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EXPLOSIVE SAFETY REMEDIATION PLAN FOR NOMANS LAND ISLAND

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ACRONYMS

AID	Aerial Ignition Device
ANGB	Air National Guard Base
BDU	Bomb Dummy Unit
DET	Detachment
DOD	Department of Defense
EODB	EOD Bulletin
EOD	Explosive Ordnance Disposal
EOR	Explosive Ordnance Recognition
FWS	U.S. Fish and Wildlife Service
MU	Mobile Unit
NAS	Naval Air Station
OIC	Officer in Charge
PPE	Personal Protective Equipment
USN	U.S. Navy
UXO	Unexploded Ordnance

EXECUTIVE SUMMARY

Nomans Land Island is an uninhabited 628-acre island located in the Atlantic Ocean, south of Martha's Vineyard, Massachusetts. It was a U.S. Navy (USN) bombing and gunnery range from World War II until May 1996, and a joint USN range and U.S. Fish and Wildlife Service (FWS) wildlife refuge since 1970. The western two-thirds of the island contain the practice targets, while the eastern one-third is home to a variety of waterfowl and colonial nesting species. The island's location within the Atlantic Flyway makes it an important stopover for neotropical and other migratory birds.

The island is administered by Naval Air Station South Weymouth, Massachusetts. In 1995, the air station and the island were placed on the recommended closure list by the Base Realignment and Closure Commission. This list was later approved by Congress. Soon afterwards, the FWS requested a no-cost transfer of the island, intending for it to become a non-staffed satellite refuge of the Great Meadows National Wildlife Refuge, Sudbury, Massachusetts. The FWS was the only federal agency to apply for a transfer of the island.

Based on the intended end use, a surface sweep of the island for unexploded ordnance (UXO) should be conducted. Much of the UXO, however, lies amidst tall grasses and under the brush covering the island. These grasses and brush must be significantly reduced before a UXO clearance operation can be mounted. The final proposed action is to perform a controlled burn followed by a surface sweep, removing UXO to the extent made possible by site conditions. This approach was agreed upon by the USN, FWS, regulators, conservationists, and educators alike as a means to remove overgrowth and allow safe treatment of UXO, in addition to enhancing the island's role as a migratory habitat.

Following the controlled burn, USN Explosive Ordnance Disposal (EOD) personnel from EOD Mobile Unit TWO Detachment Newport, Newport, Rhode Island, will lead UXO sweep teams over the entire island to detect, identify, and render safe all surface and exposed subsurface UXO. Inert and rendered safe ordnance, will then be removed from the island

to the extent possible. However some large, concrete-filled, inert practice bombs will remain on the island after transfer. Each of these items will be individually marked, with its location identified on island maps. Additionally, future visitors to the island will be provided a handout describing inert ordnance they may encounter and appropriate safety precautions to be observed.

Once the burn, surface sweep, and removal activities are successfully concluded, island ownership will formally transfer from the USN to the FWS. Transfer documentation will include details of past ammunition and explosive contamination, decontamination efforts, and requisite residual contamination information. This information will be also entered into permanent land records. After transfer, FWS warning signs will be erected around the entire island, joining the USN warning signs already in place. FWS sign maintenance crews will thereafter repair/replace these signs in perpetuity. Should FWS personnel later discover any resurfaced ordnance, USN EOD teams will be requested to provide support, as necessary.

1.0 PURPOSE

The purpose of this Explosive Safety Remediation Plan is to demonstrate to the Department of Defense Explosive Safety Board the methods, means, and extent to which Naval Air Station (NAS) South Weymouth will remediate Nomans Land Island of known and suspected ammunition and explosive contamination prior to transfer of the island to the U.S. Fish and Wildlife Service (FWS) for use as a wildlife refuge.[1]

[1] DOD 6055.9-STD, "DOD Ammunition and Explosives Safety Standards," Chapter 12, October 1992, Change 1.

2.0 BACKGROUND

2.1 Location, Climate, Topography, and Geology

The 628-acre Nomans Land Island is located in and is surrounded by the Atlantic Ocean, lying approximately 2.7 miles south of Gay Head on the island of Martha's Vineyard, Massachusetts (see Map 1). Wave cut bluffs reaching 50 ft in height and a narrow beach of coarse gravel, cobbles, and boulders characterize three sides of the island. The north shore is characterized by a gently sloping, sand-gravel beach with a prominent sand spit. General slope is to the north with scattered moraine hills, valleys, and bogs.

The island's climate is considered moderate, similar to other coastal New England locations. The climate has a significant impact on the proposed remediation plan. The unexploded ordnance (UXO) clearance (see Section 4.5) cannot take place until a controlled burn is executed (see Section 4.4). And the controlled burn has to be late enough in the season to ensure most of the grass is dead, but before spring growth begins. Additionally, the burn must be early enough so as not to disturb indigenous wetland species or migratory, waterfowl, or shore birds (see Section 4.3). Regarding the possibility of subsurface UXO resurfacing due to frost heave after Explosive Ordnance Disposal (EOD) teams sweep the island, the frost line in this area is typically 36 in.[2]

The island surface is composed of glacial moraine of sand, gravel, cobbles, and large erratics (boulders) with no apparent outcrops of bedrock. Soil productivity is fair, although no soil surveys have been conducted.

Wetland types range from persistent emergent wetlands to permanently flooded open water. All inland wetlands are classified as palustrine. Cranberry bogs meander over about 200 acres, while shallow lakes resulting from springs and runoff cover approximately 40 acres.

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[2] Telephone conversation between Mr. Doug Murray, Radian International, Oak Ridge, Tennessee, and Mr. Paul Anderson, NAS South Weymouth, Director of Public Works, Engineering Department, 14 February 1997.

Diking of bog overflow by previous owners has created four artificial ponds. Pond Number 2 on the island's north end is subject to salt intrusion during extreme high storm tides[3] (see Map 2).

2.2 Cultural and Historical Resources

Nearby Martha's Vineyard was first settled by the English in the 1700s, and in 1714 Nomans Land Island was made part of the township of Chilmark, Massachusetts. Before that time, Nomans Land Island was probably used as a summer camp by the Wampanoag Indians. Arrowheads and heaps of shells were found by later inhabitants. Martha's Vineyard and Nomans Land Island were well-forested in the 17th century, but during the 1800s both islands were cleared almost completely for farming and sheep raising. The raising of sheep on Nomans Land Island continued until the 1940s.

During the second half of the 19th century, Nomans Land Island was used as a summer base for local fishermen and lobstermen. In 1872, the island entered another phase—that of a hunting and fishing resort for wealthy sportsmen. By 1911, all residents of the island had moved away except one family, which remained until 1912.

The last individual landowner on Nomans Land Island was Joshua Crane, who bought the entire island in 1914. For the next 28 years, Mr. Crane made many unsuccessful attempts to develop the island into a sportsmen's resort. His efforts included diking off and enlarging three ponds, which later provided good habitat for waterfowl. When Mr. Crane's efforts were interrupted by World War II, he leased Nomans Land Island to the U.S. Navy (USN) for a military air-to-ground weapons target. In 1942, the USN enlarged the airstrip, built a sturdy wharf at the landing on the north shore, and stationed 150 Combat Battalion (CB, or Seabee) personnel on the island to maintain the military target facilities during World War II. The Seabees lived in Quonset huts and constructed a radio shack, pumphouse, and brick headquarters building, some of which are still standing (see Map 3). The Quonset huts and most of the machinery and

[3] "Nomans Land Island Environmental Baseline Survey, Phase I Report," Stone & Webster Environmental Technology & Services, 18 November 1996, p. 26.

other materials used by the Seabees have since been removed. Nomans Land Island was purchased by the USN on 5 September 1952 from the Crane Property Trust.

The Department of the Navy and the Department of the Interior entered into a Joint Wildlife Management Agreement for Nomans Land Island on 29 April 1970. The agreement designated the entire island as a National Wildlife Refuge in recognition of known wildlife nesting habitats. At the same time, the agreement partitioned the island, allowing the central and western ends to continue to be used for defense purposes, including military training. Meanwhile, an area along the northeast and east coast was designated as a "No Fire Zone," prohibiting the deployment of ordnance of any type in this area (see Map 4). Since then, routine inspection trips have been conducted by the FWS Regional Biologist to catalog and study various indigenous and migratory island species.[4]

2.3 Environmental Conditions

In the aftermath of the island's deforestation, harsh oceanic winds, salt spray, and lack of shelter have created a brush, forb, grass, and sedge vegetation complex. Although a few dwarf willows (*Salix* spp.), pitch pine (*Pinus rigida*), and eastern red cedar (*Juniperus virginiana*) are present, natural reseeding is inhibited by the absence of seed trees. Dominant upland vegetation includes rose (*Rosa* spp.), poison ivy (*Rhus radicans*), bayberry (*Myrica pennsylvanica*), greenbrier (*Smilax* spp.), and arrowwood (*Viburnum dentatum*). Openings created by recent past fires support grasses and forbs, while areas not affected by fire are dominated by bayberry. Sand dune beach plant communities are comprised of beach grass (*Ammophila breviligualata*), switchgrass (*Panicum virgatum*), beardgrass (*Andropogon* spp.), seaside goldenrod (*Solidago sempervirens*), and beach pea (*Lathyrus maritimus*).

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[4] "No Man's [sic] Land Island: A Brief History," in NASSOWEYINST 3700.11D, "Target and Airspace Manual for No Man's [sic] Land Island (R-4105) Target Area," Department of the Navy, Naval Air Station South Weymouth, 7 April 1994, Enclosure 1, pp. 1-2.

A diversity of wetland types support varied plant communities. Virginia chain fern (*Woodwardia virginica*), cranberry (*Vaccinium macrocarpon*), and sphagnum mosses (*Sphagnum* spp.) represent a common wetland plant community. Other associated wetland plant species include broad-leaved cattail (*Typha latifolia*), sweetflag (*Acorus calamus*), blueberry (*V. corymbosum*), sheep laurel (*Kalmia augustifolia*), burreed (*Sparganium americanum*), soft rush (*Juncus effusus*), and marsh fern (*Thelypteris dryopteris*).

