

3.2-A Correspondence

NATIONAL SCIENCE FOUNDATION

4201 Wilson Boulevard

Arlington, Virginia 22230



**OFFICE OF THE
GENERAL COUNSEL**

5 July 2016

Ms. Nydia Préstamo Torres
Deputy State Historic Preservation Officer
State Historic Preservation Office
Caurtel Ballaga, 3rd Floor
Norcagaray
San Juan, Puerto Rico 00901

RE: Section 106 Consultation for the Proposed Changes to Arecibo Observatory Operations,
Arecibo, Puerto Rico

Dear Ms. Torres:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences (MPS), Division of Astronomical Sciences (AST) has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. The Arecibo Observatory in Puerto Rico is one of the facilities identified for potential divestment. The decision regarding the potential changes to Arecibo Observatory operations is considered a federal undertaking; accordingly, by this letter, NSF is formally initiating Section 106 consultation under the National Historic Preservation Act (NHPA). While engaging in Section 106 consultation under the NHPA, NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential environmental impacts associated with the proposed changes to operations.

Project Location and Background

The Arecibo Observatory, which includes the world's largest single-dish radio telescope, is a national center for research in radio astronomy, planetary radar, and aeronomy (including optical facilities). The Observatory is located in west-central Puerto Rico on federal land and occupies 118 acres. The construction of Arecibo was funded in the early 1960s by the Department of Defense Advanced Research Projects Agency to perform radar back-scatter studies of the ionosphere. In 1969, the facility was transferred from the Department of Defense to NSF and was made a national research center, with operations by Cornell University. In 1971, the facility became known as the National Astronomy and Ionosphere Center.

A key component of the Arecibo Observatory research facility is a 305-meter diameter, fixed, spherical reflector. The telescope has undergone two major upgrades: in 1974, the reflector was resurfaced and a high frequency planetary radar transmitter was installed; and in 1997, major new equipment installations included new ground screen shields that block ground radiation, a Gregorian dome with sub-reflectors and new electronics, and a new radar transmitter. These

improvements greatly increased the capability of the telescope. Arecibo Observatory infrastructure includes instrumentation for radio and radar astronomy and ionosphere physics, office and laboratory buildings, a heavily used visitor and education facility, and lodging facilities for visiting scientists.

In September 2011, Cornell University's cooperative agreement with NSF expired, and following a competition, a new cooperative agreement was awarded to SRI International, with sub-awards to Universities Space Research Association (USRA) and the Universidad Metropolitana (UMET). The cooperative agreement has a term of 5 years, ending in September 2016; both parties are currently discussing extending this through March 31, 2018.

In 2008, the Arecibo Observatory was listed in the National Register of Historic Places (NRHP) as the National Astronomy and Ionosphere Center historic district. It was determined to be significant under NRHP Criteria A (associated with events that have made a significant contribution to the broad patterns of our history) and C (embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master). A total of 13 buildings and structures were included in the 2008 NRHP nomination. Through correspondence with Berenice Sueiro at the Puerto Rico SHPO office, it was confirmed that five of those buildings are considered non-contributing, including:

- Building #3, Visiting Scientist Quarters and Cafeteria
- Building #4, Recreation Area
- Building #8, West Hill Visiting Scientist Quarters Bachelor Units
- Building #9, West Hill Visiting Scientist Quarters Family Units
- Building #10, North Visiting Scientist Quarters Units

Therefore, there are eight buildings and one structure that are considered to contribute to the NRHP-listed historic district:

- 305-Meter Radio Telescope and Support Towers;
- Building #1, Operations Building
- Building #2, Administration Building
- Building #5, Visitor Center
- Building #6, Learning Center
- Building #7, Photometry Shack and Optical Lab
- Buildings #11 and #12, Warehouse and Business/Purchasing
- Building #13, Maintenance Building

No other buildings or structures on the 118-acre property are listed in or considered eligible for the NRHP.

In 2015, after discovering that Arecibo Observatory was inaccurately listed on the NRHP as being owned by Cornell University, NSF contacted the National Park Service and requested that Arecibo Observatory be delisted and then re-listed with NSF as the owner. That request was granted and Arecibo was both removed and then re-listed on December 22, 2015, reflecting the corrected ownership information.

Project Description

NSF's AST is the federal steward for ground-based astronomy in the United States, funding research with awards to individual investigators and small research groups, and via cooperative agreements for operation of large telescope facilities. These national and international telescope facilities provide world-leading, one-of-a-kind observational capabilities on a competitive basis to thousands of astronomers per year. These facilities also enable scientific advances by making archived data products available to researchers. Along with funding telescope facilities and research awards, AST supports the development of advanced technologies and instrumentation and manages the allocation and assignment of specific frequencies in the radio spectrum for scientific use by the entire NSF community. The need for NSF to reduce its participation in Arecibo Observatory has been established through a number of reviews and surveys conducted by the science community. At present, Arecibo Observatory serves a variety of scientific user communities in astronomy, aeronomy, and planetary science, and is funded for all three activities as well as an active education and public outreach program. The science community evaluations, however, indicated that the science capability of Arecibo Observatory presents a lower priority than other science capabilities that NSF funds. In a funding-constrained environment, NSF needs to maintain a balanced research portfolio with the largest science return for the taxpayer dollar. Therefore, the purpose of the proposed action is for NSF to evaluate changes in operations and to substantially reduce its contribution to the funding of Arecibo Observatory. The proposed alternatives are designed to address this purpose and need.

Between 2014 and 2016, a Divestment Options Study for the Arecibo Observatory was prepared by CH2M under contract with NSF. The purpose of the study was to provide NSF with an overall condition assessment of structures and to evaluate divestment options for the facilities at Arecibo. Appendix A of the study included the Facilities Descriptions and Condition Assessments for each facility at Arecibo, as well as photographs. For reference, a hard copy of Appendix A was provided to your office on June 6, 2016. Because of this previous submittal, no additional current photographs are included with this letter.

Preliminary alternatives (four proposed action alternatives and a no action alternative) were developed based on the feasibility study and the response from the scientific community. Those preliminary alternatives were then developed into preliminary proposed alternatives that were presented to the public for comment during the public scoping period (as described below). The preliminary proposed alternatives are described below:

- **No Action Alternative – Continued NSF Investment for Science-focused Operations:** Under the No Action Alternative, NSF would not divest Arecibo Observatory and NSF would continue funding to operate it. Operations would be contingent on funding appropriations.
- **Alternative 1 – Collaboration with Interested Parties for Continued Science-focused Operations:** Alternative 1 would include continued science-focused operations by a collaboration of interested parties. Existing buildings that would no longer be of use would either be deconstructed or mothballed.
- **Alternative 2 – Collaboration with Interested Parties for Transition to Education-focused Operations:** Alternative 2 would transition the site to education-focused operations. The visitor center, learning center, and 12-meter telescope would remain operational. The 350-meter telescope would be made inoperable, but retained for

visual/historical interest. It would be secured and regularly maintained to prevent structural degradation. Existing buildings that would no longer be of use would either be deconstructed or mothballed.

- **Alternative 3 – Mothballing Facilities:** Alternative 3 would involve preservation of essential buildings, telescopes, and other equipment with periodic maintenance to keep them in working order. This would allow the facility to be reopened at a future date. Structures and facilities that would no longer be of use would be reconstructed. Gates and fencing would be evaluated to determine if upgrades are needed to provide appropriate security/access around portions of the site that would require protection.

- **Alternative 4 – Deconstruction and Site Restoration:** Alternative 4 would include deconstruction of most of the structures at Arecibo Observatory. The large concrete towers, anchors, and rim wall would not be deconstructed, but would remain in a manner that would not present a safety hazard to others. The remainder of the above-grade structures, including gates and fencing, would be removed and deconstructed. Below-grade foundations would be stabilized and filled.

These preliminary proposed alternatives may be further refined during the early phases of the compliance review and will be informed by the public process.

Public Involvement

Public scoping on the preliminary proposed alternatives and issues of concern was initiated on May 24, 2016 with publication of a Notice of Intent in the *Federal Register*. Public meetings were conducted on June 7, 2016 in San Juan and Arecibo, Puerto Rico. During the scoping meetings on June 7, 2016, NSF requested contact information for those individuals and organizations interested in participating as Section 106 consulting parties. NSF contacted those individuals and organizations to provide further details about the Section 106 consultation process and to confirm their consulting party status for this proposed action. Five individuals and organizations confirmed their participation as consulting parties:

- Tony Van Eyken (Arecibo Observatory)
- Dr. Brett Isham (Interamerican University-Bayamon)
- Xavier Siemens (NANOGRAV)
- Dr. Nicholas White (USRA)
- Qihou Zhou (Miami University)
- Luisa Zambrano-Marin (Arecibo Observatory)

NSF anticipates holding further NEPA public meetings during the Fall of 2016, following the release of the Draft EIS. Section 106 consultation needs will be addressed during the Draft EIS meetings, or during separate consulting party meetings following the Draft EIS meetings. Follow-up meetings with consulting parties will occur as needed to complete Section 106 consultation requirements.

Initiation of Section 106 Consultation

As part of the Section 106 process for the proposed changes to Arecibo Observatory operations, CH2M will conduct a site visit to Arecibo Observatory on July 19 and 20, 2016. The purpose of this survey is to verify the current conditions of existing known historic properties located at

Arecibo Observatory. A Secretary of the Interior-qualified architectural historian will conduct a reconnaissance-level field survey to update cultural resources information for the project site. The survey will include a general site assessment and informal interviews with the NSF staff and partners to obtain information regarding alterations to those buildings that contribute to the historic district. CH2M's investigations will only include the nine known properties that contribute to the NRHP-listed historic district to verify that no significant alterations have occurred to the buildings and structures since the district was listed in 2008. The nine resources that contribute to the NRHP-listed historic district were listed earlier in this letter. NSF would like to invite your office to participate in the field investigations on July 19 and 20, 2016, if you are interested and available. If your office is interested in attending the cultural resources field investigations at Arecibo, please contact Ms. Elizabeth Pentecost by phone at 703-292-4907, by email at epenteco@nsf.gov or by US Postal Service to NSF, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Blvd., Arlington, Virginia 22230 as soon as possible so we can coordinate the visit.

As described earlier, Arecibo Observatory is a federally-owned property that is listed in the NRHP; therefore, the proposed action has the potential to affect NRHP-listed historic properties. In compliance with 36 C.F.R. 800.3(c), NSF is initiating consultation with your office on the proposed changes to Arecibo Observatory operations and transmitting the required Section 106 Delivery Control Form (attached as Enclosure 1). If you have any questions, please do not hesitate to contact me by phone at 703-292-4592 or by email at cblanco@nsf.gov. We look forward to further consultation on this proposed action.

Sincerely,



Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel

Cc: Berenice R. Sueiro Vázquez, Gerente de Conservación Histórica, Puerto Rico SHPO
E. Pentecost, NSF
K. Zender, Ch2M

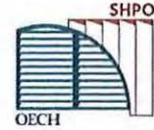
Enclosures:

1. Section 106 Delivery Control Form
2. Maps: USGS Topo and Site Plan



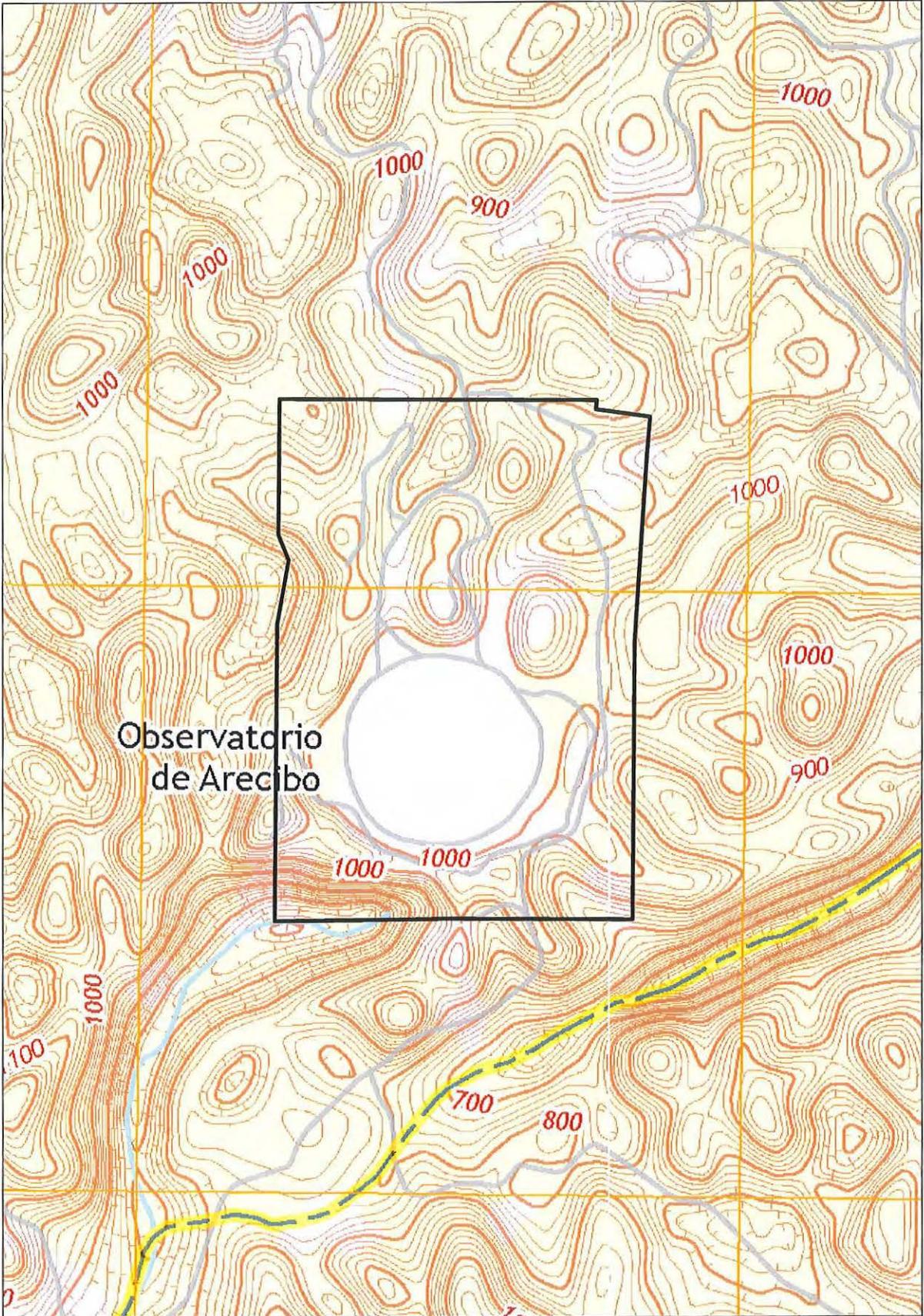
**Formulario para el control de entrega.
Proyectos de sección 106**

(Delivery control form 106 Section)



Sección A. Información a ser llenada por el proponente* (Section A. Information to be filled by proponent)			
Nombre del Proyecto/ Project's name		Número de referencia federal/ Reference federal number	
Proposed Changes to Arecibo Observatory Operations		Not Applicable	
Municipio/ Municipality	Barrio/ Ward	Nombre del Proponente/ Proponent's name	
Arecibo	Esperanza	National Science Foundation	
Agencia Federal/ Federal Agency		Total de fondos federales solicitados/ Total of federal funds to be requested	Total de acres/ Total amount of acres
National Science Foundation		Not Applicable	118 acres
Nombre de la persona que entrega/ Name of person who delivers		Firma/Signature	
Caroline M. Blanco National Science Foundation		<i>Caroline M. Blanco</i>	
Sección B. Información a ser llenada por la OECH al momento de la entrega del proyecto (Section B. Information to be filled by SHPO upon delivery)			
Fecha de entrega en la OECH/ SHPO delivery date		Nombre y firma de la persona que recibe/ Name and signature of person who received	

* Para poder cumplir su labor ministerial la OECH requiere que la Sección A de este formulario sea completada en su totalidad. Por tal razón, no se aceptarán proyectos que incumplan este requerimiento.
(To carry out our duties, the SHPO requires that Section A of this form be totally filled-out. For this reason, we will not accept an incomplete form.)



 Property Boundary and Historic District Boundary

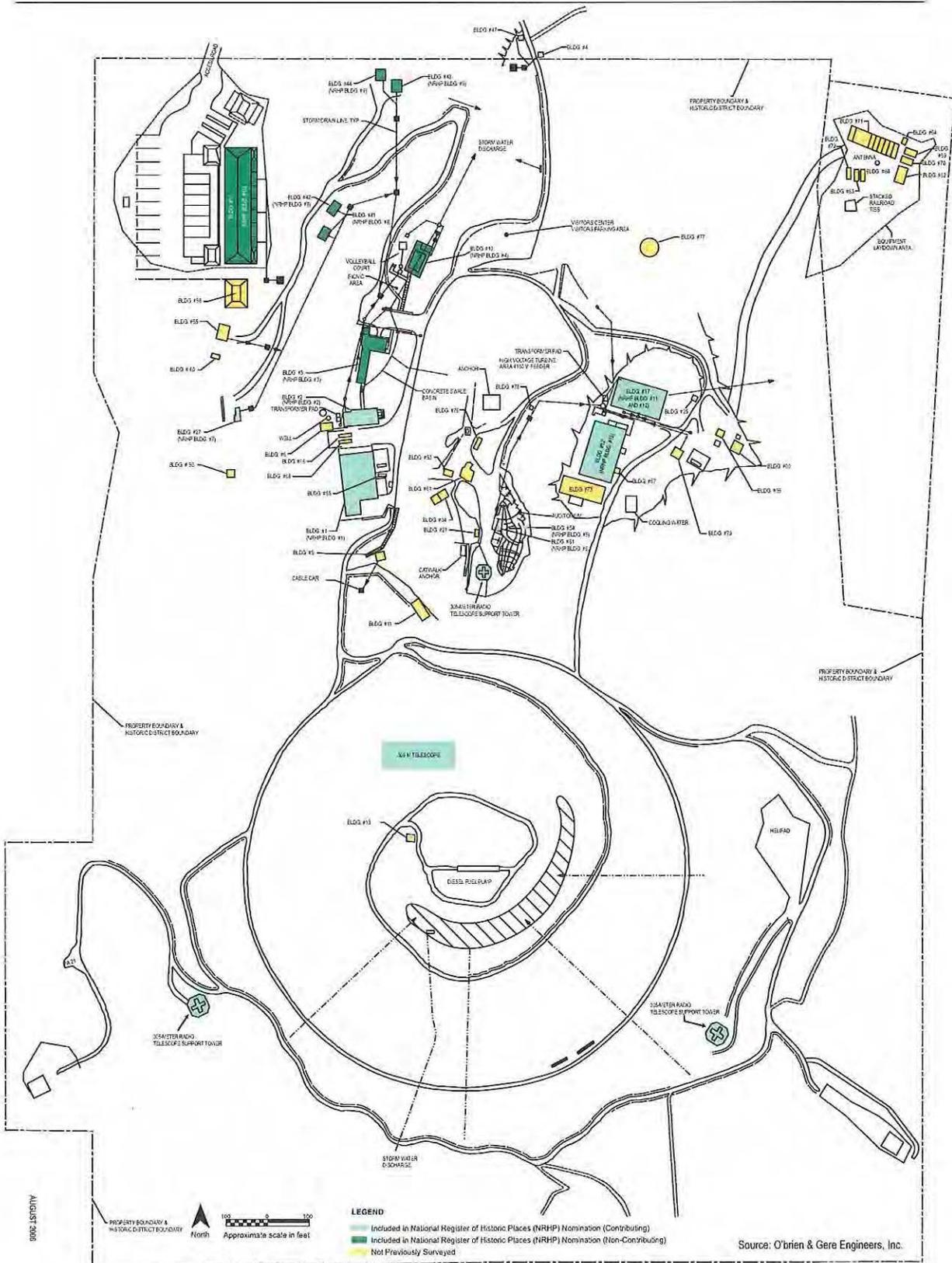


1 inch = 500 feet

Project Location
Arecibo Observatory
Puerto Rico

USGS Topographic Quads Bayaney NE (2013) and
Utado NW (2013)





APRIL 2009



LEGEND
■ Included in National Register of Historic Places (NRHP) Nomination (Contributing)
■ Included in National Register of Historic Places (NRHP) Nomination (Non-Contributing)
■ Not Previously Surveyed

Source: O'Brien & Gere Engineers, Inc.

BUILDING NO. DESCRIPTION

- | | | | |
|---|---|--|---|
| <p>1. OPERATIONS BUILDING (Constructed 1963)
 2. ADMINISTRATION BUILDING (Constructed 1963)
 3. VISITING SCIENTIST QUARTERS AND CAFETERIA (Constructed 1963)
 4. ENTRANCE GUARD HOUSE (Constructed 1963)
 5. CABLE CAR HOUSE (Constructed 1963)
 6. PUMP HOUSE/WATER TREATMENT BLDG. (Constructed 1963)
 10. SWIMMING POOL/RESTROOMS (Constructed Mid 1960's)
 11. LEWIS BUILDING-RIGGING LOFT (Constructed Mid 1960's)
 12. MAINTENANCE SHOPS (Constructed 1967)
 13. BOWL SHACK (Constructed 1960's)
 17. WAREHOUSE (Constructed 1967)
 21. ANTENNA TESTING RANGE (Constructed date ?)
 25. PAINT STORAGE BUILDING (Constructed 1967)
 27. OPTICAL LABS (Constructed 1965/1997)</p> | <p>34. HIGH VOLTAGE POWER SUPPLY BLDG. (Constructed 1973)
 35. CUMMINGS GENERATOR CONTROL BLDG. (Constructed 2000's)
 41. WEST HILL V.S.O. BACHELOR UNIT NO. 1 (Constructed date ?)
 42. WEST HILL V.S.O. BACHELOR UNIT NO. 2 (Constructed date ?)
 43. WEST HILL V.S.O. FAMILY UNIT NO. 1 (Constructed date ?)
 44. WEST HILL V.S.O. FAMILY UNIT NO. 2 (Constructed date ?)
 47. MAIN GATE RESTROOM (Constructed 1963)
 50. INTERFERENCE MONITORING SHACK (Constructed date ?)
 51. GREASE PIT (Constructed date unknown)
 53. EMERGENCY GENERATOR BLDG. (Constructed date ?)
 54. VISITOR CENTER BLDG. (Constructed 1997)
 55. LIDAR LABORATORY BLDG. (Constructed 1996)
 57. NORTH V.S.O. BLDG. (Constructed 2002)
 58. NORTH V.S.O. UTILITY BLDG.</p> | <p>59. VISITOR CENTER TRAILER (Constructed date ?)
 60. ANT. RECE. TESTING BLDG. (Constructed late 1990's)
 61. LEARNING CENTER (Constructed 2001)
 62. HFF STORAGE TRAILER (Constructed date ?)
 63. IONOSPHERE TRAILER (Constructed date ?)
 64. ELECTRONIC TRAILER (Constructed date ?)
 65. SHIELDED TRAILER (Constructed 1983)
 66. ATMOSPHERIC SCIENCE TRAILER (Constructed date ?)
 67. CRYOGENICS LAB TRAILER (Constructed 1967)
 68. SCIENTIFIC OFFICES TRAILER (Constructed date ?)
 69. ELECTRONIC TRAILER (WAVEGUIDE) (Constructed date ?)
 70. COMPUTER TRAILER (Constructed date ?)
 71. ELECTRONIC CABLE TRAILER (Constructed date ?)
 72. ELECTRONIC TRAILER (CRYOGENICS) (Constructed date ?)
 73. HF TRANSMITTER BUILDING (Constructed 2000's)</p> | <p>76. INSPIRATION FOR SCIENCE TRAILER (Constructed 2000's)
 77. PHASE REFERENCE ANTENNA (12M) (Constructed 2010)
 78. COFFEE HUT (Constructed 2000's)
 79. ENGINEERING OFFICE BUILDING (Constructed 2000's)
 80. CUMMINGS DIESEL GENERATOR BUILDING (Constructed 2000's)</p> |
|---|---|--|---|

Site Map
 Arecibo Observatory
 (National Astronomy and Ionosphere Center)
 Arecibo, Puerto Rico



Nolan-Wheatley, Marynell/NYC

From: Pentecost, Elizabeth A. <epenteco@nsf.gov>
Sent: Tuesday, July 12, 2016 3:29 PM
To: Berenice Sueiro
Cc: Blanco, Caroline M; Pentecost, Elizabeth A.
Subject: Re: Initiation of Section 106 Consultation for Proposed Changes to Arecibo Observatory Operations [EXTERNAL]
Attachments: image001.jpg; image002.jpg

Dear Ms. Suerio,

I contacted Ch2M and they have provided me with a tentative timeline for their visit to Arecibo on July 19 and July 20. There is no formal agenda for the visit at this time. The Ch2M team plans to arrive soon after the site opens (at 7 am per information from Mr. Jaime Gago at Arecibo) to orient themselves and meet their contacts onsite. Mr. Gago mentioned to Ch2M that there will be no access to and around the platform from 7 am to 10 am on Tuesday the 19th. Ch2M is planning to do the bulk of the reconnaissance architectural survey on that day, and will work around any site access limitations that morning. After 10 am on the 19th, Ch2M will have access to any buildings on site. Work will likely wrap up around 3:30, when the facility closes. During the survey, Ch2M will visit each historic building and verify existing conditions. Ch2M will do any follow-up survey work on Wednesday the 20th.

I hope this will help you in determining whether someone from your office will attend the field investigations.

Sincerely,

Elizabeth Pentecost

National Science Foundation
Division of Astronomical Sciences
Room 1045
4201 Wilson Boulevard
Arlington, VA 22230
Tel: 703-292-4907
Fax: 703-292-9034

From: Berenice Sueiro <bsueiro@prshpo.pr.gov>
Date: Tuesday, July 12, 2016 at 12:05 PM
To: "Pentecost, Elizabeth A." <epenteco@nsf.gov>
Cc: Caroline Blanco <cblanco@nsf.gov>, Kira Zender <kira.zender@ch2m.com>, Nydia Prestamo <nprestamo@prshpo.pr.gov>, Juan Llanes <jllanes@prshpo.pr.gov>
Subject: RE: Initiation of Section 106 Consultation for Proposed Changes to Arecibo Observatory Operations



Dear Ms. Pentecost:

Greetings,

We will like to know if you have an agenda for those two days . If available please submit. I will be out of the office. Mr. Juan Llanes, Historic Preservation Specialist, will evaluate scope of agenda. He will confirm attendance or not.

Best regards,

Berenice R Sueiro Vázquez
Gerente Conservación Histórica/Historic Preservation Manager
tel. 787-721-3737 ext. 2002
fax. 787-721-3773



From: Pentecost, Elizabeth A. [<mailto:epenteco@nsf.gov>]
Sent: Monday, July 11, 2016 1:30 PM
To: Berenice Sueiro
Cc: Blanco, Caroline M; Kira Zender
Subject: Initiation of Section 106 Consultation for Proposed Changes to Arecibo Observatory Operations

Dear Ms. Sueiro,

I am working with Caroline Blanco and Kristen Hamilton on the Arecibo Observatory environmental compliance issues and wanted to follow-up on the email Caroline sent you on July 5 concerning initiation of Section 106 consultation for the proposed changes to Arecibo Observatory operations. In the email, NSF extended an invitation to your office to attend the cultural resources field investigations at Arecibo on July 19 and 20.

We are inquiring now as to whether or not your office is interested in attending the field investigations so that we can coordinate the visit with the CH2M team. We would greatly appreciate it if you or a member of your staff could let me know by Thursday, July 14 whether or not you would be available to attend the field investigations.

We look forward to further consultation with the State Historic Preservation Office on this proposed action.

Sincerely,

Elizabeth Pentecost

National Science Foundation

Division of Astronomical Sciences
Room 1045
4201 Wilson Boulevard
Arlington, VA 22230
Tel: 703-292-4907
Fax: 703-292-9034

From: Berenice Sueiro <bsueiro@prshpo.pr.gov>
Date: Friday, May 20, 2016 at 3:59 PM
To: "Blanco, Caroline M" <cblanco@nsf.gov>
Cc: "Hamilton, Kristen" <KRIHAMIL@nsf.gov>, Nydia Prestamo <nprestamo@prshpo.pr.gov>
Subject: RE: Arecibo Observatory - Initiation of Environmental Review



Caroline and Kirsten:

Greetings,

As agreed in our phone conversation yesterday, the following properties are *non-contributing* in the nomination.

1. Building # 3. VSQ Rooms – Cafeteria
2. Building # 4. Recreation Area
3. Building # 8. VSQ Bachelor Units
4. Building # 9. BSQ Family Units
5. Building # 10. North VSQ Units

Also, the whole property (118 acres) is included in the National Register.

Best,

Berenice

Berenice R Sueiro Vázquez
Gerente Conservación Histórica/Historic Preservation Manager
tel. 787-721-3737 ext. 2002
fax. 787-721-3773



From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]
Sent: Thursday, May 19, 2016 2:16 PM
To: Berenice Sueiro
Cc: Hamilton, Kristen; Nydia Prestamo
Subject: Re: Arecibo Observatory - Initiation of Environmental Review

Thank you so very much, Berenice, for taking the time to talk with Kristen and me about NSF's upcoming environmental review process. You provided us with a wealth of information, which is very much appreciated. We look forward to working with you on this process!

With warm regards,

Caroline

Caroline M. Blanco
Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: Berenice Sueiro <bsueiro@prshpo.pr.gov>
Date: Thursday, May 19, 2016 at 1:28 PM
To: "Blanco, Caroline M" <cblanco@nsf.gov>
Cc: "Hamilton, Kristen" <KRIHAMIL@nsf.gov>, Nydia Prestamo <nprestamo@prshpo.pr.gov>
Subject: RE: Arecibo Observatory - Initiation of Environmental Review

Caroline and Kristen:

Hello,

Minimum documents requirements .

Cordially,

berenice

From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]
Sent: Wednesday, May 18, 2016 8:52 PM
To: Berenice Sueiro
Cc: Hamilton, Kristen; Nydia Prestamo
Subject: Re: Arecibo Observatory - Initiation of Environmental Review

Hi Berenice - That sounds wonderful! Please call Kristen and me tomorrow at 703-292-4592. That is my direct office telephone number. As for our June 6th meeting, thank you so very much for moving it to 3:00. That is very much appreciated.

I look forward to talking with you tomorrow.

Warm wishes,

Caroline

Caroline M. Blanco
Assistant General Counsel
National Science Foundation

On May 18, 2016, at 5:41 PM, "Berenice Sueiro" <bsueiro@prshpo.pr.gov> wrote:

Caroline;

Greetings,

We have a small problem with our telephone. If you give us a phone number I can call you tomorrow. The meeting on the 6th, we can make it at 3:00pm to give you time.
Cordially,

Berenice

From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]
Sent: Wednesday, May 18, 2016 3:34 PM
To: Berenice Sueiro
Cc: Hamilton, Kristen; Nydia Prestamo
Subject: Re: Arecibo Observatory - Initiation of Environmental Review

Hi Berenice – Thank you for your very quick response to my message! Thank you, also, for the update on the resignation of Diana López; I look forward to working with both you and Ms. Préstamo.

Kristen Hamilton and I are both available for a telecom tomorrow (Thursday, May 19th) at 1:00 p.m. EDT. Would that time work for you and Ms. Préstamo? Also, with regard to an in-person meeting on June 6th, I believe that I can make a 2:00 p.m. Meeting; my flight arrives a little after 11:30 a.m., I believe.

Many thanks, and if the proposed telecon time is acceptable, please advise as to what telephone number I should call.

Best regards,

Caroline

cc: Kristen, and Ms. Nydia Préstamo.

Caroline M. Blanco

Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: Berenice Sueiro <bsueiro@prshpo.pr.gov>

Date: Wednesday, May 18, 2016 at 3:14 PM

To: "Blanco, Caroline M" <cblanco@nsf.gov>

Cc: "Hamilton, Kristen" <KRIHAMIL@nsf.gov>, Nydia Prestamo <nprestamo@prshpo.pr.gov>

Subject: RE: Arecibo Observatory - Initiation of Environmental Review

<image001.jpg>

Caroline:

Greetings,

Ms. Diana López has resigned. Ms. Nydia Préstamo is the Deputy SHPO. We can meet on June 6th at 10:00am or 2:00PM. I am available this week any time, either Thursday or Friday. Please advise day and time.

Best,

Berenice

Berenice R Sueiro Vázquez
Gerente Conservación Histórica/Historic Preservation Manager
tel. 787-721-3737 ext. 2002
fax. 787-721-3773

<image002.jpg>

From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]
Sent: Wednesday, May 18, 2016 1:03 PM
To: Berenice Sueiro; Diana Lopez Sotomayor
Cc: Hamilton, Kristen
Subject: Arecibo Observatory - Initiation of Environmental Review

Hello Diana and Bernice – I hope all is wonderfully well with both of you. I am writing to share with you NSF’s initiation of an environmental review process for the Arecibo Observatory. Specifically, NSF will soon initiate an Environmental Impact Statement process, which will be published next week in a Federal Register announcement. At your earliest convenience, my colleague, Kristen Hamilton, and I would like to have a telephone conversation with you to provide you with more details and to begin early consultation with your office. Also, we are wondering whether you would be available for an in-person meeting in San Juan during the afternoon of Monday, June 6th; my colleagues from the Astronomy and Atmospheric Science Divisions and I will be on-island from June 6th to June 8th, and NSF will be holding two public scoping meetings on June 7th. When you have a moment, it would be great if you would let me know whether you are available for a telecon this week during which we can provide you with more information.

Many thanks and warm wishes,

Caroline

cc: Kristen Hamilton, NSF Environmental Compliance Officer

Caroline M. Blanco
Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: Berenice Sueiro <bsueiro@prshpo.pr.gov>
Date: Friday, May 20, 2016 at 3:59 PM
To: "Blanco, Caroline M" <cblanco@nsf.gov>
Cc: "Hamilton, Kristen" <KRIHAMIL@nsf.gov>, Nydia Prestamo <nprestamo@prshpo.pr.gov>
Subject: RE: Arecibo Observatory - Initiation of Environmental Review



Caroline and Kirsten:

Greetings,

As agreed in our phone conversation yesterday, the following properties are *non-contributing* in the nomination.

1. Building # 3. VSQ Rooms – Cafeteria
2. Building # 4. Recreation Area
3. Building # 8. VSQ Bachelor Units
4. Building # 9. BSQ Family Units
5. Building # 10. North VSQ Units

Also, the whole property (118 acres) is included in the National Register.

Best,

Berenice

Berenice R Sueiro Vázquez
Gerente Conservación Histórica/Historic Preservation Manager
tel. 787-721-3737 ext. 2002
fax. 787-721-3773



From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]
Sent: Thursday, May 19, 2016 2:16 PM
To: Berenice Sueiro
Cc: Hamilton, Kristen; Nydia Prestamo
Subject: Re: Arecibo Observatory - Initiation of Environmental Review

Thank you so very much, Berenice, for taking the time to talk with Kristen and me about NSF's upcoming environmental review process. You provided us with a wealth of information, which is very much appreciated. We look forward to working with you on this process!

With warm regards,

Caroline

Caroline M. Blanco
Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: Berenice Sueiro <bsueiro@prshpo.pr.gov>
Date: Thursday, May 19, 2016 at 1:28 PM
To: "Blanco, Caroline M" <cblanco@nsf.gov>
Cc: "Hamilton, Kristen" <KRIHAMIL@nsf.gov>, Nydia Prestamo <nprestamo@prshpo.pr.gov>
Subject: RE: Arecibo Observatory - Initiation of Environmental Review

Caroline and Kristen:

Hello,

Minimum documents requirements .

Cordially,

berenice

From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]
Sent: Wednesday, May 18, 2016 8:52 PM
To: Berenice Sueiro
Cc: Hamilton, Kristen; Nydia Prestamo
Subject: Re: Arecibo Observatory - Initiation of Environmental Review

Hi Berenice - That sounds wonderful! Please call Kristen and me tomorrow at 703-292-4592. That is my direct office telephone number. As for our June 6th meeting, thank you so very much for moving it to 3:00. That is very much appreciated.

I look forward to talking with you tomorrow.

Warm wishes,

Caroline

Caroline M. Blanco
Assistant General Counsel
National Science Foundation

On May 18, 2016, at 5:41 PM, "Berenice Sueiro" <bsueiro@prshpo.pr.gov> wrote:

Caroline;

Greetings,

We have a small problem with our telephone. If you give us a phone number I can call you tomorrow. The meeting on the 6th, we can make it at 3:00pm to give you time.
Cordially,

Berenice

From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]
Sent: Wednesday, May 18, 2016 3:34 PM
To: Berenice Sueiro
Cc: Hamilton, Kristen; Nydia Prestamo
Subject: Re: Arecibo Observatory - Initiation of Environmental Review

Hi Berenice – Thank you for your very quick response to my message! Thank you, also, for the update on the resignation of Diana López; I look forward to working with both you and Ms. Préstamo.

Kristen Hamilton and I are both available for a telecom tomorrow (Thursday, May 19th) at 1:00 p.m. EDT. Would that time work for you and Ms. Préstamo? Also, with regard to an in-person meeting on June 6th, I believe that I can make a 2:00 p.m. Meeting; my flight arrives a little after 11:30 a.m., I believe.

Many thanks, and if the proposed telecon time is acceptable, please advise as to what telephone number I should call.

Best regards,

Caroline

cc: Kristen, and Ms. Nydia Préstamo.

Caroline M. Blanco

Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: Berenice Sueiro <bsueiro@prshpo.pr.gov>

Date: Wednesday, May 18, 2016 at 3:14 PM

To: "Blanco, Caroline M" <cblanco@nsf.gov>

Cc: "Hamilton, Kristen" <KRIHAMIL@nsf.gov>, Nydia Prestamo <nprestamo@prshpo.pr.gov>

Subject: RE: Arecibo Observatory - Initiation of Environmental Review

<image001.jpg>

Caroline:

Greetings,

Ms. Diana López has resigned. Ms. Nydia Préstamo is the Deputy SHPO. We can meet on June 6th at 10:00am or 2:00PM. I am available this week any time, either Thursday or Friday. Please advise day and time.

Best,

Berenice

Berenice R Sueiro Vázquez
Gerente Conservación Histórica/Historic Preservation Manager
tel. 787-721-3737 ext. 2002
fax. 787-721-3773

<image002.jpg>

From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]
Sent: Wednesday, May 18, 2016 1:03 PM
To: Berenice Sueiro; Diana Lopez Sotomayor
Cc: Hamilton, Kristen
Subject: Arecibo Observatory - Initiation of Environmental Review

Hello Diana and Bernice – I hope all is wonderfully well with both of you. I am writing to share with you NSF’s initiation of an environmental review process for the Arecibo Observatory. Specifically, NSF will soon initiate an Environmental Impact Statement process, which will be published next week in a Federal Register announcement. At your earliest convenience, my colleague, Kristen Hamilton, and I would like to have a telephone conversation with you to provide you with more details and to begin early consultation with your office. Also, we are wondering whether you would be available for an in-person meeting in San Juan during the afternoon of Monday, June 6th; my colleagues from the Astronomy and Atmospheric Science Divisions and I will be on-island from June 6th to June 8th, and NSF will be holding two public scoping meetings on June 7th. When you have a moment, it would be great if you would let me know whether you are available for a telecon this week during which we can provide you with more information.

Many thanks and warm wishes,

Caroline

cc: Kristen Hamilton, NSF Environmental Compliance Officer

Caroline M. Blanco
Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

NATIONAL SCIENCE FOUNDATION**Notice of Intent To Prepare an Environmental Impact Statement and Initiate Section 106 Consultation for Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico and Notice of Public Scoping Meetings and Comment Period****AGENCY:** National Science Foundation.**ACTION:** Notice of intent to prepare an Environmental Impact Statement and initiate Section 106 consultation for proposed changes to Arecibo Observatory operations, Arecibo, Puerto Rico and notice of public scoping meetings and comment period.

SUMMARY: In compliance with the National Environmental Policy Act of 1969, as amended, the National Science Foundation (NSF) intends to prepare an Environmental Impact Statement (EIS) to evaluate potential environmental effects of proposed changes to operations at Arecibo Observatory, in Arecibo, Puerto Rico. (See supplementary information below for more detail.) By this notice, NSF is announcing the beginning of the scoping process to solicit public comments and identify issues to be analyzed in the EIS. NSF also intends to initiate consultation under Section 106 of the National Historic Preservation Act to evaluate potential effects to the Arecibo Observatory, which is a historic property listed in the National Register of Historic Places.

DATES: This notice initiates the public scoping process for the EIS and the initiation of public involvement under Section 106 per 36 CFR 800.2(d). Comments on issues may be submitted verbally during scoping meetings scheduled for June 7, 2016 (see details below) or in writing until June 23, 2016. To be eligible for inclusion in the Draft EIS, all comments must be received prior to the close of the scoping period. NSF will provide additional opportunities for public participation upon publication of the Draft EIS.

ADDRESSES: You may submit comments related to this proposal by either of the following methods:

- *Email to:* envcomp-AST@nsf.gov, with subject line "Arecibo Observatory."

- *Mail to:* Ms. Elizabeth Pentecost, RE: Arecibo Observatory, National Science Foundation, Suite 1045, 4201 Wilson Blvd., Arlington, VA 22230.

Scoping Meetings: NSF will host two public scoping meetings.

- *Daytime meeting:* June 7, 2016, at 9:30 a.m. to 11:30 a.m., DoubleTree by

Hilton San Juan, 105 Avenida De Diego, San Juan, PR, Phone: (787) 721-6500.

- *Evening meeting:* June 7, 2016, 6:00 p.m. to 8:00 p.m., Colegio de Ingenieros y Agrimensores de Puerto Rico/Puerto Rico Professional College of Engineers and Land Surveyors (Arecibo Chapter), Ave. Manuel T. Guillán Urdáz, Conector 129 Carr. 10, Arecibo, Puerto Rico, Phone: (787) 758-2250.

Comments will be transcribed by a court reporter. Spanish language translation will be provided for simultaneous translation of presentations. Please contact NSF at least one week in advance of the meeting if you would like to request special accommodations (*i.e.*, sign language interpretation, etc.).

FOR FURTHER INFORMATION CONTACT: For further information regarding the EIS process or Section 106 consultation, please contact: Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Blvd., Arlington, VA 22230; telephone: (703) 292-4907; email: epenteco@nsf.gov.

SUPPLEMENTARY INFORMATION: The Arecibo Observatory is an NSF-owned scientific research and education facility located in Puerto Rico. In 2011, NSF awarded a five-year Cooperative Agreement to SRI International (SRI), which together with Universities Space Research Association (USRA) and Universidad Metropolitana (UMET) have formed the Arecibo Management Team to operate and maintain the Arecibo Observatory for the benefit of research communities. Arecibo Observatory enables research in three scientific disciplines: Space and atmospheric sciences, radio astronomy, and solar system radar studies; the last of these is largely funded through a research award to USRA from the National Aeronautics and Space Administration. An education and public outreach program complements the Arecibo Observatory scientific program. A key component of the Arecibo Observatory research facility is a 305-meter diameter, fixed, spherical reflector. Arecibo Observatory infrastructure includes instrumentation for radio and radar astronomy, ionospheric physics, office and laboratory buildings, a heavily utilized visitor and education facility, and lodging facilities for visiting scientists.

Through a series of academic community-based reviews, NSF has identified the need to divest several facilities from its portfolio in order to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and

beyond. In 2012, NSF's Division of Astronomical Sciences' (AST's) portfolio review committee recommended that "continued AST involvement in Arecibo . . . be re-evaluated later in the decade in light of the science opportunities and budget forecasts at that time." In 2016, NSF's Division of Atmospheric and Geospace Sciences' (AGS') portfolio review committee recommended significantly decreasing funding for the Space and Atmospheric Sciences portion of the Arecibo mission. In response to these evolving recommendations, in 2016, NSF completed a feasibility study to inform and define options for the observatory's future disposition that would involve significantly decreasing or eliminating NSF funding of Arecibo. Concurrently, NSF sought viable concepts of operations from the scientific community via a Dear Colleague Letter NSF 16-005 (see www.nsf.gov/AST), with responses due by January 15, 2016. Alternatives to be evaluated in the EIS will be refined through continued public input, with preliminary alternatives that include the following:

- Continued NSF investment for science-focused operations (No-Action Alternative)
- Collaboration with interested parties for continued science-focused operations
- Collaboration with interested parties for transition to education-focused operations
- Mothballing of facilities (suspension of operations in a manner such that operations could resume efficiently at some future date)
- Deconstruction and site restoration

The purpose of the public scoping process is to determine relevant issues that will influence the scope of the environmental analysis, including identification of viable alternatives, and guide the process for developing the EIS. At present, NSF has identified the following preliminary resource areas for analysis of potential impacts: Air quality, biological resources, cultural resources, geological resources, solid waste generation, health and safety, socioeconomics, traffic, and groundwater resources. NSF will consult under Section 106 of the National Historic Preservation Act and Section 7 of the Endangered Species Act in coordination with this EIS process, as appropriate. Federal, state, and local agencies, along with other stakeholders that may be interested or affected by NSF's decision on this proposal are invited to participate in the scoping

process and, if eligible, may request to participate as a cooperating agency.

Proposal Information: Information will be posted, throughout the EIS process, at www.nsf.gov/AST.

Dated: May 18, 2016.

Suzanne H. Plimpton,

Reports Clearance Officer, National Science Foundation.

[FR Doc. 2016-12036 Filed 5-20-16; 8:45 am]

BILLING CODE 7555-01-P

NUCLEAR REGULATORY COMMISSION

[Docket Nos. 50-445, 50-446, and 72-74; License Nos. NPF-87 and NPF-89; NRC-2016-0020]

In the Matter of Luminant Generation Company LLC; Comanche Peak Nuclear Power Plant, Unit Nos. 1 and 2, and Independent Spent Fuel Storage Installation Facility

AGENCY: Nuclear Regulatory Commission.

ACTION: Direct and indirect transfer of license; order.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is issuing an order approving the direct transfer of ownership and indirect transfer of control of Facility Operating License (FOL) Nos. NPF-87 and NPF-89 and the general license for the independent spent fuel storage installation facility from the current holder, Luminant Generation Company LLC, to as-yet unnamed companies, herein identified as Comanche Peak LLC, as owner, and Operating Company LLC, as operator. The NRC will issue conforming amendments to the FOLs for administrative purposes to reflect the proposed license transfer. No physical changes to the facility or operational changes were proposed in the application. The Order is effective upon issuance.

DATES: The Order was issued on May 6, 2016, and is effective for 1 year.

ADDRESSES: Please refer to Docket ID NRC-2016-0020 when contacting the NRC about the availability of information regarding this document. You may obtain publicly-available information related to this document using any of the following methods:

- **Federal Rulemaking Web site:** Go to <http://www.regulations.gov> and search for Docket ID NRC-2016-0020. Address questions about NRC dockets to Carol Gallagher; telephone: 301-415-3463; email: Carol.Gallagher@nrc.gov. For technical questions, contact the individual listed in the **FOR FURTHER**

INFORMATION CONTACT section of this document.

- **NRC's Agencywide Documents Access and Management System (ADAMS):** You may obtain publicly available documents online in the ADAMS Public Documents collection at <http://www.nrc.gov/reading-rm/adams.html>. To begin the search, select "ADAMS Public Documents" and then select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by email to pdr.resource@nrc.gov. The ADAMS accession number for each document referenced in this document (if that document is available in ADAMS) is provided the first time that a document is referenced. The Order was issued to the licensee in a letter dated May 6, 2016 (ADAMS Accession No. ML16096A266).

- **NRC's PDR:** You may examine and purchase copies of public documents at the NRC's PDR, Room O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

FOR FURTHER INFORMATION CONTACT: Margaret Watford, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone: 301-415-1233, email: Margaret.Watford@nrc.gov.

SUPPLEMENTARY INFORMATION: The text of the Order is attached.

Dated at Rockville, Maryland, this 16th day of May 2016.

For the Nuclear Regulatory Commission.

Margaret M. Watford,

Project Manager, Plant Licensing Branch IV-1, Division of Operating Reactor Licensing, Office of Nuclear Reactor Regulation.

Attachment—Order Approving Transfer of Licenses and Approving Conforming Amendments

United States of America

Nuclear Regulatory Commission

In the Matter of Luminant Generation Company LLC; Comanche Peak Nuclear Power Plant, Unit Nos. 1 and 2

Dockets Nos. 50-445 and 50-446
License Nos. NPF-87 and NPF-89

Order Approving the Transfer of Licenses and Approving Conforming Amendments

I.

Luminant Generation Company LLC (Luminant Power, the licensee) is the holder of the Facility Operating License (FOL) Nos. NPF-87 and NPF-89 of the Comanche Peak Nuclear Power Plant, Unit Nos. 1 and 2 (CPNPP), and the holder of the general license for the independent spent fuel storage installation (ISFSI) facility. CPNPP is located in Somervell County, Texas.

II.

Pursuant to Section 184 of the Atomic Energy Act of 1954, as amended (the Act), and Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.80, "Transfer of licenses," Luminant Generation Company LLC (Luminant Power) requested that the U.S. Nuclear Regulatory Commission (NRC) consent to the transfer of the FOL Nos. NPF-87 and NPF-89 for CPNPP, and the general license for the ISFSI facility (Docket No. 72-74) from the current holder, Luminant Power, to as-yet unnamed companies, herein identified as Comanche Peak LLC (CP LLC), as owner, and Operating Company LLC (OpCo LLC), as operator (together these entities are referred to as "the licensees"). Luminant Power submitted the request by application dated November 12, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15320A093), as supplemented by letters dated December 9, 2015, and March 14, March 29, April 7, and April 20, 2016 (ADAMS Accession Nos. ML15345A048, ML16076A162, ML16091A121, ML16099A291, and ML16112A396, respectively).

Luminant Power is acting on behalf of itself and the future to-be-formed companies. These future to-be-formed companies include the ultimate parent of CP LLC and OpCo LLC, Reorganized Texas Competitive Electric Holdings Corporation (Reorganized TCEH), and the intermediate parents, Intermediate Holding Company LLC, Asset Company LLC, and Preferred Stock Company Corporation (together with Luminant Power these entities are referred to as the "Applicants"). Entity names in the licensee's application and supplements are placeholders.

On April 29, 2014, Luminant Power notified the NRC of its filing of a bankruptcy (ADAMS Accession No. ML14120A212). Luminant Power is owned by Energy Future Competitive Holdings Company LLC (EFCH), through its wholly owned subsidiaries. The EFCH is a direct wholly owned subsidiary of Energy Future Holdings Corporation (EFH). The current and intended ownership structure of the facility is depicted in the simplified organizational charts provided in Exhibits A and B of Enclosure 1 in the submittal dated November 12, 2015. As a result of the proposed transactions and consistent with Exhibit B, EFH and EFCH will no longer ultimately own CPNPP. The licenses will be transferred from Luminant Power to CP LLC, responsible for ownership of the facility, and OpCo LLC, responsible for the operation and maintenance of CPNPP. At the emergence from bankruptcy, Reorganized TCEH, the ultimate parent company of CP LLC, will be owned by a numerous and diverse set of independent and unaffiliated stockholders. No single entity is expected to own a majority of, or exercise control over Reorganized TCEH or its Board of Directors. Current Luminant Power nuclear management and technical personnel will be employed by OpCo LLC. Accordingly, there will be no change in management or technical qualification, and OpCo LLC will continue to be technically qualified to operate the facility. No physical changes to the CPNPP and ISFSI facility or operational changes are proposed in the application.

From: Pentecost, Elizabeth A. [mailto:epenteco@nsf.gov]
Sent: Thursday, June 16, 2016 8:00 AM
To: anthony.vaneyken@sri.com
Subject: EIS for Arecibo Observatory - Identification of Consulting Parties

June 16, 2016

Subject: Identification of Consulting Parties for Section 106 Compliance for Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico

Dear Mr. Van Eyken:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences has identified the need to change the operations at several facilities in its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. The Arecibo Observatory in Puerto Rico is one of the facilities identified for a potential change in operations. NSF will be initiating Section 106 consultation under the National Historic Preservation Act (NHPA) for this undertaking.

In 2008, the Arecibo Observatory was listed in the National Register of Historic Places (NRHP). It was determined to be significant under NRHP Criteria A (associated with events that have made a significant contribution to the broad patterns of our history) and C (embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master).

NSF will be conducting an Environmental Impact Statement under the National Environmental Policy Act (NEPA) to identify potential impacts associated with this potential change in operations while simultaneously engaging in Section 106 consultation under the NHPA.

At present, alternatives under consideration include:

- Continued NSF investment for science-focused operations (No Action Alternative)
- Collaboration with interested parties for continued science-focused operations
- Collaboration with interested parties for transition to education-focused operations
- Mothballing of facilities (suspension of operations in a manner such that operations could resume efficiently at some future date)
- Deconstruction and site restoration

NSF is identifying organizations and individuals with an interest in the project's potential to affect historic properties who may qualify as consulting parties. Consulting parties can include individuals and organizations with a demonstrated interest in the project "due to the nature of their legal or economic relation to the undertaking or affected properties, or their concern with the undertaking's effects on historic properties" (30 Code of Federal Regulations Part 800.2[5]). You indicated an interest in participating as a consulting party at the NEPA scoping meeting on June 7, 2016 by checking the Section 106 consulting party box on the sign-in sheet. The purpose of this letter is to determine if you wish to be a consulting party under Section 106 for this project. The Section 106 process is described at <http://www.achp.gov/citizensguide.html>.

As a consulting party, you will be actively informed of and able to participate in the Section 106 process, including consultation meetings, and your views will be actively sought. If you would like to request consulting party status on this project, please respond no later than June 29, 2016 by contacting:

Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Blvd., Arlington, Virginia 22230; telephone: (703) 292-4907; email: epenteco@nsf.gov.

If you do not respond within this timeframe, you may request consulting party status in the future; however, the project may advance without your input and you will not have an opportunity to comment on the previous steps. If you are requesting consulting party status, we do ask that your organization nominate one representative and an alternate to participate on behalf of the group. There is also an opportunity for individuals to participate in the Section 106 process in a more limited capacity as members of the public.

We look forward to your response to this request and to your role as a consulting party on this project, should you choose to participate. Should you have any questions, or wish to discuss the project or our agency's responsibilities in more detail, please contact me at (703) 292-4907.

Sincerely,



Elizabeth Pentecost
Project Management Administrator
Division of Astronomical Sciences

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230



5 July 2016

Ms. Nydia Préstamo Torres
Deputy State Historic Preservation Officer
State Historic Preservation Office
Caurtel Ballaga, 3rd Floor
Norcagaray
San Juan, Puerto Rico 00901

RE: Section 106 Consultation for the Proposed Changes to Arecibo Observatory Operations,
Arecibo, Puerto Rico

Dear Ms. Torres:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences (MPS), Division of Astronomical Sciences (AST) has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. The Arecibo Observatory in Puerto Rico is one of the facilities identified for potential divestment. The decision regarding the potential changes to Arecibo Observatory operations is considered a federal undertaking; accordingly, by this letter, NSF is formally initiating Section 106 consultation under the National Historic Preservation Act (NHPA). While engaging in Section 106 consultation under the NHPA, NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential environmental impacts associated with the proposed changes to operations.

Project Location and Background

The Arecibo Observatory, which includes the world's largest single-dish radio telescope, is a national center for research in radio astronomy, planetary radar, and aeronomy (including optical facilities). The Observatory is located in west-central Puerto Rico on federal land and occupies 118 acres. The construction of Arecibo was funded in the early 1960s by the Department of Defense Advanced Research Projects Agency to perform radar back-scatter studies of the ionosphere. In 1969, the facility was transferred from the Department of Defense to NSF and was made a national research center, with operations by Cornell University. In 1971, the facility became known as the National Astronomy and Ionosphere Center.

