to determine a specific location. The County reported not having any transfer stations at that time and that site did not belong to Solid Waste Management department.

A.1.3 Critical Past LLC
12100 Sunrise Valley Drive
Box E-230-16
Reston, VA 20191
800-249-4430 / 302-724-4153
http://www.criticalpast.com/

The research team used the online research search engine to identify potentially relevant films and photo images that this company has gathered royalty-free from various sources including the National Archives. The search engine did not identify any relevant materials on subject site.

A.1.4 Defense Environment, Safety and Occupational Health Network and Information Exchange (DENIX)
http://www.denix.osd.mil/

The DENIX website, hosted by the DoD Environment, Safety and Occupational Health (ESOH), includes working group libraries to share information, including the Recovered Chemical Warfare Material (RCWM) library. The RCWM Program addresses munitions with an unknown fill and Chemical Warfare Material (CWM) that are not addressed (demilitarized) as part of DOD's CWM stockpile. The RCWM Program oversight has been delegated to the Assistant Secretary of the Army (ASA -IE&E).

The research team queried the database for the following key words: Banana, Joint Long Range Proving Ground and Patrick. The team did not find any relevant material showing a connection to NASBR, JLRPG, Patrick AFB or NASB OBDA having a chemical warfare material connection.

A.1.5 Defense Technical Information Center (DTIC)
8725 John J. Kingman Road Ste. 0944
Ft. Belvoir, VA 22060-6218
1-800-CAL-DTIC (1-800-225-3842)
Mary Jones, Research
703-767-9603
Registration Office
703-767-8673
http://www.dtic.mil/dtic/
https://www.dtic.mil/REGateway/welcome

The Defense Technical Information Center (DTIC) is the largest central resource for DoD and government-funded scientific, technical, engineering, and business related information. It is a DoD Field Activity within the Under Secretary of Defense for Acquisition, Technology and Logistics (AT&L), reporting to the Director, Defense Research & Engineering (DDR&E). DTIC provides ready access to relevant information formerly contained in their various Technical Information Centers or libraries located throughout the DoD (e.g. scanned PDFs of reports). DTIC's origins date back to WWII and a shared Air Corps and Navy document center (i.e. library) to collect, process and distribute scientific and technical reports. DTIC sponsors a number of additional Information Analysis Centers (IACs) including most relevantly to this investigation Homeland Defense and Security Information Analysis Center (HDIAC) (formerly CBRNIAC). A DTIC information query accesses not only the information catalogue / database within the DTIC holdings but also within the IACs as well, allowing a search for a report in multiple different repositories. The unclassified material is available on-line, though much of the material has distribution restrictions limiting it with DoD. Classified documents are available as well but are distributed in hard copy form.

The research team conducted an online search of the DTIC database. There were no relevant documents pertaining to NAS Banana River timeframe.

A.1.6 Environmental Data Resources, Inc.
6 Armstrong Rd, 4th Floor
Shelton, CT 06484
800-352-0050
http://www.edrnet.com/

Founded in 1990, EDP is a leading provider of environmental risk information in the United States with an extensive database of environmental land records (e.g. Federal, State and Tribal NPL, CERCLIS, RCRA, landfill, solid waste disposal, leaky tanks, brownfields, spills and releases, etc.) and historical land use records (historic USGS

topographic Maps, Sanborn fire insurance maps, aerial imagery, Flood Zone Data, USDA Soil Conservation Service (SCS) soil surveys) and familiarity with local / regional hydrologic hydrogeologic and geologic information and water agency records.

The research team tasked EDR with providing a standard package of their environmental and historical land use records for the subject site, which were used in preparation of this PA.

A.1.7 Florida Department of Environmental Protection (FDEP)
3900 Commonwealth Boulevard
Tallahassee, FL 32399-3000
https://floridadep.gov/

The research team used the FDEP's Geospatial Open Data access to the CLOSED Waste Cleanup (Responsible Party) sites (CAP_RAP) data set. These are sites where the case file has been closed by the District Waste Cleanup Section and all cleanup phases, including long term monitoring have been accomplished and are no longer the responsibility of the district. Cases referred to, and accepted by, other program areas, e.g., the EPA, State Cleanup/Superfund programs, petroleum programs, dry cleaning solvent cleanup program are also designated as CLOSED. Within the subject FUDS is a CAP_RAP site 374247. This concerned a Removal Site Evaluation (RSE) at the South Patrick Shores, July 2019 (see Section 2.2.8)

A.1.8 Library of Congress (LOC)
101 Independence Ave, SE
Washington, DC 20540
http://www.loc.gov/
http://www.loc.gov/pictures/collection/hh/

The Historic American Buildings Survey/Historic American Engineering Record/Historic American Landscapes Survey (HABS/HAER/HALS) collection at the LOC includes numerous documents, drawings, large-format photographs, and written histories for more than 38,600 historic structures and sites. The NPS HABS, HAER and HALS programs is ongoing, new documentation is added continually, and online digitization is occurring in phases. The research team queried the HABS/HAER/HALS collection of the LOC and located no additional pertinent material related to the site.

The LOC also operates a cooperative cataloging program, the National Union Catalog of Manuscript Collections (NUCMC), that creates online records describing archival and manuscript collections held by repositories located throughout the United States and its territories. The program provides free searching, via the NUCMC gateways, of archival and manuscript cataloging in the Online Computer Library Center OCLC WorldCat. The research team queried the NUMC to assist in locating additional potential collections of relevant records for the subject site but found nothing relevant.

A.1.9 National Archives I at Washington, DC
8th and Pennsylvania
Washington, DC 20408-0001
Jill Abraham
202-501-5671
http://www.archives.gov/dc-metro/washington/index.html

The research team reviewed the following items based on analysis of the available Findings Aids:

Record Group 26 (Records of the U.S. Coast Guard)

Entry 381 Station Files, 1941-1977
Box 4

Record Group 38 (Records of the Office of the Chief of Naval Operations)

Entry 275 Security Classified General Records Relating to the Development of Shore Stations, 1920-1942
Boxes 14, 17, 20, 24, 28, 44, 45, 53, 55

Record Group 72 (Records of the Bureau of Aeronautics)

Entry 62A General Correspondence, 1925-1942
Boxes 3628, 3904, 3921, 3922, 4015-4018

Entry 217 Records of the Shore Station Development Program, 1940
Boxes 1-5

A.1.10 National Archives at College Park (NARA-CP), Textual Records
8601 Adelphi Road
College Park, MD 20740-6001
301-837-6800
http://www.archives.gov/dc-metro/college-park/index.html

For each of the Record Groups (RG) of potential interest at this repository, the research team reviewed the Master Location Register (MLR) and Finding Aids available in the public research rooms to help locate potential Entries / Series / Accessions of records of relevance and if possible refined to specific boxes. The team also consulted with staff archivists and the NARA Online Public Access (http://www.archives.gov/research/search/) search engine (formerly the Archival Research Catalog or ARC) for additional suggested material. The following is a detailed list of records researched at this repository.

Record Group 38 (Records of the Office of the Chief of Naval Operations)

Entry 2 Chief of Naval Operations General Correspondence, July 1942-June 1943
Boxes 39, 133, 145

Entry 2 Chief of Naval Operations General Correspondence, July 1943-June 1944
Boxes 140, 259, 285, 286

Entry 2 Chief of Naval Operations General Correspondence, July 1944-June 1945
Boxes 560, 706, 729

Entry 2 Chief of Naval Operations General Correspondence, July 1945-June 1946
Boxes 1015, 1142, 1161

Entry NM63-1 Index to General Correspondence, 1942-1946
Boxes 2, 24, 41, 369, 448, 881, 910

Entry 353 Records Relating to Naval Activity During World War II (War Diaries)
Box 448

Record Group 51 (Records of the Bureau of Budget)

Entry 149B Inspection Reports, 1940-1945
Boxes 228, 229, 424

Record Group 71 (Records of the Bureau of Yards and Docks)

Entry 1001 Naval Property Case Files, 1941-1958
Boxes 196, 199, 200, 201, 231, 1514

Entry 1037 Lease Files, 1941-1947
Boxes 30, 32

Entry 1040 Record Set of Publications 1945-1963
Boxes 11-18

Record Group 72 (Records of the Bureau of Aeronautics)

Entry 62B General Correspondence, 1943-1945
Boxes 507, 2811, 2843, 2859, 2863, 2935, 2990, 3065, 3072, 3114, 3181, 3282, 3300, 3353

Entry 62B General Correspondence, 1946
Boxes 397, 406, 407, 482, 496, 507, 509

Entry 62B General Correspondence, 1947
Boxes 407, 424

Entry 67 Confidential Correspondence, 1922-1944
Boxes 1081, 1099, 1122, 1123, 1127, 1168, 1202

Entry 67A Confidential General Correspondence, 1945
Boxes 288, 303

Entry 1001A Unclassified General Correspondence, 1948-1949
Boxes 434, 435

Entry 1001B Unclassified General Correspondence, 1950
Box 223

Entry 1001C Unclassified General Correspondence, 1951
Box 193

Entry 1001E Unclassified General Correspondence, 1953
Box 270

Entry 1001F Unclassified General Correspondence, 1954
Box 194

Entry 1001G Unclassified General Correspondence, 1955
Boxes 209-211

Entry 1001 H Unclassified General Correspondence, 1956
Box 189

Entry 1021 Records Relating to Inactive Air Stations (Real Estate) Files, 1943-1959
Boxes 1-14

Record Group 77 (Records of the Chief of Engineers)

Entry 276 Project and Geographic Files, 1954 (57A-0374)
Box 18

Entry 435 Project Geographic files, 1949-1950 (53A-0325)
Box 53

Entry 437 Military Planning Design Construction, 1953 (56D-0398)
Box 304

Entry 543 Central Decimal Files, 1949-1950 (54A-0006)
Boxes 1-2

Record Group 80 (General Records of the Department of the Navy)

Entry 13 Office of the Secretary General Correspondence, July 1942-June 1943
Boxes 126, 127, 180, 209, 210, 333, 362

Entry 16 SEC/NAV General Correspondence (formerly Security Classified), 1940-1947
Boxes 462, 1229, 1241, 2059, 2060

Record Group 127 (Records of the U.S. Marine Corps)

Entry 18B Office of the Commandant General Correspondence, 1939-June 1950
Boxes 206, 214, 217, 233, 1680

Record Group 341 (Records of Headquarters U.S. Air Force (Air Staff))

Entry 2A (UD-UP) Classified Subject Files 1953-55 (Dir/Civil Engineering 60A-1049)
Box 8

Entry 17 South Atlantic Engineer, 1958 (62A-1360)
Boxes 9-11

Entry 19 General Records, 1955-1957
Boxes 30, 52, 56-58, 64, 65

Entry 22 Regional Civil Engineer; South Atlantic Civil Engineer Region; Installation Construction Project Reports and Related Correspondence, 1957
Boxes 10-12

Entry 270 South Atlantic Civil Engineer Base Files, 1956 (60A-1051)
Boxes 7-9

Entry 494 Air Force Real Estate Facilities, 1948-1955
Boxes 43, 73, 105, 143, 172, 206, 216, 256, 309, 353, 416, 417, 465, 466, 522, 586

Entry P513 Real Property Case Files, 1944-1969
Box 29

Record Group 389 (Records of the Provost Marshal General)

Entry 452A Classified Decimal File, 1942-1946
Boxes 1401, 1402

Entry 461 Subject Files, 1942-1946
Box 2492

Record Group 428 (General Records of the Department of the Navy, 1941-2004)

Entry 5 Office of Information Aviation Files, 1940-1958
Boxes 1-3, 7-9

Record Group 429 (Organizations in the Executive Office of the President)

Entry 12 Central Real Property Surveys
Box 88

A.1.11 National Archives, Cartographic and Architectural Branch
8601 Adelphi Road
College Park, MD 20740
301-837-3200

The research team reviewed the Military, Forts, Posts and Installations Finding Aid notebooks in the cartographic research room regarding NASBR and Patrick AFB and reviewed the following items for relevant material:

Record Group 71 (Records of the Bureau of Yards and Docks)

Series I Microfilm Reels
Reels 624, 625

Series II Microfilm Reels Index Cards
Boxes 123, 124

Series II Microfilm Reels
Reel 590

Entry Flat Map Files (paper copies) Naval Air Stations Florida, Banana River
Folder 635-2-5 to 635-3-57
Folder 635-19-1-1 to 635-18-16
Folder 635-19-1 to 635-30-178 and unnumbered

Entry 74 Air Stations Site Plans
Reel 1

A.1.12 National Archives at College Park, Still Pictures Branch

8601 Adelphi Road
College Park, MD 20740
Reference Desk
301-837-0561

The research team reviewed the file card and album indexes available for the following for relevant material:

Record Group 71 (Records of the Bureau of Yards and Docks)

Entry 71-CA U.S. Naval Shore Establishments and Shipyards, 1890-1943
Box 71-CA-27

Entry 71-CB Construction Process and Completions U.S. Naval, 1940-1943
Box 71-CB-10

Entry 71-CP Construction and Aerial View of Naval Facilities, 1941-1953
Box 71-CP-06V

Record Group 80 (General Records of the Department of the Navy)

Entry 80-CF Decimal Classified Photographic File, 1916-1945
Box 94

Entry 80-G General Photographic File for the U.S. Navy, 1943-1958
Boxes 308, 320, 332, 459, 1245, 1331, 1336, 1356, 1393, 1449, 1489, 1520, 1688, 1669, 1673, 1916, 1918, 1940, 1978, 1979, 1985

Record Group 342 (Records of U.S. Air Force Commands and Organizations)

Entry 342-B U.S. Air Force Facilities/Sites in Black and White and Color
Boxes 296, 297

Entry 342-FH U.S. Air Force Pre-1954 Still Photograph Collection
Boxes 2111, 4006

A.1.13 National Archives at College Park - Motion Picture, Sound and Video Reference
8601 Adelphi Road
College Park, MD 20740
301-837-0526
http://www.archives.gov/dc-metro/college-park/visit-motion-picture-room.html

The research team queried the NARA Online Public Access (http://www.archives.gov/research/search/) search engine for suggested material but did not identify pertinent information.

A.1.14 National Archives and Records Administration at Atlanta (NARA-Atlanta)
5780 Jonesboro Road
Morrow, GA 30260
770-968-2100
Nathan Jordan
http://www.archives.gov/southeast/

The research team reviewed the following items based on analysis of the available Findings Aids and consultation with the staff archivist:

Record Group 77 (Records of the Office of the Chief of Engineers)

Entry 77-13-1281 Jacksonville Real Estate-Real Property Title/Historical Files
Box 16

Record Group 181 (Records of Naval Districts and Shore Establishments)

Entry 00A2191 7th Naval District Jacksonville Central Subject Files, 1942-1945
Boxes 1-30

Entry 00A3027 7th Naval District Legal Office Central Subject Files, 1947-1948
Box 1

Entry 00A-2843 7th Naval District Formerly Classified Correspondence Files, 1944-1948
Boxes 1-5

Entry 00A2547 7th Naval District Central Subject Files, 1944-1945
Boxes 1-2

Entry 00A4232 Central Subject Files (7ND Industrial Manager), 1946-1949
Boxes 1-2

Entry 00A2155 Formerly Classified General Correspondence, 1942-1945
Boxes 7-12

Entry 00A2944 7th Naval District Jacksonville, Central Subject Files, 1945-1948
Boxes 58, 59, 72

Entry 00A5517 7th Naval District Jacksonville Central Subject Files, 1952-1953
Boxes 1-3

Entry 00A7894 7th Naval District Jacksonville Central Subject Files, 1954-1955
Boxes 1-2

Entry 00A5469 Central Subject Files, 1948-1951 (7ND Industrial Manager)
Box 1

Entry 00A2155 7th Naval District Formerly Classified Correspondence, 1942-1945
Boxes 1-11

Entry DO-09 7th Naval District General Correspondence NAS Pensacola, 1940-1959
Boxes 4, 47, 48, 152, 165, 173, 277, 281, 315, 373, 374, 375

Record Group 270 (Records of the War Assets Administration)

Entry 51A1 Disposal Case Files AL through FL, 1947-1949
Box 115

Entry 51A1 Accounting Files, 1946-1947
Box 554

Record Group 341 (Records of Headquarters Air Force)

Entry 498 Correspondence RE: Development of Plans and Procedures, 1948-1955
Boxes 121, 122, 123, 124, 125, 126, 168, 169, 170, 171, 172

A.1.15 National Personnel Records Center Military Personnel Records (NPRC, MPR)

Appraisal and Disposition Section
1 Archives Drive
St. Louis, MO 63138
314-801-0800
Wilson Sullivan, Archivist, Military Operations Branch
314-801-9174
Mike Ledyard, Chief, Records Retrieval Branch
314-801-9141
Michael Tarabulski
314-801-0739
http://www.archives.gov/st-louis/index.html

The primary mission of the NPRC, MPR is to store the Official Military Personnel Files (OMPF) from all service branches for veterans for NARA; however, the NPRC, MPR retains a significant amount of Army and Air Force records accessioned after World War II that is slowly being processed for retention elsewhere in the NARA system, primarily at the College Park facility. The material was assigned to basic records groups based on whether it came from the Army or the Air Force:

Record Group 338 (Records of U. S. Army Commands, 1942-)

Record Group 342 (Records of the U.S. Air Force Commands, Organizations and Activities)

The research team reviewed the available finding aids for this material and the "01" Accession Series descriptions to identify boxes of potentially relevant information on the property and did not identify any pertinent records related to the subject property.

A.1.16 Patrick Air Force Base, 45th Engineering Squadron

Building 534
1224 Jupiter St
Patrick AFB, FL 32925
Patrick Installation Support Section, Air Force Civil Engineer Center (AFCEC/CZOE)
Regina D. Butler, Restoration Program Lead
321-494-9298
Loren Lorenz, Restoration Project Manager
321-494-5221
Theresa (Terry) Ahlin, Chief, Asset Accountability (Real Property Officer)
321-494-0653
Mike Willard
Sean Bultman, GIS/GeoBase Development Manager
Ann Heyer, Chief, Project Management
Raymond (Ray) Heard, Base Historian
321-494-2710

The research team met with Restoration Program Lead and Project Manager with the Air Force Civil Engineer Center (AFCEC) at Patrick AFB. In the 2000s, their office undertook a fairly extensive and vigorous "Preliminary Assessment" effort across Patrick AFB and Cape Canaveral AFS, as a follow-on to earlier efforts, to ensure complete inventory of areas of interest. The Restoration Project Manager worked on that effort as a contractor, gathering the data. The Restoration office provided the team access to those reports and others of potential interest, historic aerial imagery

The team also met the Real Property officer (Ms. Ahlin) who provided the team access to the files and plat maps they had on site. As a point of interest, Ms. Ahlin grew up in South Patrick Shores (300 Pelican between 1971 and 1987), and she shared anecdotes regarding things that were dug up in people's yards during her childhood.

The research team meet with the GIS/GeoBase Development Manager who provided them access to the CE GIS/Vault (Building 535, Room 102). Upon physical review of the material, the team requested and received digital scans of a number of the drawers with potentially relevant information (i.e., D26, D36, D39, D40, E21, E29, E31, E31, E36, and E37).

The research team contacted the base historian regarding potentially relevant records but they responded that they do not have any historical records from the NAS Banana River and they assumed the Navy took all of their records with them when they vacated the base proper.

A.1.17 University of Florida George A. Smathers Libraries
Special and Area Studies Collections
P. O. Box 117000
Gainesville, FL 32611-7000
352-273-2757, Special Collections
Steve Hersh, Public and Support Services Assistant
352-273-2543

The research team reviewed the Robert Moore Angas Military Installation Papers at this repository (http://www.library.ufl.edu/spec/pkyonge/angaswm.htm). The U. S. Navy contracted with Robert Angas, a professional civil engineer and registered Land Surveyor to complete reconnaissance studies and boundary descriptions of proposed and completed navy properties. Many of the studies concern the U. S. Naval Air Station (NAS) Jacksonville and satellite landing fields and bomb targets and the Naval Base at Mayport. The depth of the material varies from a page or two of notes on a site to detailed surveys, land ownership and taking records, and descriptions and drawings of installations.

Boxes 28-30

A.1.18 U.S. Army Corps of Engineers, Jacksonville District (CESAJ)
701 San Marco Blvd
Jacksonville, FL 32207
Military/Interagency and International Services Branch
Programs and Project Management Division (PPMD)
John Keiser, CESAJ FUDS Program Manager
Frank Araico, FUDS Program Manager
Donna West-Barnhill, FUDS Program Support Team
Amanda Parker, Public Affairs Specialist
Renae Peckham, FUDS Support
Sandy Sisavath, FUDS Support
Office of Counsel
Don Nelson, Assistant District Counsel
David Hart, Assistant District Counsel
Amber Jackson, Assistant District Counsel

The research team closely coordinated with the FUDS Program Manager, John Keiser, during all aspects of this PA, who primarily coordinated and interacted with other elements of the District, Division and the Air Force as required.

The research team began their research of this property by consulting the property back-up files for this investigation completed by and on behalf of the Corps of Engineers Geographic District, the Jacksonville District. The majority of these documents have been digitized and uploaded to the Corps wide FUDS Docs records management database and applicable documents to this investigation were downloaded from there. This included the previous INPR/FDE files and other pertinent project files.

The research team contacted the Real Estate Division regarding any applicable historical audited real estate of realty files for the subject property. The team identified that the Mobile District would have been responsible for real estate information on subject site. As the subject property was originally a naval acquisition and disposal, the Corps of Engineers does not maintain historical realty files for those tracts.

The CESAJ Office of Counsel conducted legal case law searches using LexisNexis and Westlaw for the litigation over the land title circa 1947-1949, but did not identify any cases as implied by correspondence that Vernon Fry of Florida Beaches sought to regain title to portions of Section 23, Township 26 South, Range 37 East acquired in a foreclosure by Kumprop, Inc.[168]. The Westlaw database had Florida cases back even further, but not one for the dispute in question. They also consulted the Brevard County Clerk of Court.

The research team contacted Mr. Nelson, Assistant District Counsel, who worked on the 1991 FUDS determination on NASBROBDA. The 1991 determination stated that the military did not operate or own a facility at NASBROBDA. He recalled contacting the Patrick AFB historian and getting installation maps and interviewing a number of people both locally and from different agencies. He recalled being told that during the WWII time frame a plane crashed and non-salvageable debris may have been left behind. He felt the relevant information they gathered should be in the backup files.

A.1.19 U.S. Army Corps of Engineers, St. Louis District
Environmental and Munitions Branch
Research and Technical Services Section (CEMVS-EC-ER)
1222 Spruce St.
St. Louis, MO 63103-2833
Rochelle R. Hance, Branch Chief
314-331-8784
Randal Curtis, Section Chief
314-331-8786

The research team consulted the National Geologic Map Database Project (NGMDB) and the USGS Store web page to locate historic USGS quadrangles from 1949 through 1988. The team downloaded quad maps for Section 23, Township 26, Range 37 for Brevard County, Florida.

https://ngmdb.usgs.gov/topoview/viewer/#12/28.1687/-80.5751
https://store.usgs.gov/

The research team reviewed the following books and secondary sources for background information pertaining the NASBR:

1985 United States Navy and Marine Corps Bases, Domestic
Paolo E. Coletta

1989 Air Force Bases Volume I Active Air Force Bases Within the United States of America on 17 September 1982
Robert Mueller

1995 United States Naval Air Station of World War II Volume I: Eastern States
M.L. Shettle, Jr.

2004 Banana River Sea Stories and War Diaries from a World War II Navy Base
Barbara Marriott

2016 Images of America Patrick Air Force Base
Roger McCormick

2018 Ghosts of World War II NAS Banana River
Barbara Marriott

A.1.20 U.S. Army Corps of Engineers, Mobile District
PO Box 2288
Mobile, AL 36628-0001
Christopher May, Supervisory Realty Specialist, CESAM-RE-C
251-694-3806
Derrick, Moton, Chief Acquisition Branch, CESAM-RE
251-694-3657
John Tetreau, Realty Specialist
251-694-3682

The research team contacted the Mobile District real estate section regarding the subject property. They provided real estate files and maps documenting the transfer of NAS Banana River to the Air Force. The information provided did not show the Navy or Air Force acquiring property in the South Pacific Shores subdivision, however there was easements for height restrictions.

A.1.21 U.S. Naval History and Heritage Command (NHHC), Naval Aviation History Branch
Building 200
Washington Navy Yard
Washington, DC 20374-5060
Dale "Joe" Gordon, Lead Reference Archivist
dale.gordon@navy.mil
202-433-9675
http://156.112.98.23/branches/nhcorg4.htm

The research team reviewed the aviation histories relating to NASBR:

Aviation Commands, 1941-1952 Collection
Boxes 183, 184

Aviation Shore Commands - Pre 1998 Collection
Box 23

World War II NAS Shore Establishments
Box 31

A.1.22 U.S. Naval History and Heritage Command (NHHC), History Branch
805 Kidder Breese Street, SE
Building 108
Washington Navy Yard
Washington, DC 20374-5060
Lisa Crunk, Photo Archivist
Lisa.crunk@navy.mil
202-433-7879
http://www.history.navy.mil/

The research team visited the photo archive to review photos related to Naval Air Station Banana River, however it did not possess any large scale aerial photos pertinent to subject property.

A.1.23 Washington National Records Center (WNRC)
4205 Suitland Road
Suitland, MD 20746-8001
Ivan Johnson
301-778-1569
http://www.archives.gov/dc-metro/suitland/

The research team did not identify any pertinent records relating to the subject property that would be located at this repository.

A.1.24 U.S. Army Research, Development and Engineering Command (RDECOM)
Historical Office
Bldg. E-5027 Blackhawk Road
Aberdeen Proving Ground
Edgewood Area, MD 21010-5423
301-778-1513

The research team did not identify any pertinent records relating to the subject property at this repository. Available finding aids, Technical Escort movement records, and historical office listings reviewed did not identify chemical warfare activities for the subject property.

A.2 AERIAL PHOTOGRAPH REPOSITORIES

The CEMVS-EC-S research team consulted the following repositories for aerial imagery of the property. Note historical imagery that exceeded 1:40,000 scale was not considered for acquisition. The light gray shading indicates historical imagery acquired.

A.2.1 National Aerial Resources (NAR)
6 Highland Avenue
Alban, NY 12205
800-827-2994
http://www.aerialsearch.net/

NAR maintains a fairly complete, comprehensive and up-to-date listing of aerial photography available from numerous sources both public and private. The research team did not perform a search of imagery for NASBROBDA (I04FL0027) at this repository.

A.2.2 National Archives at College Park, Cartographic & Architectural Branch
8601 Adelphi Road
College Park, MD 20740
866-272-6272
http://www.archives.gov/research/formats/cartographic.html

The research team consulted the aerial photo coverage overlays in Record Group 373 (Records of the U.S. Defense Intelligence Agency) for imagery at a scale of 1:40,000 or better covering the area. The contractor pulled the index sheets for NASBROBDA (I04FL0027) and identified the following imagery that covers the site:

Date	Scale	Record Group	Can Number	Frames	Total Frames
1944/02/26	1:20, 000	373	ON009133	ROLL1-3 PROJ 644 35 - 37 VV	3 (Only frame 36 was acquired)
1945/04/10	1:20, 000	373	ON001191	3501 BV 5M 165 49-60 VV	12 (Only frame 56 was acquired)
1945/11/22 (photo shows a date of 1945/10/10)	1:23, 000	373	ON003547	16PS 16PL MI 5M-204 208 VV	2 (Only frame 36 was acquired)
1947/02/19	1:20, 000	373	ON003552	311 RW 11PT4 M78 5M211 6,7 VV	2
1947/06/17	120, 0000	373	ON003551	311 RW 11PT4 M78 5M211 74, 75 VV	2 (Only frame 74

Date	Scale	Record Group	Can Number	Frames	Total Frames
					was acquired)
1953/12/17	1:15,000	373	ON003893	1355 MCS M-62 53AFR-18 187 VV	1
1954/01/07	1:15,000	373	ON003895	1355 MECS 53 AFR-18 M74 76,77 VV	2
1954/02/12	1:48,000	373	ON006111	AFMTC RCA PLG 8A 12804,12805, 128024,12014,12014	
1956/02/11	1:66,000	373	ON006804	70 SRW 6SRS 106 50-43 20 VTM	1
1956/07/30	1:31,000	373	ON006113	AFMTC RCA PLG8A 13126VV	
1957/12/11	1:70,000	373	ON094777	MSAF MONTICELLO FLT 72 135	1
1957/12/11	1:34,000	373	ON094777	MSAF MONTICELLO FLT 72 68	1
1957/12/11	1:41,000	373	ON094777	MSAF MONTICELLO FLT 72 55	1
1958/04/12	1:10,000	373	ON005876	160TRS 58-494 PROJ 58-1 62,45	2

The research team also consulted *Aerial Photographs in the National Archives-Special List 25*, dated 1990, for available imagery from:

Record Group 57 (Records of the U.S. Geological Survey)
Record Group 95 (Records of the U.S. Forest Service)
Record Group 114 (Records of the Soil Conservation Service)
Record Group 145 (Records of the Agriculture Stabilization and Conservation Service)

The team located the following imagery in these Record Groups:

Date	Scale	Record Group	Can Number	Frames	Total Frames
1943	1:20,000	145	ON030310	CYS-1C-51 & 52	2 (Only frame 51 was acquired)
1951	1:20,000	145	ON37505	CYS-3H-175 thru 177	3 (Only frame 177 was acquired)
1958	1:20,000	145	ON218203	CYS-4V-198 - 200	3

Date	Scale	Record Group	Can Number	Frames	Total Frames
					(Only frame 199 was acquired)
1977		NA	NA	VECN 5-133 thru 135 VECN 5-169 thru 171	6

A.2.3 U.S.Geologic Survey – EROS Data Center
47914 252nd Street
Sioux Falls, SD 57198
800-252-4547 ext. 2074
http://edcwww.cr.usgs.gov/

CEMVS-EC-SG tasked a contractor to perform an initial search of available imagery for NASBROBDA (I04FL0027) at this repository. MVS identified the following imagery that covers the site.

Aerial Photo Mosaics

Acquisition Date	Scale	Entity ID	Image Type	Project	Frame Nbr	# Frames

Note: *There was no imagery found for this group.*

Aerial Photography Single Frame

Acquisition Date	Scale	Entity ID (*See Note)*	Image Type	Project	Roll Nbr	Frame Nbr	# Prints
12/19/1950	60000	ARA007101602148	24	710	16	2148 thru 2150	3
10/13/1969	66050	AR611200A2C0119	14	11200	0000A2	119 thru 121	3
10/15/1969	65688	AR61120006C0111	13	11200	6	111 thru 112	2
10/16/1969	66409	AR61120008C0048	13	11200	8	48 thru 49	2
10/16/1969	66409	AR61120008C0049	13	11200	8	49	1
10/16/1969	66593	AR61120008C0037	13	11200	8	37	1
11/23/1970	60966	AR6147003600097	13	14700	36	97	1
1/18/1976	80000	AR1VECU00010011	24	VECU0	1	11 & 17	2
12/3/1977	80000	AR1VENC00050133	24	VENC0	5	133 thru 135	3
12/3/1977	80000	AR1VENC00050169	24	VENC0	5	169, 171, 173	3
3/30/1983	64750	AR5830031713457	13	83000	3171	3457	1
3/30/1983	65000	AR5830031713487	13	83000	3171	3487 thru 3489	3

6/9/1987	66000	AR5870036310713	13	87000	3631	713 thru 715	3
11/10/1988	65000	AR5880038085421	13	88000	3808	5421 thru 5423	3
11/10/1988	65000	AR5880038085473	13	88000	3808	5473 thru 5475	3
4/2/1989	65000	AR5890038500488	13	89000	3850	488 thru 490	3
4/2/1989	65000	AR5890038500522	13	89000	3850	522 thru 523	2
4/5/1990	64076	AR5900040141437	13	90000	4014	1437 thru 1440	4
10/15/1990	66000	AR5900041484082	14	90000	4148	4082 thru 4083	2
10/16/1990	63000	AR5900041494206	14	90000	4149	4206 thru 4208	3
4/3/1991	33000	AR5910042100067	13	91000	4210	67 thru 72	6
4/3/1991	33000	AR5910042110067	24	91000	4211	67 thru 71	5
4/3/1991	66000	AR5910042097681	13	91000	4209	7681 thru 7684	4
4/11/1991	31000	AR5910042130001	13	91000	4213	1 thru 2	2
4/11/1991	31000	AR5910042140001	24	91000	4214	1 thru 2	2
4/11/1991	62000	AR5910042127713	13	91000	4212	7713 thru 7714	2
10/30/1992	32000	AR5920044970223	13	92000	4497	223 thru 227	5
10/30/1992	64000	AR5920044963136	13	92000	4496	3135 thru 3137	3
3/24/1996	65666	AR5960050504968	13	96000	5050	4968 4970	2

Note: *Last 4 digits of the Entity ID are the frame number (replace XXXX with frame number – include leading zeros).*

DOQ

Acquisition Date	Resolution (meters)	Entity ID	Map Name	Quadrant	Band Type
3/18/1994	1	DI00000000060472	TROPIC	NW	RGB
1/26/1999	1	DI00000001103713	TROPIC	NW	RGB

High Resolution Orthophotography

Beginning Date	Ending Date	Resolution (meters)	Dataset Name	# Tile
12/1/2002	12/1/2002	0.5	200212_palm_bay-melbourne_fl_6in_sp_bw	14
2/1/2006	2/1/2006	1	200602_brevard_county_fl_1ft_sp_clr	9
3/1/2006	3/1/2006	0.5	200603_ae_brevard_county_fl_0x5000m_utm_clr	4
11/18/2008	1/23/2009	1	200811_brevard_county_fl_1ft_sp_clr	10
2/13/2012	4/10/2012	1	201202_brevard_county_fl_1ft_sp_clr	10

NAIP Compressed

Acquisition Date	Resolution (meters)	Dataset Name	# Tile
6/20/2007	1	200707_FLORIDA_NAIP_1X0000M_CLR	1
5/2/2010	1	201004_FLORIDA_NAIP_1X0000M_CNIR	1
6/16/2013	1	201305_FLORIDA_NAIP_1X0000M_CNIR	1
10/17/2015	1	201504_FLORIDA_NAIP_1X0000M_UTM_CNIR	1
10/29/2017	1	201710_FLORIDA_NAIP_1X0000M_UTM_CNIR	1

NAPP

Acquisition Date	Entity ID (*See Note*)	Project	Roll Nbr	Frame Nbr	Film Type	Project Number	# Frames
3/11/1994	NP0NAPP006957041	NAPP	6957	39 thru 40	CIR	9404	2
3/18/1994	NP0NAPP006960093	NAPP	6960	93 thru 96	CIR	9404	4
3/18/1994	NP0NAPP006961028	NAPP	6961	25 thru 28	CIR	9404	4
1/26/1999	NP0NAPP011078127	NAPP	11078	127 thru 130 149 thru 152	CIR	9903	8

Note: *Last 3 digits of the Entity ID are the frame number (replace XXX with frame number – include leading zeros).*

NHAP

Acquisition Date	Scale	Entity ID (*See Note)*	Project	Roll Nbr	Frame Nbr	Film Type	# Frames
2/15/1984	58000	NC1NHAP840037124	NHAP84	37	122 thru 124	CIR	3
3/1/1984	58000	NC1NHAP840043192	NHAP84	43	192 thru 194	CIR	3
2/26/1986	58000	NC1NHAP840401035	NHAP84	401	33 thru 35	CIR	3

Note: *Last 3 digits of the Entity ID are the frame number (replace XXX with frame number – include leading zeros).*

A.2.4 U.S Department of Agriculture – Farm Service Agency (USDA-FSA) Aerial Photography Field Office (APFO) 2222 West 2300 Souh Salt Lake City, UT 84119-2020 801-975-3653 http://www.fsa.usda.gov

CEMVS-EC-SG tasked a contractor to perform an initial search of available imagery for NASBROBDA (I04FL0027) at this repository. MVS researched imagery for NASBROBDA and identified the following imagery that covers the site:

NASBROBDA (I04FL0027) – Brevard County, FL

YEAR	RES/SCL	PROG	%COV *	BND/FLM	FMT	QTY *	REMARKS
1958	20000	FSA	(P)	BW	PI	7	1107 CYS-4V-198 - 200
1969	50000	NRCS	100	BW	PI	8	1108
1979	40000	FSA	100	BW	PI	8	1109
1984	60000	NHAP1	100	CIRP	SI	2	13817
1994	40000	NAPP2	100	CIRP	DI	1	
1999	40000	NAPP3	100	CIRP			
2005	2	NAIP05	100	NC	GT	78	QQ 2.983GB
2005	2	NAIP05		NC	MR	1	CCM .312GB

2006	2	NAIP06	100	NC	MR	1	CCM .312GB
2006	2	NAIP06		NC	GT	81	QQ 3.106GB
2007	1	NAIP07	100	NC	MR	1	CCM 1.248GB
2007	1	NAIP07		NC	GT	100	QQ 15.297GB
2010	1	NAIP10		M4B	GT	101	QQ 20.598GB
2010	1	NAIP10	100	NC	MR	1	CCM 1.249GB
2013	1	NAIP13		M4B	GT	101	QQ 20.546GB
2013	1	NAIP13	100	NC	MR	1	CCM 1.249GB
2015	1	NAIP15	100	NC	MR	1	CCM 1.386GB
2015	1	NAIP15		M4B	GT	102	QQ 20.751GB

* %COV and QTY represents amounts for entire county and not necessarily the site

APPENDIX B

REFERENCES AND REFERENCE MATERIAL

B REFERENCES AND REFERENCE MATERIAL

The reference numbers below refer to the endnote citations in the main text of the document. The citations refer to file names of digital scans of the source material backup documents. On the digital version of this report, the references are scanned images of the source material, typically saved as Adobe PDF files for textual material or as a TIF or JPG file for map or photo references. The file name or the last page of the PDF file indicates the location where the source material was located. The listing and scope of repositories searched for the gathered documents are listed in Appendix A - Reference Sources and Records Reviewed. The following list of endnote references only represents the items directly cited in preparation of this report, and do not illustrate all the documents reviewed or copied for the reference material.

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APPENDIX C

ABBREVIATIONS, ACRONYMS, AND BREVITY CODES

ABBREVIATIONS, ACRONYMS AND BREVITY CODES

The following list contains abbreviations, acronyms and brevity codes within this Preliminary Assessment, as well as typical others.

ABTU	Air Bomber Training Unit
AEC	Army Environmental Command
AFB	Air Force Base
AFS	Air Force Station
AGC	Army Geospatial Center
ASR	Archives Search Report
ASSHP	Abbreviated Site Safety and Health Plan
AST	Aboveground Storage Tank
ATSDR	Agency for Toxic Substances and Disease Registry
BD/DR	Building Demolition/Debris Removal
bls	below land surface
BRAC	Base Realignment and Closure
CEMVS-EC-ER	Environmental and Munitions Branch, Research and Technical Services Section, St. Louis District
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CES	Civil Engineer Squadron
CFR	Code of Federal Regulations
CON/HTRW	Containerized/Hazardous, Toxic, and Radioactive Waste
CW	Chemical Warfare
CWM	Chemical Warfare Materials
CWS*	Chemical Warfare Service
CX	Center of Expertise
DERA	Defense Environmental Restoration Account
DERP	Defense Environmental Restoration Program
DMM	Discarded Military Munitions
DoD	Department of Defense
DWMA	Drinking Water Mapping Application
EMCX	Environmental & Munitions Center of Expertise
EO	Executive Order
EOD	Explosive Ordnance Disposal
EODMIS	Explosive Ordnance Disposal Information Management System
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FDE	Findings and Determination of Eligibility
FEMA	Federal Emergency Management Agency
FDEP	Florida Department of Environmental Protection
FDER	Florida Department of Environmental Regulation
FHRS	Florida Department of Health and Rehabilitative Services
FUDS	Formerly Used Defense Sites
GIS	Geographic Information System
GPS	Global Positioning System

HHRA	Human Health Risk Assessment
HPA	Historic Photographic Analysis
HQUSACE	Headquarters, U.S. Army Corps of Engineers
HTRW	Hazardous Toxic and Radioactive Waste
INPR	Inventory Project Report
IRP	Installation Restoration Program
MC	Munitions Constituents
MD	Munitions Debris
MEC	Munitions and explosives of concern
MMRP	Military Munitions Response Program
MPPEH	Material Potentially Presenting an Explosive Hazard
MRSPP	Munitions Response Site Prioritization Protocol
MSL	Mean Sea Level
NARA	National Archives and Records Administration
NAS*	Naval Air Station
NASBR	Naval Air Station Banana River
NASBROBDA	Naval Air Station Banana River Off-Base Disposal Area
n.d.	No Date
NFRAP	No Further Remedial Action Planned
NOAA	National Oceanic and Atmospheric Administration
NWIS	National Water Information System
OSC	On-Scene Coordinator
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbons
PBM	Patrol Bomber, Martin
POC	Point of Contact
POL	Petroleum, Oils and Lubricants
PRP	Potentially Responsible Party
PWO	Public Works Officer
RI/FS	Remedial Investigation/Feasibility Study
RML	Removal Management Level
RSE	Removal Site Evaluation
SARA	Superfund Amendments and Reauthorization Act
SDWIS	Safe Drinking Water Information System
SHPO	State Historic Preservation Office
SI	Site Inspection
TTSA	Transition Training Squad Atlantic
USA	United States of America
USACE	U.S. Army Corps of Engineers
USAESCH	U.S. Army Engineering and Support Center, Huntsville
USAFETAC	U.S. Air Force Environmental Technical Application Center
USAFHRA	U.S. Air Force Historical Research Agency
USATCES	U.S. Army Technical Center for Explosive Safety
USATHMA	U.S. Army Toxic and Hazardous Materials Agency
USC	United States Code
USCG	United States Coast Guard
USDA	U.S. Department of Agriculture

USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground Storage Tank
UXO	Unexploded Ordnance
VISL	Vapor Intrusion Screening Levels
VOC	Volatile Organic Compounds
WAA*	War Assets Administration
WW II	World War II
WWTP	Waste Water Treatment Plant

* designates an historic acronym

APPENDIX D

GLOSSARY

GLOSSARY

The following list contains a glossary of selected terms associated with the FUDS program; however, inclusion of these terms does not indicate they are specifically applicable to this PA. Source references for the definitions are provided in the endnotes that follow.

Active Range[i]

A military range that is currently in service and is being regularly used for range activities

Anomaly Avoidance[ii]

Techniques employed on property known or suspected to contain UXO, other munitions that may have experienced abnormal environments (e.g., DMM), munitions constituents in high enough concentrations to pose an explosive hazard, or CA, regardless of configuration, to avoid contact with potential surface or subsurface explosive or CA hazards, to allow entry to the area for the performance of required operations.

Chain of Custody[iii]

The activities and procedures taken throughout the inspection, re-inspection and documentation process to maintain positive control of MPPEH to ensure the veracity of the process used to determine the status of material as to its explosive hazard. This includes all such activities from the time of collection through final disposition.

Chemical Agent (CA)[iv]

A chemical compound (to include experimental compounds) that, through its chemical properties produces lethal or other damaging effects on human beings, in intended for use in military operations to kill, seriously injure, or incapacitate a person through its physiological effects. Excluded are research, development, testing and evaluation (RDTE) solutions, riot control agents, chemical defoliants and herbicides, smoke and other obscuration materials; flame and incendiary materials; and industrial chemicals.

Chemical Agent (CA) Hazard[v]

A condition where danger exists because CA is present in a concentration high enough to present potential unacceptable effects (e.g., death, injury, damage) to people, operational capability, or the environment.

Chemical Agent Identification Sets (CAIS)[vi]

CAIS are military training aids containing small quantities of various chemical warfare agents and other chemicals.

Chemical Agent (CA) Safety[vii]

A condition where operational capability and readiness, people, property, and the environment are protected from the unacceptable effects or risks of a mishap involving chemical warfare material (CWM) and CA in other than munitions configurations.