Diverse upland and wetland habitats provide excellent nesting conditions for many bird species. This diversity is maintained by periodic, naturally occurring fires that retard plant succession and promote grass-forb cover types. Canadian geese (*Branta canadensis*) and, to a lesser extent, black ducks (*Anas rubripes*) and mallards (*A. platyrhynchos*) utilize these early successional plant communities as nesting and foraging sites. More open areas attract herring (*Larus argentatus*) and great black-backed gulls (*L. marinus*). Brushy cover types comprised primarily of bayberry provide nesting substrate for colonial nesting birds such as snowy egrets (*Egretta thula*) and black-crowned night herons (*Nycticorax nycticorax*). A variety of passerine birds have also been observed. In addition to nesting habitat, the island provides a stopover for migratory bird species as a feeding and loafing site. Muskrats (*Ondatra zibethnicus*) utilize the abundant wetlands and associated plant communities. Snapping (*Chelydr serpentia*), eastern painted (*Chrysemys picta picta*), and spotted turtles (*Clemmys guttata*) and eastern garter snakes (*Thamnophis sirtalis sirtalis*) have also been observed.[5]

The Commonwealth of Massachusetts Division of Fisheries and Wildlife has placed six species of vertebrates, two invertebrates, and three plants on their Watch List (not protected by the Massachusetts Endangered Species Act). These listed species have been known to occur at times on Nomans Land Island. Of the vertebrates, one species of bird has not been reported since 1918 and four others were not seen in a 1995 inventory when dense populations of competitors were present and the listed species were assumed to no longer nest there. Of the

[5] "Nomans Land Island Environmental Baseline Survey, Phase I Report," op. cit., p. 27.

invertebrates, the eastern painted and spotted turtles are present, primarily living in the peat or wetlands. And of the three plants, one occurs on the beach or dunes, one occurs in the salt ponds, and the other occurs primarily in the wetlands.[6]

2.4 Range Operations

Soon after the lease of Nomans Land Island in 1942, the USN began using it as a radar triangulation point, with exclusive military access. Sometime in 1943, its use was expanded to include bombing and gunnery range activities. In spite of assurances that at the end of the war the USN would return Nomans Land to the owner in the condition it was found, the USN continued to use the island for live weapons training for another 5 years. Finally, in 1952, the USN took title to the island by eminent domain.[7]

At about that same time, the USN discontinued live bombing of the island and stationed the Seabees there to monitor practice bombing runs, enlarge the airstrip, rebuild the wharf, and maintain the practice range.[8]

The island's use as a bombing and gunnery range continued until 31 May 1996. At that time range operations ceased in preparation for its planned closure under Base Realignment and Closure and in accordance with agreements between the USN and the FWS.[9]

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[6] Letter from Dr. Patricia Swain, Plant Community Ecologist with the Commonwealth of Massachusetts, Division of Fisheries & Wildlife, to Prof. William A. Patterson III, University of Massachusetts Department of Forestry & Wildlife Management, 3 January 1997.

[7] "Nomans Land Island Environmental Baseline Survey, Phase I Report," op. cit., p. 20.

[8] Ibid., p. 20.

[9] The facility was recommended for closure by the 1995 BRAC Commission. Congress approved the commission's recommendations in August of that year. These actions were done in accordance with the Defense Authorization Amendments and Base Closure and Realignment Act of 1988 and the Defense Base Closures and Realignment Act of 1990. Following Congressional approval, the Department of Defense (DOD) provided a Notice of Availability to all federal agencies. In October 1995, the FWS responded to the DOD by requesting a no-cost transfer of Nomans Land Island. Theirs was the only federal agency to submit a request for the transfer.

2.5 Ordnance Used

2.5.1 Live Ordnance

As previously noted, the USN discontinued live bombing on Nomans Land Island in the early 1950s. There are reports that USN Seabees subsequently cleared target areas of UXO twice a year.[10] These clearances appear to have effectively eliminated any live UXO threat. An October 1990 USN EOD survey of the entire island reported "no evidence of high explosive bomb detonations or unexploded war shots."[11] Likewise, the October 1995 environmental baseline survey noted evidence of inert bombs and small arms ammunition only.[12]

2.5.2 Inert Ordnance

Following the early 1950s moratorium on dropping live ordnance, dummy or inert ordnance was used. The 1955 target manual describes ordnance authorized for use against Nomans Land Island targets as being, "Glide/Dive/Toss/Masthead/Horizontal/Rockets and Strafing/Miniature and Water Filled Bombs/Inert Heads."[13] A map from the era identifies four targets (see Map 3).

The 1967 target manual designates the airspace surrounding Nomans Land Island as Restricted Area R-4105 and describes six individual targets:

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[10] "Nomans Land Island Environmental Baseline Survey, Phase I Report," op. cit., p. 245.
[11] Administrative message, 181200Z Oct 90, from EODGRU Two DET Newport, Rhode Island, to NAS South Weymouth, Massachusetts.
[12] "Nomans Land Island Environmental Baseline Survey, Phase I Report," op. cit., p. 245.
[13] "Compilation of Air-Surface Targets and Aircraft Operating Areas under Naval Jurisdiction in the First Naval District," Headquarters Naval Air Bases, First Naval District, Naval Air Station Quonset Point, Rhode Island, 21 March 1955, p. 9.
Note: During this period, the Commander Fleet Air Quonset, at NAS Quonset Point, Rhode Island, was designated by the USN as "using agency" of Narragansett Bay Operating Area, Nomans Land Island Target Complex, the U.S.S. James Longstreet Target, and the Narbay Helicopter Instrument Training Area.

"Targets 4, 5, and 6 located east of longitude 70° 49' 30" W are specifically designated as SPECIAL MISSION EVALUATION targets. They shall be used exclusively by high performance, Naval aircraft flying Sandblower 'BARVEL.'[14] Targets 1, 2, and 3 located west of longitude 70° 49' 30" W are available for all other designated uses. When targets 4, 5, and 6 are in use, targets 1, 2, and 3 shall be closed. Normally, except during periods of maintenance and upkeep, the complex is unmanned. The buildings in the north central portion of the island are for personnel and equipment support and are not a target." Authorized ordnance included "20MM and 50 Cal. ball ammunition; rockets to 5" [high-velocity aircraft rocket] HVAR with inert heads; miniature, water filled and MK-76 practice bombs; and practice shapes."[15]

The 1994 target manual identified the northeastern and eastern third of the island as a no-fire zone (see Map 4). It also reidentified the airspace surrounding Nomans Land Island as Restricted Area R-4105 and designated the water area surrounding the island as Prohibited Area 204.5, as depicted on National Oceanic and Atmospheric Administration Surface Charts. It authorized use of "MK 76 and MK 104 practice bombs, water/sand filled bombs, 20 [sic] and 50 caliber, 5.56 and 7.62MM ammunition, rockets up to 5" with inert heads '300MM (TP only),' and other types with prior coordination and approval from NAS South Weymouth Operations Officer, Code 50. Tracer ammunition is authorized." The manual indicated weapons could be delivered by "dive, glide, low level, and radar bombing, photo and searchlight operations." It restricted the use of white phosphorous ordnance, parachute flares, and any single piece of ordnance in excess of 50 lb.[16]

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[14] The "Sandblower Route" (code name "BARVEL") was a Federal Aviation Administration-approved and published access route from Long Island, New York, to Nomans Land Island targets. It was authorized for use during daylight and under visual flight rules only. Characteristics include a low-level, high-speed, 4-mile wide, L-shaped flight path.

[15] "Target Manual Quonset Point Area," Commander Fleet Air Quonset, U.S. Naval Air Station, Quonset Point, Rhode Island, 1 July 1967, Enclosure 1, pp. 7-15.

[16] "Target and Airspace Manual for No Man's [sic] Land Island (R4105) Target Area," op. cit., Enclosure 2, pp. 1 and 5.

3.0 AREA DESCRIPTION

3.1 Northeastern and Eastern Third

As a result of a 1970 joint management agreement between the Department of the Navy and the Department of the Interior, the northeastern and eastern third of the island was designated a wildlife refuge and bird sanctuary.[17] As such, it was identified as a "No Fire Zone" on appropriate charts and maps (see Map 4).

In spite of this classification, the 1995 Environmental Baseline Study island survey team noted that practice bombs had been dropped in the "No Fire Zone." They based their conclusion on (1) information taken from newspaper articles and military reports and (2) evidence of "numerous dummy bombs, bomb fins, and small arms ammunition casings or craters scattered about the island," including the northeastern and eastern third. Nevertheless, "the eastern third of the island, which is protected as a wildlife refuge, was freer of bombs and debris (than the western two-thirds)."[18]

As previously noted, there are no species protected by the Massachusetts Endangered Species Act on Nomans Land Island. There are, however, six species of vertebrates, two invertebrates, and three plants on the Common Wealth of Massachusetts Watch List. These species are found primarily on the beaches or in the island's wetlands.

3.2 Western Two-Thirds

The western two-thirds of Nomans Land Island hosts all air-to-ground targets. These targets, however, have been relocated and renumbered over time. For example, while the earliest target manual makes no reference to specific targets, a 30-year old target manual indicates the presence of six targets on Nomans Land Island.[19] Later descriptions identify only one

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[17] "Nomans Land Island Environmental Baseline Survey, Phase I Report," op. cit., p. 243.
[18] Ibid., p. 245.
[19] "Target Manual Quonset Point Area," op. cit., p. 7.

target.[20, 21] Interestingly, this newest target lies in a different location than targets identified in published target manuals (see Maps 3 and 4.) Clear designation of targets is further complicated since maps published at different times number what appear to be the same targets differently. For example, three maps (all undated) identify one target in the northwest corner of the island by target numbers 1, 2, and 6.

Confirming this "moving target" phenomenon, the 1995 Environmental Baseline Study reported "evidence of practice bombing activities . . . throughout the island. The survey team could not determine the full extent of practice bombs and bomb debris because of the thick vegetation that covers portions of the island. However, it appears that inert bombs and bomb debris are prevalent throughout the western two-thirds of the island."[22]

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[20] "Target and Airspace Manual for No Man's [sic] Land Island (R4105) Target Area," op. cit., Appendix II.
[21] "The Use of Nomans Land Island, Massachusetts, as a Military Training Target Range and the Protection This use Provides to the Transitory and Permanent Wildlife of the Island," Margaret R. Reed, Masters Thesis, Harvard University, November 1992, p. 16.
[22] "Nomans Land Island Environmental Baseline Survey, Phase I Report," op. cit., p. 245.

migrations. This management will take the form of periodic vegetative cover surveys and controlled burns in those areas identified by the survey as requiring a burn to improve the quality of the vegetation for nesting species and to work to restore needed habitats.

The FWS, recognizing the potential presence and danger of UXO located below the surface of the soil, has agreed to post the entire perimeter of the island with National Wildlife Refuge signs. These signs, together with existing restricted area signs (see Section 4.8.1), will serve to warn would-be trespassers of the island's protected status.[25] Further, the USN will provide all future FWS official island visitors an explosive ordnance recognition (EOR) handout describing the types of ordnance that may be encountered, appropriate safety precautions to be observed around them, and how to contact the nearest USN EOD Mobile Unit (MU) Detachment (DET) (see Section 4.8.2).

4.2 Remediation Boundaries and Depth

All island surface and partially-buried UXO will be rendered safe, with the exception of unreachable UXO on the steep cliffs on the south and east shores. EOD will also remediate hazardous UXO on the beaches, down to the low tide watermark.

Subsurface and in-water UXO will not be excavated or removed due to FWS concerns for the potential damage done by digging up subsurface sites or dredging sensitive wetlands for UXO. The FWS expressed that its preferred option is to not perform a "major cleanup that disturbs the ground/habitat if the Navy would retain liability for UXO. If they do a major cleanup, most of the wildlife would be destroyed."[26] The USN concurs with this approach. UXO visible in any of the island wetlands or ponds will be removed by EOD teams so long as the retrieval is practicable and will not disturb the wetland. Sweep teams will be equipped with ropes, grapnel hooks, and rubber boots and/or waders, but will not have diving capability.