A key component of the Arecibo Observatory research facility is a 305-meter diameter, fixed, spherical reflector. The telescope has undergone two major upgrades: in 1974, the reflector was resurfaced and a high frequency planetary radar transmitter was installed; and in 1997, major new equipment installations included new ground screen shields that block ground radiation, a Gregorian dome with sub-reflectors and new electronics, and a new radar transmitter. These

improvements greatly increased the capability of the telescope. Arecibo Observatory infrastructure includes instrumentation for radio and radar astronomy and ionosphere physics, office and laboratory buildings, a heavily used visitor and education facility, and lodging facilities for visiting scientists.

In September 2011, Cornell University's cooperative agreement with NSF expired, and following a competition, a new cooperative agreement was awarded to SRI International, with sub-awards to Universities Space Research Association (USRA) and the Universidad Metropolitana (UMET). The cooperative agreement has a term of 5 years, ending in September 2016; both parties are currently discussing extending this through March 31, 2018.

In 2008, the Arecibo Observatory was listed in the National Register of Historic Places (NRHP) as the National Astronomy and Ionosphere Center historic district. It was determined to be significant under NRHP Criteria A (associated with events that have made a significant contribution to the broad patterns of our history) and C (embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master). A total of 13 buildings and structures were included in the 2008 NRHP nomination. Through correspondence with Berenice Sueiro at the Puerto Rico SHPO office, it was confirmed that five of those buildings are considered non-contributing, including:

- Building #3, Visiting Scientist Quarters and Cafeteria
- Building #4, Recreation Area
- Building #8, West Hill Visiting Scientist Quarters Bachelor Units
- Building #9, West Hill Visiting Scientist Quarters Family Units
- Building #10, North Visiting Scientist Quarters Units

Therefore, there are eight buildings and one structure that are considered to contribute to the NRHP-listed historic district:

- 305-Meter Radio Telescope and Support Towers;
- Building #1, Operations Building
- Building #2, Administration Building
- Building #5, Visitor Center
- Building #6, Learning Center
- Building #7, Photometry Shack and Optical Lab
- Buildings #11 and #12, Warehouse and Business/Purchasing
- Building #13, Maintenance Building

No other buildings or structures on the 118-acre property are listed in or considered eligible for the NRHP.

In 2015, after discovering that Arecibo Observatory was inaccurately listed on the NRHP as being owned by Cornell University, NSF contacted the National Park Service and requested that Arecibo Observatory be delisted and then re-listed with NSF as the owner. That request was granted and Arecibo was both removed and then re-listed on December 22, 2015, reflecting the corrected ownership information.

Project Description

NSF's AST is the federal steward for ground-based astronomy in the United States, funding research with awards to individual investigators and small research groups, and via cooperative agreements for operation of large telescope facilities. These national and international telescope facilities provide world-leading, one-of-a-kind observational capabilities on a competitive basis to thousands of astronomers per year. These facilities also enable scientific advances by making archived data products available to researchers. Along with funding telescope facilities and research awards, AST supports the development of advanced technologies and instrumentation and manages the allocation and assignment of specific frequencies in the radio spectrum for scientific use by the entire NSF community. The need for NSF to reduce its participation in Arecibo Observatory has been established through a number of reviews and surveys conducted by the science community. At present, Arecibo Observatory serves a variety of scientific user communities in astronomy, aeronomy, and planetary science, and is funded for all three activities as well as an active education and public outreach program. The science community evaluations, however, indicated that the science capability of Arecibo Observatory presents a lower priority than other science capabilities that NSF funds. In a funding-constrained environment, NSF needs to maintain a balanced research portfolio with the largest science return for the taxpayer dollar. Therefore, the purpose of the proposed action is for NSF to evaluate changes in operations and to substantially reduce its contribution to the funding of Arecibo Observatory. The proposed alternatives are designed to address this purpose and need.

Between 2014 and 2016, a Divestment Options Study for the Arecibo Observatory was prepared by CH2M under contract with NSF. The purpose of the study was to provide NSF with an overall condition assessment of structures and to evaluate divestment options for the facilities at Arecibo. Appendix A of the study included the Facilities Descriptions and Condition Assessments for each facility at Arecibo, as well as photographs. For reference, a hard copy of Appendix A was provided to your office on June 6, 2016. Because of this previous submittal, no additional current photographs are included with this letter.

Preliminary alternatives (four proposed action alternatives and a no action alternative) were developed based on the feasibility study and the response from the scientific community. Those preliminary alternatives were then developed into preliminary proposed alternatives that were presented to the public for comment during the public scoping period (as described below). The preliminary proposed alternatives are described below:

- **No Action Alternative – Continued NSF Investment for Science-focused Operations:** Under the No Action Alternative, NSF would not divest Arecibo Observatory and NSF would continue funding to operate it. Operations would be contingent on funding appropriations.
- **Alternative 1 – Collaboration with Interested Parties for Continued Science-focused Operations:** Alternative 1 would include continued science-focused operations by a collaboration of interested parties. Existing buildings that would no longer be of use would either be deconstructed or mothballed.
- **Alternative 2 – Collaboration with Interested Parties for Transition to Education-focused Operations:** Alternative 2 would transition the site to education-focused operations. The visitor center, learning center, and 12-meter telescope would remain operational. The 350-meter telescope would be made inoperable, but retained for

visual/historical interest. It would be secured and regularly maintained to prevent structural degradation. Existing buildings that would no longer be of use would either be deconstructed or mothballed.

- **Alternative 3 – Mothballing Facilities:** Alternative 3 would involve preservation of essential buildings, telescopes, and other equipment with periodic maintenance to keep them in working order. This would allow the facility to be reopened at a future date. Structures and facilities that would no longer be of use would be reconstructed. Gates and fencing would be evaluated to determine if upgrades are needed to provide appropriate security/access around portions of the site that would require protection.

- **Alternative 4 – Deconstruction and Site Restoration:** Alternative 4 would include deconstruction of most of the structures at Arecibo Observatory. The large concrete towers, anchors, and rim wall would not be deconstructed, but would remain in a manner that would not present a safety hazard to others. The remainder of the above-grade structures, including gates and fencing, would be removed and deconstructed. Below-grade foundations would be stabilized and filled.

These preliminary proposed alternatives may be further refined during the early phases of the compliance review and will be informed by the public process.

Public Involvement

Public scoping on the preliminary proposed alternatives and issues of concern was initiated on May 24, 2016 with publication of a Notice of Intent in the *Federal Register*. Public meetings were conducted on June 7, 2016 in San Juan and Arecibo, Puerto Rico. During the scoping meetings on June 7, 2016, NSF requested contact information for those individuals and organizations interested in participating as Section 106 consulting parties. NSF contacted those individuals and organizations to provide further details about the Section 106 consultation process and to confirm their consulting party status for this proposed action. Five individuals and organizations confirmed their participation as consulting parties:

- Tony Van Eyken (Arecibo Observatory)
- Dr. Brett Isham (Interamerican University-Bayamon)
- Xavier Siemens (NANOGRAV)
- Dr. Nicholas White (USRA)
- Qihou Zhou (Miami University)
- Luisa Zambrano-Marin (Arecibo Observatory)

NSF anticipates holding further NEPA public meetings during the Fall of 2016, following the release of the Draft EIS. Section 106 consultation needs will be addressed during the Draft EIS meetings, or during separate consulting party meetings following the Draft EIS meetings. Follow-up meetings with consulting parties will occur as needed to complete Section 106 consultation requirements.

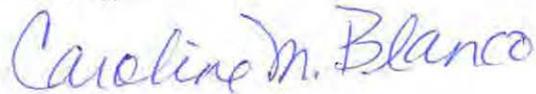
Initiation of Section 106 Consultation

As part of the Section 106 process for the proposed changes to Arecibo Observatory operations, CH2M will conduct a site visit to Arecibo Observatory on July 19 and 20, 2016. The purpose of this survey is to verify the current conditions of existing known historic properties located at

Arecibo Observatory. A Secretary of the Interior-qualified architectural historian will conduct a reconnaissance-level field survey to update cultural resources information for the project site. The survey will include a general site assessment and informal interviews with the NSF staff and partners to obtain information regarding alterations to those buildings that contribute to the historic district. CH2M's investigations will only include the nine known properties that contribute to the NRHP-listed historic district to verify that no significant alterations have occurred to the buildings and structures since the district was listed in 2008. The nine resources that contribute to the NRHP-listed historic district were listed earlier in this letter. NSF would like to invite your office to participate in the field investigations on July 19 and 20, 2016, if you are interested and available. If your office is interested in attending the cultural resources field investigations at Arecibo, please contact Ms. Elizabeth Pentecost by phone at 703-292-4907, by email at epenteco@nsf.gov or by US Postal Service to NSF, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Blvd., Arlington, Virginia 22230 as soon as possible so we can coordinate the visit.

As described earlier, Arecibo Observatory is a federally-owned property that is listed in the NRHP; therefore, the proposed action has the potential to affect NRHP-listed historic properties. In compliance with 36 C.F.R. 800.3(c), NSF is initiating consultation with your office on the proposed changes to Arecibo Observatory operations and transmitting the required Section 106 Delivery Control Form (attached as Enclosure 1). If you have any questions, please do not hesitate to contact me by phone at 703-292-4592 or by email at cblanco@nsf.gov. We look forward to further consultation on this proposed action.

Sincerely,



Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel

Cc: Berenice R. Sueiro Vázquez, Gerente de Conservación Histórica, Puerto Rico SHPO
E. Pentecost, NSF
K. Zender, Ch2M

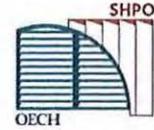
Enclosures:

1. Section 106 Delivery Control Form
2. Maps: USGS Topo and Site Plan



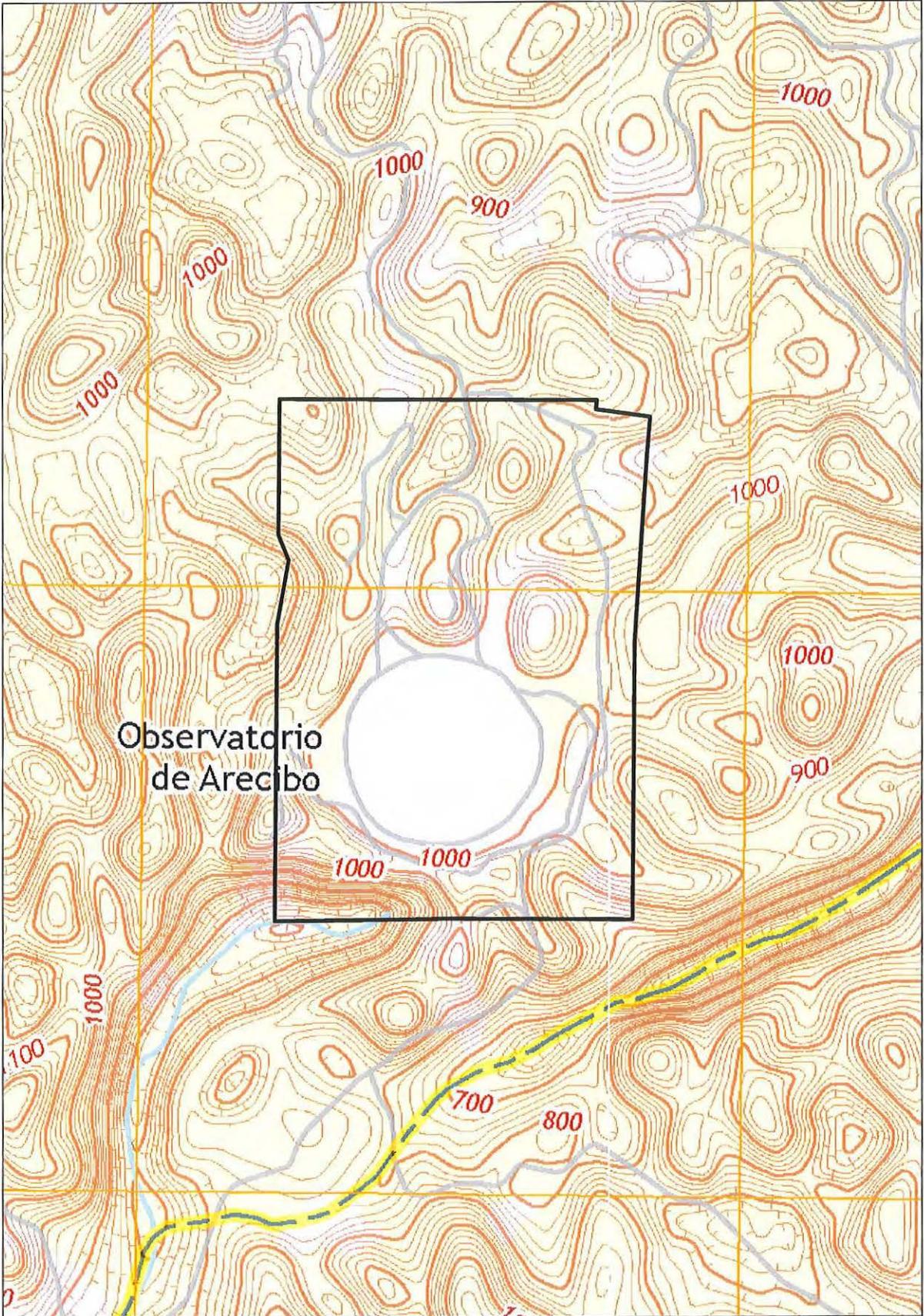
**Formulario para el control de entrega.
Proyectos de sección 106**

(Delivery control form 106 Section)



Sección A. Información a ser llenada por el proponente* (Section A. Information to be filled by proponent)			
Nombre del Proyecto/ Project's name		Número de referencia federal/ Reference federal number	
Proposed Changes to Arecibo Observatory Operations		Not Applicable	
Municipio/ Municipality	Barrio/ Ward	Nombre del Proponente/ Proponent's name	
Arecibo	Esperanza	National Science Foundation	
Agencia Federal/ Federal Agency		Total de fondos federales solicitados/ Total of federal funds to be requested	Total de acres/ Total amount of acres
National Science Foundation		Not Applicable	118 acres
Nombre de la persona que entrega/ Name of person who delivers		Firma/Signature	
Caroline M. Blanco National Science Foundation		<i>Caroline M. Blanco</i>	
Sección B. Información a ser llenada por la OECH al momento de la entrega del proyecto (Section B. Information to be filled by SHPO upon delivery)			
Fecha de entrega en la OECH/ SHPO delivery date		Nombre y firma de la persona que recibe/ Name and signature of person who received	

* Para poder cumplir su labor ministerial la OECH requiere que la Sección A de este formulario sea completada en su totalidad. Por tal razón, no se aceptarán proyectos que incumplan este requerimiento.
(To carry out our duties, the SHPO requires that Section A of this form be totally filled-out. For this reason, we will not accept an incomplete form.)



Observatorio
de Arecibo

 Property Boundary and Historic District Boundary



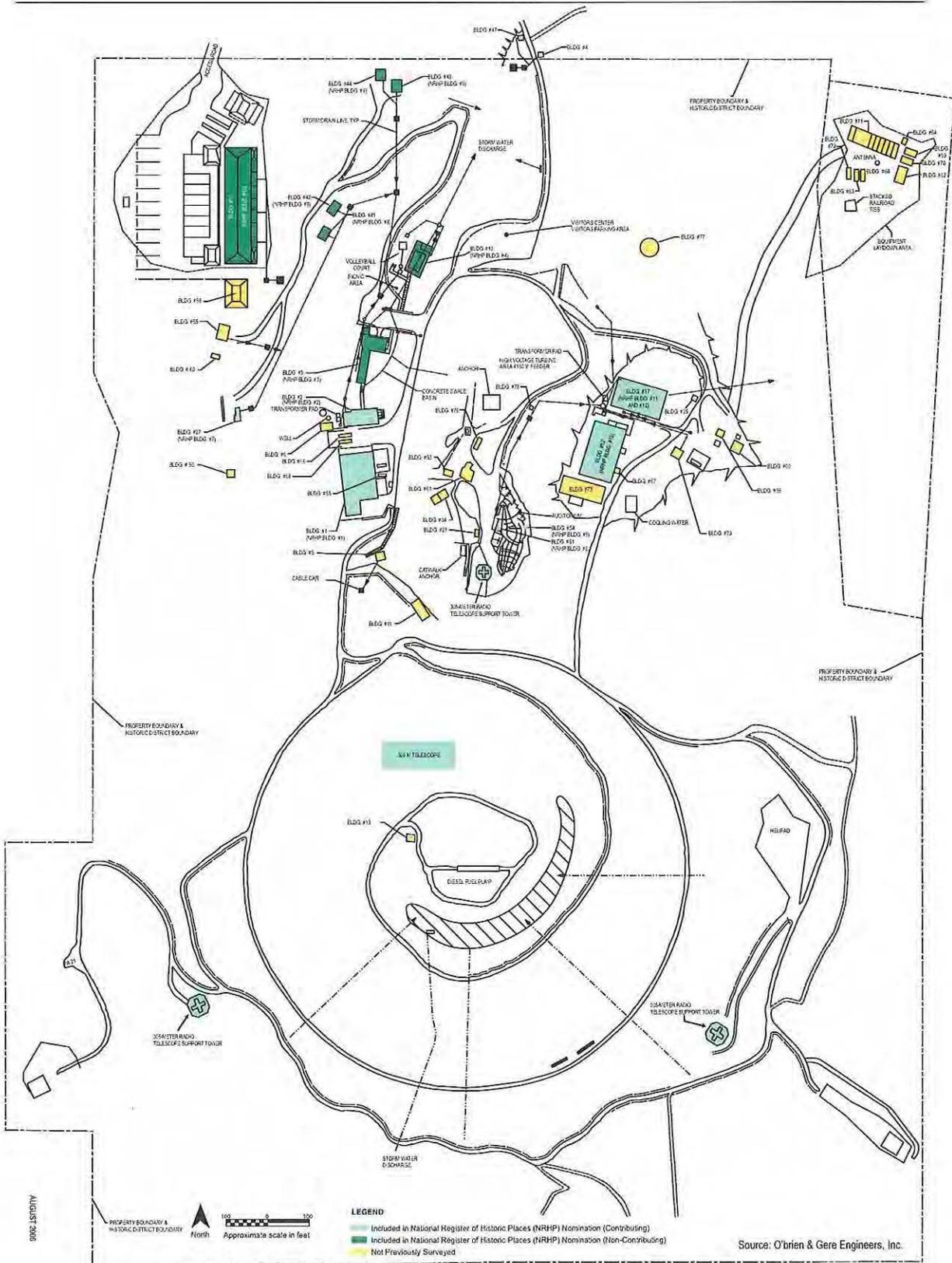
1 inch = 500 feet

Project Location
Arecibo Observatory
Puerto Rico

USGS Topographic Quads Bayaney NE (2013) and
Utado NW (2013)

ch2m

H:\SPARECIBO_OBSERVATORY\MAPFILES\CULTURAL\PROJECT_LOCATION_SHP\0 MW 2014\02/26/2018 9:09:48 AM



APRIL 2009



LEGEND
 Included in National Register of Historic Places (NRHP) Nomination (Contributing)
 Included in National Register of Historic Places (NRHP) Nomination (Non-Contributing)
 Not Previously Surveyed

Source: O'Brien & Gere Engineers, Inc.

BUILDING NO. DESCRIPTION

- | | | | |
|---|---|--|---|
| <p>1. OPERATIONS BUILDING (Constructed 1963)
 2. ADMINISTRATION BUILDING (Constructed 1963)
 3. VISITING SCIENTIST QUARTERS AND CAFETERIA (Constructed 1963)
 4. ENTRANCE GUARD HOUSE (Constructed 1963)
 5. CABLE CAR HOUSE (Constructed 1963)
 6. PUMP HOUSE/WATER TREATMENT BLDG. (Constructed 1963)
 10. SWIMMING POOL/RESTROOMS (Constructed Mid 1960's)
 11. LEWIS BUILDING-RIGGING LOFT (Constructed Mid 1960's)
 12. MAINTENANCE SHOPS (Constructed 1967)
 13. BOWL SHACK (Constructed 1960's)
 17. WAREHOUSE (Constructed 1967)
 25. PAINT STORAGE BUILDING (Constructed 1967)
 27. OPTICAL LABS (Constructed 1965/1997)</p> | <p>34. HIGH VOLTAGE POWER SUPPLY BLDG. (Constructed 1973)
 35. CUMMINGS GENERATOR CONTROL BLDG. (Constructed 2000's)
 41. WEST HILL V.S.O. BACHELOR UNIT NO. 1 (Constructed date ?)
 42. WEST HILL V.S.O. BACHELOR UNIT NO. 2 (Constructed date ?)
 43. WEST HILL V.S.O. FAMILY UNIT NO. 1 (Constructed date ?)
 44. WEST HILL V.S.O. FAMILY UNIT NO. 2 (Constructed date ?)
 47. MAIN GATE RESTROOM (Constructed 1963)
 50. INTERFERENCE MONITORING SHACK (Constructed date ?)
 51. GREASE PIT (Constructed date unknown)
 53. EMERGENCY GENERATOR BLDG. (Constructed date ?)
 54. VISITOR CENTER BLDG. (Constructed 1997)
 55. LIDAR LABORATORY BLDG. (Constructed 1996)
 57. NORTH V.S.O. BLDG. (Constructed 2002)
 58. NORTH V.S.O. UTILITY BLDG.</p> | <p>59. VISITOR CENTER TRAILER (Constructed date ?)
 60. ANT. RECE. TESTING BLDG. (Constructed late 1990's)
 61. LEARNING CENTER (Constructed 2001)
 62. HFF STORAGE TRAILER (Constructed date ?)
 63. IONOSPHERE TRAILER (Constructed date ?)
 64. ELECTRONIC TRAILER (Constructed date ?)
 65. SHIELDED TRAILER (Constructed 1983)
 66. ATMOSPHERIC SCIENCE TRAILER (Constructed date ?)
 67. CRYOGENICS LAB TRAILER (Constructed 1967)
 68. SCIENTIFIC OFFICES TRAILER (Constructed date ?)
 69. ELECTRONIC TRAILER (WAVEGUIDE) (Constructed date ?)
 70. COMPUTER TRAILER (Constructed date ?)
 71. ELECTRONIC CABLE TRAILER (Constructed date ?)
 72. ELECTRONIC TRAILER (CRYOGENICS) (Constructed date ?)
 73. HF TRANSMITTER BUILDING (Constructed 2000's)</p> | <p>76. INSPIRATION FOR SCIENCE TRAILER (Constructed 2000's)
 77. PHASE REFERENCE ANTENNA (12M) (Constructed 2010)
 78. COFFEE HUT (Constructed 2000's)
 79. ENGINEERING OFFICE BUILDING (Constructed 2000's)
 80. CUMMINGS DIESEL GENERATOR BUILDING (Constructed 2000's)</p> |
|---|---|--|---|

Site Map
 Arecibo Observatory
 (National Astronomy and Ionosphere Center)
 Arecibo, Puerto Rico



From: Pentecost, Elizabeth A. [<mailto:epenteco@nsf.gov>]

Sent: Monday, July 11, 2016 1:30 PM

To: Berenice Sueiro

Cc: Blanco, Caroline M; Kira Zender

Subject: Initiation of Section 106 Consultation for Proposed Changes to Arecibo Observatory Operations

Dear Ms. Sueiro,

I am working with Caroline Blanco and Kristen Hamilton on the Arecibo Observatory environmental compliance issues and wanted to follow-up on the email Caroline sent you on July 5 concerning initiation of Section 106 consultation for the proposed changes to Arecibo Observatory operations. In the email, NSF extended an invitation to your office to attend the cultural resources field investigations at Arecibo on July 19 and 20.

We are inquiring now as to whether or not your office is interested in attending the field investigations so that we can coordinate the visit with the CH2M team. We would greatly appreciate it if you or a member of your staff could let me know by Thursday, July 14 whether or not you would be available to attend the field investigations.

We look forward to further consultation with the State Historic Preservation Office on this proposed action.

Sincerely,

Elizabeth Pentecost

National Science Foundation

From: Pentecost, Elizabeth A. <epenteco@nsf.gov>
Sent: Tuesday, July 12, 2016 3:29 PM
To: Berenice Sueiro
Cc: Blanco, Caroline M; Pentecost, Elizabeth A.
Subject: Re: Initiation of Section 106 Consultation for Proposed Changes to Arecibo Observatory Operations [EXTERNAL]
Attachments: image001.jpg; image002.jpg

Dear Ms. Suerio,

I contacted Ch2M and they have provided me with a tentative timeline for their visit to Arecibo on July 19 and July 20. There is no formal agenda for the visit at this time. The Ch2M team plans to arrive soon after the site opens (at 7 am per information from Mr. Jaime Gago at Arecibo) to orient themselves and meet their contacts onsite. Mr. Gago mentioned to Ch2M that there will be no access to and around the platform from 7 am to 10 am on Tuesday the 19th. Ch2M is planning to do the bulk of the reconnaissance architectural survey on that day, and will work around any site access limitations that morning. After 10 am on the 19th, Ch2M will have access to any buildings on site. Work will likely wrap up around 3:30, when the facility closes. During the survey, Ch2M will visit each historic building and verify existing conditions. Ch2M will do any follow-up survey work on Wednesday the 20th.

I hope this will help you in determining whether someone from your office will attend the field investigations.

Sincerely,

Elizabeth Pentecost

National Science Foundation
Division of Astronomical Sciences
Room 1045
4201 Wilson Boulevard
Arlington, VA 22230
Tel: 703-292-4907
Fax: 703-292-9034

From: Berenice Sueiro <bsueiro@prshpo.pr.gov>
Sent: Tuesday, July 12, 2016 12:05 PM
To: Pentecost, Elizabeth A.
Cc: Blanco, Caroline M; Zender, Kira/ATL; Nydia Prestamo; Juan Llanes
Subject: RE: Initiation of Section 106 Consultation for Proposed Changes to Arecibo Observatory Operations



Dear Ms. Pentecost:

Greetings,

We will like to know if you have an agenda for those two days . If available please submit. I will be out of the office. Mr. Juan Llanes, Historic Preservation Specialist, will evaluate scope of agenda. He will confirm attendance or not.

Best regards,

Berenice R Sueiro Vázquez
Gerente Conservación Histórica/Historic Preservation Manager
tel. 787-721-3737 ext. 2002
fax. 787-721-3773



From: Pentecost, Elizabeth A. [mailto:epenteco@nsf.gov]
Sent: Monday, July 11, 2016 1:30 PM
To: Berenice Sueiro
Cc: Blanco, Caroline M; Kira Zender
Subject: Initiation of Section 106 Consultation for Proposed Changes to Arecibo Observatory Operations

Dear Ms. Sueiro,

I am working with Caroline Blanco and Kristen Hamilton on the Arecibo Observatory environmental compliance issues and wanted to follow-up on the email Caroline sent you on July 5 concerning initiation of Section 106 consultation for the proposed changes to Arecibo Observatory operations. In the email, NSF extended an invitation to your office to attend the cultural resources field investigations at Arecibo on July 19 and 20.

From: Caroline Blanco <cblanco@nsf.gov>
Date: Tuesday, July 19, 2016 at 5:23 PM
To: John Eddins <jeddins@achp.gov>
Cc: "Pentecost, Elizabeth A." <epenteco@nsf.gov>
Subject: FW: NEPA Analysis for Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico

Hi John – I hope all is well with you. I am writing to let you know that NSF has started a NEPA process for proposed changes to operations at the Arecibo Observatory in Puerto Rico. (Please also note that we have initiated a NEPA process for proposed changes to operations at Sacramento Peak Observatory in New Mexico, but I will send you information on that effort by separate email.)

Below please find an email sent by Elizabeth Pentecost of NSF's Astronomical Sciences Division to John Fowler. Attached, please find our letter to the Puerto Rico SHPO and related documentation. Also attached are the handouts that we provided at our public scoping meeting in early June. Please note that we have been in contact with the Puerto Rico SHPO for a couple of months and had an in-person meeting with the SHPO's office when we were out there on June 6th. It has been a very enjoyable and helpful experience to work with the folks in that office.

After reviewing the attached material, please let me know if you have any questions and whether the ACHP would like to be involved in the Section 106 process. In the meantime, take care and enjoy the balance of your summer.

With warm regards,

Caroline

cc: Elizabeth Pentecost

Caroline M. Blanco

Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: Elizabeth Pentecost <epenteco@nsf.gov>

Date: Tuesday, July 19, 2016 at 5:12 PM

To: "jfowler@achp.gov" <jfowler@achp.gov>

Cc: "Blanco, Caroline M" <cblanco@nsf.gov>

Subject: NEPA Analysis for Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico

Dear Mr. Fowler:

In compliance with the National Environmental Policy Act of 1969 (NEPA), as amended, the National Science Foundation (NSF) intends to prepare an Environmental Impact Statement (EIS) to evaluate potential environmental effects of proposed changes to operations at the Arecibo Observatory, in Arecibo, Puerto Rico. The Notice of Intent for this EIS was published in the Federal Register on July 5, 2016 to initiate the public scoping for the EIS.

We have been in contact with Ms. Berenice Sueiro, the Puerto Rican State Historic Preservation Officer, and I attach our letter to her office for your information as well as a response from Ms. Sueiro.

If you have any questions or need further information, please do not hesitate to contact my office or the office of Ms. Caroline Blanco, Assistant General Council (cblanco@nsf.gov). We look forward to working with the ACHP on this very important activity.

Sincerely,

Elizabeth Pentecost

National Science Foundation
Division of Astronomical Sciences
Room 1045
4201 Wilson Boulevard

Arlington, VA 22230

Tel: 703-292-4907

Fax: 703-292-9034

Zender, Kira/ATL

From: Berenice Sueiro <bsueiro@prshpo.pr.gov>
Sent: Tuesday, July 12, 2016 12:05 PM
To: Pentecost, Elizabeth A.
Cc: Blanco, Caroline M; Zender, Kira/ATL; Nydia Prestamo; Juan Llanes
Subject: RE: Initiation of Section 106 Consultation for Proposed Changes to Arecibo Observatory Operations



Dear Ms. Pentecost:

Greetings,

We will like to know if you have an agenda for those two days . If available please submit. I will be out of the office. Mr. Juan Llanes, Historic Preservation Specialist, will evaluate scope of agenda. He will confirm attendance or not.

Best regards,

Berenice R Sueiro Vázquez
Gerente Conservación Histórica/Historic Preservation Manager
tel. 787-721-3737 ext. 2002
fax. 787-721-3773



From: Pentecost, Elizabeth A. [mailto:epenteco@nsf.gov]
Sent: Monday, July 11, 2016 1:30 PM
To: Berenice Sueiro
Cc: Blanco, Caroline M; Kira Zender
Subject: Initiation of Section 106 Consultation for Proposed Changes to Arecibo Observatory Operations

Dear Ms. Sueiro,

I am working with Caroline Blanco and Kristen Hamilton on the Arecibo Observatory environmental compliance issues and wanted to follow-up on the email Caroline sent you on July 5 concerning initiation of Section 106 consultation for the proposed changes to Arecibo Observatory operations. In the email, NSF extended an invitation to your office to attend the cultural resources field investigations at Arecibo on July 19 and 20.

We are inquiring now as to whether or not your office is interested in attending the field investigations so that we can coordinate the visit with the CH2M team. We would greatly appreciate it if you or a member of your staff could let me know by Thursday, July 14 whether or not you would be available to attend the field investigations.

We look forward to further consultation with the State Historic Preservation Office on this proposed action.

Sincerely,

Elizabeth Pentecost

National Science Foundation
Division of Astronomical Sciences
Room 1045
4201 Wilson Boulevard
Arlington, VA 22230
Tel: 703-292-4907
Fax: 703-292-9034



Arecibo Observatory Operations

What is the Proposed Action?

The National Science Foundation (NSF) is conducting scoping meetings to obtain feedback on proposed changes to operations at the Arecibo Observatory. A range of alternatives is being considered for evaluation in an Environmental Impact Statement (EIS). These alternatives will be refined through continued public input, with preliminary alternatives that include the following:

- Continued NSF investment for science-focused operations (No-Action Alternative)
- Collaboration with interested parties for continued science-focused operations
- Collaboration with interested parties for transition to education-focused operations
- Mothballing of facilities (suspension of operations in a manner such that operations could resume efficiently at some future date)
- Deconstruction and site restoration

What is NEPA?

The National Environmental Policy Act of 1969 (NEPA) requires federal agencies to consider the potential environmental consequences of proposed actions on the environment prior to making final decisions. The NEPA review process is intended to provide the public with an opportunity to comment and provide input on those decisions. On May 23, 2016, NSF announced the beginning of the scoping process and solicitation of public comments to identify issues to be analyzed in an EIS. The purpose of the public scoping process is to determine relevant issues that will influence the scope of the environmental analysis, including identification of viable alternatives. Additional opportunities for public participation will be available throughout the process.

What is Section 106?

NSF also intends to initiate consultation under Section 106 of the National Historic Preservation Act (NHPA) to evaluate potential effects on the Arecibo Observatory, which is a historic property listed in the National Register of Historic Places. Section 106 of the National Historic Preservation Act requires federal agencies to consult with interested parties and the State Historic Preservation

Officer regarding potential effects of their proposed actions on significant historic properties, such as the Arecibo Observatory.

Who owns, funds, and manages Arecibo Observatory?

NSF owns and funds the Arecibo Observatory and, as a federal agency, is therefore responsible for NEPA compliance. NSF has contracted with CH2M HILL, an environmental consultant, to prepare the EIS. SRI International, with Universities Space Research Association (USRA) and Universidad Metropolitana (UMET), receives funding from NSF via a Cooperative Agreement to operate and maintain the Arecibo Observatory for the benefit of research communities. The National Aeronautics and Space Administration (NASA) provides additional funding to the Universities Space Research Association (USRA) to support solar system radar studies.

EIS Timeline

Scoping comment period: May 24 through June 23, 2016

- Public meeting June 7, 9:30 am in San Juan
- Public meeting June 7, 6:00 pm in Arecibo

Draft EIS target: Late Fall 2016

- 45-day comment period on Draft EIS
- Public meetings on Draft EIS

Final EIS target: Spring 2017

NSF Record of Decision target: Summer 2017

How to Submit Comments

Scoping comments will be accepted through June 23, 2016 and may be submitted during the public meetings or by the following methods:

Email: Envcomp-AST@nsf.gov

Mail: Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Blvd., Arlington, VA 22230.

Additional information will be posted throughout the EIS process at www.nsf.gov/AST.



National Science
Foundation

Environmental Impact Statement and Section 106 Consultation for Proposed Changes to Arecibo Observatory Operations

Arecibo, Puerto Rico

Overview:

The National Environmental Policy Act requires federal agencies to conduct an environmental review to assess the potential environmental impacts of federal actions that could significantly affect the environment.

Section 106 of the National Historic Preservation Act requires federal agencies to consult with interested parties and the State Historic Preservation Officer regarding potential effects of their proposed actions on significant historic properties, such as the Arecibo Observatory.

The purpose of the public scoping process is to determine relevant issues that will influence the scope of the environmental analysis, including identification of viable alternatives. Additional opportunities for public participation will be available throughout the process.

Project Timeline Schedule for Public Involvement:

- **Scoping Comment Period:**
May 24-June 23, 2016
- **Draft EIS target:**
Late Fall 2016
 - 45-Day Comment Period on Draft EIS
 - Public meetings on Draft EIS
- **Final EIS target:**
Spring 2017
- **Record of Decision target:**
Summer 2017

Submit Comments:

You may submit comments by either of the following methods:

Email to: envcomp-AST@nsf.gov,
with subject line
"Arecibo Observatory"

Mail to: Ms. Elizabeth Pentecost,
RE: Arecibo Observatory
National Science Foundation,
Suite 1045 4201 Wilson Blvd
Arlington, VA 22230

Project information will be posted,
throughout the EIS process, at
www.nsf.gov/AST.

NATIONAL SCIENCE FOUNDATION

4201 Wilson Boulevard

Arlington, Virginia 22230



**OFFICE OF THE
GENERAL COUNSEL**

5 July 2016

Ms. Nydia Préstamo Torres
Deputy State Historic Preservation Officer
State Historic Preservation Office
Caurtel Ballaga, 3rd Floor
Norcagaray
San Juan, Puerto Rico 00901

RE: Section 106 Consultation for the Proposed Changes to Arecibo Observatory Operations,
Arecibo, Puerto Rico

Dear Ms. Torres:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences (MPS), Division of Astronomical Sciences (AST) has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. The Arecibo Observatory in Puerto Rico is one of the facilities identified for potential divestment. The decision regarding the potential changes to Arecibo Observatory operations is considered a federal undertaking; accordingly, by this letter, NSF is formally initiating Section 106 consultation under the National Historic Preservation Act (NHPA). While engaging in Section 106 consultation under the NHPA, NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential environmental impacts associated with the proposed changes to operations.

Project Location and Background

The Arecibo Observatory, which includes the world's largest single-dish radio telescope, is a national center for research in radio astronomy, planetary radar, and aeronomy (including optical facilities). The Observatory is located in west-central Puerto Rico on federal land and occupies 118 acres. The construction of Arecibo was funded in the early 1960s by the Department of Defense Advanced Research Projects Agency to perform radar back-scatter studies of the ionosphere. In 1969, the facility was transferred from the Department of Defense to NSF and was made a national research center, with operations by Cornell University. In 1971, the facility became known as the National Astronomy and Ionosphere Center.

A key component of the Arecibo Observatory research facility is a 305-meter diameter, fixed, spherical reflector. The telescope has undergone two major upgrades: in 1974, the reflector was resurfaced and a high frequency planetary radar transmitter was installed; and in 1997, major new equipment installations included new ground screen shields that block ground radiation, a Gregorian dome with sub-reflectors and new electronics, and a new radar transmitter. These

improvements greatly increased the capability of the telescope. Arecibo Observatory infrastructure includes instrumentation for radio and radar astronomy and ionosphere physics, office and laboratory buildings, a heavily used visitor and education facility, and lodging facilities for visiting scientists.

In September 2011, Cornell University's cooperative agreement with NSF expired, and following a competition, a new cooperative agreement was awarded to SRI International, with sub-awards to Universities Space Research Association (USRA) and the Universidad Metropolitana (UMET). The cooperative agreement has a term of 5 years, ending in September 2016; both parties are currently discussing extending this through March 31, 2018.

In 2008, the Arecibo Observatory was listed in the National Register of Historic Places (NRHP) as the National Astronomy and Ionosphere Center historic district. It was determined to be significant under NRHP Criteria A (associated with events that have made a significant contribution to the broad patterns of our history) and C (embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master). A total of 13 buildings and structures were included in the 2008 NRHP nomination. Through correspondence with Berenice Sueiro at the Puerto Rico SHPO office, it was confirmed that five of those buildings are considered non-contributing, including:

- Building #3, Visiting Scientist Quarters and Cafeteria
- Building #4, Recreation Area
- Building #8, West Hill Visiting Scientist Quarters Bachelor Units
- Building #9, West Hill Visiting Scientist Quarters Family Units
- Building #10, North Visiting Scientist Quarters Units

Therefore, there are eight buildings and one structure that are considered to contribute to the NRHP-listed historic district:

- 305-Meter Radio Telescope and Support Towers;
- Building #1, Operations Building
- Building #2, Administration Building
- Building #5, Visitor Center
- Building #6, Learning Center
- Building #7, Photometry Shack and Optical Lab
- Buildings #11 and #12, Warehouse and Business/Purchasing
- Building #13, Maintenance Building

No other buildings or structures on the 118-acre property are listed in or considered eligible for the NRHP.

In 2015, after discovering that Arecibo Observatory was inaccurately listed on the NRHP as being owned by Cornell University, NSF contacted the National Park Service and requested that Arecibo Observatory be delisted and then re-listed with NSF as the owner. That request was granted and Arecibo was both removed and then re-listed on December 22, 2015, reflecting the corrected ownership information.

Project Description

NSF's AST is the federal steward for ground-based astronomy in the United States, funding research with awards to individual investigators and small research groups, and via cooperative agreements for operation of large telescope facilities. These national and international telescope facilities provide world-leading, one-of-a-kind observational capabilities on a competitive basis to thousands of astronomers per year. These facilities also enable scientific advances by making archived data products available to researchers. Along with funding telescope facilities and research awards, AST supports the development of advanced technologies and instrumentation and manages the allocation and assignment of specific frequencies in the radio spectrum for scientific use by the entire NSF community. The need for NSF to reduce its participation in Arecibo Observatory has been established through a number of reviews and surveys conducted by the science community. At present, Arecibo Observatory serves a variety of scientific user communities in astronomy, aeronomy, and planetary science, and is funded for all three activities as well as an active education and public outreach program. The science community evaluations, however, indicated that the science capability of Arecibo Observatory presents a lower priority than other science capabilities that NSF funds. In a funding-constrained environment, NSF needs to maintain a balanced research portfolio with the largest science return for the taxpayer dollar. Therefore, the purpose of the proposed action is for NSF to evaluate changes in operations and to substantially reduce its contribution to the funding of Arecibo Observatory. The proposed alternatives are designed to address this purpose and need.

Between 2014 and 2016, a Divestment Options Study for the Arecibo Observatory was prepared by CH2M under contract with NSF. The purpose of the study was to provide NSF with an overall condition assessment of structures and to evaluate divestment options for the facilities at Arecibo. Appendix A of the study included the Facilities Descriptions and Condition Assessments for each facility at Arecibo, as well as photographs. For reference, a hard copy of Appendix A was provided to your office on June 6, 2016. Because of this previous submittal, no additional current photographs are included with this letter.

Preliminary alternatives (four proposed action alternatives and a no action alternative) were developed based on the feasibility study and the response from the scientific community. Those preliminary alternatives were then developed into preliminary proposed alternatives that were presented to the public for comment during the public scoping period (as described below). The preliminary proposed alternatives are described below:

- **No Action Alternative – Continued NSF Investment for Science-focused Operations:** Under the No Action Alternative, NSF would not divest Arecibo Observatory and NSF would continue funding to operate it. Operations would be contingent on funding appropriations.
- **Alternative 1 – Collaboration with Interested Parties for Continued Science-focused Operations:** Alternative 1 would include continued science-focused operations by a collaboration of interested parties. Existing buildings that would no longer be of use would either be deconstructed or mothballed.
- **Alternative 2 – Collaboration with Interested Parties for Transition to Education-focused Operations:** Alternative 2 would transition the site to education-focused operations. The visitor center, learning center, and 12-meter telescope would remain operational. The 350-meter telescope would be made inoperable, but retained for

visual/historical interest. It would be secured and regularly maintained to prevent structural degradation. Existing buildings that would no longer be of use would either be deconstructed or mothballed.

- **Alternative 3 – Mothballing Facilities:** Alternative 3 would involve preservation of essential buildings, telescopes, and other equipment with periodic maintenance to keep them in working order. This would allow the facility to be reopened at a future date. Structures and facilities that would no longer be of use would be reconstructed. Gates and fencing would be evaluated to determine if upgrades are needed to provide appropriate security/access around portions of the site that would require protection.

- **Alternative 4 – Deconstruction and Site Restoration:** Alternative 4 would include deconstruction of most of the structures at Arecibo Observatory. The large concrete towers, anchors, and rim wall would not be deconstructed, but would remain in a manner that would not present a safety hazard to others. The remainder of the above-grade structures, including gates and fencing, would be removed and deconstructed. Below-grade foundations would be stabilized and filled.

These preliminary proposed alternatives may be further refined during the early phases of the compliance review and will be informed by the public process.

Public Involvement

Public scoping on the preliminary proposed alternatives and issues of concern was initiated on May 24, 2016 with publication of a Notice of Intent in the *Federal Register*. Public meetings were conducted on June 7, 2016 in San Juan and Arecibo, Puerto Rico. During the scoping meetings on June 7, 2016, NSF requested contact information for those individuals and organizations interested in participating as Section 106 consulting parties. NSF contacted those individuals and organizations to provide further details about the Section 106 consultation process and to confirm their consulting party status for this proposed action. Five individuals and organizations confirmed their participation as consulting parties:

- Tony Van Eyken (Arecibo Observatory)
- Dr. Brett Isham (Interamerican University-Bayamon)
- Xavier Siemens (NANOGRAV)
- Dr. Nicholas White (USRA)
- Qihou Zhou (Miami University)
- Luisa Zambrano-Marin (Arecibo Observatory)

NSF anticipates holding further NEPA public meetings during the Fall of 2016, following the release of the Draft EIS. Section 106 consultation needs will be addressed during the Draft EIS meetings, or during separate consulting party meetings following the Draft EIS meetings. Follow-up meetings with consulting parties will occur as needed to complete Section 106 consultation requirements.

Initiation of Section 106 Consultation

As part of the Section 106 process for the proposed changes to Arecibo Observatory operations, CH2M will conduct a site visit to Arecibo Observatory on July 19 and 20, 2016. The purpose of this survey is to verify the current conditions of existing known historic properties located at

Arecibo Observatory. A Secretary of the Interior-qualified architectural historian will conduct a reconnaissance-level field survey to update cultural resources information for the project site. The survey will include a general site assessment and informal interviews with the NSF staff and partners to obtain information regarding alterations to those buildings that contribute to the historic district. CH2M's investigations will only include the nine known properties that contribute to the NRHP-listed historic district to verify that no significant alterations have occurred to the buildings and structures since the district was listed in 2008. The nine resources that contribute to the NRHP-listed historic district were listed earlier in this letter. NSF would like to invite your office to participate in the field investigations on July 19 and 20, 2016, if you are interested and available. If your office is interested in attending the cultural resources field investigations at Arecibo, please contact Ms. Elizabeth Pentecost by phone at 703-292-4907, by email at epenteco@nsf.gov or by US Postal Service to NSF, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Blvd., Arlington, Virginia 22230 as soon as possible so we can coordinate the visit.

As described earlier, Arecibo Observatory is a federally-owned property that is listed in the NRHP; therefore, the proposed action has the potential to affect NRHP-listed historic properties. In compliance with 36 C.F.R. 800.3(c), NSF is initiating consultation with your office on the proposed changes to Arecibo Observatory operations and transmitting the required Section 106 Delivery Control Form (attached as Enclosure 1). If you have any questions, please do not hesitate to contact me by phone at 703-292-4592 or by email at cblanco@nsf.gov. We look forward to further consultation on this proposed action.

Sincerely,



Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel

Cc: Berenice R. Sueiro Vázquez, Gerente de Conservación Histórica, Puerto Rico SHPO
E. Pentecost, NSF
K. Zender, Ch2M

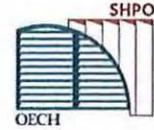
Enclosures:

1. Section 106 Delivery Control Form
2. Maps: USGS Topo and Site Plan



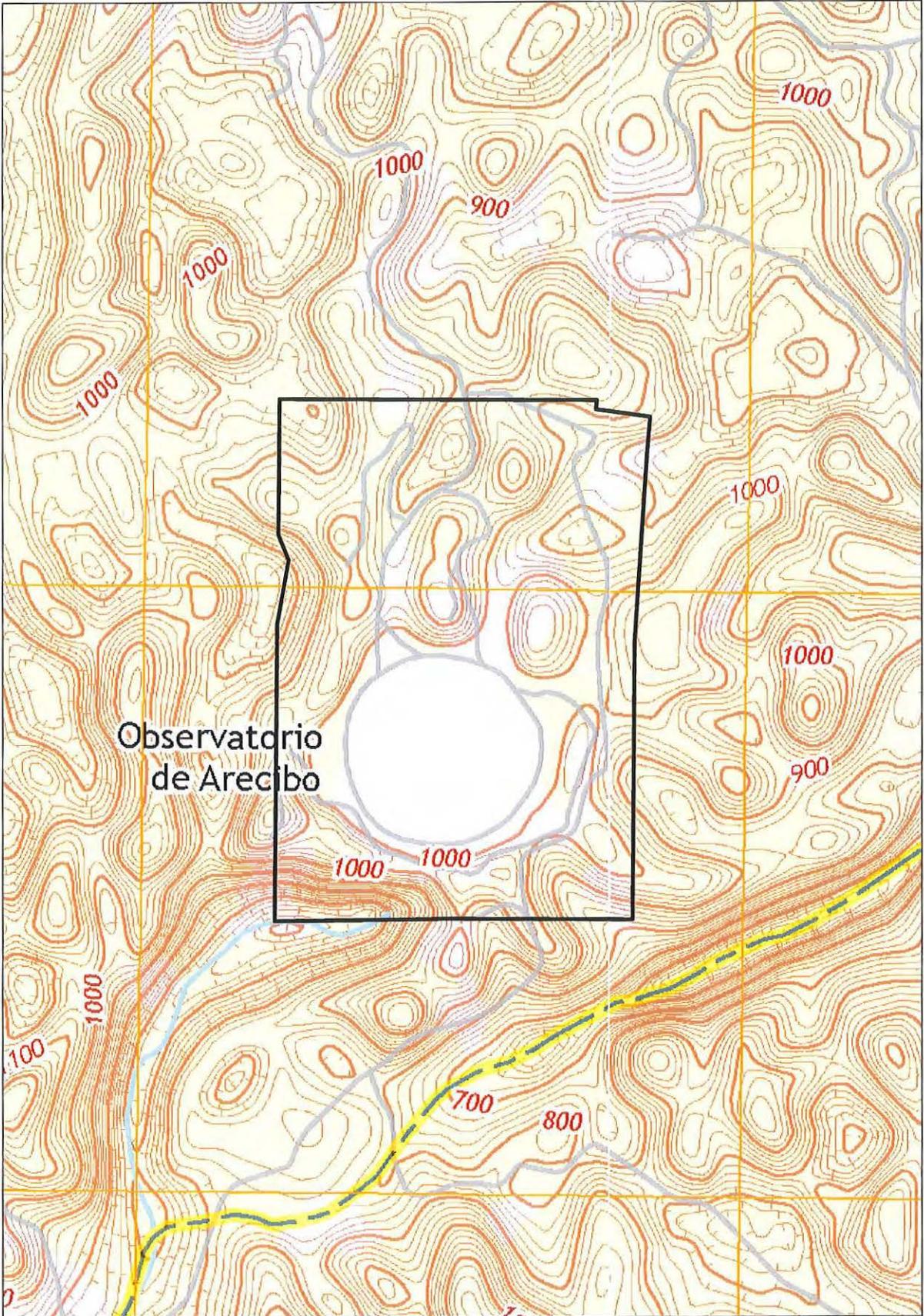
**Formulario para el control de entrega.
Proyectos de sección 106**

(Delivery control form 106 Section)



Sección A. Información a ser llenada por el proponente* (Section A. Information to be filled by proponent)			
Nombre del Proyecto/ Project's name		Número de referencia federal/ Reference federal number	
Proposed Changes to Arecibo Observatory Operations		Not Applicable	
Municipio/ Municipality	Barrio/ Ward	Nombre del Proponente/ Proponent's name	
Arecibo	Esperanza	National Science Foundation	
Agencia Federal/ Federal Agency		Total de fondos federales solicitados/ Total of federal funds to be requested	Total de acres/ Total amount of acres
National Science Foundation		Not Applicable	118 acres
Nombre de la persona que entrega/ Name of person who delivers		Firma/Signature	
Caroline M. Blanco National Science Foundation		<i>Caroline M. Blanco</i>	
Sección B. Información a ser llenada por la OECH al momento de la entrega del proyecto (Section B. Information to be filled by SHPO upon delivery)			
Fecha de entrega en la OECH/ SHPO delivery date		Nombre y firma de la persona que recibe/ Name and signature of person who received	

* Para poder cumplir su labor ministerial la OECH requiere que la Sección A de este formulario sea completada en su totalidad. Por tal razón, no se aceptarán proyectos que incumplan este requerimiento.
(To carry out our duties, the SHPO requires that Section A of this form be totally filled-out. For this reason, we will not accept an incomplete form.)



Observatorio
de Arecibo

 Property Boundary and Historic District Boundary

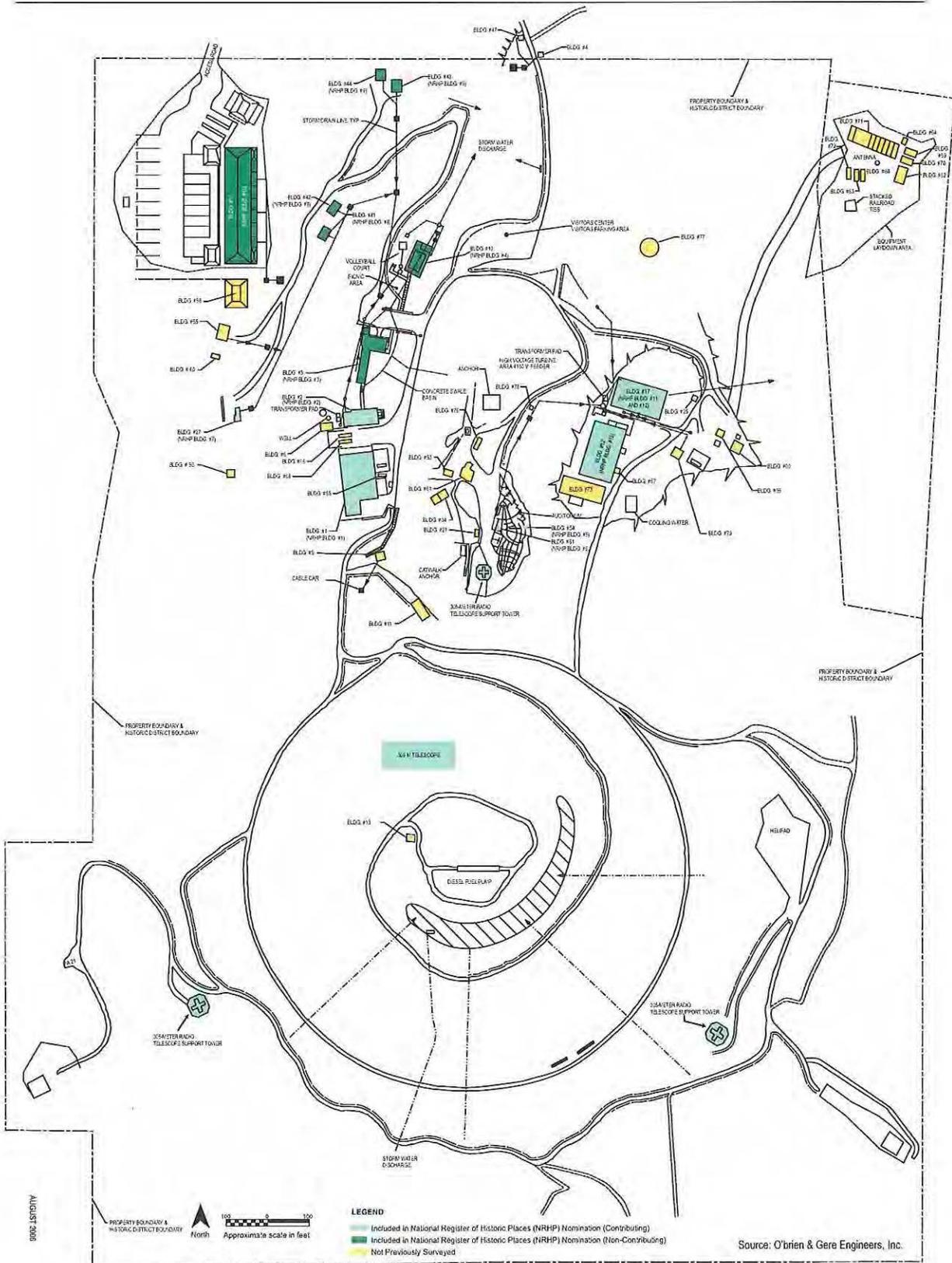


1 inch = 500 feet

Project Location
Arecibo Observatory
Puerto Rico

USGS Topographic Quads Bayaney NE (2013) and
Utado NW (2013)

ch2m



BUILDING NO.	DESCRIPTION	CONSTRUCTION DATE
1.	OPERATIONS BUILDING	(Constructed 1963)
2.	ADMINISTRATION BUILDING	(Constructed 1963)
3.	VISITING SCIENTIST QUARTERS AND CAFETERIA	(Constructed 1963)
4.	ENTRANCE GUARD HOUSE	(Constructed 1963)
5.	CABLE CAR HOUSE	(Constructed 1963)
6.	PUMP HOUSE/WATER TREATMENT BLDG.	(Constructed 1963)
10.	SWIMMING POOL/RESTROOMS	(Constructed Mid 1960's)
11.	LEWIS BUILDING-RIGGING LOFT	(Constructed Mid 1960's)
12.	MAINTENANCE SHOPS	(Constructed 1967)
13.	BOWL SHACK	(Constructed 1960's)
17.	WAREHOUSE	(Constructed 1967)
25.	PAINT STORAGE BUILDING	(Constructed 1967)
27.	OPTICAL LABS	(Constructed 1965/1997)
34.	HIGH VOLTAGE POWER SUPPLY BLDG.	(Constructed 1973)
35.	CUMMINGS GENERATOR CONTROL BLDG.	(Constructed 2000's)
41.	WEST HILL V.S.O. BACHELOR UNIT NO. 1	(Constructed date ?)
42.	WEST HILL V.S.O. BACHELOR UNIT NO. 2	(Constructed date ?)
43.	WEST HILL V.S.O. FAMILY UNIT NO. 1	(Constructed date ?)
44.	WEST HILL V.S.O. FAMILY UNIT NO. 2	(Constructed date ?)
47.	MAIN GATE RESTROOM	(Constructed 1963)
50.	INTERFERENCE MONITORING SHACK	(Constructed date ?)
51.	GREASE PIT	(Constructed date unknown)
53.	EMERGENCY GENERATOR BLDG.	(Constructed date ?)
54.	VISITOR CENTER BLDG.	(Constructed 1997)
55.	LIDAR LABORATORY BLDG.	(Constructed 1996)
57.	NORTH V.S.O. BLDG.	(Constructed 2002)
58.	NORTH V.S.O. UTILITY BLDG.	(Constructed 2000's)
59.	VISITOR CENTER TRAILER	(Constructed date ?)
60.	ANT. RECE. TESTING BLDG.	(Constructed late 1990's)
61.	LEARNING CENTER	(Constructed 2001)
62.	HFF STORAGE TRAILER	(Constructed date ?)
63.	IONOSPHERE TRAILER	(Constructed date ?)
64.	ELECTRONIC TRAILER	(Constructed date ?)
65.	SHIELDED TRAILER	(Constructed 1983)
66.	ATMOSPHERIC SCIENCE TRAILER	(Constructed date ?)
67.	CRYOGENICS LAB TRAILER	(Constructed 1967)
68.	SCIENTIFIC OFFICES TRAILER	(Constructed date ?)
69.	ELECTRONIC TRAILER (WAVEGUIDE)	(Constructed date ?)
70.	COMPUTER TRAILER	(Constructed date ?)
71.	ELECTRONIC CABLE TRAILER	(Constructed date ?)
72.	ELECTRONIC TRAILER (CRYOGENICS)	(Constructed date ?)
73.	H.F. TRANSMITTER BUILDING	(Constructed 2000's)
75.	INSPIRATION FOR SCIENCE TRAILER	(Constructed 2000's)
77.	PHASE REFERENCE ANTENNA (12M)	(Constructed 2010)
78.	COFFEE HUT	(Constructed 2000's)
79.	ENGINEERING OFFICE BUILDING	(Constructed 2000's)
80.	CUMMINGS DIESEL GENERATOR BUILDING	(Constructed 2000's)

Source: O'Brien & Gere Engineers, Inc.