Chemical Warfare Agents (CWA)

Are the V- and G-series nerve agents, H-series (i.e., "mustard" agents) and L-series (i.e., lewisite) blister agents, and certain industrial chemicals used by the military as weapons, including hydrogen cyanide (AC), cyanogens chloride (CK), or carbonyl dichloride (called phosgene or CGI00. CWA do not include riot control agents (e.g., w-chloroacetophenone (CN) and ochlorobenzylidenemalononitrile (CS) tear gas), chemical herbicides, smoke or incendiary compounds, and industrial chemicals that are not configured as a military munition.

Chemical Warfare Material (CWM)

Items generally configured as a munition containing a chemical compound that is intended to kill, seriously injure, or incapacitate a person through its physiological effects. CWM includes V- and G- series nerve agents or H-series (mustard) and L-series (lewisite) blister agents in other-than-munition configurations; and certain industrial chemicals (e.g., hydrogen cyanide (AC), cyanogen chloride (CK), or carbonyl dichloride (called phosgene or CG)) configured as a military munition. Due to their hazards, prevalence and military-unique application, chemical agent identifications sets (CAIS) are also considered CWM. CWM does not include: riot control devices; chemical defoliants and herbicides; industrial chemicals (e.g., AC, CK, or CG) not configured as a munition; smoke and other obscuration producing items; flame and incendiary producing items; or soil, water, debris or other media contaminated with low concentrations of chemical agents where no CA hazards exist.[viii]

Chemical Warfare Material (CWM) *is a general term that includes four subcategories of specific materials:*

- *CWM, explosively configured are all munitions that contain a CWA fill and any explosive component. Examples include M55 rockets with CWA, the M23 VX mine, and the M360 105-millimeter GB artillery cartridge.*
- *CWM, nonexplosively configured are all munitions that contain a CWA fill but that do not include any explosive components. Examples include any chemical munition that does not contain an explosive component and VX or mustard agent spray canisters.*
- *CWM, bulk container are all non-munitions-configured containers of CWA (e.g., a tone container).*
- *Chemical Agent Identification Sets (CAIS). All forms of CAIS are scored the same except for CAIS K941, toxic gas set M-1; and K942, toxic gas set M-2/E-11, which are scored higher due to the relatively large quantities of agent they contain.* [ix1]

Chemical Warfare Material (CWM) Response[x]

Munitions responses and other responses to address the chemical safety; explosives safety, when applicable; human health; or environmental risks presented by CA-filled munitions and CA in other than munitions configurations. (See munitions response.)

Closed Range[xi]

A military range that has been taken out of service as a range and that either has been put to new uses that are incompatible with range activities or is not considered by the military to be a potential range area. A closed range is still under the control of a DoD component.

Construction Support[xii]

Assistance provided by DoD EOD or UXO-qualified personnel and/or by personnel trained and qualified for operations involving CA, regardless of configuration, during intrusive construction activities on property known or suspected to contain UXO, other munitions that may have experienced abnormal environments (e.g., DMM), munitions constituents in high enough concentrations to pose an explosive hazard, or CA, regardless of configuration, to ensure the safety of personnel or resources from any potential explosive or CA hazards.

[1] On 23 April 2007, the Department of the Army changed the 5 September 1997 Interim Guidance for Biological Warfare Material (BWM) and Non-Stockpiled Chemical Warfare Material (CWM) Response Activities to state that CAIS that do not contain dilute amounts of nerve agent or neat Chemical Agent (i.e., CAIS K941 and K942) are no longer considered CWM.

Cultural Debris[xiii]

Debris found on operational ranges or munitions response sites, which may be removed to facilitate a range clearance or munitions response, that is not related to munitions or range operations. Such debris includes, but is not limited to: rebar, household items (refrigerators, washing machines, etc.), automobile parts and automobiles that were not associated with range targets, fence posts, and fence wire.

Defense Site[xiv]

Locations that are or were owned by, leased to, or otherwise possessed or used by the Department of Defense. The term does not include any operational range, operating storage or manufacturing facility, or facility that is used for or was permitted for the treatment or disposal of military munitions.

Discarded Military Munitions (DMM)[xv]

Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of, consistent with applicable environmental laws and regulations.

Disposal[xvi]

End of life tasks or actions for residual materials resulting from demilitarization or disposition operations.

Disposition[xvii]

The process of reusing, recycling, converting, redistributing, transferring, donating, selling, demilitarizing, treating, destroying, or fulfilling other life-cycle guidance, for DoD property.

Documentation of the Explosives Safety Status of Material[xviii]

Documentation attesting that material:
(1) does not present an explosive hazard and is consequently safe for unrestricted transfer within or release from DoD control, or
(2) is MPPEH, with the known or suspected explosive hazards stated, that is only transferable or releasable to a qualified receiver.
This documentation must be signed by a technically qualified individual with direct knowledge of:
(1) the results of both the material's 100 percent inspection and 100 percent re-inspection or of the approved process used and the appropriate level of re-inspection, and
(2) the veracity of the chain-of-custody for the material. This signature is followed by the signature of another technically qualified individual who inspects the material on a sampling basis (sampling procedures are determined by DoD entity that is inspecting the material).

Environmental Regulators and Safety Officials[xix]

Include, but may not be limited to environmental regulators, environmental coordinators or hazardous material coordinators, law enforcement officers, and safety personnel of the U.S. Environmental Protection Agency (USEPA), American Indians and Alaska Natives, other Federal Land Managers, and/or the States. When appropriate, public health officials of various agencies may also be involved.

Explosive Hazard[xx]

A condition where danger exists because explosives are present that may react (e.g., detonate, deflagrate) in a mishap with potential unacceptable effects (e.g., death, injury, damage) to people, property, operational capability, or the environment.

Explosive Ordnance Disposal (EOD)[xxi]

The detection, identification, on-site evaluation, rendering safe, recovery, and final disposal of unexploded ordnance and of other munitions that have become an imposing danger, for example, by damage or deterioration.

Explosive Ordnance Disposal (EOD) Personnel[xxii]

Military personnel who have graduated from the Naval School, Explosive Ordnance Disposal; are assigned to a military unit with a Service-defined EOD mission; and meet Service and assigned unit requirements to perform EOD duties. EOD personnel have received specialized training to address explosive and certain CA hazards during both peacetime and wartime. EOD personnel are trained and equipped to perform Render Safe Procedures (RSP) on nuclear, biological, chemical, and conventional munitions, and on improvised explosive devices.

Explosive Ordnance Disposal (EOD) Unit[xxiii]

A military organization constituted by proper authority; manned with EOD personnel; outfitted with equipment required to perform EOD functions; and assigned an EOD mission.

Explosives or Munitions Emergency Response[xxiv]

All immediate response activities by an explosives and munitions emergency response specialist to control, mitigate, or eliminate the actual or potential threat encountered during an explosives or munitions emergency. An explosives or munitions emergency response may include in-place render-safe procedures, treatment or destruction of the explosives or munitions, and/or transporting those items to another location to be rendered safe, treated, or destroyed. Any reasonable delay in the completion of an explosives or munitions emergency response caused by a necessary, unforeseen, or uncontrollable circumstance will not terminate the explosives or munitions emergency. Explosives and munitions emergency responses can occur on either public or private lands and are not limited to responses at RCRA facilities.

Explosives Safety[xxv]

A condition where operational capability and readiness, people, property, and the environment are protected from the unacceptable effects or risks or potential mishaps involving military munitions.

Former Range[xxvi]

Former range means the munitions response site is a location that was:
(1) Closed by a formal decision made by the DoD Component with administrative control over the location, or
(2) *Put to a use incompatible with the presence of UXO, DMM, or MC.*

Formerly Used Defense Sites (FUDS)[xxvii]

A FUDS is defined as a facility or site (property) that was under the jurisdiction of the Secretary of Defense and owned by, leased to, or otherwise possessed by the United States at the time of actions leading to contamination by hazardous substances. By the Department of Defense Environmental Restoration Program (DERP) policy, the FUDS program is limited to those real properties that were transferred from DoD control prior to 17 October 1986. FUDS properties can be located within the 50 States, District of Columbia, Territories, Commonwealths, and possessions of the United States.

Historical Evidence[xxviii]

Historical evidence means that the investigation:
(1) Found written documents or records, or
(2) Documented interviews of persons with knowledge of site conditions, or
(3) *Found and verified other forms of information.*

Inactive Range[xxix]

A military range that is not currently being used, but that is still under military control and considered by the military to be a potential range area, and that has not been put to a new use that is incompatible with range activities.

Interim Holding Facility (IHF)[xxx]

A temporary storage facility designed to hold recovered chemical warfare material (RCWM).

Land Use Controls (LUC)[xxxi]

LUC are physical, legal, or administrative mechanisms that restrict the use of, or limit access to, real property, to manage risks to human health and the environment. Physical Mechanisms encompass a variety of engineered remedies to contain or reduce contamination and/or physical barriers to limit access to real property, such as fences or signs.

Long-Term Management (LTM)[xxxii]

The period of site management (including maintenance, monitoring, record keeping, 5-year reviews, etc.) initiated after response (removal or remedial) objectives have been met (i.e., after Response Complete).

Material Potentially Presenting an Explosive Hazard (MPPEH)[xxxiii]

Material potentially containing explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal; and range-related debris); or material potentially contaminating a high enough concentration of explosives such that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, ventilation ducts that were associated with munitions production, demilitarization or disposal operations). Excluded from MPPEH are munitions within DoD's established munitions management system and other hazardous items that may present explosion hazards (e.g., gasoline cans, compressed gas cylinders) that are not munitions and are not intended for use as munitions.

Military Munitions[xxxiv]

Military munitions means all ammunition products and components produced or used by the armed forces for national defense and security, including ammunition products or components under the control of the Department of Defense, the Coast Guard, the Department of Energy, and the National Guard. The term includes: confined gaseous, liquid, and solid propellants; explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives, and chemical warfare agents; chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components thereof.

The term does not include wholly inert items; improvised explosive devices; and nuclear weapons, nuclear devices, and nuclear components, other than nonnuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) have been completed.

Military Munitions Burial Site[xxxv]

A site, regardless of location, where military munitions or CA, regardless of configuration, were intentionally buried, with the intent to abandon or discard. This term includes burial sites used to dispose of military munitions or CA, regardless of configuration, in a manner consistent with applicable environmental laws and regulations or the national practice at the time of burial. It does not include sites where munitions were intentionally covered with earth during authorized destruction by detonation, or where in-situ capping is implemented as an engineered remedy under an authorized response action.

Military Munitions Response Program (MMRP) Site[xxxvi]

A discrete location within a Munitions response Area (MRA) that may or may not require a munitions response.

Military Range[xxxvii]

Designated land and water areas set aside, managed, and used to conduct research on, develop, test, and evaluate military munitions and explosives, other ordnance, or weapon systems, or to train military personnel in their use and handling. Ranges include firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, and buffer zones with restricted access and exclusionary areas.

Military Separation Distance (MSD)[xxxviii]

MSD is the distance at which personnel in the open must be from an intentional or unintentional detonation.

Munition Response Area (MRA)[xxxix]

Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former ranges and munitions burial areas. A munitions response area is comprised of one or more munitions response sites.

Munition Response Site (MRS)[xl]

A discrete location within a MRA that is known to require a munitions response.

Munition with the Greatest Fragmentation Distance (MGFD)[xli]

The munition with the greatest fragment distance that is reasonably expected (based on research or characterization) to be encountered in any particular area.

Munitions Constituents (MC) [xlii]

Any materials originating from unexploded ordnance (UXO), discarded military munitions (DMM), or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.

Munitions Debris[xliii]

Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.

Munitions and Explosives of Concern (MEC)[xliv]

This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means:

(a) Unexploded Ordnance (UXO), as defined in 10 U.S.C. 1(e)(5);

(b) Discarded military munitions (DMM), as defined in 10 U.S.C. 2710 (e)(2); or

(c) Munitions constituents (e.g., TNT, RDX) as defined in 10 U.S.C. 2710(e)(3), present in high enough concentrations to pose an explosive hazard.

Munitions Response[xlv]

Response actions, including investigation, removal actions and remedial actions to address the explosives safety, human health, or environmental risks presented by unexploded ordnance (UXO), discarded military munitions (DMM), or munitions constituents (MC), or to support a determination that no removal or remedial action is required.

Mutual Agreement[xlvi]

A meeting of the minds on a specific subject, and a manifestation of intent of the parties to do or refrain from doing some specific act or acts. Inherent in any mutual agreement or collaborative process are the acknowledgement of each member's role in the process and their differing views of their authorities. The mutual agreement process will provide a means of resolving differences without denying the parties an opportunity to exercise their respective authorities should mutual agreement fail to be achieved.

One Percent Lethality Distance[xlvii]

A distance calculated from a given CA Maximum Credible Event (MCE) and meteorological conditions (temperature, wind speed, Pasquill stability factor) and established as the distance at which dosage from that MCE agent release would be 150 mg-min/m^3 for H and HD agents, 75 mg-min/m^3 for HT agent, 150 mg-min/m^3 for Lewisite, 10 mg-min/m^3 for GB agent, 4.3 mg-min/m^3 for VX vapor, and 0.1 mg-min/m^3 for inhalation and deposition of liquid VX.

On-call Construction Support[xlviii]

Construction support provided, on an as needed basis, where the probability of encountering UXO, other munitions that may have experienced abnormal environments (e.g., DMM), munitions constituents in high enough concentrations to pose an explosive hazard, or CA, regardless of configuration, has been determined to be low. This support can respond from off-site when called, or be on-site and available to provide required construction support.

On-Site Construction Support[xlix]

Dedicated construction support, where the probability of encountering UXO, other munitions that may have experienced abnormal environments (e.g., DMM), munitions constituents in high enough concentrations to pose an explosive hazard, or CA, regardless of configuration, has been determined to be moderate to high.

On-the-Surface[l]

A situation in which UXO, DMM or CA, regardless of configuration, are: (A) entirely or partially exposed above the ground surface (i.e., the top of the soil layer); or (B) entirely or partially exposed above the surface of a water body (e.g., because of tidal activity).

Open Burn (OB)[li]

An open-air combustion process by which excess, unserviceable, or obsolete munitions are destroyed to eliminate their inherent explosive hazards.

Open Detonation (OD)[lii]

An open-air process used for the treatment of excess, unserviceable or obsolete munitions whereby an explosive donor charge initiates the munitions being treated.

Operational Range[liii]

A range that is under the jurisdiction, custody, or control of the Secretary of Defense and that is used for range activities; or although not currently being used for range activities, that is still considered by the Secretary to be a range and has not been put to a new use that is incompatible with range activities. (10 U.S.C. 101(e)(3)(A) and (B)). Also includes "military range," "active range," and "inactive range" as those terms are defined in 40 CFR 266.201.

Ordnance and Explosives (OE) [liv]

Anything related to munitions designed to cause damage to personnel or material through explosive force, incendiary action or toxic effects. OE is: bombs and warheads, missiles; artillery, mortar and rocket ammunition, small arms ammunition; antipersonnel and antitank mines; demolition charges; high explosives and propellants; depleted uranium rounds; military chemical warfare materials as defined [below]; and all similar and related items or components, explosive in nature or otherwise designed to cause damage to personnel or material (e.g., fuze, boosters/propellants or soils/media contaminated with explosives if the concentration is sufficient to be reactive.) . . .Unexploded Ordnance (UXO) is an item of explosive ordnance which has failed to function as designed or has been abandoned, discarded or improperly disposed of and is still capable of functioning, causing damage to personnel or material.

Other Than Operational Range

Replaces the previous definitions for Closed, Transferring, or Transferred ranges

Physical Evidence[lv]

Physical evidence means:

(1) *Recorded observations from on-site investigations, such as finding intact UXO or DMM, or components, fragments, or other pieces of military munitions, or*

(2) *The results of field or laboratory sampling and analysis procedures, or*

(3) *The results of geophysical investigations.*

Primary Explosives[lvi]

Primary explosives are highly sensitive compounds that are typically used in detonators and primers. A reaction is easily triggered by heat, spark, impact or friction. Examples of primary explosives are lead azide and mercury fulminate.

Public Access Exclusion Distance (PAED)[lvii]

The PAED is defined as longest distance of the hazardous fragment distance, inhabited building distance (IBD) for overpressure, or the One Percent Lethality Distance. For siting purposes, the PAED is analogous to the IBD for explosives; therefore, personnel not directly associated with the chemical operations are not to be allowed within the PAED.

Qualified Receiver[lviii]

Entities that have personnel who are, or individuals who are, trained and experienced in the identification and safe handling of used and unused military munitions, and any known or potential explosive hazards that may be associated with the MPPEH they receive; and are licensed and permitted or otherwise qualified to receive, manage, and process MPPEH.

Range[lix]

A designated land or water area that is set aside, managed, and used for range activities of the Department of Defense. The term includes firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, electronic scoring sites, buffer zones with restricted access, and exclusionary areas. The term also includes airspace areas designated for military use in accordance with regulations and procedures prescribed by the Administrator of the Federal Aviation Administration.

Range Activities[lx]

Research, development, testing, and evaluation of military munitions, other ordnance, and weapons systems; and the training of members of the armed forces in the use and handling of military munitions, other ordnance, and weapons systems.

Range Clearance[lxi]

The destruction, or removal and proper disposition of used military munitions (e.g., unexploded ordnance (UXO) and munitions debris) and other range-related debris (e.g., target debris, military munitions packaging and crating material) to maintain or enhance operational range safety or prevent the accumulation of such material from impairing or preventing operational range use. "Range clearance" does not include removal, treatment, or remediation of chemical residues or munitions constituents from environmental media, nor actions to address discarded military munitions (e.g., burial pits) on operational ranges.

Range Related Debris[lxii]

Debris, other than munitions debris, collected from operational ranges or from former ranges (e.g., target debris, military munitions packaging and crating material).

Recovered Chemical Warfare Materiel (RCWM)[lxiii]

CWM used for its intended purpose or previously disposed of as waste, which has been discovered during a CWM response or by chance (e.g., accidental discovery by a member of the public), that DoD has either secured in place or placed under DoD control, normally in a DDESB-approved storage location or interim holding facility, pending final disposition.

Render Safe Procedures (RSP)[lxiv]

The portion of EOD procedures that involves the application of special disposal methods or tools to interrupt the functioning or otherwise defeat the firing train of UXO from triggering an unacceptable detonation.

Secondary Explosives[lxv]

Secondary explosives are generally less sensitive to initiation than primary explosives and are typically used in booster and main charge applications. A severe shock is usually required to trigger a reaction. Examples are TNT, cyclo-1,3,5-trimethylene-2,4,6-trinitramine (RDX or cyclonite), HMX, and tetryl.

Small Arms Ammunition[lxvi]

Ammunition, without projectiles that contain explosives (other than tracers) that is .50 caliber or smaller, or for shotguns.

Team Separation Distance (TSD)[lxvii]

The distance that munitions response teams must be separated from each other during munitions response activities involving intrusive operations.

Technical Escort Unit (TEU)[lxviii]

A DoD organization manned with specially trained personnel that provide verification, sampling, detection, mitigation, render safe, decontamination, packaging, escort and remediation of chemical, biological and industrial devices or hazardous material.

Technology-aided Surface Removal[lxix]

A removal of UXO, DMM or CWM on the surface (i.e., the top of the soil layer) only, in which the detection process is primarily performed visually, but is augmented by technology aids (e.g., hand-held magnetometers or metal detectors) because vegetation, the weathering of UXO, DMM or CWM, or other factors make visual detection difficult.

Time Critical Removal Action (TCRA) [lxx]

Removal actions where, based on the site evaluation, a determination is made that a removal is appropriate, and that less than 6 months exists before on-site removal activity must begin.

Transferred range[lxxi]

A military range that is no longer under military control and has been leased, transferred, or returned to another entity, including Federal entities. This includes a military range that is no longer under military control but was used under the terms of a withdrawal, executive order, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the Federal land manager.

Transferring Range[lxxii]

A military range that is proposed to be leased, transferred, or returned from the Department of Defense to another entity, including Federal entities. This includes a military range that is used under the terms of a withdrawal, executive order, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the Federal land manager. An active range will not be considered a ``transferring range'' until the transfer is imminent.

Unexploded Ordnance (UXO) [lxxiii]

Military munitions that:

(a) Have been primed, fuzed, armed, or otherwise prepared for actions;

(b) Have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and

(c) *Remain unexploded whether by malfunction, design, or any other cause.*

UXO Technicians[lxxiv]

Personnel who are qualified for and filling Department of Labor, Service Contract Act, Directory of Occupations, contractor positions of UXO Technician I, UXO Technician II, and UXO Technician III.

UXO-Qualified Personnel[lxxv]

Personnel who have performed successfully in military EOD positions, or are qualified to perform in the following Department of Labor, Service Contract Act, Directory of Occupations, contractor positions: UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist, or Senior UXO Supervisor.

Venting[lxxvi]

Exposing any internal cavities of MPPEH, to include training or practice munitions (e.g., concrete bombs), using DDESB- or DoD Component-approved procedures, to confirm that an explosive hazard is not present.

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[i] Environmental Protection Agency, Military Munitions Rule, published 12 February 1997 (62 FR 6622)

[ii] Department of the Army Office of the Assistant Secretary Installations and Environment, Memorandum for the Assistant Chief of Staff For Installation Management, Subject: Munitions Response Terminology, 21 April 2005. (Hereafter Memorandum, Subject: Munitions Response Terminology, 21 April 2005.)

[iii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[iv] Corps of Engineers Safety Office (CESO), *ER 385-1-92, Safety - Safety and Occupational Health Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Activities*, 1 September 2000

[v] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[vi] Department of Defense, Munitions Response Site Prioritization Protocol; Proposed Rule, 22 August 2003; 32 CFR Part 179

[vii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[viii] Corps of Engineers Safety Office (CESO), *ER 385-1-92, Safety - Safety and Occupational Health Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Activities*, 1 September 2000

[ix] Department of Defense, Munitions Response Site Prioritization Protocol; Proposed Rule, 22 August 2003; 32 CFR Part 179

[x] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xi] Originally defined in the 26 September 1997 DOD proposed range rule, *Closed, Transferred, and Transferring Ranges Containing Military Munitions*, Title 32 Code of Federal Regulations (CFR) Part 178, which the DoD withdrew on 13 November 2000.

[xii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xiii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xiv] 10 U.S.C. 2710(e)(1)

[xv] 10 U.S.C. 2710(e)(2)

[xvi] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xvii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xviii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xix] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xx] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xxi] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xxii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xxiii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xxiv] Military Munitions Rule, 40 CFR 260.10

[xxv] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xxvi] Department of Defense, Munitions Response Site Prioritization Protocol; Proposed Rule, 22 August 2003; 32 CFR Part 179

[xxvii] Department of the Army, U.S. Army Corps of Engineers, Environmental Quality, Formerly Used Defense Sites (FUDS) Program Policy, ER 200-3-1, dated 20May2004.

[xxviii] Department of Defense, Munitions Response Site Prioritization Protocol; Proposed Rule, 22 August 2003; 32 CFR Part 179

[xxix] Environmental Protection Agency, Military Munitions Rule, published 12 February 1997 (62 FR 6622)

[xxx] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xxxi] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xxxii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005..

[xxxiii] Department of the Army Office of the Assistant Secretary Installations and Environment, Memorandum for the Assistant Chief of Staff For Installation Management, Subject: Definition Related to Munitions Response Action, 28 October 2003:

[xxxiv] 10 U.S.C. 101(e)(4)(A) through (C)

[xxxv] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xxxvi] U.S. Army Corps of Engineers-St. Louis District, Ordnance and Technical Services Branch CEMVS-ED-P developed this term in lieu of using Munitions Response Site (MRS)

[xxxvii] Military Munitions Rule, 40 CFR 266.201

[xxxviii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xxxix] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xl] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xli] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xlii] 10 U.S.C. 2710(e)(3)

[xliii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xliv] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xlv] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xlvi] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xlvii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xlviii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[xlix] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[l] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[li] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[lii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[liii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[liv] Corps of Engineers Safety Office (CESO), *ER 385-1-92, Safety - Safety and Occupational Health Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Activities*, 1 September 2000

[lv] Department of Defense, Munitions Response Site Prioritization Protocol; Proposed Rule, 22 August 2003; 32 CFR Part 179

[lvi] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[lvii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[lviii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[lix] 10 U.S.C. 101(e)(1)(A) and (B)

[lx] 10 U.S.C. 101(e)(2)(A) and (B)

[lxi] Department of the Army Office of the Assistant Secretary Installations and Environment, Memorandum for the Assistant Chief of Staff For Installation Management, Subject: Definition Related to Munitions Response Action, 28 October 2003:

[lxii] Department of the Army Office of the Assistant Secretary Installations and Environment, Memorandum for the Assistant Chief of Staff For Installation Management, Subject: Definition Related to Munitions Response Action, 28 October 2003:

[lxiii] U. S. Army Corps of Engineers (CESO-I)
2003 *ER 385-1-95, Safety - Safety and Health Requirements for Ordnance and Explosives (OE) Operations*, 16 June 2003

[lxiv] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[lxv] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[lxvi] Department of Defense, Munitions Response Site Prioritization Protocol; Proposed Rule, 22 August 2003; 32 CFR Part 179

[lxvii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[lxviii] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[lxix] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[lxx] *40 CFR 300.5*

[lxxi] Originally defined in the 26 September 1997 DOD proposed range rule, *Closed, Transferred, and Transferring Ranges Containing Military Munitions*, Title 32 Code of Federal Regulations (CFR) Part 178, which the DoD withdrew on 13 November 2000.

[lxxii] Originally defined in the 26 September 1997 DOD proposed range rule, *Closed, Transferred, and Transferring Ranges Containing Military Munitions*, Title 32 Code of Federal Regulations (CFR) Part 178, which the DoD withdrew on 13 November 2000.

[lxxiii] 10 U.S.C. 101(e)(5)(A) through (C)

[lxxiv] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[lxxv] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

[lxxvi] Memorandum, Subject: Munitions Response Terminology, 21 April 2005.

APPENDIX E

PA (PRELIMINARY ASSESSMENT) DATA AND SITE CHARACTERISTICS FORM

Reference: U. S. Environmental Protection Agency, *Guidance for Performing Preliminary Assessments Under CERCLA, EPA/540/G-91/013, Publication 9345.0-01A*, September 1991; Appendix D.

OMB Approval Number: 2050-0095
Approved for Use Through: 1/92

EPA Potential Hazardous Waste Site Preliminary Assessment Form

Identification

State: ***Florida***
CERCLIS Number: ***Not Applicable***
CERCLIS Discovery Date: ***Not Applicable***

1. General Site Information

Name:	Street Address:				
Naval Air Station Banana River Off-Base Disposal Area, I04FL0027	***Not Applicable***				
City:	State:	Zip Code:	County:	Co. Code:	Cong. Dist:[ii]
South Patrick Shores	***FL***	32937	***Brevard***	***(FL) (009)***[i]	***8***
Latitude: Longitude:	Approximate Area of Site:		Status of Site:		
N28° 12' 22'' , W80° 35' 58''	***32*** Acres		☐ Active ☐ Not Specified ■ Inactive ☐ NA (GW plume, etc.)		

2. Owner/Operator Information

Owner:	Operator:
The former site is currently owned by private residents and commercial buildings	***The site has subsequently been redeveloped for residential housing and is no longer operated***
Street Address: ***Not applicable***	Street Address: ***Not applicable***
City: ***South Patrick Shores***	City: ***South Patrick Shores***
State: ***FL*** Zip Code: ***32937*** Telephone: ***Not applicable***	State: ***FL*** Zip Code: ***32937*** Telephone: ***Not Applicable***
Type of Ownership: ■ Private ☐ County ☐ Federal Agency Name _____ ☐ State ☐ Other _____ ☐ Indian	How Initially Identified: ☐ Citizen Complaint ■ Federal Program ☐ PA Petition ☐ Incidental ☐ State/Local Program ☐ Not Specified ☐ RCRA/CERCLA Notification ■ Other _***DERP-FUDS***__

3. Site Evaluator Information

Name of Evaluator:	Agency/Organization:	Date Prepared:
Randal Curtis, 314-331-8786	***U.S. Army Corps of Engineers-St. Louis District (CEMVS-ED-P)***	***16 December 2019***
Street Address: ***1222 Spruce St***	City: ***St Louis***	State: ***Missouri***
Name of EPA or State Agency Contact: ***EPA Region 4***	Street Address:	
City:	State:	Telephone:

4. Site Disposition (for EPA use only)

Emergency Response/Removal Assessment Recommendation:	CERCLIS Recommendation:	Signature:
Yes No Date: _____	Higher Priority SI Lower Priority SI NFRAP RCRA Other _____ Date: _____	Name (typed): Position:

EPA **Potential Hazardous Waste Site**
Preliminary Assessment Form - Page 2 of 4

CERCLIS Number: ***Not Applicable***

5. General Site Characteristics

Predominant Land Uses Within 1 Mile of Site (check all that apply):

Industrial Agriculture DOI
Commercial Mining Other Federal Facility
Residential DOD _____
Forest/Fields DOE Other _____

Site Setting: Years of Operation:

Urban
Suburban
Rural

Beginning Year ***1942***

Ending Year ***1947***

Unknown

Type of Site Operations (check all that apply):

Manufacturing (must check subcategory)
- Lumber and Wood Products
- Inorganic Chemicals
- Plastic and/or Rubber Products
- Paints, Varnishes
- Industrial Organic Chemicals
- Agricultural Chemicals (e.g., pesticides, fertilizers)
- Miscellaneous Chemical Products (e.g., adhesives, explosives, ink)
- Primary Metals
- Metal Coating, Plating, Engraving
- Metal Forging, Stamping
- Fabricated Structural Metal Products
- Electronic Equipment
- Other Manufacturing

Mining
- Metals
- Coal
- Oil and Gas
- Non-metallic Minerals

Retail
Recycling
Junk/Salvage Yard
Municipal Landfill
Other Landfill
DOD
DOB
DOI
Other Federal Facility _____
RCRA
- Treatment, Storage, or Disposal
- Large Quantity Generator
- Small Quantity Generator
- Subtitle D
  - Municipal
  - Industrial
- "Converter"
- "Protective Filer"
- "Non- or Late Filer"

Not Specified
Other _____

Waste Generated:
Onsite
Offsite
Onsite and Offsite

Waste Deposition Authorized By:
Present Owner
Former Owner
Present & Former Owner
Unauthorized
Unknown

Waste Accessible to the Public:
Yes
No

Distance to Nearest Dwelling, School, or Workplace:

0 Feet

6. Waste Characteristics Information

Source Type: (check all that apply)

Landfill _____
Surface Impoundment _____
Drums _____
Tanks and Non-Drum Containers _____
Chemical Waste Pile _____

Source Waste Quantity: (include units) Tier*:

General Types of Waste (check all that apply)

Metals
Organics
Inorganics
Solvents
Paints/Pigments
Lab/Hospital Waste
Radioactive Waste
Construction/Demolition Waste
Other
Pesticides/Herbicides
Acids/Bases
Oily Waste
Municipal Waste
Mining Waste
Explosives

Scrap Metal or Junk Pile _____ _____ Tailing Pile _____ _____ Trash Pile (open dump) _____ _____ Land Treatment _____ _____ Contaminated Ground Water Plume (unidentified source) _____ _____ Contaminated Surface Water/Sediment (unidentified source) _____ _____ Contaminated Soil _____ _____ Other _____ No Sources * C = Constituent, W = Wastestream, V = Volume, A = Area	Physical State of Waste as Deposited (check all that apply): ***Solid*** Sludge Powder Liquid Gas

EPA **Potential Hazardous Waste Site**
Preliminary Assessment Form - Page 3 of 4

CERCLIS Number: ***Not Applicable***

7. Ground Water Pathway

Is Ground Water Used for Drinking Water Within 4 Miles: Yes **No**	Is There a Suspected Release to Ground Water: Yes **No**	List Secondary Target Population Served by Ground Water Withdrawn From: 0 - ¼ Mile _____ > ¼ - ½ Mile _____ > ½ – 1 Mile _____ > 1 – 2 Miles _____ > 2 – 3 Miles _____ > 3 – 4 Miles _____ Total Within 4 Miles _____
Type of Drinking Water Wells Within 4 Miles (check all that Apply): Municipal Private **None**	Have Primary Target Drinking Water Wells Been Identified: Yes **No** If Yes, Enter Primary Target Population: ___ People	
Depth to Shallowest Aquifer: _***<20***__ Feet	Nearest Designated Wellhead Protection Area: Underlies Site > 0 – 4 Miles None Within 4 Miles	
Karst Terrain/Aquifer Present: Yes **No**		

8. Surface Water Pathway

Type of Surface Water Draining Site and 15 Miles Downstream (check all That apply): Stream **River** **Pond** Lake Bay **Ocean** Other _____	Shortest Overland Distance From Any Source to Surface Water: ____**1000**_ Feet ____**0.19**__ Miles
Is There a Suspected Release to Surface Water: Yes **No**	Site is Located in: Annual – 10 yr Floodplain **> 10 yr – 100 yr Floodplain** > 100 yr – 500 yr Floodplain > 500 yr Floodplain
Drinking Water Intakes Located Along the Surface Water Migration Path: Yes **No** Have Primary Target Drinking Water Intakes Been Identified: Yes **No** If Yes, Enter Population Served by Primary Target Intakes: _____ People	List All Secondary Target Drinking Water Intakes: Name Water Body Flow (cfs) Population Served _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ Total within 15 Miles_____

Fisheries Located Along the Surface Water Migration Path: Yes **No** Have Primary Target Fisheries Been Identified: Yes **No**	List All Secondary Target Fisheries: Water Body/Fishery Name — Flow (cfs) _____ _____ _____ _____ _____ _____

EPA Potential Hazardous Waste Site
Preliminary Assessment Form - Page 4 of 4

CERCLIS Number: : ***Not Applicable***

7. Surface Water Pathway (continued)

Wetlands Located Along the Surface Water Migration Path:
Yes
No

Have Primary Target Wetlands Been Identified:
Yes
No

List Secondary Target Wetlands:

Water Body	Flow (cfs)	Frontage Miles
Banana River	_	**1-2 miles**
Freshwater pond	_	**<0.5 miles**
Atlantic Ocean		**<0.5 miles**

Other Sensitive Environments Located Along the Surface Water Migration Path:
Yes
No

Have Primary Target Sensitive Environments Been Identified:
Yes
No

List Secondary Target Sensitive Environments:

Water Body	Flow (cfs)	Sensitive Environment Type

8. Soil Exposure Pathway

Are People Occupying Residences or Attending School or Daycare on or Within 200 Feet of Areas of Known or Suspected Contamination:
Yes
No

If Yes, Enter Total Resident Population:
24,602 People

Number of Workers Onsite:
None
1 – 100
101 – 1,000
> 1,000

Have Terrestrial Sensitive Environments Been Identified on Or Within 200 Feet of Areas of Known or Suspected Contamination:
Yes
No

If Yes, List Each Terrestrial Sensitive Environment

10. Air Pathway

Is There a Suspected Release to Air:
Yes
No

Enter Total Population on or Within:
Onsite _____
0 – ¼ Mile__779_

Wetlands Located Within 4 Miles of the Site:
Yes
No

Other Sensitive Environments Located Within 4 Miles of the Site:
Yes
No

> ¼ - ½ Mile_**1,835**___ > ½ - 1 Mile_**3,546**___ > 1 – 2 Miles_**4,515**___ > 2 – 3 Miles_**6,285**___ > 3 – 4 Miles__**7,642**__ Total Within 4 Miles__**24,602**__	List All Sensitive Environments Within ½ Mile of the Site: Distance Sensitive Environment Type/Wetlands Area (acres) Onsite _____ 0 – ¼ Mile _____ > ¼ - ½ Mile _____

[i] US Census Bureau FIPS Codes for Counties and County Equivalent Entities
Website: http://www.census.gov/geo/reference/codes/cou.html
Excel: http://www.census.gov/2010census/xls/fips_codes_website.xls

[ii] U.S. Census Bureau
Website: http://www.census.gov/fastfacts/

APPENDIX F

ORDNANCE TECHNICAL DATA SHEETS

ORDNANCE TECHNICAL DATA SHEETS

The following Ordnance Technical Data Sheets represent typical examples of munition items associated with Naval Air Station Banana River Off-Base Disposal Area. These are general descriptions and may not include all the specific variations of a particular ammunition item. This list is compiled from information found regarding Naval Air Station Banana River Off-Base Disposal Area and may not be comprehensive. Many of the data sheets were prepared under previous projects and may not contain the most complete available data or references. Additionally, Ordnance Technical Data Sheets have not been developed for all munitions.

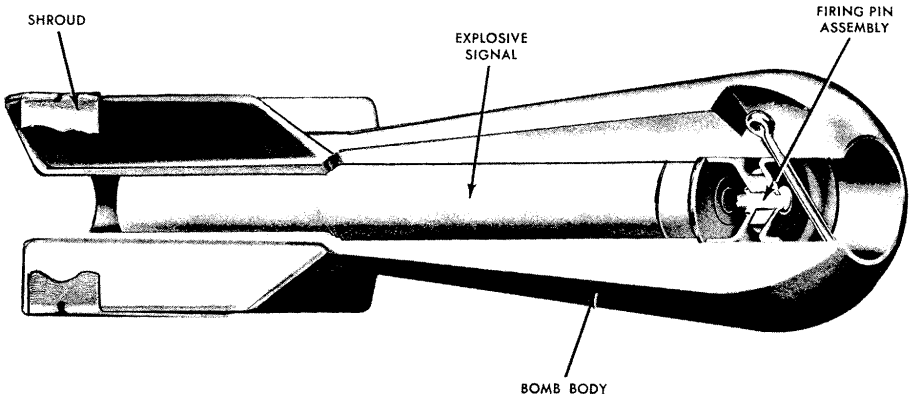
No.	Ordnance Technical Data Sheets[1]
F-2	Miniature Practice Bombs, AN-Mk 5 Mod 1, AN-Mk 23, AN-Mk 43
F-5	Practice Bomb, 100 pound, M85
F-7	Spotting charges, M1A1, M3 M5 for M38A2 Practice Bomb
F-10	Marker, Location, Marine, Mk 25

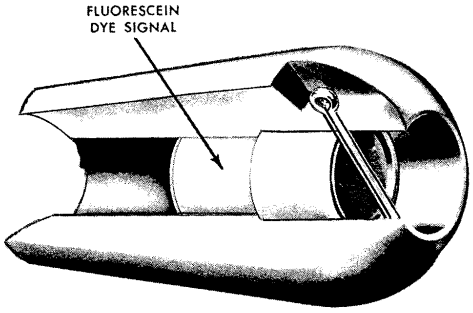
[1] All Ordnance Technical Data Sheets are prepared by U.S. Army Corps of Engineers, St. Louis District, Environmental and Munitions Branch, Engineering Division.

APPENDIX F-1

Bombs, Miniature Practice
AN-Mk 5 Mod 1, AN-Mk 23, AN-Mk 43

Bombs, Miniature Practice
AN-Mk 5 Mod 1, AN-Mk 23, AN-Mk 43





ORD D1160

Historical Notes: These miniature practice bombs (sometimes the designation “AN-Mk” is used) were in use for a long period time, from circa the late 1930’s to the 1960’s (although it is still listed in current publications). Some were designed for armored-deck boat targets and others were not suitable. Some bomb racks could carry up to eight of these small bombs.

Description: These bombs are used for low-altitude horizontal, or dive-bombing practice. The three bombs are similar in physical appearance, but differ basically in the metal used to cast the body, and thus, their weight. The AN-Mark 43 is made of lead-antimony alloy and the AN-Mark 5 is made of a zinc alloy. These bombs are used with the AN-Mark 4 practice bomb signal that is a blank 10-gauge shotgun shell (extended length). Signals contain a black powder expelling charge and a red phosphorous pyrotechnic mixture. These bombs also are used with the Mark 5 signal that contains a fluorescent dye and is actuated by impact on water. When the Mk5 signal is installed, the firing pin assembly is not used.

Over-all length ..... 8.25 inches
Body Diameter ..... 2.18 inches
Fin Dimension ..... 2.5 inches
Weight (nominal) .....AN-Mk 5 Mod 1: 2 lb. 11 oz. (zinc alloy)
.....AN-Mk 23: 3 lb. (cast iron)
.....AN-Mk 43: 4 lb. 7 oz. (lead-antimony alloy)
Signal .....AN-Mark 4 or Mark 5

References:

TM 9-1984, *Disposal of Allied Bombs and Fuzes*, 12 November 1942
TM 9-1904, *Ammunition Inspection Guide*, 2 March 1944
OP 1280, *Aircraft Bombs*, 17 February 1945
OP 1664, *U.S. Explosive Ordnance*, 28 May 1947
TM 9-1325-200/NAVWEPS OP 3530/TO 1-1-28, *Bombs and Bomb* Components, 29 April 1966

APPENDIX F-2

BOMB, PRACTICE, 100 POUND, M85

BOMB, PRACTICE, 100 POUND, M85

Description. The M85 is a round-nosed cylindrical type bomb constructed completely (except for fin assembly and spotting charge) of reinforced concrete. It simulates the M38A2 in general shape and employs the same spotting charges as the M38A2.

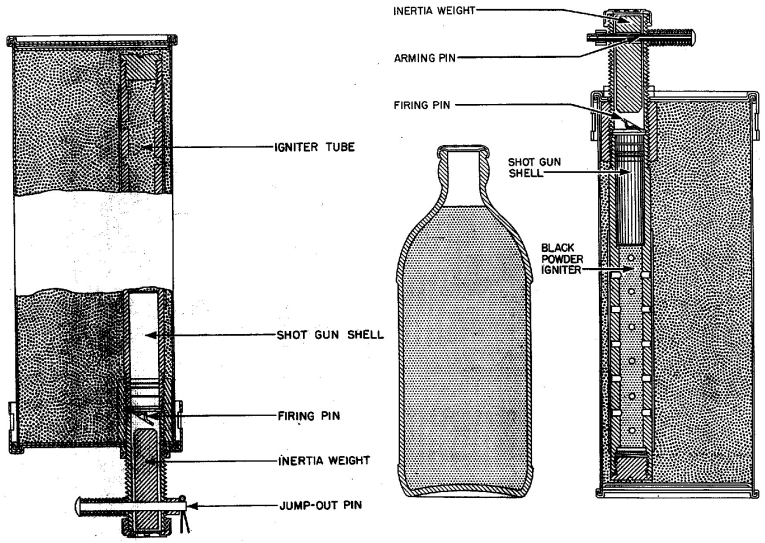
Over-all length..... 38.25 inches
Diameter ..... 8.13 inches
Weight sand loaded & spotting charge ..... 103.5 pounds

References: NAVSEA OP 1664 Volume 2, *U.S. Explosive Ordnance*, February 1954; TM 9-1980, *Bombs for Aircraft,* December 1950

APPENDIX F-3

Spotting Charges, M1A1, M3, M5

Spotting Charges, M1A1, M3, M5 (for M38A2 Practice Bomb)



M1A1 M5 M3

M1A1 Spotting Charge. This type of spotting charge fits in the after end of the 100-pound Practice Bomb M38A2. It produces a flash of flame and white smoke for observation of bombing accuracy. It is made from a large tin can, 11.18-inches long, 3.43-inches diameter, weighing 4.25-pounds. At the top of the can is a cover, which has a hole in it for the insertion of a 28-gage blank shotgun shell and firing mechanism. Upon impact, the inertia weight drives the firing pin into the shotgun-type primer, igniting the 3-pounds of black powder. Black powder is a mixture of potassium nitrate (or sodium nitrate), charcoal and sulfur.

The blank 28-gage shotgun shell uses a percussion primer and a smokeless powder or black powder filler. Smokeless powder can be a single-base type made of nitrocellulose (guncotton) or a double-base, which consists of nitrocellulose and nitroglycerine, plus other additives. The 28-gage shotgun shell used a commercial percussion primer. Identifying the exact components of a primer is made difficult by the fact that the military used both mercuric and corrosive primers at the same time it used non-mercuric and non-corrosive types. Commercial primers of the day, manufactured by companies such as Remington and Winchester, typically contained potassium chlorate, antimony sulfide, lead thiocyanate and TNT.

M3 Spotting Charge. The spotting charge has a 2 1/3-pound dark smoke filling and a black-powder igniter. It is 5/8 of an inch longer than the Spotting Charge M1A1, but otherwise similar. The M3, with its dark smoke filler, is well adapted for bombing

practice over snow-covered terrain. The black-powder igniter charge contains approximately 425 grains.