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[25] "Operational Use and Management Program [for] Nomans Land [sic]," U.S. Fish and Wildlife Service, undated.
[26] "The Transfer Process for Nomans Land Island," briefing statement prepared by Jeffery M. Donahoe, Chief, Division of Realty, U.S. Fish and Wildlife Service, 25 April 1996.

4.0 PLANNED REMEDIATION

The USN and FWS have reached a common understanding that the level of remediation of Nomans Land Island must meet the protection goals for the proposed end use and at the same time ensure the island's habitat is preserved. The following paragraphs describe the plan to achieve both objectives.

4.1 End Use

Since 1970, Nomans Land Island has been managed as a Naval bombing and gunnery range and a National Wildlife Refuge under a Joint Management Agreement signed by the Departments of the Navy and Interior. Once the bombing and gunnery range is closed and the island is transferred to the FWS, the two Departments have agreed the island should be managed as a non-staffed satellite refuge of the Great Meadows National Wildlife Refuge located in Sudbury, Massachusetts. As a refuge, the island would continue to provide permanent long-term protection of the island's wildlife and its habitat. The transfer is considered compatible with the current use of the island.[23]

With respect to the depth of clearance, the FWS agreed that "following the completion of the 'burn and [surface] sweep' the FWS will be able to accept a no-cost transfer of title to this island for inclusion into the National Wildlife Refuge System. This transfer, or any Memorandum of Agreement developed prior to the transfer, will fully detail the responsibilities of the Navy as it relates to the level of cleanup of contaminants (ordnance and other associated debris) as well as establish liability for those contaminants that may eventually remain on site."[24]

Nomans Land Island National Wildlife Refuge will continue to be managed to enhance and improve the habitat for nesting and migratory bird use during spring and fall

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[23] "Statement of Justification 1334, No-cost Transfer of Nomans Island [sic] from the Department of the Navy to Department of the Interior," Attachment to a GSA Form 1334, "Request for Transfer of Excess Real Property and Related Personal Property," 5 October 1995.

[24] Letter from David A. Carr, Realty Officer, U.S. Fish and Wildlife Service, Region 5, to Commander Glenn E. Doten, Base Transition Coordinator, NAS South Weymouth, 14 January 1997.

As agreed, the USN will respond to UXO later discovered by the FWS maintenance crews or biological wildlife survey teams (see Section 4.8.2).

4.3 Proposed Remediation Activity Schedule

The island's status as a migratory bird refuge makes timing of the remediation critical. Remedial action should occur so as to not disturb the habitat of indigenous wetland species or migratory, waterfowl, or shore birds. This remedial action will begin with a controlled burn (see Section 4.4) in the early spring in order to take maximum advantage of the dead grasses and dormant brush, and not adversely affect avian species.[27] The UXO clearance operation should follow soon thereafter, before the recovering vegetation has a chance to regenerate and hide the exposed UXO.

4.4 Controlled Burn

Dense vegetation covers much of the island. If left in place it would continue to hide UXO, significantly inhibit any UXO clearance operation, and create an unwanted safety hazard for the UXO sweep teams. A mechanical clearance of the ground cover (such as mechanical raking and mowing) was discounted as inherently hazardous for this area and possibly defeating the objective of the visual surface sweep.[28] A controlled burn, on the other hand, was viewed by the Commonwealth of Massachusetts, the FWS, and the USN as being able to simultaneously meet two objectives: (1) achieving short-term reduction of vegetative cover by $\geq$50%, allowing for a more effective visual surface sweep of UXO and (2) meeting ecological management goals of maintaining open, early successional habitat on the island.[29]

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[27] Letter from Ms. Sharon Ware, Acting Refuge Manager, U.S. Fish and Wildlife Service, Great Meadows National Wildlife Refuge, to Mr. Dave Barney, Environmental Director, NAS South Weymouth, Massachusetts, 9 January 1997.
[28] Ibid., "Operational Use and Management Program [for] Nomans Land [sic]."
[29] "Prescribed Burn Prescription, Nomans Land Island," Prof. William A. Patterson III, University of Massachusetts Department of Forestry and Wildlife Management, 6 January 1997, p. 4.

To this end NAS South Weymouth, together with the University of Massachusetts at Amherst, Department of Forestry and Wildlife Management, prepared a controlled burn plan. It has since been approved by the FWS[30] and the Common Wealth of Massachusetts[31] and concurred with by the Navy's EOD MU TWO DET Newport.[32]

The plan takes into account the presence of UXO and personnel safety concerns, air pollution control regulations, archeological and cultural issues, existing vegetation cover, presence of wetlands and listed species, and bird migratory patterns. Regarding the wetlands, the plan concludes that by burning in early spring the prevailing wet conditions will prevent harm to the wetland areas. The burn plan contains required parameters for wind direction, effective windspeed, the grass and brush fuel moisture content, and atmospheric mixing height. Also included in the plan are requirements for the temperature range, relative humidity, and number of days since significant rain. Another segment of the burn plan also addresses smoke management.[33]

The burn plan outlines a primary and an alternative approach to accomplishing a controlled burn: aerial and ground ignition, respectively. If the aerial ignition method is unavailable or unable to reduce the vegetation growth below the 50% target, the ground ignition plan will be implemented.

4.4.1 Controlled Burn Aerial Ignition

Aerial ignition will be achieved by dropping aerial ignition devices (AIDs) from a Massachusetts Army National Guard UH-1 helicopter over the entire island. The AIDs are ping-pong ball-sized plastic vessels containing potassium permanganate. Each device is injected with ethylene glycol as it passes through a dispensing machine mounted on the side of the helicopter.

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[30] 9 January 1997 Ware letter to Barney, op. cit.
[31] Letter from the Massachusetts Department of Environmental Protection to the NAS South Weymouth Environmental Director, 15 January 1997.
[32] Interview by Mr. Doug Murray, Radian International, Oak Ridge, Tennessee, with LT Jim Beene, EOD MU Two, Newport, Rhode Island, 7 February 1997.
[33] "Prescribed Burn Prescription, Nomans Land Island," op. cit., pp. 5-6.

The mixing of the two chemicals produces a time-delayed exothermic reaction that results in a 1- to 2-ft tongue of flame being emitted from the device for a period of 0.5 to 2 minutes following ejection from the machine. The flames ignite spot fires when the devices fall in available fuel (dead grass and brush) on the ground. Firing is planned to begin on the downwind side (east side) of the island, with AIDs dropped in an approximately 100- by 100-ft grid on north-to-south lines. Lines will parallel each other, and seeding will proceed from east to west across the island (see Map 5). Spot fires will be extinguished naturally as they coalesce, with individual spots burning for 15 to 30 minutes.[34]

4.4.2 Controlled Burn Ground Ignition

This approach involves personnel being delivered to the island's north shore by helicopter where they will set fires along preselected paths on the island using drip torches. These fire igniters, with EOD personnel walking ahead, will begin walking south from the north shore, roughly following the old road (path) shown on topographic maps as bisecting the island (see Map 6). Departures from the path will be made with caution. Once a line of fire has begun and is burning to the east, additional firing, following the abandoned airstrip and proceeding from the southeast to the northwest and then back along the north shore of the island, will be carried out with the intention of igniting a ring of fire to encompass the remaining western half of the island. Personnel will be cautioned to avoid contact with smoke burning through areas of poison ivy. Because of the potential for ignition of UXO, personnel will continually move away from areas as they are ignited.[35] Personal protective equipment (PPE) and other safety and health issues and requirements are discussed in the following paragraphs.

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[34] Ibid., p. 8.
[35] Ibid., p. 8.

4.4.3 Controlled Burn Team Composition and Team Preparation

The aerial ignition team will consist of the helicopter flying crew, a "burn boss," and someone to assist in loading the AID dispensing machine. Aside from support crews at Otis Air National Guard Base (ANGB), Massachusetts, no others will be involved either in the air or on the island.

The alternative ground ignition plan will require an entirely different team. Burning operations will be supervised by an overall "burn boss." Reporting to the "burn boss" will be two "fire leaders," each "red carded" or in training with a minimum "step test" score of 45.[36] Ground crews will consist of one (preferably two) fire leaders qualified to the standards of the Nature Conservancy or National Wildfire Coordinating Group (for fuel models 1, 3, and 6) and two EOD personnel. Each will be in good physical condition and equipped with their respective operating and communication equipment, safety devices, and PPE.

A 1-hour briefing will precede the operation. Present at the briefing will be both flight and ground crews. The briefing will include a review of the flight plan, flight safety, routine and emergency communication procedures, fire ignition procedures using the drip torches, and fire extinguishing procedures.[37]

4.4.4 Containment

There will be no direct attempt to hold the fire within prescribed lines. The fires should burn to the cliffs along the shore and extinguish themselves. To the extent that EOD personnel deem it safely possible, smoldering areas should be examined and evaluated as potential

[36] This, and other burning qualifications, are standards of either the Nature Conservancy or the National Wildfire Coordinating Group.
[37] "Prescribed Burn Prescription, Nomans Land Island," op. cit., pp. 7.

long-term smoke hazards. The fire will be permitted to burn until all flames have extinguished themselves. Every effort will be made to have the fires out by 1600 hours ET. Helicopter-borne water buckets will be used if necessary.

4.5 UXO Remediation of the Island

Once the controlled burn clears the island of most (≥50%) of its vegetative cover, the UXO teams can safely begin their remediation effort. The burning should expose UXO overlooked by previous sweep teams and allow the deployed teams to move about most of the island unencumbered by tall grass and brush.

The success of the UXO clearance operation is critical to the transfer of the island to the FWS. According to the Service's Regional Realty Director, the transfer can only take place "if the property is free of all environmental contaminants or a remedial action plan acceptable to the [U.S. Fish and Wildlife] Service is in place and an agreement by the Department [of the Navy] is in effect to execute all actions necessary to complete this plan."[38]

At the conclusion of the UXO sweep operation, a report of the operation will be provided to the FWS, Great Meadows National Wildlife Refuge, providing information on the extent of the sweep and future operational limitations and/or considerations (see Section 4.7).

4.5.1 UXO Clearance Team

A minimum of 37 persons will conduct the UXO surface sweep operations of Nomans Land Island as shown in Table 1. The EOD officer will stay on the island for the duration of the clearance operation, while equally sized and equally capable UXO clearance teams, each with an independent medical technician, will rotate on and off the island every 4 days until UXO clearance is complete. This sweep operation is anticipated to last 18 days.[39]

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[38] Memo from John G. Taylor to Mr. Marian E. Digiamarino, undated.
[39] Memorandum "Clearance of Nomans Island" [sic], from OIC, EOD MU Two to Commanding Officer, NAS South Weymouth, Enclosure 1, undated.