Site Map
Arecibo Observatory
(National Astronomy and Ionosphere Center)
Arecibo, Puerto Rico



From: Pentecost, Elizabeth A. <epenteco@nsf.gov>
Sent: Tuesday, July 19, 2016 5:12 PM
To: jfowler@achp.gov
Cc: Blanco, Caroline M
Subject: NEPA Analysis for Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico [EXTERNAL]
Attachments: Arecibo - Initiation of Section 106 Letter 7.05.2016[1].pdf; RE: Initiation of Section 106 Consultation for Proposed Changes to Arecibo Observatory Operations

Dear Mr. Fowler:

In compliance with the National Environmental Policy Act of 1969 (NEPA), as amended, the National Science Foundation (NSF) intends to prepare an Environmental Impact Statement (EIS) to evaluate potential environmental effects of proposed changes to operations at the Arecibo Observatory, in Arecibo, Puerto Rico. The Notice of Intent for this EIS was published in the Federal Register on July 5, 2016 to initiate the public scoping for the EIS.

We have been in contact with Ms. Berenice Sueiro, the Puerto Rican State Historic Preservation Officer, and I attach our letter to her office for your information as well as a response from Ms. Sueiro.

If you have any questions or need further information, please do not hesitate to contact my office or the office of Ms. Caroline Blanco, Assistant General Council (cblanco@nsf.gov). We look forward to working with the ACHP on this very important activity.

Sincerely,

Elizabeth Pentecost

National Science Foundation
Division of Astronomical Sciences
Room 1045
4201 Wilson Boulevard
Arlington, VA 22230
Tel: 703-292-4907
Fax: 703-292-9034

Zender, Kira/ATL

From: Berenice Sueiro <bsueiro@prshpo.pr.gov>
Sent: Tuesday, July 12, 2016 12:05 PM
To: Pentecost, Elizabeth A.
Cc: Blanco, Caroline M; Zender, Kira/ATL; Nydia Prestamo; Juan Llanes
Subject: RE: Initiation of Section 106 Consultation for Proposed Changes to Arecibo Observatory Operations



Dear Ms. Pentecost:

Greetings,

We will like to know if you have an agenda for those two days . If available please submit. I will be out of the office. Mr. Juan Llanes, Historic Preservation Specialist, will evaluate scope of agenda. He will confirm attendance or not.

Best regards,

Berenice R Sueiro Vázquez
Gerente Conservación Histórica/Historic Preservation Manager
tel. 787-721-3737 ext. 2002
fax. 787-721-3773



From: Pentecost, Elizabeth A. [mailto:epenteco@nsf.gov]
Sent: Monday, July 11, 2016 1:30 PM
To: Berenice Sueiro
Cc: Blanco, Caroline M; Kira Zender
Subject: Initiation of Section 106 Consultation for Proposed Changes to Arecibo Observatory Operations

Dear Ms. Sueiro,

I am working with Caroline Blanco and Kristen Hamilton on the Arecibo Observatory environmental compliance issues and wanted to follow-up on the email Caroline sent you on July 5 concerning initiation of Section 106 consultation for the proposed changes to Arecibo Observatory operations. In the email, NSF extended an invitation to your office to attend the cultural resources field investigations at Arecibo on July 19 and 20.

We are inquiring now as to whether or not your office is interested in attending the field investigations so that we can coordinate the visit with the CH2M team. We would greatly appreciate it if you or a member of your staff could let me know by Thursday, July 14 whether or not you would be available to attend the field investigations.

We look forward to further consultation with the State Historic Preservation Office on this proposed action.

Sincerely,

Elizabeth Pentecost

National Science Foundation
Division of Astronomical Sciences
Room 1045
4201 Wilson Boulevard
Arlington, VA 22230
Tel: 703-292-4907
Fax: 703-292-9034

NATIONAL SCIENCE FOUNDATION

4201 Wilson Boulevard

Arlington, Virginia 22230



**OFFICE OF THE
GENERAL COUNSEL**

5 July 2016

Ms. Nydia Préstamo Torres
Deputy State Historic Preservation Officer
State Historic Preservation Office
Caurtel Ballaga, 3rd Floor
Norcagaray
San Juan, Puerto Rico 00901

RE: Section 106 Consultation for the Proposed Changes to Arecibo Observatory Operations,
Arecibo, Puerto Rico

Dear Ms. Torres:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences (MPS), Division of Astronomical Sciences (AST) has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. The Arecibo Observatory in Puerto Rico is one of the facilities identified for potential divestment. The decision regarding the potential changes to Arecibo Observatory operations is considered a federal undertaking; accordingly, by this letter, NSF is formally initiating Section 106 consultation under the National Historic Preservation Act (NHPA). While engaging in Section 106 consultation under the NHPA, NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential environmental impacts associated with the proposed changes to operations.

Project Location and Background

The Arecibo Observatory, which includes the world's largest single-dish radio telescope, is a national center for research in radio astronomy, planetary radar, and aeronomy (including optical facilities). The Observatory is located in west-central Puerto Rico on federal land and occupies 118 acres. The construction of Arecibo was funded in the early 1960s by the Department of Defense Advanced Research Projects Agency to perform radar back-scatter studies of the ionosphere. In 1969, the facility was transferred from the Department of Defense to NSF and was made a national research center, with operations by Cornell University. In 1971, the facility became known as the National Astronomy and Ionosphere Center.

A key component of the Arecibo Observatory research facility is a 305-meter diameter, fixed, spherical reflector. The telescope has undergone two major upgrades: in 1974, the reflector was resurfaced and a high frequency planetary radar transmitter was installed; and in 1997, major new equipment installations included new ground screen shields that block ground radiation, a Gregorian dome with sub-reflectors and new electronics, and a new radar transmitter. These

improvements greatly increased the capability of the telescope. Arecibo Observatory infrastructure includes instrumentation for radio and radar astronomy and ionosphere physics, office and laboratory buildings, a heavily used visitor and education facility, and lodging facilities for visiting scientists.

In September 2011, Cornell University's cooperative agreement with NSF expired, and following a competition, a new cooperative agreement was awarded to SRI International, with sub-awards to Universities Space Research Association (USRA) and the Universidad Metropolitana (UMET). The cooperative agreement has a term of 5 years, ending in September 2016; both parties are currently discussing extending this through March 31, 2018.

In 2008, the Arecibo Observatory was listed in the National Register of Historic Places (NRHP) as the National Astronomy and Ionosphere Center historic district. It was determined to be significant under NRHP Criteria A (associated with events that have made a significant contribution to the broad patterns of our history) and C (embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master). A total of 13 buildings and structures were included in the 2008 NRHP nomination. Through correspondence with Berenice Sueiro at the Puerto Rico SHPO office, it was confirmed that five of those buildings are considered non-contributing, including:

- Building #3, Visiting Scientist Quarters and Cafeteria
- Building #4, Recreation Area
- Building #8, West Hill Visiting Scientist Quarters Bachelor Units
- Building #9, West Hill Visiting Scientist Quarters Family Units
- Building #10, North Visiting Scientist Quarters Units

Therefore, there are eight buildings and one structure that are considered to contribute to the NRHP-listed historic district:

- 305-Meter Radio Telescope and Support Towers;
- Building #1, Operations Building
- Building #2, Administration Building
- Building #5, Visitor Center
- Building #6, Learning Center
- Building #7, Photometry Shack and Optical Lab
- Buildings #11 and #12, Warehouse and Business/Purchasing
- Building #13, Maintenance Building

No other buildings or structures on the 118-acre property are listed in or considered eligible for the NRHP.

In 2015, after discovering that Arecibo Observatory was inaccurately listed on the NRHP as being owned by Cornell University, NSF contacted the National Park Service and requested that Arecibo Observatory be delisted and then re-listed with NSF as the owner. That request was granted and Arecibo was both removed and then re-listed on December 22, 2015, reflecting the corrected ownership information.

Project Description

NSF's AST is the federal steward for ground-based astronomy in the United States, funding research with awards to individual investigators and small research groups, and via cooperative agreements for operation of large telescope facilities. These national and international telescope facilities provide world-leading, one-of-a-kind observational capabilities on a competitive basis to thousands of astronomers per year. These facilities also enable scientific advances by making archived data products available to researchers. Along with funding telescope facilities and research awards, AST supports the development of advanced technologies and instrumentation and manages the allocation and assignment of specific frequencies in the radio spectrum for scientific use by the entire NSF community. The need for NSF to reduce its participation in Arecibo Observatory has been established through a number of reviews and surveys conducted by the science community. At present, Arecibo Observatory serves a variety of scientific user communities in astronomy, aeronomy, and planetary science, and is funded for all three activities as well as an active education and public outreach program. The science community evaluations, however, indicated that the science capability of Arecibo Observatory presents a lower priority than other science capabilities that NSF funds. In a funding-constrained environment, NSF needs to maintain a balanced research portfolio with the largest science return for the taxpayer dollar. Therefore, the purpose of the proposed action is for NSF to evaluate changes in operations and to substantially reduce its contribution to the funding of Arecibo Observatory. The proposed alternatives are designed to address this purpose and need.

Between 2014 and 2016, a Divestment Options Study for the Arecibo Observatory was prepared by CH2M under contract with NSF. The purpose of the study was to provide NSF with an overall condition assessment of structures and to evaluate divestment options for the facilities at Arecibo. Appendix A of the study included the Facilities Descriptions and Condition Assessments for each facility at Arecibo, as well as photographs. For reference, a hard copy of Appendix A was provided to your office on June 6, 2016. Because of this previous submittal, no additional current photographs are included with this letter.

Preliminary alternatives (four proposed action alternatives and a no action alternative) were developed based on the feasibility study and the response from the scientific community. Those preliminary alternatives were then developed into preliminary proposed alternatives that were presented to the public for comment during the public scoping period (as described below). The preliminary proposed alternatives are described below:

- **No Action Alternative – Continued NSF Investment for Science-focused Operations:** Under the No Action Alternative, NSF would not divest Arecibo Observatory and NSF would continue funding to operate it. Operations would be contingent on funding appropriations.
- **Alternative 1 – Collaboration with Interested Parties for Continued Science-focused Operations:** Alternative 1 would include continued science-focused operations by a collaboration of interested parties. Existing buildings that would no longer be of use would either be deconstructed or mothballed.
- **Alternative 2 – Collaboration with Interested Parties for Transition to Education-focused Operations:** Alternative 2 would transition the site to education-focused operations. The visitor center, learning center, and 12-meter telescope would remain operational. The 350-meter telescope would be made inoperable, but retained for

visual/historical interest. It would be secured and regularly maintained to prevent structural degradation. Existing buildings that would no longer be of use would either be deconstructed or mothballed.

- **Alternative 3 – Mothballing Facilities:** Alternative 3 would involve preservation of essential buildings, telescopes, and other equipment with periodic maintenance to keep them in working order. This would allow the facility to be reopened at a future date. Structures and facilities that would no longer be of use would be reconstructed. Gates and fencing would be evaluated to determine if upgrades are needed to provide appropriate security/access around portions of the site that would require protection.

- **Alternative 4 – Deconstruction and Site Restoration:** Alternative 4 would include deconstruction of most of the structures at Arecibo Observatory. The large concrete towers, anchors, and rim wall would not be deconstructed, but would remain in a manner that would not present a safety hazard to others. The remainder of the above-grade structures, including gates and fencing, would be removed and deconstructed. Below-grade foundations would be stabilized and filled.

These preliminary proposed alternatives may be further refined during the early phases of the compliance review and will be informed by the public process.

Public Involvement

Public scoping on the preliminary proposed alternatives and issues of concern was initiated on May 24, 2016 with publication of a Notice of Intent in the *Federal Register*. Public meetings were conducted on June 7, 2016 in San Juan and Arecibo, Puerto Rico. During the scoping meetings on June 7, 2016, NSF requested contact information for those individuals and organizations interested in participating as Section 106 consulting parties. NSF contacted those individuals and organizations to provide further details about the Section 106 consultation process and to confirm their consulting party status for this proposed action. Five individuals and organizations confirmed their participation as consulting parties:

- Tony Van Eyken (Arecibo Observatory)
- Dr. Brett Isham (Interamerican University-Bayamon)
- Xavier Siemens (NANOGRAV)
- Dr. Nicholas White (USRA)
- Qihou Zhou (Miami University)
- Luisa Zambrano-Marin (Arecibo Observatory)

NSF anticipates holding further NEPA public meetings during the Fall of 2016, following the release of the Draft EIS. Section 106 consultation needs will be addressed during the Draft EIS meetings, or during separate consulting party meetings following the Draft EIS meetings. Follow-up meetings with consulting parties will occur as needed to complete Section 106 consultation requirements.

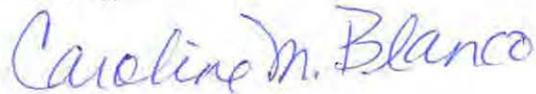
Initiation of Section 106 Consultation

As part of the Section 106 process for the proposed changes to Arecibo Observatory operations, CH2M will conduct a site visit to Arecibo Observatory on July 19 and 20, 2016. The purpose of this survey is to verify the current conditions of existing known historic properties located at

Arecibo Observatory. A Secretary of the Interior-qualified architectural historian will conduct a reconnaissance-level field survey to update cultural resources information for the project site. The survey will include a general site assessment and informal interviews with the NSF staff and partners to obtain information regarding alterations to those buildings that contribute to the historic district. CH2M's investigations will only include the nine known properties that contribute to the NRHP-listed historic district to verify that no significant alterations have occurred to the buildings and structures since the district was listed in 2008. The nine resources that contribute to the NRHP-listed historic district were listed earlier in this letter. NSF would like to invite your office to participate in the field investigations on July 19 and 20, 2016, if you are interested and available. If your office is interested in attending the cultural resources field investigations at Arecibo, please contact Ms. Elizabeth Pentecost by phone at 703-292-4907, by email at epenteco@nsf.gov or by US Postal Service to NSF, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Blvd., Arlington, Virginia 22230 as soon as possible so we can coordinate the visit.

As described earlier, Arecibo Observatory is a federally-owned property that is listed in the NRHP; therefore, the proposed action has the potential to affect NRHP-listed historic properties. In compliance with 36 C.F.R. 800.3(c), NSF is initiating consultation with your office on the proposed changes to Arecibo Observatory operations and transmitting the required Section 106 Delivery Control Form (attached as Enclosure 1). If you have any questions, please do not hesitate to contact me by phone at 703-292-4592 or by email at cblanco@nsf.gov. We look forward to further consultation on this proposed action.

Sincerely,



Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel

Cc: Berenice R. Sueiro Vázquez, Gerente de Conservación Histórica, Puerto Rico SHPO
E. Pentecost, NSF
K. Zender, Ch2M

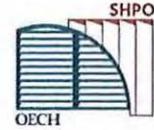
Enclosures:

1. Section 106 Delivery Control Form
2. Maps: USGS Topo and Site Plan



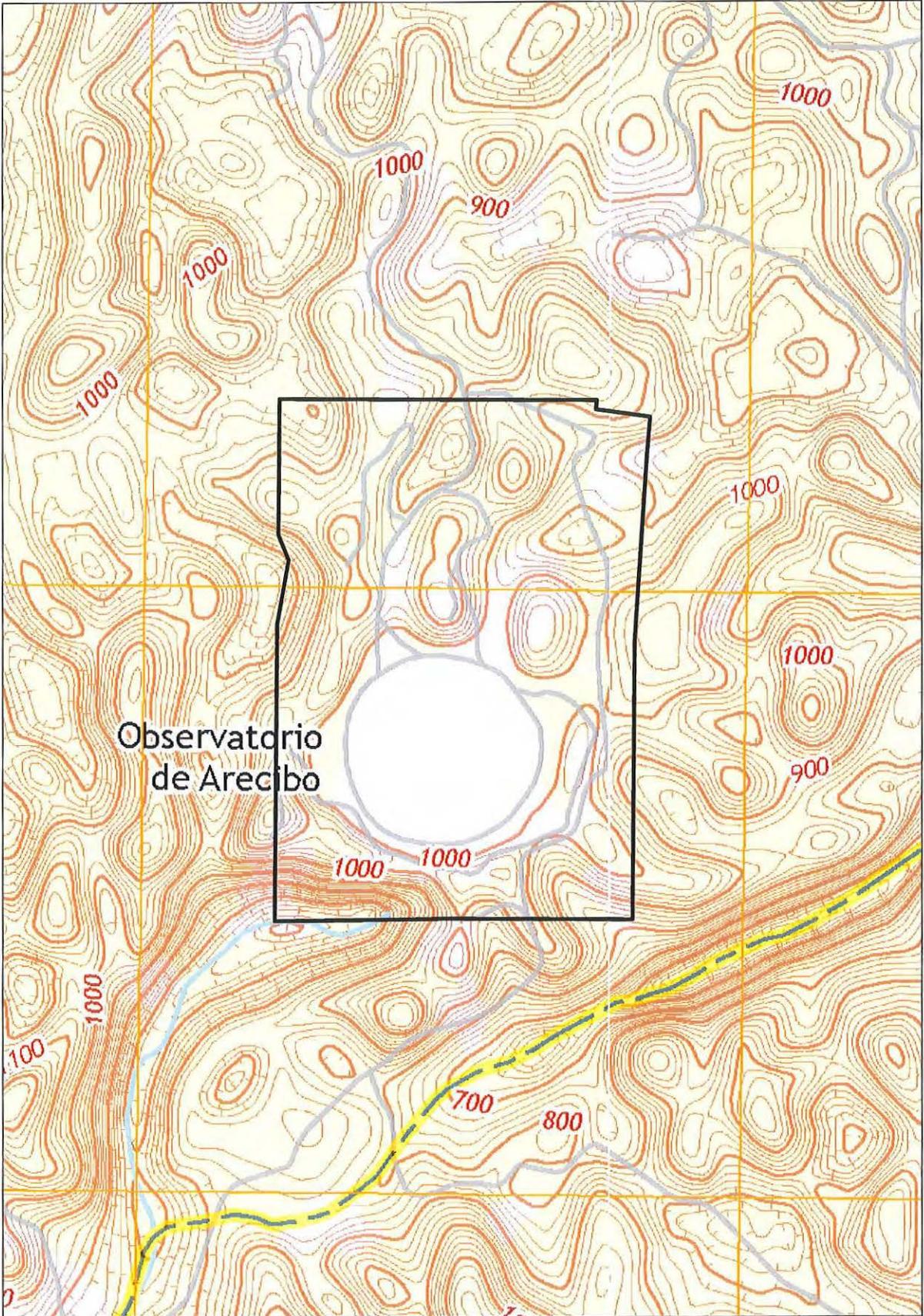
**Formulario para el control de entrega.
Proyectos de sección 106**

(Delivery control form 106 Section)



Sección A. Información a ser llenada por el proponente* (Section A. Information to be filled by proponent)			
Nombre del Proyecto/ Project's name		Número de referencia federal/ Reference federal number	
Proposed Changes to Arecibo Observatory Operations		Not Applicable	
Municipio/ Municipality	Barrio/ Ward	Nombre del Proponente/ Proponent's name	
Arecibo	Esperanza	National Science Foundation	
Agencia Federal/ Federal Agency		Total de fondos federales solicitados/ Total of federal funds to be requested	Total de acres/ Total amount of acres
National Science Foundation		Not Applicable	118 acres
Nombre de la persona que entrega/ Name of person who delivers		Firma/Signature	
Caroline M. Blanco National Science Foundation		<i>Caroline M. Blanco</i>	
Sección B. Información a ser llenada por la OECH al momento de la entrega del proyecto (Section B. Information to be filled by SHPO upon delivery)			
Fecha de entrega en la OECH/ SHPO delivery date		Nombre y firma de la persona que recibe/ Name and signature of person who received	

* Para poder cumplir su labor ministerial la OECH requiere que la Sección A de este formulario sea completada en su totalidad. Por tal razón, no se aceptarán proyectos que incumplan este requerimiento.
(To carry out our duties, the SHPO requires that Section A of this form be totally filled-out. For this reason, we will not accept an incomplete form.)



Observatorio
de Arecibo

 Property Boundary and Historic District Boundary

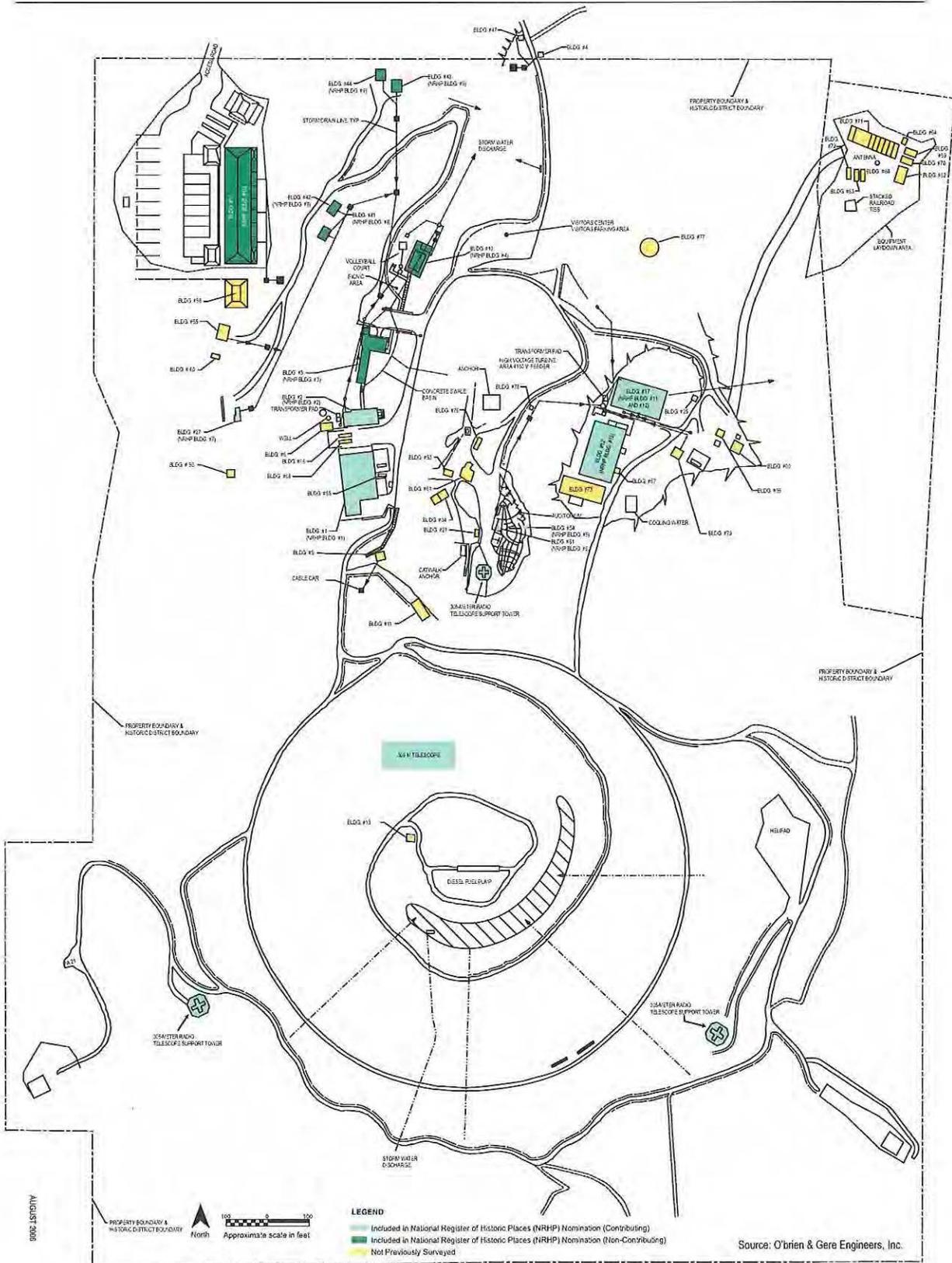


1 inch = 500 feet

Project Location
Arecibo Observatory
Puerto Rico

USGS Topographic Quads Bayaney NE (2013) and
Utado NW (2013)

ch2m



Source: O'Brien & Gere Engineers, Inc.

BUILDING NO. DESCRIPTION

- | | | | |
|---|---|--|---|
| 1. OPERATIONS BUILDING (Constructed 1963) | 34. HIGH VOLTAGE POWER SUPPLY BLDG. (Constructed 1973) | 59. VISITOR CENTER TRAILER (Constructed date ?) | 76. INSPIRATION FOR SCIENCE TRAILER (Constructed 2000's) |
| 2. ADMINISTRATION BUILDING (Constructed 1963) | 35. CUMMINGS GENERATOR CONTROL BLDG. (Constructed 2001's) | 60. ANT. RECE. TESTING BLDG. (Constructed late 1990's) | 77. PHASE REFERENCE ANTENNA (12M) (Constructed 2010) |
| 3. VISITING SCIENTIST QUARTERS AND CAFETERIA (Constructed 1963) | 41. WEST HILL V.S.O. BACHELOR UNIT NO. 1 (Constructed date ?) | 61. LEARNING CENTER (Constructed 2001) | 78. COFFEE HUT (Constructed 2000's) |
| 4. ENTRANCE GUARD HOUSE (Constructed 1963) | 42. WEST HILL V.S.O. BACHELOR UNIT NO. 2 (Constructed date ?) | 62. HFF STORAGE TRAILER (Constructed date ?) | 79. ENGINEERING OFFICE BUILDING (Constructed 2000's) |
| 5. CABLE CAR HOUSE (Constructed 1963) | 43. WEST HILL V.S.O. FAMILY UNIT NO. 1 (Constructed date ?) | 63. IONOSPHERE TRAILER (Constructed date ?) | 80. CUMMINGS DIESEL GENERATOR BUILDING (Constructed 2000's) |
| 6. PUMP HOUSE/WATER TREATMENT BLDG. (Constructed 1963) | 44. WEST HILL V.S.O. FAMILY UNIT NO. 2 (Constructed date ?) | 64. ELECTRONIC TRAILER (Constructed date ?) | |
| 10. SWIMMING POOL/RESTROOMS (Constructed Mid 1960's) | 47. MAIN GATE RESTROOM (Constructed 1963) | 65. SHIELDED TRAILER (Constructed 1983) | |
| 11. LEWIS BUILDING-RIGGING LOFT (Constructed Mid 1960's) | 50. INTERFERENCE MONITORING SHACK (Constructed date ?) | 66. ATMOSPHERIC SCIENCE TRAILER (Constructed date ?) | |
| 12. MAINTENANCE SHOPS (Constructed 1967) | 51. GREASE PIT (Constructed date unknown) | 67. CRYOGENICS LAB TRAILER (Constructed 1967) | |
| 13. BOWL SHACK (Constructed 1960's) | 53. EMERGENCY GENERATOR BLDG. (Constructed date ?) | 68. SCIENTIFIC OFFICES TRAILER (Constructed date ?) | |
| 17. WAREHOUSE (Constructed 1967) | 54. VISITOR CENTER BLDG. (Constructed 1997) | 69. ELECTRONIC TRAILER (WAVEGUIDE) (Constructed date ?) | |
| 21. ANTENNA TESTING RANGE (Constructed date ?) | 55. LIDAR LABORATORY BLDG. (Constructed 1996) | 70. COMPUTER TRAILER (Constructed date ?) | |
| 25. PAINT STORAGE BUILDING (Constructed 1967) | 57. NORTH V.S.O. BLDG. (Constructed 2002) | 71. ELECTRONIC CABLE TRAILER (Constructed date ?) | |
| 27. OPTICAL LABS (Constructed 1965/1997) | 58. NORTH V.S.O. UTILITY BLDG. | 72. ELECTRONIC TRAILER (CRYOGENICS) (Constructed date ?) | |
| | | 73. HF TRANSMITTER BUILDING (Constructed 2000's) | |

Site Map
 Arecibo Observatory
 (National Astronomy and Ionosphere Center)
 Arecibo, Puerto Rico





ESTADO LIBRE ASOCIADO DE
PUERTO RICO

Oficina Estatal de Conservación Histórica
State Historic Preservation Office

August 8, 2016

Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel
National Science Foundation
4201 Wilson Boulevard
Arlington, Virginia 22230

SHPO: 06-06-16-03. Section 106 Consultation for the Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico.

Dear Ms. Blanco:

Our Office has received and reviewed the above referenced project in accordance with 54 USC 306108 (commonly known as Section 106 of the *National Historic Preservation Act*, and 36 CFR Part 800: *Protection of Historic Properties*. The State Historic Preservation Officer (SHPO) is to advise and assist federal agencies and other responsible entities when identifying historic properties, assessing effects upon them, and considering alternatives to avoid or reduce the project's effects.

As we understand, the National Science Foundation, in order to retain its economic capabilities, has come to the conclusion that it needs to divest itself from some of its properties. The Arecibo Observatory has been identified as one of those properties for potential divestment. Five proposed preliminary alternatives have been developed, out of which four could have an effect upon the property's performance ability.

However, no conclusive course of action has been determined at this time. As such, the Puerto Rico State Preservation Office kindly requests to be keep abreast upon any determination regarding this significant property in order to asses and resolve project effects.

Cuartel de Ballajá (Tercer Piso),
Calle Norzagaray, Esquina Beneficencia, Viejo San Juan, P.R. 00901

PO Box 9023935, San Juan, P.R. 00902-3935
Tel: 787-721-3737 Fax: 787-721-3773
www.oech.gobierno.pr



SHPO
OFICINA ESTATAL DE
CONSERVACIÓN HISTÓRICA
OFICINA DEL GOBERNADOR
**STATE HISTORIC
PRESERVATION OFFICE**
OFFICE OF THE GOVERNOR

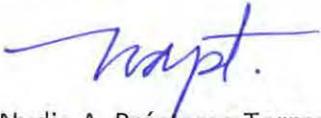
OECH

Caroline M. Blanco
August 8, 2016
Page 2

SHPO: 06-06-16-03 **Section 106 Consultation for the Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico.**

If you have any questions regarding this matter, please do not hesitate to contact Arch. Berenice R. Sueiro, Historic Preservation Manager.

Sincerely,



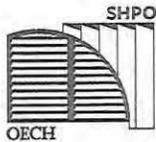
Nydia A. Préstamo Torres, M. Arch
Acting State Historic Preservation Officer

NAPT/BRS/jvr



ESTADO LIBRE ASOCIADO DE
PUERTO RICO

Oficina Estatal de Conservación Histórica
State Historic Preservation Office



SHPO
OFICINA ESTATAL DE
CONSERVACIÓN HISTÓRICA
OFICINA DEL GOBERNADOR
STATE HISTORIC
PRESERVATION OFFICE
OFFICE OF THE GOVERNOR

SAN JUAN, P.R. 00909



Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
National Science Foundation
4201 Wilson Boulevard
Arlington, Virginia 22230

1265





Berenice R Sueiro Vázquez, AIT
Gerente Conservación Histórica/ Historic Preservation Manager
OECH/SHPO
PO Box 9023935
San Juan, PR 00902-3935
T. (787) 721-3737 x 2002
F. (787) 721-3773

From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]
Sent: Thursday, September 15, 2016 5:40 PM
To: Berenice Sueiro <bsueiro@prshpo.pr.gov>
Cc: Lori.Price@CH2M.com; Kira.Zender@CH2M.com; Pentecost, Elizabeth A. <epenteco@nsf.gov>
Subject: Arecibo: Update and Consulting Parties List

Hi Berenice – Thank you so very much to both you and Juan for taking the time to talk with us today. We really appreciate the collaboration.

As promised, here are a couple of questions that we have for your office:

1. Our current proposed plan is to issue the Draft Environmental Impact Statement (DEIS) in late October. This will begin a 45 day public comment period on the DEIS. We plan to hold two public meetings on the DEIS, one during the evening in Arecibo (possibly on Wednesday evening, November 16th) and the other during the daytime on the following day (Thursday, November 17th) in San Juan. During both public meetings, we plan to mention the Section 106 process and invite attendees to join us at a Section 106 consultation meeting to be held after the San Juan public meeting on the DEIS (likely on the afternoon of Thursday, November 17th). The intent behind this proposed plan is to allow DEIS meeting attendees to learn more about the proposed action during the public meetings and determine whether they might wish to serve as consulting parties and participate in the Section 106 consultation meeting after the last public meeting on the DEIS. We also plan to announce the Section 106 consultation meeting in the Federal Register along with

the availability of the DEIS and in local newspapers. Stakeholders who are on our current list would also be notified of this schedule (once finalized). After we arrive in San Juan, but before our DEIS public meetings are held, we would like to meet with you in person to help plan for our Section 106 consultation meeting. Does this proposed plan sound acceptable to you?

2. As mentioned during our call today, we are nearly finished with a report on anticipated adverse effects associated with each of the proposed alternatives. That report will form the basis of our analysis of impacts on cultural resources in our DEIS, which is currently being drafted. We would be happy to share the report with you once it is finalized and would be very interested in knowing any comments you may have on it. Although we would likely not have enough time to address any comments that you may have on the report in the DEIS, we certainly would be able to address your comments during the 45 day public comment period on the DEIS. Your comments could also help inform our Section 106 consultation process. Would you find it helpful for us to send the final report to you?

Finally, we mentioned during our call that we now have six people who have indicated that they wish to serve as consulting parties in our Section 106 consultation process. They are as follows:

Current List of Section 106 Consulting Parties

Name	Organization
Tony Van Eyken	Arecibo Observatory
Brett Isham	Interamerican University-Bayamon
Xavier Siemens	North American Nanohertz Observatory for Gravitational
Nicholas White	USRA
Qihou Zhou	Miami University
Luisa Fda Zambrano-Marin	Arecibo Observatory Space Academy

Thank you, again, for your continued assistance with our Section 106 consultation process. We look forward to learning your responses to our questions. If you have any follow-up questions or concerns, please do not hesitate to contact me.

With best wishes,

Caroline

Caroline M. Blanco

Assistant General Counsel

National Science Foundation

4201 Wilson Blvd., Suite 1265

Arlington, VA 22230

Tel.: 703.292.4592

Fax: 703.292.9041

Email: cblanco@nsf.gov

From: Berenice Sueiro <bsueiro@prshpo.pr.gov>

Date: Friday, September 16, 2016 at 10:42 AM

To: "Blanco, Caroline M" <cblanco@nsf.gov>

Cc: "Lori.Price@CH2M.com" <Lori.Price@CH2M.com>, "Kira.Zender@CH2M.com" <Kira.Zender@CH2M.com>, Elizabeth Pentecost <epenteco@nsf.gov>, Nydia Prestamo <nprestamo@prshpo.pr.gov>, Miguel Bonini <mbonini@prshpo.pr.gov>, Juan Llanes <jllanes@prshpo.pr.gov>

Subject: RE: Arcibo: Update and Consulting Parties List



Hi Caroline,

In response to your two questions:

1. We can meet with you the week of November 14th. Please advise on the date so we can schedule it in advance.
2. We can comment the *report on anticipated adverse effects associated with each of the of the proposed alternatives*, if we receive it with enough time to review it before you issue the DEIS.

Thanks for sending the preliminary list of the 106 consulting parties. We appreciate your effort in starting the consultation process early planning stages.

Best regards,



Berenice R Sueiro Vázquez, AIT
Gerente Conservación Histórica/ Historic Preservation Manager
OECH/SHPO
PO Box 9023935
San Juan, PR 00902-3935
T. (787) 721-3737 x 2002
F. (787) 721-3773

From: Blanco, Caroline M [mailto:cblanco@nsf.gov]
Sent: Thursday, October 06, 2016 7:10 PM
To: John Eddins
Cc: Pentecost, Elizabeth A.
Subject: FW: NEPA Analysis for Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico

Hi John – I hope this finds you well. I am following up on the email I sent to you in mid-July about NSF’s proposed changes to Arecibo Observatory operations in Puerto Rico. For many months, we have been in close contact with the Puerto Rico SHPO and have developed a positive working relationship with that office on this issue. We will be back out to meet with the SHPO next month and will hold a section 106 consultation meeting with the consulting parties a couple of days thereafter. One update since I last wrote to you is that NSF has identified a preferred alternative, which is to continue science-focused operations through a collaboration of interested parties; that alternative, along with 4 other action alternatives and a no-action alternative will be analyzed in a Draft EIS, which we plan to issue in early November.

Since we have not heard from the ACHP following the letter and email correspondence that we sent, NSF is assuming that the ACHP does not wish to participate in our section 106 process. If that assumption is incorrect, please let me know as soon as possible so that we can work together on this proposed action. Regardless of whether the ACHP wishes to participate in the section 106 process, NSF plans to provide the ACHP with notice of the issuance of the Draft EIS once it is released. Thank you in advance for consideration of my request to confirm the ACHP’s position on whether it wishes to be involved in NSF’s proposed action regarding Arecibo Observatory. If you have any questions or would like to discuss this request, please do not hesitate to contact me.

Have a wonderful Columbus Day weekend, and take care.

All the best,

Caroline

Caroline M. Blanco

Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: "Blanco, Caroline M" <cblanco@nsf.gov>

Date: Tuesday, July 19, 2016 at 5:23 PM

To: John Eddins <jeddins@achp.gov>

Cc: Elizabeth Pentecost <epenteco@nsf.gov>

Subject: FW: NEPA Analysis for Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico

Hi John – I hope all is well with you. I am writing to let you know that NSF has started a NEPA process for proposed changes to operations at the Arecibo Observatory in Puerto Rico. (Please also note that we have initiated a NEPA process for proposed changes to operations at Sacramento Peak Observatory in New Mexico, but I will send you information on that effort by separate email.)

Below please find an email sent by Elizabeth Pentecost of NSF's Astronomical Sciences Division to John Fowler. Attached, please find our letter to the Puerto Rico SHPO and related documentation. Also attached are the handouts that we provided at our public scoping meeting in early June. Please note that we have been in contact with the Puerto Rico SHPO for a couple of months and had an in-person meeting with the SHPO's office when we were out there on June 6th. It has been a very enjoyable and helpful experience to work with the folks in that office.

After reviewing the attached material, please let me know if you have any questions and whether the ACHP would like to be involved in the Section 106 process. In the meantime, take care and enjoy the balance of your summer.

With warm regards,

Caroline

cc: Elizabeth Pentecost

Caroline M. Blanco
Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: Elizabeth Pentecost <epenteco@nsf.gov>
Date: Tuesday, July 19, 2016 at 5:12 PM
To: "jfowler@achp.gov" <jfowler@achp.gov>
Cc: "Blanco, Caroline M" <cblanco@nsf.gov>
Subject: NEPA Analysis for Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico

Dear Mr. Fowler:

In compliance with the National Environmental Policy Act of 1969 (NEPA), as amended, the National Science Foundation (NSF) intends to prepare an Environmental Impact Statement (EIS) to evaluate potential environmental effects of proposed changes to operations at the Arecibo Observatory, in Arecibo, Puerto Rico. The Notice of Intent for this EIS was published in the Federal Register on July 5, 2016 to initiate the public scoping for the EIS.

We have been in contact with Ms. Berenice Sueiro, the Puerto Rican State Historic Preservation Officer, and I attach our letter to her office for your information as well as a response from Ms. Sueiro.

If you have any questions or need further information, please do not hesitate to contact my office or the office of Ms. Caroline Blanco, Assistant General Council (cblanco@nsf.gov). We look forward to working with the ACHP on this very important activity.

Sincerely,

Elizabeth Pentecost

National Science Foundation
Division of Astronomical Sciences
Room 1045
4201 Wilson Boulevard
Arlington, VA 22230
Tel: 703-292-4907
Fax: 703-292-9034

From: John Eddins <jeddins@achp.gov>
Sent: Friday, October 7, 2016 8:25 AM
To: Caroline Blanco
Cc: Pentecost, Elizabeth A.
Subject: RE: NEPA Analysis for Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico

Thanks for the update, Caroline.

I'll review the July email and the material you've provided and get back to you.

John

John T. Eddins

ACHP

202-517-0211

e106-online section 106 documentation submittal system

now available to all federal agencies

<http://www.achp.gov/work106.html>

From: Blanco, Caroline M [mailto:cblanco@nsf.gov]
Sent: Thursday, October 06, 2016 7:10 PM
To: John Eddins
Cc: Pentecost, Elizabeth A.
Subject: FW: NEPA Analysis for Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico

Hi John – I hope this finds you well. I am following up on the email I sent to you in mid-July about NSF's proposed changes to Arecibo Observatory operations in Puerto Rico. For many months, we have been in close contact with the Puerto Rico SHPO and have developed a positive working relationship with that office on this issue. We will be back out to meet with the SHPO next month and will hold a section 106 consultation meeting with the consulting parties a couple of days thereafter. One update since I last wrote to you is that NSF has identified a preferred alternative, which is to continue science-focused operations through a collaboration of interested parties; that alternative, along with 4 other action alternatives and a no-action alternative will be analyzed in a Draft EIS, which we plan to issue in early November.

Since we have not heard from the ACHP following the letter and email correspondence that we sent, NSF is assuming that the ACHP does not wish to participate in our section 106 process. If that assumption is incorrect, please let me know as soon as possible so that we can work together on this proposed action. Regardless of whether the ACHP wishes to participate in the section 106 process, NSF plans to provide the ACHP with notice of the issuance of the Draft EIS once it is released. Thank you in advance for consideration of my request to confirm the ACHP's position on whether it wishes to be involved in NSF's proposed action regarding Arecibo Observatory. If you have any questions or would like to discuss this request, please do not hesitate to contact me.

Have a wonderful Columbus Day weekend, and take care.

All the best,

Caroline

Caroline M. Blanco

Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: "Blanco, Caroline M" <cblanco@nsf.gov>

Date: Tuesday, July 19, 2016 at 5:23 PM

To: John Eddins <jeddins@achp.gov>

Cc: Elizabeth Pentecost <epenteco@nsf.gov>

Subject: FW: NEPA Analysis for Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico

Hi John – I hope all is well with you. I am writing to let you know that NSF has started a NEPA process for proposed changes to operations at the Arecibo Observatory in Puerto Rico. (Please also note that we have initiated a NEPA process for proposed changes to operations at Sacramento Peak Observatory in New Mexico, but I will send you information on that effort by separate email.)

Below please find an email sent by Elizabeth Pentecost of NSF's Astronomical Sciences Division to John Fowler. Attached, please find our letter to the Puerto Rico SHPO and related documentation. Also attached are the handouts that we provided at our public scoping meeting in early June. Please note that we have been in contact with the Puerto Rico SHPO for a couple of months and had an in-person meeting with the SHPO's office when we were out there on June 6th. It has been a very enjoyable and helpful experience to work with the folks in that office.

After reviewing the attached material, please let me know if you have any questions and whether the ACHP would like to be involved in the Section 106 process. In the meantime, take care and enjoy the balance of your summer.

With warm regards,

Caroline

cc: Elizabeth Pentecost

Caroline M. Blanco

Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: Elizabeth Pentecost <epenteco@nsf.gov>

Date: Tuesday, July 19, 2016 at 5:12 PM

To: "jfowler@achp.gov" <jfowler@achp.gov>

Cc: "Blanco, Caroline M" <cblanco@nsf.gov>

Subject: NEPA Analysis for Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico

Dear Mr. Fowler:

In compliance with the National Environmental Policy Act of 1969 (NEPA), as amended, the National Science Foundation (NSF) intends to prepare an Environmental Impact Statement (EIS) to evaluate potential environmental effects of proposed changes to operations at the Arecibo Observatory, in Arecibo, Puerto Rico. The Notice of Intent for this EIS was published in the Federal Register on July 5, 2016 to initiate the public scoping for the EIS.

We have been in contact with Ms. Berenice Sueiro, the Puerto Rican State Historic Preservation Officer, and I attach our letter to her office for your information as well as a response from Ms. Sueiro.

If you have any questions or need further information, please do not hesitate to contact my office or the office of Ms. Caroline Blanco, Assistant General Council (cblanco@nsf.gov). We look forward to working with the ACHP on this very important activity.

Sincerely,

Elizabeth Pentecost

National Science Foundation
Division of Astronomical Sciences
Room 1045
4201 Wilson Boulevard
Arlington, VA 22230
Tel: 703-292-4907
Fax: 703-292-9034

From: Blanco, Caroline M [mailto:cblanco@nsf.gov]

Sent: Wednesday, October 19, 2016 5:52 PM

To: Miguel Bonini <mbonini@prshpo.pr.gov>; Berenice Sueiro <bsueiro@prshpo.pr.gov>; Nydia Prestamo <nprestamo@prshpo.pr.gov>; Juan Llanes <jllanes@prshpo.pr.gov>

Cc: Price, Lori/TPA <Lori.Price@CH2M.com>; Zender, Kira/ATL <Kira.Zender@CH2M.com>; Pentecost, Elizabeth A. <epenteco@nsf.gov>

Subject: Arecibo: Cultural Resources Assessment and Proposed Meeting Date and Time [EXTERNAL]

Greetings! I hope that this finds you all well. I am writing to provide you with an update on our Draft EIS process and to convey our Cultural Resources Assessment document that we mentioned to you last month

All is proceeding well with regard to preparation of the Draft EIS and we should have it ready for release by the end of this month. Our public meetings will likely take place on November 16th (in Arecibo) and 17th (in San Juan), with a Section 106 consultation meeting to take place in San Juan from 1:00 p.m. to 2:30 p.m. on the 17th. If at all possible, we would very much like to meet with you on the afternoon of the 15th at your office. During that meeting, we hope to discuss the next steps in our process, including preparation for the consultation meeting on the 17th.

Attached please also find a copy of our Cultural Resources Assessment for your review and comment. If you have an opportunity to review the document before we visit with you in San Juan, perhaps we can schedule a telecon to discuss it.

Thank you for your continued involvement with our process. We look forward to working with you further and to seeing you next month! If you have any questions at all, please do not hesitate to contact me.

Warm wishes,

Caroline

P.s. Please note that a hard copy of the attached documents will also be sent to you via U.S. Mail.

Caroline M. Blanco

Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: Berenice Sueiro <bsueiro@prshpo.pr.gov>

Date: Friday, September 16, 2016 at 10:42 AM

To: "Blanco, Caroline M" <cblanco@nsf.gov>

Cc: "Lori.Price@CH2M.com" <Lori.Price@CH2M.com>, "Kira.Zender@CH2M.com" <Kira.Zender@CH2M.com>, Elizabeth Pentecost <epenteco@nsf.gov>, Nydia Prestamo <nprestamo@prshpo.pr.gov>, Miguel Bonini <mbonini@prshpo.pr.gov>, Juan Llanes <jllanes@prshpo.pr.gov>

Subject: RE: Arecibo: Update and Consulting Parties List



Hi Caroline,

In response to your two questions:

1. We can meet with you the week of November 14th. Please advise on the date so we can schedule it in advance.
2. We can comment the *report on anticipated adverse effects associated with each of the of the proposed alternatives*, if we receive it with enough time to review it before you issue the DEIS.

Thanks for sending the preliminary list of the 106 consulting parties. We appreciate your effort in starting the consultation process early planning stages.

Best regards,



Berenice R Sueiro Vázquez, AIT
Gerente Conservación Histórica/ Historic Preservation Manager
OECH/SHPO
PO Box 9023935
San Juan, PR 00902-3935
T. (787) 721-3737 x 2002
F. (787) 721-3773

From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]
Sent: Thursday, September 15, 2016 5:40 PM
To: Berenice Sueiro <bsueiro@prshpo.pr.gov>
Cc: Lori.Price@CH2M.com; Kira.Zender@CH2M.com; Pentecost, Elizabeth A. <epenteco@nsf.gov>
Subject: Arecibo: Update and Consulting Parties List

Hi Berenice – Thank you so very much to both you and Juan for taking the time to talk with us today. We really appreciate the collaboration.

As promised, here are a couple of questions that we have for your office:

1. Our current proposed plan is to issue the Draft Environmental Impact Statement (DEIS) in late October. This will begin a 45 day public comment period on the DEIS. We plan to hold two public meetings on the DEIS, one during the evening in Arecibo (possibly on Wednesday evening, November 16th) and the other during the daytime on the following day (Thursday, November 17th) in San Juan. During both public meetings, we plan to mention the Section 106 process and invite attendees to join us at a Section 106 consultation meeting to be held after the San Juan public meeting on the DEIS (likely on the afternoon of Thursday, November 17th). The intent behind this proposed plan is to allow DEIS meeting attendees to learn more about the proposed action during the public meetings and determine whether they might wish to serve as consulting parties and participate in the Section 106 consultation meeting after the last public meeting on the DEIS. We also plan to announce the Section 106 consultation meeting in the Federal Register along with

the availability of the DEIS and in local newspapers. Stakeholders who are on our current list would also be notified of this schedule (once finalized). After we arrive in San Juan, but before our DEIS public meetings are held, we would like to meet with you in person to help plan for our Section 106 consultation meeting. Does this proposed plan sound acceptable to you?

2. As mentioned during our call today, we are nearly finished with a report on anticipated adverse effects associated with each of the proposed alternatives. That report will form the basis of our analysis of impacts on cultural resources in our DEIS, which is currently being drafted. We would be happy to share the report with you once it is finalized and would be very interested in knowing any comments you may have on it. Although we would likely not have enough time to address any comments that you may have on the report in the DEIS, we certainly would be able to address your comments during the 45 day public comment period on the DEIS. Your comments could also help inform our Section 106 consultation process. Would you find it helpful for us to send the final report to you?

Finally, we mentioned during our call that we now have six people who have indicated that they wish to serve as consulting parties in our Section 106 consultation process. They are as follows:

Current List of Section 106 Consulting Parties

Name	Organization
Tony Van Eyken	Arecibo Observatory
Brett Isham	Interamerican University-Bayamon
Xavier Siemens	North American Nanohertz Observatory for Gravitational
Nicholas White	USRA
Qihou Zhou	Miami University
Luisa Fda Zambrano-Marin	Arecibo Observatory Space Academy

Thank you, again, for your continued assistance with our Section 106 consultation process. We look forward to learning your responses to our questions. If you have any follow-up questions or concerns, please do not hesitate to contact me.

With best wishes,

Caroline

Caroline M. Blanco

Assistant General Counsel

National Science Foundation

4201 Wilson Blvd., Suite 1265

Arlington, VA 22230

Tel.: 703.292.4592

Fax: 703.292.9041

Email: cblanco@nsf.gov

Subject: Section 106 Assessment of Effects for EIS For Arecibo Observatory
Date: Thursday, October 20, 2016 at 11:53:29 AM Eastern Daylight Time
From: Pentecost, Elizabeth A.
To: brettisham@gmail.com
CC: Hamilton, Kristen, Blanco, Caroline M, Kira Zender, Pentecost, Elizabeth A.
Attachments: Arecibo - Cultural Resources Assessment of Effects_Tech Report_10192016.pdf

Information is being sent by email only. If you would like a hard copy letter/report please let us know.

October 20, 2016

RE: Section 106 Assessment of Effects for the Proposed Changes to Arecibo Observatory Operations,
Arecibo, Puerto Rico

Dear Dr. Isham:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. The Arecibo Observatory in Puerto Rico is one of the facilities identified for potential deconstruction. The decision regarding the potential changes to the Arecibo Observatory in Puerto Rico is considered a federal undertaking and triggers compliance with Section 106 of the National Historic Preservation Act (NHPA). NSF formally initiated Section 106 consultation with the Puerto Rico State Historic Preservation Office (SHPO) on July 5, 2016. You have requested consulting party status for the proposed undertaking as part of the Section 106 process. With this letter, NSF is transmitting the *Proposed Changes to Arecibo Observatory Operations: Historic Properties Assessment of Effects* (CH2M, 2016) for your information and review (enclosed), and inviting you to attend a consultation meeting to be held on November 17, 2016.

In 2008, the Arecibo Observatory was listed in the National Register of Historic Places (NRHP) as the National Astronomy and Ionosphere Center historic district. It was determined to be significant under NRHP Criteria A (associated with events that have made a significant contribution to the broad patterns of our history) and C (embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master). There are eight buildings and one structure that contribute to the NRHP-listed historic district. Under proposed Alternatives 1, 2, 4, and 5, historic properties that contribute to the NRHP-listed historic district would be deconstructed, resulting in a finding of Adverse Effect under Section 106. Alternative 3 would mothball and retain historic properties for future use, resulting in a finding of No Adverse Effect to historic properties. Under the No-Action Alternative, there would be no change from the existing conditions and No Historic Properties Affected.

NSF invites you to attend a Section 106 consulting parties meeting on November 17, 2016, at the Doubletree by Hilton Hotel San Juan, 105 Avenida De Diego, San Juan, PR. The Section 106 consulting parties meeting will be from 1:00 pm to 2:30 pm and will begin one hour after the public meeting on the DEIS. The public meeting on the DEIS will also be held at the same hotel from 10:00 am to 12:00 pm on November 17, 2016.