M5 Spotting Charge. The spotting charge consists of a glass bottle filled with FS smoke mixture. An ordinary bottle cap seals the mixture. The bottle is held to the Practice Bomb M38A2 by a wire twisted around the neck of the bottle and attached to the tail vanes. The charge assembly weighs 2.54 pounds.

Summary of Propellant, Explosives & Pyrotechnics (PEP)

SPOTTING CHARGE, M1A1 (1938 – circa 1950)

COMPONENT	PEP	QUANTITY
Percussion primer in 28-gage blank shotgun shell	Primer mix (approximate proportions) • Potassium chlorate (53%) • Lead thiocyanate (25%) • Antimony sulfide (17%) • TNT, Grade III (5%)	[less than 1 grain *]
Propellant in 28-gage blank shotgun shell	Smokeless powder -- Pyrocellulose (Nitrocellulose with 12.6% nitrogen):	Approximately 12-17 grains
Spotting charge	Black powder: • Potassium nitrate (74%) • Charcoal (15.6%) • Sulfur (10.4%)	3 pounds

* 15.4 grains = 1 gram; 7,000 grains = 1 pound

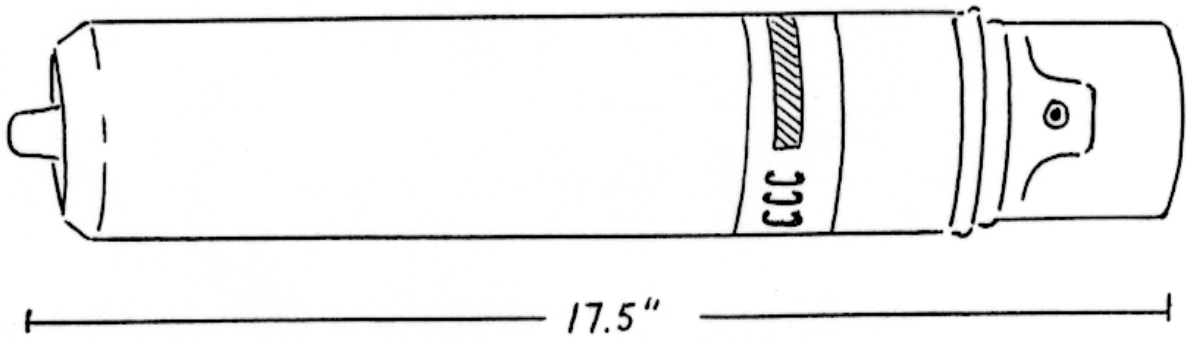
References:

TM 9-1980, *Bombs for Aircraft*, 3 June 1942
TM 9-1904, *Ammunition Inspection Guide*, 2 March 1944
TM 9-1980, *Bombs for Aircraft*, 15 November 1944
NAVSEA OP 1664 Volume 2, *U.S. Explosive Ordnance*, 28 May 1947
TM 9-1980, *Bombs for Aircraft*, 7 December 1950

APPENDIX F-4

MARKER, LOCATION, MARINE, MK 25

MARKER, LOCATION, MARINE, MK 25



Use. The Mark 25 is a pyrotechnic smoke-producing device that is dropped into the ocean from aircraft to mark a location or object in the water.

Description. The Mark 25 is an aluminum tube containing red phosphorus (RP). It is dropped from US Navy aircraft, such as the P3 Orion to mark locations or objects at sea. Upon hitting the water, the Mark 25 emits smoke from red phosphorus. The flare has an ejection hazard in addition to the burning RP. It is believed to have been in service from the 1960's until the present

Weight of Expended Round ..... approximately 3 pounds
Length of Expended Round ..... 17.5 inches
Diameter ..... 3 inches

Reference: *USMC EOD* sources.

APPENDIX G

TEXTUAL REFERENCES

ELECTRONIC COPY ONLY

Due to the volume of textual references of source documents gathered and cited for this PA effort, it was determined not to include a printout of them as an appendix.

*The endnotes included as Appendix B are digital scans of the cited textual references and are included within FRMD records/or/provided as part of the digital version of this report. The gathered textual document scans are in Adobe *.PDF format.*

APPENDIX H

STILL PHOTOGRAPH REFERENCES

ELECTRONIC COPY ONLY

Selected historic still photographs are included as figures in the main text of this report. Additional historic imagery is included within FRMD records/or/the digital version of this report.

APPENDIX I

MAPS/DRAWINGS REFERENCES

ELECTRONIC COPY ONLY

Due to the volume of maps and drawings references gathered and cited for this PA effort, it was determined not to include a printout of them as an appendix.

Digital scans of the maps and drawings references are included within FRMD records/or/provided as part of the digital version of this report.

APPENDIX J

INTERVIEWS

The Corps of Engineers Jacksonville District conducted more than 70 interviews with current, former, and nearby residents and other interested parties during the completion of this PA. This included numerous interviews during a public out-reach event at the Pelican Beach Club House in Satellite Beach, Thursday, 24 October 2019, from 8:00 a.m. to 8:00 p.m. where USACE employees sought information from the community about NASBROBDA and responded to their questions. Most all the interviewees included personal information regarding their health and other concerns that for privacy reasons are not specifically included in this public document. When relevant information provided during interviews was substantiated by other documented sources, those other sources are cited instead of the interviewees. Where an interviewee was the only source of relevant information, it was noted in this document but unattributed to a specific person. USACE will utilize the interview information when evaluating fieldwork activities, should a project be approved.

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APPENDIX K

ABBREVIATED SITE SAFETY AND HEALTH PLAN (ASSHP)

NOT USED

APPENDIX L

PROPERTY VISIT REPORT

CESAJ-PM-M 30 September 2019

MEMORANDUM FOR RECORD

SUBJECT: PA Visual Property Inspection: Naval Air Station Banana River Off-Base Disposal Area - Florida

1. Representatives from the Jacksonville District Corps of Engineers traveled to South Patrick Shores to perform a site visit of the former Naval Air Station Banana River Off-Base Disposal Area (NASBROBDA). The Preliminary Assessment (PA) program requires a visual property inspection. The PA program supports the Defense Environmental Restoration Program (DERP) at Formerly Used Defense Sites (FUDS).

2. The PA site visit reviewed the potential for munitions and explosives of concern (MEC) and Hazardous Toxic Radioactive Waste (HTRW) based on a visual examination at the former NASBROBDA. This potential is based on an analysis of the collected information. The site visit inspection included only visual and non-intrusive methods of inspection. The PA investigation team consisted of the following personnel: John Keiser and Donna West who visited the South Patrick Shores community on 30 September 2019 and met with selected residents of the community.

3. The site visit team arrived at 165 Dorset Lane at 15:00 and met with a resident who over the course of the last year has found numerous items buried in their yard that they think are associated with former military operations. They had someone conduct a magnetometer search of the yard and marked areas where the resident subsequently dug up various objects of unknown origin. Several other residents of the NASBROBDA FUDS were present as well, one of whom brought a bucket of items found in their yard. Another resident reported that they had not found anything in their yard, including when they excavated for an in-ground pool. The site visit team spent approximately four hours at this location discussing the material found with those present and the process the FUDS program follows for evaluating sites.

4. Subsequently, the site visit team traversed the area within and near NASBOBDA by vehicle (i.e., “windshield inspection”) but did not conduct additional traverse of private residential property.

Photo 1 *– Miscellaneous material dug up by the resident at 165 Dorset Lane, 30 September 2019*

Photo 2 *– Heavily corroded material dug up by the resident at 165 Dorset Lane, 30 September 2019*

Photo 3 *– Representative Debris next to Bucket Full of Glass and Metal Debris found at 113 SE First Street, Photo taken at 165 Dorset Lane* 30 September 2019

JOHN KEISER, P.E.
Program Manager, Formerly Used Defense Site Program, Jacksonville District

DONNA WEST
Program Support Team

APPENDIX M

PROPERTY VISIT PHOTOGRAPHS

NOT APPLICABLE

Selected property visit photographs are included within the text of Appendix L – Property Visit Report.

APPENDIX N

RISK ASSESSMENT CODE (RAC) WORKSHEET

NOT USED

APPENDIX O

NASBROBDA
HISTORICAL PHOTOGRAPHIC ANALYSIS

Naval Air Station Banana River Off-Base Disposal Area

Historical Photographic Analysis – Special Report

Source: National Archives at College Park. 1947Mar18.

U.S. Army Corps of Engineers
Army Geospatial Center
Warfighter Support Directorate
Hydrologic & Environmental Analysis Branch
Environmental Analysis Group
7701 Telegraph Road
Alexandria, Virginia 22315-3864

Final Report
January 2020

Prepared for the U.S. Army Corps of Engineers, Jacksonville District

TABLE OF CONTENTS

Naval Air Station Banana River
Off-Base Disposal Area, Brevard County, Florida
Historical Photographic Analysis – Special Report

By

U.S. Army Corps of Engineers
Army Geospatial Center
Warfighter Support Directorate
Hydrologic and Environmental Analysis Branch
Environmental Analysis Group
7701 Telegraph Road
Alexandria, Virginia 22315-3864

January 2020 Final Report

Prepared for

U.S. Army Corps of Engineers, Jacksonville District

NOTICE

The views, opinions, and conclusions in this report are those of the author and should not be construed as official Department of Army positions or policy unless so designated by other documentation.

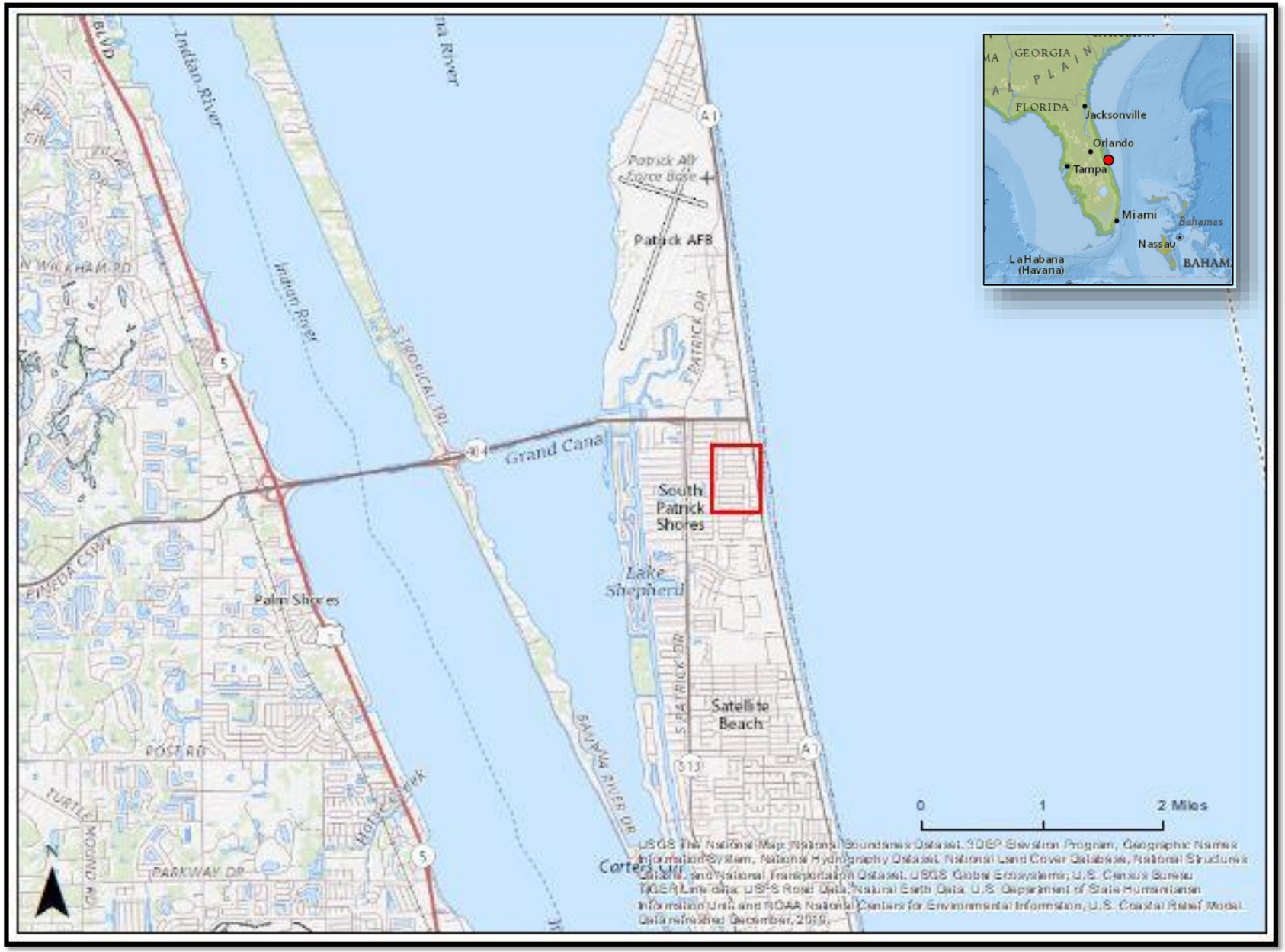
Images contained in this report may be restricted for use other than research. It is the responsibility of the party using the images from this study to contact the Army Geospatial Center, Warfighter Support Directorate in order to ascertain clearance for use.

INTRODUCTION

This report presents the results of a historical photographic analysis (HPA) of the Naval Air Station Banana River Off-Base Disposal Area (NASBROBDA) located approximately one kilometer south of the current Patrick Air Force Base, Florida. The Hydrologic and Environmental Analysis Branch of the Warfighter Support Directorate analyzed historical photographic and cartographic records relative to the project area from the 1940s to present.

The primary objective of this study was to detail the character and extent of the disposal area located off the military base between 1940 and 1960. The secondary objective was to provide topographic details for the area prior to operational use. Research was completed in collaboration with the St. Louis District Research and Technical Services Section (CEMVS-EC-ER) in support of the Preliminary Assessment (PA), completed concurrently.

METHODOLOGY



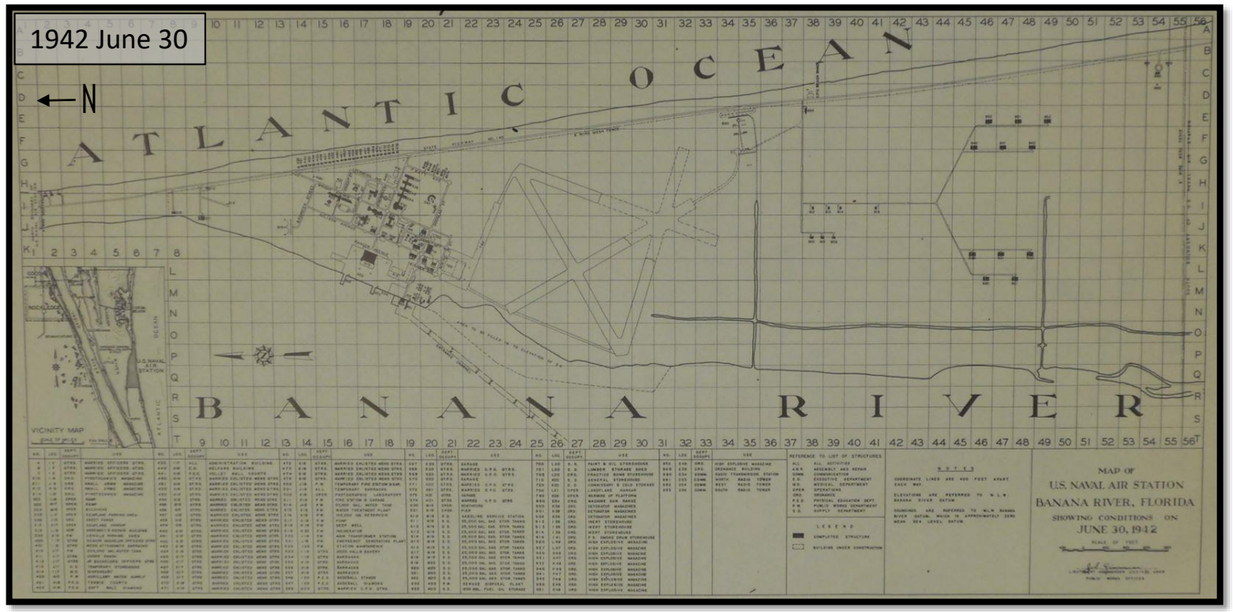
The analysis presented in this report is primarily based on historical photography from 1941 through present day. Photography captures a single moment in time. Historical Photographic Analysis (HPA) uses those moments in time to provide a narrative of activity. Significant features, derived through photo analysis, are displayed on select photos in this study. Visible signatures such as size, shape, shadow, tone, texture, and pattern allow features to be recognized on the aerial data. Limitations inherent in some of these data include substandard photo reproduction (i.e. granularity, washout, or vagueness of the image, scale, variations in time of day and tidal levels, and atmospheric haze).

Study Area

HPA STUDY AREA

The study area boundary shown in red was chosen to insure a complete overview of potential impacted area. The area boundary shown in green was selected to provide an overview of the surrounding area for select years. These boundaries do not indicate areas of activity, but areas of study used only for this historical photographic analysis.

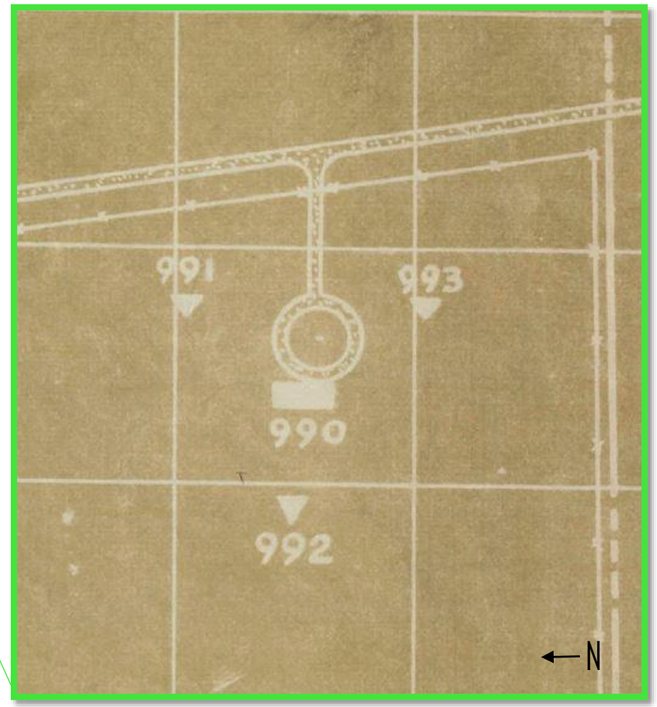
MAP OVERVIEW - HISTORY



Source: National Archives at College Park.

The maps shown relay the conditions of Naval Air Station Banana River in 1942 and 1945. The map inset below shows the nearest activity to the off-base disposal area.

Note: Additional versions of this site plan from 1943, 1944, 1946, and 1947 were available and reviewed for references relating to the off-base disposal area.

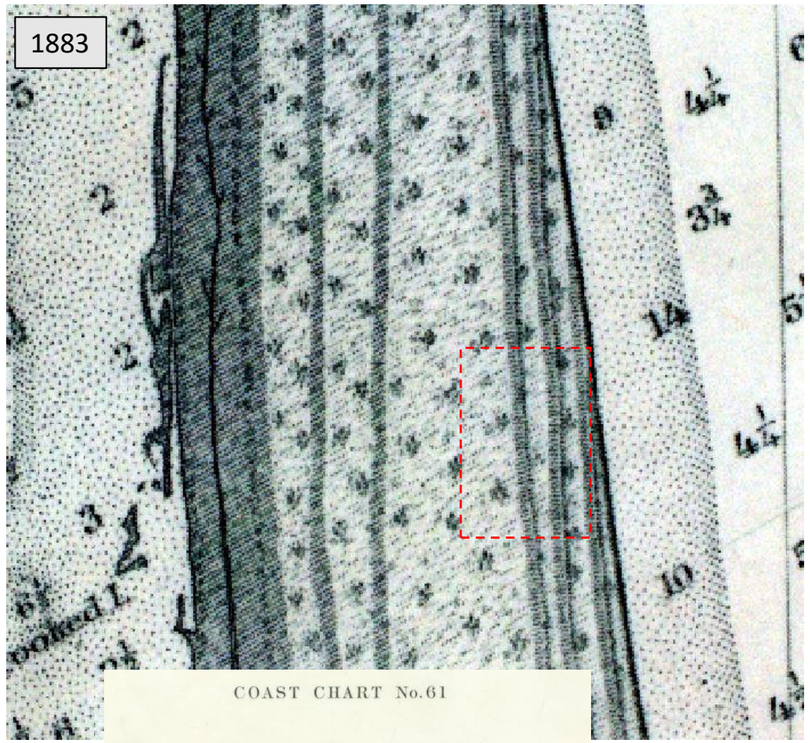


Source: Google Earth; 2017 March 20.

MAP OVERVIEW - HISTORY

These historical maps show the topography and surface material of the off-base disposal area prior to the build-up of the region north of what is shown that made up the Naval Air Station Banana River. There was no key to identify what the surface markings represented, but since most remained the same in later years we know the parallel and linear (north-south) features are naturally formed via wind and water processes. The general area was covered with grasses and evergreen shrubs. The first documented roads appear by 1932. Their use, within the off-base disposal area, diminished by 1941.

1883



COAST CHART No.61

CAPE CANAVERAL

FLORIDA

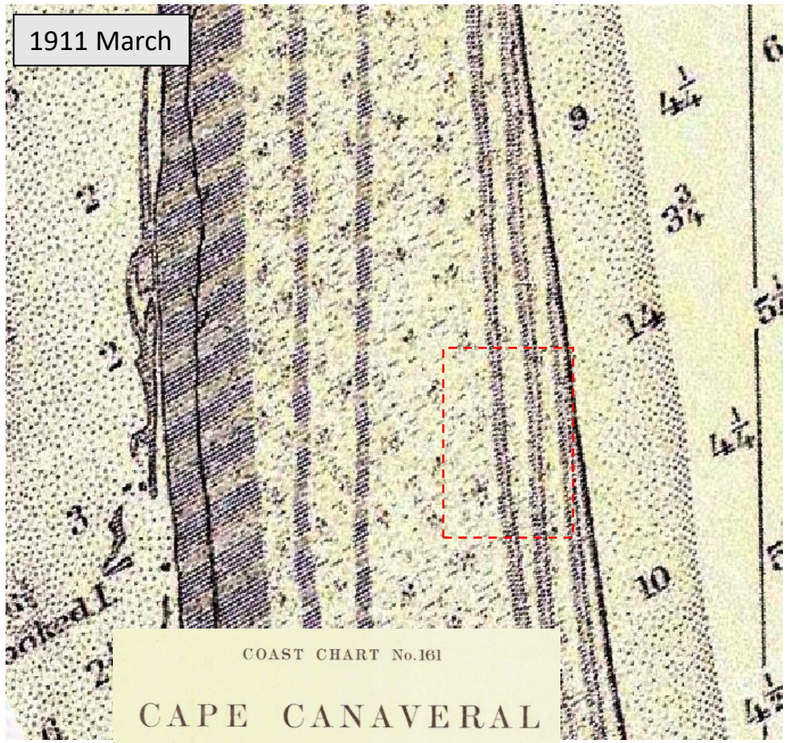
Scale 80000

1883

Issued March 1883, J.E.HILGARD Superintendent.
Verified R.D.Cutts, Assistant in charge of Office.

Approximate location of Off-Base Disposal Area

1911 March



COAST CHART No.161

CAPE CANAVERAL

FLORIDA

Scale 80000

(Polyconic Projection)

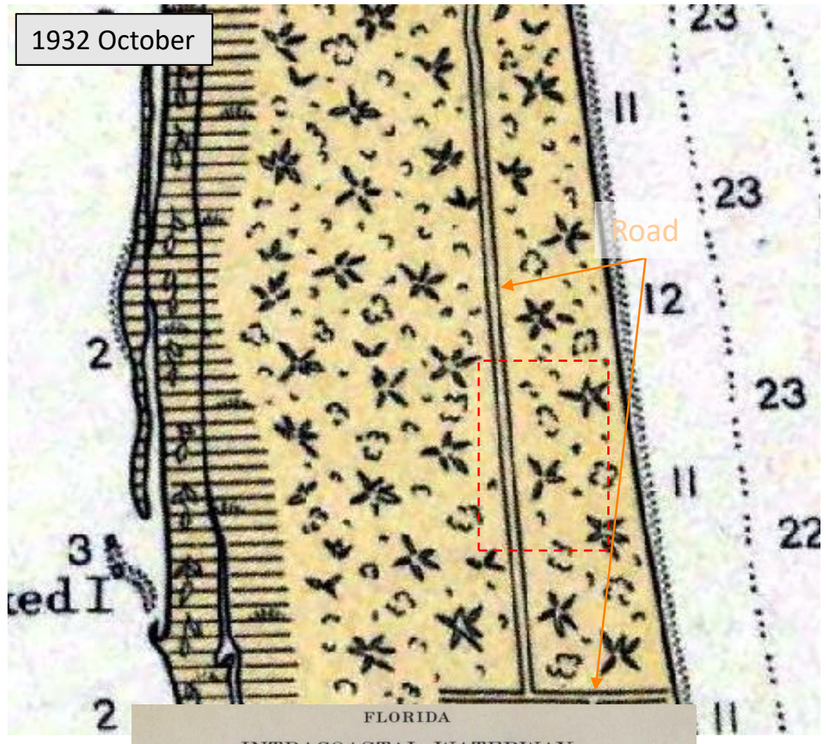
Issued March 1883, J.E.HILGARD Superintendent.
Verified R.D.Cutts, Assistant in charge of Office.

(Date of first publication, 1883)

SPECIAL EDITION MARCH 1911

Corrections to Oct. 1906

1932 October



FLORIDA

INTRACOASTAL WATERWAY

TITUSVILLE TO JUPITER INLET

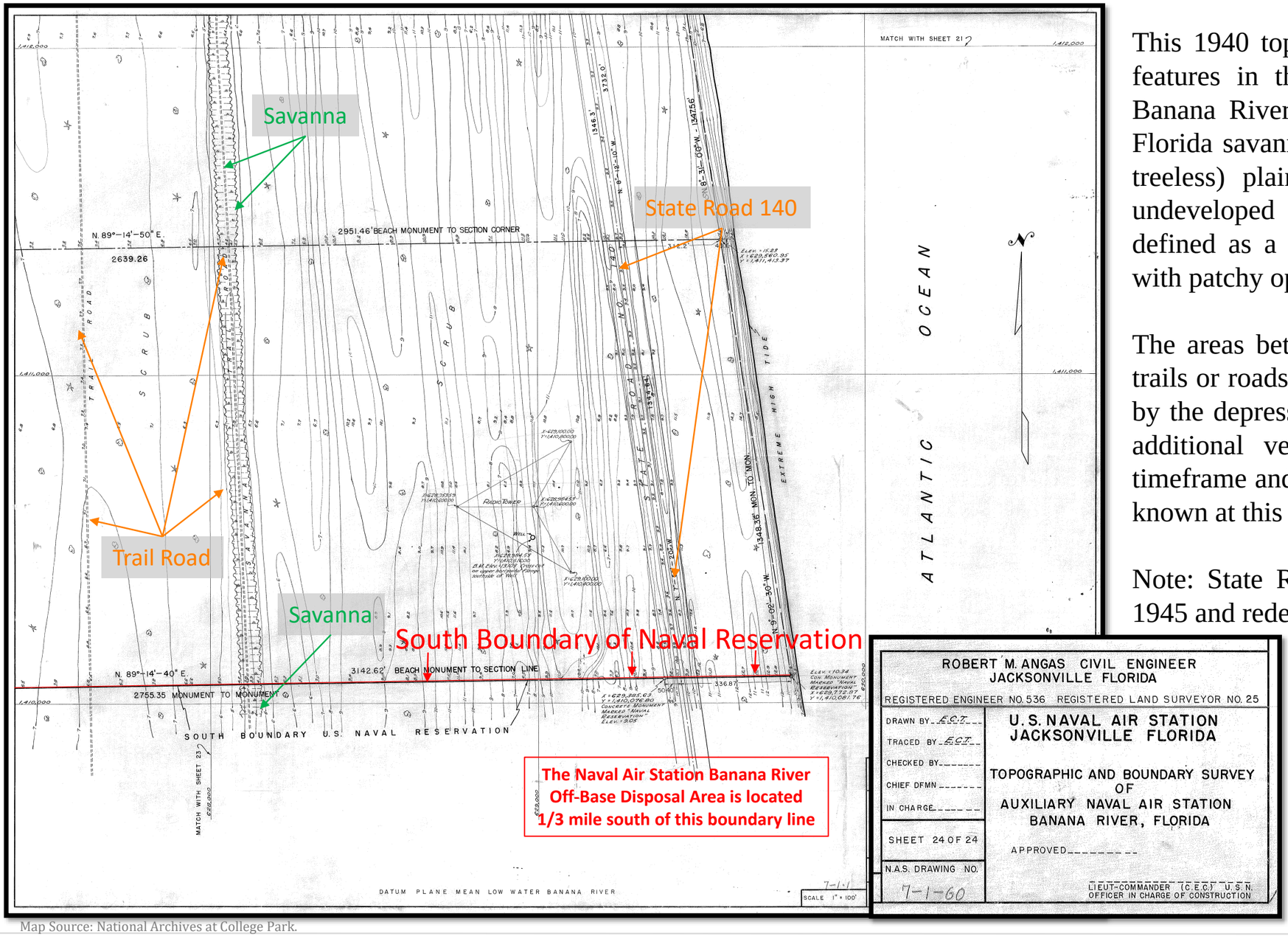
Scale 80000

SOUNDINGS IN FEET
AT MEAN LOW WATER

Published at Washington D.C. Oct. 1932
BY THE U.S. COAST AND GEODETIC SURVEY
R.S.Patton, Director

Map Source: National Oceanic and Atmospheric Administration.

MAP OVERVIEW - HISTORY



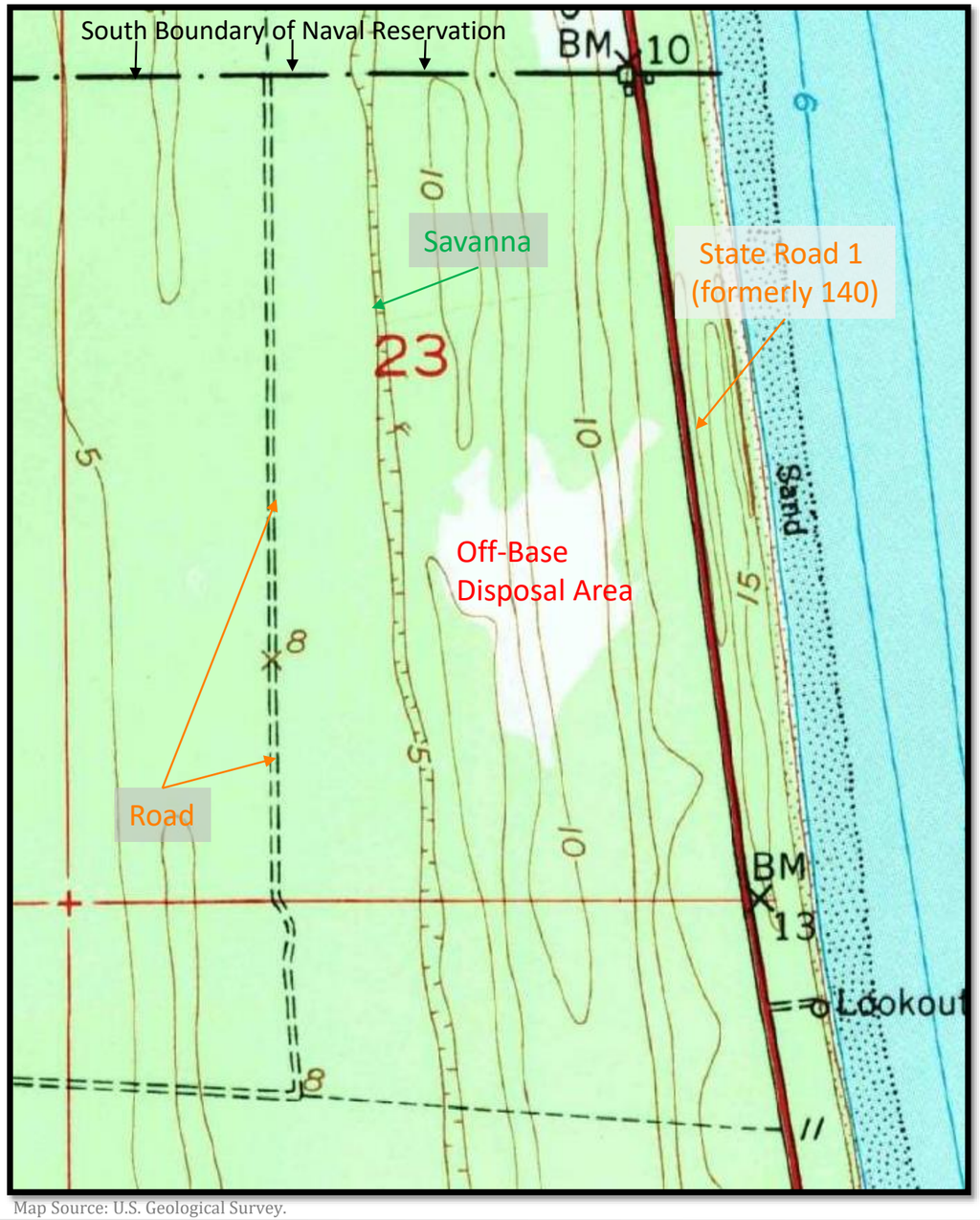
Map Source: National Archives at College Park.

This 1940 topographic map shows the pre-development features in the southeastern area of the former NAS Banana River, just north of the off-base disposal area. Florida savanna is defined as an open canopy (primarily treeless) plain made up of grasses. The majority of undeveloped surface was classified as scrub which is defined as a dense cover of evergreen shrubs scattered with patchy openings that consist of bare sand.

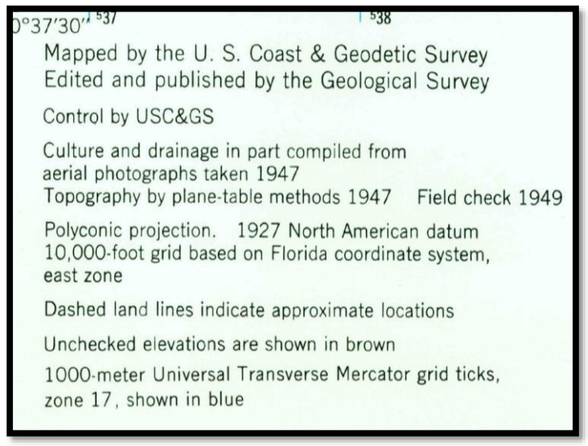
The areas between the linear sand dunes were used for trails or roads, likely due to the wind protection provided by the depression between ridges as well as some of the additional vegetation found within these areas. The timeframe and specific use of these trails and roads is not known at this time.

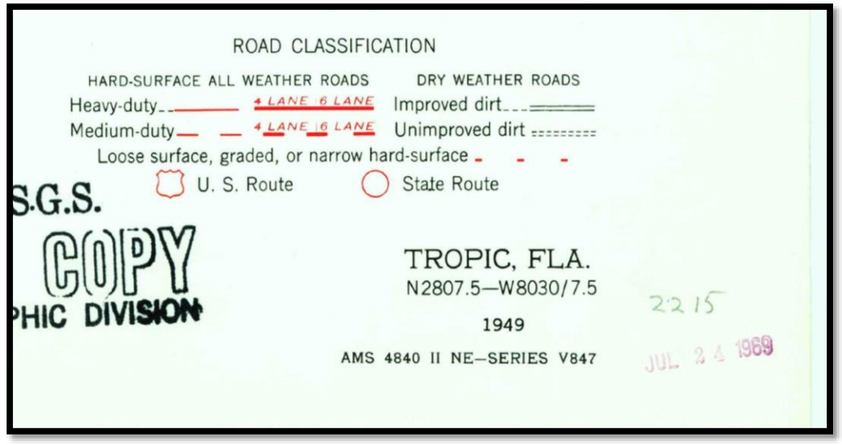
Note: State Road 140 was designated State Road 1 in 1945 and redesignated State Road A1A in 1947.

MAP OVERVIEW - HISTORY



This subset of a 1949 topographic map shows pre-development surface features in and around the off-base disposal area (illustrated by white outline). The savanna, separate road/trail, and linear sand dunes identified in the 1940 survey are still present and extend west of the area of interest.





Map Source: U.S. Geological Survey.

PHOTOGRAPHIC ANALYSIS – 24 September 1941

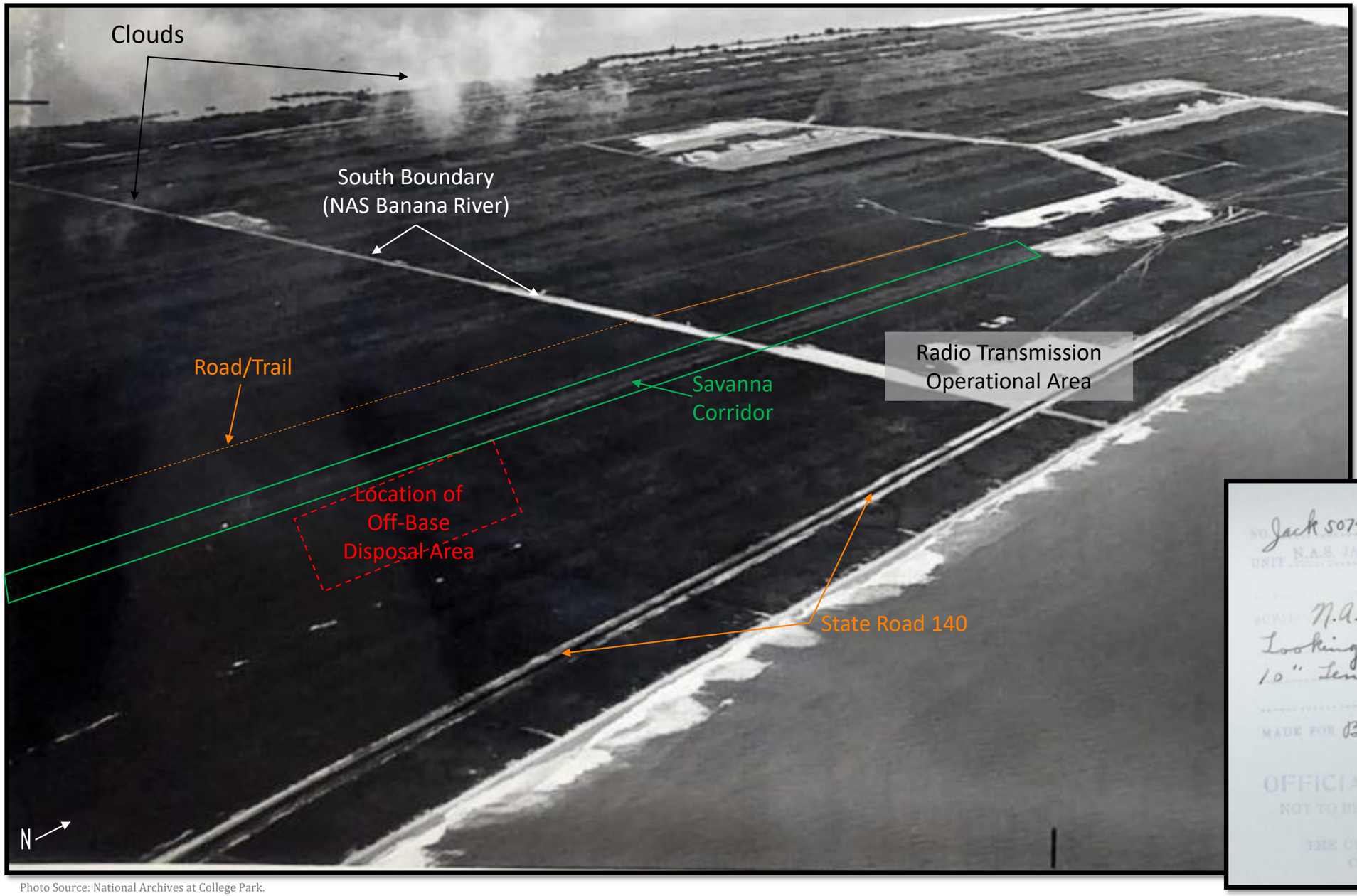
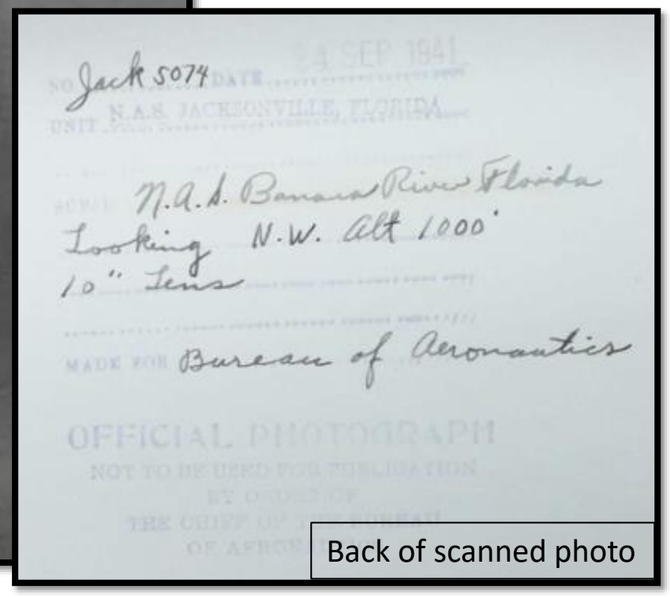


Photo Source: National Archives at College Park.

This September 1941 oblique photo shows the off-base disposal area prior to operational use. The spatial resolution is not ideal for confirmation, but roads or trails indicated on maps are not observed west of the area of interest (map location annotated on this image). The approximated boundary of the 1943 disposal area is annotated on this image for reference. The Naval Air Station Banana River was activated on 01 October 1941.



Back of scanned photo

PHOTOGRAPHIC ANALYSIS – 14 February 1943

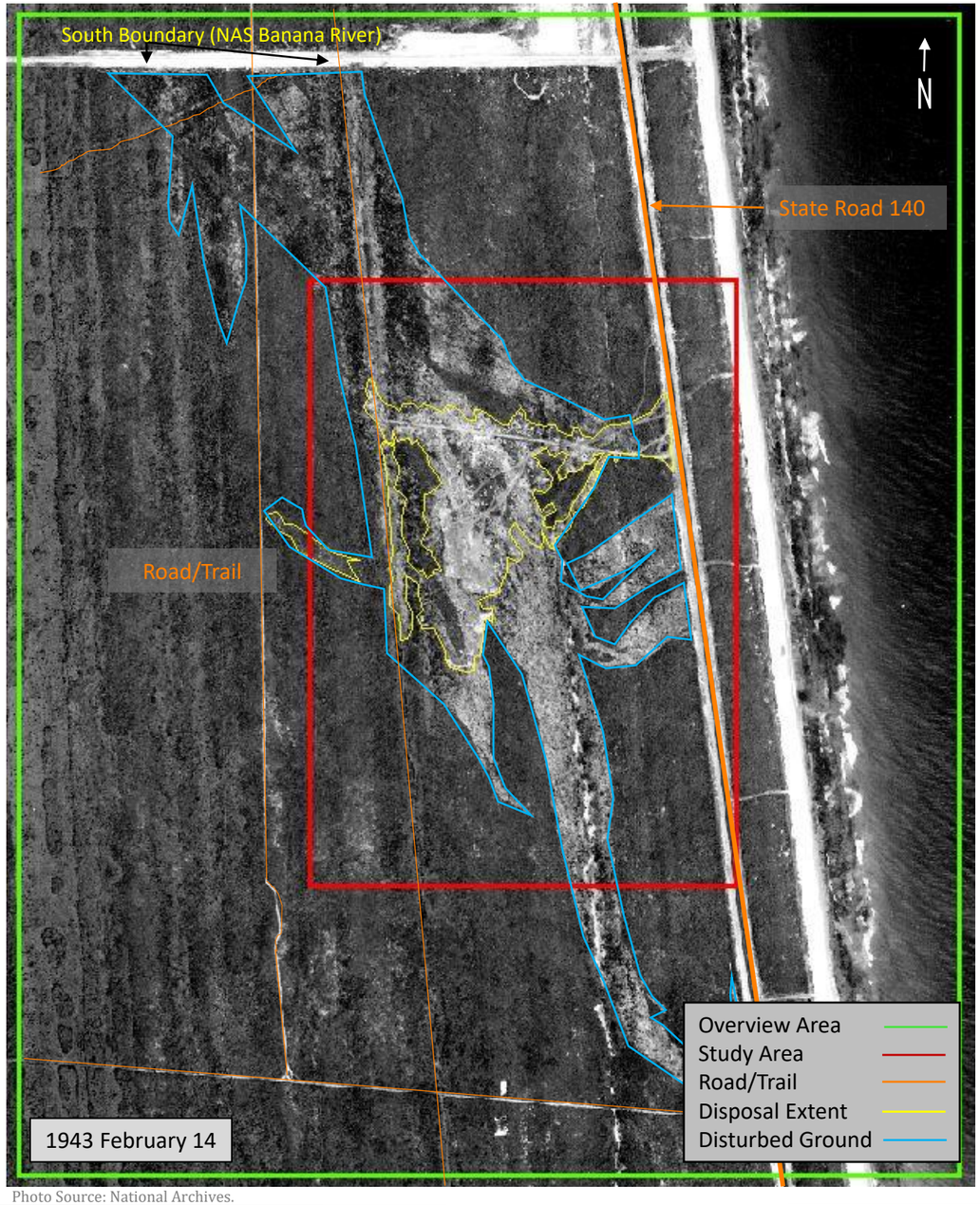


Photo Source: National Archives.