Table 1

UXO Clearance Team Composition

Team	Persons	Function	Required Skills	Source
EOD officer	1	Officer in charge (OIC) provides overall supervision of the operation	Graduate of U.S. Navy School EOD (NAVSCOLEOD)	EOD MU TWO DET Newport[a]
Independent medical technicians (corpsmen)	2	Provide on-site emergency medical care	Trained in caring for injuries normally associated with clearance operations of this kind (i.e., back and neck injuries, lacerations, broken bones, and all heat-related injuries)	NAS South Weymouth
Sweep teams (EOD technicians)	4	Detect, identify, render safe, recover, or destroy UXO	Graduate of NAVSCOLEOD	EOD MU TWO DET Newport[a]
Various	30	Augment EOD technicians in UXO sweep duties, as required	Trained by EOD technicians in explosive ordnance recognition, hazards, and precautions	NAS South Weymouth
Total	37			

[a]EOD MU TWO DET is currently assigned one EOD officer and four EOD technicians. Additional EOD technicians are being sought from other EOD units on a temporary active duty basis.

4.5.2 Remediation Operations

4.5.2.1 Team Deployment

Teams will rotate to the island from Otis ANGB, Massachusetts, and back again by helicopter. On-site teams will bivouac on the northern shore of the island. This bivouac site will also serve as a command post and staging area for remediation operations. The explosives storage site will also be on the northern shore, but sited at a quantity distance protective of personnel and other facilities.[40]

[40] Explosives will stored in a barricaded operating location at a distance from the command post and other essential personnel or facilities based on an explosive storage quantity-distance (Q-D) separation factor of K-18. K-18 ensures an acceptable level of risk. This separation factor is based on EOD storing a one-day's supply of class/division 1.1 explosives on the island. The separation distance can be calculated by means of the formula

EOD teams will have on hand a sufficient quantity of explosives, detonators, and both electric and non-electric initiators to complete the clearance operation. They will also have appropriate communication equipment and suitable PPE for the operation. This will include leather boots and gloves, Battle Dress Uniform or coveralls, and safety glasses[41]. Explosives[42] will be transported to and from Nomans Land Island via helicopter from Otis ANGB. Explosives will be stored on the island overnight.[43]

4.5.2.2 Grid Maps

To facilitate a methodical shore-to-shore survey of the island, it will be divided into workable grids. These will be laid out by sweep teams, marking the corners and sides of the grids with surveyors flags and systematically numbering each grid with a unique identifier. Although the establishment of 23 grids is currently planned, these grids will vary in size due to terrain restrictions. Map 7 suggests how this would appear.

Prior to sweep operations on a particular grid, the EOD team leader will be given a map, with an enlargement of that grid or segment of the island to be swept (Map 9, the 1:400 map included with this submittal, could be enlarged and used for that purpose). During the sweep, team leaders will record the number and types of UXO encountered within each grid. As subsequent sweep teams neutralize UXO, these records will be updated accordingly.

Maps annotated by the sweep teams will be turned over to the Environmental Director, NAS South Weymouth, after the island UXO sweep. Notations of remaining UXO [e.g., inert Bomb Dummy Unit (BDU)-50s] will become part of the final report (see Section 4.7) and entered in the permanent land records of Chilmark Township.

$D=KW^{1/3}$; where D=required distance (in feet), K=protection factor depending on the degree of risk assumed or permitted, and $W^{1/3}$=the cube root of the NEW (in pounds). For example, if EOD brought to the island 100 lb, the K-18 Q-D would be 464 ft.

[41] Telephone conversation between Mr. Doug Murray, Radian International, Oak Ridge, Tennessee, and GMCS Al Larkins, EOD MU Two, Newport, Rhode Island, 13 March 1997.

[42] EOD teams will have types and quantities of explosives prescribed in NAVSEA SW060-AA-MMA-010 (formerly OP 2212), "Demolition Materials," 1 September 1989.

[43] "Clearance of Nomans Island" [sic] memo, op. cit.

4.5.2.3 Flagging

Once island grids are marked, the EOD teams will begin identifying and flagging UXO items according to Table 2.

Table 2

Clearance Operation Flagging

Color	Meaning	Action Required	
		EOD	Augmentees
Orange	Grid corners/sweep lanes	N/A	N/A
Yellow	Live/suspected UXO	Return later to apply appropriate render-safe procedure[a]	Do not disturb. No action required at this time
White	Practice UXO with no evidence of live spotting charge that are too large to move[b]	Inspect, mark with orange spray paint, and document on map indicating their inert status	N/A

[a]Live UXO will be rendered safe using ordnance-specific render-safe procedures (for newer items), or using EOD Bulletin 60A-1-1-31, "Explosive Ordnance Disposal Procedures: General Information on EOD Disposal Procedures," 19 January 1982, Change 10, 31 May 1994 (for older items).
[b] Because UXO sweep teams have no equipment to move large or heavy items, not every inert ordnance item can or will be collected. Teams will collect only those pieces larger than helicopter net webbing, but small enough to be man portable.

During this flagging phase, the EOD Officer in Charge (OIC) will assign the on-site sweep teams to separate grids. This will ensure no duplication of effort and improve team efficiency. Individual teams, under the direction of the EOD team leader, will walk shoulder-to-shoulder throughout the entire grid.

4.5.2.4 Sweep Operations

Based upon recent surveys, live ordnance (in the form of live bombs or projectiles) is not likely to be encountered. Should any be found, however, they will be rendered safe in situ using procedures outlined in ordnance-specific EOD Bulletins (EODBs) or EODB 60A-1-1-31 (see Table 2). Application of a render-safe procedure to live ordnance that is unsafe to move usually results in few recoverable fragments.

Inert ordnance on the island primarily falls into two classes: practice bombs and aircraft cannon or gun target practice projectiles. Of the latter class, little is likely to be encountered or recovered. The absence of hard targets over the years implies there was little to slow down or stop fired projectiles. Consequently, the vast majority of these will remain buried far below the surface.

Regarding practice bombs, the preponderance of these are likely to be of three types: BDU-50 (500-lb MK-82 concrete-filled general-purpose bomb, many with MK-15 Snake Eye high-drag aluminum fins), BDU-33s (25-lb steel practice bomb), and MK-106 (9-lb steel sheet metal practice bomb). Each of these comes with a red or white phosphorous spotting charge normally expended upon impact. All of these found on the surface, or partially buried beneath the surface, will be inspected for the presence of unexpended spotting charges. Should spotting charges be found, the ordnance will be counter-charged using C-4 plastic explosives. Once the unexpended spotting charge is neutralized, each practice bomb will be reinspected and—if free of explosives—certified accordingly (see Table 2). All inert ordnance items discovered during sweep operations will marked with orange paint. Inert BDU-50s will be left in place, while inert BDU-33s and MK-106s will be hauled by hand or by wheelbarrow to an EOD-designated collection point within each grid, or to a designated collection point in a neighboring grid. From there, the inert items will loaded into nets suitable for ferrying by CH-47 helicopter to a selected Defense Reutilization and Marketing Office staging area for marketing and resale as recycling feedstock.

To meet the requirements outlined in Section 4.7, maps will be marked identifying inert BDU-50s or other large inert ordnance items that cannot be safely carried or hauled to collection points. In addition, to prevent BDU-50s from being incorrectly identified by future island visitors as hazardous UXO, EOD will ensure the bomb is oriented with the counter-charged casing holes clearly visible.

4.6 Health and Safety

4.6.1 Explosives Safety

The sweep team's first priority is explosive safety. A detailed health and safety plan will be written and approved prior to actual sweep operations. This plan will be based, in part, on details presented in this submittal.

Good training will enhance safety. All non-EOD personnel on the sweep teams will receive EOR training in the days prior to deployment. This training will be documented by the trainers. Prior to each trip to the island—as part of the day's operational briefing—a safety briefing will be given by the EOD Explosives Operation Supervisor. This will serve as refresher training for the non-EOD personnel. The essential message is: don't touch anything unless qualified to handle it.

The right PPE is also essential to a safe operation. Each member of the sweep team will be outfitted with appropriate PPE, inspected for form, fit, and function prior to deploying onto the island (see Section 4.5.2.1).

Any team member has authority to stop any unsafe operation at any time. Souvenir taking, running, or throwing of items is not permitted.

4.6.2 Emergency Response Actions

Once on the island, each team will be provided radios. In case of accident, these will be used to report the extent of injury, the first aid being administered by the corpsman, and the need for backup support, if any. In the event of radio failure, an augmentee will be selected to go to the command post and report the situation to the EOD OIC. The EOD OIC may then request mainland backup support, if required.

4.7 Transfer Records

NAS South Weymouth will prepare documentation detailing Nomans Land Island's past and present UXO contamination. This information will be enclosed along with the report of excess to be entered on the permanent land records. Required data include:

- Past ammunition and explosive contamination;
- Decontamination efforts;
- Areas of remaining contamination, positively identifying nomenclature, hazard, quantity, and exact locations;
- Restrictions and prohibitions concerning use of the real property; and
- Provisions for continued Department of Defense (DOD) surveillance of the island where remaining UXO is above the frost line.[44, 45]

4.8 Post-Transfer Considerations

Two key provisions of the FWS Operational Use and Management Program involve (1) erecting and maintaining warning signs and (2) dealing with surfaced UXO.

4.8.1 Warning Signs

The FWS requires that "the entire periphery of the island . . . be posted with National Wildlife Refuge signs. These signs will be affixed to 4X4 wooden posts hand carried and hand dug into the soil. These signs will be maintained in perpetuity by the FWS. The FWS will also maintain in perpetuity the UXO [sic] Public Notification signs to be provided and initially

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[44] Ibid., "DOD Ammunition and Explosives Safety Standards," Chapter 12.

[45] "Ammunition and Explosives Ashore—Safety Regulations for Handling, Storing, Production, Renovation and Shipping," NAVSEA OP 5, Volume 1, 1 March 1995, Change 1, 15 November 1995, paragraph 2-1.13.6.c and d(1).

erected by the USN with replacement signs provided to the FWS by the USN and at Navy expense in perpetuity."[46] Based on past experience with signs of this type on the island, semiannual maintenance is required.[47]

Ten 4- by 8-ft public notice signs are currently posted at strategic approaches to Nomans Land Island (see Figure 1 and Map 8).[48] Sign wording and placement was directed by the Commander, NAS South Weymouth.

4.8.2 Discovered UXO

It is DOD and USN policy that "every means possible shall be used to protect members of the general public from exposure to hazards from contaminated real property currently or formerly under DOD ownership or control."[49, 50] It is also DOD and USN policy to "make provisions for continued DOD surveillance of areas where UXO is above the frost line, yet below the remediation depth."[51, 52]

Regarding continued surveillance of the island, the transfer records (see Section 4.7) will contain details regarding the frequency and extent of continued surveillance operations. Based on the movement of buried UXO due to the location of the frost line, an island-wide surface sweep could be required after a 5-year period.

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[46] "Operational Use and Management Program [for] Nomans Land [sic]," op. cit.
[47] Interview by Mr. Doug Murray, Radian International, Oak Ridge, Tennessee, with Mr. Mike Voelker, NAS South Weymouth, Director of Public Works, Engineering Department, 6 February 1997.
[48] "Ammunition and Explosives Ashore—Safety Regulations for Handling, Storing, Production, Renovation and Shipping," op. cit., paragraphs 2-1.13.4 and 2-2.1.2a.
[49] "DOD Ammunition and Explosives Safety Standards," op. cit., paragraph B.1.
[50] "Ammunition and Explosives Ashore—Safety Regulations for Handling, Storing, Production, Renovation and Shipping," op. cit., paragraph 2-1.13.6.a.