The Section 106 consulting parties meeting will provide an overview of the Section 106 process, review the

proposed Alternatives and their anticipated effects on the historic Arecibo Observatory, and discuss potential mitigation measures. If you are plan to attend the meeting, please respond no later than November 1, 2016 by contacting:

Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Blvd., Arlington, Virginia 22230; telephone: (703) 292—4907; email: epenteco@nsf.gov.

If you cannot attend in person but would like to attend via teleconference, please indicate that and we will make arrangements to accommodate that. We look forward to your response and to consulting with you on this undertaking. Should you have any questions, please contact Elizabeth Pentecost at (703) 292-4907.

Regards,

James S. Ulvestad
Division Director
Division of Astronomical Sciences

Attachment:

Proposed Changes to Arecibo Observatory Operations: Historic Properties Assessment of Effects

Subject: Section 106 Assessment of Effects for EIS For Arecibo Observatory
Date: Thursday, October 20, 2016 at 11:53:44 AM Eastern Daylight Time
From: Pentecost, Elizabeth A.
To: siemens@uwm.edu
CC: Hamilton, Kristen, Blanco, Caroline M, Pentecost, Elizabeth A., Kira Zender
Attachments: Arecibo - Cultural Resources Assessment of Effects_Tech Report_10192016.pdf

Information is being sent by email only. If you would like a hard copy letter/report please let us know.

October 20, 2016

RE: Section 106 Assessment of Effects for the Proposed Changes to Arecibo Observatory Operations,
Arecibo, Puerto Rico

Dear Dr. Siemens:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. The Arecibo Observatory in Puerto Rico is one of the facilities identified for potential deconstruction. The decision regarding the potential changes to the Arecibo Observatory in Puerto Rico is considered a federal undertaking and triggers compliance with Section 106 of the National Historic Preservation Act (NHPA). NSF formally initiated Section 106 consultation with the Puerto Rico State Historic Preservation Office (SHPO) on July 5, 2016. You have requested consulting party status for the proposed undertaking as part of the Section 106 process. With this letter, NSF is transmitting the *Proposed Changes to Arecibo Observatory Operations: Historic Properties Assessment of Effects* (CH2M, 2016) for your information and review (enclosed), and inviting you to attend a consultation meeting to be held on November 17, 2016.

In 2008, the Arecibo Observatory was listed in the National Register of Historic Places (NRHP) as the National Astronomy and Ionosphere Center historic district. It was determined to be significant under NRHP Criteria A (associated with events that have made a significant contribution to the broad patterns of our history) and C (embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master). There are eight buildings and one structure that contribute to the NRHP-listed historic district. Under proposed Alternatives 1, 2, 4, and 5, historic properties that contribute to the NRHP-listed historic district would be deconstructed, resulting in a finding of Adverse Effect under Section 106. Alternative 3 would mothball and retain historic properties for future use, resulting in a finding of No Adverse Effect to historic properties. Under the No-Action Alternative, there would be no change from the existing conditions and No Historic Properties Affected.

NSF invites you to attend a Section 106 consulting parties meeting on November 17, 2016, at the Doubletree by Hilton Hotel San Juan, 105 Avenida De Diego, San Juan, PR. The Section 106 consulting parties meeting will be from 1:00 pm to 2:30 pm and will begin one hour after the public meeting on the DEIS. The public meeting on the DEIS will also be held at the same hotel from 10:00 am to 12:00 pm on November 17, 2016.

The Section 106 consulting parties meeting will provide an overview of the Section 106 process, review the proposed Alternatives and their anticipated effects on the historic Arecibo Observatory, and discuss

potential mitigation measures. If you are plan to attend the meeting, please respond no later than November 1, 2016 by contacting:

Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Blvd., Arlington, Virginia 22230; telephone: (703) 292--4907; email: epenteco@nsf.gov.

If you cannot attend in person but would like to attend via teleconference, please indicate that and we will make arrangements to accommodate that. We look forward to your response and to consulting with you on this undertaking. Should you have any questions, please contact Elizabeth Pentecost at (703) 292-4907.

Regards,

James S. Ulvestad
Division Director
Division of Astronomical Sciences

Attachment:

Proposed Changes to Arecibo Observatory Operations: Historic Properties Assessment of Effects

Subject: Section 106 Assessment of Effects for EIS For Arecibo Observatory
Date: Thursday, October 20, 2016 at 11:53:04 AM Eastern Daylight Time
From: Pentecost, Elizabeth A.
To: anthony.vaneyken@sri.com
CC: Hamilton, Kristen, Blanco, Caroline M, Kira Zender, Pentecost, Elizabeth A.
Attachments: Arecibo - Cultural Resources Assessment of Effects_Tech Report_10192016.pdf

Information is being sent by email only. If you would like a hard copy letter/report please let us know.

October 20, 2016

RE: Section 106 Assessment of Effects for the Proposed Changes to Arecibo Observatory Operations,
Arecibo, Puerto Rico

Dear Mr. Van Eyken:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. The Arecibo Observatory in Puerto Rico is one of the facilities identified for potential deconstruction. The decision regarding the potential changes to the Arecibo Observatory in Puerto Rico is considered a federal undertaking and triggers compliance with Section 106 of the National Historic Preservation Act (NHPA). NSF formally initiated Section 106 consultation with the Puerto Rico State Historic Preservation Office (SHPO) on July 5, 2016. You have requested consulting party status for the proposed undertaking as part of the Section 106 process. With this letter, NSF is transmitting the *Proposed Changes to Arecibo Observatory Operations: Historic Properties Assessment of Effects* (CH2M, 2016) for your information and review (enclosed), and inviting you to attend a consultation meeting to be held on November 17, 2016.

In 2008, the Arecibo Observatory was listed in the National Register of Historic Places (NRHP) as the National Astronomy and Ionosphere Center historic district. It was determined to be significant under NRHP Criteria A (associated with events that have made a significant contribution to the broad patterns of our history) and C (embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master). There are eight buildings and one structure that contribute to the NRHP-listed historic district. Under proposed Alternatives 1, 2, 4, and 5, historic properties that contribute to the NRHP-listed historic district would be deconstructed, resulting in a finding of Adverse Effect under Section 106. Alternative 3 would mothball and retain historic properties for future use, resulting in a finding of No Adverse Effect to historic properties. Under the No-Action Alternative, there would be no change from the existing conditions and No Historic Properties Affected.

NSF invites you to attend a Section 106 consulting parties meeting on November 17, 2016, at the Doubletree by Hilton Hotel San Juan, 105 Avenida De Diego, San Juan, PR. The Section 106 consulting parties meeting will be from 1:00 pm to 2:30 pm and will begin one hour after the public meeting on the DEIS. The public meeting on the DEIS will also be held at the same hotel from 10:00 am to 12:00 pm on November 17, 2016.

The Section 106 consulting parties meeting will provide an overview of the Section 106 process, review the proposed Alternatives and their anticipated effects on the historic Arecibo Observatory, and discuss

potential mitigation measures. If you are plan to attend the meeting, please respond no later than November 1, 2016 by contacting:

Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Blvd., Arlington, Virginia 22230; telephone: (703) 292--4907; email: epenteco@nsf.gov.

If you cannot attend in person but would like to attend via teleconference, please indicate that and we will make arrangements to accommodate that. We look forward to your response and to consulting with you on this undertaking. Should you have any questions, please contact Elizabeth Pentecost at (703) 292-4907.

Regards,

James S. Ulvestad
Division Director
Division of Astronomical Sciences

Attachment:

Proposed Changes to Arecibo Observatory Operations: Historic Properties Assessment of Effects

Subject: Section 106 Assessment of Effects for EIS For Arecibo Observatory
Date: Thursday, October 20, 2016 at 11:54:28 AM Eastern Daylight Time
From: Pentecost, Elizabeth A.
To: Nicholas White
CC: Hamilton, Kristen, Blanco, Caroline M, Pentecost, Elizabeth A., Kira Zender
Attachments: Arecibo - Cultural Resources Assessment of Effects_Tech Report_10192016[2].pdf

Information is being sent by email only. If you would like a hard copy letter/report please let us know.

October 20, 2016

RE: Section 106 Assessment of Effects for the Proposed Changes to Arecibo Observatory Operations,
Arecibo, Puerto Rico

Dear Dr. White:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. The Arecibo Observatory in Puerto Rico is one of the facilities identified for potential deconstruction. The decision regarding the potential changes to the Arecibo Observatory in Puerto Rico is considered a federal undertaking and triggers compliance with Section 106 of the National Historic Preservation Act (NHPA). NSF formally initiated Section 106 consultation with the Puerto Rico State Historic Preservation Office (SHPO) on July 5, 2016. You have requested consulting party status for the proposed undertaking as part of the Section 106 process. With this letter, NSF is transmitting the *Proposed Changes to Arecibo Observatory Operations: Historic Properties Assessment of Effects* (CH2M, 2016) for your information and review (enclosed), and inviting you to attend a consultation meeting to be held on November 17, 2016.

In 2008, the Arecibo Observatory was listed in the National Register of Historic Places (NRHP) as the National Astronomy and Ionosphere Center historic district. It was determined to be significant under NRHP Criteria A (associated with events that have made a significant contribution to the broad patterns of our history) and C (embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master). There are eight buildings and one structure that contribute to the NRHP-listed historic district. Under proposed Alternatives 1, 2, 4, and 5, historic properties that contribute to the NRHP-listed historic district would be deconstructed, resulting in a finding of Adverse Effect under Section 106. Alternative 3 would mothball and retain historic properties for future use, resulting in a finding of No Adverse Effect to historic properties. Under the No-Action Alternative, there would be no change from the existing conditions and No Historic Properties Affected.

NSF invites you to attend a Section 106 consulting parties meeting on November 17, 2016, at the Doubletree by Hilton Hotel San Juan, 105 Avenida De Diego, San Juan, PR. The Section 106 consulting parties meeting will be from 1:00 pm to 2:30 pm and will begin one hour after the public meeting on the DEIS. The public meeting on the DEIS will also be held at the same hotel from 10:00 am to 12:00 pm on November 17, 2016.

The Section 106 consulting parties meeting will provide an overview of the Section 106 process, review the proposed Alternatives and their anticipated effects on the historic Arecibo Observatory, and discuss

potential mitigation measures. If you are plan to attend the meeting, please respond no later than November 1, 2016 by contacting:

Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Blvd., Arlington, Virginia 22230; telephone: (703) 292--4907; email: epenteco@nsf.gov.

If you cannot attend in person but would like to attend via teleconference, please indicate that and we will make arrangements to accommodate that. We look forward to your response and to consulting with you on this undertaking. Should you have any questions, please contact Elizabeth Pentecost at (703) 292-4907.

Regards,

James S. Ulvestad
Division Director
Division of Astronomical Sciences

Attachment:

Proposed Changes to Arecibo Observatory Operations: Historic Properties Assessment of Effects

Subject: Section 106 Assessment of Effects for EIS For Arecibo Observatory
Date: Thursday, October 20, 2016 at 11:54:50 AM Eastern Daylight Time
From: Pentecost, Elizabeth A.
To: luisafzambrano@gmail.com
CC: Hamilton, Kristen, Blanco, Caroline M, Kira Zender, Pentecost, Elizabeth A.
Attachments: Arecibo - Cultural Resources Assessment of Effects_Tech Report_10192016[2][1][1].pdf

Information is being sent by email only. If you would like a hard copy letter/report please let us know.

October 20, 2016

RE: Section 106 Assessment of Effects for the Proposed Changes to Arecibo Observatory Operations,
Arecibo, Puerto Rico

Dear Ms. Zambrano-Marin:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. The Arecibo Observatory in Puerto Rico is one of the facilities identified for potential deconstruction. The decision regarding the potential changes to the Arecibo Observatory in Puerto Rico is considered a federal undertaking and triggers compliance with Section 106 of the National Historic Preservation Act (NHPA). NSF formally initiated Section 106 consultation with the Puerto Rico State Historic Preservation Office (SHPO) on July 5, 2016. You have requested consulting party status for the proposed undertaking as part of the Section 106 process. With this letter, NSF is transmitting the *Proposed Changes to Arecibo Observatory Operations: Historic Properties Assessment of Effects* (CH2M, 2016) for your information and review (enclosed), and inviting you to attend a consultation meeting to be held on November 17, 2016.

In 2008, the Arecibo Observatory was listed in the National Register of Historic Places (NRHP) as the National Astronomy and Ionosphere Center historic district. It was determined to be significant under NRHP Criteria A (associated with events that have made a significant contribution to the broad patterns of our history) and C (embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master). There are eight buildings and one structure that contribute to the NRHP-listed historic district. Under proposed Alternatives 1, 2, 4, and 5, historic properties that contribute to the NRHP-listed historic district would be deconstructed, resulting in a finding of Adverse Effect under Section 106. Alternative 3 would mothball and retain historic properties for future use, resulting in a finding of No Adverse Effect to historic properties. Under the No-Action Alternative, there would be no change from the existing conditions and No Historic Properties Affected.

NSF invites you to attend a Section 106 consulting parties meeting on November 17, 2016, at the Doubletree by Hilton Hotel San Juan, 105 Avenida De Diego, San Juan, PR. The Section 106 consulting parties meeting will be from 1:00 pm to 2:30 pm and will begin one hour after the public meeting on the DEIS. The public meeting on the DEIS will also be held at the same hotel from 10:00 am to 12:00 pm on November 17, 2016.

The Section 106 consulting parties meeting will provide an overview of the Section 106 process, review the proposed Alternatives and their anticipated effects on the historic Arecibo Observatory, and discuss

potential mitigation measures. If you are plan to attend the meeting, please respond no later than November 1, 2016 by contacting:

Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Blvd., Arlington, Virginia 22230; telephone: (703) 292--4907; email: epenteco@nsf.gov.

If you cannot attend in person but would like to attend via teleconference, please indicate that and we will make arrangements to accommodate that. We look forward to your response and to consulting with you on this undertaking. Should you have any questions, please contact Elizabeth Pentecost at (703) 292-4907.

Regards,

James S. Ulvestad
Division Director
Division of Astronomical Sciences

Attachment:

Proposed Changes to Arecibo Observatory Operations: Historic Properties Assessment of Effects

Subject: Section 106 Assessment of Effects for EIS For Arecibo Observatory
Date: Thursday, October 20, 2016 at 11:59:48 AM Eastern Daylight Time
From: Pentecost, Elizabeth A.
To: zhouq@miamioh.edu
CC: Pentecost, Elizabeth A.
Attachments: Arecibo - Cultural Resources Assessment of Effects_Tech Report_10192016[2][1][2].pdf

Information is being sent by email only. If you would like a hard copy letter/report please let us know.

October 20, 2016

RE: Section 106 Assessment of Effects for the Proposed Changes to Arecibo Observatory Operations,
Arecibo, Puerto Rico

Dear Dr. Zhou:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. The Arecibo Observatory in Puerto Rico is one of the facilities identified for potential deconstruction. The decision regarding the potential changes to the Arecibo Observatory in Puerto Rico is considered a federal undertaking and triggers compliance with Section 106 of the National Historic Preservation Act (NHPA). NSF formally initiated Section 106 consultation with the Puerto Rico State Historic Preservation Office (SHPO) on July 5, 2016. You have requested consulting party status for the proposed undertaking as part of the Section 106 process. With this letter, NSF is transmitting the *Proposed Changes to Arecibo Observatory Operations: Historic Properties Assessment of Effects* (CH2M, 2016) for your information and review (enclosed), and inviting you to attend a consultation meeting to be held on November 17, 2016.

In 2008, the Arecibo Observatory was listed in the National Register of Historic Places (NRHP) as the National Astronomy and Ionosphere Center historic district. It was determined to be significant under NRHP Criteria A (associated with events that have made a significant contribution to the broad patterns of our history) and C (embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master). There are eight buildings and one structure that contribute to the NRHP-listed historic district. Under proposed Alternatives 1, 2, 4, and 5, historic properties that contribute to the NRHP-listed historic district would be deconstructed, resulting in a finding of Adverse Effect under Section 106. Alternative 3 would mothball and retain historic properties for future use, resulting in a finding of No Adverse Effect to historic properties. Under the No-Action Alternative, there would be no change from the existing conditions and No Historic Properties Affected.

NSF invites you to attend a Section 106 consulting parties meeting on November 17, 2016, at the Doubletree by Hilton Hotel San Juan, 105 Avenida De Diego, San Juan, PR. The Section 106 consulting parties meeting will be from 1:00 pm to 2:30 pm and will begin one hour after the public meeting on the DEIS. The public meeting on the DEIS will also be held at the same hotel from 10:00 am to 12:00 pm on November 17, 2016.

The Section 106 consulting parties meeting will provide an overview of the Section 106 process, review the proposed Alternatives and their anticipated effects on the historic Arecibo Observatory, and discuss

potential mitigation measures. If you are plan to attend the meeting, please respond no later than November 1, 2016 by contacting:

Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Blvd., Arlington, Virginia 22230; telephone: (703) 292--4907; email: epenteco@nsf.gov.

If you cannot attend in person but would like to attend via teleconference, please indicate that and we will make arrangements to accommodate that. We look forward to your response and to consulting with you on this undertaking. Should you have any questions, please contact Elizabeth Pentecost at (703) 292-4907.

Regards,

James S. Ulvestad
Division Director
Division of Astronomical Sciences

Attachment:

Proposed Changes to Arecibo Observatory Operations: Historic Properties Assessment of Effects



In compliance with the National Environmental Policy Act of 1969 (NEPA), as amended, the National Science Foundation (NSF) has prepared a Draft Environmental Impact Statement (DEIS) to evaluate the potential environmental effects of proposed operational changes due to funding constraints for the Arecibo Observatory, in Arecibo, Puerto Rico. Concurrent with the NEPA process, NSF has also initiated consultation under Section 106 of the National Historic Preservation Act (NHPA) to evaluate potential effects to the Arecibo Observatory, which is a historic property listed in the National Register of Historic Places.

By this notice, NSF is announcing the beginning of the public comment period to solicit public comments on the Draft EIS and continuation of public involvement under Section 106 by means of a meeting with Consulting Parties. Comments may be submitted verbally during the public meetings and Consulting Parties meeting scheduled for November 16-17, 2016 (see details below) or in writing until December 12, 2016. To be eligible for inclusion in the Final EIS, all comments must be received prior to the close of the public comment period.

The DEIS is posted at www.nsf.gov/AST (see "AST Facilities - Environmental Reviews") and copies are available for review at the following libraries in Puerto Rico:

Biblioteca Electrónica Pública Municipal Nicolás Nadal Barreto 210 Calle Santiago Iglesias Arecibo, PR Phone: (787) 878-1178	Archivo General y Biblioteca Nacional de Puerto Rico 500 Avenida Juan Ponce De León San Juan, PR Phone: (787) 725-1060 ext. 2001
--	--

NSF will host two public meetings on the DEIS and one consulting parties meeting on Section 106 of the NHPA:

DEIS Evening meeting: November 16, 2016 from 6:00 pm to 8:00 pm
Colegio de Ingenieros y Agrimensores de Puerto Rico
Puerto Rico Professional College of Engineers and Land Surveyors (Arecibo Chapter)
Ave. Manuel T. Guillán Urdáz
Conector 129 Carr. 10
Arecibo, Puerto Rico
Phone: (787) 758-2250

DEIS Daytime meeting: November 17, 2016 from 10:00 am to 12:00 pm
DoubleTree by Hilton San Juan
105 Avenida De Diego
San Juan, Puerto Rico
Phone: (787) 721-6500

Comments will be transcribed by a court reporter. Translation in English and Spanish will be provided during the meeting. Please contact NSF at least one week in advance of the meeting if you would like to request special accommodations (for example, sign language interpretation).

Section 106 of the NHPA Consulting Parties meeting:
November 17, 2016 from 1:00 pm to 2:30 pm
DoubleTree by Hilton San Juan
105 Avenida De Diego
San Juan, Puerto Rico
Phone: (787) 721-6500

All persons and entities that are consulting parties or are interested in becoming consulting parties are invited to attend. Spanish language translation will also be provided for this meeting.

For further information regarding the EIS process or Section 106 consultation, and to submit comments on the DEIS, please contact:

Regular Mail:	Ms. Elizabeth Pentecost RE: Arecibo Observatory National Science Foundation, Division of Astronomical Sciences Suite 1045 4201 Wilson Blvd. Arlington, VA 22230
Email:	Envcomp-AST@nsf.gov , with subject line "Arecibo Observatory"
Telephone:	(703) 292-4907

Project information, including the DEIS and information about the public meeting is posted at www.nsf.gov/AST; meeting materials will also be posted following the meeting. A Notice of Availability has been published and is available on the Federal Register.



En cumplimiento con la Ley Nacional de Política Ambiental del 1969 (NEPA, por sus siglas en inglés), según enmendada, la Fundación Nacional de Ciencias (NSF, por sus siglas en inglés) ha preparado un Borrador de la Declaración de Impacto Ambiental (BDIA) para evaluar los potenciales efectos ambientales de los cambios operacionales propuestos

debido a restricciones en el presupuesto asignado al Observatorio de Arecibo, en Arecibo, Puerto Rico. Concurrentemente con el proceso de NEPA, la NSF también ha iniciado un proceso de consulta bajo la Sección 106 de la Ley Nacional de Preservación Histórica (NHPA, por sus siglas en inglés) para evaluar los efectos potenciales al Observatorio de Arecibo, la cual es una propiedad histórica que ese encuentra en la lista del Registro Nacional de Lugares Históricos.

Mediante esta notificación, la NSF está anunciando el inicio del periodo de comentario público para solicitar comentarios del público sobre el BDIA y continuar con la participación del público bajo la Sección 106 a través de una reunión con las Partes Consultantes. Los comentarios pueden ser sometidos verbalmente durante las reuniones públicas con las Partes Consultantes programadas para los días 16 y 17 de noviembre de 2016 (ver detalles abajo) o por escrito hasta el 12 de diciembre de 2016. Para ser elegible para ser incluido en la DIA Final, todos los comentarios deben ser recibidos previo al cierre del periodo de comentario público.

El BDIA se puede acceder en la página de Internet www.nsf.gov/AST (ver "AST Facilities -- Environmental Reviews") y copias impresas están disponibles para revisión en las siguientes bibliotecas en Puerto Rico:

Biblioteca Electrónica Pública Municipal Nicolás Nadal Barreto 210 Calle Santiago Iglesias Arecibo, PR Teléfono: (787) 878-1178	Archivo General y Biblioteca Nacional de Puerto Rico 500 Avenida Juan Ponce De León San Juan, PR Teléfono: (787) 725-1060 ext. 2001
---	---

La NSF llevará a cabo dos reuniones públicas sobre el BDIA y una reunión de las Partes Consultantes de la Sección 106 del NHPA:

Reunión nocturna sobre el BDIA:
16 de noviembre de 2016, de 6:00 pm a 8:00 pm
Colegio de Ingenieros y Agrimensores de Puerto Rico
(Capítulo de Arecibo)
Ave. Manuel T. Guillán Urdáz
Conector 129 Carr. 10
Arecibo, Puerto Rico
Teléfono: (787) 758-2250

Reunión diurna sobre el BDIA:
17 de noviembre de 2016, de 10:00 am a 12:00 pm
DoubleTree by Hilton San Juan
105 Avenida De Diego
San Juan, Puerto Rico
Teléfono: (787) 721-6500

Los comentarios van a ser transcritos por un taquígrafo. Se proveerá traducción en inglés y español durante la reunión. Favor contactar a la NSF con al menos una semana de anticipación a la reunión si usted desea solicitar servicios especiales (como por ejemplo, interpretación de lenguaje de señas).

Reunión de las Partes Consultantes de la Sección 106:
November 17, 2016 de 1:00 pm a 2:30 pm
DoubleTree by Hilton San Juan
105 Avenida De Diego
San Juan, Puerto Rico
Teléfono: (787) 721-6500

Se invita a todas las personas y entidades que sean Partes Consultantes o que estén interesadas en convertirse en Partes Consultantes a asistir a esta reunión. También se proveerá traducción al español para esta reunión.

Para información adicional acerca del proceso de la DIA o de la consulta de la Sección 106, y para someter comentarios sobre el BDIA, favor de contactar:

Correo Regular:	Ms. Elizabeth Pentecost RE: Arecibo Observatory National Science Foundation, Division of Astronomical Sciences Suite 1045 4201 Wilson Blvd. Arlington, VA 22230
Email:	Envcomp-AST@nsf.gov , especif que en la línea del asunto: "Arecibo Observatory"
Teléfono:	(703) 292-4907

La información del Proyecto, incluyendo el BDIA y la información sobre la reunión pública están disponibles en la página de Internet www.nsf.gov/AST; los materiales de la reunión también estarán disponibles luego de la reunión en la misma página. Una Notificación de Disponibilidad ha sido publicada y está disponible en el Registro Federal.

Entregan terna al gobernador

Junta Fiscal presenta nombres de candidatos para ser el coordinador de revitalización

José A. Delgado
jdelgado@elnuevodia.com
Twitter: @JoseADelgadoEND

WASHINGTON.- El gobernador Alejandro García Padilla recibió anoche, de manos de la junta federal que controla las finanzas de su gobierno, un listado de tres candidatos al puesto de coordinador de revitalización de infraestructura, que podrá impulsar proyectos que se consideran claves para el desarrollo económico de Puerto Rico.

Los nombres fueron enviados por la Junta de Supervisión Fiscal -el nombre que le da la ley PROMESA a la nueva autoridad federal a cargo de las finanzas de la Isla-, justo al vencerse el plazo que tenían para someter al gobernador una terna de personas que consideran aptas para la posición.

Los tres candidatos son: **Aaron Bieleberg**, **Joseph Fontana** y **Riz Shah**. Los tres tienen por lo menos 14 años de experiencia en asuntos de infraestructura.

García Padilla tiene 10 días para notificarle a la Junta de Supervisión Fiscal a quien ha seleccionado.

Si no lo hace, entonces la junta podrá seleccionar el funcionario directamente. El coordinador de revitalización podrá impulsar proyectos de infraestructura de forma expedita, por encima de las normas del gobierno local.

No obstante, la junta dio a entender que el nombramiento que haga ahora puede ser interino y que más adelante puede proponer -al próximo gobernador- otro candidato.

Por otro lado, la junta federal anunció que la empresa Heidrick & Struggles le asiste en la búsqueda del candidato a director ejecutivo, al puesto permanente de coordinador de revitalización, y el asesor legal interno. Se trata de nombramientos que esperan completarse entre 90 y 120 días.

Según los mandatos de la junta, García Padilla tenía también hasta ayer para enviarle los informes de ingresos y gastos del gobierno de la Isla para el año fiscal que empezó el 1 de julio.

NOMBRES SUGERIDOS

AARON BIELEBERG
● Socio de la empresa especializada en proyectos de infraestructura McKinsey, con oficina en Washington D.C.

JOSEPH FONTANA
● Tiene 30 años de experiencia en proyectos de energía, acueductos y alcantarillados, finanzas y transacciones corporativas para la empresa Ernst & Young

RIZ SHAH
● Ingeniero arquitectónico a cargo del sector público de infraestructura en la oficina de Washington D.C. de la empresa PwC's Capital Projects & Infrastructure

QUIEBRAS

ORIENTACIÓN GRATUITA

personalmente por el
Lcdo. Rodolfo Hernández Ramos
Con 42 años de experiencia.

HONORARIOS DE ABOGADO A TRAVÉS DE PLAN DE PAGO RADICACIONES:
Capítulo 13 - \$310.00
Capítulo 7 - \$335.00

(787) 881-8484

Calle Truncado 544, Suite 3, Hatillo, PR 00659
Edif. American Detective Academy, Frente a Plaza del Norte al First Bank

Protege Casa, Auto y a tu codeudor a tiempo

LEONARDO'S

POSICIÓN DISPONIBLE:

- Vendedor(a) | Tiempo Parcial**
Excelentes habilidades de venta y servicio al cliente.
Disponibilidad para trabajar los fines de semana.
Requerido mínimo dos años de educación universitaria.

Patrono con igualdad de empleo.
Envía tu resume a:
rh@leonardos.com

Edén Dorado

En la Vida...
Hay momentos en que
no puedes pasar vivo

Apartamento para Alquiler a Gente Muy Especial
Personas de la Segunda Edad (Mayores de 50 Años)

Aquí encontrarás

- Elegancia
- Armonía
- Comodidad
- Detalles
- Estacionamiento
- Espacios

Que haya de este, el lugar ideal para vivir y tener un nuevo nivel de calidad de vida.
"Privilegiada focalización y fácil acceso "cerca de todo"
Localizado en el casco urbano y zona histórica del pueblo de Manatí

Edén Dorado
Es una pequeña comunidad de 12 apartamentos

Estos Tienen:

- Sala Comedor
- Cocina con Gabinetes
- Baño-Calentador de línea
- 1 ó 2 habitaciones con amplio guardarropa
- Un estacionamiento bajo techo por apartamento
- Diseño antiguo
- Hermosos y amplios balcones
- Techos doble altura lo que provee iluminación natural en el interior, sensación de amplitud y mayor ventilación

Impresionante patio interior

Inf. 787-854-6716

Tu aportación hace la diferencia.

DALE A NUESTROS PACIENTITOS LA OPORTUNIDAD DE MEJORAR.

Cada dólar recaudado se queda aquí.



¡Haz tu donativo hoy!
787-622-2200

Fundación de Niños SAN JORGE



In compliance with the National Environmental Policy Act of 1969 (NEPA), as amended, the National Science Foundation (NSF) has prepared a Draft Environmental Impact Statement (DEIS) to evaluate the potential environmental effects of proposed operational changes due to funding constraints for the Arecibo Observatory, in Arecibo, Puerto Rico. Concurrent with the NEPA process, NSF has also initiated consultation under Section 106 of the National Historic Preservation Act (NHPA) to evaluate potential effects to the Arecibo Observatory, which is a historic property listed in the National Register of Historic Places.

By this notice, NSF is announcing the beginning of the public comment period to solicit public comments on the Draft EIS and continuation of public involvement under Section 106 by means of a meeting with Consulting Parties. Comments may be submitted verbally during the public meetings and Consulting Parties meeting scheduled for November 16-17, 2016 (see details below) or in writing until December 12, 2016. To be eligible for inclusion in the Final EIS, all comments must be received prior to the close of the public comment period.

The DEIS is posted at www.nsf.gov/AST (see "AST Facilities - Environmental Reviews") and copies are available for review at the following libraries in Puerto Rico:

Biblioteca Electrónica Pública Municipal Nicolás Nadal Barreto 210 Calle Santiago Iglesias Arecibo, PR Phone: (787) 878-1178	Archivo General y Biblioteca Nacional de Puerto Rico 500 Avenida Juan Ponce De León San Juan, PR Phone: (787) 725-1060 ext. 2001
--	--

NSF will host two public meetings on the DEIS and one consulting parties meeting on Section 106 of the NHPA:

DEIS Evening meeting: November 16, 2016 from 6:00 pm to 8:00 pm
Colegio de Ingenieros y Agrimensores de Puerto Rico
Puerto Rico Professional College of Engineers and Land Surveyors (Arecibo Chapter)
Ave. Manuel T. Guillán Urdáz
Conector 129 Carr. 10
Arecibo, Puerto Rico
Phone: (787) 758-2250

DEIS Daytime meeting: November 17, 2016 from 10:00 am to 12:00 pm
DoubleTree by Hilton San Juan
105 Avenida De Diego
San Juan, Puerto Rico
Phone: (787) 721-6500

Comments will be transcribed by a court reporter. Translation in English and Spanish will be provided during the meeting. Please contact NSF at least one week in advance of the meeting if you would like to request special accommodations (for example, sign language interpretation).

Section 106 of the NHPA Consulting Parties meeting:
November 17, 2016 from 1:00 pm to 2:30 pm
DoubleTree by Hilton San Juan
105 Avenida De Diego
San Juan, Puerto Rico
Phone: (787) 721-6500

All persons and entities that are consulting parties or are interested in becoming consulting parties are invited to attend. Spanish language translation will also be provided for this meeting.

For further information regarding the EIS process or Section 106 consultation, and to submit comments on the DEIS, please contact:

Regular Mail: Ms. Elizabeth Pentecost
RE: Arecibo Observatory
National Science Foundation, Division of
Astronomical Sciences
Suite 1045
4201 Wilson Blvd.
Arlington, VA 22230

Email: Envcomp-AST@nsf.gov, with subject line "Arecibo Observatory"
(703) 292-4907

Telephone: (703) 292-4907

Project information, including the DEIS and information about the public meeting is posted at www.nsf.gov/AST; meeting materials will also be posted following the meeting. A Notice of Availability has been published and is available on the Federal Register.



En cumplimiento con la Ley Nacional de Política Ambiental del 1969 (NEPA, por sus siglas en inglés), según enmendada, la Fundación Nacional de Ciencias (NSF, por sus siglas en inglés) ha preparado un Borrador de la Declaración de Impacto Ambiental (BDIA) para evaluar los potenciales efectos ambientales de los cambios operacionales propuestos debido a restricciones en el presupuesto asignado al Observatorio de Arecibo, en Arecibo, Puerto Rico. Concurrentemente con el proceso de NEPA, la NSF también ha iniciado un proceso de consulta bajo la Sección 106 de la Ley Nacional de Preservación Histórica (NHPA, por sus siglas en inglés) para evaluar los efectos potenciales al Observatorio de Arecibo, la cual es una propiedad histórica que se encuentra en la lista del Registro Nacional de Lugares Históricos.

Mediante esta notificación, la NSF está anunciando el inicio del período de comentario público para solicitar comentarios del público sobre el BDIA y continuar con la participación del público bajo la Sección 106 a través de una reunión con las Partes Consultantes. Los comentarios pueden ser sometidos verbalmente durante las reuniones públicas con las Partes Consultantes programadas para los días 16 y 17 de noviembre de 2016 (ver detalles abajo) o por escrito hasta el 12 de diciembre de 2016. Para ser elegible para ser incluido en la DIA Final, todos los comentarios deben ser recibidos previo al cierre del período de comentario público.

El BDIA se puede acceder en la página de Internet www.nsf.gov/AST (ver "AST Facilities -- Environmental Reviews") y copias impresas están disponibles para revisión en las siguientes bibliotecas en Puerto Rico:

Biblioteca Electrónica Pública Municipal Nicolás Nadal Barreto 210 Calle Santiago Iglesias Arecibo, PR Teléfono: (787) 878-1178	Archivo General y Biblioteca Nacional de Puerto Rico 500 Avenida Juan Ponce De León San Juan, PR Teléfono: (787) 725-1060 ext. 2001
---	---

La NSF llevará a cabo dos reuniones públicas sobre el BDIA y una reunión de las Partes Consultantes de la Sección 106 del NHPA:

Reunión nocturna sobre el BDIA:
16 de noviembre de 2016, de 6:00 pm a 8:00 pm
Colegio de Ingenieros y Agrimensores de Puerto Rico
(Capítulo de Arecibo)
Ave. Manuel T. Guillán Urdáz
Conector 129 Carr. 10
Arecibo, Puerto Rico
Teléfono: (787) 758-2250

Reunión diurna sobre el BDIA:
17 de noviembre de 2016, de 10:00 am a 12:00 pm
DoubleTree by Hilton San Juan
105 Avenida De Diego
San Juan, Puerto Rico
Teléfono: (787) 721-6500

Los comentarios van a ser transcritos por un taquígrafo. Se proveerá traducción en inglés y español durante la reunión. Favor contactar a NSF con al menos una semana de anticipación a la reunión si usted desea solicitar servicios especiales (como por ejemplo, interpretación de lenguaje de señas).

Reunión de las Partes Consultantes de la Sección 106:
November 17, 2016 de 1:00 pm a 2:30 pm
DoubleTree by Hilton San Juan
105 Avenida De Diego
San Juan, Puerto Rico
Teléfono: (787) 721-6500

Se invita a todas las personas y entidades que sean Partes Consultantes o que estén interesadas en convertirse en Partes Consultantes a asistir a esta reunión. También se proveerá traducción al español para esta reunión.

Para información adicional acerca del proceso de la DIA o de la consulta de la Sección 106, y para someter comentarios sobre el BDIA, favor de contactar:

Correo Regular: Ms. Elizabeth Pentecost
RE: Arecibo Observatory
National Science Foundation, Division of
Astronomical Sciences
Suite 1045
4201 Wilson Blvd.
Arlington, VA 22230

Email: Envcomp-AST@nsf.gov, especif que en la línea del asunto: "Arecibo Observatory"
(703) 292-4907

Teléfono: (703) 292-4907

La información del Proyecto, incluyendo el BDIA y la información sobre la reunión pública están disponibles en la página de Internet www.nsf.gov/AST; los materiales de la reunión también estarán disponibles luego de la reunión en la misma página. Una Notificación de Disponibilidad ha sido publicada y está disponible en el Registro Federal.

On Nov 4, 2016, at 3:54 PM, "John Eddins" <jeddins@achp.gov> wrote:

Caroline

I'll review the Draft EIS and then send out a response.

If we haven't responded in 15 days from receipt of notice, the fed can move on in the process.

As long as there are no issues with Section 106 process, we will not likely want to enter.

John

John T. Eddins

ACHP

202-517-0211

e106-online section 106 documentation submittal system

now available to all federal agencies

<http://www.achp.gov/work106.html>

On Nov 4, 2016, at 3:54 PM, "John Eddins" <jeddins@achp.gov> wrote:

Caroline

I'll review the Draft EIS and then send out a response.

If we haven't responded in 15 days from receipt of notice, the fed can move on in the process.

As long as there are no issues with Section 106 process, we will not likely want to enter.
John

John T. Eddins

ACHP

202-517-0211

e106-online section 106 documentation submittal system

now available to all federal agencies

<http://www.achp.gov/work106.html>

From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]

Sent: Friday, November 04, 2016 3:43 PM

To: John Eddins

Cc: Pentecost, Elizabeth A.

Subject: Re: NEPA Analysis for Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico

Hi John - I am just following up on our requests from July and last month about whether the ACHP is interested in participating in our Section 106 process related to NSF's proposed changes to Arecibo Observatory Operations. We recently released our Draft EIS, and I believe your office was notified, but in case you have not seen it, here is a link to the page:

https://www.nsf.gov/mps/ast/env_impact_reviews/arecibo/arecibo_drafteis.jsp.

We are moving forward with our process and, as I mentioned last time, we are assuming that, given the length of time from our original request, the ACHP is not interested in participating in our NEPA or Section 106 process. Please notify me as soon as possible if this assumption is misplaced.

Many thanks, and I hope all is well with you.

All the best,

Caroline

Caroline M. Blanco

Assistant General Counsel

National Science Foundation

On Oct 7, 2016, at 8:25 AM, "John Eddins" <jeddins@achp.gov> wrote:



ESTADO LIBRE ASOCIADO DE
PUERTO RICO

Oficina Estatal de Conservación Histórica
State Historic Preservation Office

December 12, 2016

Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

**SHPO 06-06-16-03 PROPOSED CHANGES TO ARECIBO OBSERVATORY OPERATIONS,
ARECIBO, PUERTO RICO**

Dear Ms. Blanco:

We acknowledge receipt of your documentation describing five proposed changes to the operation of the Arecibo Observatory; a property listed in the National Register of Historic Places at the national level of significance. We believe all five alternatives, including number 3 (which would change the character of the property's use for an indefinite period of time), meet the criteria of adverse effect. As such, we recommend you notify the Advisory Council on Historic Preservation (Council), pursuant to 36 CFR 800.6(a)(1), and continue consultation with the consulting parties to seek ways to resolve adverse effects. Considering the strong island wide interest in this undertaking and the national significance of the Arecibo Observatory, we recommend you invite the Council to participate in the consultation.

Please include the SHPO project number in any future correspondence. If you have any questions, please contact Berenice Sueiro (bsueiro@prshpo.pr.gov) or Miguel Bonini (mbonini@prshpo.pr.gov) at our Office. You may also contact us by phone at (787) 721-3737.

Sincerely,


F&R Cariangeli León Moraza, Esq.
State Historic Preservation Officer

CLM/BRS/MB

Cuartel de Ballajá (Tercer Piso),
Calle Norzagaray, Esquina Beneficencia, Viejo San Juan, P.R. 00901

PO Box 9023935, San Juan, P.R. 00902-3935
Tel: 787-721-3737 Fax: 787-721-3773
www.oech.gobierno.pr



OFICINA ESTATAL DE
CONSERVACIÓN HISTÓRICA
OFICINA DEL GOBERNADOR
STATE HISTORIC
PRESERVATION OFFICE
OFFICE OF THE GOVERNOR

From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]
Sent: Thursday, December 15, 2016 4:13 PM
To: John Eddins
Cc: Hamilton, Kristen; Pentecost, Elizabeth A.
Subject: FW: Arecibo: Cultural Resources Assessment and Proposed Meeting Date and Time

Hi John – I hope all is well with you. I am writing to follow-up on NSF’s invitation to the ACHP to participate in our Section 106 process. Attached please find a letter from the Puerto Rico SHPO, in which the SHPO also requests that NSF invite the ACHP to participate. Please let me know whether the ACHP would, indeed, like to participate in our Section 106 process, and whether you need any additional information to make that decision.

Many thanks, and happy holidays to you!

Best regards,

Caroline

Caroline M. Blanco
Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: "Blanco, Caroline M" <cblanco@nsf.gov>
Date: Thursday, December 15, 2016 at 5:09 PM
To: John Eddins <jeddins@achp.gov>
Cc: "Hamilton, Kristen" <KRIHAMIL@nsf.gov>, Elizabeth Pentecost <epenteco@nsf.gov>
Subject: Re: Arecibo: Cultural Resources Assessment and Proposed Meeting Date and Time

Hi John – Thank you for your quick response. While I think that our process has been working well, there are people who work at or live near the Arecibo Observatory who are very upset that NSF is considering reduced operations at Arecibo (or even possible deconstruction of the facility). We have had several conversations with the SHPO and we seem to agree that a Programmatic Agreement may be the way to address potential adverse effects. We are currently drafting a PA that we intend to circulate to the SHPO for consideration. At that time, I would also like to circulate it to you for your thoughts/input. Would you be comfortable with that level of participation? And, as for full participation, I will leave that to you and, perhaps, that can be determined as our process moves forward. Please let me know what your thoughts are on this proposed approach.

Many thanks.

All the best,

Caroline

Caroline M. Blanco

Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: John Eddins <jeddins@achp.gov>
Date: Thursday, December 15, 2016 at 4:23 PM
To: "Blanco, Caroline M" <cblanco@nsf.gov>
Cc: "Hamilton, Kristen" <KRIHAMIL@nsf.gov>, Elizabeth Pentecost <epenteco@nsf.gov>
Subject: RE: Arcibo: Cultural Resources Assessment and Proposed Meeting Date and Time

Caroline

Sorry to have kept you on the back burner.
Do you see a need for us to participate, or just need the letter to show we declined.
I'll follow up on either early next week.
And Happy Holidays to all of you at NSF.
John

John T. Eddins
ACHP
202-517-0211
*[e106-online section 106 documentation submittal system
now available to all federal agencies
http://www.achp.gov/work106.html](http://www.achp.gov/work106.html)*

From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]
Sent: Thursday, December 15, 2016 4:13 PM
To: John Eddins
Cc: Hamilton, Kristen; Pentecost, Elizabeth A.
Subject: FW: Arcibo: Cultural Resources Assessment and Proposed Meeting Date and Time

Hi John – I hope all is well with you. I am writing to follow-up on NSF's invitation to the ACHP to participate in our Section 106 process. Attached please find a letter from the Puerto Rico SHPO, in which the SHPO also requests that NSF invite the ACHP to participate. Please let me know whether the ACHP would, indeed, like to participate in our Section 106 process, and whether you need any additional information to make that decision.

Many thanks, and happy holidays to you!

Best regards,

Caroline

Caroline M. Blanco

Assistant General Counsel

National Science Foundation

4201 Wilson Blvd., Suite 1265

Arlington, VA 22230

Tel.: 703.292.4592

Fax: 703.292.9041

Email: cblanco@nsf.gov



From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]
Sent: Wednesday, April 26, 2017 5:35 PM
To: Berenice Sueiro <bsueiro@prshpo.pr.gov>
Cc: Lori.Price@CH2M.com; Kira.Zender@CH2M.com; Pentecost, Elizabeth A. <epenteco@nsf.gov>; Hamilton, Kristen <KRIHAMIL@nsf.gov>
Subject: Re: Arcibo: Cultural Resources Assessment and Proposed Meeting Date and Time

Hi Berenice – I am following up to make sure that you received the email (below) that I sent last Friday. As mentioned in that email, I would like to talk with you to discuss the contents of the preliminary draft PA, which should be ready to send out to you before the end of this week. I am hoping to not take up too much of your time, and anticipate that the call would likely last only about 15 minutes or so; the purpose of the call is to provide you with some contextual information regarding the preliminary draft PA. If at all possible, I would like to talk with you tomorrow. Would that work for you and, if so, do you have a time that would be better than another? As a note, after we receive comments from you on the preliminary draft PA, we would like to send it out to the consulting parties and, if you believe it is appropriate, post it to our website for a 30 day comment period. I can provide you with more thoughts on our proposed process when we are able to connect.

Many thanks.

All the best,

Caroline

Caroline M. Blanco
 Assistant General Counsel
 National Science Foundation
 4201 Wilson Blvd., Suite 1265
 Arlington, VA 22230
 Tel.: 703.292.4592
 Fax: 703.292.9041
 Email: cblanco@nsf.gov

From: "Blanco, Caroline M" <cblanco@nsf.gov>
Date: Friday, April 21, 2017 at 12:19 PM
To: Berenice Sueiro <bsueiro@prshpo.pr.gov>

Cc: "Lori.Price@CH2M.com" <Lori.Price@CH2M.com>, "Kira.Zender@CH2M.com" <Kira.Zender@CH2M.com>, Elizabeth Pentecost <epenteco@nsf.gov>, "Hamilton, Kristen" <KRIHAMIL@nsf.gov>

Subject: Re: Arcibo: Cultural Resources Assessment and Proposed Meeting Date and Time

Hi Berenice – I hope this finds you well. Since we were last in contact, our team has been busy reviewing comments on the Draft EIS, working on our responses to those comments, preparing a preliminary draft of the Final EIS, working on a Biological Assessment concerning threatened and endangered species, and developing a preliminary draft Programmatic Agreement (PA) so that we have a starting place to begin conversations with the consulting parties. We are still putting the final touches on the preliminary draft PA, but I intend to send it to you very soon for your review and comment before sending it out to the consulting parties. I would like to talk with you about the contents of the preliminary draft PA, and wonder whether you have time to talk today or Monday (or at your earliest convenience). Might you be available for such a call?

Many thanks, Berenice.

All the best,

Caroline

Caroline M. Blanco

Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov



From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]
Sent: Wednesday, April 26, 2017 5:35 PM
To: Berenice Sueiro <bsueiro@prshpo.pr.gov>
Cc: Lori.Price@CH2M.com; Kira.Zender@CH2M.com; Pentecost, Elizabeth A. <epenteco@nsf.gov>; Hamilton, Kristen <KRIHAMIL@nsf.gov>
Subject: Re: Arcibo: Cultural Resources Assessment and Proposed Meeting Date and Time

Hi Berenice – I am following up to make sure that you received the email (below) that I sent last Friday. As mentioned in that email, I would like to talk with you to discuss the contents of the preliminary draft PA, which should be ready to send out to you before the end of this week. I am hoping to not take up too much of your time, and anticipate that the call would likely last only about 15 minutes or so; the purpose of the call is to provide you with some contextual information regarding the preliminary draft PA. If at all possible, I would like to talk with you tomorrow. Would that work for you and, if so, do you have a time that would be better than another? As a note, after we receive comments from you on the preliminary draft PA, we would like to send it out to the consulting parties and, if you believe it is appropriate, post it to our website for a 30 day comment period. I can provide you with more thoughts on our proposed process when we are able to connect.

Many thanks.

All the best,

Caroline

Caroline M. Blanco
 Assistant General Counsel
 National Science Foundation
 4201 Wilson Blvd., Suite 1265
 Arlington, VA 22230
 Tel.: 703.292.4592
 Fax: 703.292.9041
 Email: cblanco@nsf.gov

From: "Blanco, Caroline M" <cblanco@nsf.gov>
Date: Friday, April 21, 2017 at 12:19 PM
To: Berenice Sueiro <bsueiro@prshpo.pr.gov>

From: Berenice Sueiro [mailto:bsueiro@prshpo.pr.gov]
Sent: Wednesday, April 26, 2017 6:31 PM
To: Blanco, Caroline M <cblanco@nsf.gov>
Cc: Price, Lori/TPA <Lori.Price@CH2M.com>; Zender, Kira/ATL <Kira.Zender@CH2M.com>; Pentecost, Elizabeth A. <epenteco@nsf.gov>; Hamilton, Kristen <KRIHAMIL@nsf.gov>; Carlos A. Rubio Cancela Director Ejecutivo <carubio@prshpo.pr.gov>; Miguel Bonini <mbonini@prshpo.pr.gov>
Subject: RE: Arecibo: Cultural Resources Assessment and Proposed Meeting Date and Time [EXTERNAL]



GOBIERNO DE PUERTO RICO
Oficina Estatal de Conservación Histórica

Caroline:

Greetings,

Please accept my apologies for not answering before. We have been busy. We have a new SHPO. His name is Carlos A Rubio Cancela.

Tomorrow, I am available around 3:00PM. I will be out of the office in the morning. I will verify with Miguel Bonini, Senior Historic Property Specialist, if he can join us in the call at that time. I will confirm.

Best regards,

Berenice

Berenice R Sueiro Vázquez, AIT
Gerente Conservación Histórica
Historic Preservation Manager
P.O. Box 9023935
San Juan, P.R. 00902-3935
T. (787) 721-3737 x.2002
F. (787) 721-3773



NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

Mr. John M. Fowler, Director
Advisory Council on Historic Preservation
401 F Street NW, Suite 308
Washington DC 20001-2637

April 28, 2017

RE: Section 106 Consultation for the Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico, Invitation to Participate, and Request to Review Draft Programmatic Agreement

Dear Mr. Fowler,

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. The Arecibo Observatory in Puerto Rico is one of those facilities. NSF has identified five Action Alternatives, all of which include some level of potential deconstruction of the facility. The decision regarding the potential changes to operations of the Arecibo Observatory in Puerto Rico is considered a federal undertaking and triggers compliance with Section 106 of the National Historic Preservation Act (NHPA). While engaging in Section 106 consultation under NHPA, NSF is simultaneously proceeding with its environmental review under the National Environmental Policy Act (NEPA) to identify potential environmental impacts associated with the proposed changes to operations. A Draft Environmental Impact Statement (EIS) was published on October 28, 2016, which evaluated potential environmental impacts of the following alternatives:

- **Alternative 1** – Collaboration with Interested Parties for Continued Science-focused Operations (Agency Preferred Alternative)
- **Alternative 2** – Collaboration with Interested Parties for Transition to Education-focused Operations
- **Alternative 3** – Mothballing of Facilities
- **Alternative 4** – Partial Deconstruction and Site Restoration
- **Alternative 5** – Complete Deconstruction and Site Restoration
- **No-Action Alternative** – Continued NSF Investment for Science-focused Operations

This Draft EIS may be viewed at www.nsf.gov/AST (click on "AST Facilities- Environmental Reviews").

The Section 106 consultation thus far has included the following communications:

- May 23, 2016: NSF published its "Notice of Intent To Prepare an Environmental Impact Statement and Initiate Section 106 Consultation for Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico and Notice of Public Scoping Meetings and Comment Period" in the Federal Register, and distributed it to potential stakeholders
- June 6, 2016: NSF met in-person with State Historic Preservation Officer (SHPO) staff in San Juan to introduce the proposed action
- June 7, 2016: NSF held two public scoping meetings (one in San Juan and another in Arecibo) to begin its NEPA process and its Section 106 consultation process; stakeholders were invited to identify themselves as consulting parties on the sign-in sheet
- June 16, 2016: NSF sent emails to the people who expressed an interest in becoming consulting parties and asked for confirmation regarding whether they wanted to formally participate in NSF's Section 106 process as consulting parties; 6 responded saying they did want to participate as consulting parties
- July 5, 2016: NSF sent a Section 106 consultation initiation letter to the SHPO
- July 19, 2016: NSF sent an email to Mr. John Fowler and Mr. John Eddins forwarding its Section 106 consultation initiation letter and inviting participation from the Advisory Council on Historic Preservation (Council); no responses were received
- August 8, 2016: The SHPO sent a letter to NSF stating that it "received and reviewed" NSF's proposed action in accordance with the NHPA and its implementing regulations. Because NSF had not yet determined a conclusive course of action, the SHPO requested in its letter that it "be kept abreast upon any determination regarding this significant property in order to assess and resolve project effects"
- October 6, 2019: NSF emailed the Council with a status update and to inquire if the Council would like to participate in the Section 106 process; no response was received
- October 19, 2016: NSF submitted an Assessment of Effects to SHPO (Enclosure 1), with a finding of adverse effects (the six consulting parties were copied on the correspondence and the Assessment of Effects was posted on the NSF public webpage)
- November 4, 2017: NSF (Ms. Caroline Blanco) emailed the Council a link to the Draft EIS and inquired about Council participation
- November 4, 2017: The Council (Mr. Eddins) responded that if the Council doesn't respond in 15 days, NSF can move forward, and noted that if there are no issues with the Section 106 process they would not be likely to participate
- November 15, 2017: NSF met in-person with the SHPO and staff in San Juan to discuss adverse effects finding and to begin consideration of possible mitigation measures; during the meeting, a consensus was reached that a Programmatic Agreement (PA) would likely be the appropriate mechanism to address adverse effects
- November 17, 2017: NSF held a consulting parties meeting and four additional consulting parties were added to the list as a result of their participation in this meeting (note that a transcript of this meeting is available upon request)

- December 12, 2016: the SHPO sent a letter to NSF acknowledging receipt of documentation describing all five action Alternatives and noting that all five Alternatives meet the criteria of adverse effect; the SHPO recommended that NSF notify the Council and continue to consult with consulting parties to seek ways to resolve adverse effects
- December 15, 2016: NSF forwarded the SHPO's December 12th letter to the Counsel and invited the Council to participate in the Section 106 process
- December 15, 2016: The Council (Mr. Eddins) and NSF (Ms. Blanco) exchanged emails concerning the need for Council involvement, and NSF described public opposition to the proposal and its intention to draft a Programmatic Agreement (PA); no further response from the Counsel was received
- Winter/spring 2017: NSF prepared a preliminary draft of the PA and has been working on reviewing and developing responses to public comments received on the Draft EIS; NSF has also been preparing and finalizing the Final EIS (anticipated release in the Summer of 2017)
- April 2017: NSF is sharing a preliminary draft PA to the SHPO and Council for an early review, to be followed by an invitation to the consulting parties to review and comment on the draft PA during a 30 day comment period (the draft PA will also be posted on the NSF public webpage); NSF also plans to hold a telephonic consultation meeting soon after the close of the 30 day comment period

We are attaching, in Enclosure 2, copies of the above correspondence. Also note that all of the SHPO letters and the Assessment of Effects are posted on the NSF public website referenced above.

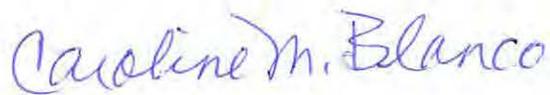
Per 36 CFR 800.11, we would like to formally invite your participation in this Section 106 process and invite your early review of the enclosed preliminary draft PA. The regulations also specify documentation requirements, which we believe are fully addressed in the enclosed *Proposed Changes to Arecibo Observatory Operations: Historic Properties Assessment of Effects* (Assessment of Effects), as described below:

1. Description of undertaking - please see *Section 1.1, Definition of Proposed Undertaking, Section 1.2, Proposed Alternatives Background, and Section 1.3, Proposed Alternatives Description* in the enclosed Assessment of Effects, with the Area of Potential Effects described in *Section 1.4*
2. Description of steps taken to identify historic properties - please see *Section 1.4, Area of Potential Effects, and Section 1.5, Methodology* in the enclosed Assessment of Effects
3. Description of historic properties affected - please see *Section 2, Identified Historic Properties*, in the enclosed Assessment of Effects
4. Undertaking's effects on historic properties (adverse) - please see *Section 3, Assessment of Effects*, in the enclosed Assessment of Effects
5. Explanation of why the effects meet the criteria of adverse effect - please see *Section 3, Assessment of Effects*, in the enclosed Assessment of Effects
6. Copies or summaries of views provided by the public and consulting parties - please see Enclosure 2 for SHPO letters and Enclosure 4 for a summary of comments relating to cultural resources that were submitted during both the DEIS and the Section 106 public comment periods.