This 14 February 1943 overview shows the extent of disposal activity (yellow polygon). A wider irregular area of surface disturbance is observed (blue polygon). This disturbance is indicative of removal of vegetative undergrowth or ground cover. The origin of these changes is not directly related to disposal activities since there are no visible vehicle tracks or ground scarring present. The cause appears related to natural functions such as erosion, drainage, or wind, but the reason is not clear.

Historical documents reveal there were early issues with sand blowing across the airfield and base. Stabilization, landscaping, and wind break activities were completed by 12 February 1943. It is difficult to interpret since there was a lot of activity occurring simultaneously in the area.

Text Source: Naval History and Heritage Command.

Source: Google Earth; 2017 March 20.

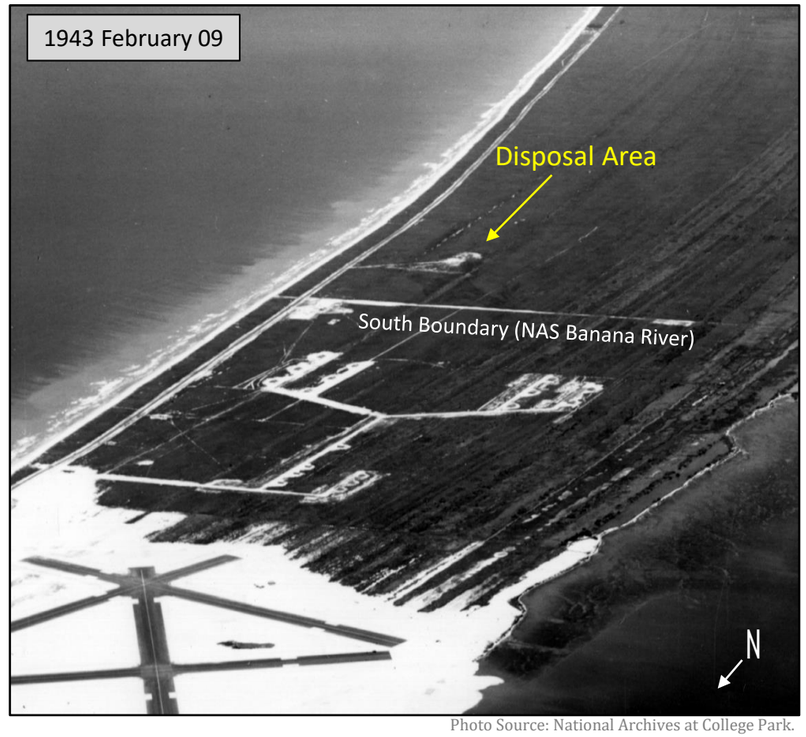


Photo Source: National Archives at College Park.

PHOTOGRAPHIC ANALYSIS – 14 February 1943

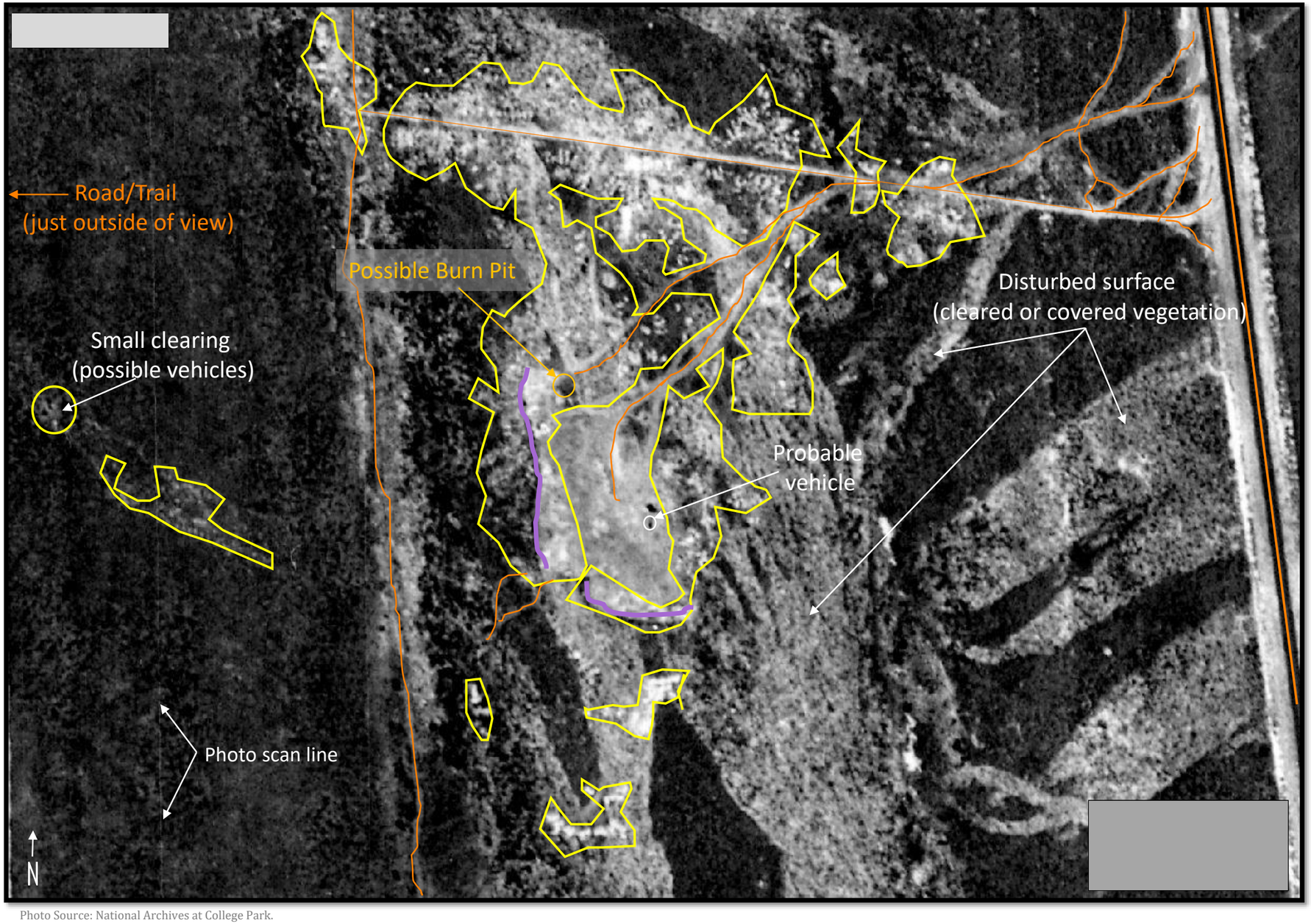
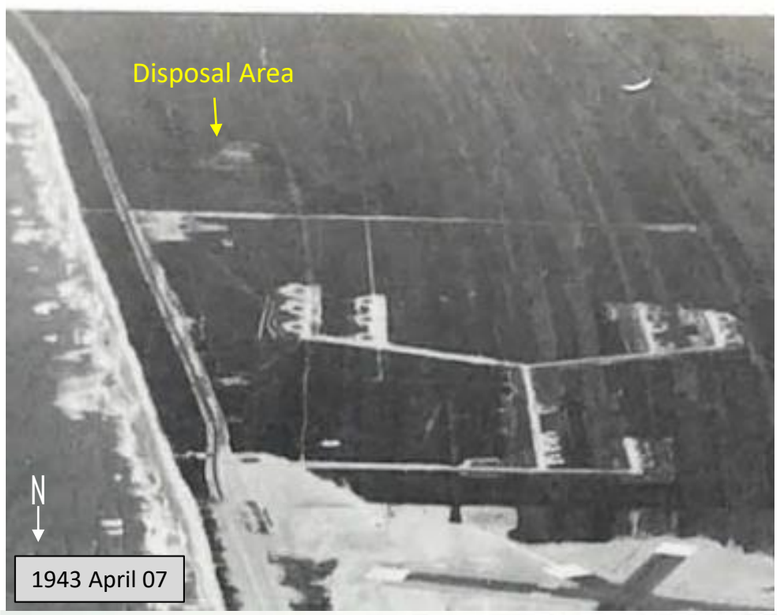


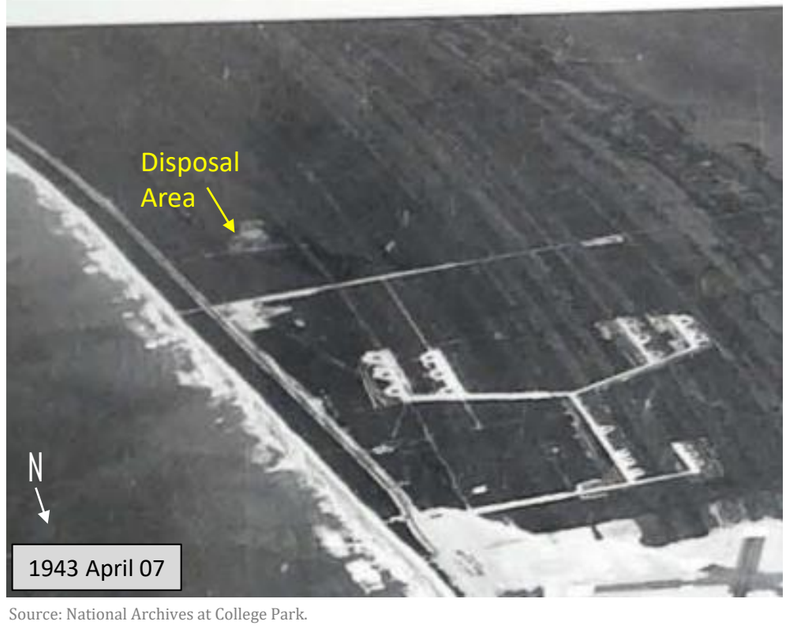
Photo Source: National Archives at College Park.

This 14 February 1943 subset from the larger overview on the previous page shows detailed activity of the main off-base disposal area. Multiple entry points on the northeast side of the disposal suggest most of the activity came from NAS Banana River. Material mounds and scattered debris are visible throughout the area.

Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 1943 Oblique Photos





Source: National Archives at College Park.

Source: National Archives at College Park.

Active burning, with visible smoke plume, is observed in the disposal area in the 19 June 1943 oblique image.

PHOTOGRAPHIC ANALYSIS – 06 June 1943

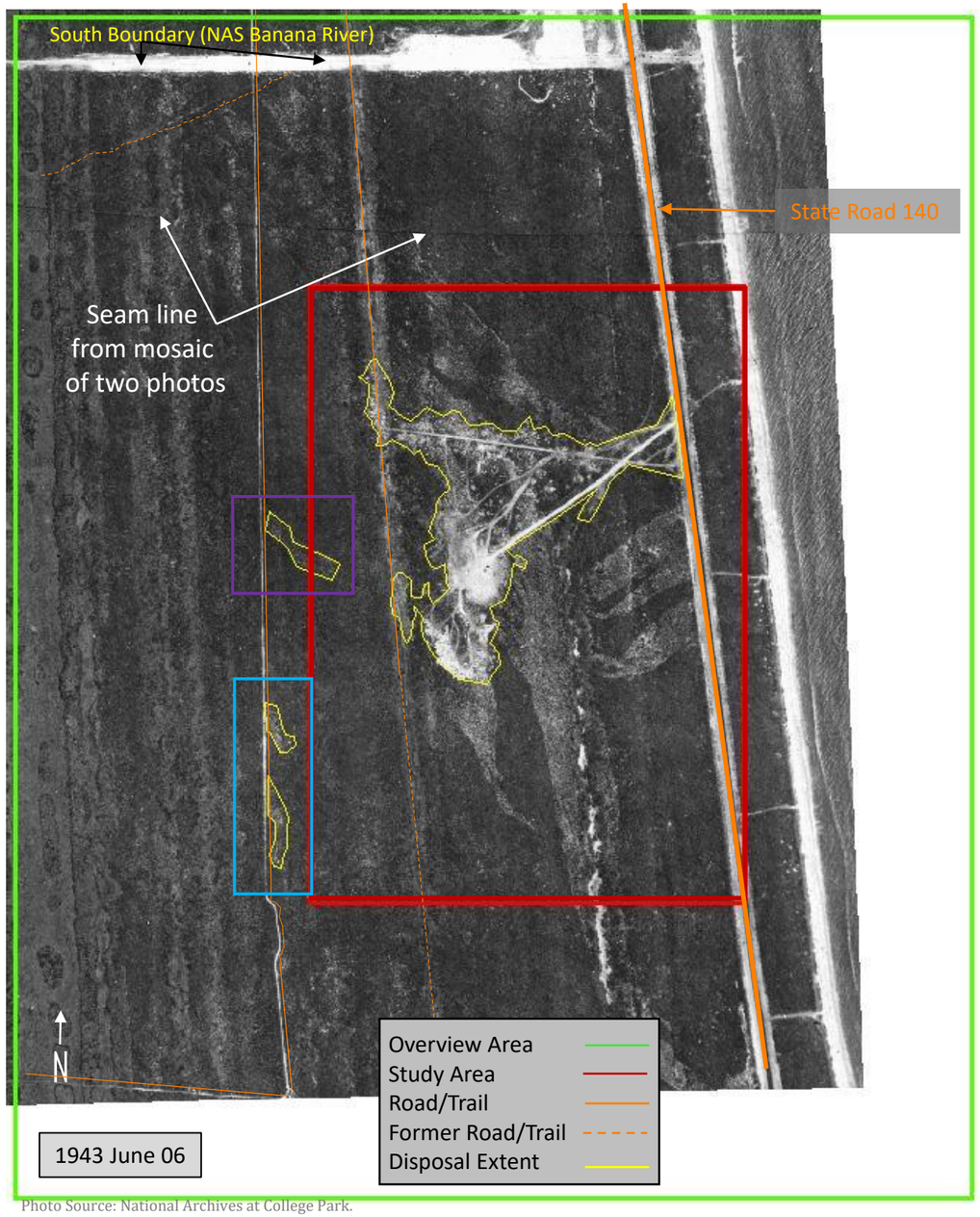
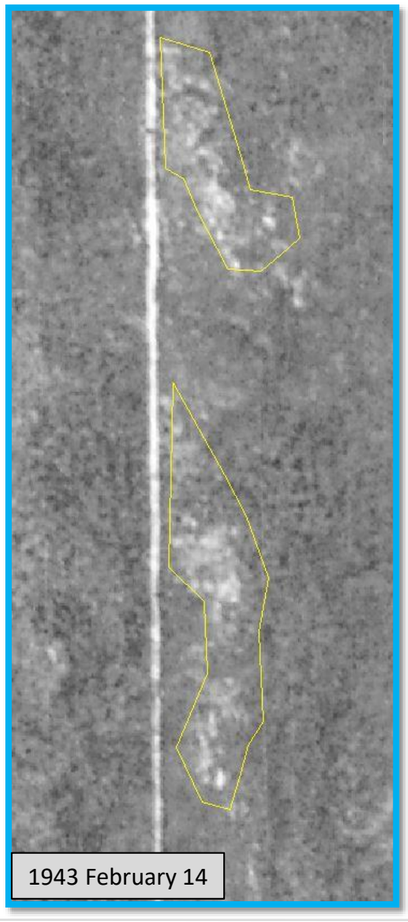


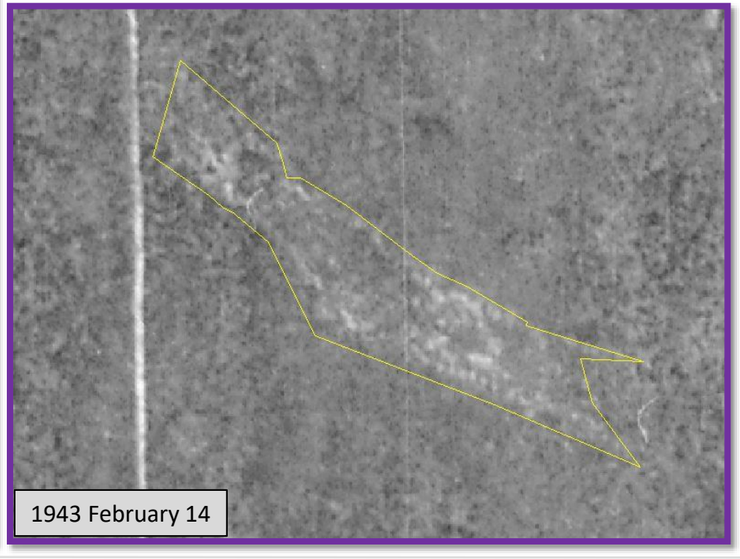
Photo Source: National Archives at College Park.

This 06 June 1943 overview shows the extent of disposal activity. The surface disturbance area is still visible, but is less distinct as observed in February of the same year as vegetation returns to its previous state or regrowth occurs.



These insets are from the 14 February 1943 aerial photo of the boundary areas shown in the 06 June 1943 overview photograph.

Source: Google Earth; 2017 March 20.



PHOTOGRAPHIC ANALYSIS – 06 June 1943

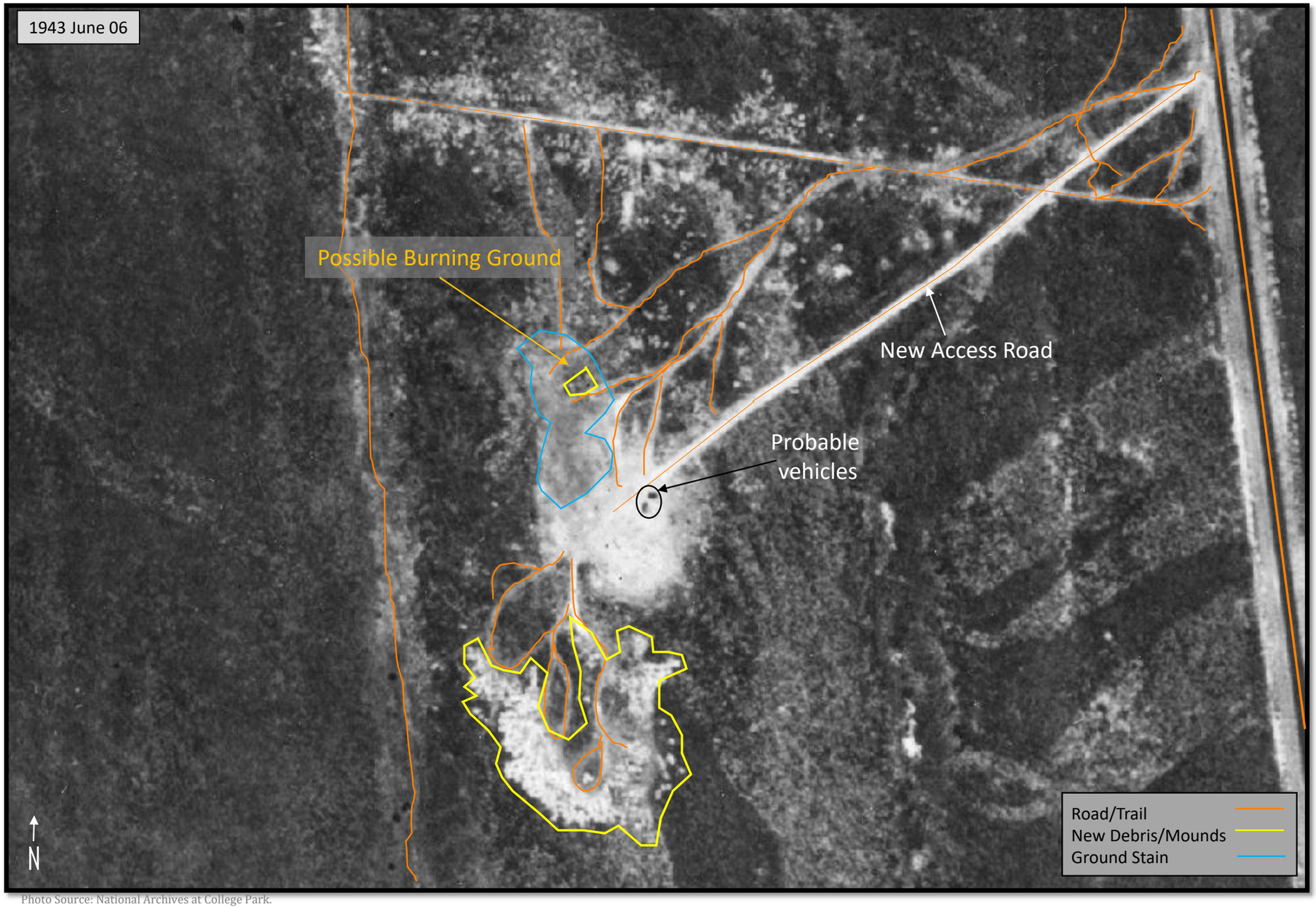


Photo Source: National Archives at College Park.

This 06 June 1943 subset from the larger overview on the previous page shows detailed activity of the main off-base disposal area. An improved access road has been created leading into the center of the disposal area. Increased use is observed with additional roads/tracks within the disposal area and additional mounded material and debris in the southernmost section of the disposal area. The upper section of the disposal area does not appear used during the February to June interim period.

Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 26 February 1944

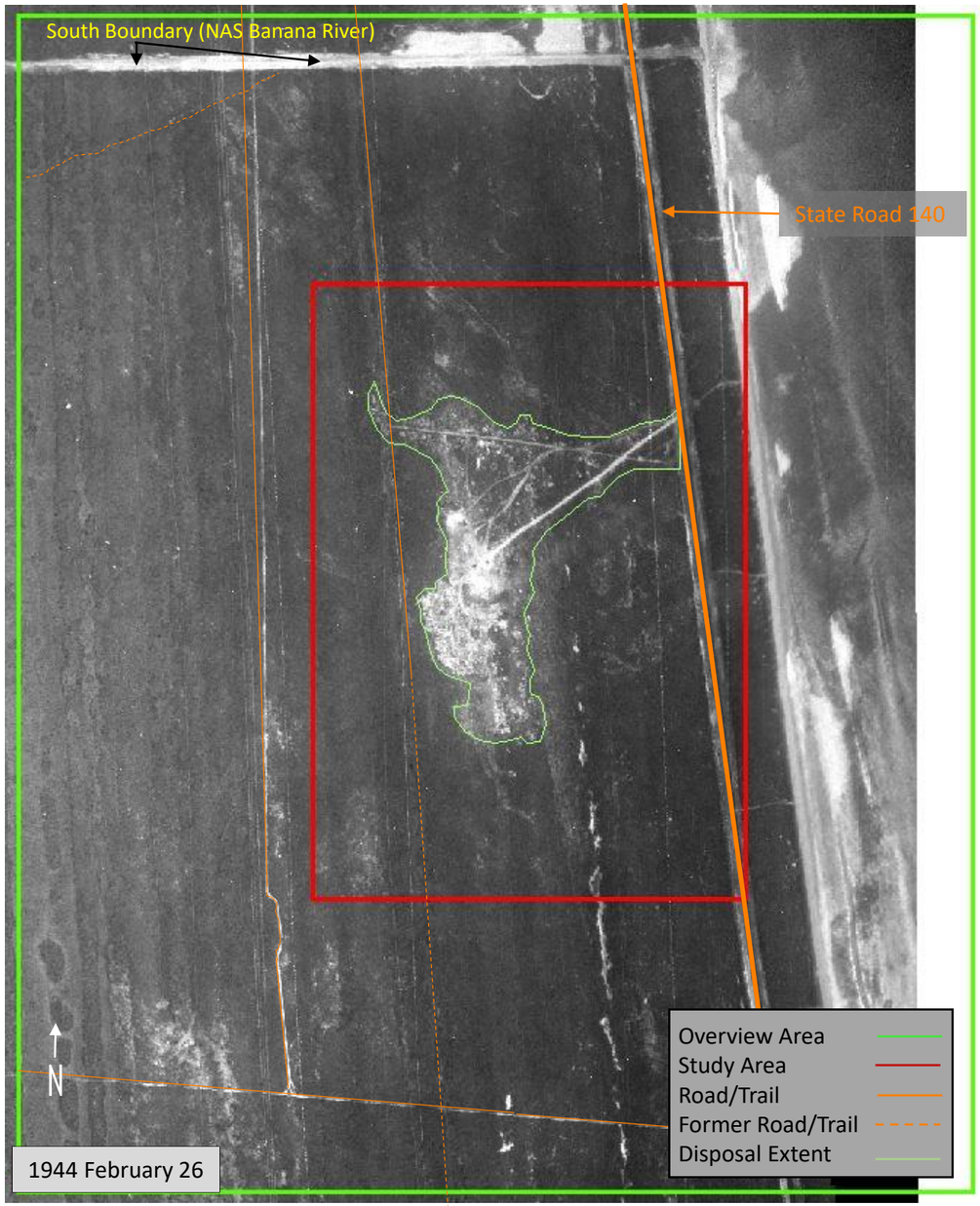
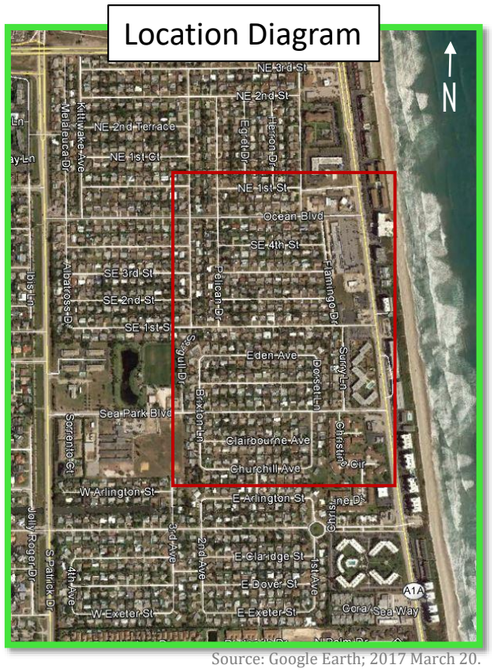


Photo Source: National Archives at College Park.

This 26 February 1944 overview shows the extent of disposal activity. The surface disturbance area is no longer visible.



Source: Google Earth; 2017 March 20.

NOTE: This photograph has multiple scan lines, or banding, that run from north to south and are not natural features. The lines are errors created during the scan of the aerial film.

PHOTOGRAPHIC ANALYSIS – 26 February 1944

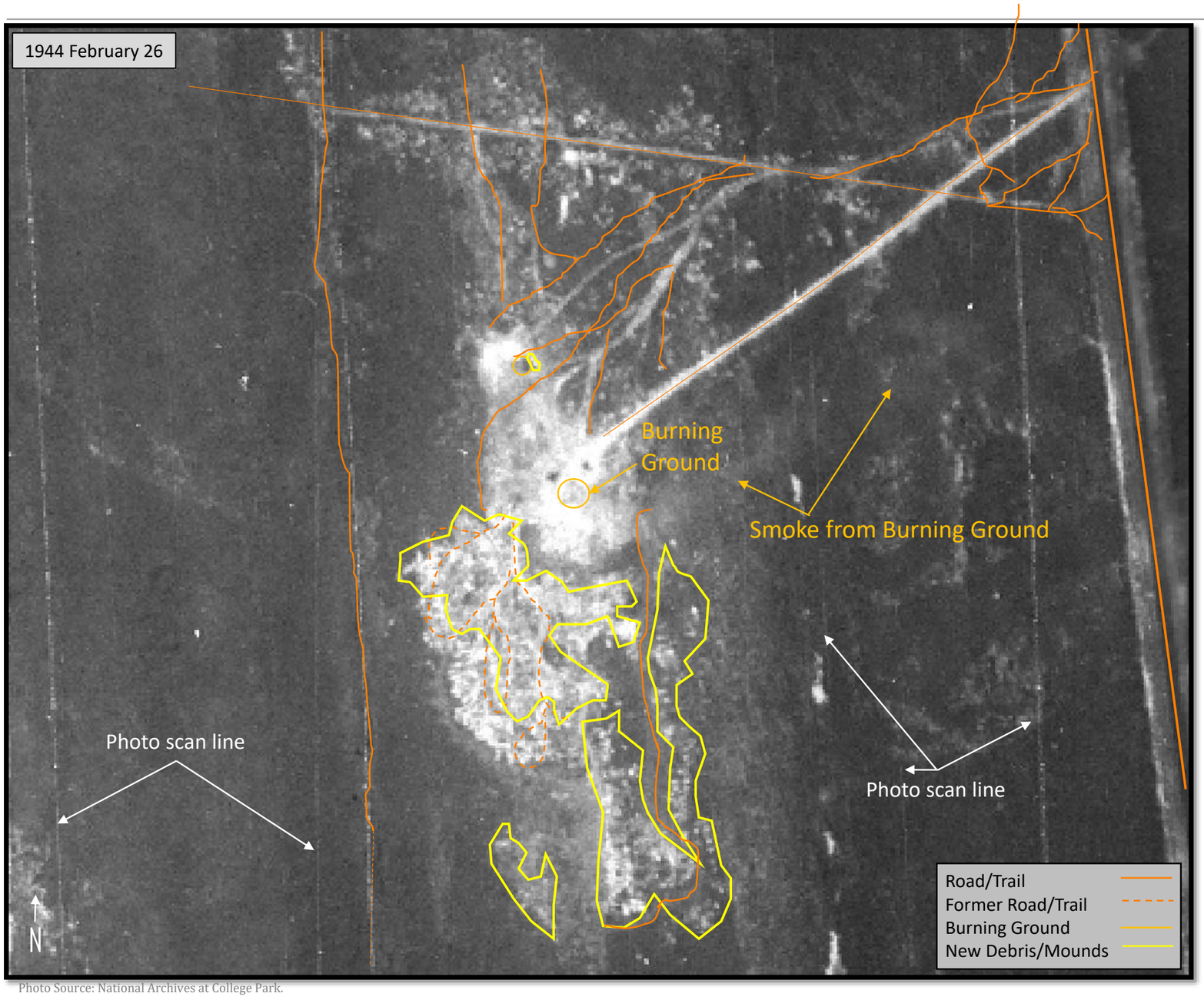


Photo Source: National Archives at College Park.

This 26 February 1944 subset from the larger overview on the previous page shows detailed activity of the main off-base disposal area. The disposal access point is located in the northeast corner curving northward toward NAS Banana River. Hundreds of small material mounds measuring 2-5 meters in diameter are visible in both the southern and northern areas of the disposal area, but increased use is observed in the center and southern sections of the disposal area. A smoke trail from an area with shallow pits is visible flowing in a northeast direction. There is a larger mound in the area of a previously identified burning ground where several smaller mounds were located.

Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 10 April 1945

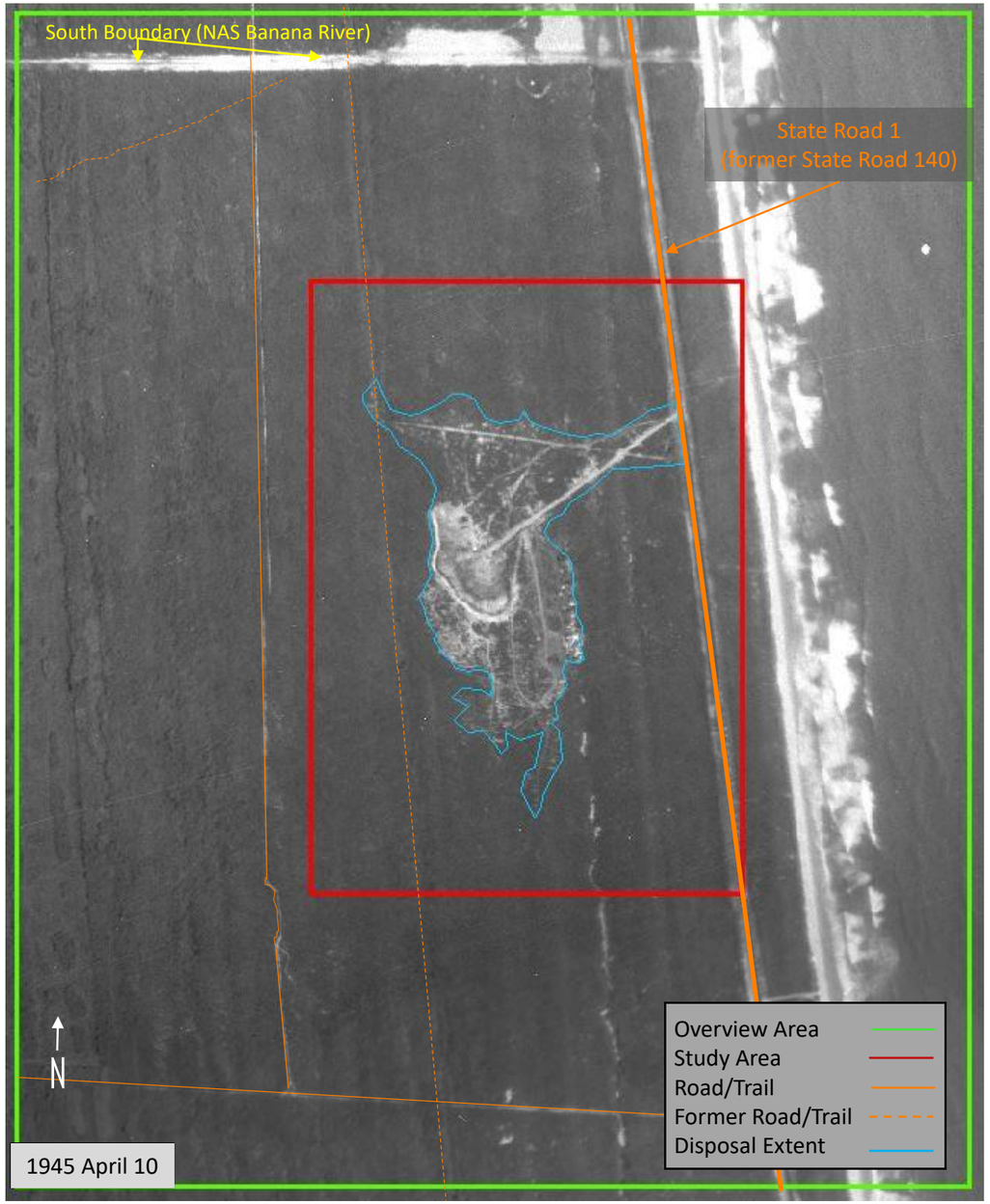


Photo Source: National Archives at College Park.

This 10 April 1945 overview shows the extent of disposal activity. The road/trail west of the off-base disposal area appears to have limited use or is relegated to a walking path.

NAS Banana River was a designated salvage point for scrap material. The amount sent to this station increased just after the war ended due to other stations closing. Disposal and burn areas are mentioned numerous times within historical documents, but locations are not specified.

State Road 140 was designated State Road 1 in 1945.

Text Source: Naval History and Heritage Command.

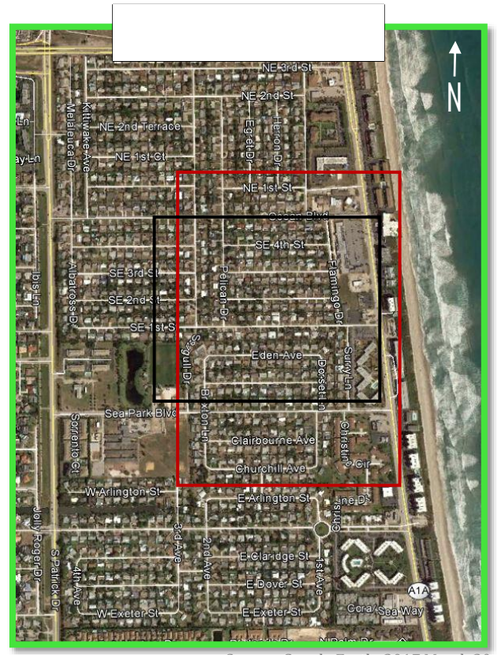
<u>NOTE</u>: This photograph has multiple subtle scratches that run southwest to northeast. The lines were likely on the film prior to scanning.

Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 10 April 1945

Photo Source: National Archives at College Park.

This 10 April 1945 subset from the larger overview on the previous page shows detailed activity of the main off-base disposal area. There is increased activity observed in the center and southern sections of the disposal area with additional roads and mounds of material and debris. There is a well defined berm surrounding the center of the disposal area. The spatial resolution of this image is poor and deters from confirmation of activity, but it appears material was being pushed to the outer edges to keep the center area clear.



Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 10 October 1945

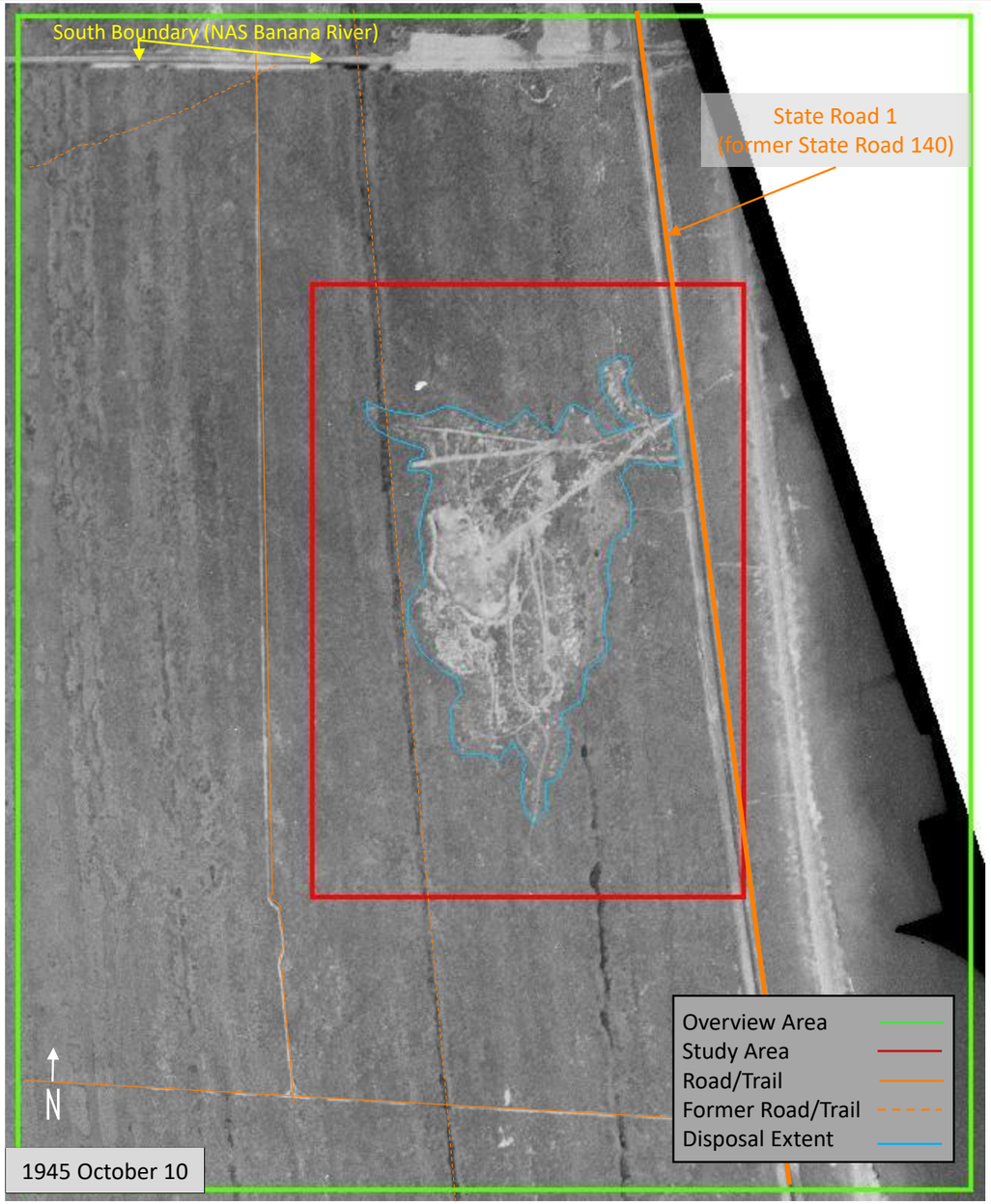


Photo Source: National Archives.

This 10 October 1945 overview shows the extent of disposal activity. The former road/trail immediately west of the off-base disposal area appears subject to erosion.

Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 10 October 1945

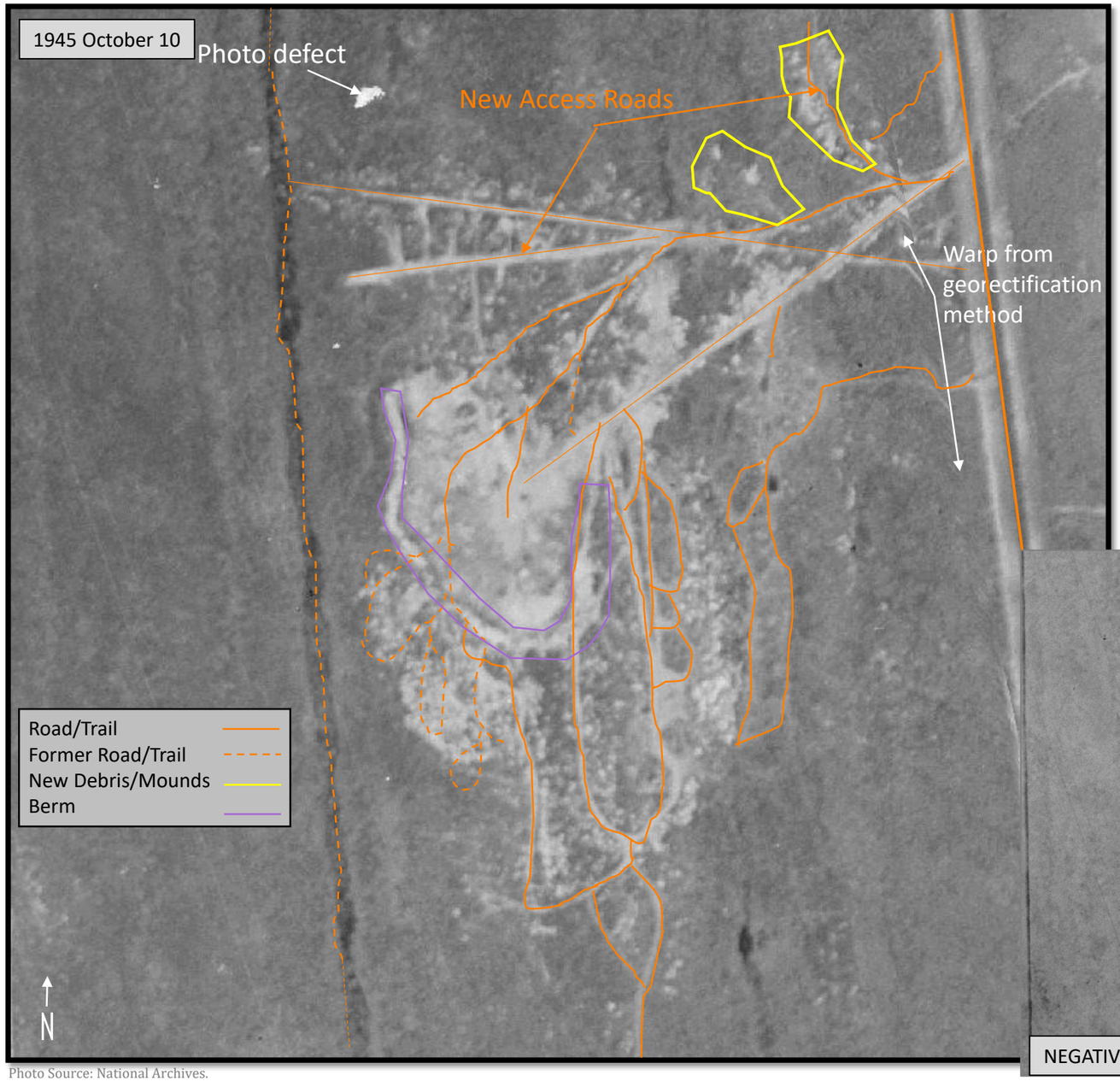
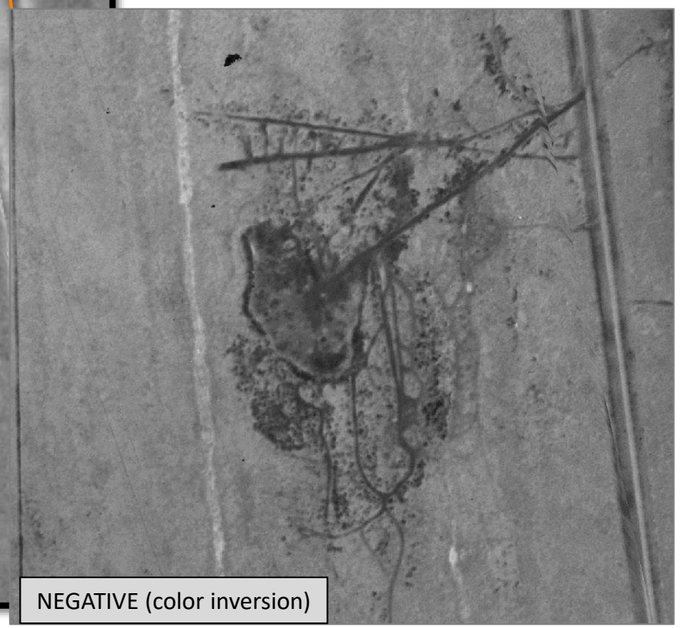
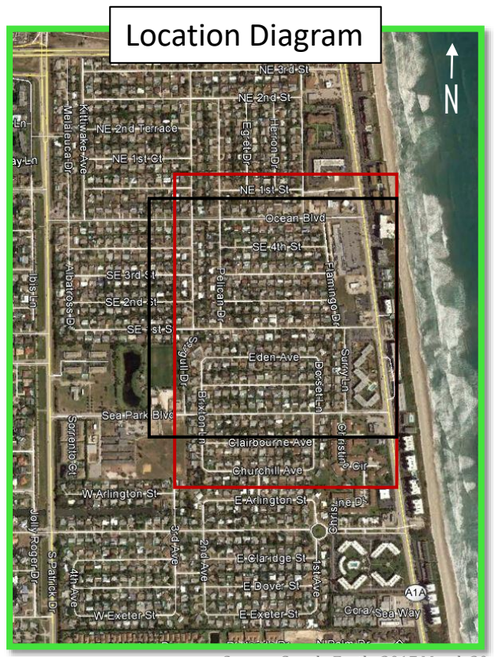


Photo Source: National Archives.

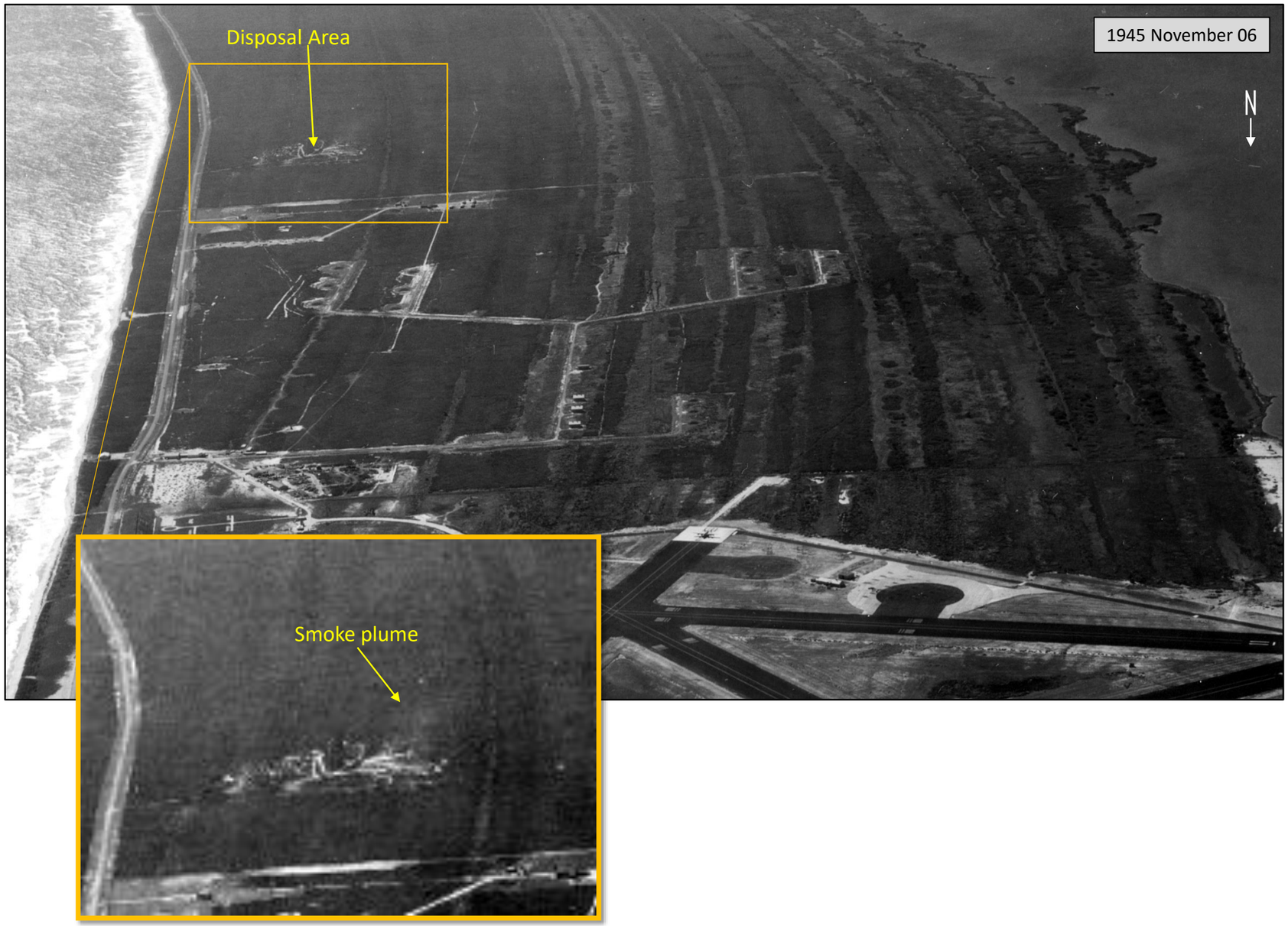


This 10 October 1945 subset from the larger overview on the previous page shows detailed activity of the main off-base disposal area. There is an increase in activity in both the uppermost and lowermost section of the disposal area with new roads and mounded material and debris. There are also additional roads observed in areas that may have been there in the April 1945 image, but poor resolution deterred identification. The previously identified berm is still in place with a break in the center to the southwest.



Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 06 November 1945



Smoke venting from an open burn pit is observed in this November 1945 oblique photograph. The below is an subset of the disposal area.

Photo Source: National Archives at College Park.

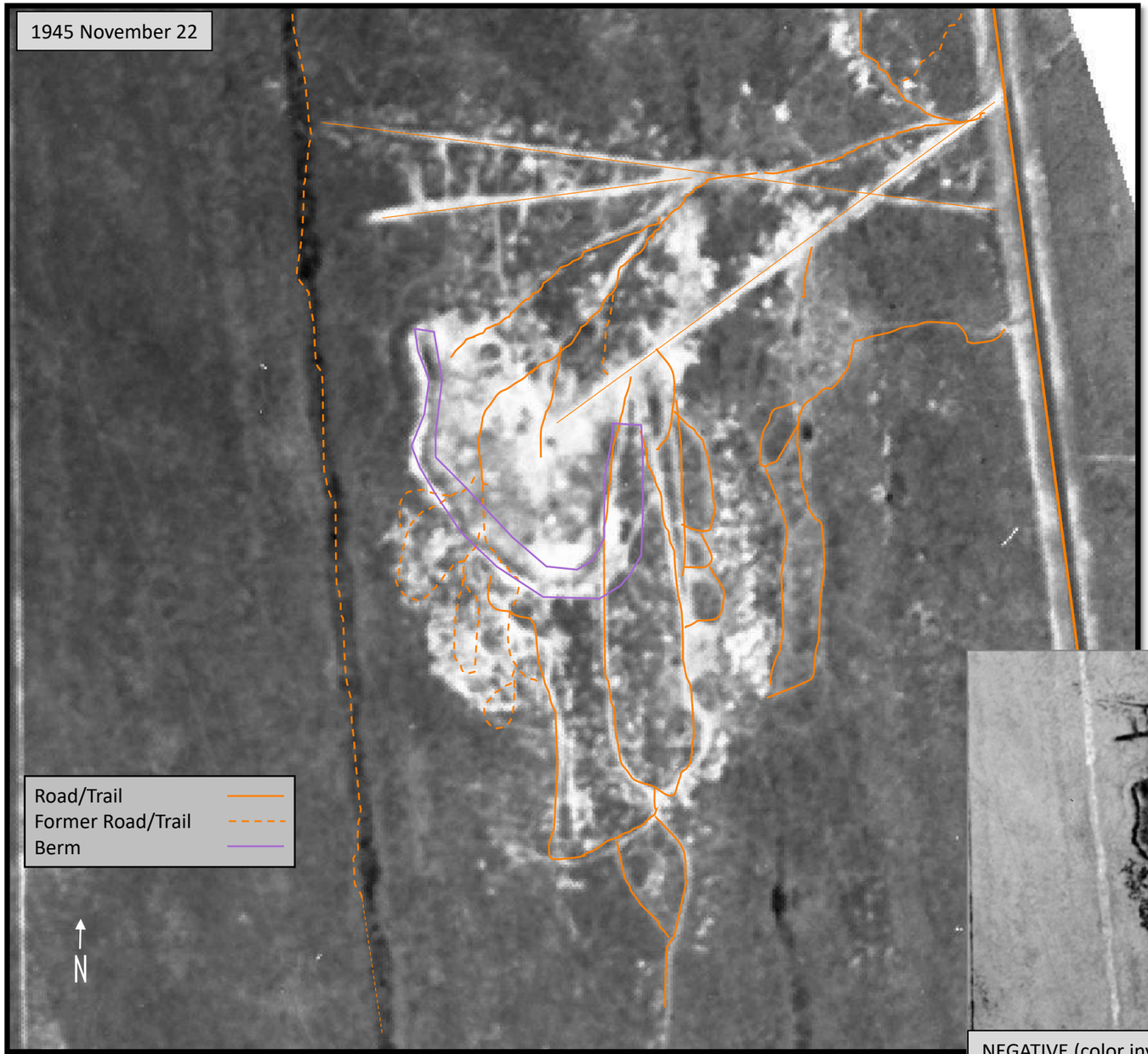
PHOTOGRAPHIC ANALYSIS – 22 November 1945

Photo Source: National Archives at College Park.

This 22 November 1945 overview shows the extent of disposal activity. Little change is observed between 10 October and 22 November 1945.

Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 22 November 1945



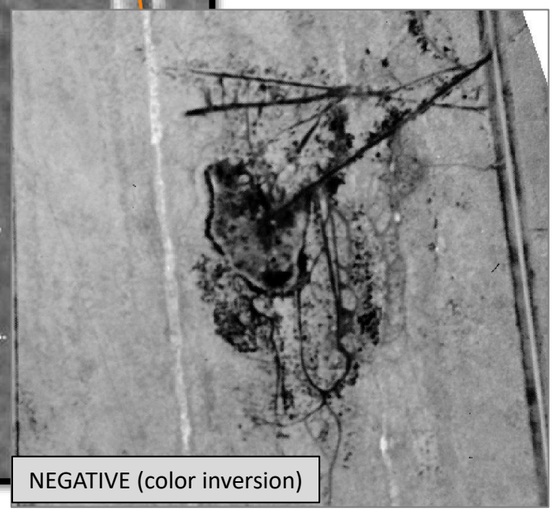


Photo Source: National Archives at College Park.

This 22 November 1945 subset from the larger overview on the previous page shows detailed activity of the main off-base disposal area. Roads leading north and south of the site are still active, along with an increase in the number of mounds of material around those access roads.

Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 19 February 1947

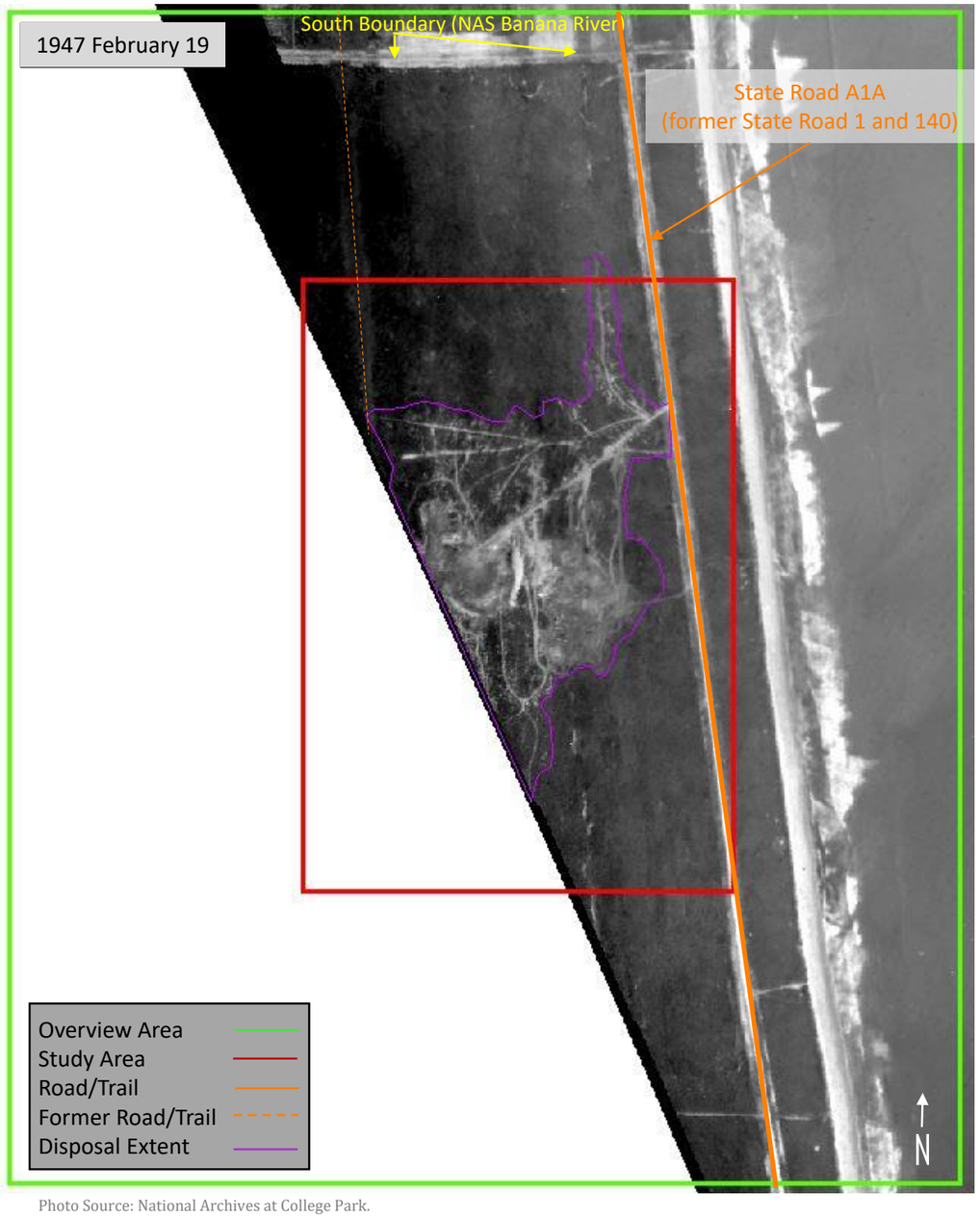


Photo Source: National Archives at College Park.

This 19 February 1947 overview shows the extent of disposal activity. There was only partial aerial coverage for this month, but a good portion of the off-base disposal area is visible.

Below is an aerial oblique acquired on 18 March 1947. The disposal area is visible from a low angle which reveals the fluctuation in height between the mounds and the natural surface.

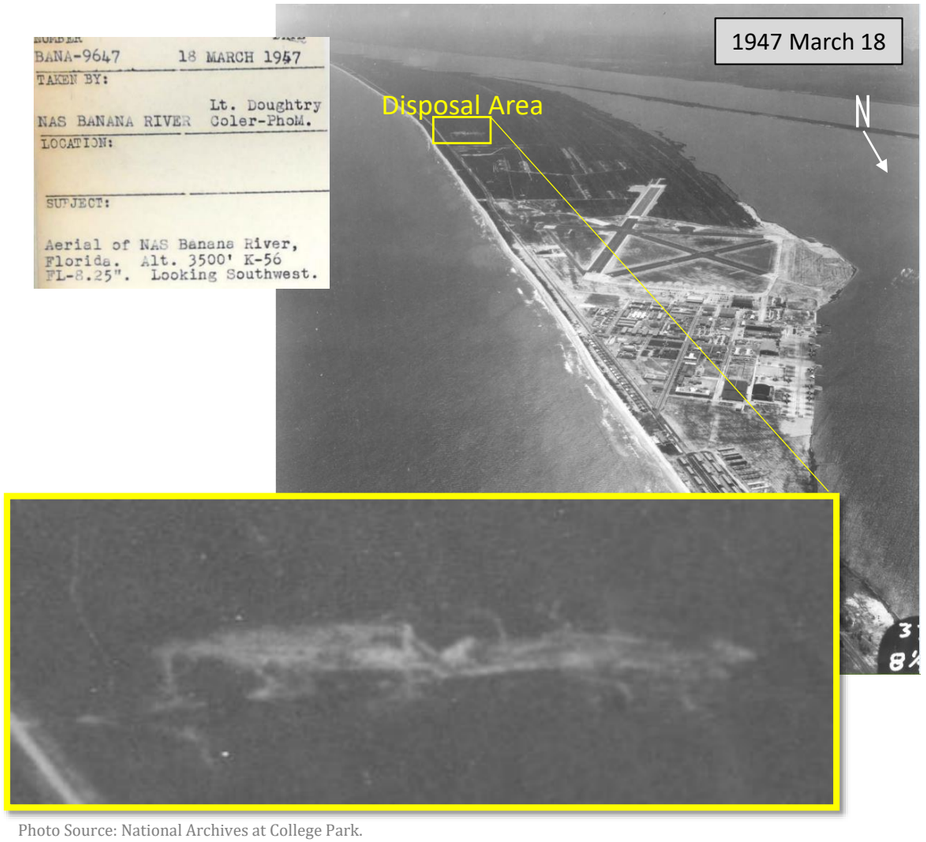
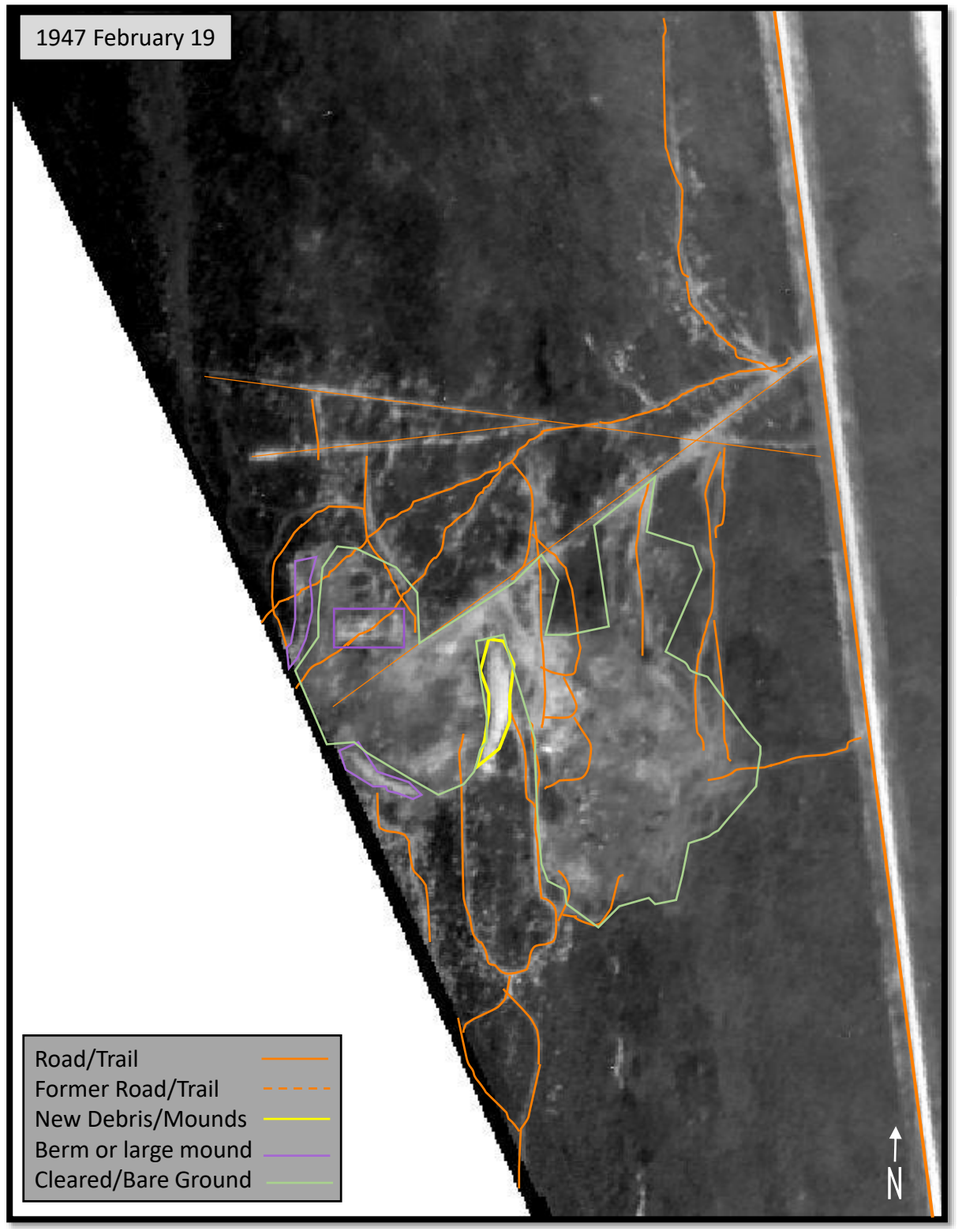


Photo Source: National Archives at College Park.

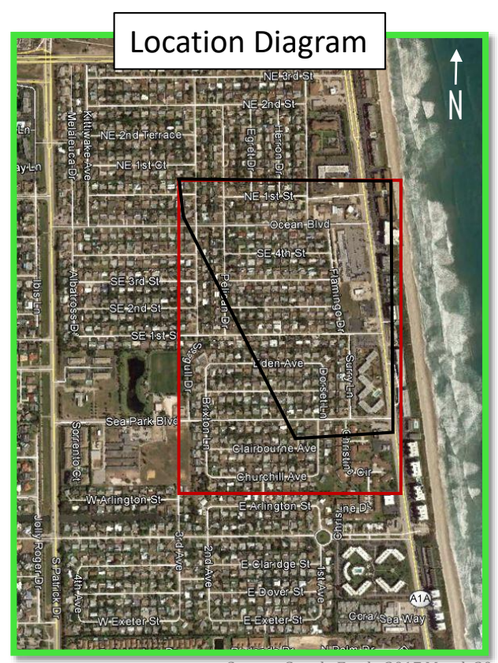
Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 19 February 1947



This 19 February 1947 subset from the larger overview on the previous page shows detailed activity of the main off-base disposal area. The central area has been expanded and a large cleared area is observed on the eastern side (between State Road A1A and the off-base disposal area) where material mounds were located in November 1945. The previous berm has been broken down with large openings where the berm used to sit. There is also a new larger linear-shaped mound in the center of the site.

Photo Source: National Archives at College Park.



Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 17 June 1947

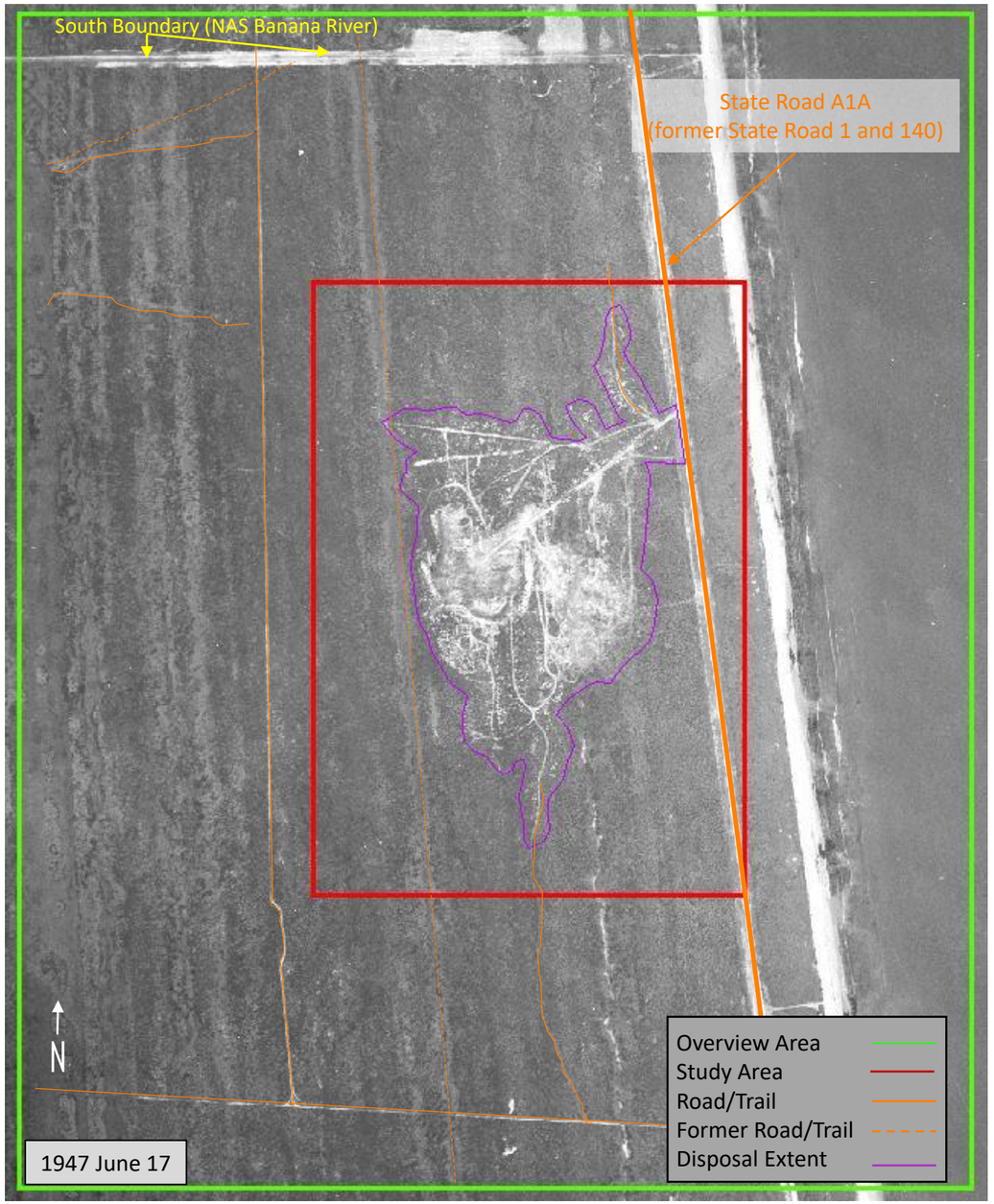


Photo Source: National Archives.

This 17 June 1947 overview shows the extent of disposal activity. There are new trail additions leading away from the existing road/trail west of the disposal area and roads extending north and south from the off-base disposal area.

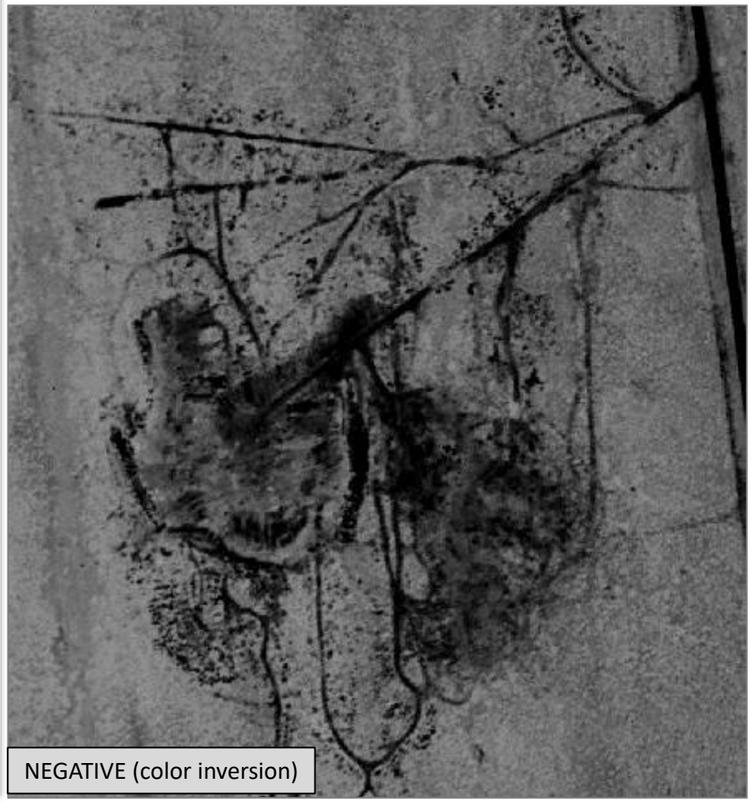
Note: State Road 140 was designated State Road 1 in 1945 and redesignated State Road A1A in 1947.

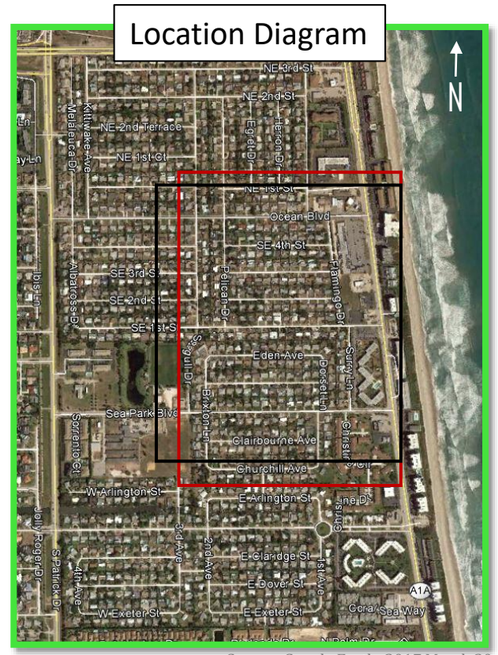
Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 17 June 1947

Photo Source: National Archives.

This 17 June 1947 subset from the larger overview on the previous page shows detailed activity of the main off-base disposal area. There are no significant changes between the area visible in February and June 1947.





Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 08 December 1947

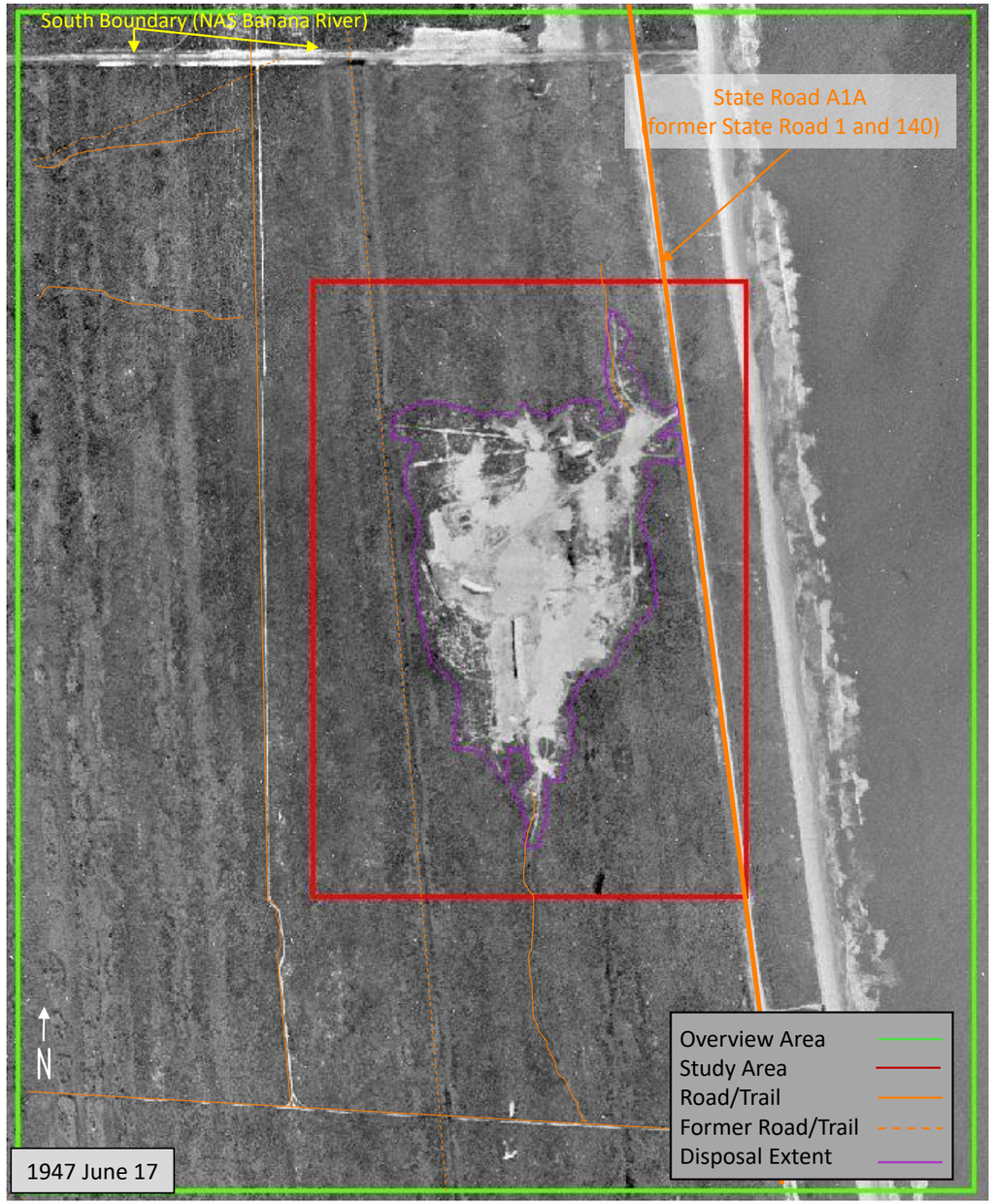
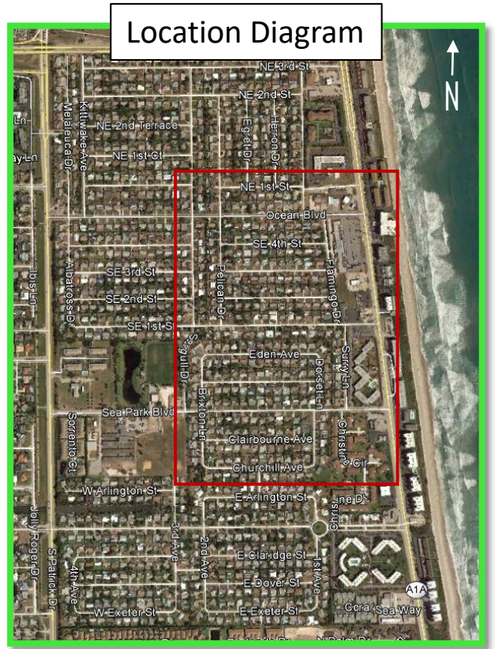


Photo Source: National Archives.

This 08 December 1947 overview shows the extent of disposal activity. Significant activity is observed between June and December of 1947. The details are displayed on the following page.



Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 08 December 1947

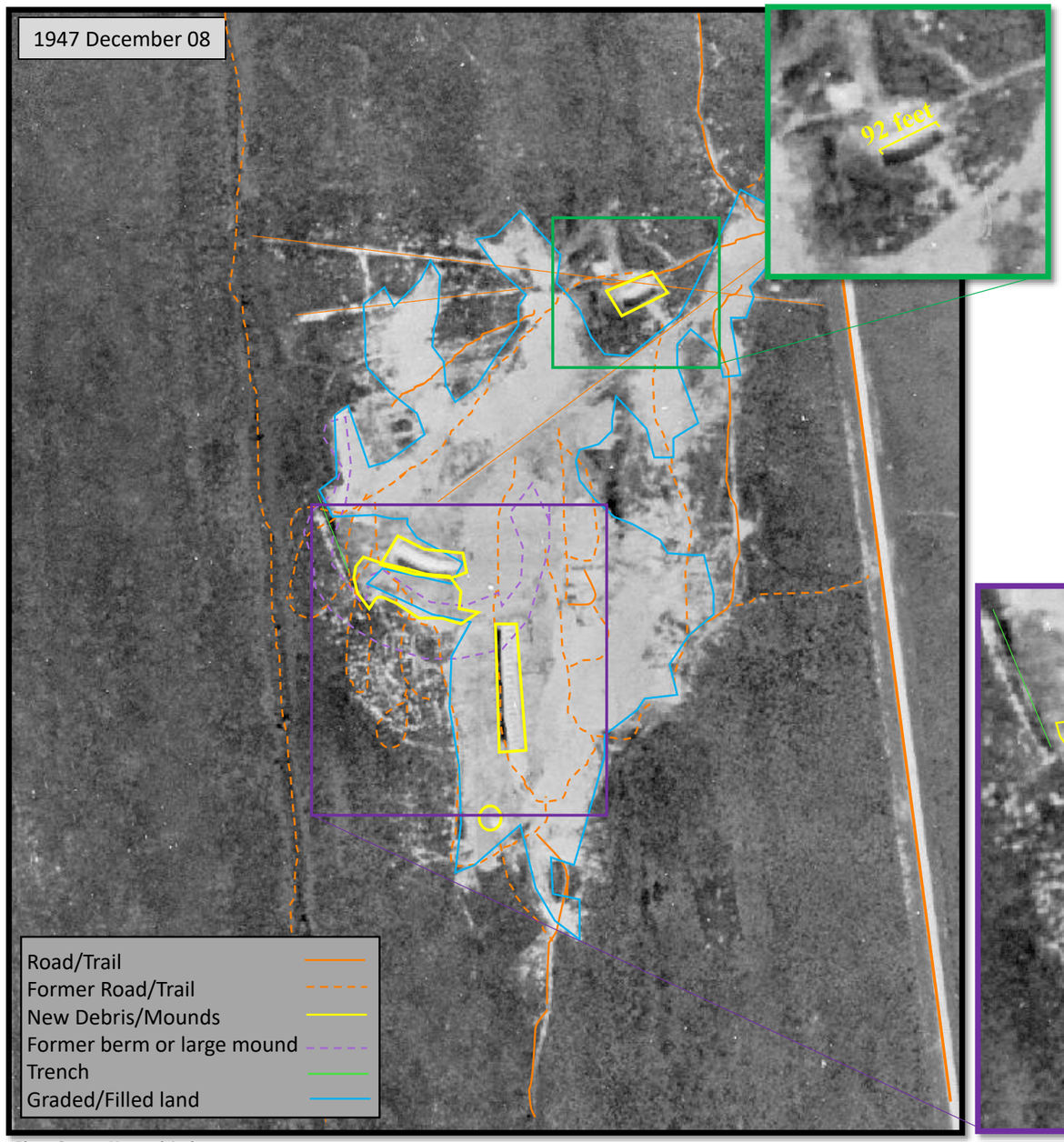
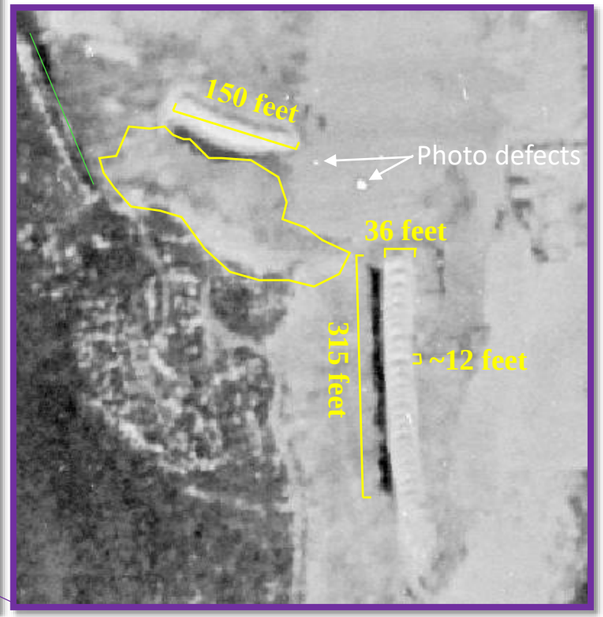
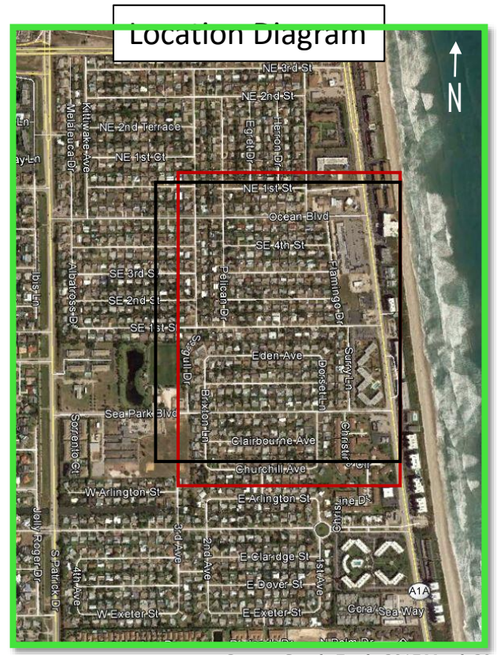


Photo Source: National Archives.



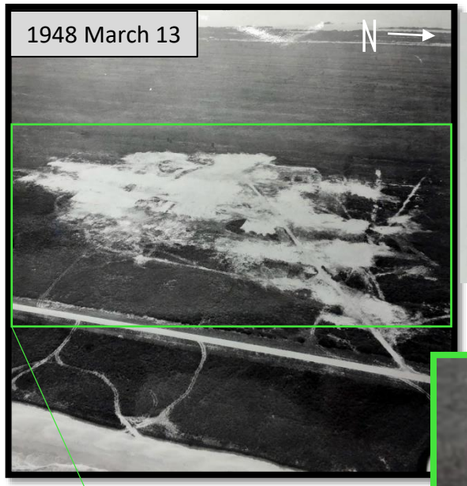
This 08 December 1947 subset from the larger overview on the previous page shows detailed activity of the main off-base disposal area.