[51] "DOD Ammunition and Explosives Safety Standards," op. cit., paragraph C4b(7).
[52] "Ammunition and Explosives Ashore—Safety Regulations for Handling, Storing, Production, Renovation and Shipping," op. cit., paragraph 2-1.13.6.e(2)(g).

WARNING

RESTRICTED AREA

U.S. GOV'T PROPERTY

TRESPASSERS WILL BE PROSECUTED

DANGER - TARGET AREA - LIVE BOMBS

Figure 1. Warning Sign

Although the "general public" is prohibited from going ashore Nomans Land Island, trespassing is known to occur.[53] Even so, trespassers must be protected from UXO. The signs are one protective measure and the planned shore-to-shore surface sweep is another. Nevertheless, surfaced UXO may be discovered by trespassers. It is unlikely, however, they will report the sightings.

Sign maintenance workers, wildlife managers, and other FWS personnel routinely visit the island on official business. They too must be protected. The FWS "expects the Navy/DOD to be responsible for any UXO issues in perpetuity."[54] Besides the periodic surveillance of the island previously mentioned, three approaches will be taken:

- EOR Handout

  EOD MU TWO DET, Newport, Rhode Island, will prepare an EOR handout for island visitors containing (1) line drawings or photographs of common island UXO, including large concrete-filled bombs after being rendered safe, (2) safety precautions to be observed when encountering UXO, (3) UXO site marking procedures, and (4) EOD MU TWO DET's phone numbers. A master copy of this handout will be provide to Great Meadows National

[53] "Nomans Land Island Environmental Baseline Survey, Phase I Report," op. cit., p. 243.
[54] "Nomans Land Island Meeting 08/14/96" minutes, Lee J. Vescovich, NAVFAC EFDNORTH.

Wildlife Refuge headquarters for future copying and distribution to official island visitors.

- EOD Response

  The second approach involves EOD responding to reports of ordnance discovered, marked, and noted on maps by official visitors.[55] This response may be immediate, if the situation is deemed critical to the safety of island visitors, or may be delayed until the next UXO sweep operation.

- UXO Sweep of the Island

  Periodically, at the request of the FWS, the supporting EOD unit will be asked to survey the island for signs of surfaced UXO and conduct surface sweeps, if required.

[55] Currently, the responsible unit is EOD MU TWO DET Newport, 1176 Howell St, Newport, Rhode Island 02841-1708, Telephone (401) 841-3301/3302. If EOD MU TWO DET Newport is deployed, reassigned, or otherwise no longer responsible for EOD support in this region in the future, the replacement unit can be found by calling EODGRU TWO at (757) 464-8462.

5.0 MAPS AND PHOTOGRAPHS

5.1 Maps

The following referenced maps are included with this plan:

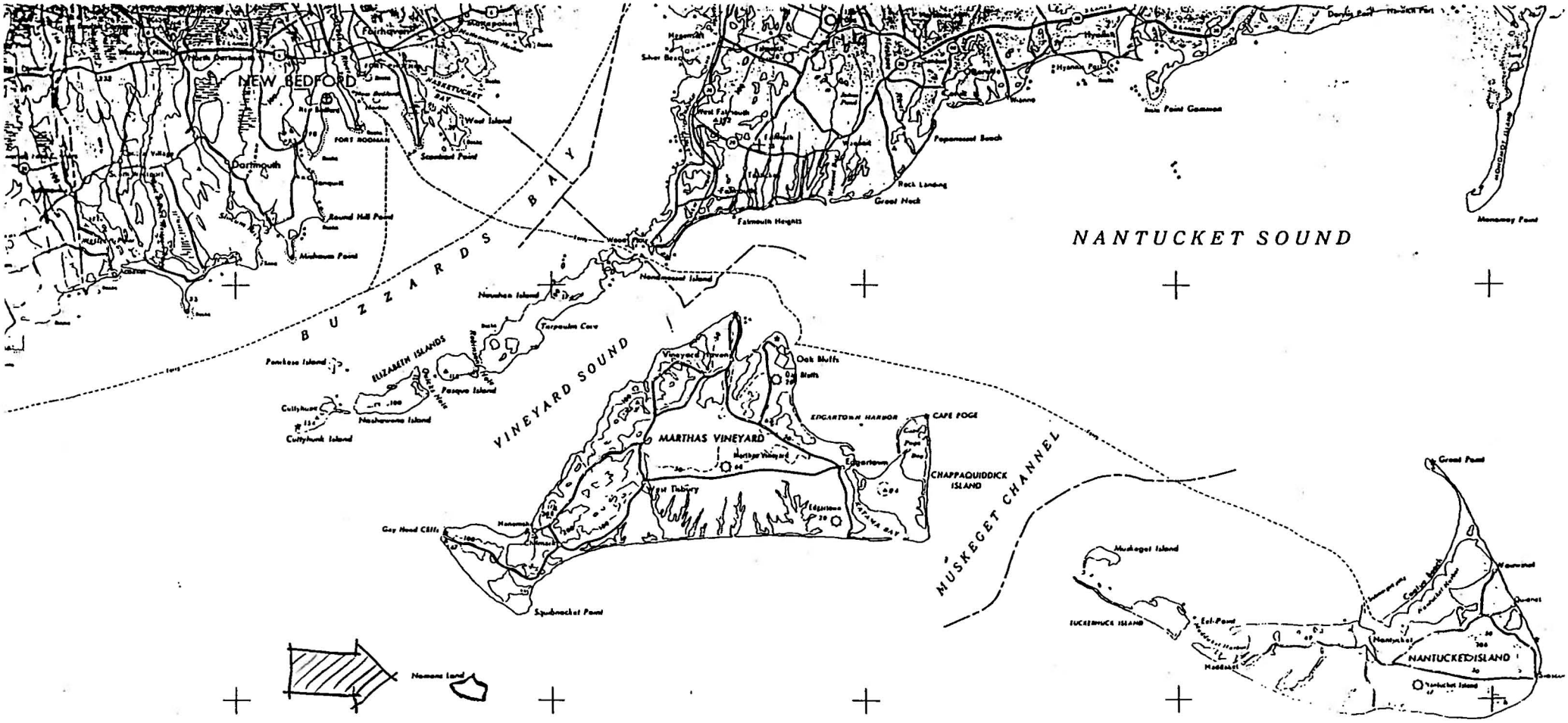
- Map 1—Nomans Land Island Relative to Martha's Vineyard, Massachusetts, and the mainland.
- Map 2—Nomans Land Island National Wildlife Refuge, January 1973.
- Map 3—Map of Nomans Land Island, circa 1950.
- Map 4—Target map from "Target and Airspace Manual for Noman's Land Island [sic] (R4105) Target Area," 7 April 1994.
- Map 5—Aerial Ignition Plan from "Prescribed Burn Prescription - Nomans Land Island," 6 January 1997.
- Map 6—Alternative Ground Ignition Plan from "Prescribed Burn Prescription - Nomans Land Island," 6 January 1997.
- Map 7—Map 3 overlaid with UXO sweep grids.
- Map 8—Map 2, showing locations of restricted area signs.
- Map 9—1:400 map.

5.2 Photographs

The following photos are included with the plan:

- Photo 1—Aerial shot of Target 1.
- Photo 2—Ground shot of Target 1.
- Photo 3—Aerial shot of radar targets (note partially buried, high-drag BDU-50).

- Photo 4—Close-up shot of partially buried, high-drag BDU-50 with BDU-33 in foreground.
- Photo 5—MK-106 practice bomb.
- Photo 6—Concrete-filled practice bomb, unknown nomenclature.



N T I C . O C E A N

Map 1

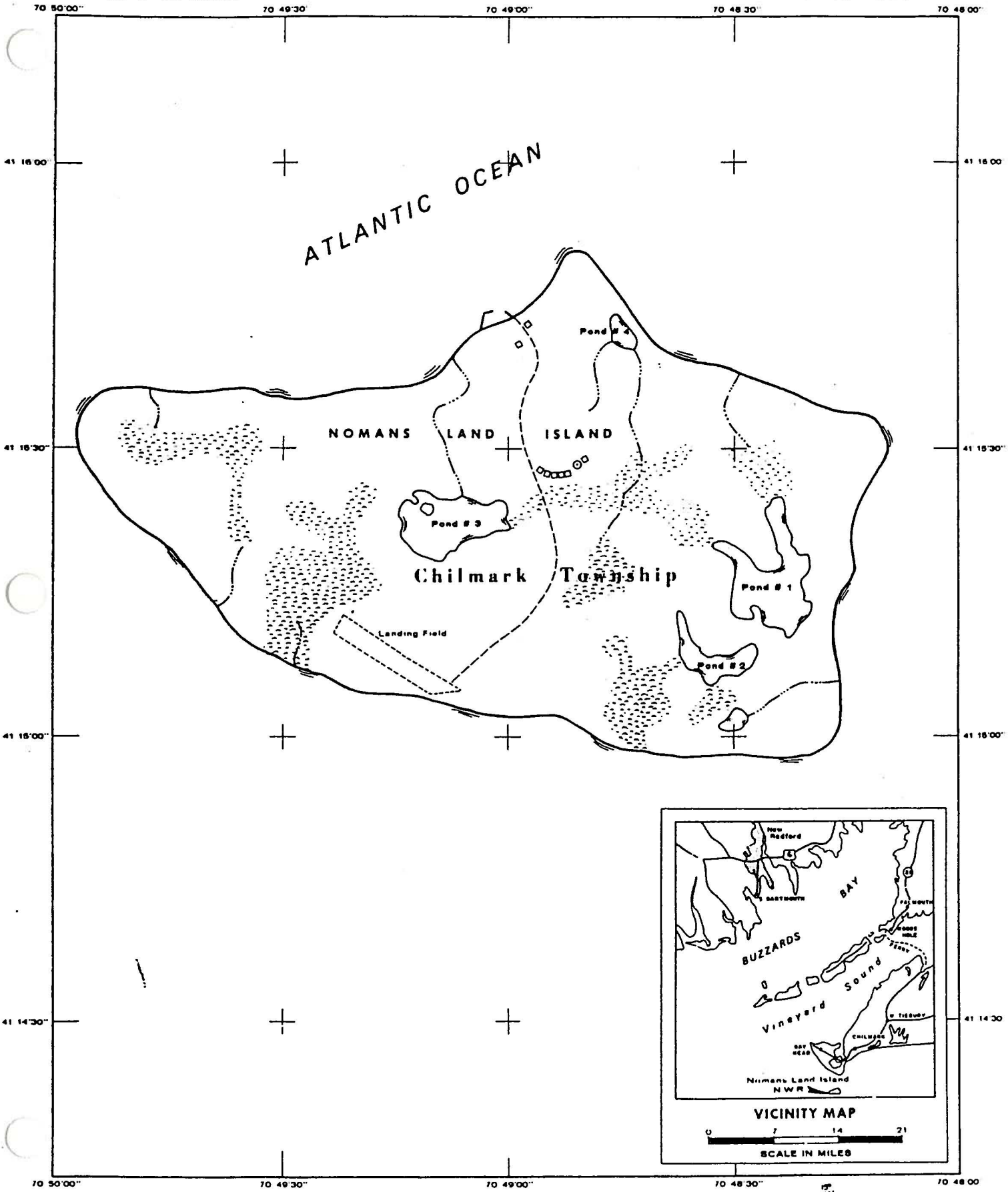
Map 2

NOMANS LAND ISLAND NATIONAL WILDLIFE REFUGE

DUKES COUNTY, MASSACHUSETTS

UNITED STATES
DEPARTMENT OF THE INTERIOR

UNITED STATES
FISH AND WILDLIFE SERVICE



COMPILED IN THE DIVISION OF ENGINEERING
FROM SURVEYS BY G. S. AND F. & W. S.