We are providing the preliminary draft PA to both you and the SHPO simultaneously, and we request your initial thoughts on this document ahead of our sharing it with the full consulting parties group and the public for a 30-day review and comment period.

I will follow up with your office shortly to discuss your anticipated participation. If you have any questions, please contact me by phone at 703-292-4592 or by email at cblanco@nsf.gov. We look forward to further consultation with you on this proposed undertaking.

Regards,



Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel

Cc: Mr. John Eddins, ACHP (via email)
Ms. Charlene Dwin Vaughn (via email)
SHPO staff (via email)

Enclosures:

- (1) *Proposed Changes to Arecibo Observatory Operations: Historic Properties Assessment of Effects*
- (2) *Consultation record*
- (3) *Preliminary Draft Programmatic Agreement*
- (4) *Summary of public and consulting parties comments relating to cultural resources*

Nolan-Wheatley, Marynell/NYC

From: Blanco, Caroline M <cblanco@nsf.gov>
Sent: Friday, April 28, 2017 6:01 PM
To: jfowler@achp.gov; 'Charlene Vaughn'; John Eddins
Cc: Berenice Sueiro; carubio@prshpo.pr.gov; mbonini@prshpo.pr.gov; Hamilton, Kristen; Pentecost, Elizabeth A.; Price, Lori/TPA; Zender, Kira/ATL; Gaume Jr., Ralph A.; Pesce, Joseph E.
Subject: Invitation to Participate in Section 106 Consultation for National Science Foundation Undertaking: Proposed Changes to Operations at Arecibo Observatory [EXTERNAL]
Attachments: Arecibo - ACHP (signed) Letter 4.28.2017.pdf

Dear John, Charlene, and John,

I hope this finds you all well and enjoying the nice Spring weather that has finally arrived! All is well here at the National Science Foundation.

I am writing today to formally invite the ACHP to participate in NSF's Section 106 consultation process for proposed changes to operations at Arecibo Observatory. I have sent several emails to the ACHP since last summer about this undertaking and invited the ACHP's participation in NSF's Section 106 consultation process, however we are now at a point that in which the ACHP's participation would be especially helpful. NSF has made a determination of adverse effects and has drafted a preliminary draft Programmatic Agreement (PA) to address the adverse effects from this undertaking. If possible, we would like your initial feedback on the preliminary draft PA before we send it out to the Consulting Parties and make it available to the public for a 30-day comment period. Since we would like to initiate the 30-day comment period on or about the week of May 5th, it would be most appreciated if you are able to provide us with your initial feedback before then. At this juncture, NSF anticipates issuing its Record of Decision in late summer, so we are trying to move our Section 106 consultation process forward to allow for as much time as possible to work with the Consulting Parties and the public on ways to resolve the adverse effects.

Attached you will find a formal letter from me inviting the ACHP to participate in NSF's Section 106 consultation process. (A hard copy of the attached letter and its 4 Enclosures are also being sent to you by regular, United States mail.) Due to the size of the attachments to the letter (Enclosures 1-4), I will send them in two separate emails that will follow this one; one email will contain only Enclosure 2, and the other will contain Enclosures 1, 3, and 4. Please note that the draft PA, which includes 4 attachments (Attachments A-D), is found in Enclosure 3, however, I was unable at this time to include the attachments. I will provide them as soon as I can, but, at the latest, I will send them along with the draft PA when it is sent out for formal review and comment during the 30-day comment period.

Thank you in advance for your attention to this matter, and please do not hesitate to contact me if you have any questions, need additional information, or would like to discuss this matter further. My contact information is below.

Warm regards,

Caroline

Caroline M. Blanco
Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

Cc: Carlos A. Rubio Cancela, Puerto Rico SHPO
Berenice R. Sueiro Vázquez, Historic Preservation Manager (Puerto Rico SHPO)
Miguel Bonini, Senior Historic Property Specialist (Puerto Rico SHPO)
Ralph A. Gaume, Jr., Ph.D., Acting Division Director, Division of Astronomical Sciences (NSF)
Joseph E. Pesce, Ph.D., Arecibo Program Officer (NSF)
Elizabeth Pentecost, Project Administrator, Division of Astronomical Sciences (NSF)
Kristen Hamilton, Environmental Compliance Officer (NSF)
Kira Zender, Project Manager/Senior Planner CH2M Hill (NSF's environmental services contractor)
Lori Price, Senior Cultural Resources Specialist

From: "Blanco, Caroline M" <cblanco@nsf.gov>

Date: Monday, May 1, 2017 at 11:33 AM

To: John Eddins <jeddins@achp.gov>

Cc: 'Charlene Vaughn' <cvaughn@achp.gov>

Subject: Re: Invitation to Participate in Section 106 Consultation for National Science Foundation Undertaking: Proposed Changes to Operations at Arecibo Observatory

Hi John – Thank you so much for your quick response to my message. I hope that you will soon have some relief from your caseload, and I look forward to working with you on other matters in the future.

Hi Charlene – Perhaps we can have a telephone conversation when you have time and after you have had an opportunity to read through the materials I sent to you on Friday??? I would be more than happy to catch you up on where we are.

Thank you, both.

Best,

Caroline

Caroline M. Blanco

Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: John Eddins <jeddins@achp.gov>

Date: Monday, May 1, 2017 at 10:55 AM

From: "Blanco, Caroline M" <cblanco@nsf.gov>

Date: Monday, May 1, 2017 at 11:33 AM

To: John Eddins <jeddins@achp.gov>

Cc: 'Charlene Vaughn' <cvaughn@achp.gov>

Subject: Re: Invitation to Participate in Section 106 Consultation for National Science Foundation Undertaking: Proposed Changes to Operations at Arecibo Observatory

Hi John – Thank you so much for your quick response to my message. I hope that you will soon have some relief from your caseload, and I look forward to working with you on other matters in the future.

Hi Charlene – Perhaps we can have a telephone conversation when you have time and after you have had an opportunity to read through the materials I sent to you on Friday??? I would be more than happy to catch you up on where we are.

Thank you, both.

Best,

Caroline

Caroline M. Blanco

Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: John Eddins <jeddins@achp.gov>

Date: Monday, May 1, 2017 at 10:55 AM

To: "Blanco, Caroline M" <cblanco@nsf.gov>

Cc: 'Charlene Vaughn' <cvaughn@achp.gov>

Subject: RE: Invitation to Participate in Section 106 Consultation for National Science Foundation Undertaking: Proposed Changes to Operations at Arecibo Observatory

Caroline

Thanks for the notification and associated documents.

Charlene has decided that she will be handling the consultation for this undertaking.

I'm swamped with other cases.

John

John T. Eddins

ACHP

202-517-0211

e106-online section 106 documentation submittal system

now available to all federal agencies

<http://www.achp.gov/work106.html>

From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]

Sent: Friday, April 28, 2017 6:01 PM

To: John Fowler; Charlene Vaughn; John Eddins

Cc: Berenice Sueiro; carubio@prshpo.pr.gov; mbonini@prshpo.pr.gov; Hamilton, Kristen; Pentecost, Elizabeth A.; Lori Price; Kira Zender; Gaume Jr., Ralph A.; Pesce, Joseph E.

Subject: Invitation to Participate in Section 106 Consultation for National Science Foundation Undertaking: Proposed Changes to Operations at Arecibo Observatory

Dear John, Charlene, and John,

I hope this finds you all well and enjoying the nice Spring weather that has finally arrived! All is well here at the National Science Foundation.

I am writing today to formally invite the ACHP to participate in NSF's Section 106 consultation process for proposed changes to operations at Arecibo Observatory. I have sent several emails to the ACHP since last summer about this undertaking and invited the ACHP's participation in NSF's Section 106 consultation process, however we are now at a point that in which the ACHP's participation would be especially helpful. NSF has made a determination of adverse effects and has drafted a preliminary draft Programmatic Agreement (PA) to address the adverse effects from this undertaking. If possible, we would like your initial feedback on the preliminary draft PA before we send it out to the Consulting Parties and make it available to the public for a 30-day comment period. Since we would like to initiate the 30-day comment period on or about the week of May 5th, it would be most appreciated if you are able to provide us with your initial feedback before then. At this juncture, NSF anticipates issuing its Record of Decision in late summer, so we are trying to move our Section 106 consultation process forward to allow for as much time as possible to work with the Consulting Parties and the public on ways to resolve the adverse effects.

Attached you will find a formal letter from me inviting the ACHP to participate in NSF's Section 106 consultation process. (A hard copy of the attached letter and its 4 Enclosures are also being sent to you by regular, United States mail.) Due to the size of the attachments to the letter (Enclosures 1-4), I will send them in two separate emails that will follow this one; one email will contain only Enclosure 2, and the other will contain Enclosures 1, 3, and 4. Please note that the draft PA, which includes 4 attachments (Attachments A-D), is found in Enclosure 3, however, I was unable at this time to include the attachments. I will provide them as soon as I can, but, at the latest, I will send them along with the draft PA when it is sent out for formal review and comment during the 30-day comment period.

Thank you in advance for your attention to this matter, and please do not hesitate to contact me if you have any questions, need additional information, or would like to discuss this matter further. My contact information is below.

Warm regards,

Caroline

Caroline M. Blanco

Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

Cc: Carlos A. Rubio Cancela, Puerto Rico SHPO
Berenice R. Sueiro Vázquez, Historic Preservation Manager (Puerto Rico SHPO)
Miguel Bonini, Senior Historic Property Specialist (Puerto Rico SHPO)
Ralph A. Gaume, Jr., Ph.D., Acting Division Director, Division of Astronomical Sciences (NSF)
Joseph E. Pesce, Ph.D., Arecibo Program Officer (NSF)
Elizabeth Pentecost, Project Administrator, Division of Astronomical Sciences (NSF)
Kristen Hamilton, Environmental Compliance Officer (NSF)
Kira Zender, Project Manager/Senior Planner CH2M Hill (NSF's environmental services contractor)
Lori Price, Senior Cultural Resources Specialist

Subject: RE: Invitation to Participate in Section 106 Consultation for National Science Foundation Undertaking:
Proposed Changes to Operations at Arecibo Observatory



GOBIERNO DE PUERTO RICO
Oficina Estatal de Conservación Histórica

Caroline:

Greetings,

We will send comments soon.

Besr regards,

Berenice R Sueiro Vázquez, AIT
Gerente Conservación Histórica

Historic Preservation Manager

P.O. Box 9023935

San Juan, P.R. 00902-3935

T. (787) 721-3737 x.2002

F. (787) 721-3773



From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]

Sent: Thursday, May 18, 2017 12:22 PM

To: 'Charlene Vaughn' <cvaughn@achp.gov>; Berenice Sueiro <bsueiro@prshpo.pr.gov>

Cc: Lori.Price@CH2M.com; Pentecost, Elizabeth A. <epenteco@nsf.gov>; Hamilton, Kristen <KRIHAMIL@nsf.gov>

Subject: FW: Invitation to Participate in Section 106 Consultation for National Science Foundation Undertaking:
Proposed Changes to Operations at Arecibo Observatory

Hi Charlene and Berenice – I hope that all is well with both of you. I am following up on my April 28th letter (see attached) and subsequent conversation with Charlene regarding NSF's draft Programmatic Agreement (PA). As I mentioned to both of you, NSF really wants to get this document out to the consulting parties and the public for a 30-day review and comment period so that we can work toward completing our Section 106 consultation by the end of August. We do plan to have the document translated, but before we do that, I wanted to check in with both of you to see if either of you has any comments on the draft. If possible, we would really like to get the document out to the consulting parties and the public for comment before the end of May. That would then leave us with the month of July to work with the consulting parties, SHPO, and ACHP to begin to finalize the document. We then propose (at Charlene's suggestion) to hold a meeting in San Juan to discuss any remaining issues with the consulting parties. Two dates that likely work for us are either August 14th or 15th; are you available on those dates???

I have one more update to provide to both of you. During NSF's solicitation process (requesting the submission of proposals by entities to potentially operate Arcibo for scientific/educational purposes), we have begun to discuss the possibility of transferring ownership of Arcibo to a non-federal entity. We know that we have already included suggested provisions in the draft PA that address all of the proposed alternatives for disposition of the facility (from a change in operators who would continue to operate the facility for scientific and/or educational purposes, to partial or complete deconstruction of the facility), however, we did not specifically address a transfer to a non-federal entity. It seems to us, however, that the scope of alternatives addressed in the draft PA would include provisions that could be applied to address an alternative that includes the transfer of the facility to a non-federal entity, but I wanted to see what your thoughts are on this point.

Once I hear back from both of you and incorporate any comments that you may have on the draft PA, I plan to reach out to Betsy Merritt of the National Trust to see if the Trust is interested in serving as a consulting party in our process. I believe, also, that Charlene was going to see if there might be other entities/people who might be interested in participating in our process – the hope was that we could reach out to others who might be knowledgeable and able to provide additional and creative input into our draft PA.

Thank you both for working with us on our Section 106 consultation process. We look forward to hearing back from you at your earliest convenience.

Warm wishes,

Caroline

p.s. Charlene – I do not believe that I have seen a letter from you yet responding to NSF's invitation to participate in our Section 106 process. Please let me know if you have already sent it and I need to look elsewhere in the agency to locate it. Thank you.

Caroline M. Blanco

Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: "Blanco, Caroline M" <cblanco@nsf.gov>

Date: Friday, April 28, 2017 at 6:01 PM

To: "jfowler@achp.gov" <jfowler@achp.gov>, 'Charlene Vaughn' <cvaughn@achp.gov>, John Eddins

From: Berenice Sueiro <bsueiro@prshpo.pr.gov>

Date: Thursday, May 18, 2017 at 5:33 PM

To: "Blanco, Caroline M" <cblanco@nsf.gov>, 'Charlene Vaughn' <cvaughn@achp.gov>

Cc: "Lori.Price@CH2M.com" <Lori.Price@CH2M.com>, Elizabeth Pentecost <epenteco@nsf.gov>, "Hamilton, Kristen" <KRIHAMIL@nsf.gov>, "Carlos A. Rubio Cancela Director Ejecutivo" <carubio@prshpo.pr.gov>, Miguel Bonini <mbonini@prshpo.pr.gov>, Santiago Gala <sgala@prshpo.pr.gov>, Juan Llanes <jllanes@prshpo.pr.gov>

Subject: RE: Invitation to Participate in Section 106 Consultation for National Science Foundation Undertaking:
Proposed Changes to Operations at Arecibo Observatory



GOBIERNO DE PUERTO RICO
Oficina Estatal de Conservación Histórica

Caroline:

Greetings,

We will send comments soon.

Best regards,

Berenice R Sueiro Vázquez, AIT
Gerente Conservación Histórica

Historic Preservation Manager

P.O. Box 9023935

San Juan, P.R. 00902-3935

T. (787) 721-3737 x.2002

F. (787) 721-3773



From: Blanco, Caroline M [mailto:cblanco@nsf.gov]

Sent: Tuesday, May 23, 2017 8:55 PM

To: Berenice Sueiro <bsueiro@prshpo.pr.gov>; 'Charlene Vaughn' <cvaughn@achp.gov>

Cc: Hamilton, Kristen <KRIHAMIL@nsf.gov>; Price, Lori/TPA <Lori.Price@CH2M.com>; Pentecost, Elizabeth A. <epenteco@nsf.gov>; Zender, Kira/ATL <Kira.Zender@CH2M.com>

Subject: National Science Foundation Undertaking: Request for Comments on Preliminary Draft Programmatic Agreement re Proposed Changes to Operations at Arecibo Observatory [EXTERNAL]

Hi Berenice and Charlene – I hope all is well with both of you. I apologize for sending you another email about NSF's section 106 compliance; I certainly appreciate how busy you both are. Due to our tight timeline, however, I am following-up to see if either of you has comments on our preliminary draft Programmatic Agreement. Because of our need to complete our Section 106 compliance by the end of August, and because we would really like to provide our consulting parties and the public with a 30-day review and comment period on the draft Programmatic Agreement, we will need to send it out on Friday, May 26th to have it translated. It would be wonderful if we could have the benefit of your initial thoughts about the draft Programmatic Agreement before we send it out for review and comment. If you do have any comments – or even initial thoughts – on our draft Programmatic Agreement, we will need to receive them by the end of the day on May 25th. Many thanks in advance for any feedback you are able to provide us.

Warm wishes,

Caroline

Caroline M. Blanco

Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: Charlene Vaughn [mailto:cvaughn@achp.gov]

Sent: Wednesday, May 24, 2017 9:57 AM

To: Caroline Blanco <cblanco@nsf.gov>; Berenice Sueiro <bsueiro@prshpo.pr.gov>

Cc: Hamilton, Kristen <KRIHAMIL@nsf.gov>; Price, Lori/TPA <Lori.Price@CH2M.com>; Pentecost, Elizabeth A. <epenteco@nsf.gov>; Zender, Kira/ATL <Kira.Zender@CH2M.com>

Subject: RE: National Science Foundation Undertaking: Request for Comments on Preliminary Draft Programmatic Agreement re Proposed Changes to Operations at Arecibo Observatory [EXTERNAL]

Hi Caroline,

I have not been able to speak with the SHPO regarding the details of this matter. While I understand the timeframe you have to meet for this undertaking, the ACHP also must speak to the SHPO before we can endorse this PA. We do not have extensive knowledge about this resource and must have the perspective of the SHPO regarding how this draft PA was developed.

I will try to speak with Berenice this week and get a letter out to NSF as soon as possible. I am certain that the ACHP will have comments on the PA and will try to get them to you by close of business Thursday.

Charlene

From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]

Sent: Wednesday, May 24, 2017 3:13 PM

To: Charlene Vaughn <cvaughn@achp.gov>; Berenice Sueiro <bsueiro@prshpo.pr.gov>

Cc: Hamilton, Kristen <KRIHAMIL@nsf.gov>; Lori Price <lori.price@ch2m.com>; Pentecost, Elizabeth A. <epenteco@nsf.gov>; Kira Zender <kira.zender@ch2m.com>

Subject: Re: National Science Foundation Undertaking: Request for Comments on Preliminary Draft Programmatic Agreement re Proposed Changes to Operations at Arecibo Observatory

Thank you, Charlene. I really appreciate any help that you and Berenice can provide. If there is any chance of being able to transfer the property to a potential proposer to allow for continued operations, NSF will need to meet its deadline of issuing the ROD by late August/early September. I am very sorry for the tight timeline, but we are doing what we can to move this situation in a positive direction --- if at all possible.

Many thanks, again.

All the best,

Caroline

Caroline M. Blanco

Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov



GOBIERNO DE PUERTO RICO
Oficina Estatal de Conservación Histórica

May 25, 2017

Caroline M. Blanco

Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

SHPO 06-06-16-03 PROPOSED CHANGES TO ARECIBO OBSERVATORY OPERATIONS, ARECIBO, PUERTO RICO

Dear Ms. Blanco,

We acknowledge receipt of your draft of a programmatic agreement (PA) to resolve the adverse effects that may be caused by several potential changes to the operation of the Arecibo Observatory in Puerto Rico. We have carefully reviewed this draft.

As recommended in our letter of December 12, 2016, we believe consultation among the various consulting parties, including the Advisory Council on Historic Preservation, should continue in order to seek agreement on how to resolve these potential effects. This consultation is still pending. We therefore believe the treatment options presented in the draft PA, prior to the participation of the all the parties involved in seeking to resolve effects, premature.

In light of the local, national, international and maybe (dare we say) even universal interest in this world class astronomical facility, we believe all alternatives under consideration for the future operation of the Arecibo Observatory, including the "No-Action Alternative - Continued NSF Investment for Science-focused Operations," should be part of this group discussion.

If you have any questions regarding this matter, please contact our Office.

Sincerely,

Carlos A. Rubio-Cancela
State Historic Preservation Officer

CARC/BRS/MB

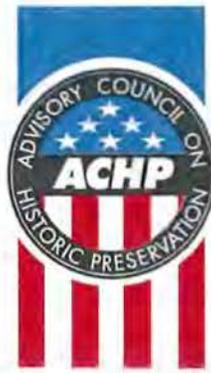
c. Charlene Dwin Vaughn
ACHP



Milford Wayne Donaldson, FAIA
Chairman

Leonard A. Forsman
Vice Chairman

John M. Fowler
Executive Director



Preserving America's Heritage

May 26, 2017

Dr. France A. Córdova
Director
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

Ref: *Proposed Changes to Arecibo Observatory Operations
Arecibo, Puerto Rico*

Dear Dr. Córdova:

In response to the recent notification by the National Science Foundation (NSF), the Advisory Council on Historic Preservation (ACHP) will participate in consultation for the proposed changes to the Arecibo Observatory Operations in Arecibo, Puerto Rico. Our decision to participate in this consultation is based on the *Criteria for Council Involvement in Reviewing Individual Section 106 Cases*, contained within our regulations. The criteria are met for this proposed undertaking because the undertaking will have substantial impacts on an important historic property.

Section 800.6(a) (1) (iii) of our regulations requires that we notify you, as the head of the agency, of our decision to participate in consultation. By copy of this letter, we are also notifying Caroline M. Blanco, NSF's Federal Preservation Officer and Assistant General Counsel of this decision.

Our participation in this consultation will be handled by Charlene Dwin Vaughn, AICP, Assistant Director, Office of Federal Agency Programs, who can be reached at 202-517-0207 or by e-mail at cvaughn@achp.gov. We look forward to working with NSF and other consulting parties to consider alternatives to this undertaking that could avoid, minimize, or mitigate potential adverse effects on historic properties and to reach a memorandum of agreement.

Sincerely,

John M. Fowler
Executive Director



Preserving America's Heritage

May 30, 2017

Ms. Caroline M. Blanco
Assistant General Counsel/Federal Preservation Officer
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

Ref: *Proposed Funding Changes to Arecibo Observatory Operations
Arecibo, Puerto Rico*

Dear Ms. Blanco:

By letter dated May 25, 2017, the Advisory Council on Historic Preservation (ACHP) notified the Director of the National Science Foundation, Dr. Frances Córdova that we would be participating in the Section 106 consultation for the referenced undertaking, submitted to us for review on April 28, 2017. The Arecibo Observatory Historic District, which will be adversely affected by the proposed changes to Arecibo Observatory Operations, is listed in the National Register of Historic Places. Although originally listed in 2008, it was relisted in 2015 to correct the ownership information and clarify that NSF was the property owner. NSF published a Draft Environmental Impact Statement (DEIS) on the proposed changes to the NSF's funding stream for Observatory operations on October 28, 2016. Neither the Puerto Rico State Historic Preservation Officer (SHPO) nor the ACHP submitted comments on this document. However, by letter dated May 26, 2017, the Puerto Rico SHPO advised NSF that it had reviewed the April 28, 2017 DEIS, and concluded that the development of the draft Programmatic Agreement (PA) may be premature since NSF has not yet convened a Section 106 consultation meeting with consulting parties.

The ACHP concurs with the Puerto Rico SHPO's conclusion; it does not appear that NSF has fully considered the full range of alternatives to this undertaking, particularly the avoidance and minimization alternatives. Further, the draft PA does not incorporate any mitigation measures that have been recommended by the Puerto Rico SHPO as they have not yet discussed these issues with NSF. Only after NSF has engaged in meaningful consultation with all consulting parties would we be prepared to comment on the draft PA that outlines a robust mitigation strategy.

Having reviewed the DEIS and the transcript from the two on-site public meetings held in Puerto Rico in 2016, we have identified a number of historic preservation concerns related to the five alternatives discussed in the DEIS that NSF will need to address as we go forward with the Section 106 review process. We, therefore, request that NSF address the following issues which we believe are relevant to the Section 106 review because they have the potential to affect the continued operation, and thus the integrity, of this historic property.

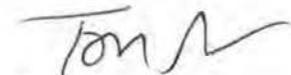
1. How will NASA fulfill its Congressionally- mandated responsibilities to track and characterize asteroids if NSF ceases to operate the Arecibo Observatory as a scientific facility?

2. Has NSF engaged in formal discussions with NASA about assuming a more prominent role in the management and operations of the Arecibo Observatory? Could NASA contribute additional funds to such an arrangement to compensate for NSF's proposed divestiture of all or part of the facility?
3. What impact will changes in operations at the Arecibo Observatory have on the NSF's NANOGrav Physics Frontier Center, which we understand has been recognized recently for cutting edge scientific accomplishments?
4. Has the DEIS explored the cultural effects that the divestiture and deconstruction program will have on the Arecibo community in particular, and the Commonwealth of Puerto Rico in general? If the facility is substantially altered, is it likely that tourism to Arecibo will be reduced?
5. Has NSF contacted other Federal agencies besides NASA to ascertain their interest in partnering with NSF to operate the Arecibo Observatory as a scientific and/or educational facility? What agencies have been contacted and what was their response?
6. What consulting parties have expressed an interest in participating in the Section 106 review process? Were any invited to participate in developing the draft PA submitted to us on April 28, 2017? If so, do you have summaries of their comments and how they were addressed in the draft PA?
7. Has NSF spoken with local officials about the purpose and need statement in the DEIS? What input have they had on the effects of changing the operations of the Arecibo Observatory?
8. How many visitors has NSF had to its website to review or comment on the Arecibo Observatory DEIS? Did any of them submit comments that informed the approach NSF has taken to develop the draft PA?
9. Is it possible to extend the Cooperative Agreement with SRI USRA until 2020, the date which NSF's GEO Advisory Committee recommended it reduce funding to support the Arecibo Observatory to \$1.1 million?
10. How does NSF intend to address the NEPA concerns, such as socio-economic issues, and reference them in the Section 106 PA? (Numerous comments regarding the value of the Arecibo Observatory to local, US, and International students, and the need to continue STEM programs at the high school and college level were shared during the public meetings. While these issues are not directly related to historic preservation, they are related to the NEPA review and the importance of this historic property to the socio-economic well-being of residents and students.)

Thank you for sharing with us the chronology of the Section 106 review to date in the April 28, 2017 letter. The summary of the dates was helpful in clarifying the level of outreach NSF has made to all stakeholders. We appreciate that NSF has a schedule for completing its NEPA review that also requires the agency to demonstrate progress in moving forward with the Section 106 review. Therefore, we request that NSF schedule a teleconference in June 2017 with the Puerto Rico SHPO and the ACHP to discuss how it has considered avoidance and minimization alternatives as well as identifying dates for hosting a consultation meeting for all consulting parties. During the teleconference, we can also discuss the August 2017 deadline that we understand NSF has identified as the deadline for completing its NEPA document.

If you have any questions or want to discuss this matter further, please contact Charlene Dwin Vaughn, ACIP, at cvaughn@achp.gov, or by telephone at 202-517-0207.

Sincerely,



Reid Nelson
Director
Office of Federal Agency Programs

From: 'Charlene Vaughn' <cvaughn@achp.gov>
Date: Tuesday, June 13, 2017 at 6:56 PM
To: "Blanco, Caroline M" <cblanco@nsf.gov>, "Berenice Sueiro (sueiroberenice@gmail.com)" <sueiroberenice@gmail.com>, "carubio@prshpo.pr.gov" <carubio@prshpo.pr.gov>, ""mbonini@prshpo.pr.gov"" <mbonini@prshpo.pr.gov>
Cc: Reid Nelson <rnelson@achp.gov>
Subject: Arecibo - NSF Preliminary Draft PA 6.13.2017 v.2

Hello All,

Attached are the comments from the ACHP on the draft PA submitted to us today by NSF. I understand that NSF needs to move forward with the consultation. However, the draft PA does not reflect the last conversation that the PRSHPO and ACHP had with NSF regarding the Section 106 consultation. While this document is comprehensive, it fails to reflect the outcome of meaningful and good faith consultation. As such, we recommend that NSF review our comments and any provided by the PRSHPO then convene a consultation meeting with ALL consulting parties that clarifies why this PA is being developed at this time when there are many issues that are yet to be resolved. Reviewing the stipulations would have been premature until all parties have contributed to drafting provisions that are appropriate for NSF's plans to divest and shutter or partially shutter the Arecibo Observatory.

I will be out of the office Thursday and Friday of this week and Monday to Wednesday of next week. I hope NSF is able to schedule a Section 106 teleconference with consulting parties during this period.

Regards,

Charlene Vaughn

From: Charlene Vaughn [mailto:cvaughn@achp.gov]

Sent: Wednesday, June 14, 2017 1:55 PM

To: Caroline Blanco <cblanco@nsf.gov>; carubio@prshpo.pr.gov; 'mbonini@prshpo.pr.gov' <mbonini@prshpo.pr.gov>; Berenice Sueiro <bsueiro@prshpo.pr.gov>

Cc: Reid Nelson <rnelson@achp.gov>; Price, Lori/TPA <Lori.Price@CH2M.com>; Hamilton, Kristen <KRIHAMIL@nsf.gov>; Pentecost, Elizabeth A. <epenteco@nsf.gov>; Zender, Kira/ATL <Kira.Zender@CH2M.com>

Subject: RE: Arecibo - NSF Preliminary Draft PA 6.13.2017 v.2 [EXTERNAL]

Thanks for the follow-up email, Caroline. I'm glad you located and reviewed the 1991 study we developed, ***Balancing Historic preservation Needs with the Operation of Highly Technical and Scientific Facilities***. I do believe that NSF is trying to adhere to this guidance. However, I don't think it has been communicated properly to consulting parties who have other expectations about the parameters under which the Section 106 review is being conducted. Since I understand that NSF has indicated that its peer review process has concluded that the Arecibo Facility should be divested soon, this action has been tangled with the treatment of a National Register property. Perhaps during the teleconference next week, NSF can explain how it is dealing with science and historic preservation separately to advance the Section 106 review process. Until and unless this is clarified, Alternatives 1 and 2, which have a historic preservation focus, may be confusing during the resolution of adverse effects.

Charlene

From: Charlene Vaughn [mailto:cvaughn@achp.gov]

Sent: Wednesday, June 14, 2017 11:13 AM

To: Caroline Blanco <cblanco@nsf.gov>; Berenice Sueiro (sueiroberenice@gmail.com) <sueiroberenice@gmail.com>; carubio@prshpo.pr.gov; 'mbonini@prshpo.pr.gov' <mbonini@prshpo.pr.gov>

Cc: Reid Nelson <rnelson@achp.gov>; Price, Lori/TPA <Lori.Price@CH2M.com>; Hamilton, Kristen <KRIHAMIL@nsf.gov>; Pentecost, Elizabeth A. <epenteco@nsf.gov>; Zender, Kira/ATL <Kira.Zender@CH2M.com>

Subject: RE: Arecibo - NSF Preliminary Draft PA 6.13.2017 v.2 [EXTERNAL]

Hello Caroline,

Thanks for your response. Let me explain several points so that you understand the ACHP's perspective as we move forward with the Section 106 consultation for the Arecibo Observatory divestiture.

1. NSF's revised draft PA needs work. In particular, it needs to be developed following consultation with consulting parties. Both the SHPO and ACHP agreed on this position during our teleconference a couple of weeks ago. We are not saying that NSF has not made a conscientious effort to advance this review. However, we do think additional consultation is sorely needed if we are to provide relevant feedback.
2. The original draft PA you provided WAS NOT ready to be shared with consulting parties. The SHPO had major issues that needed to be addressed such as NSF's use of some of the terminology in the draft PA which needed to be corrected. Fixing some of the language was necessary and appropriate..
3. The feedback I have received from several consulting parties expressed frustration and confusion about how NSF engaged local residents and officials that have long-term association with the Arecibo facility in the Section 106 consultation. They indicated that NSF gave succinct presentations during the consultation and public meetings. Further, they believe that most of their questions were not addressed leaving them confused about the fate of Arecibo. As such, they need to understand how NSF arrived at the alternatives and what will happen to this National Register property.
4. It would be helpful if NSF could consult with an agency such as NASA regarding how it has coordinated its NEPA and NHPA reviews for the divestiture of historic properties. We think understanding how they handled Section 106 consultation when alternatives had not been selected, and additional information needed to be gathered would be extremely useful. The FPO at NASA is knowledgeable about Section 106 and should be a good contact.
5. I understand that NSF has worked with a couple of entities that responded to the solicitation of proposals. As such, we need to discuss how the alternatives for continued scientific and educational use should be handled as a "marketing" alternative. We could then discuss the other alternatives as fall back options if the marketing is infeasible. I think this is a more cogent way to address the alternatives and could allow us to address avoidance and mitigation alternatives.

6. In closing, NSF has been explicit in summarizing the ACHP's lack of response to the efforts it made to engage us early in the Section 106 consultation for the Arecibo Observatory divestiture. We understand your point and I have apologized that this action by staff was not appropriate and in keeping with Federal agency and stakeholder engagement policies. Having said that, I am now representing ACHP management in coordinating this review. Further, to continuously be reminded of past ACHP staff oversights is frustrating and not helpful. I need to focus on finding a way through this Section 106 review rather than looking back at problems and oversights, which you know I was unaware of at the time.

I look forward to speaking with you when I return to the office next week. I remain optimistic that NSF, the PRSHPO, consulting parties, and the ACHP can work through many of our concerns if we allocate the time that is needed.

Regards,

Charlene

From: Charlene Vaughn [mailto:cvaughn@achp.gov]

Sent: Wednesday, June 14, 2017 1:00 PM

To: Caroline Blanco <cblanco@nsf.gov>; Berenice Sueiro <bsueiro@prshpo.pr.gov>

Cc: Hamilton, Kristen <KRIHAMIL@nsf.gov>; Price, Lori/TPA <Lori.Price@CH2M.com>; Zender, Kira/ATL <Kira.Zender@CH2M.com>; Pentecost, Elizabeth A. <epenteco@nsf.gov>

Subject: RE: Arecibo - Telephonic consultation meeting and in-person meeting --- [EXTERNAL]

Hello Caroline and Berenice,

I am available to participate in a Section 106 teleconference to discuss Arecibo on June 21st at 3:30 pm as. I will return from Milwaukee by noon on June 21st. In addition, I can participate in a teleconference on July 7th as the ACHP does not have funds for travel to Puerto Rico.

Regards,

Charlene Vaughn

From: Pentecost, Elizabeth A. [mailto:epenteco@nsf.gov]

Sent: Wednesday, June 14, 2017 5:25 PM

To: anthony.vaneyken@sri.com; jschmelz@usra.edu; nwhite@usra.edu; danuchko@hotmail.com; carmen.pantoja1@upr.edu; babilonia.miguel@yahoo.com; zhouq@miamioh.edu; luisafzambrano@gmail.com; siemens@uwm.edu; brettisham3@gmail.com

Subject: Notification of consulting parties/historic preservation meeting via teleconference on June 21 regarding NSF's proposed changes to Arecibo Observatory operations [EXTERNAL]

Importance: High

Good afternoon,

This email is being distributed to those who have self-identified as a consulting party in the Section 106 (of the National Historic Preservation Act) consultation process regarding the National Science Foundation's proposed changes to Arecibo Observatory operations. **We would like to invite you to participate in consulting parties meetings as follows (pending confirmation by the Puerto Rico State Historic Preservation Officer):**

- **Teleconference on Wednesday, June 21, at 3:30pm. Please call 1-866-831-9952 and use participant pin 3889592#**
- **Meeting in San Juan on Thursday, July 6, at 6:00pm (location information to be provided soon)**

During our last consulting parties meeting in November we agreed on the Area of Potential Effects as the boundary of the National Astronomy and Ionosphere Center (Arecibo Observatory) Historic District and discussed adverse effects that could occur as a result of the proposed alternatives NSF is evaluating. Since that meeting, NSF has continued to consult with the Puerto Rico State Historic Preservation Officer, and also with the Advisory Council on Historic Preservation, which has recently joined our consultation process for this undertaking. NSF has determined that all the alternatives being considered could result in adverse effects to the historic district. The next step in the process, as mentioned during our November meeting, is to consult with you to develop measures to avoid, minimize, or mitigate potential effects, and to document these measures in an agreement document such as a Programmatic Agreement (PA). We anticipate that any PA that is developed should address all potential alternatives, since NSF is not yet able to make a determination as to whether its preferred alternative (*Collaboration with Interested Parties for Continued Science-focused Operations*) is feasible.

Several of you submitted comments on the Draft Environmental Impact Statement (DEIS) that addressed concerns about cultural resources. These comments will be addressed in the Final EIS, and NSF has reviewed them as part of the Section 106 process as well. Comments noted that the Observatory has cultural importance to Puerto Rico and to the greater scientific community, and many commenters objected to its demise.

We have developed some draft measures (see below) to use as a starting point for our discussion of potential avoidance, minimization, and mitigation measures at our June 21st meeting. We welcome your feedback on these proposed

measures as well as any other historic preservation ideas you may have to address potential adverse effects. The 2008 [National Register nomination](#) for the historic district may provide you with helpful context for the discussion on historic preservation (note that the ownership of the observatory is National Science Foundation, not Cornell University, and this has since been updated).

Following the teleconference, NSF will consider all comments provided to date – including those conveyed during our June 21st meeting – and prepare a draft PA for your review. After we issue a draft PA, we will initiate a 30-day comment period so that you can continue to provide input on historic preservation measures. It is our intention to provide, and post to our website, the draft PA prior to the in-person meeting on July 6th. The purpose of the meeting on July 6th will be to continue the conversation and discuss your comments on the draft PA.

We appreciate your participation in this Section 106 process.

Possible measures to address adverse effects to the National Astronomy and Ionosphere Center (Arecibo Observatory) Historic District:

Under Alternatives 1 (*Collaboration with Interested Parties for Continued Science-focused Operations*) and 2 (*Collaboration with Interested Parties for Transition to Education-focused Operations*):

- NSF would encourage any and all collaborators to retain and use the historic buildings and structures that contribute to the NAIC historic district
- NSF would provide to the collaborator, via a qualified historic preservation professional, historic preservation awareness training to encourage awareness of the historic significance of the Observatory and to minimize the potential for adverse effects to the historic property
- If the collaborator does not wish to retain and use all buildings, NSF would ensure appropriate documentation of buildings and structures occurs prior to any demolition
- In the case that NSF transfers ownership of the Observatory to a non-federal entity, NSF would ensure that the Observatory is documented and will include historic preservation measures in the legal documents as part of any title transfer.
 - Ideas for preservation measures for any new owner: (1) require the new owner to invite the Puerto Rico State Historic Preservation Officer to a site visit every X years, in order to provide guidance and recommendations on preservation of the historic district; and (2) require that if demolition of a contributing element occurs the new owner would provide interpretive plaques or signs to tell the story of how that facility contributed to the Observatory and historic district.

Alternative 3 (*Mothballing Facilities*):

- Essential buildings would be mothballed and radio telescopes and other equipment would be protected and maintained in an operational readiness condition, allowing the facility to be reopened at a future date. No historic properties would be demolished. Mothballing would be implemented in accordance with Secretary of the Interior and National Park Service guidance and standards.

Alternatives 4 (*Partial Demolition and Site Restoration*) and 5 (*Full Demolition and Site Restoration*):

- NSF would ensure appropriate documentation of buildings and structures occurs prior to any demolition

Sincerely,

Elizabeth Pentecost

From: Blanco, Caroline M [<mailto:cblanco@nsf.gov>]
Sent: Wednesday, June 14, 2017 12:30 AM
To: Charlene Vaughn; Berenice Sueiro (sueiroberenice@gmail.com); carubio@prshpo.pr.gov; 'mbonini@prshpo.pr.gov'
Cc: Reid Nelson; Lori Price; Hamilton, Kristen; Pentecost, Elizabeth A.; Kira Zender
Subject: Re: Arecibo - NSF Preliminary Draft PA 6.13.2017 v.2

Hi Charlene – Thank you for responding so quickly to my message. After reading both your email and comments, I have several significant concerns. First, I am concerned that we have quite a disconnect with regard to the consultation that NSF has done to date. Second, I am concerned that some of what NSF conveyed during our conference call was not understood, such as NSF's repeated outreach efforts to local Puerto Rican officials and NSF's process for soliciting proposals for new operators. Third, there seem to be differences in our understanding of the process that I thought we had agreed to at the end of our call: my recollection is that we discussed having NSF prepare a revised preliminary draft PA for initial review by you and Berenice before we sent it out to the consulting parties. That is the reason why I sent you and Berenice the revised preliminary draft PA earlier today. Had we known that your preference was for us to send it out first to the consulting parties, we would have done so in April when we sent you the first version of the preliminary draft PA. Also, just to clarify, the preliminary draft PA is by no means intended to be a near-final draft document; rather, it was intended to be a starting point for discussion purposes.

At this juncture and in light of your message, NSF will endeavor to set up a teleconference with the 10 consulting parties and the SHPO as soon as possible to discuss ways to avoid, minimize and/or mitigate adverse effects related to the various proposed alternatives. While I understand that it is a bit challenging to discuss adverse effects associated with five alternatives, NSF does not know at this point which alternative it will select and, to be in compliance with the law, NSF must complete its Section 106 consultation process before it issues a final decision. This is why we set forth suggested ways to address adverse effects for each alternative and this is also why we followed the advice of the SHPO to prepare a PA instead of a MOA.

In closing, I think it is important to point out that NSF made great efforts to start its Section 106 compliance at the earliest stage possible so that a meaningful process could take place over a very reasonable time-frame. It has now been over a year since we started our process and we have done our best to follow all of the good advice that the SHPO has given us since we first spoke with the SHPO in the Spring of 2016. Over the past year, we also made repeated efforts to involve the ACHP and only recently (last month) did the ACHP accept our invitation to participate in our process. It is very unfortunate that, despite these numerous and good-faith efforts to conduct a transparent and meaningful Section 106 consultation process within a reasonable time-frame, NSF is now facing a crunched schedule and a process that is not based on a mutual understanding of what has transpired to date. In light of this situation, I suggest that we have an in-person meeting (perhaps at the end of next week when you are back in the office) to discuss the status of our process and next steps. Hopefully, by that time, NSF will have been able to hold a consultation meeting, as you suggest, with the consulting parties. It is my sincere hope that we can resolve the issues raised in your email and comments and develop a clear and mutually understood process for moving forward. If a meeting at the end of next week is acceptable to you, please propose a day and time for us to meet. Hopefully, Berenice will be able to join us in that meeting by phone.

Best regards,

Caroline

Caroline M. Blanco
Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592

From: Blanco, Caroline M [mailto:cblanco@nsf.gov]
Sent: Wednesday, June 14, 2017 12:41 PM
To: Berenice Sueiro <bsueiro@prshpo.pr.gov>
Cc: 'Charlene Vaughn' <cvaughn@achp.gov>; Hamilton, Kristen <KRIHAMIL@nsf.gov>; Price, Lori/TPA <Lori.Price@CH2M.com>; Zender, Kira/ATL <Kira.Zender@CH2M.com>; Pentecost, Elizabeth A. <epenteco@nsf.gov>
Subject: Arecibo - Telephonic consultation meeting and in-person meeting --- [EXTERNAL]
Importance: High

Hi Berenice – I am following-up regarding Charlene’s suggestion that NSF hold a Section 106 consultation meeting with consulting parties before she returns to her office next Thursday, June 22nd. To give the consulting parties maximum notice, we are proposing to have the telephonic consultation meeting on Wednesday, June 21st starting at 3:30, and we plan to send out a meeting invite by the end of today. Are you available on Wednesday, the 21st of June at 3:30?

In addition, we are planning for an in-person consultation meeting with the consulting parties in San Juan on Friday, July 7th. Are you available? (Charlene – Are you available to participate either in-person or by phone?)

Many thanks.

Best,

Caroline

Caroline M. Blanco
Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: Blanco, Caroline M [mailto:cblanco@nsf.gov]

Sent: Wednesday, June 14, 2017 1:37 PM

To: Charlene Vaughn <cvaughn@achp.gov>; carubio@prshpo.pr.gov; 'mbonini@prshpo.pr.gov' <mbonini@prshpo.pr.gov>; Berenice Sueiro <bsueiro@prshpo.pr.gov>

Cc: Reid Nelson <rnelson@achp.gov>; Price, Lori/TPA <Lori.Price@CH2M.com>; Hamilton, Kristen <KRIHAMIL@nsf.gov>; Pentecost, Elizabeth A. <epenteco@nsf.gov>; Zender, Kira/ATL <Kira.Zender@CH2M.com>

Subject: Re: Arecibo - NSF Preliminary Draft PA 6.13.2017 v.2 [EXTERNAL]

Thank you, Charlene. We are in the process of trying to set up a consulting parties telephonic meeting to take place within the week (tentatively set up for Wednesday, June 21st at 3:30 p.m.). Hopefully, that meeting will be a good follow-on to our Section 106 consultation meeting that took place last November in San Juan. (Attached to this message is a pdf of the meeting notes from our November 17, 2016 consultation meeting.) And, after our next meeting, we can take another look at our preliminary draft PA and adjust it as needed to reflect input from the consulting parties. Hopefully, as I said in my message last night, we (NSF, the SHPO, and the ACHP) can meet at the end of next week to discuss what transpired during next Wednesday's consulting parties meeting, and determine next steps.

We have some feedback regarding a couple of points raised in your recent emails. First, you had asked whether consulting parties had input into the solicitation for new operators at Arecibo Observatory. As I mentioned to you during our conference call, the process for evaluating proposals in response to the solicitation is based on NSF's scientific review process, which includes a merit review conducted by scientific experts to evaluate the proposals based on several established criteria, including scientific merit. After the merit review process, the NSF Program Officer will determine whether a proposal should be recommended for funding (i.e., the proposal is "viable"). If a proposal is recommended for funding, then NSF conducts its environmental reviews. It is at that point where impacts on historic properties are evaluated and addressed pursuant to Section 106. During both of the calls that we had with you over the past month, you mentioned a document that the ACHP prepared that addresses the balance between historic preservation needs and the operation of scientific facilities. We found that document and reviewed it (the summary of the 1991 study can be found at: <http://www.achp.gov/balancingsum.html#conclusions>). According to the document, scientific reviews are to be kept separate and distinct from historic preservation concerns. This appears to be consistent with NSF's approach. The relevant provision of the document follows:

Balancing Historic Preservation Needs with the Operation of Highly Technical or Scientific Facilities (1991)

Decisions about projects that may affect historic properties need to be made with as complete an understanding as possible of such effects. However, considerations of preservation options should be kept distinct from the peer review process of awarding research grants and the determination of research priorities central to the scientific research process.

Scientists fear that the impact a proposed research project may have on historic properties ultimately will be considered in determining the project's scientific value. This, in turn, suggests that non-scientists could have a major impact on what

kind of research is carried out, and where. There is a real concern on the part of the scientific community that nonscientific issues will either cloud the scientific worth of a proposed activity or result in changes that will make the research less effective or comprehensive.

These two issues, the scientific value of a research activity and the considerations of effect to historic properties, should be kept separate and distinct. The Section 106 process is ideally designed to reach a consensus on accommodating historic preservation concerns as an activity proceeds; it begins with a bias toward allowing the activity to go ahead. The law states that agencies must "take into account" the effects of their undertakings on historic properties, and afford the Council a reasonable opportunity to comment on those effects. It does not mandate preservation/retention but requires only that preservation values be considered in decisions that would alter or harm historic properties. This should not be construed by the historic preservation community as a license to scrutinize and rewrite research plans and decisions much less to open them to public debate.

Please let me know if you understand the process to be different than that articulated in the 1991 document.

Second, you suggested that we contact NASA about our NEPA and NHPA processes. As I believe we may have mentioned during our last call with you, NASA is a cooperating agency in our NEPA process for this proposed action. We have not received any input from NASA on our 106 process, but have been keeping them apprised of where things stand. We can, nevertheless, reach out to their Federal Preservation Officer to directly discuss this situation and see if they have any suggestions.

Finally, please note that in bringing up NSF's prior efforts to work with the ACHP, it was not my intent to call out the ACHP for not being responsive; I acknowledge, and very much appreciate, the apology that you gave over the phone when we last spoke. The reason that I did bring up NSF's prior efforts was to try to express why we now find ourselves with a very short timeline and a need to clarify how to move forward with our process. As I explained last night, I feel as though we have been diligent and responsive to the guidance provided by the SHPO, have tried to carefully respond to the suggestions you made during our call, and have approached our process with transparency and commitment. Hopefully, you will see that we have taken this approach as we move forward.

Thank you, again, and please let me know if you are available for an in-person meeting on either Thursday or Friday of next week.

Best regards,

Caroline

Caroline M. Blanco
Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265
Arlington, VA 22230
Tel.: 703.292.4592
Fax: 703.292.9041
Email: cblanco@nsf.gov

From: Pentecost, Elizabeth A. [mailto:epenteco@nsf.gov]

Sent: Thursday, June 15, 2017 4:45 PM

To: anthony.vaneyken@sri.com; nwhite@usra.edu; jschmelz@usra.edu; danuchko@hotmail.com; carmen.pantoja1@upr.edu; babilonia.miguel@yahoo.com; brettisham3@gmail.com; siemens@uwm.edu; luisafzambrano@gmail.com; zhouq@miamioh.edu

Subject: Notification of consulting parties/historic preservation meetings regarding NSF's proposed changes to Arecibo Observatory operations ***UPDATED*** [EXTERNAL]

Good afternoon, the below message has been updated since yesterday. Please note that the in-person meeting location has been moved from San Juan to Arecibo, and the Puerto Rico State Historic Preservation Officer has confirmed that staff will be able to attend these meetings.

This email is being distributed to those who have self-identified as a consulting party in the Section 106 (of the National Historic Preservation Act) consultation process regarding the National Science Foundation's proposed changes to Arecibo Observatory operations. **We would like to invite you to participate in consulting parties' meetings as follows:**

- **Teleconference on Wednesday, June 21, 2017, at 3:30pm EDT. Please call 1-866-831-9952 and use participant pin 3889592#**
- **Meeting in San Juan on Thursday, July 6, 2017, at 6:00pm EDT, at Colegio de Ingenieros y Agrimensores de Puerto Rico/Puerto Rico Professional College of Engineers and Land Surveyors (Arecibo Chapter), Ave. Manuel T. Guilla'n Urda'z, Conector 129 Carr. 10, Arecibo, Puerto Rico, Phone: (787) 758-2250**

During our last consulting parties meeting in November we agreed on the Area of Potential Effects as the boundary of the National Astronomy and Ionosphere Center (Arecibo Observatory) Historic District and discussed adverse effects that could occur as a result of the proposed alternatives NSF is evaluating. Since that meeting, NSF has continued to consult with the Puerto Rico State Historic Preservation Officer, and also with the Advisory Council on Historic Preservation, which has recently joined our consultation process for this undertaking. NSF has determined that all the alternatives being considered could result in adverse effects to the historic district. The next step in the process, as mentioned during our November meeting, is to consult with you to develop measures to avoid, minimize, or mitigate potential effects, and to document these measures in an agreement document such as a Programmatic Agreement (PA). We anticipate that any PA that is developed should address all potential alternatives, since NSF is not yet able to make a determination as to whether its preferred alternative (*Collaboration with Interested Parties for Continued Science-focused Operations*) is feasible.

Several of you submitted comments on the Draft Environmental Impact Statement (DEIS) that addressed concerns about cultural resources. These comments will be addressed in the Final EIS, and NSF has reviewed them as part of the Section 106 process as well. Comments noted that the Observatory has cultural importance to Puerto Rico and to the greater scientific community, and many commenters objected to its demise.

We have developed some draft measures (see below) to use as a starting point for our discussion of potential avoidance, minimization, and mitigation measures at our June 21st meeting. We welcome your feedback on these proposed

measures as well as any other historic preservation ideas you may have to address potential adverse effects. The 2008 [National Register nomination](#) for the historic district may provide you with helpful context for the discussion on historic preservation (note that the ownership of the observatory is National Science Foundation, not Cornell University, and this has since been updated).

Following the teleconference, NSF will consider all comments provided to date – including those conveyed during our June 21st meeting – and prepare a draft PA for your review. After we issue a draft PA, we will initiate a 30-day comment period so that you can continue to provide input on historic preservation measures. It is our intention to provide, and post to our website, the draft PA prior to the in-person meeting on July 6th. The purpose of the meeting on July 6th will be to continue the conversation and discuss your comments on the draft PA.

We appreciate your participation in this Section 106 process.

Possible measures to address adverse effects to the National Astronomy and Ionosphere Center (Arecibo Observatory) Historic District:

Under Alternatives 1 (*Collaboration with Interested Parties for Continued Science-focused Operations*) and 2 (*Collaboration with Interested Parties for Transition to Education-focused Operations*):

- NSF would encourage any and all collaborators to retain and use the historic buildings and structures that contribute to the NAIC historic district
- NSF would provide to the collaborator, via a qualified historic preservation professional, historic preservation awareness training to encourage awareness of the historic significance of the Observatory and to minimize the potential for adverse effects to the historic property
- If the collaborator does not wish to retain and use all buildings, NSF would ensure appropriate documentation of buildings and structures occurs prior to any demolition
- In the case that NSF transfers ownership of the Observatory to a non-federal entity, NSF would ensure that the Observatory is documented and will include historic preservation measures in the legal documents as part of any title transfer.
 - Ideas for preservation measures for any new owner: (1) require the new owner to invite the Puerto Rico State Historic Preservation Officer to a site visit every X years, in order to provide guidance and recommendations on preservation of the historic district; and (2) require that if demolition of a contributing element occurs the new owner would provide interpretive plaques or signs to tell the story of how that facility contributed to the Observatory and historic district.

Alternative 3 (*Mothballing Facilities*):

- Essential buildings would be mothballed and radio telescopes and other equipment would be protected and maintained in an operational readiness condition, allowing the facility to be reopened at a future date. No historic properties would be demolished. Mothballing would be implemented in accordance with Secretary of the Interior and National Park Service guidance and standards.

Alternatives 4 (*Partial Demolition and Site Restoration*) and 5 (*Full Demolition and Site Restoration*):

- NSF would ensure appropriate documentation of buildings and structures occurs prior to any demolition

Sincerely,

Elizabeth Pentecost

National Science Foundation
Division of Astronomical Sciences
Room 1045

4201 Wilson Boulevard
Arlington, VA 22230
Tel: 703-292-4907
Fax: 703-292-9034

From: Pentecost, Elizabeth A. [mailto:epenteco@nsf.gov]

Sent: Thursday, June 15, 2017 6:01 PM

To: anthony.vaneyken@sri.com; nwhite@usra.edu; jschmelz@usra.edu; danuchko@hotmail.com; carmen.pantoja1@upr.edu; babilonia.miguel@yahoo.com; brettisham3@gmail.com; siemens@uwm.edu; luisafzambrano@gmail.com; zhouq@miamioh.edu

Subject: Notification of consulting parties/historic preservation meetings regarding NSF's proposed changes to Arecibo Observatory operations ***UPD [EXTERNAL]

Minor edit to the venue for the in-person meeting. Arecibo, not San Juan.

Good afternoon, the below message has been updated since yesterday. Please note that the in-person meeting location has been moved from San Juan to Arecibo, and the Puerto Rico State Historic Preservation Officer has confirmed that staff will be able to attend these meetings.