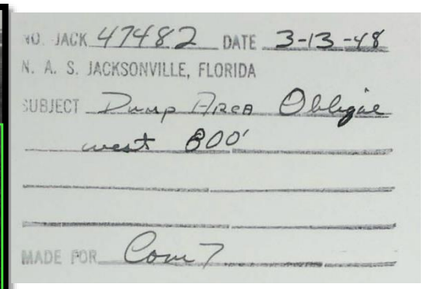
The majority of the off-base disposal area has been filled and/or graded. There are still a few areas on the perimeter containing scattered mound and debris. There are three distinct linear containment area/structures. The shadow of the longest feature, in the southern section of the site, falls to the west which could be caused by an overhang and the feature appears slanted (note: the time of photo acquisition would have cast shadows to the north if the feature was evenly distributed).



Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 13 March 1948

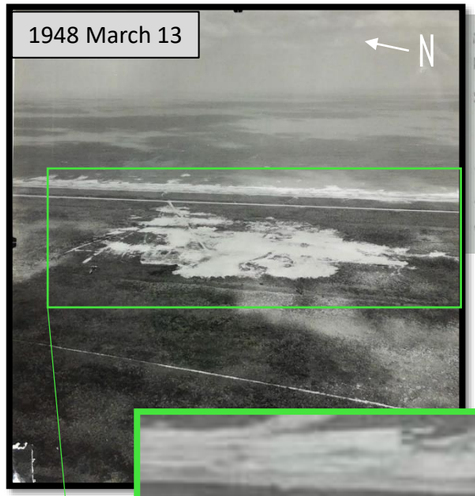




This oblique photograph taken on 13 March 1948 shows the former off-base disposal area mostly leveled by fill and/or grading.

Photo Source: National Archives at College Park.

PHOTOGRAPHIC ANALYSIS – 13 March 1948



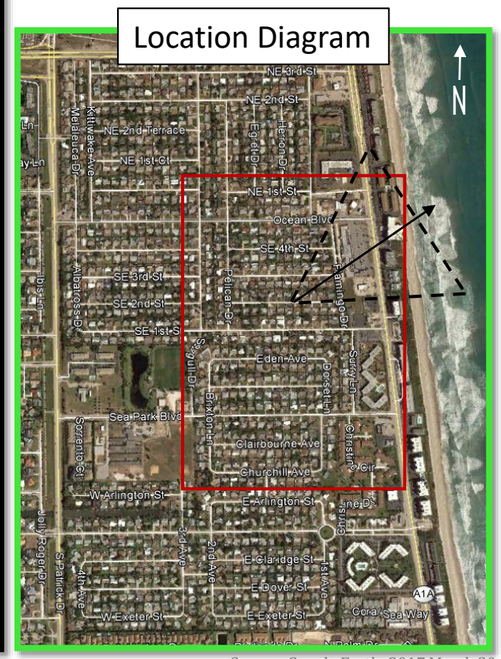
This oblique photograph taken on 13 March 1948 shows another view of the former off-base disposal area after restoration efforts.

Photo Source: National Archives at College Park.

PHOTOGRAPHIC ANALYSIS – 13 March 1948

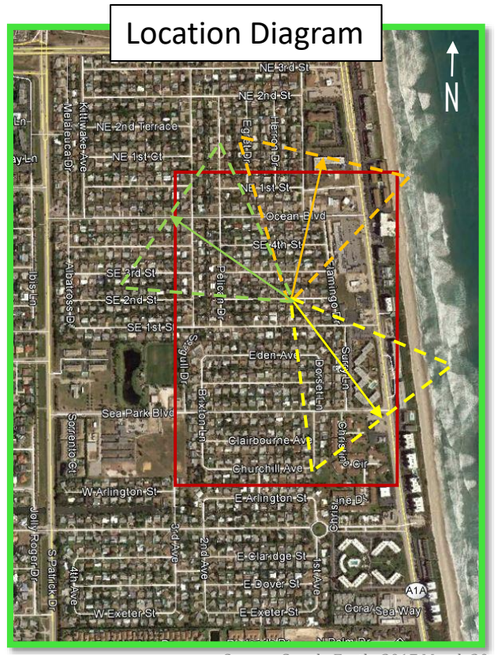
Photo Source: National Archives at College Park.

This ground photograph, taken 13 March 1948, shows a view from within the former off-base disposal area on the main access road looking east toward the coastline.



Source: Google Earth; 2017 March 20.

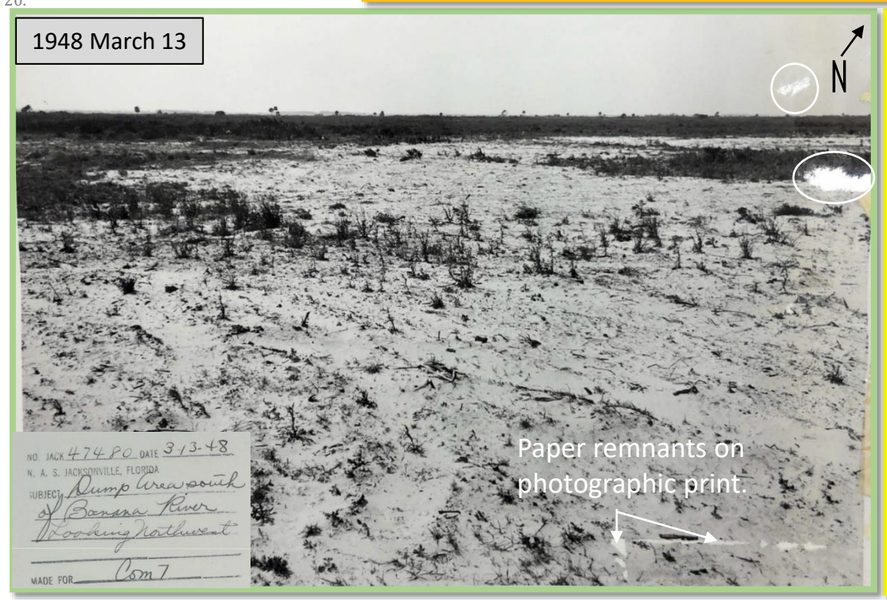
PHOTOGRAPHIC ANALYSIS – 13 March 1948



Source: Google Earth; 2017 March 20.

These ground photographs, taken 13 March 1948, show the former off-base disposal area after restoration efforts.

Note: Glare spots are visible on all of these photos (annotated in white). The glare came from an overhead lamp during data collection.



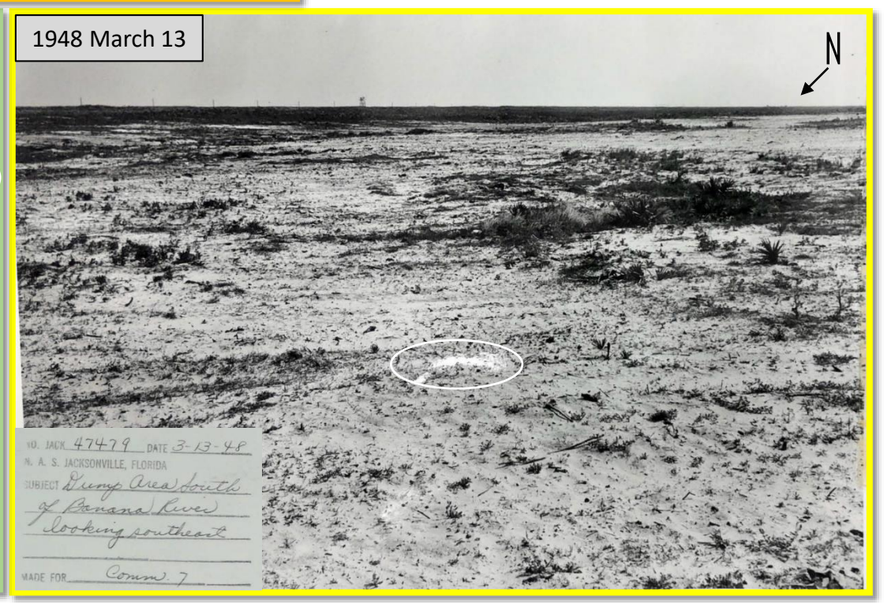


Photo Source: National Archives at College Park.

PHOTOGRAPHIC ANALYSIS – 08 April 1950

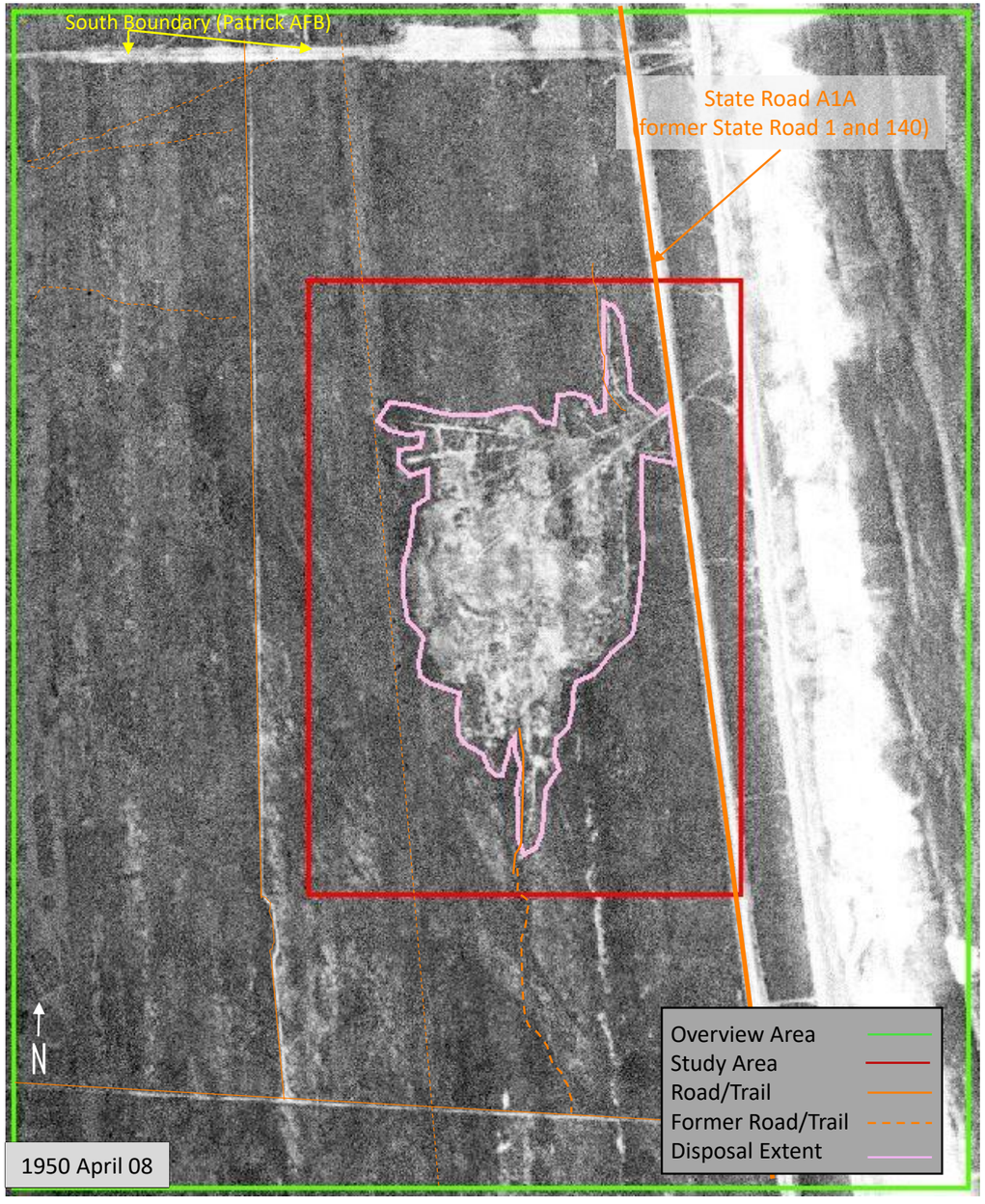


Photo Source: U.S. Geological Survey.

This 08 April 1950 overview shows the extent of activity within the former off-base disposal area. Regrowth of vegetation is observed over the majority of the site.

The Naval Air Station Banana River was transferred to the U.S. Air Force effective 01 September 1948 and later designated Patrick Air Force Base.

Text Source: Naval History and Heritage Command.

Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 08 April 1950

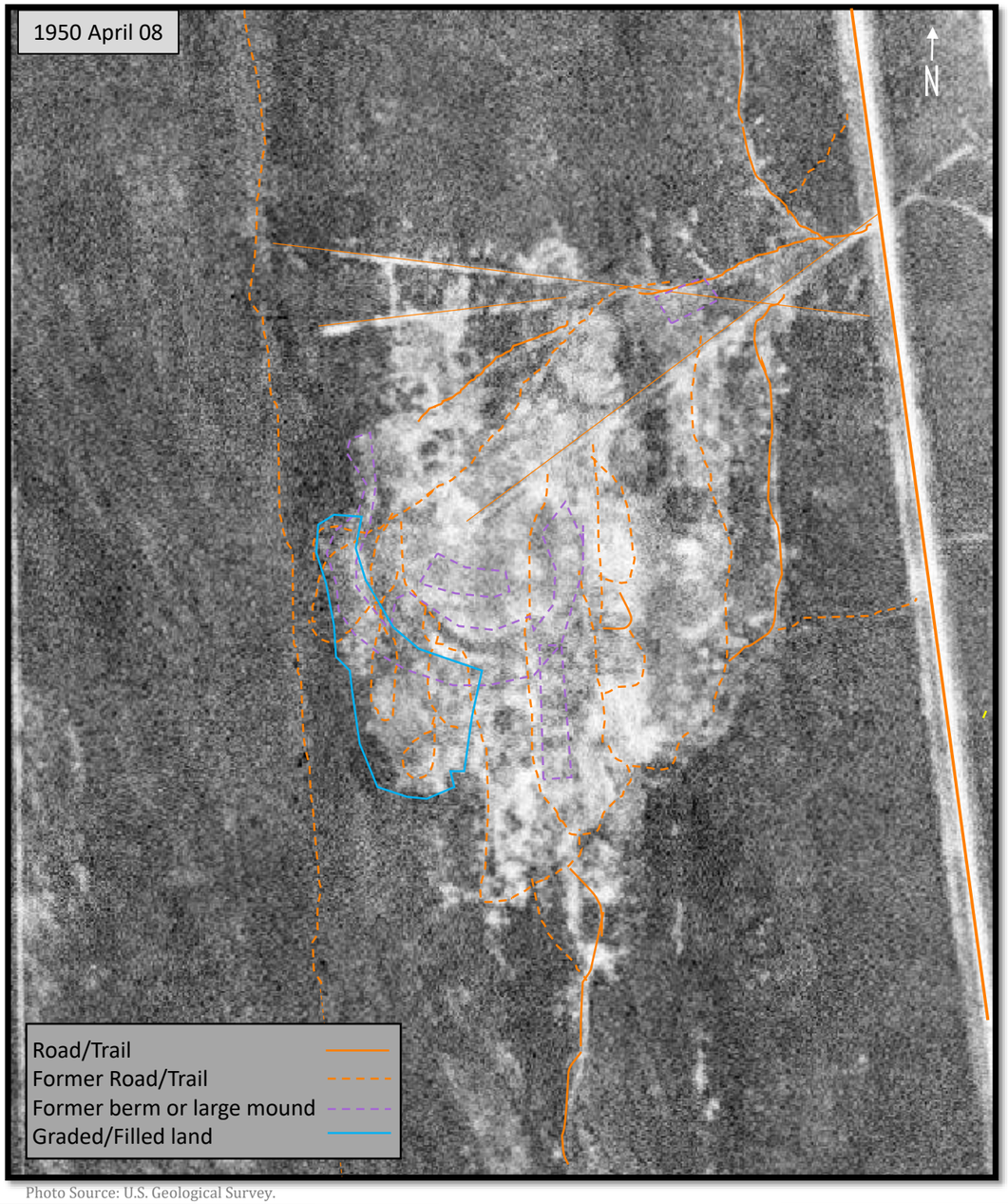
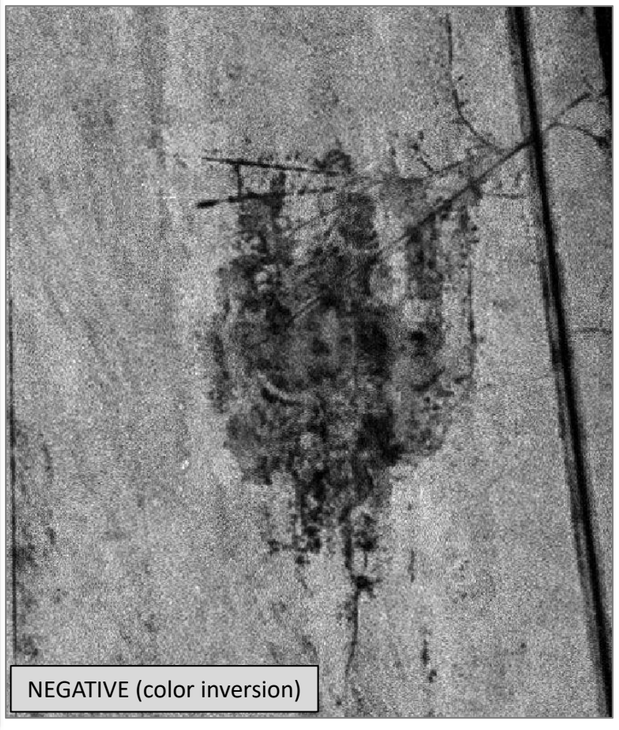
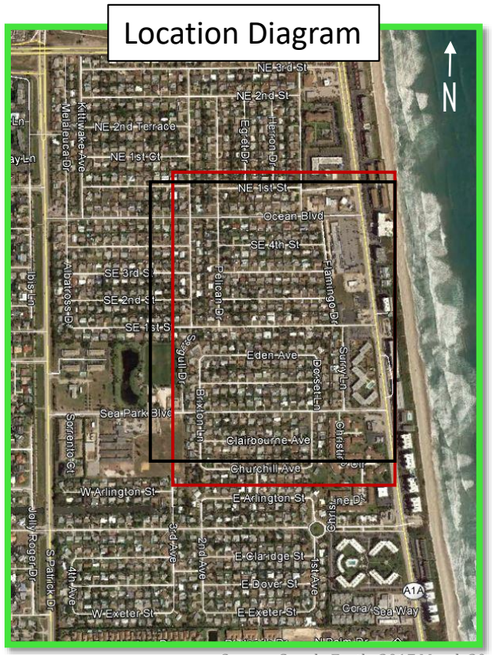


Photo Source: U.S. Geological Survey.

This 08 April 1950 subset from the larger overview on the previous page shows detailed activity within the former off-base disposal area. Between December 1947 and April 1950, the area to the southwest was filled and/or graded. The three prominent linear features identified in December 1947 are no longer visible. The poor spatial resolution of this photograph limits specific identification of features.



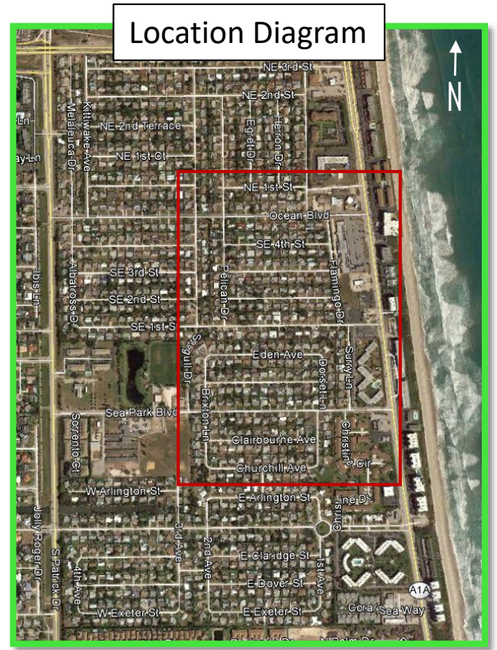


Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 02 April 1951

Photo Source: National Archives.

This 02 April 1951 overview shows the extent of activity within the former off-base disposal area, which did not change from 08 April 1950. Continued return of vegetation is observed over the majority of the site.



Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 02 April 1951

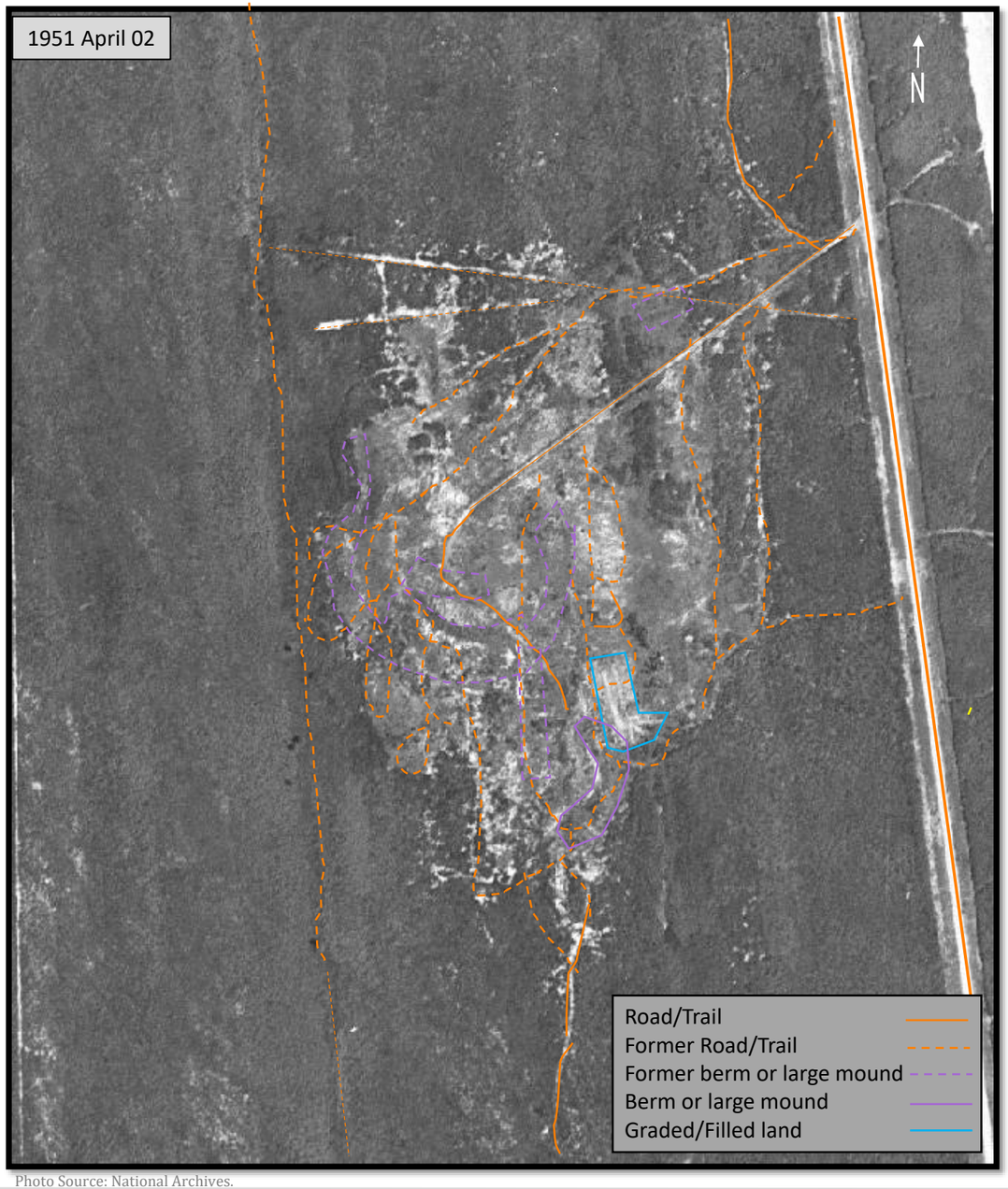
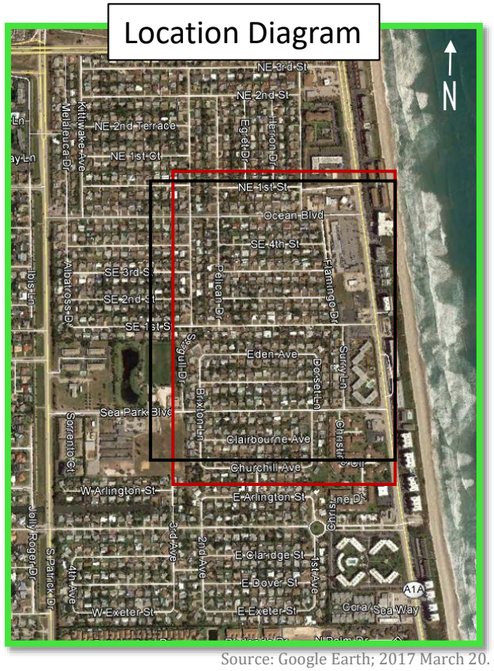


Photo Source: National Archives.

This 02 April 1951 subset from the larger overview on the previous page shows detailed activity within the former off-base disposal area. The area shows continued, but limited use; the main road from the northeast entry point is well used and hooks south at the center of the disposal area. The road from the south entry point shows less usage. The main central area shows disturbed ground, berms, and freshly graded scars on the surface.



Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 17 December 1953

Photo Source: National Archives at College Park.

This 17 December 1953 overview shows the extent of activity within the former off-base disposal area since 02 April 1951. Continued return of vegetation is observed over much of the site, but the access road has been extended and remains active. The entry point to the south is also active. The former road/trail immediately west of the former disposal area, what was a linear depression between sand dunes, and several smaller areas within the former disposal area appear flooded, likely due to rain as the other linear depressions (or riles between sand dunes) are also filled with water.

Location Diagram

Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 17 December 1953

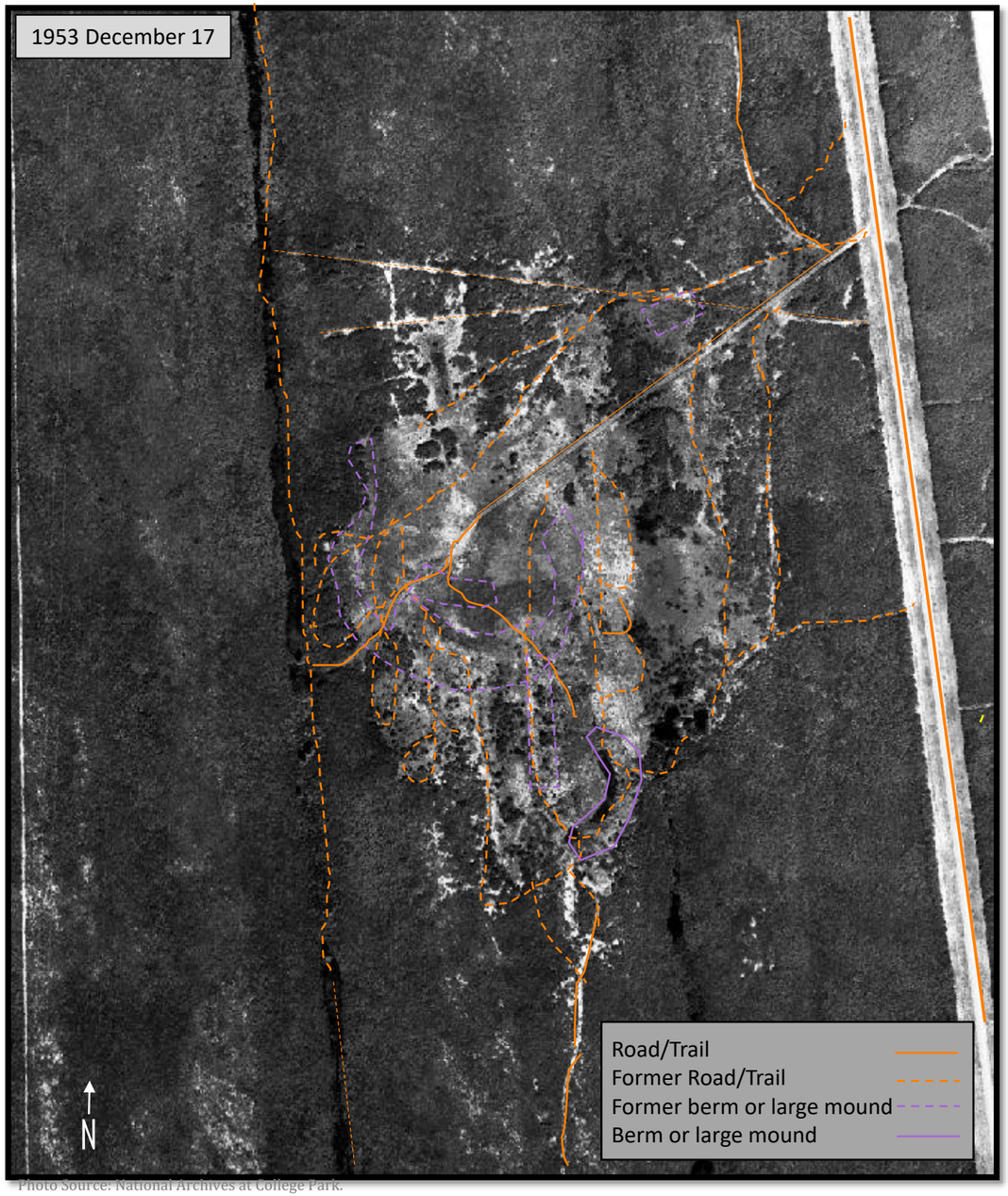


Photo Source: National Archives at College Park.

This 17 December 1953 subset from the larger overview on the previous page shows detailed activity within the former off-base disposal area. Limited activity is observed within the former disposal area that includes an extension of the main access road leading to the old trail/road immediately west of the former disposal area.

Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 07 January 1954

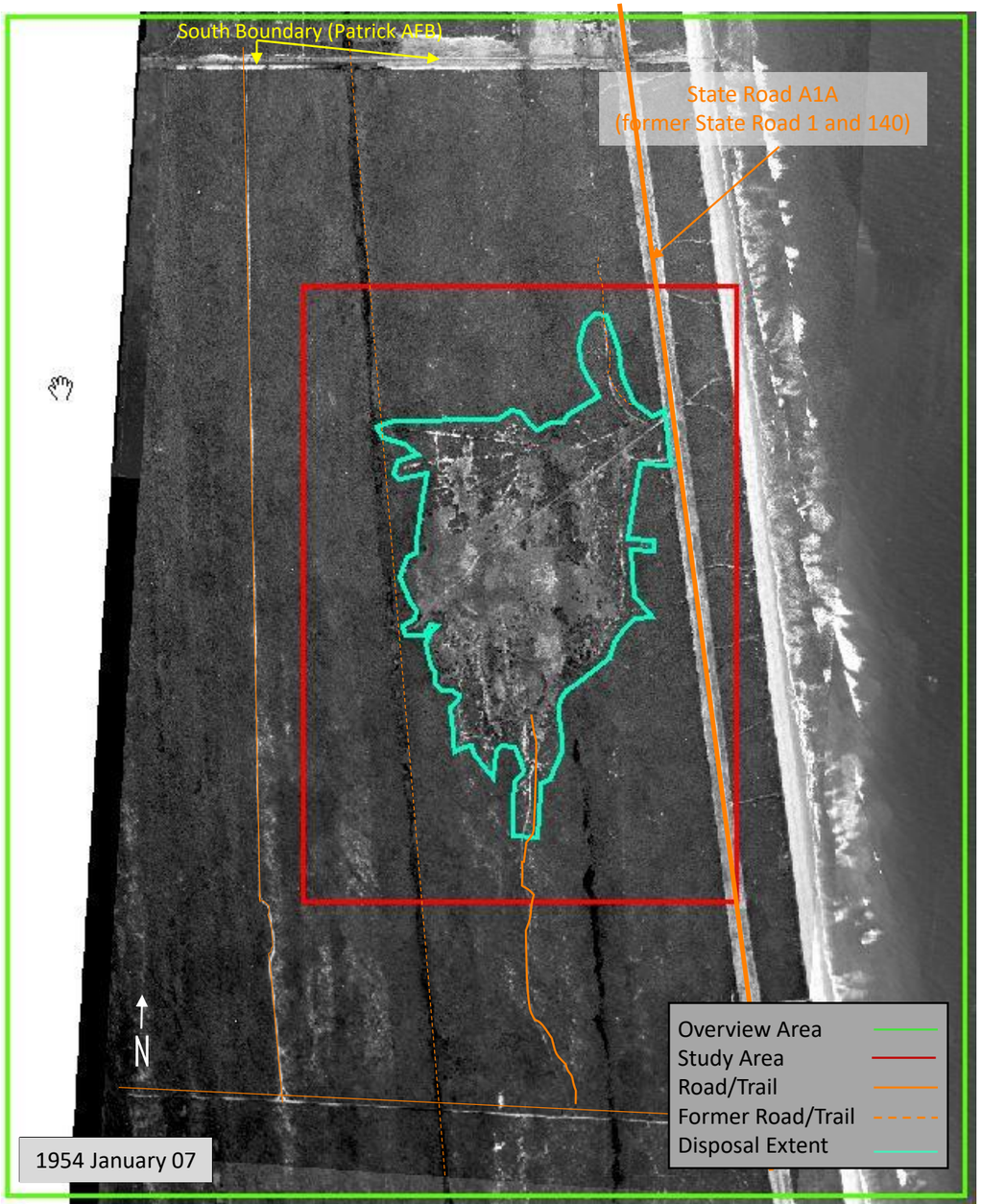


Photo Source: National Archives at College Park.

This 07 January 1954 overview shows the extent of activity within the former off-base disposal area since 17 December 1953 (three weeks prior). Little change is observed during this timeframe.

Location Diagram

Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 07 January 1954

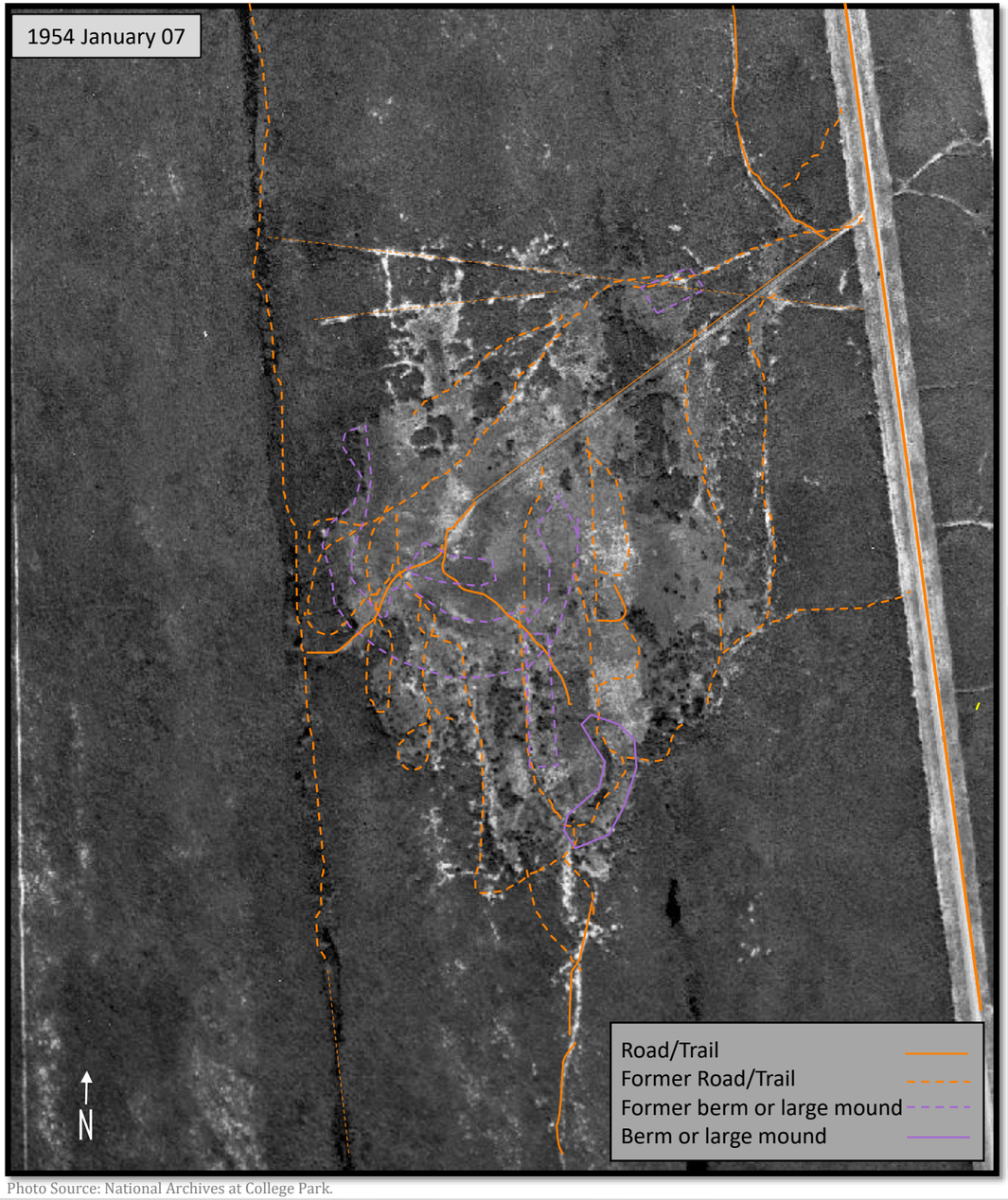
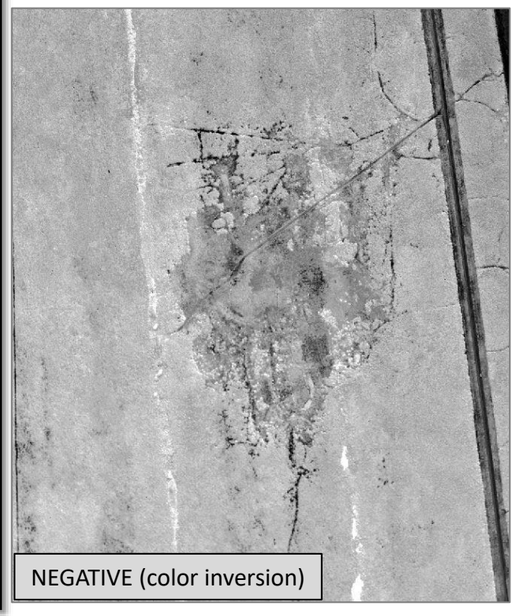


Photo Source: National Archives at College Park.

This 07 January 1954 subset from the larger overview on the previous page shows detailed activity within the former off-base disposal area. No new activity is observed.



Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 12 February 1954

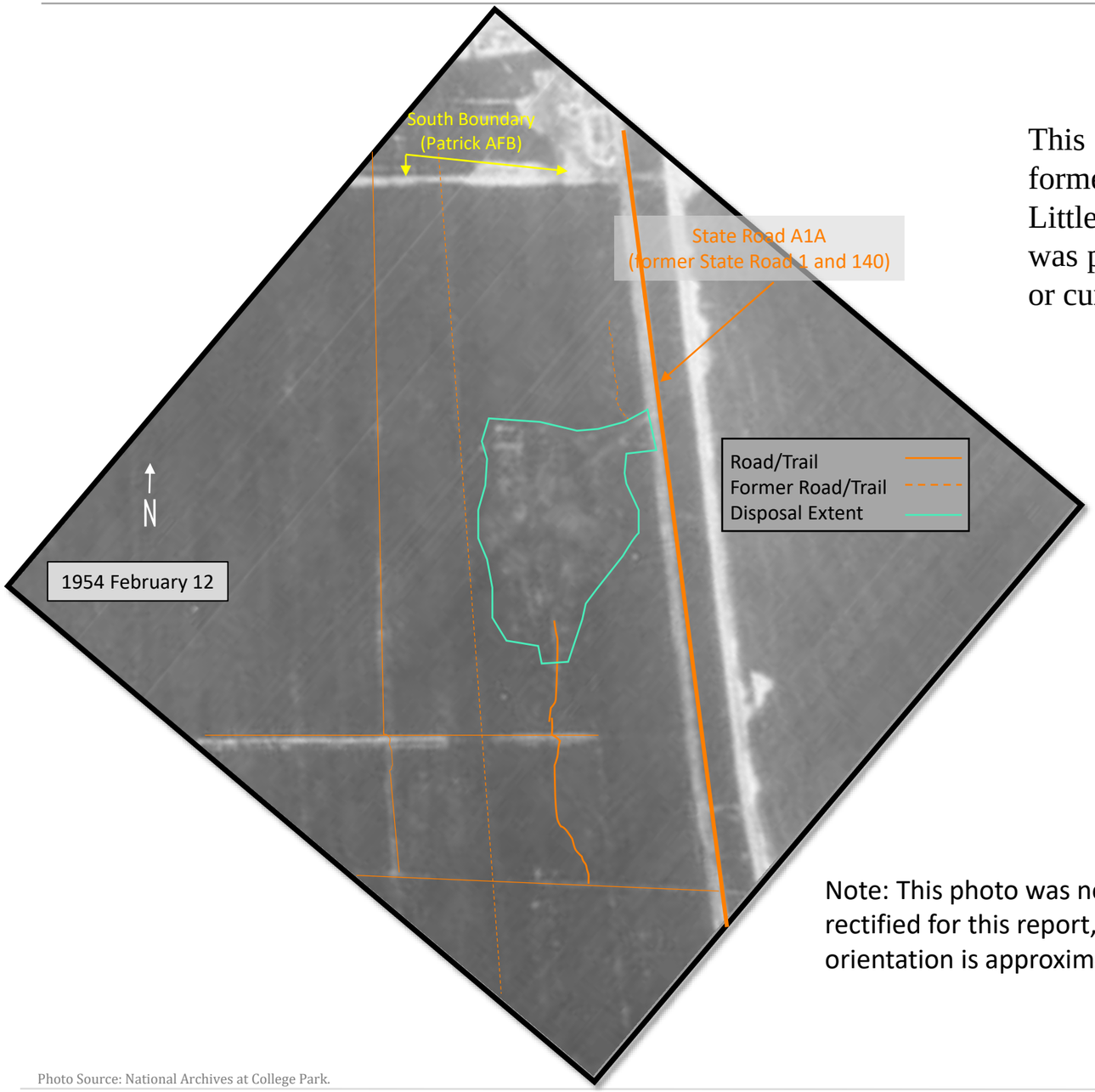


Photo Source: National Archives at College Park.

This 12 February 1954 overview shows the extent of activity within the former off-base disposal area since 07 January 1954 (five weeks prior). Little change is observed during this timeframe. The spatial resolution was poor, so the disposal extent shown may not include the entire former or current activity. This image was included for consistency.

Note: This photo was not rectified for this report, so orientation is approximate.

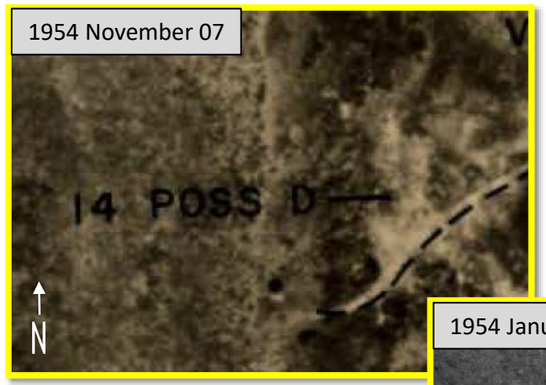
Source: Google Earth; 2017 March 20.