Scale 0 660 1320 1980 2640 Feet

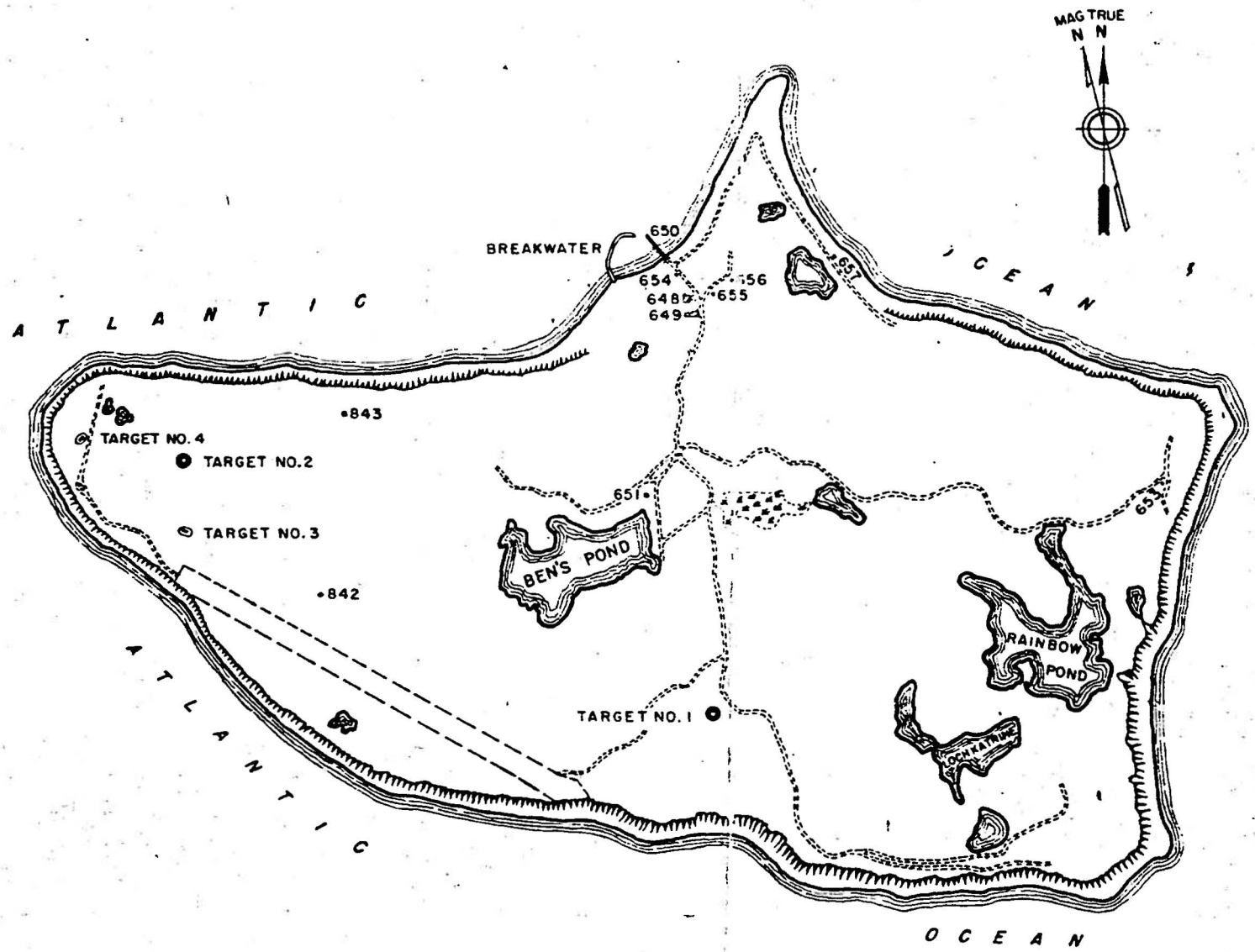
MAGNETIC N
True North

MEAN
DECLINATION
1951

BOSTON, MASSACHUSETTS JANUARY 1973
POSTED

5MA846 402

Acquired in fee by Condemnation 5 Sept. 1952
from Crane Property Trust for $6,500



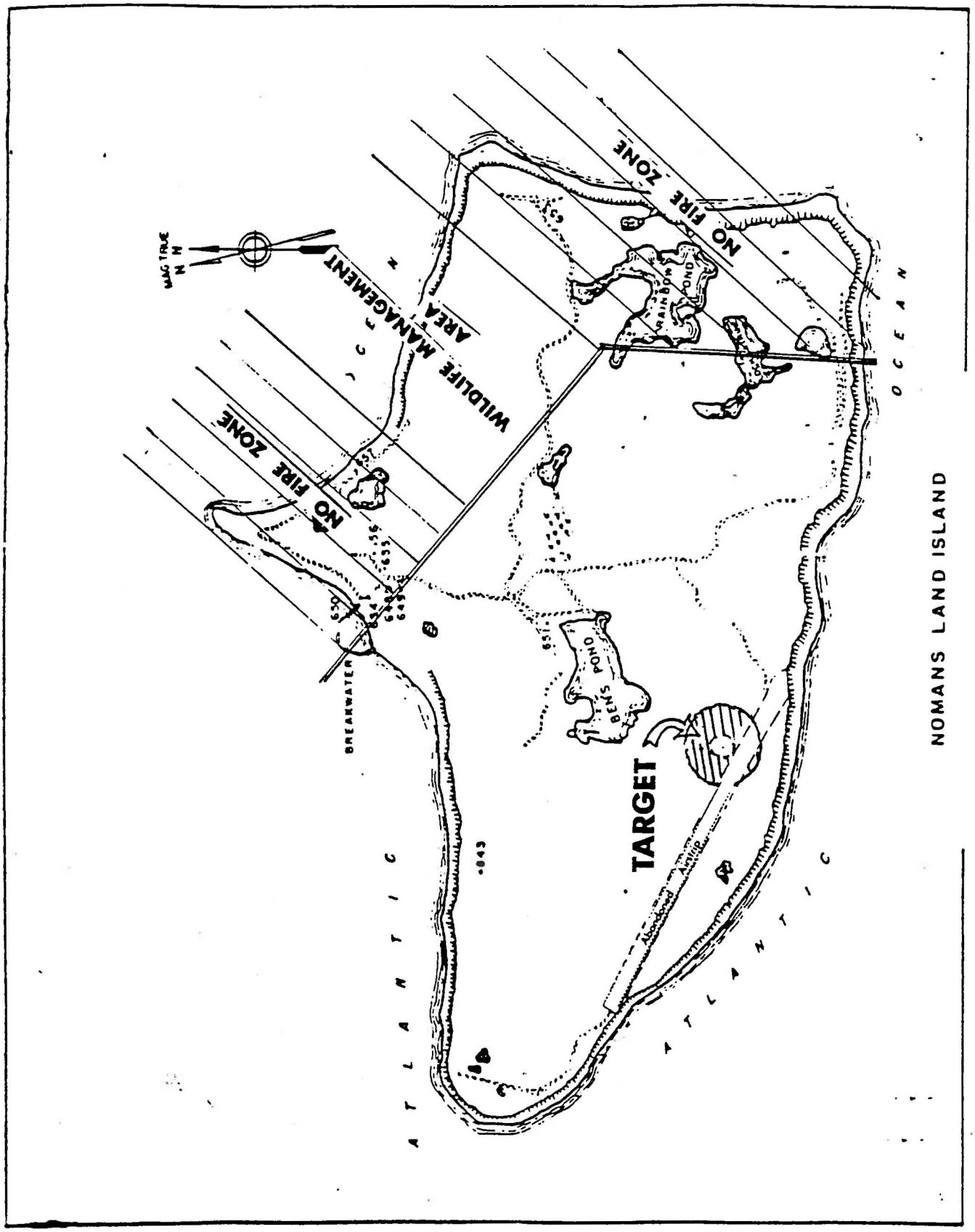
NOMANS LAND ISLAND
SCALE: 1" = 743 ±

628 acres

Map 3

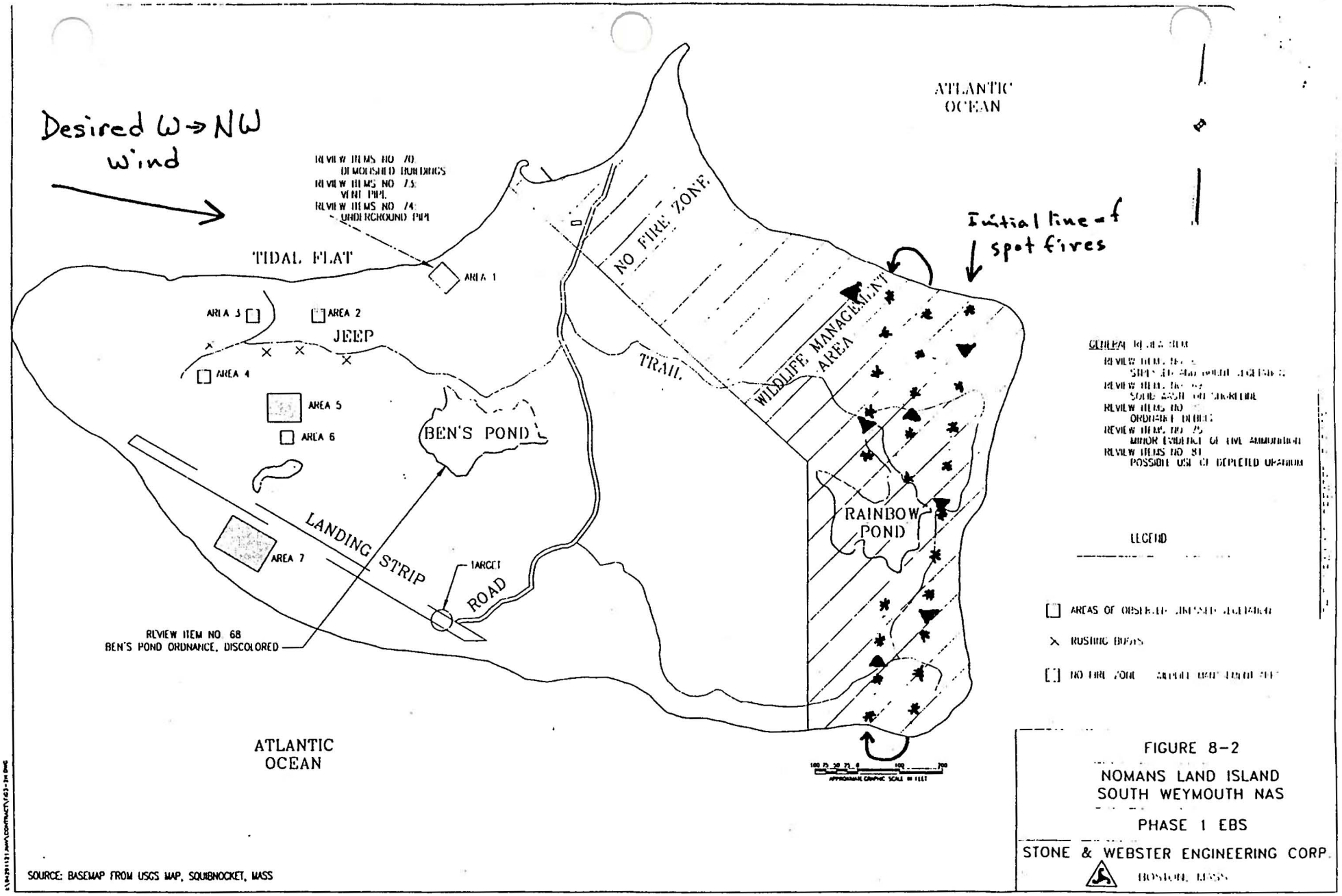
APR 0 1

Map 4



Encl (2)