This email is being distributed to those who have self-identified as a consulting party in the Section 106 (of the National Historic Preservation Act) consultation process regarding the National Science Foundation's proposed changes to Arecibo Observatory operations. **We would like to invite you to participate in consulting parties' meetings as follows:**

- **Teleconference on Wednesday, June 21, 2017, at 3:30pm EDT. Please call 1-866-831-9952 and use participant pin 3889592#**
- **Meeting in Arecibo on Thursday, July 6, 2017, at 6:00pm EDT, at Colegio de Ingenieros y Agrimensores de Puerto Rico/Puerto Rico Professional College of Engineers and Land Surveyors (Arecibo Chapter), Ave. Manuel T. Guilla'n Urda'z, Conector 129 Carr. 10, Arecibo, Puerto Rico, Phone: (787) 758-2250**

During our last consulting parties meeting in November we agreed on the Area of Potential Effects as the boundary of the National Astronomy and Ionosphere Center (Arecibo Observatory) Historic District and discussed adverse effects that could occur as a result of the proposed alternatives NSF is evaluating. Since that meeting, NSF has continued to consult with the Puerto Rico State Historic Preservation Officer, and also with the Advisory Council on Historic Preservation, which has recently joined our consultation process for this undertaking. NSF has determined that all the alternatives being considered could result in adverse effects to the historic district. The next step in the process, as mentioned during our November meeting, is to consult with you to develop measures to avoid, minimize, or mitigate potential effects, and to document these measures in an agreement document such as a Programmatic Agreement (PA). We anticipate that any PA that is developed should address all potential alternatives, since NSF is not yet able to make a determination as to whether its preferred alternative (*Collaboration with Interested Parties for Continued Science-focused Operations*) is feasible.

Several of you submitted comments on the Draft Environmental Impact Statement (DEIS) that addressed concerns about cultural resources. These comments will be addressed in the Final EIS, and NSF has reviewed them as part of the Section

106 process as well. Comments noted that the Observatory has cultural importance to Puerto Rico and to the greater scientific community, and many commenters objected to its demise.

We have developed some draft measures (see below) to use as a starting point for our discussion of potential avoidance, minimization, and mitigation measures at our June 21st meeting. We welcome your feedback on these proposed measures as well as any other historic preservation ideas you may have to address potential adverse effects. The 2008 [National Register nomination](#) for the historic district may provide you with helpful context for the discussion on historic preservation (note that the ownership of the observatory is National Science Foundation, not Cornell University, and this has since been updated).

Following the teleconference, NSF will consider all comments provided to date – including those conveyed during our June 21st meeting – and prepare a draft PA for your review. After we issue a draft PA, we will initiate a 30-day comment period so that you can continue to provide input on historic preservation measures. It is our intention to provide, and post to our website, the draft PA prior to the in-person meeting on July 6th. The purpose of the meeting on July 6th will be to continue the conversation and discuss your comments on the draft PA.

We appreciate your participation in this Section 106 process.

Possible measures to address adverse effects to the National Astronomy and Ionosphere Center (Arecibo Observatory) Historic District:

Under Alternatives 1 (*Collaboration with Interested Parties for Continued Science-focused Operations*) and 2 (*Collaboration with Interested Parties for Transition to Education-focused Operations*):

- NSF would encourage any and all collaborators to retain and use the historic buildings and structures that contribute to the NAIC historic district
- NSF would provide to the collaborator, via a qualified historic preservation professional, historic preservation awareness training to encourage awareness of the historic significance of the Observatory and to minimize the potential for adverse effects to the historic property
- If the collaborator does not wish to retain and use all buildings, NSF would ensure appropriate documentation of buildings and structures occurs prior to any demolition
- In the case that NSF transfers ownership of the Observatory to a non-federal entity, NSF would ensure that the Observatory is documented and will include historic preservation measures in the legal documents as part of any title transfer.
 - Ideas for preservation measures for any new owner: (1) require the new owner to invite the Puerto Rico State Historic Preservation Officer to a site visit every X years, in order to provide guidance and recommendations on preservation of the historic district; and (2) require that if demolition of a contributing element occurs the new owner would provide interpretive plaques or signs to tell the story of how that facility contributed to the Observatory and historic district.

Alternative 3 (*Mothballing Facilities*):

- Essential buildings would be mothballed and radio telescopes and other equipment would be protected and maintained in an operational readiness condition, allowing the facility to be reopened at a future date. No historic properties would be demolished. Mothballing would be implemented in accordance with Secretary of the Interior and National Park Service guidance and standards.

Alternatives 4 (*Partial Demolition and Site Restoration*) and 5 (*Full Demolition and Site Restoration*):

- NSF would ensure appropriate documentation of buildings and structures occurs prior to any demolition

Sincerely,

Elizabeth Pentecost

National Science Foundation
Division of Astronomical Sciences
Room 1045
4201 Wilson Boulevard
Arlington, VA 22230
Tel: 703-292-4907
Fax: 703-292-9034

From: Pentecost, Elizabeth A. [mailto:epenteco@nsf.gov]

Sent: Friday, June 16, 2017 3:54 PM

To: kelly@sri.com; anthony.vaneyken@sri.com; nwhite@usra.edu; jschmelz@usra.edu; contact@tourism.pr.gov; cmendez@camaraderepresentantes.org; secretario@estado.pr.gov; info@prsciencetrust.org; info@prsciencetrust.org; manuel.laboy@ddec.pr.gov; pjrossello@suagm.edu; rossello@suagm.edu; frankie.chevere@cce.pr.gov; gonzalez@pupr.edu; carlos.gonzalez55@upr.edu; mrivera966@suagm.edu; ut_tlipsett@suagm.edu; um_kgonzalez@suagm.edu; hrodriguez183@suagm.edu; um_mortiz@suagm.edu; luiturralde@suagm.edu; scantrel@suagm.edu; guerrero.carmen@epa.gov; angelicaarenado@jca.pr.gov; hmcolon@suagm.edu; ndelgado@suagm.edu; amunoz@farpr.org; rcortes@farpr.org; cmolina.arecibo@gmail.com; francialynnette@yahoo.com; contreras@dtop.pr.gov; jmartinez@bayamon.inter.edu; acucurella@caribbean.edu; dreyes@caribbean.edu; evazquez@pupr.edu; gonzalez@pupr.edu; Jose.maeso@aae.pr.gov; Isabel.medina@aae.pr.gov; ue_mdiaz@suagm.edu; verivera@suagm.edu; ut_gbetancou@suagm.edu; dalicear@suagm.edu; otilio.gonzalez@upr.edu; Juan.cersosimo@upr.edu; Rafael.muller@upr.edu; aida.vidal@upr.edu; ethel.rios1@upr.edu; brenda.hernandez6@upr.edu; rector.uprm@upr.edu; herbert.c.carlson@gmail.com; djuth@ix.netcom.com; ajc@haystack.mit.edu; pje@haystack.mit.edu; lpg@haystack.mit.edu; lwaldrop@illinois.edu; bern@ppdmail.nrl.navy.mil; vasha@cora.nwra.com; moore@ece.ufl.edu; marco.milla@jro.igp.gob.pe; bela.fejer@usu.edu; john.emmert@nrl.navy.mil; reastes@mail.ucf.edu; jmakela@uiuc.edu; tony.mannucci@jpl.nasa.gov; mendillo@bu.edu; ridley@umich.edu; michael.nicolls@sri.com; larry.paxton@jhuapl.edu; mikeruo@vt.edu; david.hysell@cornell.edu; mlarsen@clemson.edu; flind@haystack.mit.edu; earle@vt.edu; scott.seaton@sri.com; siemens@uwm.edu; maura.mclaughlin@mail.wvu.edu; cordes@astro.cornell.edu; campbell@astro.cornell.edu; haynes@astro.cornell.edu; herter@astro.cornell.edu; joseph.lazio@jpl.nasa.gov; ejs@uiuc.edu; tbeasley@nrao.edu; james.green@nasa.gov; lindley.johnson@nasa.gov; thomas.s.statler@nasa.gov; jason@barnesos.net; lucy.mcfadden@nasa.gov; joanna.rankin@gmail.com; pete@breakthroughprize.org; danw@ssl.berkeley.edu; meg.urry@aaas.org; kevin.marvel@aaas.org; joel.parriott@aaas.org; mmountain@aura-astronomy.org; David.Schurr@nasa.gov; Ramon.Lugo@ucf.edu; Guerrero.carmen@Epa.gov; weldinortiz@jca.pr.gov; GloriaToro@jca.pr.gov; Susan_Silander@fws.gov; jose_cruz-burgos@fws.gov; juanbaba@jca.pr.gov; decano.arci@uprm.edu; sindulfo.castillo@usace.army.mil; magarcia@drna.gobierno.pr; jsalguero@drna.gobierno.pr; golivieri@drna.gobierno.pr; nvelazquez@drna.pr.gov; cindy_fury@fws.gov; jfowler@achp.gov; jeddins@achp.gov; bsueiro@prshpo.pr.gov; dcolon@drna.pr.gov; Knutson.Lingard@epa.gov; cpadin@suagm.edu; marelisa_Rivera@fws.gov; omar_monsegur@fws.gov; rvidal@drna.gobierno.pr; jsustache@drna.gobierno.pr; sustachejose925@gmail.com; francisco.cordova@sri.com; mbonini@prshpo.pr.gov; nprestamo@prshpo.pr.gov; jllanes@prshpo.pr.gov; brettisham3@gmail.com; lzambrano@usra.edu; zhouq@miamioh.edu; tvazquez@drna.pr.gov; ediazdrna@drna.pr.gov; ddelgado@drna.pr.gov; rcolonesparra@hotmail.com; carlacc@aosa.naic.edu; nadiadrake1@gmail.com; alex.perez67@hotmail.com; olgaromanpr@gmail.com; fsoberal@naic.edu; jgago@naic.edu; ecabassa@gmail.com; juan.arratia@gmail.com; martorell.deborah@gmail.com; miguelzarrieora@yahoo.com; scott.m.ransom@gmail.com; jose.molina@nss.org; crosario@naic.edu; rcorrea@naic.edu; rcortes@elnuevodia.com; adrianalc@aosa.naic.edu; wilberth@aosa.naic.edu; llopez@naic.edu; tghosh@naic.edu; csalter@naic.edu; seymour.andrew@gmail.com; annevirk@gmail.com; viviana.tirado@upr.edu; ed@naic.edu; shark051@umn.edu; coralifriedman@yahoo.com; arun@naic.edu; karun00612@yahoo.com; lquintero@naic.edu; ptaylor@naic.edu; helen_minchin@hotmail.com; arosado@naic.edu; jonathan@naic.edu; cbrum@naic.edu; phil@naic.edu; edgardo-

54@hotmail.com; icabrera@naic.edu; sandrarobles@live.com; estades_2@hotmail.com; rminchin@naic.edu; angel@naic.edu; hiramcrespo1141@gmail.com; carmen.pantoja1@upr.edu; joshrothastro@gmail.com; t.symons@ku.edu; kkaldon@comcast.net; tcohen@gemini.edu; jkania@alumni.cmu.edu; leszek.nowakowski@upr.edu; annevirk@gmail.com; ptaylor@naic.edu; raulrios@alum.mit.edu; secretary@areciboscience.org; jkaldon@comcast.net; juan.ramirez3@upr.edu; kraemer@cua.edu; ebriggs733@gmail.com; michaelcnolan.1@gmail.com; barbylon@gmail.com; babilonia.miguel@yahoo.com; rvermeulen@astron.nl; joannabi2000@gmail.com; kristinakaldon@gmail.com; yyk@asc.rssi.ru; luis.beltran@dma.pr.gov; ed-araya@wiu.edu; pmh72@cornell.edu; lgurvits@jive.eu; a.rozek@kent.ac.uk; wbrisken@gmail.com; carlos.estevez1@upr.edu; rhysyt@gmail.com; tbecker@swri.edu; joyce.stanley@ios.doi.gov; henri.radovan@upr.edu; rsteele@bakerdonelson.com; rbooth@ska.ac.za; seymour.andrew@gmail.com; santa.perez1@upr.edu; joshyserrano@gmail.com; keiichi@asiaa.sinica.edu.tw; michael.william.busch@gmail.com; sbryan4@asu.edu; gabriela.rosado.gonzalez@gmail.com; jocelyn.santiago@upr.edu; zparagi@jive.eu; info@spiritandtruthministries.org; l@svenlittkowski.name; jeff.grady@gmail.com; tothereandback5@gmail.com; fernandotissera2009@hotmail.com; stairs@astro.ubc.ca; charles.sanders@prodigy.net; hoffmann@telemax.de; rubyenell47@yahoo.com; elizabethscooper@gmail.com; ierkic@ece.uprm.edu; judynorsigian@gmail.com; asesana@star.sr.bham.ac.uk; yua120@psu.edu; lrl62@cornell.edu; xiomarairivera@yahoo.com; sergiocolon@yahoo.com; lbenner@charter.net; ehowell@orex.lpl.arizona.edu; seanm@astro.cornell.edu; Ron.Vervack@jhuapl.edu; DPS.Chair@aas.org; jlm@epss.ucla.edu; korpela@ssl.berkeley.edu; Steven.gibson@wku.edu; aridolfi@mpifr-bonn.mpg.de; gdiaz@prsciencetrust.org; casey.dreier@planetary.org; secretary@areciboscience.org; Njoubert@farpr.org; troischtp@hartwick.edu; rferdman@physics.mcgill.ca; swiggumj@uwm.edu; timothyolszanski@gmail.com; kyrazn@gmail.com; maryi@myfairpoint.net; ricardor@mit.edu; alfredclayton@hotmail.com; Stovall.kevin@gmail.com; decesar@uwm.edu; ac@armandocaussade.org; tdolch@hillsdale.edu; hallenbg@union.edu; jkwasizu@umail.iu.edu; barbn.trejo@gamil.com; m.haverkorn@astro.ru.nl; andrea.tellez120@gmail.com; adams@astron.nl; pfreire@mpifr-bonn.mpg.de; davidjacob94@gmail.com; kmoranirizarry@gmail.com; allison@physast.uga.edu; cid2@cornell.edu; thankins@aoc.nrao.edu; daleferguso@gmail.com; jweisber@carleton.edu; craithel@email.arizona.edu; loris@physast.uga.edu; haynes@astro.cornell.edu; jco65@cornell.edu; Timothy.Robishaw@nrc-cnrc.gc.ca; hwahl16@gmail.com; J.W.T.Hessels@uva.nl; dmitra@uvm.edu; tim.pennucci@nanograv.org; koopman@union.edu; jladdbvt@gamil.com; ddmmeteor@frontier.com; mcron@skidmore.edu; mtl82@cornell.edu; amm4ws@virginia.edu; mfillmore@together.net; Jade.Morton@colostate.edu; lrivera@bayamon.inter.edu; sondy@lpl.arizona.edu; balchd@miamioh.edu; varenius@chalmers.se; Casey.Brinkman- Traverse@uvm.edu; globebiz@camden.net; keesi.caballero48@gmail.com; ngizani@eap.gr; niced@lafayette.edu; Marina.Brozovic@jpl.nasa.gov; jhasobral@yahoo.com.br; thankful.cromartle@gmail.com; heiles@astro.berkeley.edu; fred.woo@ubc.ca; David.J.Thompson@nasa.gov; Mark.Walker@manlyastrophysics.org; fredrick.jenet@utrgv.edu; jcannon@macalester.edu; fcrawfor@fandm.edu; jonathansf13@gmail.com; gizap@miamioh.edu; alovell@agnesscott.edu; yz2505@columbia.edu; colonmedinasergio@yahoo.com; secretaryobservatory@astron.nl; langevelde@jive.edu; gongy@miamioh.edu; jvu1@psu.edu; ealtiere@phas.ubc.ca; postal1248@gmail.com; henning@unm.edu; neuralize@gmail.com; henderss@lafayette.edu; kelletdw@miamioh.edu; wolfgangschuemann@gmx.net; Wes.Patterson@jhuapl.edu; bj.howerton@bia.gov; dfdubois@cybermesa.com; b.strom@slabarchitects.com; leeuwen@astron.nl; dejesus@outlook.com; philkronberg@gmail.com; nleaflight@yahoo.com; smith@cenbg.in2p3.fr; jdm9@psu.edu; carloscs@aosa.naic.edu; seclark@astro.columbia.edu; niurka_lee@yahoo.com; tcruwithme@yahoo.com; stephen.d.orourke@gmail.com; mark@flatphysica.com; goldston@gmail.com; peter.tomas@gmail.com; daliana.rodriguez@gmail.com; grout_r@msn.com; sonimalarro@yahoo.com; marc.lewis@sstar.com; karun00612@yahoo.com; faramram@choicecable.net; herbert.c.carlson@gmail.com; sra.r.rodriguez@hotmail.com; mafeliciano23@gmail.com; lizas3@sbcglobal.net; lesli.mari@yahoo.com; mstiles1955@gmail.com; lmatos11@yahoo.com; rcarrasquillom@gmail.com; kaufmanek@gmail.com; sexologamedica@gmail.com; mrosaesther@gmail.com; jl_2677@icloud.com; josean25@yahoo.com; mariarsantiago@gmail.com; caftersion@gmail.com; angie.cablop@gmail.com; cruzro@coqui.net; zahirarivera2006@gmail.com; sarasantiago450@gmail.com; yyai20092282@yahoo.com; J-orz27@hotmail.com; j.mendez10@yahoo.com; eriksonpr2333@gmail.com; rositroche@hotmail.com; smoral01@gmail.com; marioew6@icloud.com; ojmercador@gmail.com; fromansanabria@msn.com; luzfomtanez889@gmail.com; david.stark@ipmu.jp; janandrespena72@gmail.com; hillis.pratt@dom.com; irisg.rios@yahoo.com; andrealm@aosa.naic.edu; gery.realtyconsultants@gmail.com; delfindelfin1992@gmail.com;

nydiam67@gmail.com; zorytorra11@icloud.com; ivetteruiz1966@gmail.com; lydmariea@aosa.naic.edu; rolandox2000@hotmail.com; richard@musicstoppr.net; adrianaim@aosa.naic.edu; yesharyaviles@gmail.com; sunflowerhp@hotmail.com; guillonube@icloud.com; crespog1103@gmail.com; lourdesmartinez137@hotmail.com; alejandrорiv1@hotmail.com; vazquez1019@msn.com; lilliam_gb@yahoo.com; bin.liu@mail.wvu.edu; keckert@mail.unc.edu; mciee@mit.edu; lylesjoseph@gmail.com; monica.whiteside@gmail.com; Hpick3@aol.com; M.D.Smith@kent.ac.uk; Olivia.Keenan@astro.cf.ac.uk; frankie57pr@yahoo.com; sarah.scoles@gmail.com; Eric.Sahlstrom@internationalSpace.com; mshepard@bloomu.edu; danuchko@hotmail.com; trivera@senado.pr.gov
Subject: Save the Date: upcoming public meeting to discuss historic regarding NSF's proposed changes to Arecibo Observatory operations [EXTERNAL]

Good afternoon,

The National Science Foundation (NSF) invites your participation at an upcoming Section 106 (of the National Historic Preservation Act) consultation meeting. The purpose of the meeting is to discuss measures to avoid, minimize, and/or mitigate potential effects to historic properties from NSF's proposed changes to Arecibo Observatory operations. Additional details about the meeting will be provided closer to the date. Information about NSF's proposed action can be found at: https://www.nsf.gov/mps/ast/env_impact_reviews/env_rev_arecibo.jsp.

The meeting will be in Arecibo on Thursday, July 6, 2017, at 6:00pm, at Colegio de Ingenieros y Agrimensores de Puerto Rico/Puerto Rico Professional College of Engineers and Land Surveyors (Arecibo Chapter), Ave. Manuel T. Guilla'n Urda'z, Conector 129 Carr. 10, Arecibo, Puerto Rico, Phone: (787) 758-2250.

Sincerely,

Elizabeth Pentecost

National Science Foundation
Division of Astronomical Sciences
Room 1045
4201 Wilson Boulevard
Arlington, VA 22230
Tel: 703-292-4907
Fax: 703-292-9034

From: Pentecost, Elizabeth A. [mailto:epenteco@nsf.gov]

Sent: Friday, June 16, 2017 9:41 AM

To: trivera@senado.pr.gov; cmendez@camaraderepresentantes.org; cmolina.arecibo@gmail.com; francialynnette@yahoo.com; secretario@estado.pr.gov

Subject: Notification of consulting parties/historic preservation meetings regarding NSF's proposed changes to Arecibo Observatory operations [EXTERNAL]

Good morning,

Due to your jurisdiction over, and/or potential interest in, matters related to the Arecibo Observatory, we would like to invite you to attend and participate in two upcoming meetings. We have included additional background information on the ongoing Section 106 consultation process for Arecibo Observatory in the detailed invitation letter below.

Please let us know if you have any questions about the process.

Sincerely,

Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
Room 1045
4201 Wilson Boulevard
Arlington, VA 22230
Tel: 703-292-4907
Fax: 703-292-9034
epenteco@nsf.gov

Please note that the in-person meeting location is Arecibo, and the Puerto Rico State Historic Preservation Officer has confirmed that staff will be able to attend these meetings.

This email is being distributed to those who have self-identified as a consulting party in the Section 106 (of the National Historic Preservation Act) consultation process regarding the National Science Foundation's proposed changes to Arecibo Observatory operations. **We would like to invite you to participate in consulting parties' meetings as follows:**

- **Teleconference on Wednesday, June 21, 2017, at 3:30pm EDT. Please call 1-866-831-9952 and use participant pin 3889592#**
- **Meeting in Arecibo on Thursday, July 6, 2017, at 6:00pm EDT, at Colegio de Ingenieros y Agrimensores de Puerto Rico/Puerto Rico Professional College of Engineers and Land Surveyors (Arecibo Chapter), Ave. Manuel T. Guillaín Urda'z, Conector 129 Carr. 10, Arecibo, Puerto Rico, Phone: (787) 758-2250**

During the last consulting parties meeting in November we agreed on the Area of Potential Effects as the boundary of the National Astronomy and Ionosphere Center (Arecibo Observatory) Historic District and discussed adverse effects that could occur as a result of the proposed alternatives NSF is evaluating. Since that meeting, NSF has continued to consult with the Puerto Rico State Historic Preservation Officer, and also with the Advisory Council on Historic Preservation, which has recently joined our consultation process for this undertaking. NSF has determined that all the alternatives being considered could result in adverse effects to the historic district. The next step in the process, as mentioned during our November meeting, is to consult with you to develop measures to avoid, minimize, or mitigate potential effects, and to document these measures in an agreement document such as a Programmatic Agreement (PA). We anticipate that any PA that is developed should address all potential alternatives, since NSF is not yet able to make a determination as to whether its preferred alternative (*Collaboration with Interested Parties for Continued Science-focused Operations*) is feasible.

Several of you submitted comments on the Draft Environmental Impact Statement (DEIS) that addressed concerns about cultural resources. These comments will be addressed in the Final EIS, and NSF has reviewed them as part of the Section 106 process as well. Comments noted that the Observatory has cultural importance to Puerto Rico and to the greater scientific community, and many commenters objected to its demise.

We have developed some draft measures (see below) to use as a starting point for our discussion of potential avoidance, minimization, and mitigation measures at our June 21st meeting. We welcome your feedback on these proposed measures as well as any other historic preservation ideas you may have to address potential adverse effects. The 2008 [National Register nomination](#) for the historic district may provide you with helpful context for the discussion on historic preservation (note that the ownership of the observatory is National Science Foundation, not Cornell University, and this has since been updated).

Following the teleconference, NSF will consider all comments provided to date – including those conveyed during our June 21st meeting – and prepare a draft PA for your review. After we issue a draft PA, we will initiate a 30-day comment period so that you can continue to provide input on historic preservation measures. It is our intention to provide, and post to our website, the draft PA prior to the in-person meeting on July 6th. The purpose of the meeting on July 6th will be to continue the conversation and discuss your comments on the draft PA.

We appreciate your participation in this Section 106 process.

Possible measures to address adverse effects to the National Astronomy and Ionosphere Center (Arecibo Observatory) Historic District:

Under Alternatives 1 (*Collaboration with Interested Parties for Continued Science-focused Operations*) and 2 (*Collaboration with Interested Parties for Transition to Education-focused Operations*):

- NSF would encourage any and all collaborators to retain and use the historic buildings and structures that contribute to the NAIC historic district
- NSF would provide to the collaborator, via a qualified historic preservation professional, historic preservation awareness training to encourage awareness of the historic significance of the Observatory and to minimize the potential for adverse effects to the historic property
- If the collaborator does not wish to retain and use all buildings, NSF would ensure appropriate documentation of buildings and structures occurs prior to any demolition
- In the case that NSF transfers ownership of the Observatory to a non-federal entity, NSF would ensure that the Observatory is documented and will include historic preservation measures in the legal documents as part of any title transfer.
 - Ideas for preservation measures for any new owner: (1) require the new owner to invite the Puerto Rico State Historic Preservation Officer to a site visit every X years, in order to provide guidance and recommendations on preservation of the historic district; and (2) require that if demolition of a

contributing element occurs the new owner would provide interpretive plaques or signs to tell the story of how that facility contributed to the Observatory and historic district.

Alternative 3 (Mothballing Facilities):

- Essential buildings would be mothballed and radio telescopes and other equipment would be protected and maintained in an operational readiness condition, allowing the facility to be reopened at a future date. No historic properties would be demolished. Mothballing would be implemented in accordance with Secretary of the Interior and National Park Service guidance and standards.

Alternatives 4 (Partial Demolition and Site Restoration) and 5 (Full Demolition and Site Restoration):

- NSF would ensure appropriate documentation of buildings and structures occurs prior to any demolition

From: Berenice Sueiro [mailto:bsueiro@prshpo.pr.gov]
Sent: Friday, June 23, 2017 12:25 PM
To: Caroline Blanco; Charlene Vaughn
Cc: Carlos A. Rubio Cancela Director Ejecutivo; Gloria Ortiz
Subject: Ballaja's Cooperative Agreement



GOBIERNO DE PUERTO RICO
Oficina Estatal de Conservación Histórica

Caroline and Charlene:

Greetings,

Enclosed you will find the Cooperative Agreement between the US Government and PR Government for the long term preservation and maintenance of the Cuartel de Ballaja, Parcels A and B. We can work in a preservation covenant. It should include the Secretary of the Interior's Standards for the Treatment of Historic Properties.

Also, I have included NPS brochure for the Monuments Program and the Recreation Program, that we can review.

Best regards,

Berenice R Sueiro Vázquez, AIT
Gerente Conservación Histórica
Historic Preservation Manager
P.O. Box 9023935
San Juan, P.R. 00902-3935
T. (787) 721-3737 x.2002
F. (787) 721-3773



From: "Blanco, Caroline M" <cblanco@nsf.gov>

Date: Friday, June 23, 2017 at 1:17 PM

To: 'Charlene Vaughn' <cvaughn@achp.gov>, Berenice Sueiro <bsueiro@prshpo.pr.gov>

Cc: "Carlos A. Rubio Cancela Director Ejecutivo" <carubio@prshpo.pr.gov>, Gloria Ortiz <gmortiz@prshpo.pr.gov>

Subject: Re: Ballaja's Cooperative Agreement

Thank you, Berenice. We will review the cooperative agreement and see what adjustments we can suggest to our draft PA (which is now about ready to be sent out). Since we just received the cooperative agreement, the next draft of the PA that you will see (likely later today) will not reflect any components of the cooperative agreement, but, during our 30-day review period, we will have some time to review the cooperative agreement carefully and see if we can apply some of the components of it into our draft PA. Please, also, let me know if you have any suggestions regarding how it can be applied to our situation.

Many thanks.

Best,

Caroline

Caroline M. Blanco
Assistant General Counsel
National Science Foundation
4201 Wilson Blvd., Suite 1265

From: Pentecost, Elizabeth A. <epenteco@nsf.gov>
Sent: Friday, June 23, 2017 5:51 PM
To: anthony.vaneyken@sri.com; nwhite@usra.edu; jschmelz@usra.edu; danuchko@hotmail.com; carmen.pantoja1@upr.edu; babilonia.miguel@yahoo.com; brettisham3@gmail.com; siemens@uwm.edu; luisafzambrano@gmail.com; zhouq@miamioh.edu
Cc: Berenice Sueiro; cvaughn@achp.gov
Subject: Arecibo Environmental Impact Statement - Draft Programmatic Agreement [EXTERNAL]
Attachments: NASA Cultural Resources Management Policies and Procedures 2017.pdf; Arecibo - NSF Draft PA 6.23.2017.pdf; Arecibo - FAQs for PA.pdf; Arecibo - Preliminary Agenda for July 6.2017 Consulting Parties Meeting.pdf

Dear Consulting Parties:

As you are aware, the National Science Foundation (NSF) is in the process of evaluating proposed operational changes to Arecibo Observatory, Arecibo, Puerto Rico due to funding constraints (Proposed Action). Attached for your review and comment is the Draft Programmatic Agreement (Draft PA) concerning this Proposed Action, prepared pursuant to Section 106 of the National Historic Preservation Act (Section 106). (Please note that under Section 106, the Proposed Action is an “undertaking”). The purpose of the Draft PA is to address adverse effects on historic properties associated with NSF’s undertaking.

The public comment period for the Draft PA begins today, June 23, 2017, and will remain open **up to and including July 24, 2017**. Written comments may be submitted to NSF via email (envcomp-AST@nsf.gov) or via mail to Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite 1045, 4210 Wilson Blvd, Arlington VA 22230. (As you review the Draft PA, please note that the term, “PLACEHOLDER” appears in several places in the document; this term will be removed when the document is in final form.)

NSF also invites your participation at a Section 106 consultation meeting to be held in Arecibo on **Thursday, July 6, 2017, at 6:00pm, at Colegio de Ingenieros y Agrimensores de Puerto Rico/Puerto Rico Professional College of Engineers and Land Surveyors (Arecibo Chapter), Ave. Manuel T. Guilla’n Urda’z, Conector 129 Carr. 10, Arecibo, Puerto Rico, Phone: (787) 758–2250**. The purpose of this consultation meeting is to discuss the Draft PA as well as any other suggested measures you may have to avoid, minimize, and/or mitigate potential effects to historic properties associated with NSF’s undertaking. (A preliminary agenda for the July 6th Section 106 Consultation Meeting is attached to this message; the final agenda is forthcoming and will be posted to NSF’s Division of Astronomical Sciences website: https://www.nsf.gov/mps/ast/env_impact_reviews/arecibo/arecibo_section106.jsp.)

A copy of the Draft PA is posted in English (posted on Monday in Spanish) at https://www.nsf.gov/mps/ast/env_impact_reviews/arecibo/arecibo_section106.jsp. Hard copies of the Draft PA will be available at the following libraries: Biblioteca Electro´nica Pu´blica Municipal Nicola’s Nadal Barreto, 210 Calle Santiago Iglesias, Arecibo, PR, Phone: (787) 878–1178; and Archivo General y Biblioteca Nacional de PR, 500 Avenida Juan Ponce De Leo´n, San Juan, PR, Phone: (787) 725–ext. 2001.

In addition to the Draft PA, there are two documents (attached) that you may find helpful:

1. Frequently Asked Questions (posted to the AST web site in English and will be posted to the web site in Spanish on Monday)
2. Document, *NASA Cultural Resource Management*. (Please note that, although this document is in draft form, it is scheduled to become effective on June 30, 2017.)

You may also wish to consult these additional resources (available at the links provided below) for further information on the Section 106 process:

- a. Advisory Council on Historic Preservation website: www.achp.gov
- b. Document, *Balancing Historic Preservation Needs with the Operation of Highly Technical or Scientific Facilities*. Link: <http://achp.gov/pubs-scitech.html>
- c. ACHP Success Stories, Link: http://achp.gov/sec106_successes.html

For information regarding NSF's request for proposals regarding the management and operations of the Arecibo Observatory, please see the document, Solicitation NSF 17-538, *Management and Operations of the Arecibo Observatory*, Link: https://www.nsf.gov/publications/pub_summ.jsp?WT.z_pims_id=505401&ods_key=nsf17538.

Finally, please note that NSF is in the process of updating the Division of Astronomical Sciences website to include more documents associated with NSF's compliance with Section 106, the National Environmental Policy Act, and the Endangered Species Act for the proposed operational changes to Arecibo Observatory.

We hope to see you at our July 6th Section 106 consultation meeting.

Sincerely,

Elizabeth Pentecost

National Science Foundation
Division of Astronomical Sciences
Room 1045
4201 Wilson Boulevard
Arlington, VA 22230
Tel: 703-292-4907
Fax: 703-292-9034

3.5-A Arecibo Environmental Baseline Study

FINAL

Environmental Baseline Study

Arecibo Observatory
Arecibo, Puerto Rico

Prepared for

National Science Foundation

December 2015



Executive Summary

This Environmental Baseline Study (EBS) has been prepared to document the current environmental conditions on the approximately 120-acre contiguous parcel (herein referred to as the subject property) located near Arecibo, Puerto Rico. The National Science Foundation requested this EBS to determine the environmental condition prior to any future divestment activities. This EBS report has been prepared in accordance with the ASTM International (ASTM) provisional standards practice for *Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM, 2013).

This EBS report is based on information obtained through a records search, visual site inspections, physical site inspections, and interviews. The records search included a review of available records, including environmental restoration reports, previous surveys, building drawings, and inspection reports. Visual surveys of the subject property and interviews with current employees were conducted. The EBS assessment also included an evaluation of environmental conditions at offsite properties that could pose environmental concerns or affect the subject property. For adjacent properties, visual surveys consisted of observations made from public roads or views from property boundaries.

No recognized environmental conditions (RECs) were found on the subject property.

No historical recognized environmental conditions were found on the subject property.

The following *de minimis* conditions were identified on the subject property:

- Staining on warehouse concrete floor next to motor oil storage.
- Staining in the parking areas likely do to oil drips from vehicles were observed.

The following are other conditions on the subject property that are not considered RECs, but are worth disclosing:

- Asbestos-containing material was found in Buildings #1, #2, #3, #4, #6, and #17.
- Lead-based paint was found in Buildings #1, #2, #3, #4, #5, #7, #10, #11, #12, #17, #27, #47, #58, #61 and the gate area.
- The polychlorinated biphenyl content of the pole-mounted transformers on the property is unknown as the transformers are not labeled Non- polychlorinated biphenyl and documentation was not readily available for review.
- A 55-gallon capacity oil-water separator is associated with the tank farm containment area. Stormwater that collects within the containment area is pumped to the oil-water separator and then discharges to the ground surface. Inspection/maintenance records of the oil-water separator were not available for review. With the oil-water separator being 50 years old, a possibility exists that it may have failed and impacted surrounding soils.
- The septic and leachfield system serving the maintenance area has the potential for concern. No maintenance records were available and the system has served facilities where hazardous and petroleum products have been stored and used for over 50 years. No visual evidence of contamination was observed during the site reconnaissance.

To assess the potential for adjacent properties to affect the subject property, a records search and database search of RECs within 1 mile of the subject property was performed for this EBS assessment (see Attachment C). No other neighboring properties appear to have the potential to environmentally affect the properties.

This page left intentionally blank.

Contents

Executive Summary	ES-1
Acronyms and Abbreviations	iii
1 Introduction	1
1.1 Purpose of Environmental Condition of Subject Property Report	1
1.1.1 Content of Environmental Baseline Survey Report	2
1.2 Survey Methodology.....	7
1.2.1 Site Reconnaissance.....	7
1.2.2 Records Search and Review	7
1.2.3 Interviews	7
1.2.4 Review of Special Resources.....	7
1.3 Significant Assumptions	7
1.4 Limitations, Exceptions, and Data Gaps.....	7
1.4.1 Limitations	7
1.4.2 Exceptions	7
1.4.3 Data Gaps.....	8
2 Site Description	9
2.1 Location and Legal Description	9
2.2 Current Use of the Subject Property	9
2.3 Description of Structures, Roads, and Other Improvements	9
2.4 Site Utilities	10
2.4.1 Water Service.....	10
2.4.2 Wastewater	10
2.4.3 Stormwater	11
2.4.4 Electric	11
2.5 Current Use of the Adjoining Property	11
3 Site History	13
3.1 Previous Environmental Baseline Surveys	13
3.2 Historical Use Information of the Subject Property	13
3.2.1 Aerial Photographs	13
3.2.2 Topographic Maps	14
3.3 Environmental Records.....	14
4 Findings: Subject Property	15
4.1 Environmental Setting	15
4.1.1 Climate	15
4.1.2 Land Use.....	15
4.1.3 Regional Physiography and Topography	15
4.1.4 Geology	15
4.1.5 Soils and Groundwater	16
4.1.6 Surface Water and Wetlands.....	16
4.1.7 Threatened and Endangered Species	16
4.2 Environmental Factors.....	18
4.2.1 Hazardous Material/Petroleum Product Management.....	18
4.2.2 Aboveground Storage Tanks.....	19
4.2.3 Underground Storage Tanks	20

4.2.4	Environmental Investigations	20
4.3	Disclosure Factors	20
4.3.1	Asbestos-containing Materials	21
4.3.2	Lead-based Paint.....	21
4.3.3	Polychlorinated Biphenyls	22
4.3.4	Radon	22
4.3.5	Medical/Biohazardous Waste.....	22
4.3.6	Munitions and Explosives of Concern.....	22
5	Findings: Adjacent Properties	23
5.1	Land Use.....	23
5.2	Surveyed Properties.....	23
5.2.1	Federal Databases.....	23
5.2.2	Puerto Rico and Tribal Databases.....	25
5.2.3	Additional Environmental Site Information.....	26
6	Interviews	27
7	Findings and Conclusions	29
7.1	Recognized Environmental Conditions	29
7.2	Historical Recognized Environmental Conditions	29
7.3	<i>De Minimis</i> Conditions	29
7.4	Other Conditions of Note.....	29
8	Certification for the Arecibo EBS.....	31
9	References.....	33

Attachments

- A Site Reconnaissance Photographs
- B Environmental Data Resources, Inc., Radius Map Reports with Geocheck
- C Aerial Photographs and Topographic Maps

Tables

1-1	Data Gaps	8
2-1	Septic Systems	10
3-1	EDR Database Listings	14
4-1	Rare, Threatened, and Endangered Species Summary (Arecibo, Puerto Rico)	17
4-2	ASTs Located on the Subject Property.....	19
4-3	Confirmed ACM.....	21
4-4	2007 LBP Survey Results	21
6-1	Personnel Interviewed during the Site Visit	27

Figures

1-1	Project Location Map.....	3
1-2	Subject Property	5

Acronyms and Abbreviations

DOT	department of transportation
NOV	Notice of Violation
pCi/L	picocurie per liter
ACM	asbestos-containing material
AST	aboveground storage tank
ASTM	ASTM International
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CESQG	Conditionally Exempt Small Quantity Generator
EBS	Environmental Baseline Study
EDR	Environmental Data Resources, Inc.
FINDS	Facility Index System/Facility Registry System
HREC	Historical Recognized Environmental Condition
ICIS	Integrated Compliance Information System
LBP	lead-based paint
LUST	leaking underground storage tank
msl	mean sea level
NPL	National Priorities List
NSF	National Science Foundation
PCB	polychlorinated biphenyl
PR EQB	Puerto Rico Environmental Quality Board
REC	recognized environmental condition
RTE	rare, threatened, or endangered
TSCA	Toxic Substances Control Act
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
VSI	visual site inspection

This page left intentionally blank.

Introduction

The National Science Foundation (NSF) issued a Statement of Work for the Divestment Options Studies for the NSF-funded Telescopes and Observatories Project Task Order on July 29, 2014 and a scope revision on August 5, 2014 under Blanket Purchase Agreement NSFDACS14B1186. This document describes the Environmental Baseline Study (EBS) assessment portion of the task order for the approximately 120-acre property of the Arecibo Observatory, hereinafter referred to as the subject property, located near Arecibo, Puerto Rico. Figure 1-1 depicts the location of the subject property.

This EBS report is organized as follows:

- Section 1 presents the purpose and scope of the EBS.
- Section 2 describes the site and the current uses.
- Section 3 provides historical uses of the property.
- Section 4 presents the environmental setting information and findings on the property.
- Section 5 presents results of the adjacent property assessment for the EBS.
- Section 6 presents information provided from interviews.
- Section 7 provides findings and conclusions.
- Section 8 provides the certification page.
- Section 9 provides the references consulted in preparing this document.

The appendices to this document include the following:

- Attachment A contains photographs taken during the October 6-9, 2014 site visit.
- Attachment B contains the Environmental Data Resources, Inc. (EDR) reports for the subject properties and adjacent properties.
- Attachment C contains copies of historical aerial photographs and historical topographic maps for the subject property.

This EBS report has been prepared in accordance with the ASTM International (ASTM) provisional standards practice for *Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM, 2013).

1.1 Purpose of Environmental Condition of Subject Property Report

The purpose of this EBS report is to document the environmental condition of the subject property prior to any divestment activities or changes in operational strategy.

The purpose of the EBS assessment is to identify, to the extent feasible, the presence or likely presence of any hazardous substances or petroleum products on the subject property under conditions that indicate an existing release, a past release, or a material threat of release of any hazardous substances or petroleum products into structures on the subject property. This does not include *de minimis* conditions that do not present a threat to human health or the environment, and that generally would not be the subject of an enforcement action if brought to the attention of appropriate government agencies.

This EBS report is intended to help NSF conduct the following tasks:

- Develop sufficient information to identify what actions are necessary to protect human health and the environment prior to a real property transaction.
- Aid in establishing lease or deed restrictions.
- Support notice, when required under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) § 120(h)(3), of the type, quantity, and timeframe of any storage, release, or disposal of hazardous materials or petroleum products and their wastes on the properties.
- Define potential liabilities associated with real property transactions.
- Evaluate possible effects on property valuation caused by contamination or other identified concerns.

1.1.1 Content of Environmental Baseline Survey Report

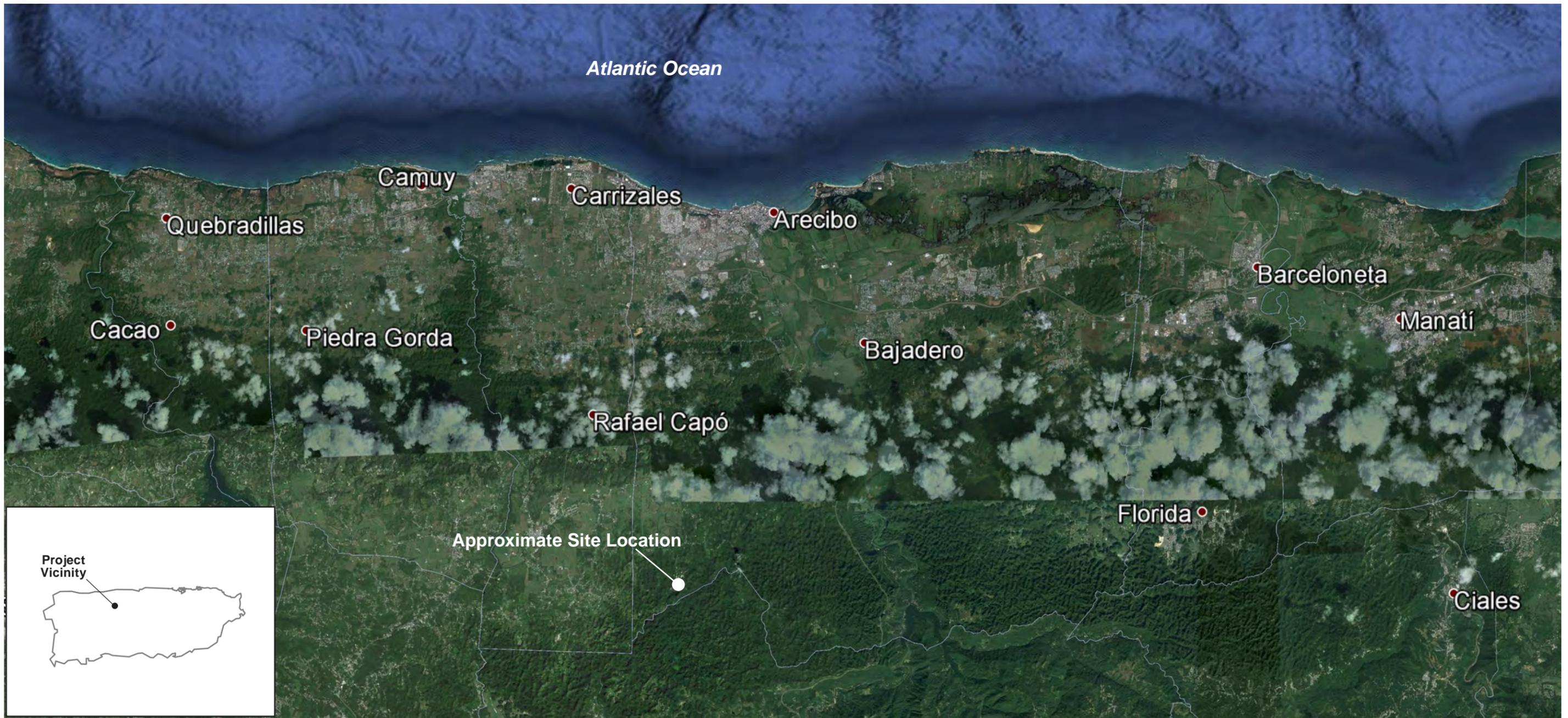
The information contained in this EBS report was obtained through a records search, visual site inspections (VSIs), physical site inspections (sensory observations), and interviews. The records search included an analysis of historical aerial photographs (Attachment C) and a review of available regulatory agency records.

VSIs were performed in accordance with ASTM E1527-13 *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM, 2013). The inspection consisted of a visual examination of the subject properties.

The EBS assessment also included an assessment of environmental conditions on properties within the ASTM standard radius search distance of the subject properties that could pose an environmental concern. As part of this assessment, reasonably ascertainable environmental databases were identified. Search radii were used to identify sites located in the general area of the subject properties. Adjacent properties were visually surveyed from accessible public areas as part of the EBS activities.

This EBS report specifically addresses the approximately 120-acre subject property, which is located near Arecibo, Puerto Rico. The general location and the subject property are illustrated in Figures 1-1 and 1-2.

Database and windshield surveys were conducted for several properties adjacent to the subject property. In addition, a records search was performed for properties within 1 mile of the subject property. The records and surrounding property evaluations are described in Sections 3 and 4, respectively.



Aerial photo source: Google ©2014, modified by CH2M HILL

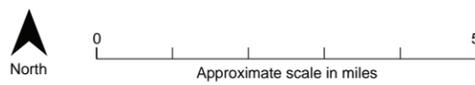
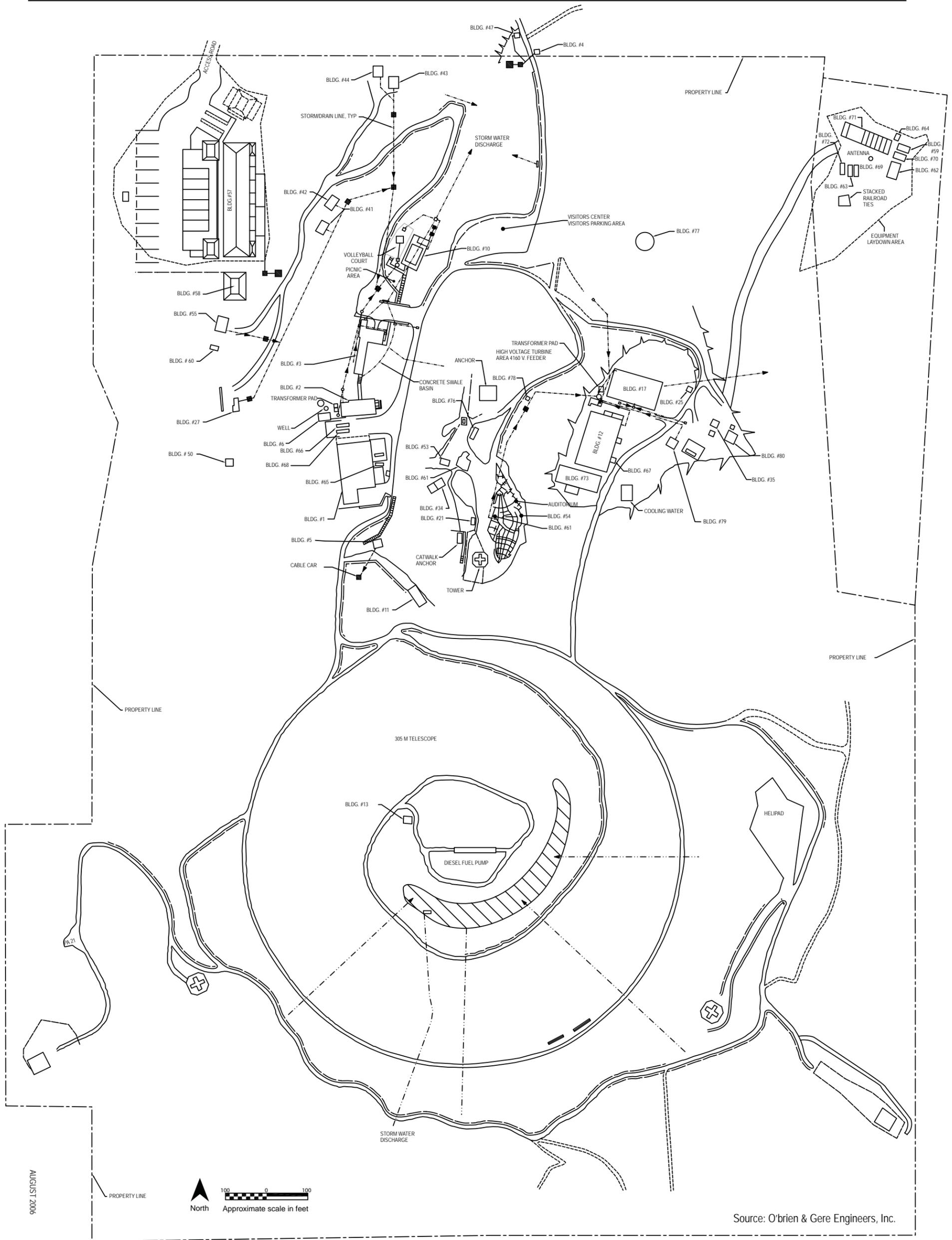


FIGURE 1-1
Project Location Map
 Arecibo Observatory
 Arecibo, Puerto Rico



This page left intentionally blank.



AUGUST 2006

North
 100 0 100
 Approximate scale in feet

Source: O'Brien & Gere Engineers, Inc.

BUILDING NO. DESCRIPTION

- | | | | |
|--|--|-------------------------------------|--|
| 1. OPERATIONS BUILDING | 34. HIGH VOLTAGE POWER SUPPLY BLDG. | 59. VISITOR CENTER TRAILER | 76. INSPIRATION FOR SCIENCE TRAILER |
| 2. ADMINISTRATION BUILDING | 35. CUMMINGS GENERATOR CONTROL BLDG. | 60. ANT. RECE. TESTING BLDG. | 77. PHASE REFERENCE ANTENNA (12M) |
| 3. VISITING SCIENTIST QUARTERS AND CAFETERIA | 41. WEST HILL V.S.Q. BACHELOR UNIT NO. 1 | 61. LEARNING CENTER | 78. COFFEE HUT |
| 4. ENTRANCE GUARD HOUSE | 42. WEST HILL V.S.Q. BACHELOR UNIT NO. 2 | 62. HFF STORAGE TRAILER | 79. ENGINEERING OFFICE BUILDING |
| 5. CABLE CAR HOUSE | 43. WEST HILL V.S.Q. FAMILY UNIT NO. 1 | 63. IONOSONDE TRAILER | 80. CUMMINGS DIESEL GENERATOR BUILDING |
| 6. PUMP HOUSE/WATER TREATMENT BLDG. | 44. WEST HILL V.S.Q. FAMILY UNIT NO. 2 | 64. ELECTRONIC TRAILER | |
| 10. SWIMMING POOL/RESTROOMS | 47. MAIN GATE RESTROOM | 65. SHIELDED TRAILER | |
| 11. LEWIS BUILDING-RIGGING LOFT | 50. INTERFERENCE MONITORING SHACK | 66. ATMOSPHERIC SCIENCE TRAILER | |
| 12. MAINTENANCE SHOPS | 51. GREASE PIT | 67. CRYOGENICS LAB TRAILER | |
| 13. BOWL SHACK | 53. EMERGENCY GENERATOR BLDG. | 68. SCIENTIFIC OFFICES TRAILER | |
| 17. WAREHOUSE | 54. VISITOR CENTER BLDG. | 69. ELECTRONIC TRAILER (WAVEGUIDE) | |
| 21. ANTENNA TESTING RANGE | 55. LIDAR LABORATORY BLDG. | 70. COMPUTER TRAILER | |
| 25. PAINT STORAGE BUILDING | 57. NORTH V.S.Q. BLDG. | 71. ELECTRONICS CABLE TRAILER | |
| 27. OPTICAL LABS | 58. NORTH V.S.Q. UTILITY BLDG. | 72. ELECTRONIC TRAILER (CRYOGENICS) | |
| | | 73. HF TRANSMITTER BUILDING | |

FIGURE 1-2
Subject Property
 Arecibo Observatory
 Arecibo, Puerto Rico



This page left intentionally blank.

1.2 Survey Methodology

1.2.1 Site Reconnaissance

VSI s were conducted October 20 through October 22, 2014. The VSIs included an escorted walk-through of accessible areas of buildings, facilities, and open areas. One of the primary objectives of the VSIs was to note visual evidence of contamination or potential sources of contamination, including leaks, spills, and any other evidence of past or current releases. Each of the existing buildings were visually inspected; however the interiors of occupied residential quarters, and several locked storage container buildings were not visually inspected.

1.2.2 Records Search and Review

The onsite records search was performed October 20 through October 22, 2014 and was facilitated by Wilson Arias. Mr. Arias provided environmental documentation and facilitated the visual inspection.

1.2.3 Interviews

Interviews were conducted October 20 through October 22, 2014 with the site personnel who were knowledgeable of the environmental issues with the subject property. Section 6 lists those interviewed.

1.2.4 Review of Special Resources

None.

1.3 Significant Assumptions

None.

1.4 Limitations, Exceptions, and Data Gaps

1.4.1 Limitations

The interior of some residential housing was not surveyed. The property line where there were no access roads was not viewed. Dense vegetation limited line of sight in some areas. No test pits were installed to inspect subsurface soil conditions. No sampling or analysis of any media was conducted during this survey.

This report has been prepared in compliance with ASTM E1527-13. In preparing this report, CH2M HILL has relied on certain information provided by federal, state, and local officials and other parties referenced herein, and on information contained in the files of governmental agencies that was reasonably ascertainable at the time of this assessment. Although there may have been some degree of overlap in the information provided by these various sources, an independent verification of the accuracy or completeness of all information reviewed or received during the course of this site assessment was not conducted.

1.4.2 Exceptions

There are no identified exceptions.

1.4.3 Data Gaps

According to § 3.2.20 of ASTM E1527-13, a data gap is a lack of or inability to obtain information required by the ASTM standard despite good faith efforts to gather the data. Data gaps may result from incompleteness in any of the activities required by the ASTM standard. A data gap is considered significant only if it affects the ability to identify recognized environmental conditions (RECs). Data gaps that were identified are listed in Table 1-1.

Table 1-1. Data Gaps

Environmental Baseline Study, Arecibo Observatory, Puerto Rico

Data Gap	Explanation	Significance of Gap
Site History	Site history not available in 5-year intervals.	Low – Standard historical sources of information include aerial photographs, historical topographic maps, city directory abstracts, and Sanborn Fire Insurance Maps. Additional maps would not likely provide additional relevant information.
Interiors of Residential buildings and mobile storage containers	The interior of some residential housing and several mobile storage containers were not surveyed due to inaccessibility	Low – Historic use of the facilities for residential purposes is unlikely to have had a significant environmental impact on the subject property. Based on interviews the storage containers did not contain hazardous materials and no impacts to the surrounding environment were observed.

Site Description

This section describes the methodology used to assess the EBS. The process included a records search, VSIs, physical site inspections, and interviews.

2.1 Location and Legal Description

The subject property is located at Carr 625, Km. 3.2, Barrio Esperanza, Arecibo, Puerto Rico. The subject property is approximately 120 acres located approximately 60 miles west of San Juan, and 10 miles south of the City of Arecibo. Subject property deeds were not available for review.

2.2 Current Use of the Subject Property

The subject property is currently used for radio astronomy observations, research, and support activities including, administrative, maintenance, and housing.