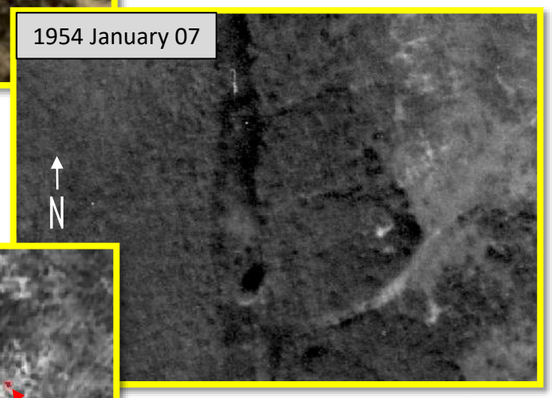
PHOTOGRAPHIC ANALYSIS – 07 November 1954

A site analysis was performed by the Environmental Protection Agency in 1991 and revealed 'possible' drums based on the 07 November 1954 photograph shown here. This 1954 photograph was unavailable in its original form at the time of this report, and the resulting spatial resolution was not conducive to confirming particular features, therefore drum disposal could not be confirmed. This area is shown here in January 1954 and December 1953, to include the scale of a traditional 55 gallon metal drum (23 inches wide by 34.5 inches tall).

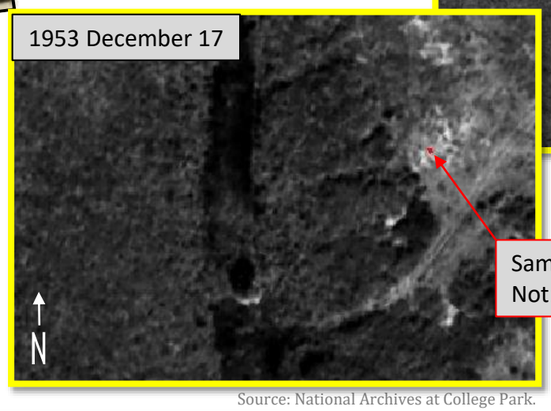
Source: Environmental Protection Agency.

Note: This photo was not rectified for this report, so orientation is approximate.

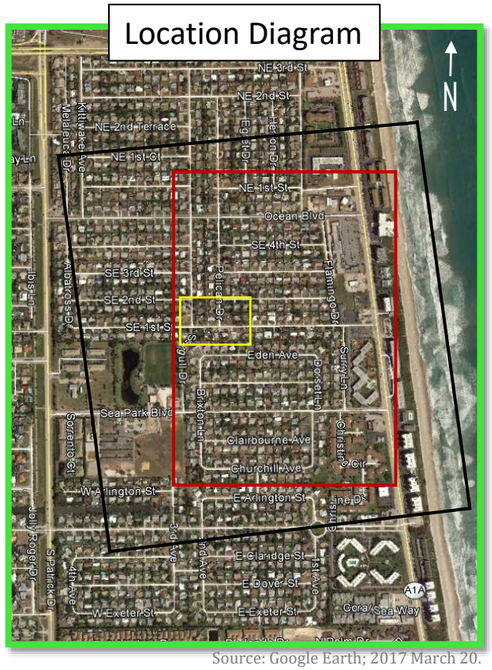




Source: National Archives at College Park.



Source: National Archives at College Park.

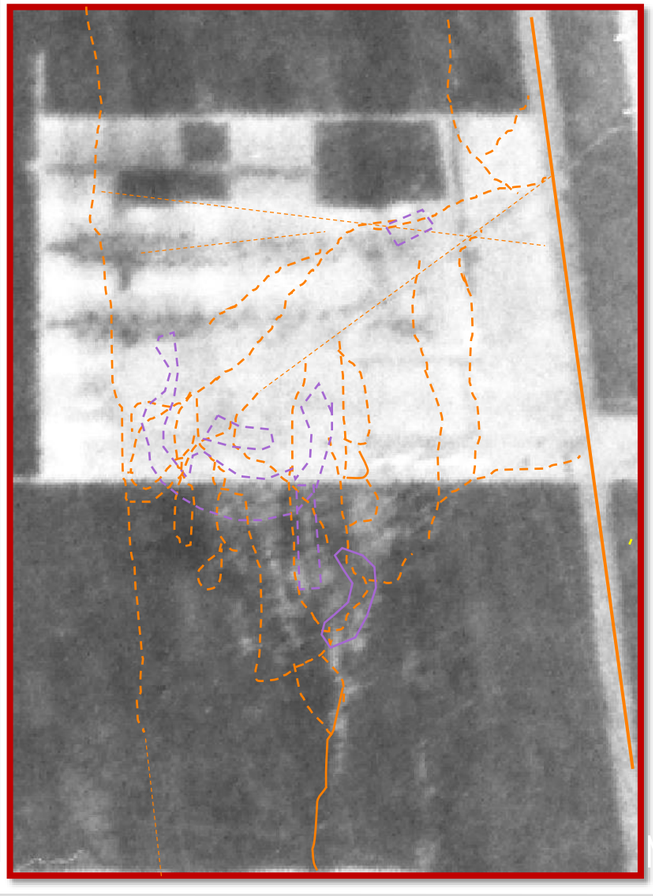


Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 11 February 1956

Photo Source: National Archives at College Park.

This 11 February 1956 photograph shows the extent of activity within the former off-base disposal area. The construction of the South Patrick Shores development has begun and has been graded with the potential addition of fill material. New roads connecting to the development as well as tracks going through the southern half of the former disposal area are visible. The subset from the larger image shows the former tracks, roads (one that is still visible in this image), and larger mounds from previous years.



Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 30 July 1956

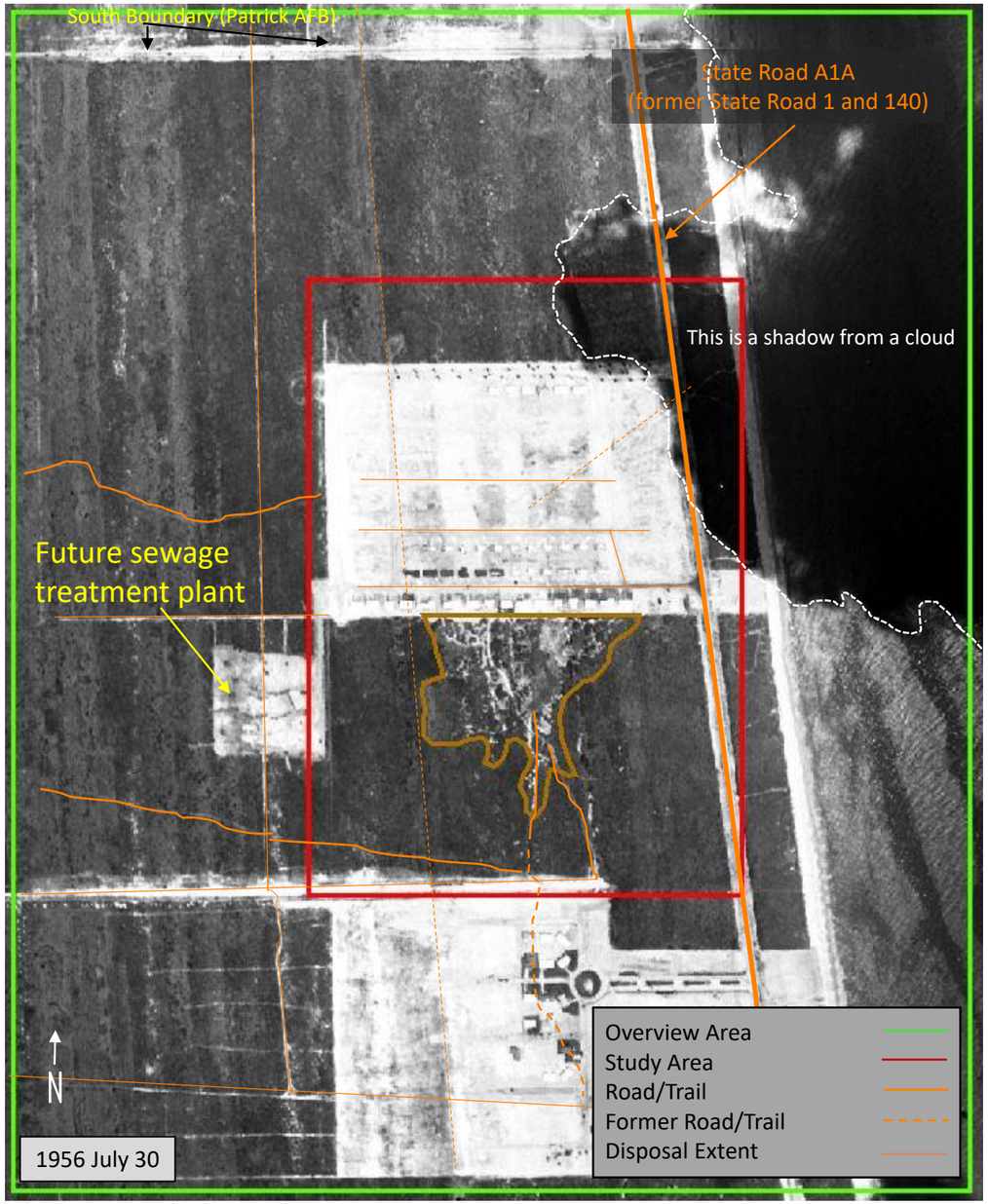
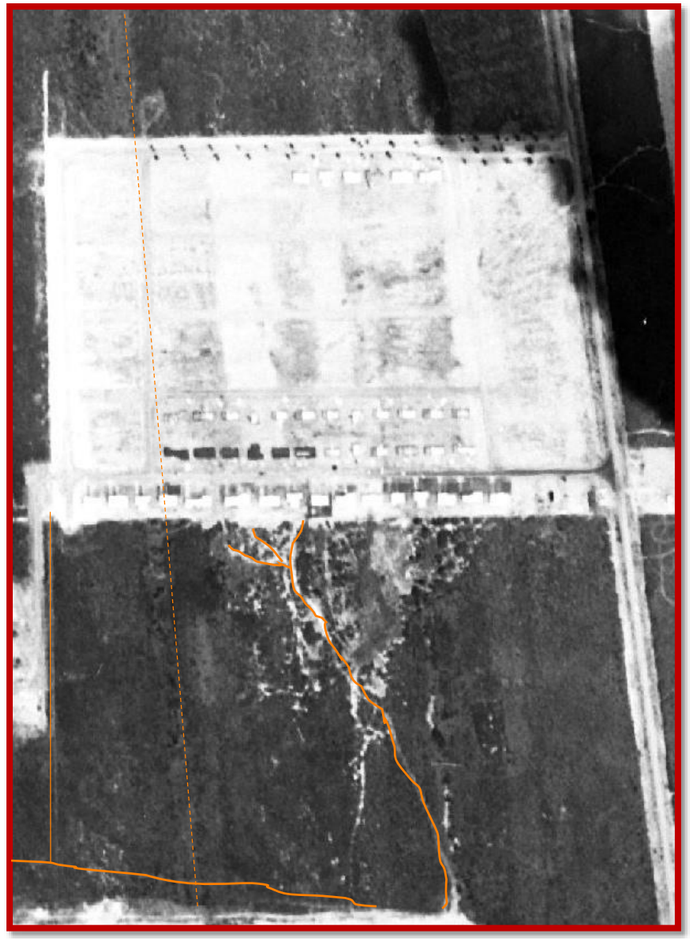


Photo Source: National Archives at College Park.

This 30 July 1956 photograph shows the extent of activity within the former off-base disposal area. The construction of the South Patrick Shores development continues along with associated utilities (sewage treatment plant) and already covers the majority of the former disposal area. The area was low-lying and partially marshy where fill material was likely needed prior to construction. The developed area appears filled in, further graded, and roads and houses are being constructed. There are active roads/tracks traversing the southern half of the former disposal area, but new activity appears to stay within the new development area.



Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 11 December 1957

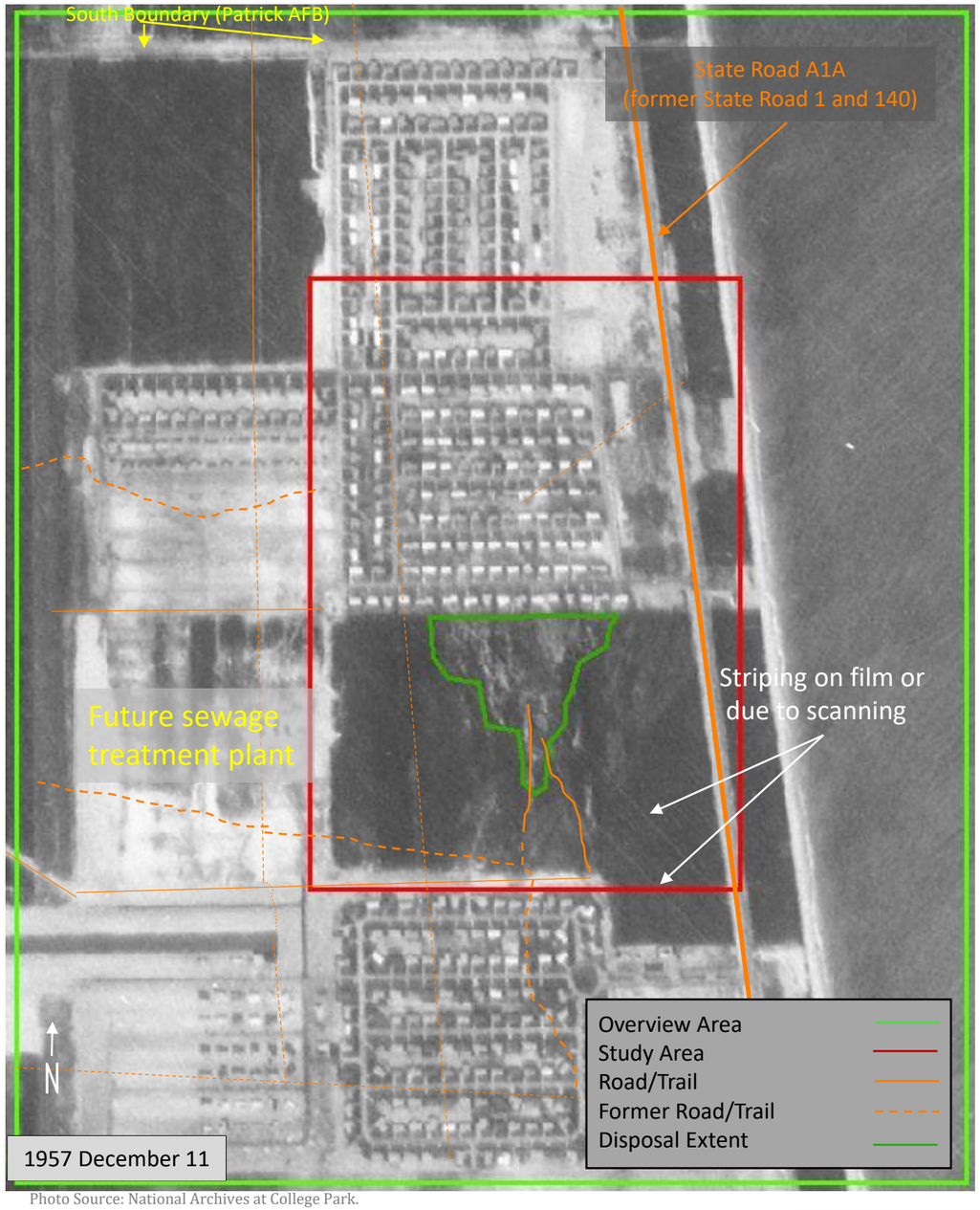
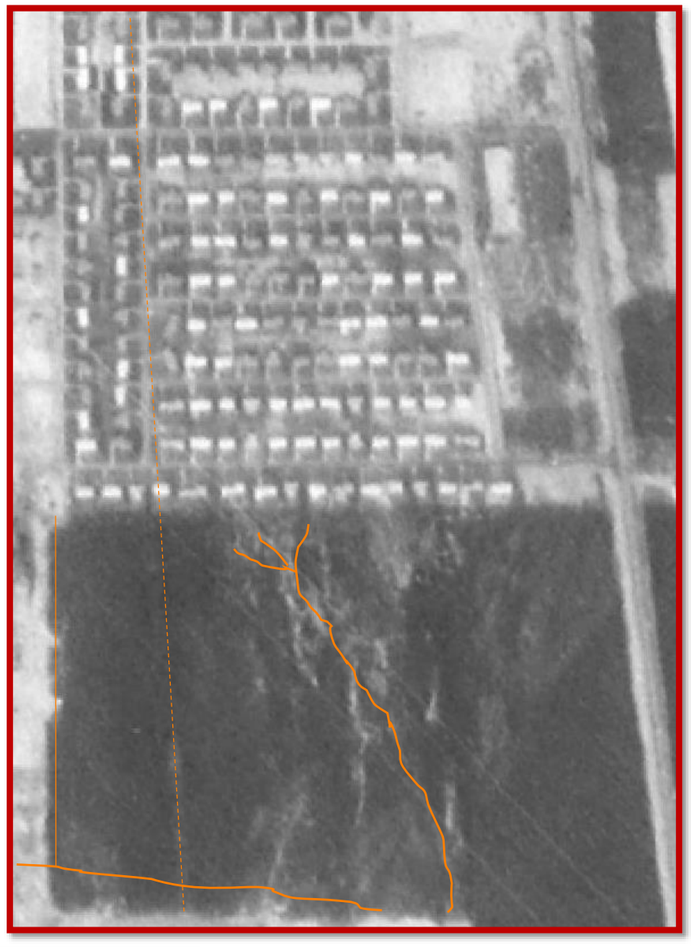


Photo Source: National Archives at College Park.

This 11 December 1957 photograph shows the extent of activity within the former off-base disposal area. The construction of the South Patrick Shores development continues along with associated utilities (sewage treatment plant). Additional development is observed north, west and further south of the former disposal area (and beyond the extent of earlier disposal operations). The southern part of the former disposal area is still visible, but appears inactive. The spatial resolution of this photograph is considered poor.

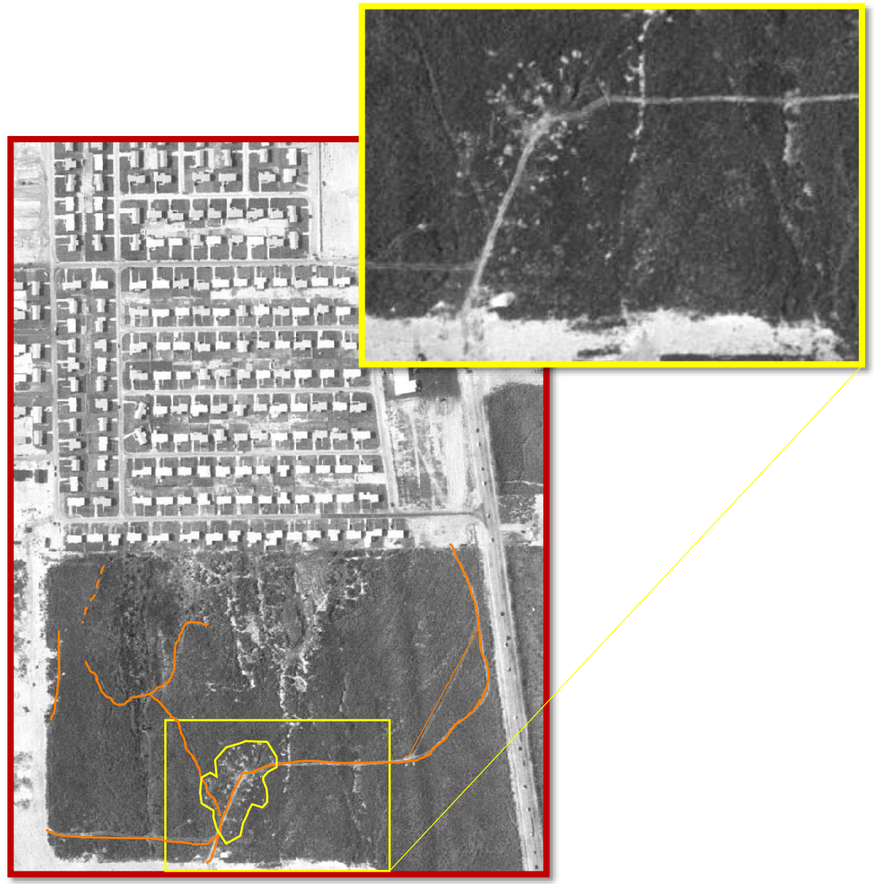


Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 23 April 1958

Photo Source: National Archives.

This 23 April 1958 photograph shows the extent of activity within the former off-base disposal area. Continued development of the South Patrick Shores area, sewage treatment plant and development extending outside of the study area is observed. An access road was constructed from an area southeast of SE 1st Street and extends to an area toward the middle of the future Churchill Avenue. Newly added debris and waste is observed (see yellow inset box below) along this access road that is most likely associated with the construction efforts surrounding the former off-base disposal area. The southern half of the former off-base disposal area is still visible, but appears inactive.



Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – 03 November 1958

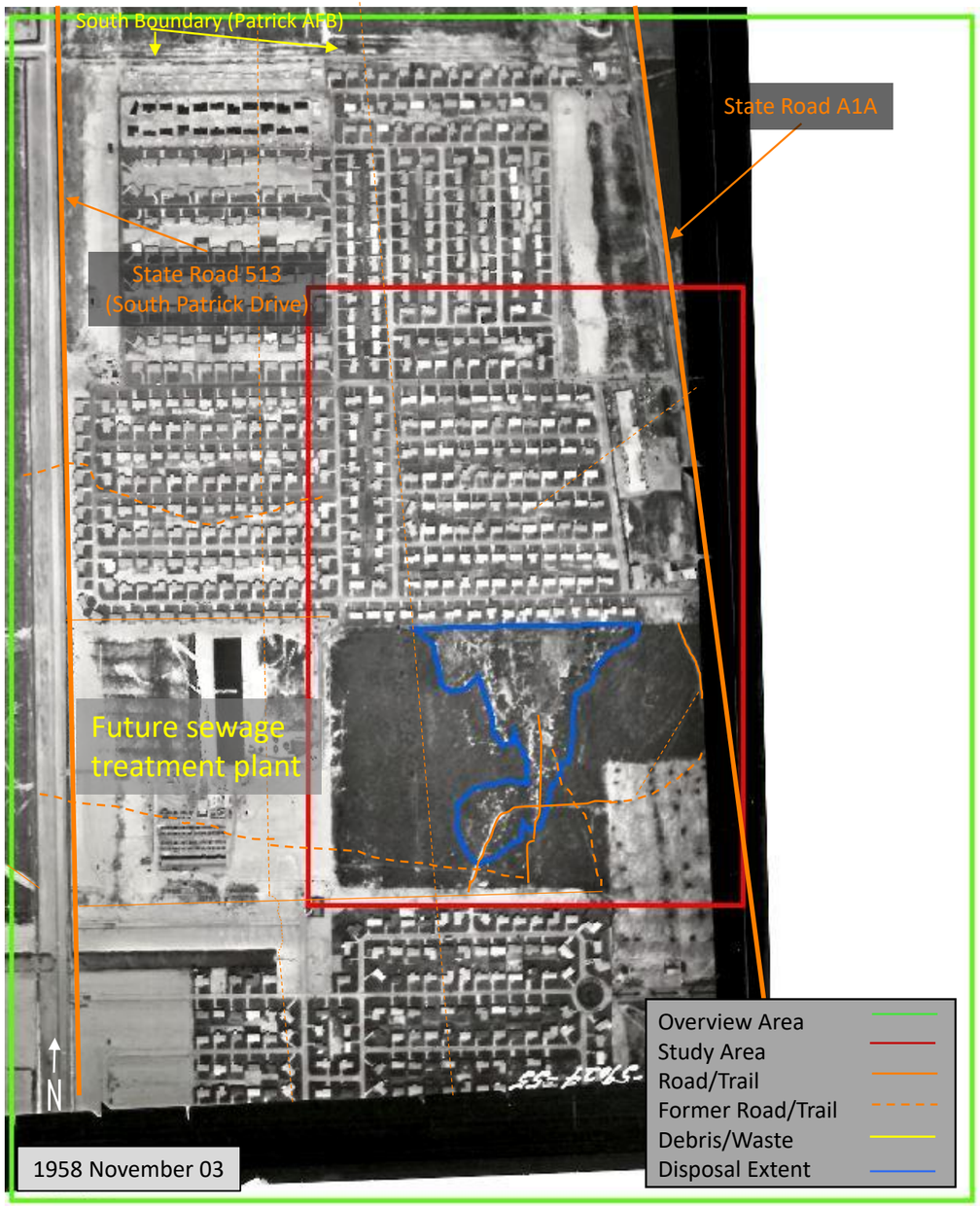
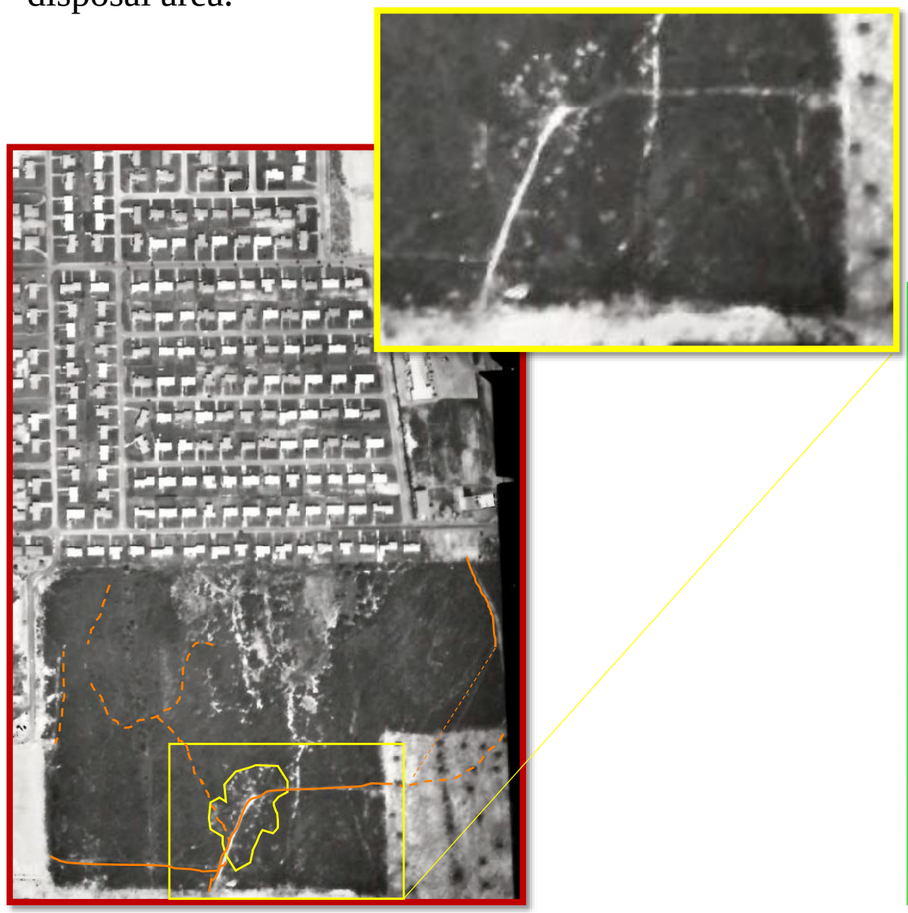
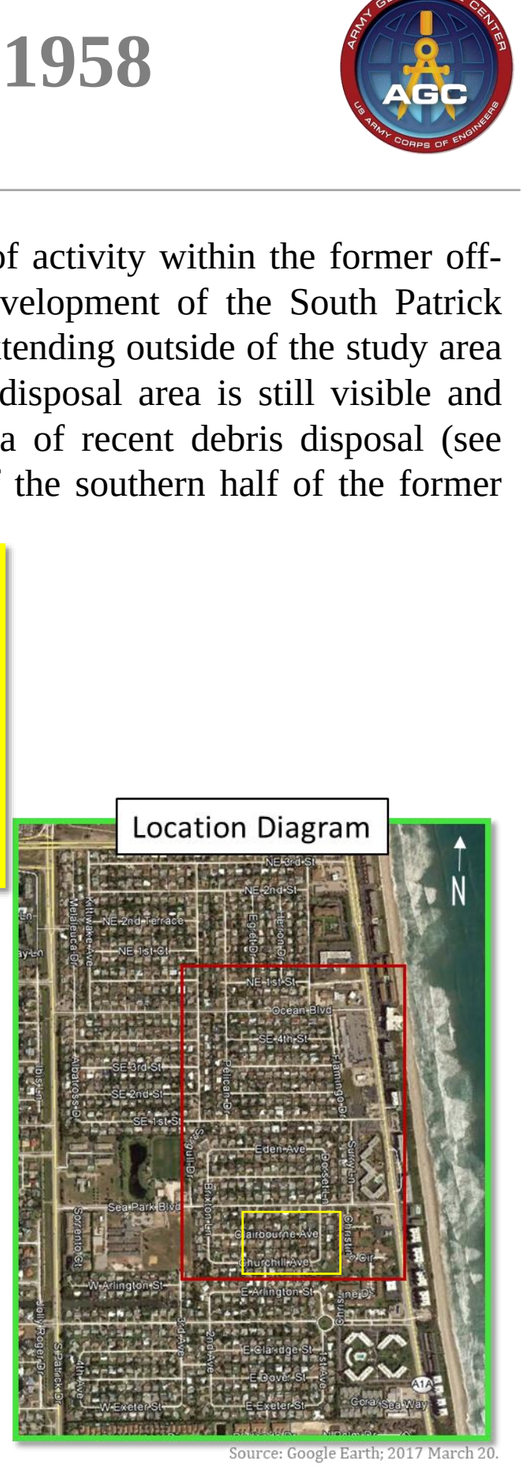


Photo Source: Patrick AFB.

This 03 November 1958 photograph shows the extent of activity within the former off-base disposal area since 23 April 1958. Continued development of the South Patrick Shores area, sewage treatment plant and development extending outside of the study area is observed. The southern half of the former off-base disposal area is still visible and appears inactive. No new activity is visible in the area of recent debris disposal (see yellow inset box). Development is starting southeast of the southern half of the former disposal area.





Source: Google Earth; 2017 March 20.

PHOTOGRAPHIC ANALYSIS – Overview 1961

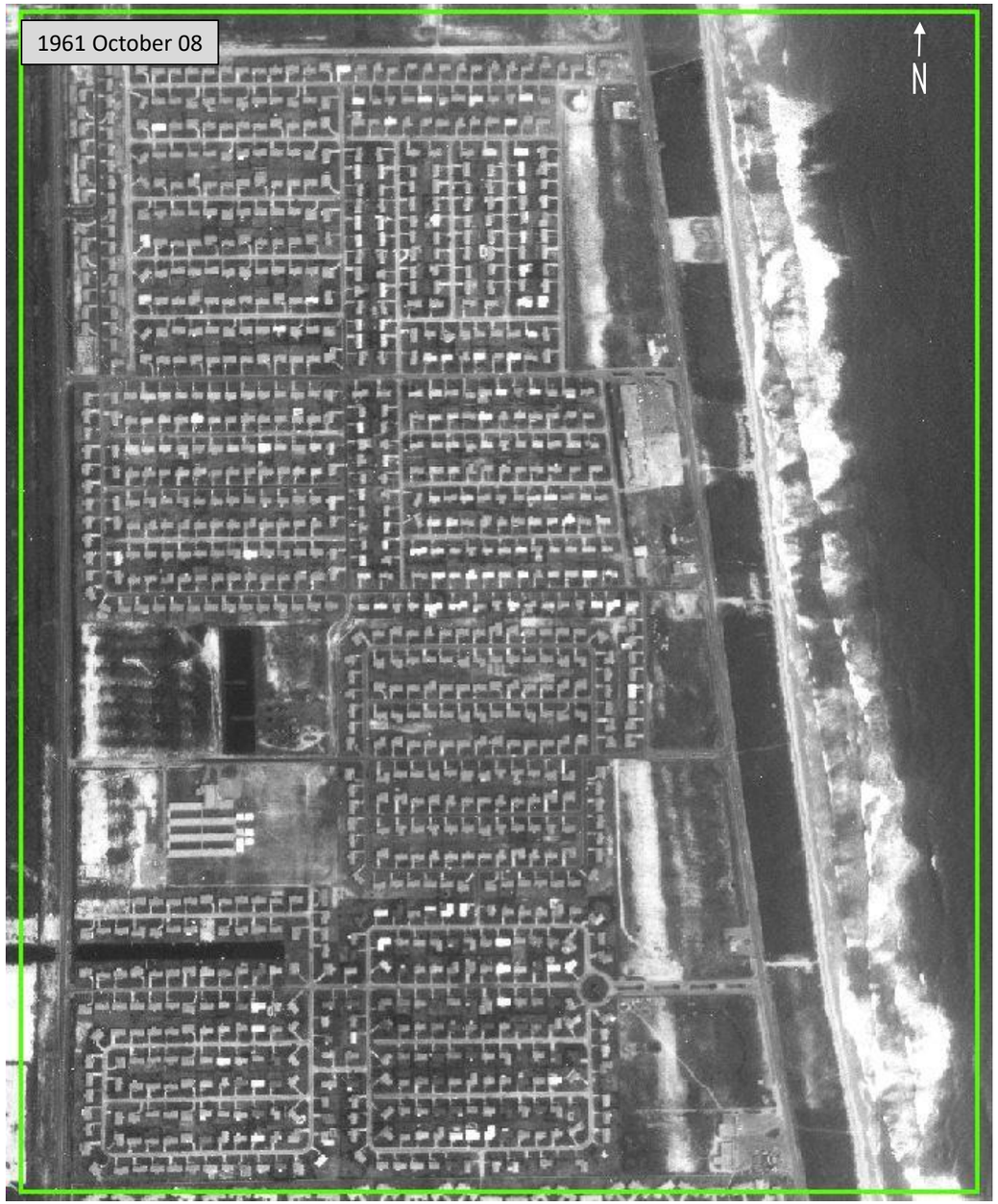


Photo Source: National Archives at College Park.

This 08 October 1961 photograph shows an overview of the former off-base disposal area. The disposal area is no longer visible. Residential and commercial properties make up the land use for the entire former off-base disposal area.

PHOTOGRAPHIC ANALYSIS – Overview 1967 and 1969

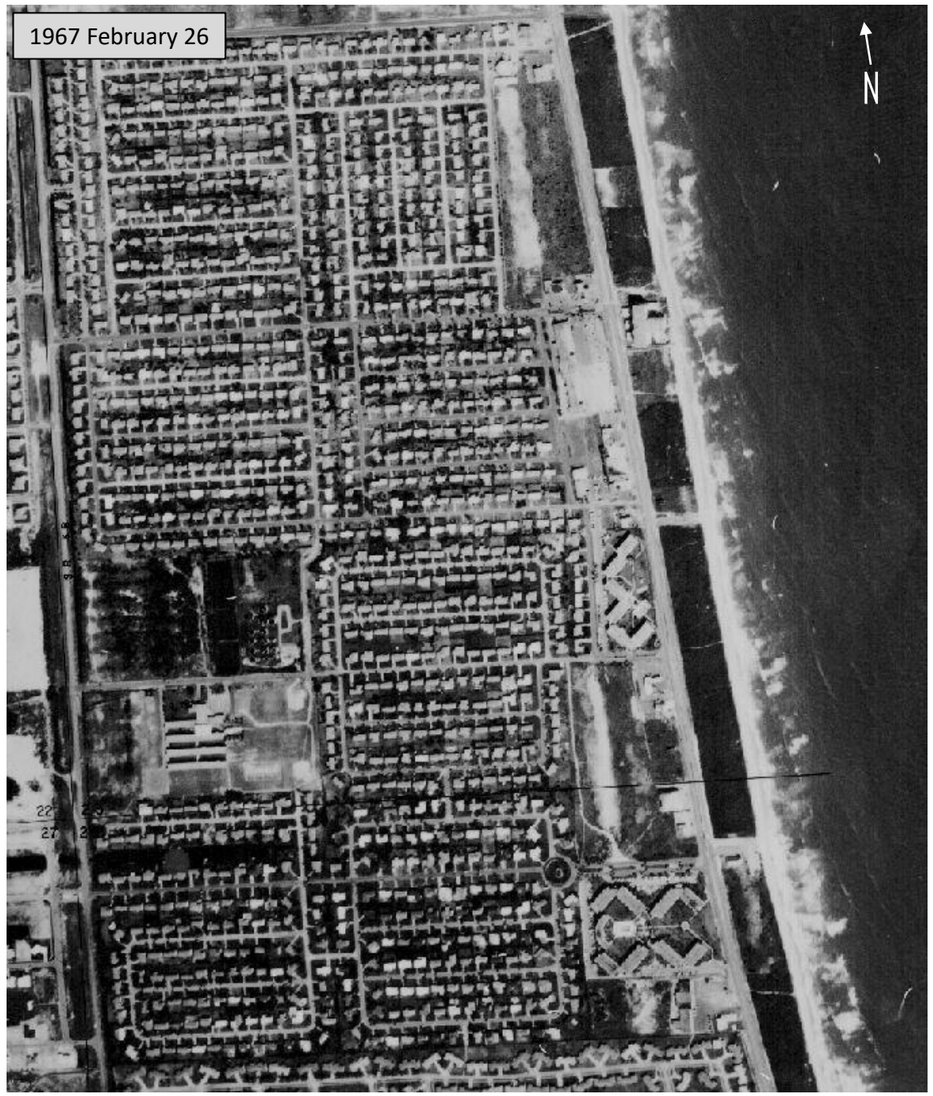


Photo Source: Patrick AFB.

Note: This photo was not rectified for this report, so orientation is approximate.

Photo Source: U.S. Geological Survey.

Note: This is a Color-infrared (CIR) aerial photograph (false color photography). The red tone is usually associated with healthy vegetation.

PHOTOGRAPHIC ANALYSIS – Overview 1972 and 1975

Photo Source: Florida Department of Transportation.

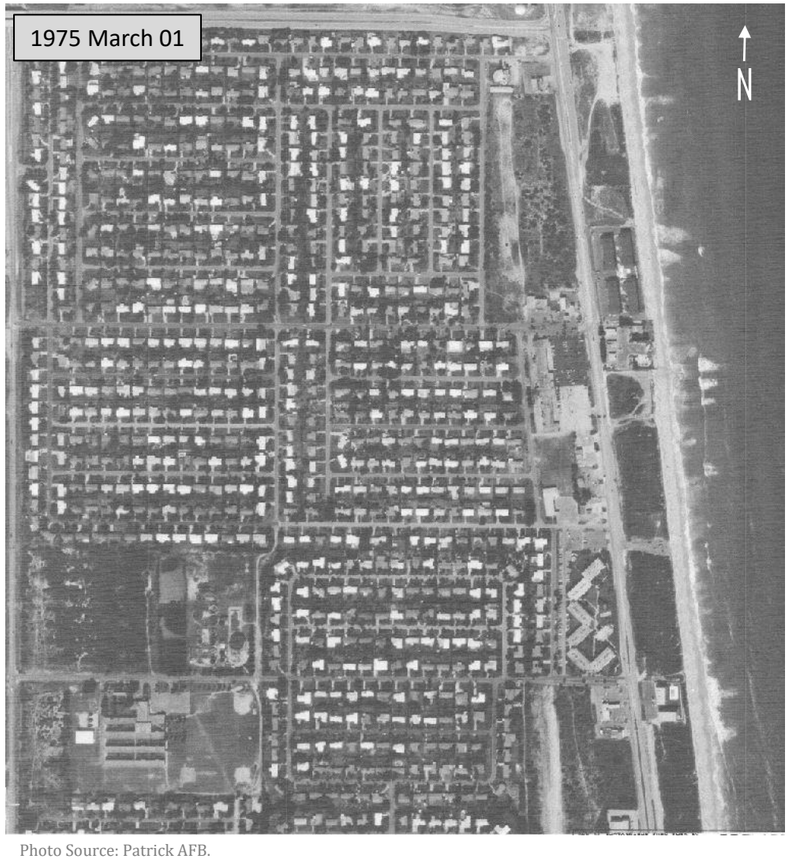


Photo Source: Patrick AFB.

Note: This photo was not rectified for this report, so orientation is approximate. This frame also does not provide full coverage of the overview area.

PHOTOGRAPHIC ANALYSIS – Overview 1980 and 1983

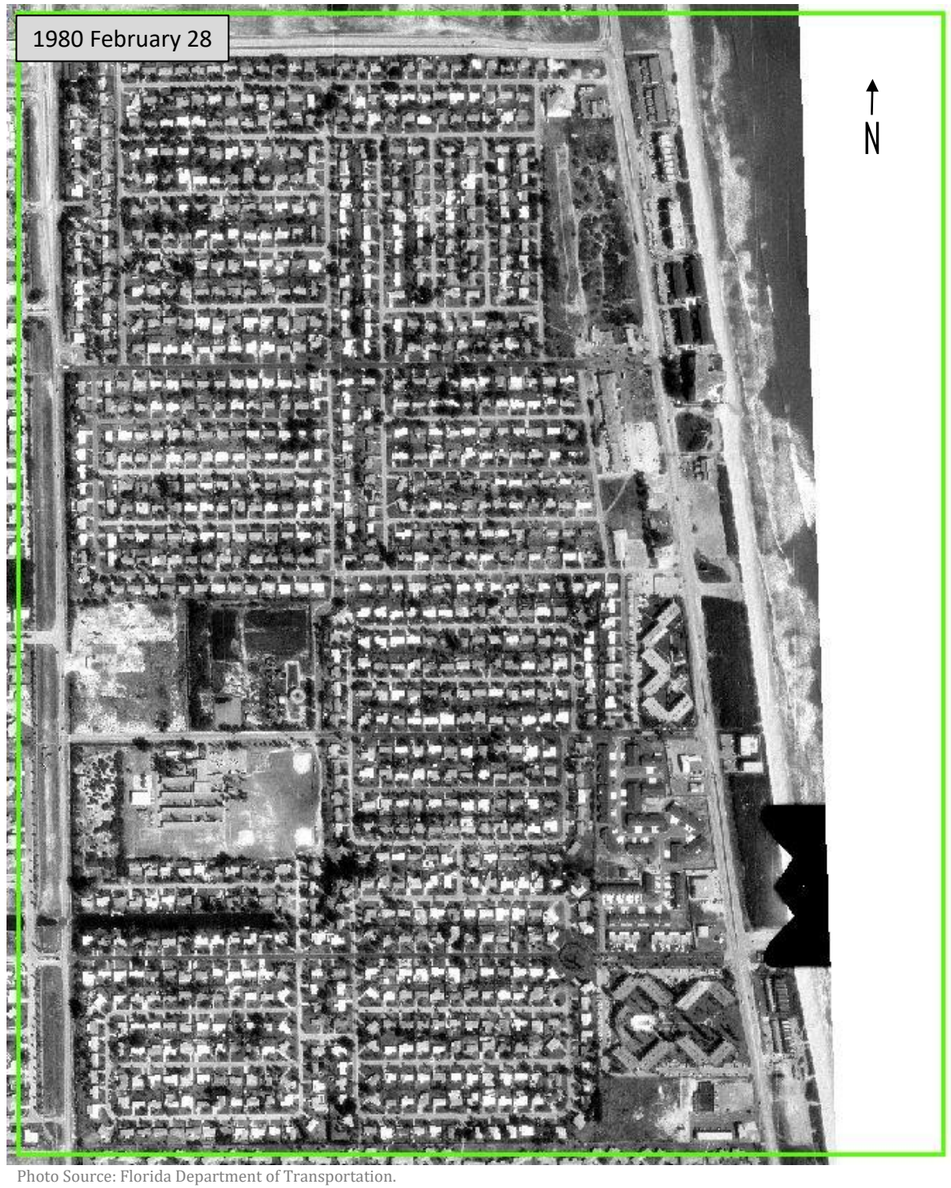


Photo Source: Florida Department of Transportation.

Photo Source: Florida Department of Transportation.

PHOTOGRAPHIC ANALYSIS – Overview 1986 and 1993

Photo Source: Patrick AFB.

Photo Source: Florida Department of Transportation.

PHOTOGRAPHIC ANALYSIS – Overview 1996 and 2001

Photo Source: Patrick AFB.

Photo Source: Patrick AFB.

Note: These photos were not rectified for this report, so orientation is approximate. Both frames do not provide full coverage of the overview area.