APPENDIX II



Map 5

Aerial Ignition Plan

* indicates aerial with 100ft buffer ignition

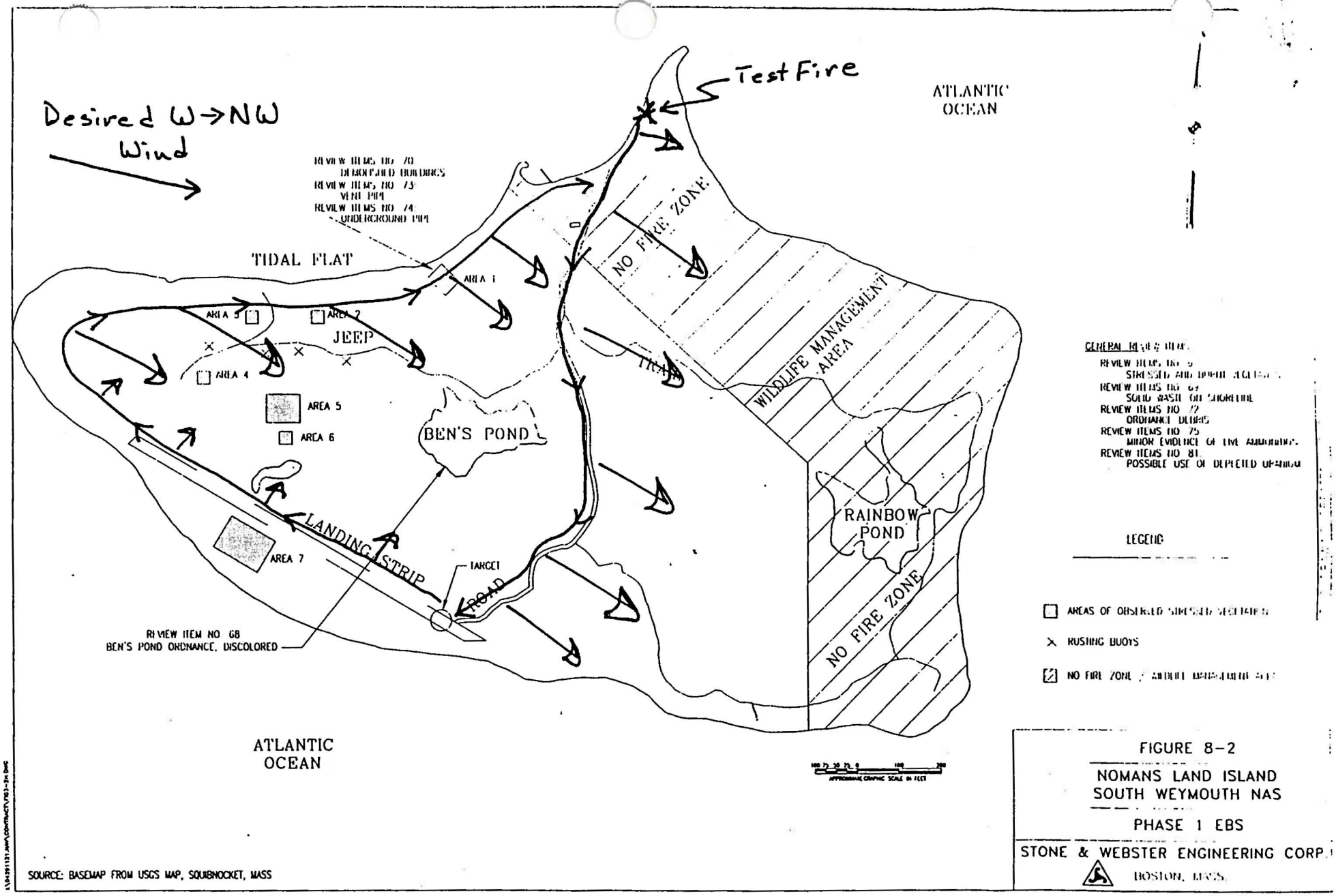


FIGURE 8-2

NOMANS LAND ISLAND
SOUTH WEYMOUTH NAS

PHASE 1 EBS

STONE & WEBSTER ENGINEERING CORP.
BOSTON, MASS.