The Arecibo Telescope (Photographs 1 and 2) operates continuously and the facility employs approximately 150 employees. The visitor center (Photograph 3) receives approximately 100,000 visitors per year and is open Wednesday through Sunday of each week.

The subject property is divided into four main areas: the reflector area, the research and administrative area, the maintenance area, and the housing area.

The reflector area is located at the south half of the subject property. It includes the reflector dish, platform, the platform crew building (Lewis Building) and the cable car house (Photograph 4-7).

The research and administrative area is located at the central part of the property. It includes the main control and research building (Building #1), administrative building (Building #2), engineering offices (Buildings #66 and 68), and learning center and auditorium (Photographs 8-11).

The maintenance area is located at the northeast part of the property. It includes maintenance shops, warehouses, storage yards, the maintenance office, the paint storage building, the generator building, and fuel tanks (Photographs 12-17). The northwest corner of the property is used for additional storage and staging areas which consist mainly of mobile storage units (Photographs 18-19).

The housing area is located at the northwest and includes housing for visiting scientists and guests, cafeteria, swimming pool, and recreation area (Photographs 20-24). Just south of this area is the LIDAR building and optical lab (Photographs 25-26).

2.3 Description of Structures, Roads, and Other Improvements

A total of 50 buildings are located on the subject property. Further descriptions of the buildings are presented in the Divestment Options Study Report.

There is one gate to the subject property located at the northern boundary (Photograph 27). A road winds to the various areas of the subject property as shown on Figure 2-2.

2.4 Site Utilities

The water service, sanitary sewer system, and electricity utility providers and the general stormwater flow for the subject property are discussed in this section.

2.4.1 Water Service

An onsite drinking water well (USGS40001045257) provides water to the facilities on the subject property (Photograph 28-29). Depth to groundwater is approximately 350 feet below ground surface (EDR, 2014a).

2.4.2 Wastewater

Six septic systems throughout the facility handle discharges from toilets and sinks throughout the subject property. The cafeteria also discharges to a septic system, but discharge first goes through a grease trap (Photograph 30). The septic tanks are permitted by Puerto Rico Environmental Quality Board (PR EQB) and are in compliance. The septic systems are listed in Table 2-1.

Table 2-1. Septic Systems

Environmental Baseline Study, Arecibo Observatory, Puerto Rico

Septic System	Location	Septic Tank IDs
SS-1	Guard House	ST1
SS-2	Northwest Area	ST2A ST2B ST2C ST2D ST2E
SS-3	Cable Car Building	ST3
SS-4	Maintenance Area	ST4A ST4B ST4C ST4D
SS-5	North Visitors Quarters	ST5
SS-7	Pool Area	ST7

According to interviews, the septic systems have underground injection control permits registered with PR EQB.

A 55-gallon capacity oil-water separator is associated with the tank farm containment area. Stormwater that collects within the containment area is pumped to the oil-water separator and then discharges to the ground surface. Inspection/maintenance records of the oil-water separator were not available for review.

2.4.3 Stormwater

Stormwater runoff in the subject property generally flows down slopes and natural swales, and discharges in to several natural sinkholes. Stormwater in the maintenance area flows through several drop-inlets and gravity drains to an outfall to the east of area. Stormwater in the reflector area collects in a pond at the bottom in a natural sinkhole below the reflector (Photograph 31). Water is pumped from the pond and discharged approximately 400 feet southwest of the sinkhole to an intermittent stream.

2.4.4 Electric

Electric service is provided by Puerto Rico Electric Power Authority.

2.5 Current Use of the Adjoining Property

The adjoining property to the north, south, east, and west are mainly undeveloped land with a few rural residences.

This page left intentionally blank.

Site History

The subject property was first developed in 1960 by the U.S. Department of Defense. The Arecibo Ionosphere Observatory was formally opened on November 1, 1963. NSF acquired the property from the U.S. Department of Defense on October 1, 1969. Arecibo Ionosphere Observatory officially changed to National Astronomy and Ionosphere Center on September 1, 1971. The Observatory houses a 305-meter diameter reflector with a 900-ton platform suspended 450 feet above the reflector. The entire structure (reflector and platform) is suspended by a cable system attached to three reinforced concrete towers. Guy cables tied to anchors support the towers (Photograph 32).

The reflector and platform were upgraded in 1974 and then again in 1997. Currently the platform is being painted.

3.1 Previous Environmental Baseline Surveys

An EBS was completed January 2008 by Engineering, Compliance & Construction, Inc. The EBS did not specifically identify RECs. However, the following findings were of note:

- Asbestos-containing material (ACM) was found in Buildings #1, #2, #3, #4, #6, and #17.
- Lead-based paint (LBP) was found in Buildings #1, #2, #3, #4, #5, #7, #10, #11, #12, #17, #27, #47, #58, #61, the gate area, and the concrete guard along the road to the maintenance area.
- An unpermitted solid waste landfill was on the property known as the “semi-junk” pile. (This has been since investigated. See Section 4.2.4).
- Six unpermitted septic systems are on the property. (These have since been permitted. See Section 2.4.2).
- The polychlorinated biphenyl (PCB) content of the pole-mounted transformers on the property are unknown since the transformers are not labeled “Non-PCB” or “PCB-free”.
- No petroleum, lubricant, or oil releases were observed except small staining in the parking areas.
- Two active underground storage tanks (USTs) failed the recent cathodic protection tests. A third inactive UST was not properly closed and remains buried. (All USTs have been removed. See Section 4.2.3).

3.2 Historical Use Information of the Subject Property

3.2.1 Aerial Photographs

Year	Subject Property	Adjacent and Surrounding Properties
1968	The reflector, the support buildings in the northeast, and the maintenance area building are visible. Roads through the observatory are visible	Several structures are visible to the north of the subject property; the surrounding area is natural mountainous terrain.
1972	Similar to the 1968 photograph.	Similar to the 1968 photograph.

Year	Subject Property	Adjacent and Surrounding Properties
1977	The photo is not clear. No apparent differences from the 1972 photograph.	The photo is not clear. No apparent differences from the 1972 photograph.
1993	Several buildings appear on the west side of the subject property and at the maintenance area.	Two additional structures are visible north of the subject property.

3.2.2 Topographic Maps

Year	Subject Property	Adjacent and Surrounding Properties
1946	One structure is visible on the east boundary of the subject property.	A few scattered structures are visible in the area surrounding the subject property.
1947	Similar to the 1946 map.	Similar to the 1946 map.
1952	Another structure appears where the current reflector is located.	Similar to the 1947 map.
1957	Similar to the 1952 map.	Similar to the 1952 map.
1970	The reflector and building for the observatory appear on the map	Similar to the 1957 map.
1982	Similar to the 1970 map.	Similar to the 1970 map.

3.3 Environmental Records

CH2M HILL contracted with EDR of Milford, Connecticut, to review available regulatory agency databases for listings of the subject property. The complete list of databases are presented in Section 5. Table 3-1 presents the listings for the subject property.

Table 3-1. EDR Database Listings

Environmental Baseline Study, Arecibo Observatory, Puerto Rico

Site Name	Database(s)	Site Address	Location Relative to Site
Arecibo Observatory	UST	Arecibo, PR 00612	Target property
Arecibo Observatory	RCRA-CESQG	Arecibo, PR 00612	Target property
Arecibo Observatory	FINDS/ICIS	Arecibo, PR 00612	Target property
Arecibo Observatory	FINDS/RCRAInfo	Arecibo, PR 00612	Target property
CESQG	Conditionally Exempt Small Quantity Generator		
FINDS	Facility Index System/Facility Registry System		
ICIS	Integrated Compliance Information System		
RCRA	Resource Conservation and Recovery Act		

The USTs listed in the database have been closed as described in Section 4.2.3. No RECs were identified from the search.

Findings: Subject Property

4.1 Environmental Setting

The subject property is located at the south end of Route PR-625, Arecibo, Puerto Rico 00612 in Arecibo County. It is located at the following coordinates: Latitude 18° 20' 53.88''N and Longitude 66° 45' 8.64''W. The approximate elevation of the property is 996 feet above mean sea level (msl). The subject property is approximately 120 acres in size.

4.1.1 Climate

According to the National Oceanic and Atmospheric Administration, the average monthly high temperature ranges from 64 degrees Fahrenheit in February to 91 degrees Fahrenheit in September. The annual average precipitation is about 51 inches (Western Regional Climate Center, 2014).

4.1.2 Land Use

The land surrounding Arecibo is rural countryside near the northwest coast of Puerto Rico. Both residents and tourists visit the subject property. The subject property layout is shown on Figure 1-2.

4.1.3 Regional Physiography and Topography

The subject property is located in Northern Coastal Plains. Rivers flow northward to the Atlantic Ocean through forest lands. The belt of closed forest is interrupted by the canyons and valleys of several rivers. The forest lands have little surface drainage, but a prevalence of underground drainage. These lands constitute the karst belt of the northern limestone (U.S. Department of Agriculture, 2001).

Karsification in Puerto Rico's climate and rock types causes slopes to become nearly vertical, creating a steep topography. The general topography gradient across the subject property is from the north to the south. The approximate elevation of the property is 996 feet above msl, but varies widely over short distances.

4.1.4 Geology

The subject property is located within a sinkhole. Sinkholes are typical in karst landscapes, which are produced by the solution process, where limestone bedrock dissolves by chemical reaction. Limestone formations range in age from Cretaceous to the Quaternary Periods (USDA, 2001). The Lares Formation extends to approximately 800 feet msl with the Cibao Formation below the Lares.

Cone karst is formed by conical hills in the Lares Limestone. The hills are grouped linearly with intervening sinks. Its formation is attributed to solution along joints in the limestone, or to the notion that the cones are residuals after the collapse of caverns of underground rivers. The best developed cone karst in Puerto Rico occurs near the subject property where many of the cones are sharp, pointed, nearly circular or oval, 650 to 980 feet in diameter at the base, and rise 160 to 250 feet from the bottom of adjacent depressions (U.S. Department of Agriculture, 2001).

4.1.5 Soils and Groundwater

According to the U.S. Department of Agriculture Soil Conservation Service, the subject property is underlain by a soil type called Soller, which is clayey and has a high water table. Soller soils are characterized as silt-clay to 12 inches, weathered bedrock from 12 to 26 inches, and unweathered bedrock from 26 to 30 inches. Depth to the water table is greater than 6 feet.

The northern limestone contains two productive aquifers. The upper aquifer within the Aymamon and Aguada Limestones and alluvial deposits occur along the coast. The lower aquifer occurs within various members of the Cibao Formation and the Lares Limestone. The regional groundwater flow direction is to the north coastline. Locally, groundwater flow direction is impacted by topography, hydrogeology, soil characteristics, and nearby waterbodies. The nearest named surface water body is the Tanama River located approximately 2,500 feet southwest of the subject property. Storm water drains to various sinkholes on and around the subject property.

The subject property is not located in the 100-year or 500-year flood zones, as defined by the Federal Emergency Management Agency (FEMA).

According to EDR, two groundwater wells are listed as being located within 1-mile of the subject property. One well is registered to the USGS Puerto Rico Water Science Center and is located on the subject property. The well hole depth is 900 feet, cased to 600 feet. The depth to water in the well is approximately 350 feet below ground surface. The second well is located ½ to 1-mile north-northwest. This well is also registered to U.S. Geological Survey (USGS) Puerto Rico Water Science Center and is approximately 951 feet deep. No public water supply wells were identified in the EDR report.

4.1.6 Surface Water and Wetlands

A wetland and waterbody delineation and jurisdictional determination of Waters of the U.S. were not included in this effort. A desktop analysis was completed using USGS quadrangle maps (USGS; Bayaney, Puerto Rico), available aerial photography, and site visit observations to identify potential wetlands and waterbodies.

An unnamed intermittent stream is located approximately 400 feet southwest of the Arecibo site that appears to connect to the Tanama River located approximately 2,500 feet to the southwest of the Arecibo site based on review of USGS quadrangle maps and the U.S. Fish and Wildlife Service (USFWS) Wetlands Mapper (USFWS, 2014). No other intermittent or perennial waterbodies were identified at the subject property during site visit observations or on the USGS quadrangle maps or USFWS Wetlands Mapper.

Potential wetland areas are located in the vicinity of the subject property based the presence of localized standing water and saturated areas observed during previous site visits. The only mapped potential wetland areas in the vicinity of the subject property are riverine wetlands associated with adjacent waterbodies (USFWS, 2014).

4.1.7 Threatened and Endangered Species

Habitat assessments and species-specific surveys to determine the presence or absence of rare, threatened, or endangered (RTE) species were not included in this effort. Publicly available sources of information regarding federally-listed RTE species that may be found on or in the vicinity of the subject property were evaluated as part of a desktop review. The USFWS Endangered Species List (Puerto Rico/Virgin Islands) was the primary source of information used for the desktop analysis. The Puerto Rico Department of Natural and Environmental Resources has designated areas throughout Puerto Rico as critical habitat for several flora and fauna species. No officially protected areas are located within the

subject property. The protected area nearest to the subject property is the Río Abaja State Forest, located approximately 1.5 miles east of the subject property.

Twenty-three RTE species are listed by the USFWS as potentially occurring in Arecibo, Puerto Rico. A general habitat description and desktop evaluation of the potential utilization of the Arecibo site by RTE species are summarized for each of the 23 species in **Table 4-1**. Two plant species (*Cornutia obovata* and *Tectaria estremezana*) are identified by the USFWS as potentially occurring near the subject property. Surveys for RTE species or detailed habitat assessments were not included in this effort to determine if these species or the RTE species located in the Río Abaja State Forest are present or are likely to use the subject property. Impacts to RTE species are unknown but are not anticipated because activities would be generally limited to previously disturbed areas within the subject property.

Table 4-1. Rare, Threatened, and Endangered Species Summary (Arecibo, Puerto Rico)

Environmental Baseline Study, Arecibo Observatory, Puerto Rico

Group	Name	Federal Status	Habitat Description / Location	Desktop Analysis
Bird	<i>Accipiter striatus venator</i> (Puerto Rican Sharpshinned Hawk)	Endangered	Río Abajo State Forest	Potential; Proximity of subject property to area
Bird	<i>Amazona vittata</i> (Puerto Rican Parrot)	Endangered	Río Abajo State Forest	Potential; Proximity of subject property to area
Plant	<i>Auerodendron pauciflorum</i> (No Common Name)	Endangered	Río Abajo State Forest	Potential; Proximity of subject property to area
Bird	<i>Buteo platypterus brunnescens</i> (Puerto Rican Broadwinged Hawk)	Endangered	Río Abajo State Forest	Potential; Proximity of subject property to area
Plant	<i>Calyptronoma rivalis</i> (No Common Name)	Threatened	Río Abajo State Forest	Potential; Proximity of subject property to area
Reptile	<i>Chelonia mydas</i> (Green Sea Turtle)	Threatened	Coastal Zones	No Potential; No coastal areas at subject property
Plant	<i>Cordia bellonis</i> (No Common Name)	Endangered	Río Abajo State Forest	Potential; Proximity of subject property to area
Plant	<i>Cornutia obovata</i> (No Common Name)	Endangered	Río Abajo State Forest, Near Arecibo Observatory	Likely Potential; Proximity of subject property to area
Plant	<i>Daphnopsis hellerana</i> (No Common Name)	Endangered	Northern Limestone (Karst) Hills	Potential; Karst areas are present at subject property
Reptile	<i>Dermochelys coriacea</i> (Leatherback Sea Turtle)	Endangered	Coastal Zones	No Potential; No coastal areas at subject property
Reptile	<i>Epicrates inornatus</i> (Puerto Rican Boa)	Endangered	Forested Volcanic and Limestone (Karst) Hills	Potential; Karst areas are present at Arecibo site
Reptile	<i>Eretmochelys imbricata</i> (Hawksbill Sea Turtle)	Endangered	Coastal Zones	No Potential; No coastal areas at subject property
Plant	<i>Goetzea elegans</i> (Beautiful Goetzea)	Endangered	Cambalache State Forest	Unlikely; Identified area is not proximate to subject property
Plant	<i>Myrcia paganii</i> (No Common Name)	Endangered	Biafara Arrozal	Unlikely; Identified area is not proximate to subject property

Table 4-1. Rare, Threatened, and Endangered Species Summary (Arecibo, Puerto Rico)*Environmental Baseline Study, Arecibo Observatory, Puerto Rico*

Group	Name	Federal Status	Habitat Description / Location	Desktop Analysis
Plant	<i>Ottoschulzia rhodoxylon</i> (No Common Name)	Threatened	Cambalache State Forest, Sabana Hoyos	Unlikely; Identified area is not proximate to subject property
Bird	<i>Pelecanus occidentalis</i> (Brown Pelican)	Delisted due to Recovery	Coastal Zones, Inland Waterbodies, No Nesting	No Potential; No coastal areas at subject property
Amphibian	<i>Peltophryne lemur</i> (Puerto Rican Crested Toad)	Threatened	Northern Karst Regions	Potential; Karst areas are present at subject property
Plant	<i>Pleodendron macranthum</i> (No Common Name)	Endangered	Río Abajo State Forest	Potential; Proximity of subject property to area
Plant	<i>Schoepfia arenaria</i> (No Common Name)	Threatened	Río Abajo State Forest	Potential; Proximity of subject property to area
Plant	<i>Solanum drymophilum</i> (No Common Name)	Endangered	Río Abajo State Forest	Potential; Proximity of subject property to area
Bird	<i>Sterna dougallii</i> (Roseate Tern)	Threatened	Coastal Areas and Offshore Cays, Nesting	No Potential; No coastal areas at subject property
Plant	<i>Tectaria estremarana</i> (No Common Name)	Endangered	Río Abajo State Forest, Near Arecibo Observatory	Likely Potential; Proximity of subject property to area
Mammal	<i>Trichechus manatus</i> (Antillean Manatee)	Endangered	Coastal Zones	No Potential; No coastal areas at subject property

Sources:

USFWS Endangered Species List (Puerto Rico/Virgin Islands) (<http://www.fws.gov/caribbean/es/documents/2012-Species-MapUpdate-2012.pdf>)NatureServe (<http://explorer.natureserve.org/index.htm>)

4.2 Environmental Factors

The following sections discuss environmental factors that may affect the subject property.

4.2.1 Hazardous Material/Petroleum Product Management

The majority of hazardous materials and petroleum products are stored in areas near the warehouse building. Smaller quantities of products were stored at buildings where they intend to be used. Hazardous material/petroleum product inventory lists were not available. However, the following materials were observed:

- Building #1: Machine shop flammable locker with isopropanol and epoxy coating (Photograph 33); Electronics lab flammable locker with isopropanol and spray paint (Photograph 34).
- Generator Building: 2 55-gallon drums of oil (Photograph 35).
- Building #17: small quantities of motor oil (Photograph 36).
- Six sheds behind building #17 (Photograph 37) contain the following:

- CS-1: New lead-acid batteries (Photograph 38)
 - CS-2: Chlorine (Photograph 39)
 - CS-3 (corrosive storage): 26 2.5-liter hydrochloric acid containers, 1 gallon of ammonia absorber, and 9 1-gallon containers of ammonium (29 percent).
 - CS-4: 14 gallons of Amine CD, 20 gallons of Roundup, snail and slug pellets, brush killer, and 75 pounds of Pramito SPS. (Photograph 40)
 - CS-5: 5 bags of fertilizer.
 - CS-6: 15 bags of black beauty abrasive.
- Building #25 is used for storage for paint and oil. It contains numerous 1-gallon and 5-gallon cans of paint, motor oil, antifreeze, petroleum distillates, (Photographs 41)
 - Next to Building #25 is a diked area with container for oil dispensing. It includes 5 55-gallon drums of lubricant oil and 9 5-gallon containers of motor oil. (Photograph 42)
 - The caged shed next to the vehicle lift building (grease pit) contains 3 overpacked 55-gallon drums of used oil (Photograph 43).
 - Inside the machine shop: cans of paint, motor oils, and lubricants. (Photograph 44-45)
 - Building #27 (Optics Lab): 1 5-gallon container of methanol. (Photograph 46)
 - Paint and primer containers are stored in an outside closet of the utility building next to the north visiting scientist quarters building (Photograph 47).
 - On the platform above the reflector, 2 5-gallon buckets of gear oil and 120 pounds of grease (Photograph 48).

Carbon-14 (C-14) is stored on site and used for experiments. On June 23, 2014, Mr. Todd J. Jackson of the United States Nuclear Regulatory Commission inspected the C-14. The C-14 was secured with no leaks. (Dade Moeller, 2014)

Fuel oil is also stored in aboveground storage tanks (ASTs) and USTs, as listed in Section 4.2.2 and 4.2.3, respectively.

No significant spills of hazardous materials or petroleum products were observed; however, the following staining was observed:

- Stain on warehouse concrete floor next to motor oil storage (Photograph 49).
- Stains at parking spaces at cafeteria (Photograph 50)

Generated waste stored in the waste accumulation area is located outside Building #17, and includes 55-gallon drums containing contaminated diesel, paint, grease, oily rags, aerosol cans, oil filters, and used oil (Photograph 51).

4.2.2 Aboveground Storage Tanks

There are five ASTs on the subject property and are described on Table 4-2.

Table 4-2. ASTs Located on the Subject Property
Environmental Baseline Study, Arecibo Observatory, Puerto Rico

AST Location	Capacity	Contents	Photograph
Generator Building	1,000-gallon daily tank	Diesel	52
Maintenance area tank dike	12,000 gallons	Diesel	53

Table 4-2. ASTs Located on the Subject Property
Environmental Baseline Study, Arecibo Observatory, Puerto Rico

AST Location	Capacity	Contents	Photograph
Maintenance area tank dike	2,000 gallons	Gasoline	53
North of Building #53	2,000 gallons	Diesel	54
Below reflector	300 gallons	Diesel	Not available

The day tank is a metal double-walled tank on a concrete slab. The 300-gallon tank below the reflector was temporarily removed from service to be painted. The concrete slab did not show any staining and there was no stressed vegetation around the slab. No leaks or staining were observed. The other tanks are in concrete dikes and no leaks or stains were observed.

4.2.3 Underground Storage Tanks

No USTs are on the subject property. Three gasoline USTs previously existed on the property. A 4,000-gallon tank and a 2,000-gallon tank were installed near the maintenance building in 1983. A 3,000-gallon tank was installed near the former pina colada stand in 1963. This UST was abandoned in place; however, the tank was not properly closed according to PR EQB. In 2011, all three USTs were removed and confirmation samples were taken and no contamination was detected above PR EQB criteria. (O'Brien & Gere, 2011)

4.2.4 Environmental Investigations

The following environmental investigations were performed at the subject property:

- An investigation was conducted in December 2007 at a former debris pile located northeast of the reflector dish in an area known as the semi-junk yard. The debris was removed and four surface soils were collected and analyzed for mercury, cadmium, chromium, lead, diesel range organics, oil range organics, gasoline range organics, PCBs, semi-volatile organics, and volatile organics. The results for all samples showed that the analytes were below U.S. Environmental Protection Agency (USEPA) Region III risk-based concentrations. (Pace Analytical, Inc., 2007)
- Soil samples were collected and analyzed as part of the oil-water separator and dry well closure at the former vehicle wash rack in Building #51. The soil was analyzed for volatile organic compounds, total petroleum hydrocarbons, metals, and cyanide. Only arsenic was above USEPA Region III risk-based concentrations and was likely representative of background concentrations (O'Brien & Gere, 2004). The PR EQB approved the closure report on December 12, 2005.
- Soil samples were collected and analyzed as part of a dry well closure associated with the tank farm secondary containment system. The soil was analyzed for volatile organic compounds, total petroleum hydrocarbons, metals, and cyanide. Only arsenic was above USEPA Region III risk-based concentrations and was likely representative of background concentrations (O'Brien & Gere, 2007). The closure report was approved by PR EQB in March 2007.

4.3 Disclosure Factors

Disclosure factors are not regulated under CERCLA and, if properly managed, do not have an environmental impact on the property and do not affect the property categorization. However, their presence may result in an environmental concern if a release to the environment has occurred. Each of the disclosure factors are discussed in the following sections.

4.3.1 Asbestos-containing Materials

Renovation and demolition of buildings with ACMs have the potential for releasing asbestos fiber into the air. Asbestos fibers could be released because of disturbance or damage to various building materials, such as pipe lagging, ceilings, floor tile, sheetrock, waterlines, and gasket material.

ACM surveys were performed in 2005 at Buildings #1, #2, and #3. Another survey was performed in 2007 for Buildings #4, #6, and #17. Table 4-3 summarized the ACM survey results.

Table 4-3. Confirmed ACM

Environmental Baseline Study, Arecibo Observatory, Puerto Rico

Building	ACM
Building #1	12"x12" brown speckles floor tile; 9"x9" floor tile
Building #2	9"x9" floor tile; reflective sheet on interior lighting in stairwell
Building #3	Silver Roof Coating
Building #4	Roof mastic
Building #6	Tank expansion joint
Building #17	Gray window caulk; 12"x12" blue floor tile: expansion joint

No records of ACM abatement were obtained.

4.3.2 Lead-based Paint

Lead is a heavy, ductile metal commonly found in association with organic compounds, oxides, salts, and metallic lead. Human exposure to lead has been classified as an adverse health risk by agencies such as the Occupational Safety and Health Administration and USEPA. Sources of exposure to lead include paint, dust, and soil.

Exposure to LBP primarily presents a health concern to children, and its use was generally discontinued in 1978. The routine application of LBP in the past, and the associated peeling or degradation of paint over time, have created the potential for localized lead contamination in soils around buildings that were constructed before or during 1978.

A LBP survey was conducted in 2007. Table 4-4 lists the areas with detectable levels of lead.

Table 4-4. 2007 LBP Survey Results

Environmental Baseline Study, Arecibo Observatory, Puerto Rico

Building	LBP Description
Building #1	Interior white paint
Building #2	Exterior white paint
Building #3	Exterior paint; interior paint in laundry room
Building #4	Exterior paint
Building #5	Exterior white paint
Building #7	Interior paint, stair railing, guard rails and posts, gray hand rails
Building #10	Exterior paint, roof finish
Building #11	Exterior paint, guard rail
Building #12	Exterior paint
Building #17	White and green paint

Table 4-4. 2007 LBP Survey Results*Environmental Baseline Study, Arecibo Observatory, Puerto Rico*

Building	LBP Description
Building #27	Red primer, white and green paint
Building #47	Paint in restroom
Building #58	Paint on flashing
Building #61	White paint, rail and stair paint
Gate	Parking striping, rails
Concrete guard along the road to the maintenance area.	Paint on concrete guard.

No records of LBP removal were obtained. Significant peeling paint was not observed during the site reconnaissance.

Tests have shown that LBP still exists on areas of the platform. Currently the platform above the reflector is being painted as part of an on-going project to remove paint and primer and repaint with non-LBP (O'Brien & Gere, 2006).

4.3.3 Polychlorinated Biphenyls

Electrical transformers, capacitors, switches, light ballasts, and machinery with hydraulic systems are potential sources of PCB-containing oil. No PCB survey reports were available for review.

The transformers and switches outside Building #1 contain non-PCB dielectric fluid (Photograph 55). The transformers and capacitors inside the Transformer Room are labeled non-PCB.

The transformers at the high voltage power supply building are labeled non-PBC (Photograph 56).

Pole-mounted transformers were located throughout the subject property and are owned by Puerto Rico Electric Company. These transformers were not labeled to indicate the presence or absence of PCBs. They appeared to be in good condition, and no leak, soil staining, or stressed vegetation was observed around the poles.

Light ballasts in the buildings were not checked to determine if they contain PCBs. However, fluorescent bulbs were generally not used due to the interference they cause with the telescope.

4.3.4 Radon

Radon testing has not been performed recently at the subject property. In 1993, USGS collected 13 indoor air samples in the subject property and analyzed them for radon. The mean radon value was 0.3 picocurie per liter with the maximum value of 0.9 picocurie per liter. (USGS, 1995). Radon is not anticipated to be a potential environmental concern at the subject property.

4.3.5 Medical/Biohazardous Waste

From the records search and interviews, no medical or biohazardous waste was found to be stored on the subject property.

4.3.6 Munitions and Explosives of Concern

From the records search and interviews, no munitions and explosive of concern are on the subject property.

Findings: Adjacent Properties

5.1 Land Use

Arecibo is located in a rural area of northwest Puerto Rico. The main industries for Puerto Rico are agriculture and tourism. The land use adjacent to Arecibo is low density, rural residential/agricultural, and undeveloped land.

5.2 Surveyed Properties

CH2M HILL contracted with EDR of Milford, Connecticut to review available regulatory agency databases for sites within the various ASTM-prescribed radii of the property. The specific radii are identified according to source in the complete database search, provided in Attachment B. Additional sources of information include:

- GoogleEarth™

The following databases were searched and provided in the EDR report to identify generators and transporters of hazardous wastes; hazardous waste treatment, storage, and disposal facilities; and sites where releases of hazardous materials have been reported:

5.2.1 Federal Databases

- USEPA National Priorities List (NPL) of uncontrolled or abandoned hazardous waste sites identified for priority remedial action (last updated 09/29/14)
- USEPA Proposed NPL site list (last updated 09/29/14)
- USEPA Delisted NPL site list (last updated 09/29/14)
- USEPA Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) list of sites that either are proposed for or are on the NPL and sites that are in the screening and assessment phase for possible inclusion on the NPL (last updated 10/25/13)
- Federal Facility site listing of NPL and Base Realignment and Closure (BRAC) sites found in CERCLIS database (last updated 07/21/14)
- CERCLIS No Further Remedial Action Planned sites where, following an initial investigation, no contamination was found, contamination was removed quickly, or the contamination was not serious enough to require federal Superfund action or NPL consideration (last updated 10/25/13)
- EPA database of Resource Conservation and Recovery Act (RCRA) facilities that are undergoing corrective action (CORRACTS) because there has been a release of hazardous waste or constituents into the environment from a RCRA facility (last updated 06/10/14)
- RCRA Treatment, storage, and disposal facilities (RCRA-TSDF) (last updated 06/10/2014)
- EPA RCRA large-quantity, small-quantity, and conditionally exempt small-quantity generators (last updated 06/10/2014)
- U.S. Engineering Controls: Federal engineering control registry (last updated 09/18/2014)

- U.S. Institutional Controls: Federal institutional control registry (last updated 09/18/2014)
- Land Use Control Information System (LUCIS) records pertaining to former Navy Base Realignment and Closure sites (last updated 08/29/2014)
- Federal Emergency Response Notification System (ERNS) list of reported accidental releases of oil and hazardous substances (last updated 9/29/14)
- FEMA underground storage tank (UST) locations (last updated 01/01/10)
- U.S. Brownfields (last updated 09/22/14)
- Open Dump Inventory (ODI) (last updated 06/30/1985)
- U.S. Clandestine Drug Labs (US CDL) Drug Enforcement Administration (last updated 07/25/14)
- LIENS2 is the CERCLA Lien Information database (last updated 02/18/14)
- EPA database of Superfund Consent Decrees (last updated 12/31/13)
- Records of Decision that document permanent remedies at an NPL site (last updated 11/25/13)
- EPA Toxic Substances Control Act (TSCA) database, which identifies manufacturers and importers of chemical substances (last updated 12/31/2006)
- EPA Office of Prevention, Pesticides and Toxic Substances Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA)/TSCA Tracking System (FTTS), which tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA, and the EPCRA (last updated 04/09/2009)
- U.S. Mines Master Index File Department of Labor (last updated 08/05/2014)
- Section 7 Tracking Systems reports types and amounts of pesticides, active ingredients, and devices produced (last updated 12/31/2009)
- National Clandestine Laboratory Registry (US HIST CDL) for either clandestine drug laboratories or dump sites (last updated 07/25/2014)
- U.S. Department of Transportation (DOT) Hazardous Materials Information Reporting System (HMIRS), which contains hazardous material spill incidents reported to DOT (last updated 09/30/14)
- USEPA database of RCRA facilities that currently do not generate hazardous waste (RCRA-NonGen) (last updated 06/10/14)
- USEPA Records of Decision (ROD) database (last updated 11/25/13)
- U.S. Department of Transportation (DOT) Office of Pipeline Safety (OPS) Incident and Accident Data (last updated 07/31/12)
- U.S. Department of Defense Sites (DOD) (last updated 12/31/2005)
- U.S. Army Corps of Engineers Former Used Defense Sites (FUDS) (last updated 06/06/2014)
- USEPA database of Superfund Consent Decrees (CONSENT) (last updated 12/31/13)
- Uranium Mill Tailings Sites (UMTRA) locations (last updated 09/14/2010)
- Emergency Planning and Community Right-to-Know Act (EPCRA) inventory of toxic chemical emissions (Toxic Release Inventory System [TRIS]) (last updated 12/31/2011)
- Integrated Compliance Information System (ICIS) national enforcement and compliance program for the National Pollutant Discharge Elimination System (NPDES) (last updated 07/31/2014)

- USEPA PCB Activity Data Systems (PADS), which identifies transporters, commercial stores, and/or brokers, and disposers of PCBs who are required to notify EPA (last updated 07/01/14)
- USEPA Material Licensing Tracking System (MLTS) maintained by the Nuclear Regulatory Commission maintains list of sites that possess or use radioactive materials (last updated 07/22/13)
- Radiation Information Database (RADINFO) facilities regulated by EPA for radiation and radioactivity (last updated 10/07/14)
- EPA Facility Index System (FINDS) that contains information and “pointers” to other sources that contain more detail, including permit compliance system (PCS), Aerometric Information Retrieval System (AIRS), Enforcement Docket (DOCKET), Federal Underground Injection Control (FURS), Criminal Docket (C-DOCKET), Federal Facilities Information System (FFIS), state environmental laws and statutes (STATE), and polychlorinated biphenyl (PCB) activity data system (PADS) (last updated 08/16/14)
- RCRA Administrative Action Tracking System (RAATS) contains records based on enforcement actions (last updated 04/17/1995)
- USEPA Risk Management Plans (RMP) chemical accident prevention at facilities using extremely hazardous substances (last updated 08/01/2014)
- USEPA Biennial Reporting System (BRS) database, which collects detailed data regarding large-quantity generators and treatment, storage, and disposal facilities (last updated 12/31/2011)
- USEPA 2020 Corrective Action List (COR ACTION) a RCRA cleanup baseline includes facilities expected to need corrective action (last updated 11/11/2011)
- USEPA Lead Smelter Sites a listing of former lead smelter locations (last updated 06/04/14)
- USEPA Potentially Responsible Parties (PRP) a listing of verified potential responsible parties (last updated 10/25/13)
- USEPA Financial Assurance Information (US FIN ASSUR) facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the cleanup, closure, and post-closure care (last updated 09/04/14)
- Steam-Electric Plan Operation Data (COAL ASH DOE) listing of power plants that store ash in surface ponds (last updated 12/31/2005)
- US AIRS (AFS) Aerometric Information Retrieval System Facility Subsystem contains compliance data on air pollution sources (last updated 10/16/2014)
- US AIRS MINOR Air Facility Systems Data is a listing of minor source facilities (last updated 10/16/2014)
- Coal combustion residues surface impoundments (COAL ASH EPA) list (last updated 07/01/2014)
- PCB Transformer Database (PCB TRANSFORMER) registration database (last updated 02/01/2011)
- USEPA Watch List on enforcement matters (last updated 08/30/2013)

5.2.2 Puerto Rico and Tribal Databases

- Indian Reservation Locations (INDIAN RESERV) (last updated 12/31/2005)
- Federally and Indian administrated lands (FEDLAND) (last updated 12/31/2005)
- Indian Report on the Status of Open Dumps on Indian Land (INDIAN ODI) (last updated 12/31/1998)

- Leaking Underground Storage Tank (LUST) database contains an inventory of reported LUST incidents (last updated 12/01/2010)
- UST database contains data regarding registered USTs (last updated 01/01/2008)
- State Coalition for remediation of drycleaners (SCRD DRYCLEANERS) (last updated 03/07/2011)

5.2.3 Additional Environmental Site Information

The subject property was listed in UST, RCRA-CESQG, FINDS-ICS, and FINDS-RCRAInfo databases in the EDR report as shown in Table 3-1. No other properties were identified by EDR within 1 mile from the subject property boundary. Searches ranged from the location of the subject property to 1 mile from the subject property location. The EDR report did not identify any orphan properties (unknown locations).

SECTION 6

Interviews

Interviews were conducted October 20 through October 22, 2014, with the personnel listed in Table 6-1.

Table 6-1. Personnel Interviewed during the Site Visit
Environmental Baseline Study, Arecibo Observatory, Puerto Rico

Personnel	Title or Department	Information or Services Provided
Mr. Jaime Gago	Engineer, Arecibo Observatory	Provided facility maps. Escorted the field team for a portion of the site reconnaissance.
Mr. Robert Kerr	Facility Manager, Arecibo Observatory	Provided background information.

Information gathered from the interviews are presented within the other sections of this report.

This page left intentionally blank.

Findings and Conclusions

This section consolidates the findings presented in Sections 4 and 5 in accordance with ASTM E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*.

The findings of this EBS report were based on reasonably available environmental information; interviews with site, state, and local personnel; a review of previous environmental studies; and federal and state database and file information related to the storage, release, treatment, or disposal of hazardous substances or petroleum products. Results were also based on visual observations of the subject property and adjacent properties.

7.1 Recognized Environmental Conditions

RECs are defined as the presence or likely presence of a hazardous substance or petroleum product on the property under conditions that indicate an existing release, a past release, or material threat of a release of hazardous substances or petroleum products into the structures of the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with applicable laws. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be subject to enforcement action if brought to the attention of the appropriate government agencies. No RECs were found on the subject property.

7.2 Historical Recognized Environmental Conditions

A Historical Recognized Environmental Condition (HREC) is one that in the past would have been considered a REC but which is not currently considered a REC. If a past release of a hazardous substance or petroleum product has occurred in connection with the subject property and has been remediated, with such remediation accepted by a responsible regulatory agency, that condition is considered an HREC. No HRECs were found on the subject property.

7.3 *De Minimis* Conditions

De minimis conditions are conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be subject to an enforcement action if brought to the attention of the appropriate government agencies. Conditions determined to be *de minimis* are not RECs. The following *de minimis* conditions were identified on the subject property:

- Stain on warehouse concrete floor next to motor oil storage.
- Staining at the parking area which are likely small vehicle oil leaks.

7.4 Other Conditions of Note

The following are other conditions on the subject property that are not considered RECs, but are worth disclosing:

- ACM was found in Buildings #1, #2, #3, #4, #6, and #17.

SECTION 7 FINDINGS AND CONCLUSIONS

- LBP was found in Buildings #1, #2, #3, #4, #5, #7, #10, #11, #12, #17, #27, #47, #58, #61 and the gate area.
- The PCB content of the pole-mounted transformers on the subject property are unknown as the transformers are not labeled Non-PCB and documentation was not readily available for review.
- A 55-gallon capacity oil-water separator is associated with the tank farm containment area. Stormwater that collects within the containment area is pumped to the oil-water separator and then discharges to the ground surface. Inspection/maintenance records of the oil-water separator were not available for review. With the oil-water separator being 50 years old, a possibility exist that it may have failed and impacted surrounding soils.
- The septic and leachfield system serving the maintenance area has the potential for concern. No maintenance records were available and the system has served facilities where hazardous and petroleum products have been stored and used for over 50 years. No visual evidence of contamination was observed during the site reconnaissance.

SECTION 8

Certification for the Arecibo EBS

CH2M HILL has performed an EBS for the approximately 120-acre subject property located near Arecibo, Puerto Rico. We reviewed all of the appropriate records that were made available and conducted site inspections of the facility. The information in this EBS report is based on records made available and, to the best of CH2M HILL's knowledge, is correct and current as of October 2014.

We declare that, to the best of our professional knowledge and belief, we meet the definition of environmental professional as defined in §312.10 of 40 *Code of Federal Regulations* Part 312, and we have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject properties. We have developed and performed all of the appropriate inquiries in conformance with the standards and practices set forth in 40 *Code of Federal Regulations* Part 312.

Michael Brose
Environmental Scientist
CH2M HILL

Date

David Stieb
Senior Technical Reviewer
CH2M HILL

Date

This page left intentionally blank.

References

- ASTM International (ASTM). 2013. Environmental Site Assessments: Phase I Environmental Site Assessment Process.
- Dade Moeller. 2014. Certificate of Leak Test. June.
- Environmental Data Resources, Inc. (EDR). 2014a. EDR Radius Map and GeoCheck Report. Arecibo Observatory, Inquiry number: 4135296.2s. 24 November 2014.
- Environmental Data Resources, Inc. (EDR). 2014b. EDR Historical Topographic Maps. Arecibo Observatory, Inquiry number: 4135296.2s. 24 November 2014.
- Environmental Data Resources, Inc. (EDR). 2014c. EDR Historical Aerial Photo Map Report. Arecibo Observatory, Inquiry number: 4135296.2s. 24 November 2014.
- NatureServe. 2014. NatureServe Web Service. Arlington, VA. <http://services.natureserve.org>. Accessed December 2014.
- O'Brien & Gere. 2004. Dry Well and Oil/Water Separator Closure Report. November.
- O'Brien & Gere. 2006. Environmental Review, National Astronomy and Ionosphere Center. Arecibo Observatory, Arecibo, Puerto Rico. For Cornell University, Ithaca, New York. October.
- O'Brien & Gere. 2007. Dry Well Closure Report – Tank Farm Area. January.
- O'Brien & Gere. 2011. Underground Storage Tank Closure Report, Observatorio de Arecibo, National Astronomy and Ionosphere Center, UST 86-0049. March.
- Pace Analytical, Inc. 2007. Laboratory Results for Arecibo Observatory for Samples Collected December 7, 2007. December.
- U.S. Department of Agriculture. 2001. Forest Service. Puerto Rican Karst – A Vital Resource. General Technical Report WO-65.
- U.S. Fish and Wildlife Service (USFWS). 2000. Endangered Species List (Puerto Rico/Virgin Islands). Division of Endangered Species. U.S. Fish and Wildlife Service. 2007. Caribbean Endangered Species Map. Ecological Services in the Caribbean.
- U.S. Fish and Wildlife Service (USFWS). 2014. Wetlands Mapper. <http://www.fws.gov/wetlands/Data/Mapper.html>. Accessed December 2014.
- U.S. Geological Survey (USGS). 1995. Geologic Radon Potential of Guam and Puerto Rico.
- Western Regional Climate Center. 2014. *Western Regional Climate Center*. www.wrcc.dri.edu. Accessed November 14, 2014.

This page left intentionally blank.

Attachment A
Site Reconnaissance Photographs



Photo 1: The Arecibo Telescope facing south.



Photo 2: Platform of the Arecibo Telescope from below the reflector dish facing up.



Photo 3: Visitors Center facing southeast.



Photo 4: Platform crew office (Lewis Building) facing south.



Photo 5: Cable Car House facing east.



Photo 6: Reflector dish facing south.



Photo 7: Platform of the Arecibo Telescope facing south.



Photo 8: Building #1 facing west.



Photo 9: Building #2 facing west.



Photo 10: Engineering office trailers (Buildings #66 and #68) facing west.



Photo11: Visitors Center facing south.



Photo 12: Maintenance Shop (Building #12) facing east.



Photo 13: Warehouse (Building #17) facing northeast.



Photo 14: Maintenance office facing north.



Photo 15: Generator Building



Photo 16: Fuel tanks facing south.



Photo 17: Paint storage building.

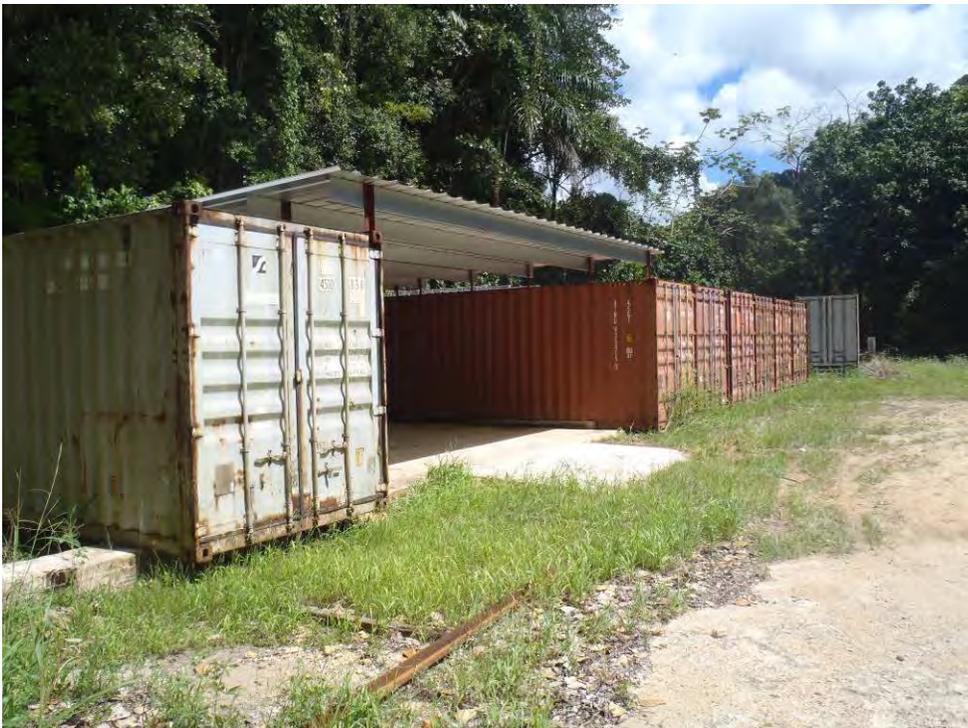


Photo18: Mobile storage containers facing northwest.



Photo 19: Storage Building #52 facing southwest



Photo 20: Building #3, Visiting Scientist Quarters and cafeteria facing east.



Photo 21: Swimming pool and basketball courts facing north.



Photo 22: Building #43, visiting scientist family unit facing east.



Photo 23: Visiting scientist bachelor unit facing east.



Photo 24: North Visiting Scientist Building facing southeast.



Photo 25: LIDAR Building facing northwest.



Photo 26: Optics lab facing east.



Photo 27: Guard house facing east.



Photo 28: Water well facing west.



Photo 29: Water treatment building facing west.



Photo 30: Grease trap next to the cafeteria facing west



Photo 31: Pond beneath reflector dish facing north.



Photo 32: Tower and guy wires facing north.



Photo 33: Flammable locker at the machine shop inside Building #1.



Photo 34: Flammable locker at the electronics lab in Building #1.



Photo 35: Drums of oil inside Generator Building.



Photo 36: Inside warehouse building.



Photo 37: Storage sheds outside warehouse building facing north.



Photo 38: Battery storage in shed CS-1.



Photo 39: Chlorine storage in shed CS-2



Photo 40: Herbicides in shed CS-4



Photo 41: Inside paint storage building (Building #25).



Photo 42: Oil storage next to warehouse facing west.



Photo 43: Grease rack and used oil storage facing west.



Photo 44: Paint inside maintenance shop.



Photo 45: Inside maintenance shop.



Photo 46: Methanol container inside Optic Lab.



Photo 47: Paint inside utility building next to the north visiting scientist quarters.



Photo 48: Gear oil and grease on platform.



Photo 49: Stain on concrete floor inside warehouse.



Photo 50: Stain on parking space at cafeteria facing southwest.



Photo 51: Used oil storage area next to Warehouse.



Photo 52: 1,000-gallon day tank for generator at Building #80.



Photo 53: 2,000-gallon gasoline aboveground storage tank and 12,000-gallon diesel aboveground storage tank facing south.



Photo 54: 2,000-gallon diesel tank for emergency generator facing west.



Photo 55: Transformer outside Building #1.



Photo 56: High voltage power supply building facing south.

Attachment B
Environmental Data Resources, Inc.,
Radius Map Reports with Geocheck



Arecibo Observatory

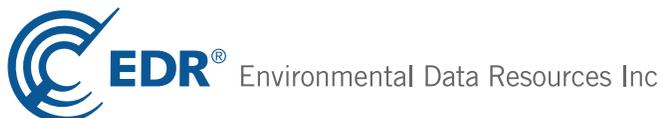
Arecibo

Arecibo, PR 00612

Inquiry Number: 4135296.2s

November 24, 2014

EDR Summary Radius Map Report



6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
Executive Summary	ES1
Overview Map	2
Detail Map	3
Map Findings Summary	4
Map Findings	7
Orphan Summary	10
Government Records Searched/Data Currency Tracking	GR-1
 <u>GEOCHECK ADDENDUM</u>	
Physical Setting Source Addendum	A-1
Physical Setting Source Summary	A-2
Physical Setting Source Map	A-7
Physical Setting Source Map Findings	A-8
Physical Setting Source Records Searched	PSGR-1

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. **NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT.** Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2014 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

ARECIBO
ARECIBO County, PR 00612

COORDINATES

Latitude (North):	18.3483000 - 18° 20' 53.88"
Longitude (West):	66.7524000 - 66° 45' 8.64"
Universal Transverse Mercator:	Zone 19
UTM X (Meters):	737518.0
UTM Y (Meters):	2030065.8
Elevation:	996 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property:	N/A
Source:	USGS 7.5 min quad index

MAPPED SITES SUMMARY

Target Property Address:
ARECIBO
, PR 00612

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft.) DIRECTION
A1	ARECIBO OBSERVATORY	ROUTE 625, KM. 3.1 E	UST		TP
A2	OBSERVATORIO DE AREC	CARR 625 KM 3.3	RCRA-CESQG		TP
A3	ARECIBO OBSERVATORY	RT 625 KM. 3.1	FINDS		TP
A4	OBSERVATORIO DE AREC	CARR 625 KM 3.3	FINDS		TP

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was identified in the following records. For more information on this property see page 7 of the attached EDR Radius Map report:

<u>Site</u>	<u>Database(s)</u>	<u>EPA ID</u>
ARECIBO OBSERVATORY ROUTE 625, KM. 3.1 E ARECIBO, PR 00612	UST	N/A
OBSERVATORIO DE AREC CARR 625 KM 3.3 ARECIBO, PR 00612	RCRA-CESQG	PRR000015057
ARECIBO OBSERVATORY RT 625 KM. 3.1 ARECIBO, PR 00612	FINDS	N/A
OBSERVATORIO DE AREC CARR 625 KM 3.3 ARECIBO, PR 00612	FINDS	N/A

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were not identified.

Unmappable (orphan) sites are not considered in the foregoing analysis.

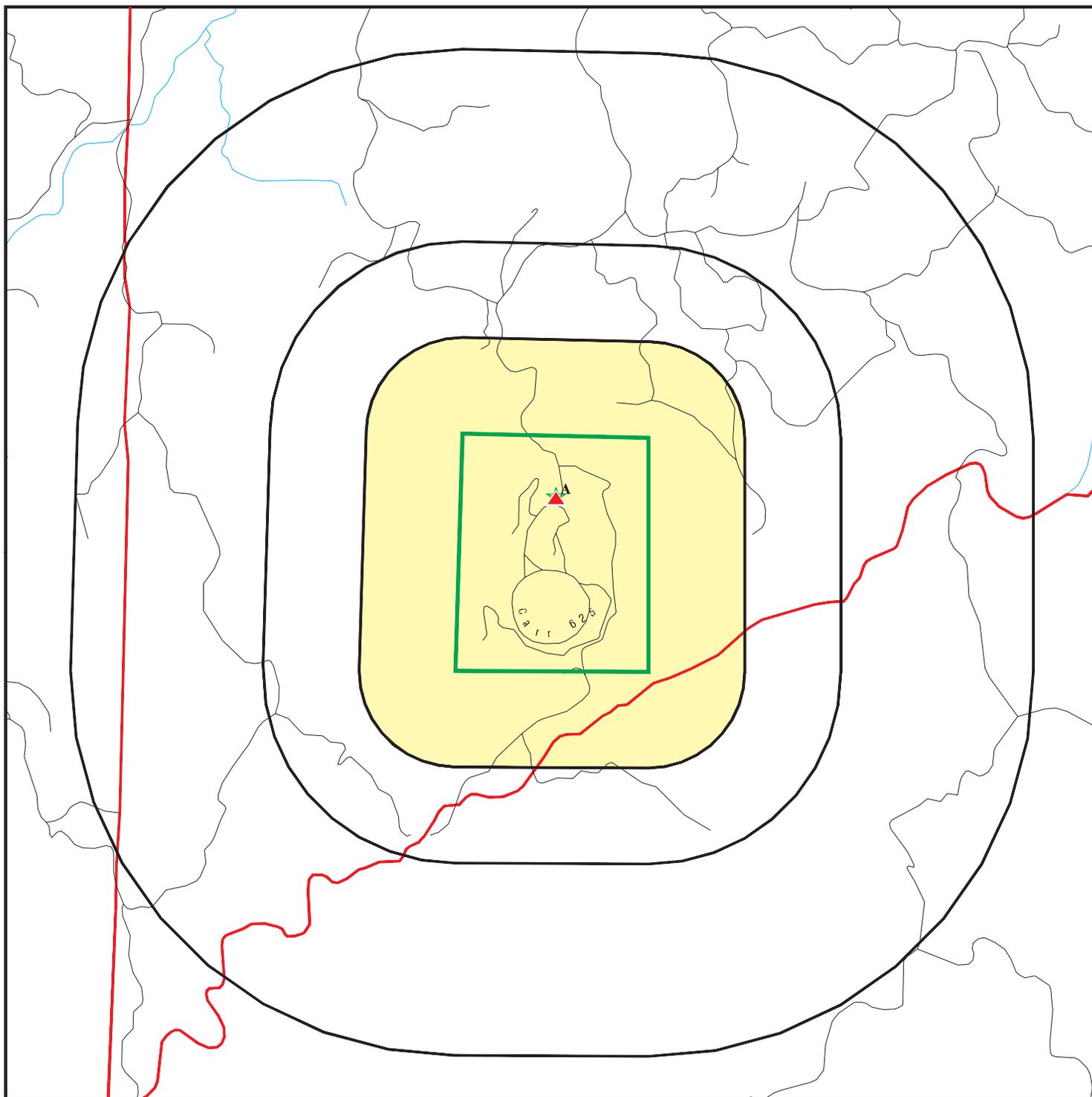
Count: 0 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
------	--------	-----------	--------------	-----	-------------

NO SITES FOUND

OVERVIEW MAP - 4135296.2S



-  Target Property
-  Sites at elevations higher than or equal to the target property
-  Sites at elevations lower than the target property
-  Manufactured Gas Plants
-  National Priority List Sites
-  Dept. Defense Sites

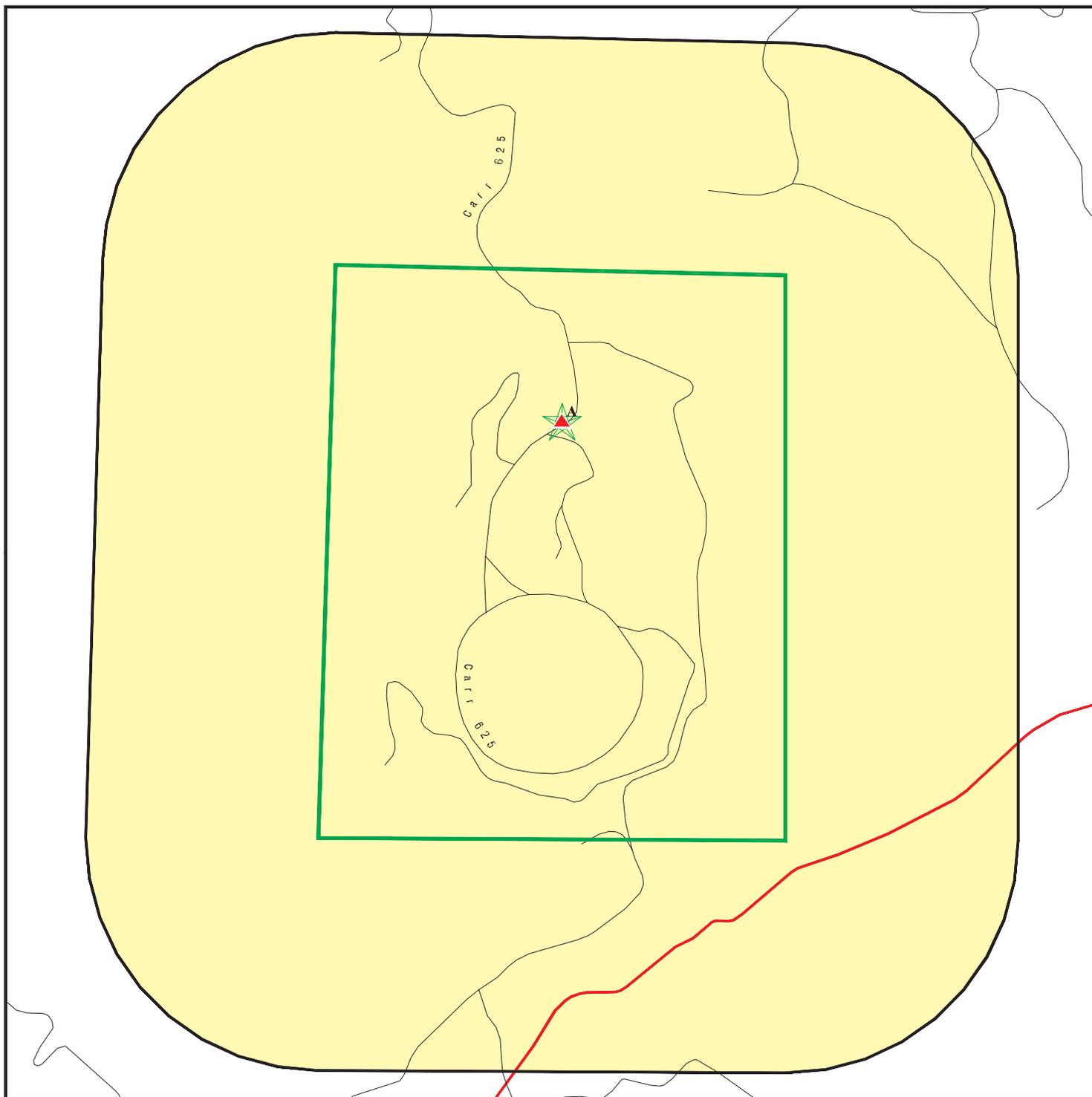
-  Indian Reservations BIA
-  County Boundary
-  100-year flood zone
-  500-year flood zone

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Arecibo Observatory
 ADDRESS: Arecibo
 Arecibo PR 00612
 LAT/LONG: 18.3483 / 66.7524

CLIENT: CH2M Hill, Inc.
 CONTACT: Mike Brose
 INQUIRY #: 4135296.2s
 DATE: November 24, 2014 6:02 pm

DETAIL MAP - 4135296.2S



-  Target Property
-  Sites at elevations higher than or equal to the target property
-  Sites at elevations lower than the target property
-  Manufactured Gas Plants
-  Sensitive Receptors
-  National Priority List Sites
-  Dept. Defense Sites

-  Indian Reservations BIA
 -  County Boundary
 -  100-year flood zone
 -  500-year flood zone
- 0 1/8 1/4 1/2 Miles



This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Arecibo Observatory
 ADDRESS: Arecibo
 Arecibo PR 00612
 LAT/LONG: 18.3483 / 66.7524

CLIENT: CH2M Hill, Inc.
 CONTACT: Mike Brose
 INQUIRY #: 4135296.2s
 DATE: November 24, 2014 6:02 pm

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
<i>Federal NPL site list</i>								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	TP		NR	NR	NR	NR	NR	0
<i>Federal Delisted NPL site list</i>								
Delisted NPL	1.000		0	0	0	0	NR	0
<i>Federal CERCLIS list</i>								
CERCLIS	0.500		0	0	0	NR	NR	0
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
<i>Federal CERCLIS NFRAP site List</i>								
CERC-NFRAP	0.500		0	0	0	NR	NR	0
<i>Federal RCRA CORRACTS facilities list</i>								
CORRACTS	1.000		0	0	0	0	NR	0
<i>Federal RCRA non-CORRACTS TSD facilities list</i>								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
<i>Federal RCRA generators list</i>								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-CESQG	0.250	1	0	0	NR	NR	NR	1
<i>Federal institutional controls / engineering controls registries</i>								
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
LUCIS	0.500		0	0	0	NR	NR	0
<i>Federal ERNS list</i>								
ERNS	TP		NR	NR	NR	NR	NR	0
<i>State- and tribal - equivalent CERCLIS</i>								
SHWS	N/A		N/A	N/A	N/A	N/A	N/A	N/A
<i>State and tribal leaking storage tank lists</i>								
LUST	0.500		0	0	0	NR	NR	0
INDIAN LUST	0.500		0	0	0	NR	NR	0
<i>State and tribal registered storage tank lists</i>								
UST	0.250	1	0	0	NR	NR	NR	1
INDIAN UST	0.250		0	0	NR	NR	NR	0
FEMA UST	0.250		0	0	NR	NR	NR	0
<i>State and tribal voluntary cleanup sites</i>								
INDIAN VCP	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL	TP		NR	NR	NR	NR	NR	0
US HIST CDL	TP		NR	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
DOD	1.000		0	0	0	0	NR	0
FUDS	1.000		0	0	0	0	NR	0
CONSENT	1.000		0	0	0	0	NR	0
ROD	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
FINDS	TP	2	NR	NR	NR	NR	NR	2
RAATS	TP		NR	NR	NR	NR	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
US AIRS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP	1.000		0	0	0	0	NR	0
---------	-------	--	---	---	---	---	----	---

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LUST	TP		NR	NR	NR	NR	NR	0
----------	----	--	----	----	----	----	----	---

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

N/A = This State does not maintain a SHWS list. See the Federal CERCLIS list.