PHOTOGRAPHIC ANALYSIS – Overview 2006 and 2017

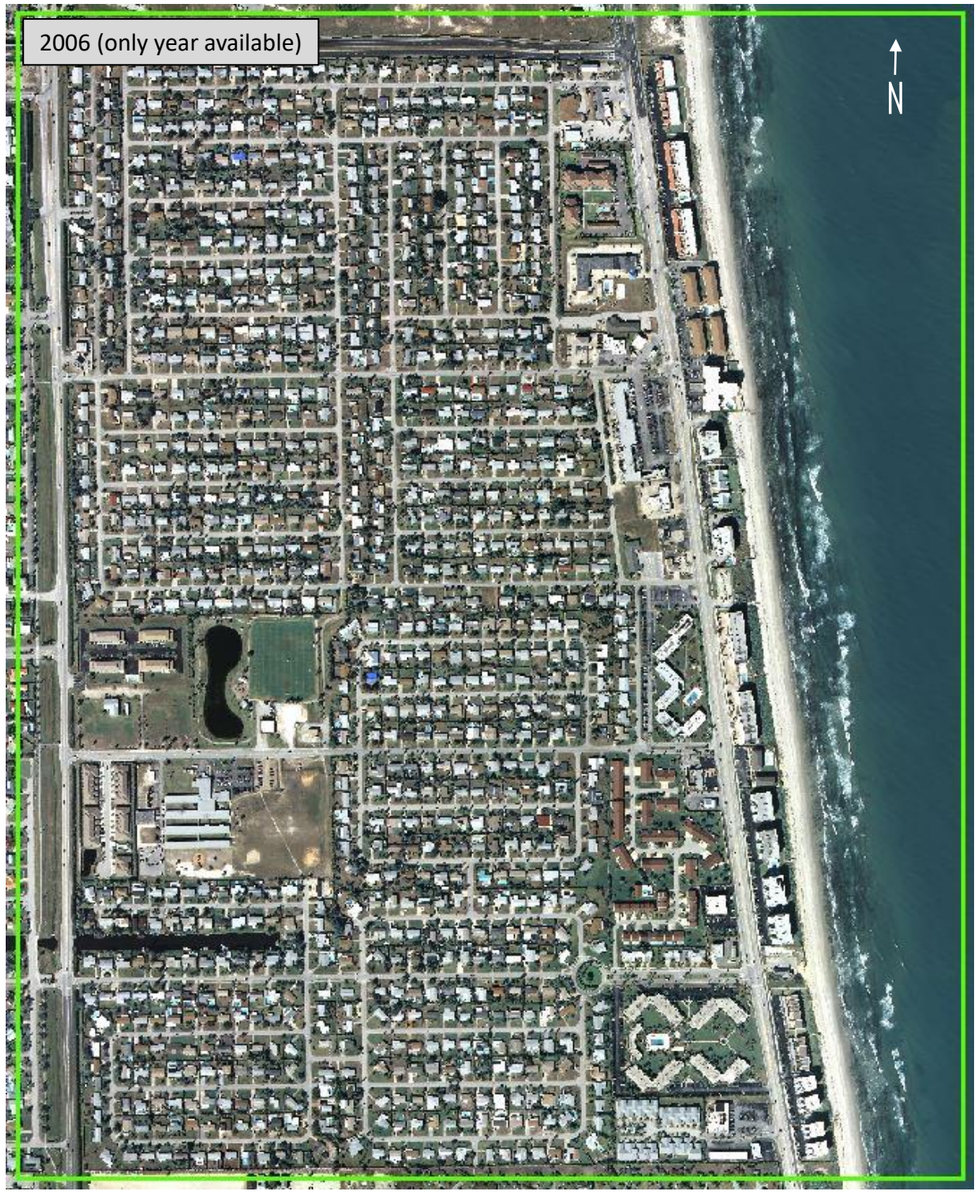


Photo Source: U.S. Department of Agriculture.

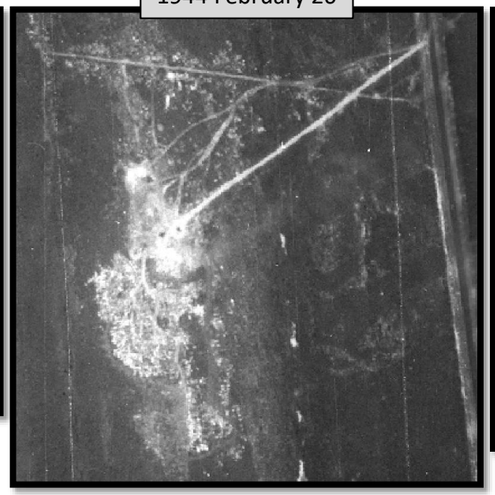
Image Source: Google Earth.

PHOTOGRAPHIC ANALYSIS – 1943 to 1947 Overview

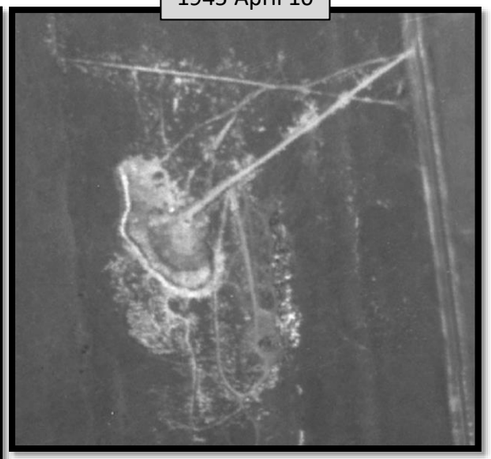
1943 February 14

1943 June 06

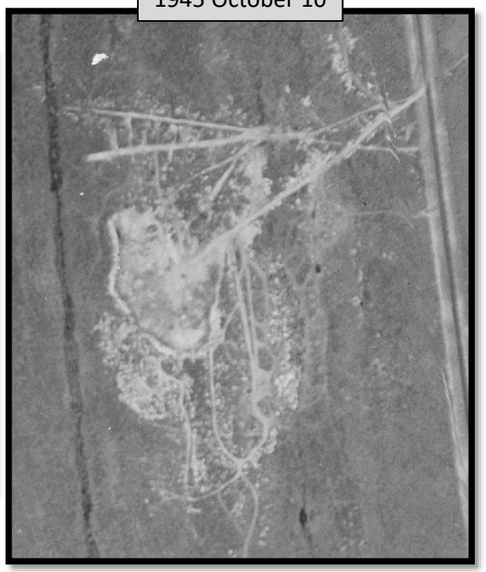
1944 February 26



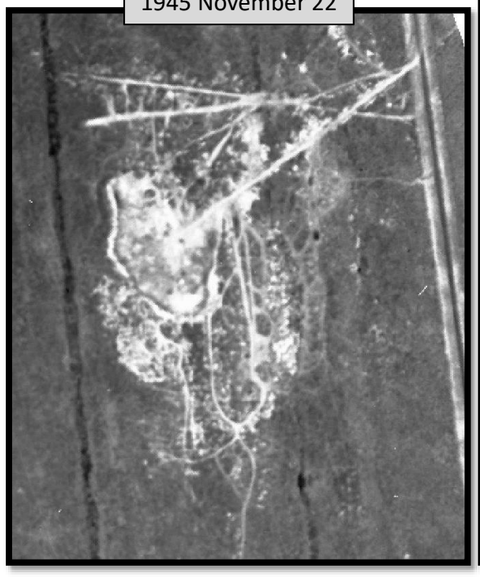
1945 April 10



1945 October 10



1945 November 22



1947 February 19

1947 June 17

1947 December 08

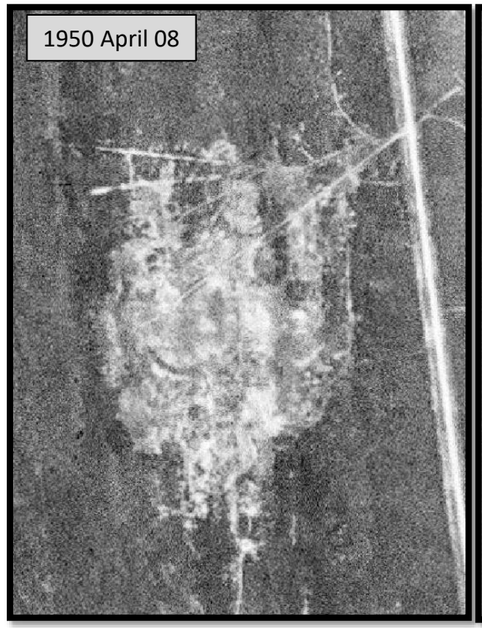
Location Diagram

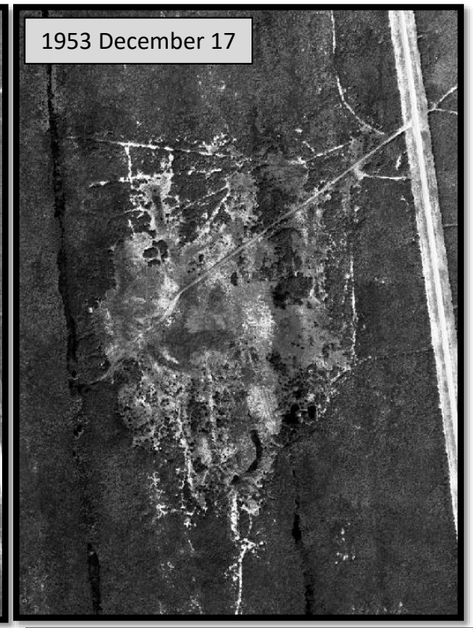
Varying extents within the one shown here (black).

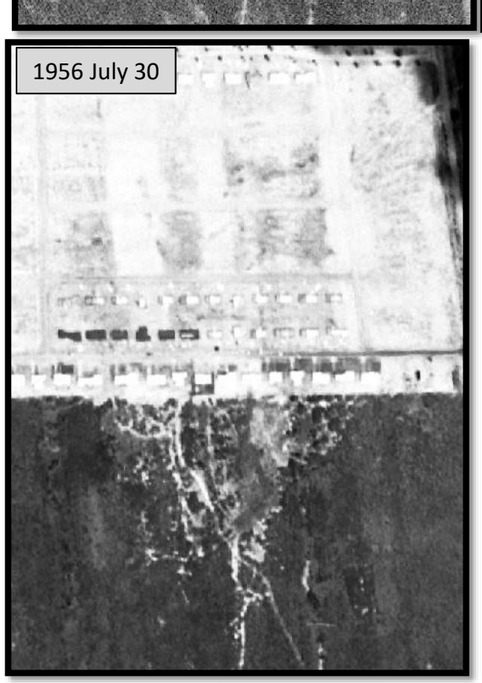
Photography Source: National Archives at College Park.

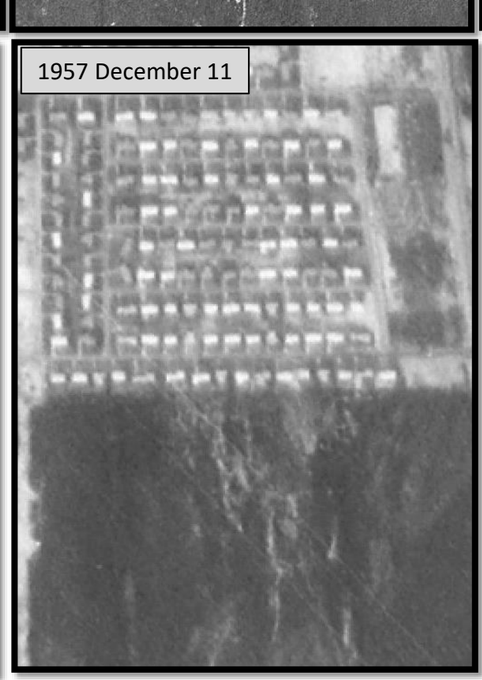
Source: Google Earth; 2017 March 20.

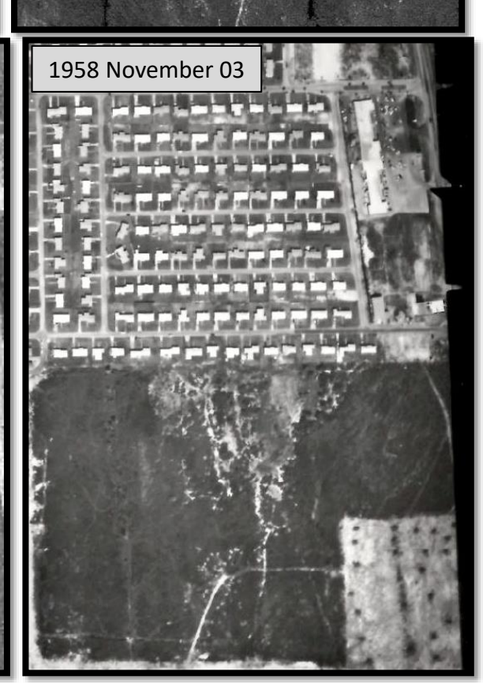
PHOTOGRAPHIC ANALYSIS – 1950 to 1958 Overview











Photography Sources:

1950 April 08 – U.S. Geological Survey

1951 April 02 - National Archives at College Park

1953 December 17 - National Archives at College Park

1954 January 07 – National Archives at College Park

1956 July 30 – National Archives at College Park

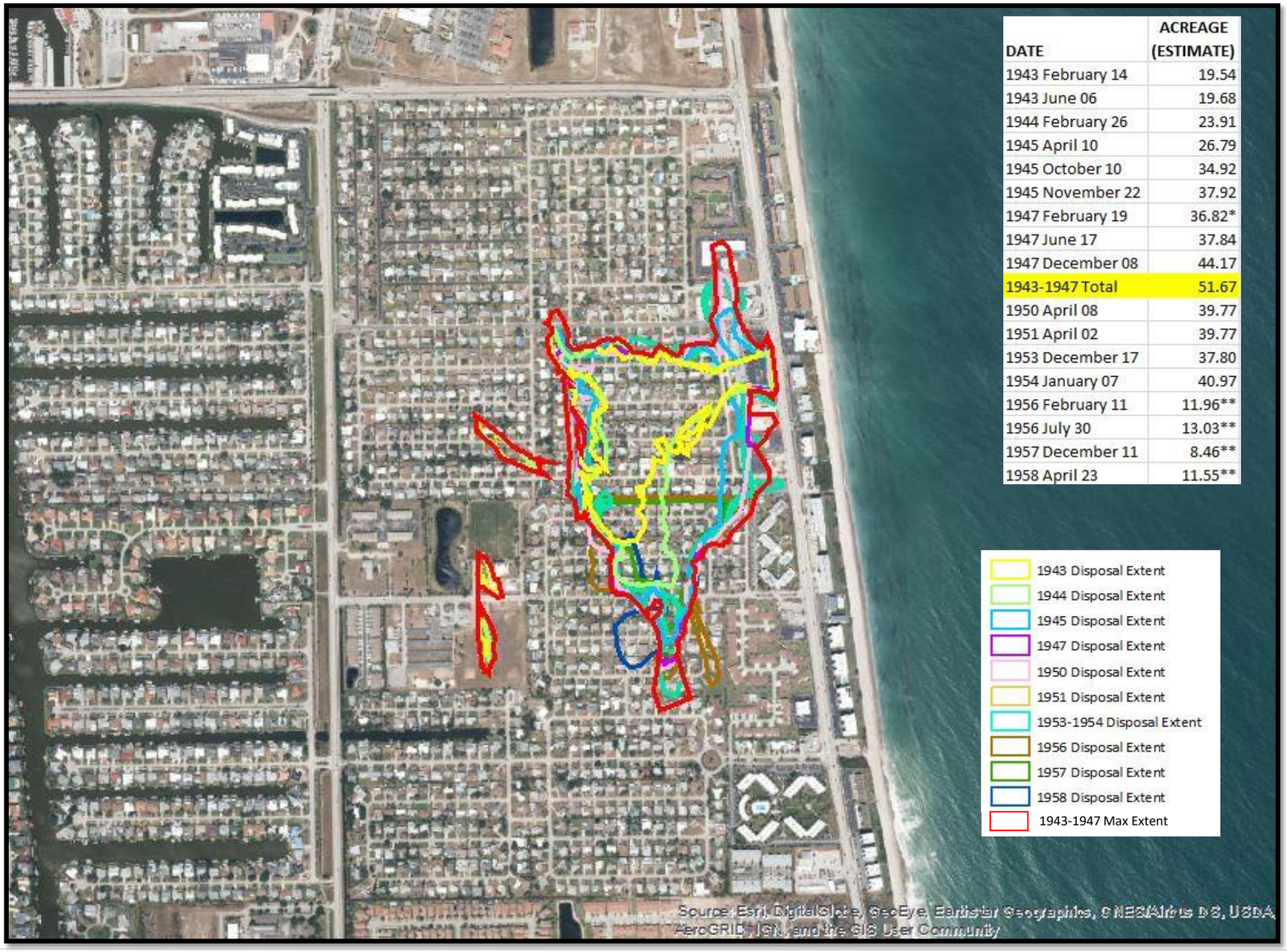
1957 December 11 – National Archives at College Park

1958 April 23 - National Archives at College Park

1958 November – Patrick Air Force Base

Source: Google Earth; 2017 March 20.

OFF-BASE DISPOSAL AREA EXTENT SUMMARY



DATE	ACREAGE (ESTIMATE)
1943 February 14	19.54
1943 June 06	19.68
1944 February 26	23.91
1945 April 10	26.79
1945 October 10	34.92
1945 November 22	37.92
1947 February 19	36.82*
1947 June 17	37.84
1947 December 08	44.17
1943-1947 Total	51.67
1950 April 08	39.77
1951 April 02	39.77
1953 December 17	37.80
1954 January 07	40.97
1956 February 11	11.96**
1956 July 30	13.03**
1957 December 11	8.46**
1958 April 23	11.55**

- 1943 Disposal Extent
- 1944 Disposal Extent
- 1945 Disposal Extent
- 1947 Disposal Extent
- 1950 Disposal Extent
- 1951 Disposal Extent
- 1953-1954 Disposal Extent
- 1956 Disposal Extent
- 1957 Disposal Extent
- 1958 Disposal Extent
- 1943-1947 Max Extent

This present day image shows the various extents of activity making up the former off-base disposal area from 1943 through 1958.

These boundaries were created by visual assessment of aerial photography and are not indicators of operational or non-operational use of the area.

The acreage figures provided represent an approximate delineation of visible disposal extent based on the date of aerial photography indicated. This extent may include access roads, ground scars and features that are no longer active, but remain visible on photography. The spatial resolution of photography affects visibility and the acreage indicated does not negate or affirm actual activity on the ground during the year of delineation.

*Partial aerial photography coverage.
**Development covers portions of the former off-base disposal area.
Maximum Extent Observed between 1943-1947 (approximate)

SPATIAL DATA SOURCES

DATE	SOURCE	TYPE
1941 September 24	NARA	Aerial Oblique PAN
1943 February 14	NARA	Aerial Vertical PAN
1943 February 09	NARA	Aerial Oblique PAN
1943 April 07	NARA	Aerial Oblique PAN
1943 June 19	NARA	Aerial Oblique PAN
1943 June 06	NARA	Aerial Vertical PAN
1944 February 26	NARA	Aerial Vertical PAN
1945 April 10	NARA	Aerial Vertical PAN
1945 October 10	NARA	Aerial Vertical PAN
1945 November 06	NARA	Aerial Oblique PAN
1945 November 22	NARA	Aerial Vertical PAN (mostly full coverage)
1947 February 19	NARA	Aerial Vertical PAN (partial coverage)
1947 March 18	NARA	Aerial Oblique PAN
1947 June 17	NARA	Aerial Vertical PAN
1947 December 08	NARA	Aerial Vertical PAN
1948 March 13	NARA	Aerial Oblique and Ground Photos PAN
1950 April 08	USGS	Aerial Vertical PAN
1951 April 02	NARA	Aerial Vertical PAN
1953 December 17	NARA	Aerial Vertical PAN
1954 January 07	NARA	Aerial Vertical PAN
1954 February 12	NARA	Aerial Vertical PAN (poor resolution)
1954 November 07	EPA	Aerial Vertical PAN (screenshot from report)
1956 February 11	NARA	Aerial Vertical PAN (poor resolution)
1956 July 30	NARA	Aerial Vertical PAN
1957 December 11	NARA	Aerial Vertical PAN (poor resolution)
1958 April 23	NARA	Aerial Vertical PAN
1958 November 03	PAFB	Aerial Vertical PAN
1961 October 08	NARA	Aerial Vertical PAN
1967 February 26	PAFB	Aerial Vertical PAN
1969 February 26	USGS	Aerial Vertical CIR
1972 March 24	FDOT	Aerial Vertical PAN
1975 March 01	PAFB	Aerial Vertical PAN (partial coverage)
1980 February 28	FDOT	Aerial Vertical PAN
1983 November 16	FDOT	Aerial Vertical PAN
1986 April 18	PAFB	Aerial Vertical PAN
1993 March 10	FDOT	Aerial Vertical PAN
1996 February 14	PAFB	Aerial Vertical PAN (partial coverage)
2001 May 29	PAFB	Aerial Vertical MS (partial coverage)
2006 (no month/day)	USDA	Aerial Vertical MS
2017 March 20	GE	Satellite Image MS

EPA – U.S. Environmental Protection Agency
FDOT − Florida Department of Transportation.
GE – Google Earth
NARA – National Archives at College Park or Atlanta
NOAA –National Oceanic and Atmospheric Administration
PAFB – Patrick Air Force Base
USDA –U.S. Department of Agriculture
USGS – U.S. Geological Survey

PAN = Panchromatic (Black & White)
MS = Multispectral (Color)
CIR = Color-infrared (False Color)

GLOSSARY

Access Road A paved or unpaved route of vehicular access.

Activity Area An area depicting various ground disturbances (to include any disturbed ground, cleared area, ground scars, etc.) related to military usage including possible waste disposal operations.

Bare Area/Ground An unvegetated ground surface; may be areas which have not revegetated at a normal rate.

Berm/Dike A man-made ridge or embankment, constructed of natural or man-made materials, often used to prevent movement of materials, usually liquids.

Building Relatively permanent, usually box-like and roofed, man-made structure.

Cleared Area An area from which man has removed the trees, shrubs or other natural vegetative cover.

Container Something such as a can, box, bucket or barrel used to hold, store and/or transport materials. Drums and tanks are subclasses of container.

Containment Area/Structure An area designed to restrain the movement of, or impound liquid, semi-liquid or dry unconsolidated material. Impoundments are a subclass of containment areas.

Debris The scattered remains of anything broken or destroyed.

Depression A sunken surface area.

Disturbed Area A rough ground surface which has been cleared, overturned, dug up, filled and/or changed from the immediate environs in some manner for an unknown purpose.

Drainage, Surface The routes by which liquid flows. Surface drainage includes perennial, intermittent, channelized and suspected pathways.

Drums Cylindrical, plastic, metal, or fiber container for storing and/or transporting materials; typically of a 55 gallon capacity, but ranging widely to suit industrial applications. Drums smaller than 55 gallons can be difficult to identify on aerial photography and may be placed in the more general category of container.

Dump A site used to dispose of solid wastes without environmental controls; i.e., not directly associated with a waste generating facility where disposal of waste is regulated.

Edge of Slope A topographic contour which simulates a relatively sharp and distinct downward inclination of the ground surface.

Effluent Substance which flows out of a containing space. Outflow or discharge. Generally refers to water and/or wastes, treated or untreated, flowing out of a treatment plant, impoundment, sewer, storm drain or industrial outfall onto the ground or into surface waters.

Excavation A cavity in the earth formed by digging or scooping out materials.

Extraction An area where earthen materials, such as minerals, sand and gravel or metals, have been removed for use elsewhere. Examples are quarries, borrow pits, pit and strip mines.

Fence A structure serving as an enclosure, barrier or boundary, usually made of posts, boards, wire and/or rails.

Fill Area Area where material, either earthen and/or non-earthen, has been deposited either for disposal, to level the ground surface, or to eliminate a wet area.

Fill Material Material, earthen and/or non-earthen, that has been deposited in a fill area.

GLOSSARY

Graded Area Area where the ground surface has been shaped; usually leveled to a smooth horizontal or sloping surface.

Ground Scar A ground surface, vegetated or unvegetated, where marks from a previous activity or feature or from a subterranean feature are visible. Ground scars can result from many things and therefore vary greatly in appearance (e.g. septic drain fields, archaeological features, buried waste disposal pits, trench scars, etc.)

Historical Boundary A line on a map or an overlay which delineates the area where a facility or activity was previously located or conducted.

Impoundment/Lagoon/Pit A containment area, man-made or naturally occurring, that appears to be used for waste and/or water storage, disposal, or treatment.

Landfill A land disposal site, usually for solid waste which intermittently employs a cover material. At a regulated sanitary landfill, waste is spread in layers, compacted to the smallest practical volume, with cover material applied at the end of each operating day.

Material A substance (usually a non-liquid, if that distinction can be made) placed, bulldozed, graded, mixed, spread, etc., over an area. Generally refers to raw or waste materials on or in the vicinity of the site.

Mounded Material Material which has been placed in piles or mounds. Frequently extraction materials, construction materials, or industrial raw materials are stored in large mounds in the open. At fill areas and landfills uniformly dump truck size mounds of material are often present.

Open Storage An open-air, outdoor area for storage of materials, supplies, vehicles and/or equipment; may or may not be enclosed by a fence.

Outfall The place where effluent is discharged.

Pit A relatively deep, steep sided hold in the ground surface.

Scrap Discarded materials that may be suitable for reprocessing

Sediment Material that settles to the bottom of a liquid. Material suspended in water or in the air.

Site Boundary A line on a map or an overlay which delineates the area where any facility or activity is located or conducted. This area is determined from the aerial photography supplemented with information provided by the client, and does not necessarily denote legal property lines.

Sludge A semi-solid residue from any number of air or water treatment processes.

Stain An area that is soiled or discolored and distinct from the surrounding area.

Standing Liquid A temporary collection of liquid on a surface.

Structure A man-made feature which cannot be classified as a building or a shed. Something made up of a number of parts that are held or put together in a particular way.

Tones, Light/Medium/Dark A general, and somewhat subjective, classification of the wide range of tones/shades visible on panchromatic photography/imagery.

Trailer A transport vehicle designed to hauled; a van drawn by a truck or automobile and used as a house or an office. Both semi and house trailers are often used for storage or office space on a site. Specific trailer types are annotated if the spatial resolution permits and if the feature is deemed significant.

Treatment/Storage/Disposal Facility Site where a hazardous substance is treated, stored and/or disposed of.

Trench A long, narrow excavation.

Vegetation Stress A condition wherein vegetation has been weakened and exhibits physiologic stress due to any number of changes in the environment; such as, exposure to toxic substances or weather extremes, lack of nourishment, inundation, parasites, or disease.

Vehicle A device for carrying passengers, goods or equipment, such as a car or a truck. Specific types of motor vehicles are annotated as such if the imagery permits their positive identification and if they are deemed significant.

Waste Disposal Area An area directly associated with a waste generating facility (as opposed to a dump site), where waste materials are discarded.

Well Head That portion of a well that is visible above the ground surface of which opens at ground level.

Wet Area Saturated ground which may or may not be an established wetland.

Wetland Areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

APPENDIX P

RESPONSE TO COMMENTS

FLORIDA DEPARTMENT OF
Environmental Protection

Bob Martinez Center
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Noah Valenstein
Secretary

April 2, 2020

U.S. Army Corps of Engineers (USACE)
Attn: John Keiser, P.E.
701 San Marco Boulevard
Jacksonville, FL 32207

Re: **Draft Final Preliminary Assessment, Naval Air Station Banana River Off-Base Disposal Area (I04FL0027), South Patrick Shores, Brevard County, Florida**

Dear Mr. Keiser:

The Department has reviewed the Draft Final Preliminary Assessment for the Naval Air Station Banana River Off-Base Disposal Area (NASBROBDA), dated March 13, 2020 (made available for download on March 13, 2020). The Department has the following comments:

1. While the purpose and the scope of the Preliminary Assessment, as described in Section 1.3 and 1.4, appear to have been mostly met, although per iii. a recommendation on whether further action is warranted is not entirely clear.

2. The presented assessment history of the NASBROBDA is helpful. There are several sections that call into question whether previous investigations were properly designed to determine potential hazards and risks in the South Patrick Shores neighborhood. Specifically, the Department found the following paragraphs notable:

Section 4.1.2, Page 42, 2nd Paragraph -

> According to documentation the Navy compiled 11 March 1948, following the inactivation of NASBR in the summer of 1947, the Public Works Department began work to *"clean up and restore"* the off-base disposal area.[84] According to the NASBR PWO, during the time of inactivation "*the restoration of the privately owned dump property became a matter of major concern as literally anything and everything had been dumped in the area violating the conditional consent of Mr. Edwards which restricted dumping to burnable materials only.*"[85] The *"cleaning up process consisted of burning and burying all rubble, trash, etc. to a depth of eight to ten feet and covering it with six feet of soil. The surface was restored to a comparative level by bulldozing the eight acres more or less."*[86]

Section 4.1.2, Page 46, 1st Paragraph -

> On 24 February 1948, the former PWO for NASBR wrote that the Navy agreed with Mr. Edwards that the Navy would only dig shallow furrows and would place a reasonable soil cover on top of the disposed material. Other than additional soil to cover the disposed material, Mr. Edwards stated no additional remediation activities were necessary. In addition, Mr. Edwards expressed satisfaction that the disposal activities and soil coverage raised the elevation of the land, thus increasing the property's value. Consequently, the restoration of the property by disposing the trash at a depth of 8 to 10 feet and covering it with 6 feet of soil exceeded the agreed restoration requirements, thus benefiting the landowner, according to the former NASBR PWO. He further recounted that Mr. Edwards never mentioned the matter of monetary compensation for the use of the land.[93] A subsequent claim on June 1948, stated that upon further examination, Mr. Fry noticed that *"long trenches 15 feet deep had been dug over an estimated 20 acres, and that these trenches had been filled with all kinds of material, wrecked planes, motors, flying jackets, lime, cement, tin cans, and every kind of rubbish except lumber."*[94]

This indicates that the risks inherent in the wastes buried in the NASBROBDA may be mainly from exposure to wastes buried deeper beneath land surface than would be identified in sampling near the land surface, unless those wastes had been disturbed and brought to the surface by past property development and sampling occurred at that location. This is supported by some of the reports of buried debris being discovered during work on below-ground utilities and residential pool construction. Based on the information presented in the Draft-Final Preliminary Assessment, direct exposure risks have in past investigations been determined based on analyses of surface soils. Therefore, risks to past/current/future construction/utility worker from exposure to buried wastes/contaminated soil and to residents where buried wastes and contaminated soil have been brought to the surface do not yet appear to have been adequately determined.

3. The Preliminary Assessment states that the FUDs-eligible property is 25 acres according to the Findings and Determination of Eligibility (FDE). However, in the Executive Summary and Section 4.4, it says that according to the Army Geospatial Center's analysis, the Off-Base Disposal Area may be larger (approximately 52 acres). In the Summary and Conclusions presented in Section 9, a conclusion as to which sized area should receive further investigation is not presented and a recommendation as to what the next step in addressing NASBROBDA is not provided. Please include clarifying statements in Section 9 about how USACE will proceed with their investigation based on the 25 acres approved under the FDE versus the 52-acre potential impact area.

4. The Summary and Conclusions presented in Section 9 could be further improved with the addition of Recommendations that would clarify next steps. The Department understands that

USACE will prepare an Inventory Project Report (INPR), as part of the FUDS eligibility process, that will identify eligible projects for the FUDS program. Those recommendations should address whether the Jacksonville District will pursue a recommendation for HTRW and/or MMRP project(s) with the understanding that those recommendations will be considered and approved or rejected by others in the USACE. The recommendations should also include, assuming an HTRW and/or MMRP project is approved, whether USACE intends to proceed with a Site Investigation or jump to a Remedial Investigation/Feasibility Study.

Assuming an HTRW and/or MMRP project is approved for NASBROBDA, the Department would like to discuss with USACE the initial Conceptual Site Model, UFP QAPP, and next steps before USACE proceeds with contract action. The Department expects the USACE to provide an initial Conceptual Site Model that incorporates all the information that was collected as part of the Preliminary Assessment in order to devise an investigative strategy to determine whether there are risks associated with buried wastes and potentially contaminated soils to be addressed or managed. The USACE may find guidance in the Department's *Guidance for Disturbance and Use of Old Closed Landfills or Waste Disposal Areas in Florida, Version 2.1, February 3, 2011*. Please note that the Department's guidance might not address potentially encountering special wastes (munitions and explosives of concern, radiological, PCBs, asbestos, etc.) and the Department would expect specific plans for handling those special wastes.

If you have any questions regarding this letter, please contact me at (850) 245-8997 or my email at david.grabka@floridadep.gov.

Sincerely,

David P. Grabka, P.G
Professional Geologist II
Remedial Project Manager
Federal Programs Section
Waste Cleanup Program

LB

ec: Laura Barrett, FDEP Laura.K.Barrett@FloridaDEP.gov
Jeff Lockwood, P.E, FDEP Jeff.Lockwood@Floridadep.gov
John Winters, P.G., FDEP John.Winters@FloridaDEP.gov
Amanda Lanphere, FDEP, Amanda.Lanphere@FloridaDEP.gov
File

DEPARTMENT OF THE ARMY
USACE, JACKSONVILLE DISTRICT
701 SAN MARCO BLVD
JACKSONVILLE, FL 32207-8175

April 9, 2020

Programs and Project Management Division
Military/Interagency and International Services Branch

SUBJECT: Naval Air Station Banana River Off-Base Disposal Area (NASBROBDA), Preliminary Assessment Draft Final Report, Response to Florida Department of Environmental Protection Comments

David P. Grabka, P.G
Professional Geologist II, Remedial Project Manager
Federal Programs Section, Waste Cleanup Program
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dear Mr. Grapka:

Thank you for your comments on the Preliminary Assessment (PA) draft final report for NASBROBDA provided by letter dated April 2, 2020 (enclosed). The U.S. Army Corps of Engineers (USACE) has reviewed the Florida Department of Environmental Protection's (FDEP) comments and provides responses herein.

FDEP Comment 1: *While the purpose and the scope of the Preliminary Assessment, as described in Section 1.3 and 1.4, appear to have been mostly met, although per iii. a recommendation on whether further action is warranted is not entirely clear.*

USACE Response: Concur. The Executive Summary and Summary and Conclusions sections have been revised to state: "On the basis of the information in this Preliminary Assessment, further CERCLA investigation on the identified potential HTRW hazard by the Jacksonville District is warranted."

FDEP Comment 2: *The presented assessment history of the NASBROBDA is helpful. There are several sections that call into question whether previous investigations were properly designed to determine potential hazards and risks in the South Patrick Shores neighborhood.*

USACE Response: Acknowledged.

FDEP Comment 3: *The Preliminary Assessment states that the FUDs-eligible property is 25 acres according to the Findings and Determination of Eligibility (FDE). However, in the Executive Summary and Section 4.4, it says that according to the Army Geospatial Center's analysis, the Off-Base Disposal Area may be larger (approximately 52 acres). In the Summary and Conclusions presented in Section 9, a conclusion as to which sized area should receive further investigation is not presented and a recommendation as to what the next step in addressing NASBROBDA is not provided.*

USACE Response: As to the next step, project approval from our division office in Atlanta will be requested, consistent with response to FDEP comment 1 above. Subsequent to project approval, the area of former Navy disposal operations would be investigated. The size of that

investigation may evolve further based on information that is gathered during the course of the investigation but would certainly consider the evaluation by the Army Geospatial Center.

FDEP Comment 4: *The Summary and Conclusions presented in Section 9 could be further improved with the addition of Recommendations that would clarify next steps. The Department understands that USACE will prepare an Inventory Project Report (INPR), as part of the FUDS eligibility process, that will identify eligible projects for the FUDS program. Those recommendations should address whether the Jacksonville District will pursue a recommendation for HTRW and/or MMRP project(s) with the understanding that those recommendations will be considered and approved or rejected by others in the USACE. The recommendations should also include, assuming an HTRW and/or MMRP project is approved, whether USACE intends to proceed with a Site Investigation or jump to a Remedial Investigation/Feasibility Study.*

USACE Response: Concur. The Summary and Conclusion section has been revised to provide clear recommendations. The last sentence of 9.2.1 has been revised as follows. "On the basis of the information in this Preliminary Assessment, further CERCLA investigation on the identified potential HTRW hazard by the Jacksonville District is warranted." The following sentence has been added at the end of 9.2.2. "On the basis of the information in this Preliminary Assessment, further investigation by the Jacksonville District on MMRP is not warranted."

Regarding FDEP's request in concluding paragraph to discuss the initial Conceptual Site Model, UFP-QAPP, and next steps before USACE proceeds with a contract action, we certainly welcome that discussion and will coordinate at the appropriate time in the project approval process.

Please contact me at 904.232.1758 or john.e.keiser@usace.army.mil should you have any questions or concerns about these responses to FDEP comments.

Sincerely,

John E. Keiser, PE
Program Manager, Formerly Used Defense Sites
Military/Interagency and International Services Branch
Programs and Project Management Division

FLORIDA DEPARTMENT OF Environmental Protection

Bob Martinez Center
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Noah Valenstein
Secretary

April 23, 2020

U.S. Army Corps of Engineers (USACE)
Attn: John Keiser, P.E.
701 San Marco Boulevard
Jacksonville, FL 32207

Re: **Responses to FDEP Comments on the Draft Final Preliminary Assessment, Naval Air Station Banana River Off-Base Disposal Area (I04FL0027), South Patrick Shores, Brevard County, Florida**

Dear Mr. Araico:

The Department has reviewed the Responses to our Comments on the Draft Final Preliminary Assessment for the Naval Air Station Banana River Off-Base Disposal Area (NASBROBDA), dated April 9, 2020 (received April 9, 2020). The responses provided are acceptable to the Department. The Department anticipates the opportunity to discuss the initial Conceptual Site Model, UFP-QAPP, and next steps before USACE proceeds with a contract action.

If you have any questions regarding this letter, please contact me at (850) 245-8997 or my email at david.grabka@floridadep.gov.

Sincerely,

David P. Grabka, P.G
Professional Geologist II
Remedial Project Manager
Federal Programs Section
Waste Cleanup Program

LB

ec: Laura Barrett, FDEP Laura.K.Barrett@FloridaDEP.gov
Jeff Lockwood, P.E, FDEP Jeff.Lockwood@Floridadep.gov
John Winters, P.G., FDEP John.Winters@FloridaDEP.gov
Amanda Lanphere, FDEP, Amanda.Lanphere@FloridaDEP.gov
File

I04FL0027

APPENDIX Q

REPORT DISTRIBUTION

FINAL REPORT DISTRIBUTION

Addressee	No. Copies
U.S. Army Engineer District – Jacksonville District U. S. Army Corps of Engineers - Jacksonville District ATTN: CESAJ-DP-S 701 San Marco Blvd Jacksonville, FL 32207	1 (*Electronic*)

APPENDIX R

REPORT PLATES

REPORT PLATES

1 **Naval Air Station Banana River Off-Base Disposal Area** – Vicinity Map
2 **Naval Air Station Banana River Off-Base Disposal Area** – Property Map

Thematic Computer-Aided Design and Drafting (CADD) map files completed in association with this Preliminary Assessment are based on historic cartographic, aerial and site visit data collected during this investigation. The thematic maps were created using Intergraph's Microstation.

The thematic maps were created by scanning and warping selected historic data to reference points collected from non-stable selected base maps such as U.S. Geological Survey (USGS) 7.5 minute, quadrangle sheets or National Imaging and Mapping Agency (NIMA) maps. The horizontal scale and horizontal datum of the base maps is generally known. In this case the datum used was 1983 North American Datum. Attempts have been made to rectify the data to the referenced base maps; however, distortions in scale and contortions of the features are present. These distortions are a result of inaccuracies in the source data, as well as the processes of scanning and rectifying the data. Much of the data on the maps lack sufficient information to support a determination of accuracy.

Many of the historic maps used were hand-drawn or built on locations that were inaccurate by modern standards. In general, historic map inaccuracies are unknown and not quantifiable. The unknown inaccuracies may then be magnified by the georeferencing process; therefore, thematic maps generated from historic maps and drawings will have accuracy no greater than the least accurate source.

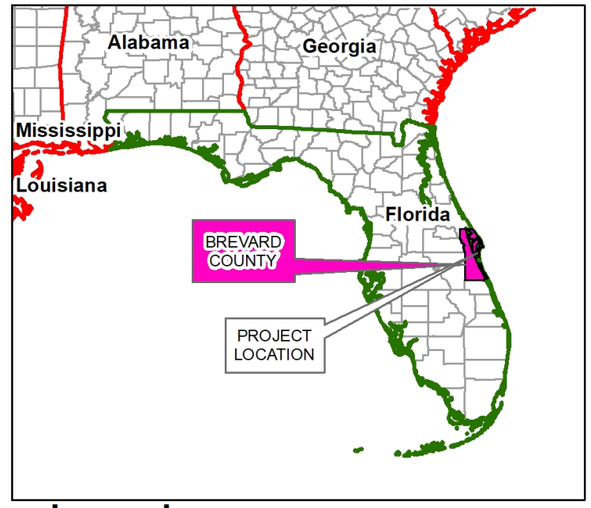
The historical aerial photography has been semi-rectified (georeferenced) to the base map; however, the photos have not been corrected for photogrammetric displacements such as those due to topography or the altitude of the aircraft at the time of imaging. They are not orthorectified images. Locations of features noted on aerial photography are not exact due to the rectifying of both the image and the base map.

The historical aerial photography is rectified (georeferenced) to the earth using 2D transformation methods. Individual images are scanned using a high-resolution scanner at a pixel resolution of between 600 and 1200 dpi. The ground control used for rectifying the imagery is acquired by selecting photo identifiable features from USGS 1:24,000 Quadrangle maps, and measuring the corresponding location on the photo. In some cases, the historical photography is far too outdated to identify corresponding features within the 1:24,000 quadrangle map, therefore, a more recent set of photos, or USGS Digital Orthophoto Quarter Quadrangles (DOQQ) may be used as an alternate control source. Great care is taken during the selection and measurement of control data to ensure the resultant rectified imagery will tie as closely as possible to overlapping imagery. In areas of high relief, all attempts are made to reduce rectification error within the target site. The accuracy of feature locations measured from rectified photos may vary, and are dependent upon the location and accuracy of

the USGS ground control used and the terrain type within the image area.

The horizontal and vertical locations of selected features noted in the Preliminary Assessment and located on the thematic maps have been established utilizing Global Positioning System (GPS) technology. These coordinates were acquired using the Federal Version PLGR96+ GPS receiver. Features located utilizing GPS techniques are so noted in the Preliminary Assessment**.** The PLGR+96 uses the Precise Positioning Service (16 m SEP) and Wide Area GPS Enhancement (WAGE) 4 m CEP**.**

The lineage and source of the historic data used to generate the thematic maps is unknown. The majority of Federal Geographic Data Committee (FGDC) Metadata fields are therefore unknown. A metadata file that gives all available pertinent information has been provided with this product. The statements above are inclusive of all available information regarding the historic data sources and the thematic maps generated. The thematic maps are not original digital mapping data; are scanned and warped data with selected unique feature annotation. The intended purpose of the mapping data is for photo-interpretation and not design. The vector data and associated symbology is unique to the intended purpose. The majority of the digitized features are not part of the current Tri-Service CADD Standards list of features and associated line types and symbology (i.e., range fans, pits, disturbed land). The mapping data produced does comply with applicable Tri-Service Standards.



Legend

- PROPERTY BOUNDARY
- PATRICK AFB
- FORMER PATRICK AFB SOUTH HOUSING AREA

N

0 6,000 12,000 Feet

U. S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT

NAS BANANA RIVER OFF BASE DISPOSAL AREA
FUDS PROPERTY NO. I04FL0027
SOUTH PATRICK SHORES, FLORIDA
BREVARD COUNTY

VICINITY MAP

PROJ. DATE: Nov 2019		PLATE NO. 1

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Legend

- PROPERTY BOUNDARY
- PATRICK AFB
- FORMER PATRICK AFB SOUTH HOUSING AREA
- PROJECT AREA

N

0 1,000 2,000
Feet

U. S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT

NAS BANANA RIVER OFF BASE DISPOSAL AREA
FUDS PROPERTY NO. I04FL0027
SOUTH PATRICK SHORES, FLORIDA
BREVARD COUNTY

PROPERTY MAP

PROJ. DATE: Nov 2019		PLATE NO. 2

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