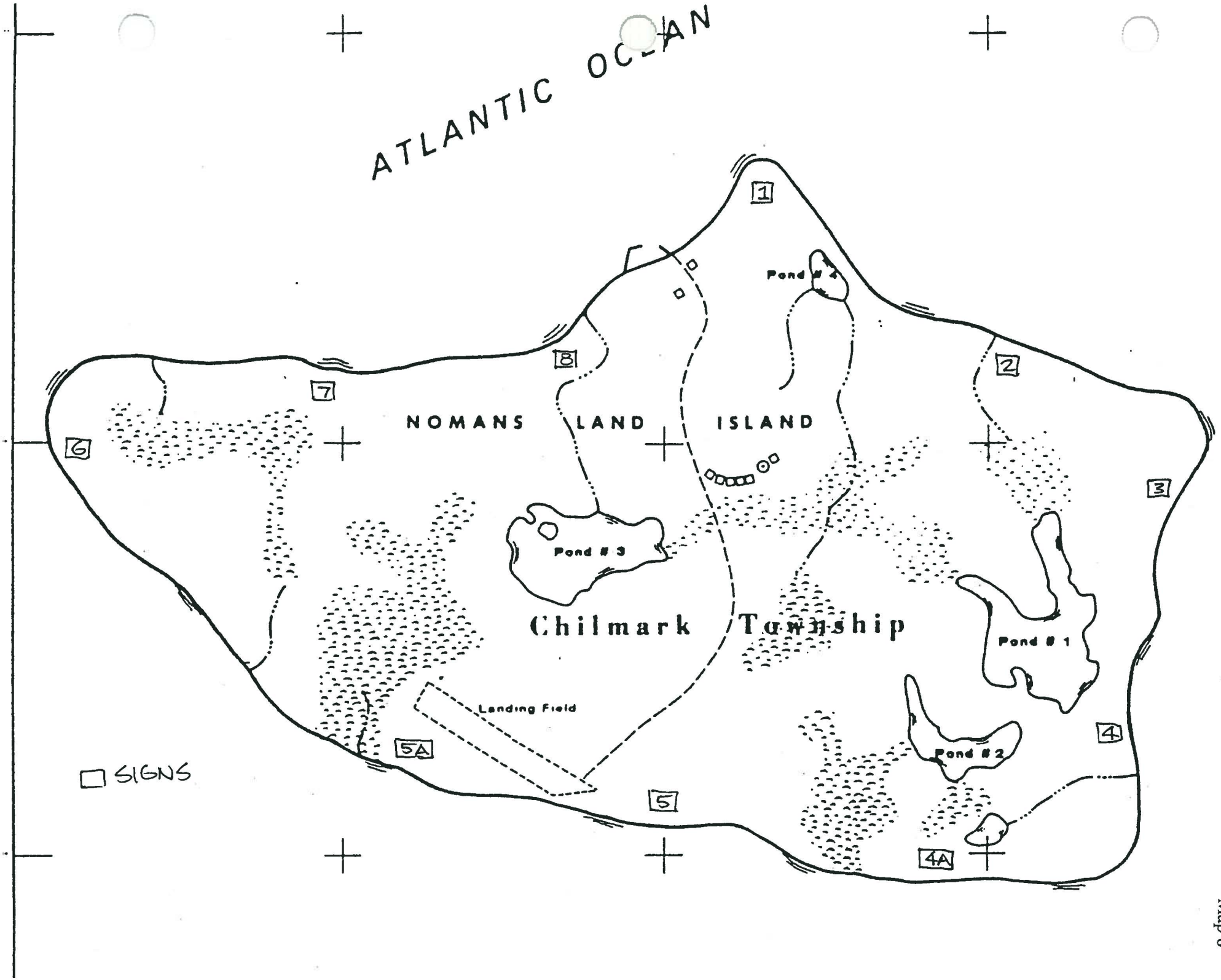
Map 6

Alternative Ground Ignition Plan

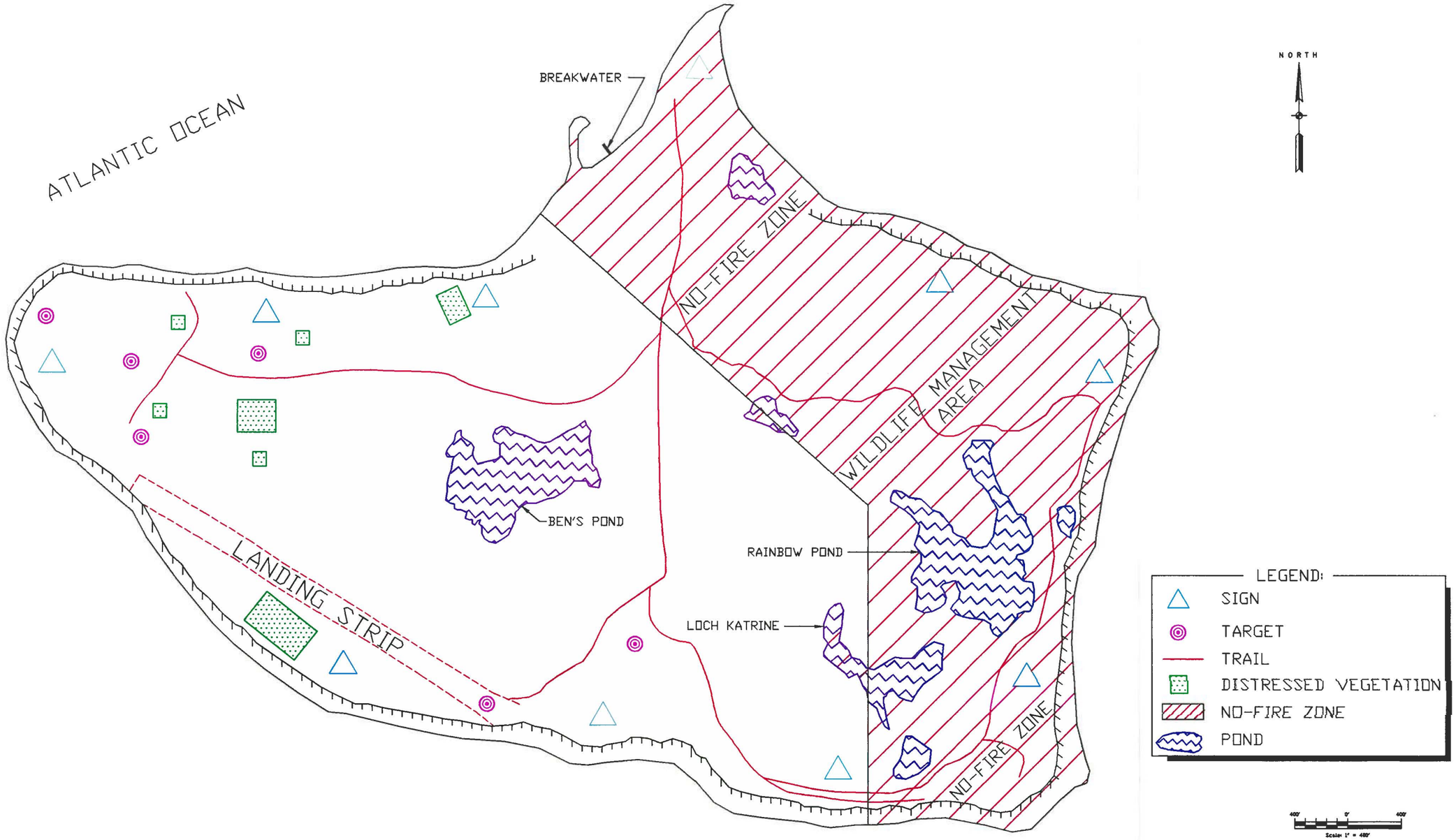
Path and Direction → Direction of Fire Spread

ATLANTIC OCEAN
NOMANS LAND ISLAND
Chilmark Township
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
B1
B2
B3
B4
B5
B6
B7
B8
B9
B10
B11
B12
B13
Pond # 1
Pond # 2
Pond # 3
Pond # 4
Landing Field

Map 7


ATLANTIC OCEAN
NOMANS LAND ISLAND
Chilmark Township
Pond # 1
Pond # 2
Pond # 3
Pond # 4
Landing Field
1
2
3
4
4A
5
5A
6
7
8
SIGNS

Map 8



SOURCE: FROM DRAWINGS OF SURVEYS BY G. S. AND F. & W. S.

RADIAN INTERNATIONAL LLC

NOMANS LAND ISLAND, CHILMARK TOWNSHIP, MASSACHUSETTS

REV. 0

DATE: 02-24-97

DRAWN BY: KATHY LETT

CHECKED BY: DOUG MURRAY

N:\PEOPLES\ISLAND.DWG

Photo 1

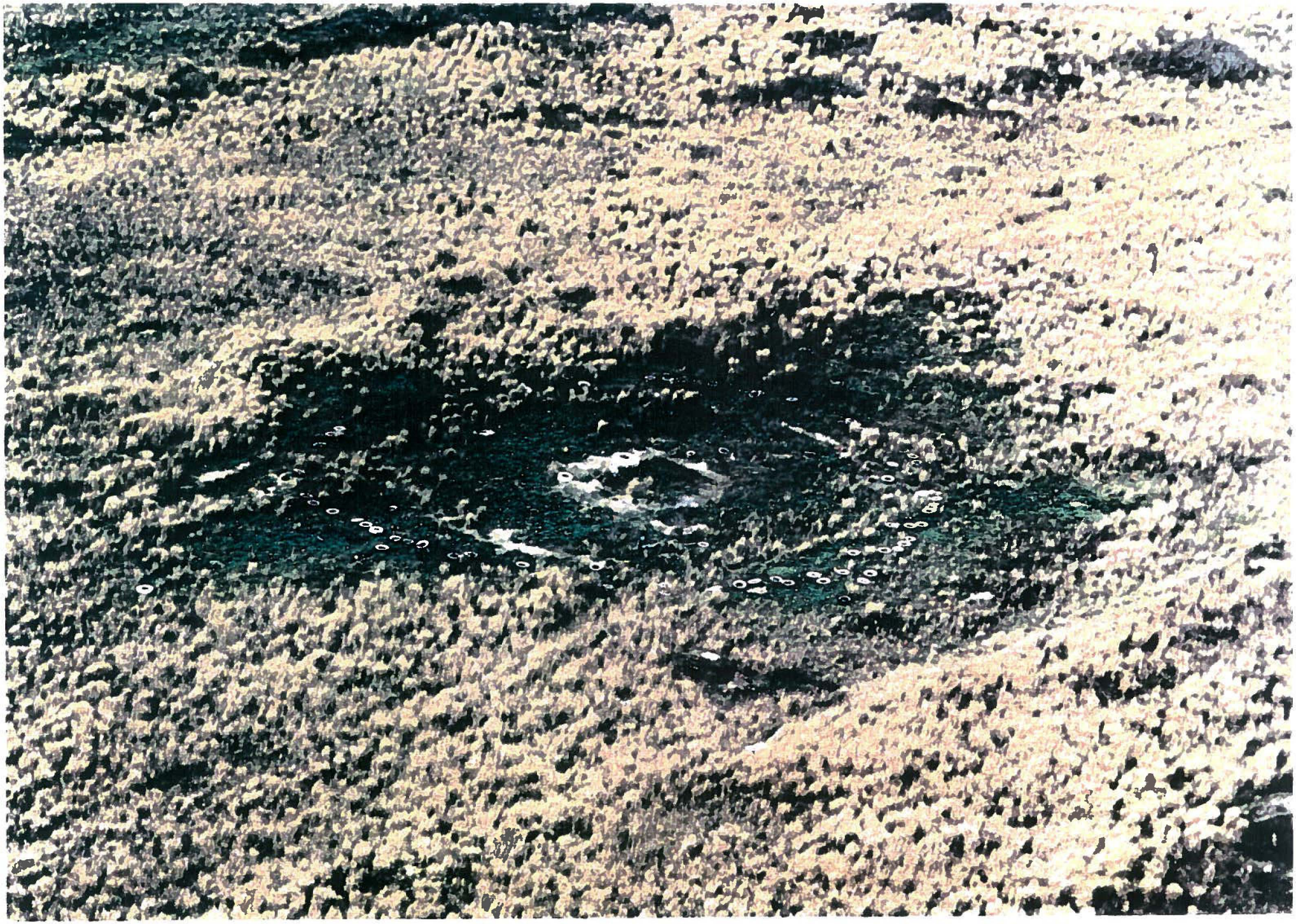


Photo 2

Photo 3

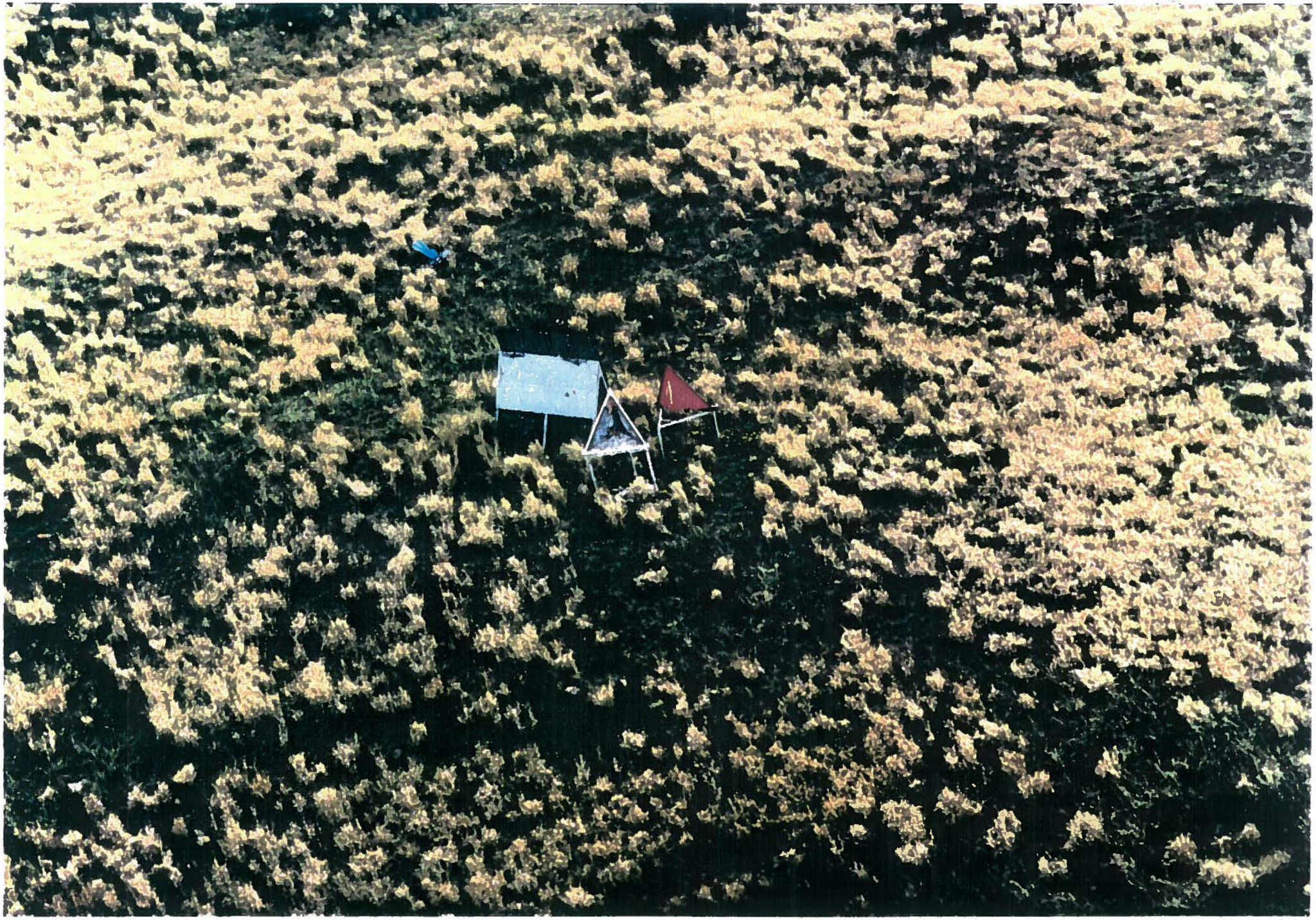


Photo 4

Photo 5

Photo 6