MAP FINDINGS

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number
--	------	-------------	--------------------------------

A1 Target Property	ARECIBO OBSERVATORY ROUTE 625, KM. 3.1 ESPERANZA WARD ARECIBO, PR 00612	UST	1000573516 N/A
---------------------------------	--	------------	--------------------------

Actual: [Click here for full text details](#)
996 ft.
UST
Facility Id: 2-860049

A2 Target Property	OBSERVATORIO DE ARECIBO CARR 625 KM 3.3 ARECIBO, PR 00612	RCRA-CESQG	1005444722 PRR000015057
---------------------------------	--	-------------------	--

Actual: [Click here for full text details](#)
996 ft.
RCRA-CESQG
EPA Id: PRR000015057

A3 Target Property	ARECIBO OBSERVATORY RT 625 KM. 3.1 ARECIBO, PR 00612	FINDS	1010053277 N/A
---------------------------------	---	--------------	--------------------------

Actual: [Click here for full text details](#)
996 ft.

A4 Target Property	OBSERVATORIO DE ARECIBO CARR 625 KM 3.3 ARECIBO, PR 00612	FINDS	1016302521 N/A
---------------------------------	--	--------------	--------------------------

Actual: [Click here for full text details](#)
996 ft.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
PR	LUST	Leaking Underground Storage Tanks	Environmental Quality Board	12/01/2010	02/03/2011	03/08/2011
PR	RGA LUST	Recovered Government Archive Leaking Underground Storage Tan	Environmental Quality Board		07/01/2013	01/04/2014
PR	SHWS	This state does not maintain a SHWS list. See the Federal CE	Environmental Quality Board			
PR	UST	Underground Storage Tank Facilities	Environmental Quality Board	01/01/2008	03/26/2008	04/23/2008
US	2020 COR ACTION	2020 Corrective Action Program List	Environmental Protection Agency	11/11/2011	05/18/2012	05/25/2012
US	BRS	Biennial Reporting System	EPA/NTIS	12/31/2011	02/26/2013	04/19/2013
US	CERCLIS	Comprehensive Environmental Response, Compensation, and Liab	EPA	10/25/2013	11/11/2013	02/13/2014
US	CERCLIS-NFRAP	CERCLIS No Further Remedial Action Planned	EPA	10/25/2013	11/11/2013	02/13/2014
US	COAL ASH DOE	Sleam-Electric Plan Operation Data	Department of Energy	12/31/2005	08/07/2009	10/22/2009
US	COAL ASH EPA	Coal Combustion Residues Surface Impoundments List	Environmental Protection Agency	07/01/2014	09/10/2014	10/20/2014
US	CONSENT	Superfund (CERCLA) Consent Decrees	Department of Justice, Consent Decree Library	12/31/2013	01/24/2014	02/24/2014
US	CORRACTS	Corrective Action Report	EPA	06/10/2014	07/02/2014	09/18/2014
US	DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations	EPA, Region 9	01/12/2009	05/07/2009	09/21/2009
US	DELISTED NPL	National Priority List Deletions	EPA	09/29/2014	10/08/2014	11/17/2014
US	DOD	Department of Defense Sites	USGS	12/31/2005	11/10/2006	01/11/2007
US	DOT OPS	Incident and Accident Data	Department of Transporation, Office of Pipeli	07/31/2012	08/07/2012	09/18/2012
US	EDR MGP	EDR Proprietary Manufactured Gas Plants	EDR, Inc.			
US	EPA WATCH LIST	EPA WATCH LIST	Environmental Protection Agency	08/30/2013	03/21/2014	06/17/2014
US	ERNS	Emergency Response Notification System	National Response Center, United States Coast	09/29/2014	09/30/2014	11/06/2014
US	FEDERAL FACILITY	Federal Facility Site Information listing	Environmental Protection Agency	07/21/2014	10/07/2014	10/20/2014
US	FEDLAND	Federal and Indian Lands	U.S. Geological Survey	12/31/2005	02/06/2006	01/11/2007
US	FEMA UST	Underground Storage Tank Listing	FEMA	01/01/2010	02/16/2010	04/12/2010
US	FINDS	Facility Index System/Facility Registry System	EPA	08/16/2014	09/10/2014	10/20/2014
US	FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fu	EPA/Office of Prevention, Pesticides and Toxi	04/09/2009	04/16/2009	05/11/2009
US	FTTS INSP	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fu	EPA	04/09/2009	04/16/2009	05/11/2009
US	FUDS	Formerly Used Defense Sites	U.S. Army Corps of Engineers	06/06/2014	09/10/2014	09/18/2014
US	HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing	Environmental Protection Agency	10/19/2006	03/01/2007	04/10/2007
US	HIST FTTS INSP	FIFRA/TSCA Tracking System Inspection & Enforcement Case Lis	Environmental Protection Agency	10/19/2006	03/01/2007	04/10/2007
US	HMIRS	Hazardous Materials Information Reporting System	U.S. Department of Transportation	09/30/2014	10/01/2014	11/06/2014
US	ICIS	Integrated Compliance Information System	Environmental Protection Agency	07/31/2014	10/29/2014	11/06/2014
US	INDIAN LUST R1	Leaking Underground Storage Tanks on Indian Land	EPA Region 1	02/01/2013	05/01/2013	11/01/2013
US	INDIAN LUST R10	Leaking Underground Storage Tanks on Indian Land	EPA Region 10	05/20/2014	06/10/2014	08/22/2014
US	INDIAN LUST R4	Leaking Underground Storage Tanks on Indian Land	EPA Region 4	07/30/2014	08/12/2014	08/22/2014
US	INDIAN LUST R5	Leaking Underground Storage Tanks on Indian Land	EPA, Region 5	11/03/2014	11/05/2014	11/17/2014
US	INDIAN LUST R6	Leaking Underground Storage Tanks on Indian Land	EPA Region 6	10/06/2014	10/29/2014	11/17/2014
US	INDIAN LUST R7	Leaking Underground Storage Tanks on Indian Land	EPA Region 7	05/22/2014	08/22/2014	09/18/2014
US	INDIAN LUST R8	Leaking Underground Storage Tanks on Indian Land	EPA Region 8	11/04/2014	11/07/2014	11/17/2014
US	INDIAN LUST R9	Leaking Underground Storage Tanks on Indian Land	Environmental Protection Agency	03/01/2013	03/01/2013	04/12/2013
US	INDIAN ODI	Report on the Status of Open Dumps on Indian Lands	Environmental Protection Agency	12/31/1998	12/03/2007	01/24/2008
US	INDIAN RESERV	Indian Reservations	USGS	12/31/2005	12/08/2006	01/11/2007
US	INDIAN UST R1	Underground Storage Tanks on Indian Land	EPA, Region 1	02/01/2013	05/01/2013	01/27/2014
US	INDIAN UST R10	Underground Storage Tanks on Indian Land	EPA Region 10	05/20/2014	06/10/2014	08/15/2014
US	INDIAN UST R4	Underground Storage Tanks on Indian Land	EPA Region 4	07/30/2014	08/12/2014	08/22/2014
US	INDIAN UST R5	Underground Storage Tanks on Indian Land	EPA Region 5	11/03/2014	11/05/2014	11/17/2014
US	INDIAN UST R6	Underground Storage Tanks on Indian Land	EPA Region 6	10/06/2014	10/29/2014	11/06/2014
US	INDIAN UST R7	Underground Storage Tanks on Indian Land	EPA Region 7	08/20/2014	08/22/2014	09/18/2014
US	INDIAN UST R8	Underground Storage Tanks on Indian Land	EPA Region 8	11/04/2014	11/07/2014	11/17/2014

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
US	INDIAN UST R9	Underground Storage Tanks on Indian Land	EPA Region 9	08/14/2014	08/15/2014	08/22/2014
US	INDIAN VCP R1	Voluntary Cleanup Priority Listing	EPA, Region 1	09/29/2014	10/01/2014	11/06/2014
US	INDIAN VCP R7	Voluntary Cleanup Priority Listing	EPA, Region 7	03/20/2008	04/22/2008	05/19/2008
US	LEAD SMELTER 1	Lead Smelter Sites	Environmental Protection Agency	06/04/2014	06/12/2014	07/28/2014
US	LEAD SMELTER 2	Lead Smelter Sites	American Journal of Public Health	04/05/2001	10/27/2010	12/02/2010
US	LIENS 2	CERCLA Lien Information	Environmental Protection Agency	02/18/2014	03/18/2014	04/24/2014
US	LUCIS	Land Use Control Information System	Department of the Navy	08/29/2014	10/09/2014	10/20/2014
US	MLTS	Material Licensing Tracking System	Nuclear Regulatory Commission	07/22/2013	08/02/2013	11/01/2013
US	NPL	National Priority List	EPA	09/29/2014	10/08/2014	11/17/2014
US	NPL LIENS	Federal Superfund Liens	EPA	10/15/1991	02/02/1994	03/30/1994
US	ODI	Open Dump Inventory	Environmental Protection Agency	06/30/1985	08/09/2004	09/17/2004
US	PADS	PCB Activity Database System	EPA	07/01/2014	10/15/2014	11/17/2014
US	PCB TRANSFORMER	PCB Transformer Registration Database	Environmental Protection Agency	02/01/2011	10/19/2011	01/10/2012
US	PRP	Potentially Responsible Parties	EPA	10/25/2013	10/17/2014	10/20/2014
US	Proposed NPL	Proposed National Priority List Sites	EPA	09/29/2014	10/08/2014	11/17/2014
US	RAATS	RCRA Administrative Action Tracking System	EPA	04/17/1995	07/03/1995	08/07/1995
US	RADINFO	Radiation Information Database	Environmental Protection Agency	10/07/2014	10/08/2014	10/20/2014
US	RCRA NonGen / NLR	RCRA - Non Generators	Environmental Protection Agency	06/10/2014	07/02/2014	09/18/2014
US	RCRA-CESQG	RCRA - Conditionally Exempt Small Quantity Generators	Environmental Protection Agency	06/10/2014	07/02/2014	09/18/2014
US	RCRA-LQG	RCRA - Large Quantity Generators	Environmental Protection Agency	06/10/2014	07/02/2014	09/18/2014
US	RCRA-SQG	RCRA - Small Quantity Generators	Environmental Protection Agency	06/10/2014	07/02/2014	09/18/2014
US	RCRA-TSDF	RCRA - Treatment, Storage and Disposal	Environmental Protection Agency	06/10/2014	07/02/2014	09/18/2014
US	RMP	Risk Management Plans	Environmental Protection Agency	08/01/2014	08/12/2014	11/06/2014
US	ROD	Records Of Decision	EPA	11/25/2013	12/12/2013	02/24/2014
US	SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing	Environmental Protection Agency	03/07/2011	03/09/2011	05/02/2011
US	SSTS	Section 7 Tracking Systems	EPA	12/31/2009	12/10/2010	02/25/2011
US	TRIS	Toxic Chemical Release Inventory System	EPA	12/31/2011	07/31/2013	09/13/2013
US	TSCA	Toxic Substances Control Act	EPA	12/31/2006	09/29/2010	12/02/2010
US	UMTRA	Uranium Mill Tailings Sites	Department of Energy	09/14/2010	10/07/2011	03/01/2012
US	US AIRS (AFS)	Aerometric Information Retrieval System Facility Subsystem (EPA	10/16/2014	10/31/2014	11/17/2014
US	US AIRS MINOR	Air Facility System Data	EPA	10/16/2014	10/31/2014	11/17/2014
US	US BROWNFIELDS	A Listing of Brownfields Sites	Environmental Protection Agency	09/22/2014	09/23/2014	10/20/2014
US	US CDL	Clandestine Drug Labs	Drug Enforcement Administration	07/25/2014	09/09/2014	10/20/2014
US	US ENG CONTROLS	Engineering Controls Sites List	Environmental Protection Agency	09/18/2014	09/19/2014	10/20/2014
US	US FIN ASSUR	Financial Assurance Information	Environmental Protection Agency	09/04/2014	09/04/2014	10/20/2014
US	US HIST CDL	National Clandestine Laboratory Register	Drug Enforcement Administration	07/25/2014	09/09/2014	10/20/2014
US	US INST CONTROL	Sites with Institutional Controls	Environmental Protection Agency	09/18/2014	09/19/2014	10/20/2014
US	US MINES	Mines Master Index File	Department of Labor, Mine Safety and Health A	08/05/2014	09/04/2014	11/17/2014

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
NJ	NJ MANIFEST	Manifest Information	Department of Environmental Protection	12/31/2011	07/19/2012	08/28/2012
RI	RI MANIFEST	Manifest information	Department of Environmental Management	12/31/2013	07/15/2014	08/13/2014
US	Oil/Gas Pipelines	GeoData Digital Line Graphs from 1:100,000-Scale Maps	USGS			
US	AHA Hospitals	Sensitive Receptor: AHA Hospitals	American Hospital Association, Inc.			
US	Medical Centers	Sensitive Receptor: Medical Centers	Centers for Medicare & Medicaid Services			
US	Nursing Homes	Sensitive Receptor: Nursing Homes	National Institutes of Health			
US	Public Schools	Sensitive Receptor: Public Schools	National Center for Education Statistics			
US	Private Schools	Sensitive Receptor: Private Schools	National Center for Education Statistics			
US	Flood Zones	100-year and 500-year flood zones	Emergency Management Agency (FEMA)			
US	NWI	National Wetlands Inventory	U.S. Fish and Wildlife Service			
US	USGS 7.5' Topographic Map	Scanned Digital USGS 7.5' Topographic Map (DRG)	USGS			

STREET AND ADDRESS INFORMATION

© 2010 Tele Atlas North America, Inc. All rights reserved. This material is proprietary and the subject of copyright protection and other intellectual property rights owned by or licensed to Tele Atlas North America, Inc. The use of this material is subject to the terms of a license agreement. You will be held liable for any unauthorized copying or disclosure of this material.

GEOCHECK[®] - PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

ARECIBO OBSERVATORY
ARECIBO
ARECIBO, PR 00612

TARGET PROPERTY COORDINATES

Latitude (North): 18.3483 - 18° 20' 53.88"
Longitude (West): 66.7524 - 66° 45' 8.64"
Universal Tranverse Mercator: Zone 19
UTM X (Meters): 737518.0
UTM Y (Meters): 2030065.8
Elevation: 996 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property: N/A
Source: USGS 7.5 min quad index

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

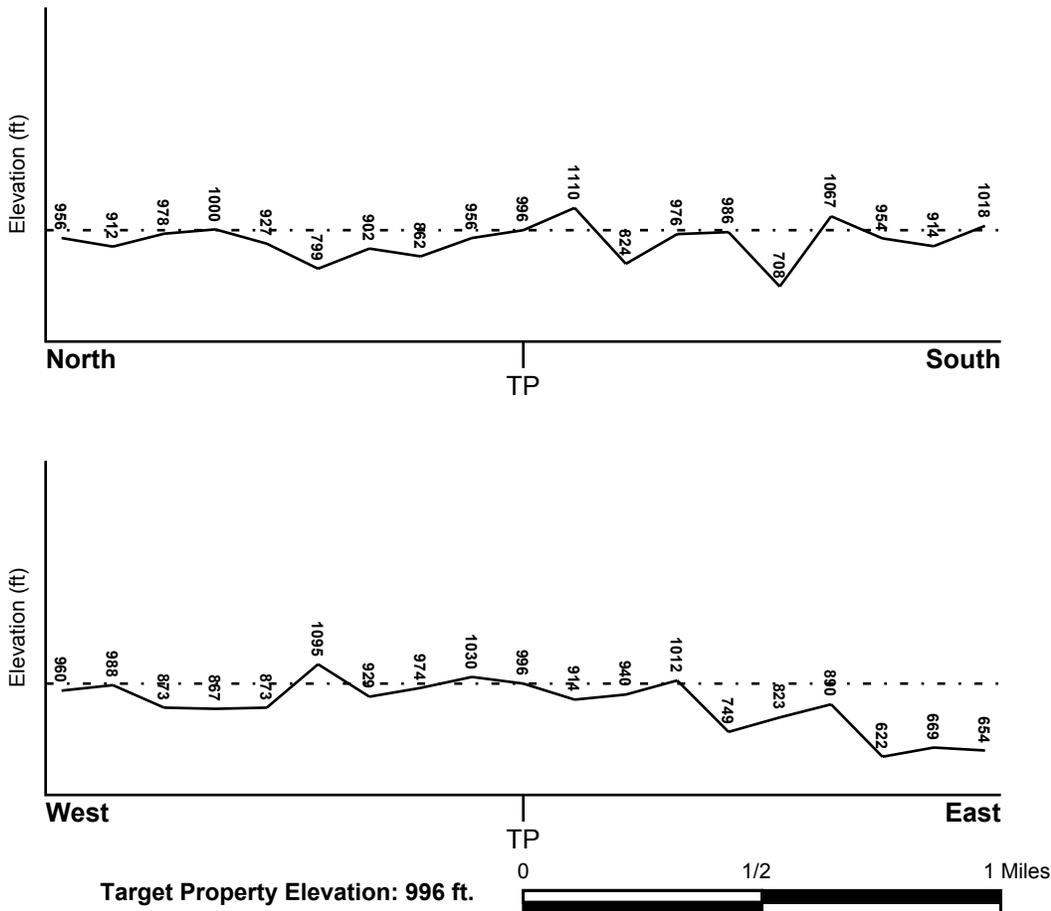
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General South

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County
ARECIBO, PR

FEMA Flood Electronic Data
YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 720000085A - FEMA Q3 Flood data

Additional Panels in search area: 720000090B - FEMA Q3 Flood data

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property
NOT AVAILABLE

NWI Electronic Data Coverage
YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

<u>MAP ID</u>	<u>LOCATION FROM TP</u>	<u>GENERAL DIRECTION GROUNDWATER FLOW</u>
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

Era: -
System: -
Series: -
Code: N/A (decoded above as Era, System & Series)

GEOLOGIC AGE IDENTIFICATION

Category: -

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps. The following information is based on Soil Conservation Service STATSGO data.

Soil Component Name: SOLLER

Soil Surface Texture: clay

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Well drained. Soils have intermediate water holding capacity. Depth to water table is more than 6 feet.

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: HIGH

Depth to Bedrock Min: > 20 inches

Depth to Bedrock Max: > 34 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
Layer	Boundary		Soil Texture Class	Classification		Permeability Rate (in/hr)	Soil Reaction (pH)
	Upper	Lower		AASHTO Group	Unified Soil		
1	0 inches	5 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Fat Clay.	Max: 2.00 Min: 0.60	Max: 8.40 Min: 7.90
2	5 inches	12 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Fat Clay.	Max: 2.00 Min: 0.60	Max: 8.40 Min: 7.90
3	12 inches	26 inches	weathered bedrock	Not reported	Not reported	Max: 0.20 Min: 0.06	Max: 0.00 Min: 0.00
4	26 inches	30 inches	unweathered bedrock	Not reported	Not reported	Max: 0.06 Min: 0.01	Max: 0.00 Min: 0.00

OTHER SOIL TYPES IN AREA

Based on Soil Conservation Service STATSGO data, the following additional subordinant soil types may appear within the general area of target property.

Soil Surface Textures: gravelly - clay loam
cobble - clay

Surficial Soil Types: gravelly - clay loam
cobble - clay

Shallow Soil Types: No Other Soil Types

Deeper Soil Types: No Other Soil Types

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

<u>DATABASE</u>	<u>SEARCH DISTANCE (miles)</u>
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL USGS WELL INFORMATION

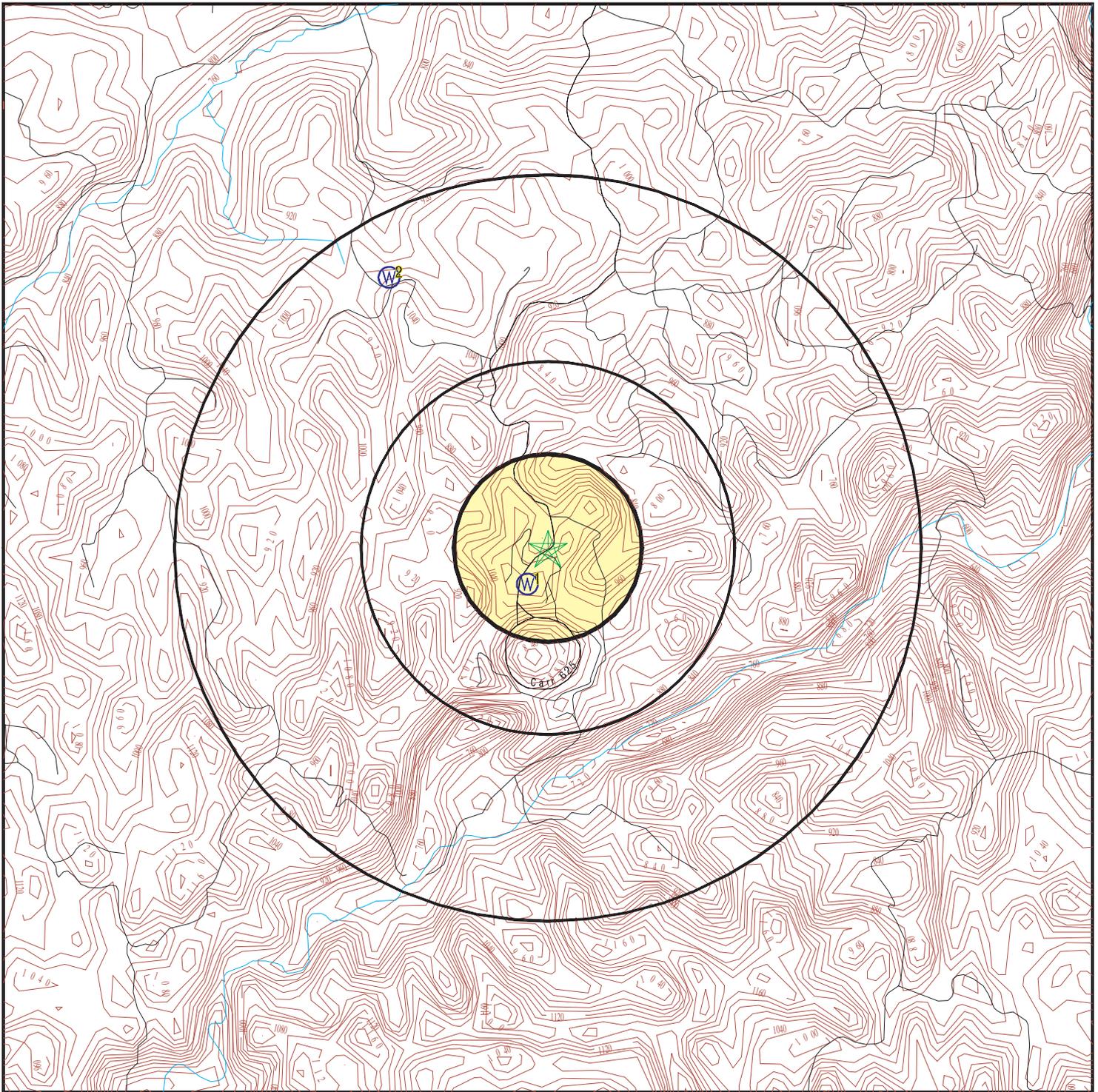
<u>MAP ID</u>	<u>WELL ID</u>	<u>LOCATION FROM TP</u>
1	USGS40001045257	0 - 1/8 Mile SSW
2	USGS40001045321	1/2 - 1 Mile NNW

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

<u>MAP ID</u>	<u>WELL ID</u>	<u>LOCATION FROM TP</u>
No PWS System Found		

Note: PWS System location is not always the same as well location.

PHYSICAL SETTING SOURCE MAP - 4135296.2s



-  County Boundary
-  Major Roads
-  Contour Lines
-  Earthquake epicenter, Richter 5 or greater
-  Water Wells
-  Public Water Supply Wells
-  Cluster of Multiple Icons



-  Groundwater Flow Direction
-  Indeterminate Groundwater Flow at Location
-  Groundwater Flow Varies at Location



SITE NAME: Arecibo Observatory
 ADDRESS: Arecibo
 Arecibo PR 00612
 LAT/LONG: 18.3483 / 66.7524

CLIENT: CH2M Hill, Inc.
 CONTACT: Mike Brose
 INQUIRY #: 4135296.2s
 DATE: November 24, 2014 6:02 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

Database

EDR ID Number

1
SSW
0 - 1/8 Mile
Higher

[Click here for full text details](#)

FED USGS

USGS40001045257

2
NNW
1/2 - 1 Mile
Lower

[Click here for full text details](#)

FED USGS

USGS40001045321

**GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON**

AREA RADON INFORMATION

Not Reported

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)

Source: United States Geologic Survey

EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Scanned Digital USGS 7.5' Topographic Map (DRG)

Source: United States Geologic Survey

A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW^R Information System

Source: EDR proprietary database of groundwater flow information

EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit

Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database

Source: Department of Agriculture, Natural Resources Conservation Services

The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database

Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)

Telephone: 800-672-5559

SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems

Source: EPA/Office of Drinking Water

Telephone: 202-564-3750

Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data

Source: EPA/Office of Drinking Water

Telephone: 202-564-3750

Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)

This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

OTHER STATE DATABASE INFORMATION

RADON

Area Radon Information

Source: USGS

Telephone: 703-356-4020

The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones

Source: EPA

Telephone: 703-356-4020

Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities

Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater

Source: Department of Commerce, National Oceanic and Atmospheric Administration

Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary faultlines, prepared in 1975 by the United State Geological Survey

STREET AND ADDRESS INFORMATION

© 2010 Tele Atlas North America, Inc. All rights reserved. This material is proprietary and the subject of copyright protection and other intellectual property rights owned by or licensed to Tele Atlas North America, Inc. The use of this material is subject to the terms of a license agreement. You will be held liable for any unauthorized copying or disclosure of this material.

Attachment C
Aerial Photographs and
Topographic Maps



Arecibo Observatory

PR-625

Arecibo, PR 00612

Inquiry Number: 4107925.9

October 17, 2014

The EDR Aerial Photo Decade Package



6 Armstrong Road, 4th Floor
Shelton, Connecticut 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. **NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT.** Purchaser accepts this Report AS IS. Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2014 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

Date EDR Searched Historical Sources:

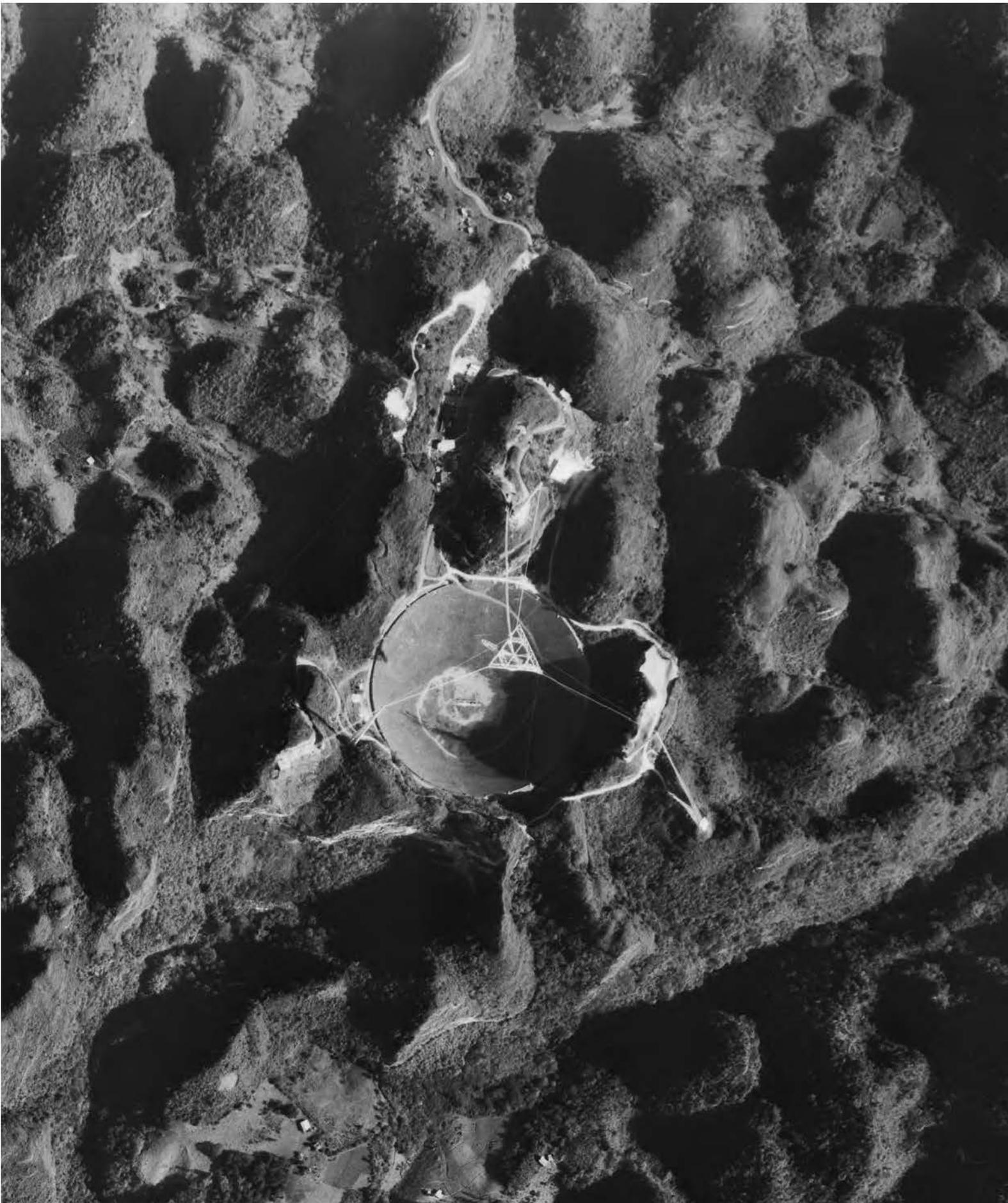
Aerial Photography October 17, 2014

Target Property:

PR-625

Arecibo, PR 00612

<u><i>Year</i></u>	<u><i>Scale</i></u>	<u><i>Details</i></u>	<u><i>Source</i></u>
1968	Aerial Photograph. Scale: 1"=500'	Flight Date: March 05, 1968	EDR
1972	Aerial Photograph. Scale: 1"=500'	Flight Date: March 05, 1972	EDR
1977	Aerial Photograph. Scale: 1"=500'	Flight Date: March 20, 1977	EDR
1993	Aerial Photograph. Scale: 1"=500'	DOQQ - acquisition dates: October 11, 1993	USGS/DOQQ

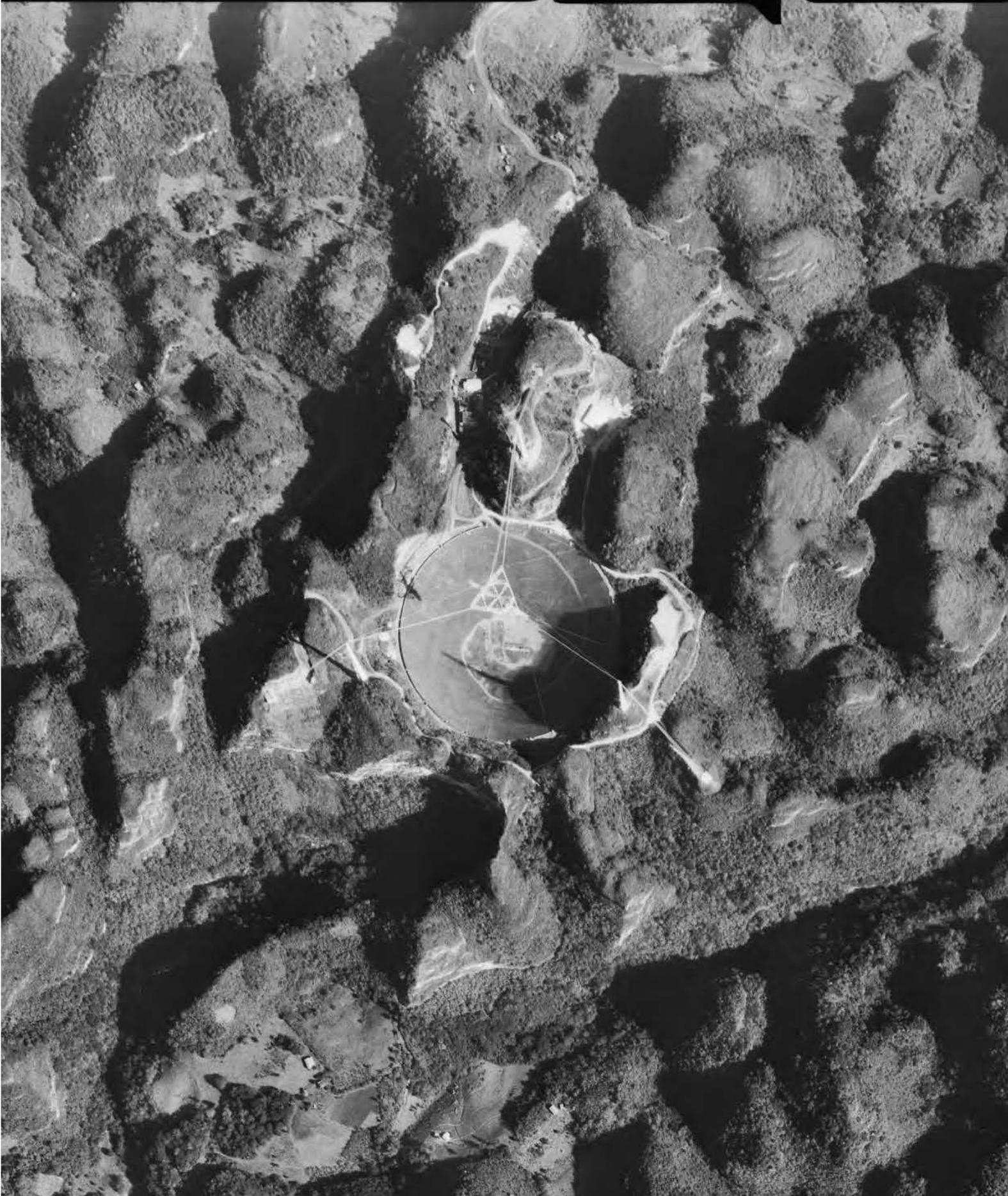


INQUIRY #: 4107925.9

YEAR: 1968



— = 500'



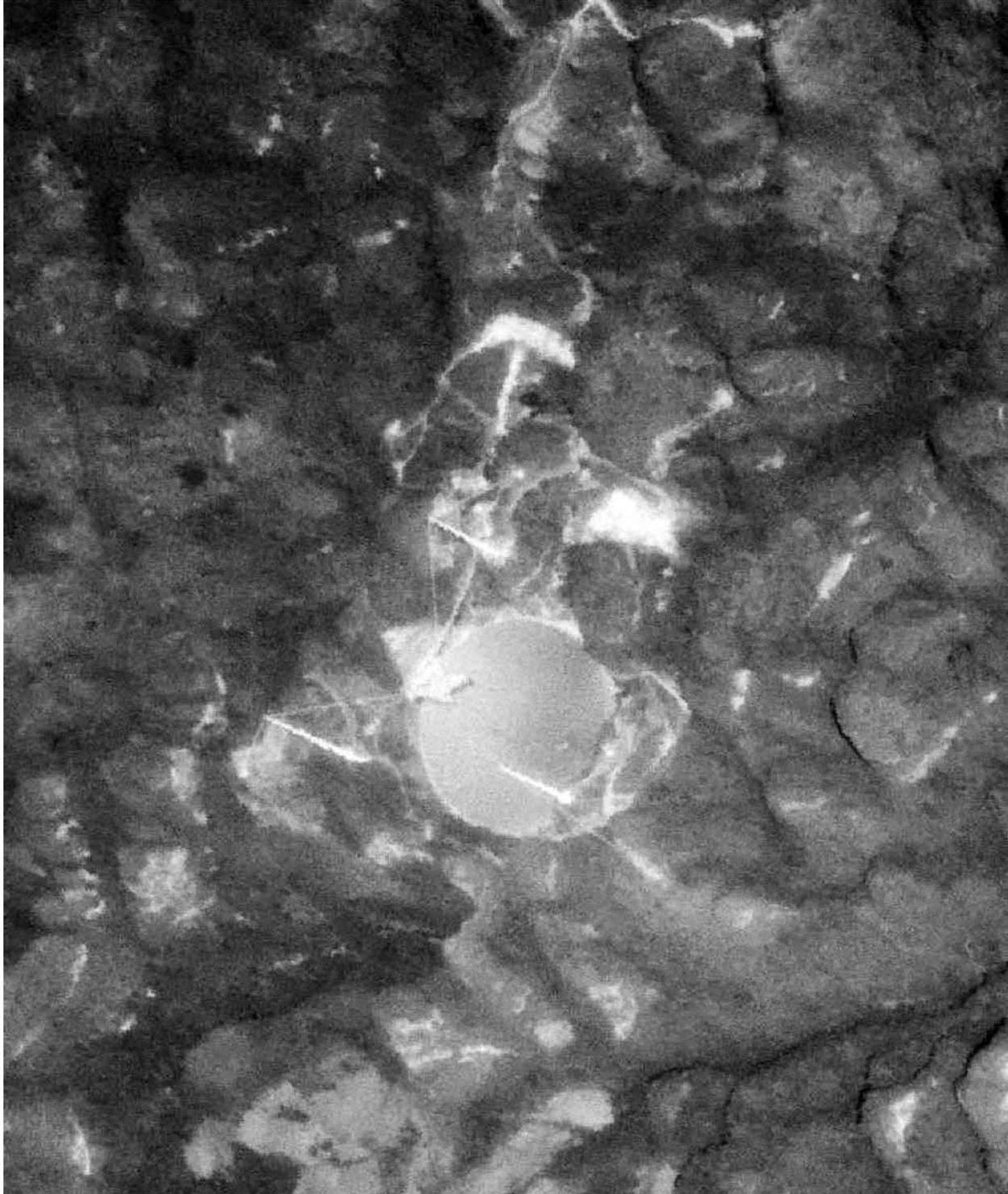
INQUIRY #: 4107925.9

YEAR: 1972

— = 500'



EDR



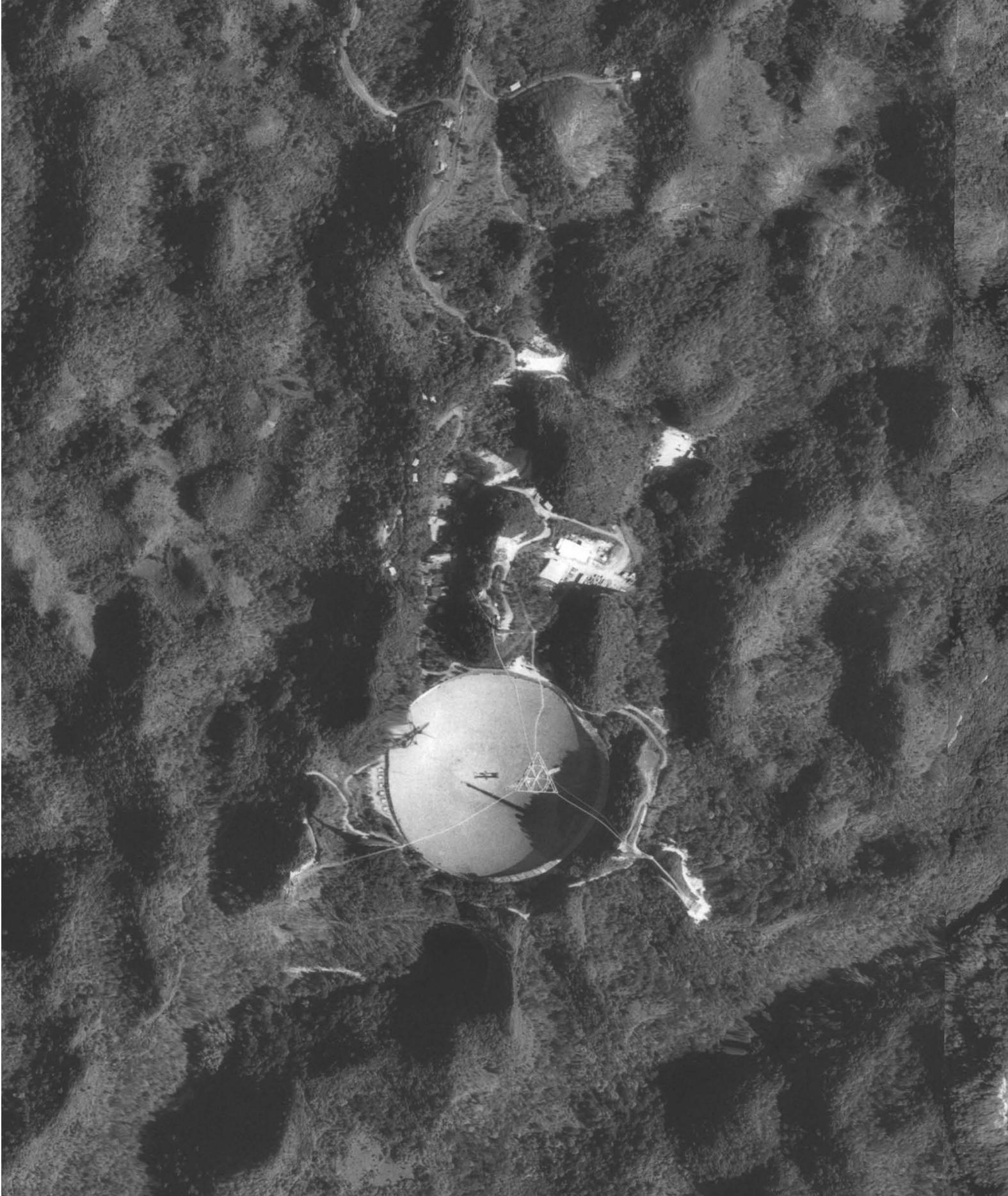
INQUIRY #: 4107925.9

YEAR: 1977

— = 500'



EDR



INQUIRY #: 4107925.9

YEAR: 1993

| = 500'





Arecibo Observatory

PR-625

Arecibo, PR 00612

Inquiry Number: 4107925.4

October 16, 2014

EDR Historical Topographic Map Report



6 Armstrong Road, 4th Floor
Shelton, Connecticut 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Historical Topographic Map Report

Environmental Data Resources, Inc.'s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDR's Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

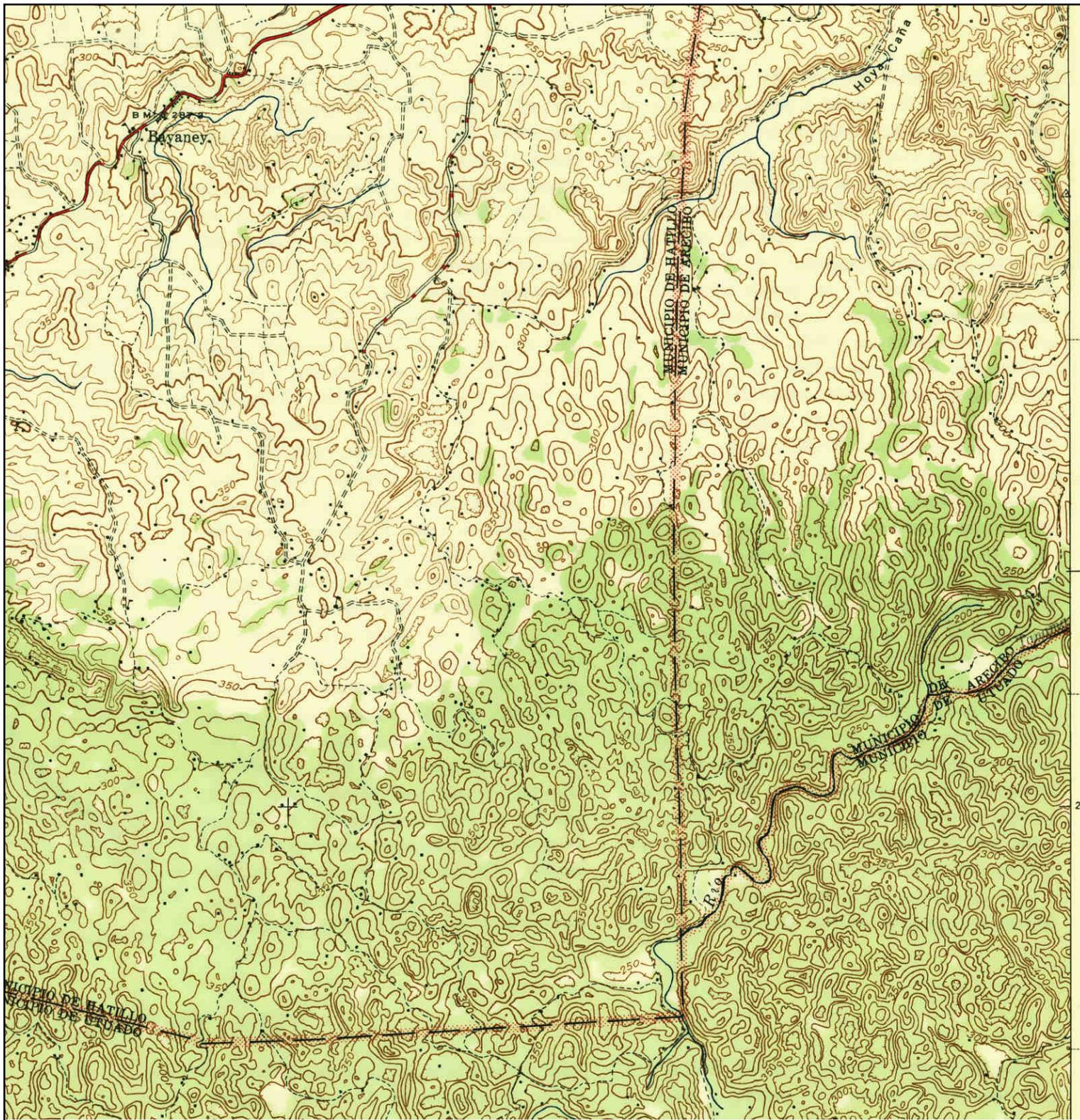
Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. **NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT.** Purchaser accepts this Report AS IS. Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2014 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

Historical Topographic Map



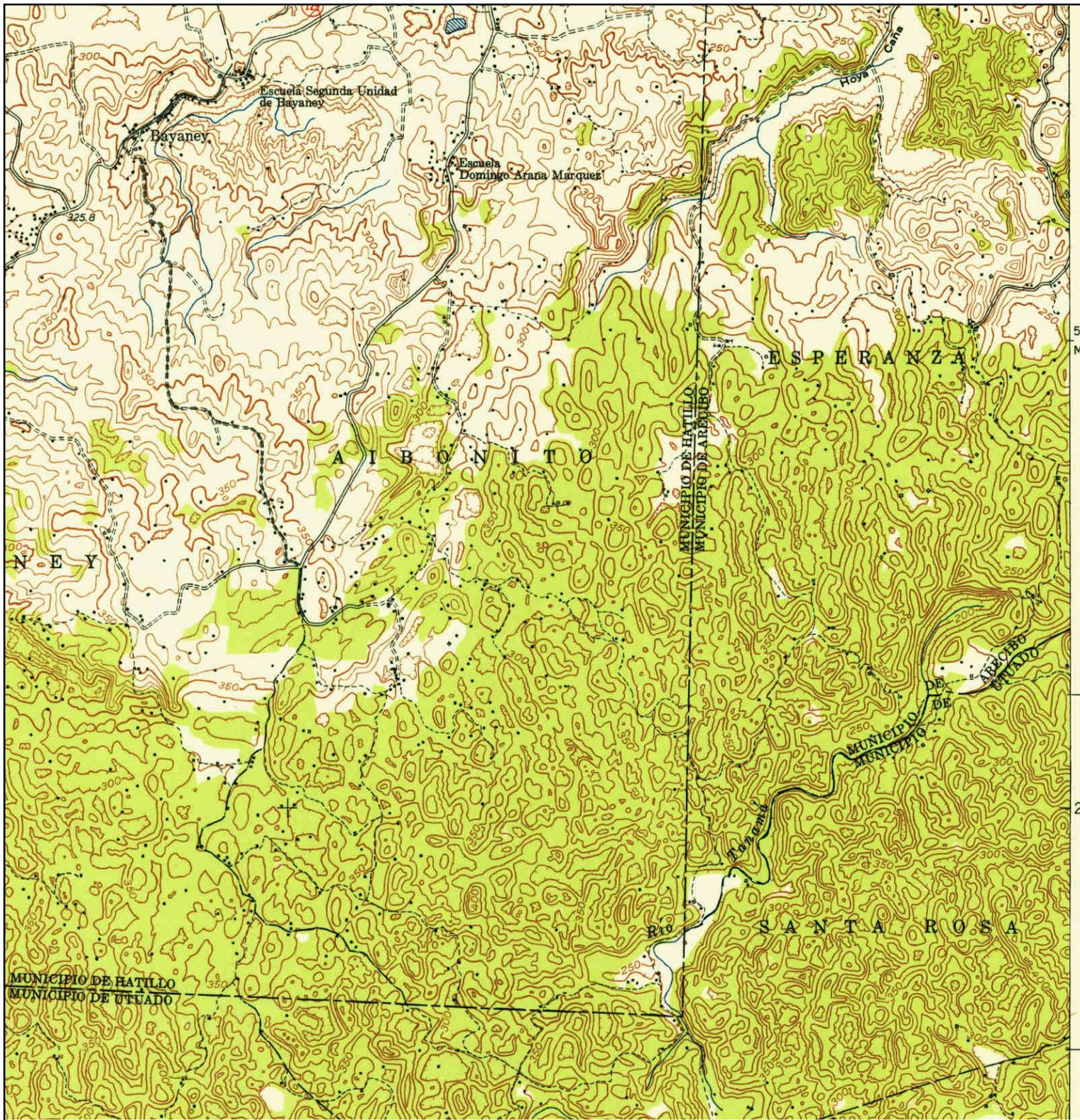
	TARGET QUAD	SITE NAME: Arecibo Observatory	CLIENT: CH2M Hill, Inc.
	NAME: BAYANEY	ADDRESS: PR-625	CONTACT: Jean Bossart
	MAP YEAR: 1946	Arecibo, PR 00612	INQUIRY#: 4107925.4
	SERIES: 7.5	LAT/LONG: 18.3458 / -66.7525	RESEARCH DATE: 10/16/2014
	SCALE: 1:30000		

Historical Topographic Map



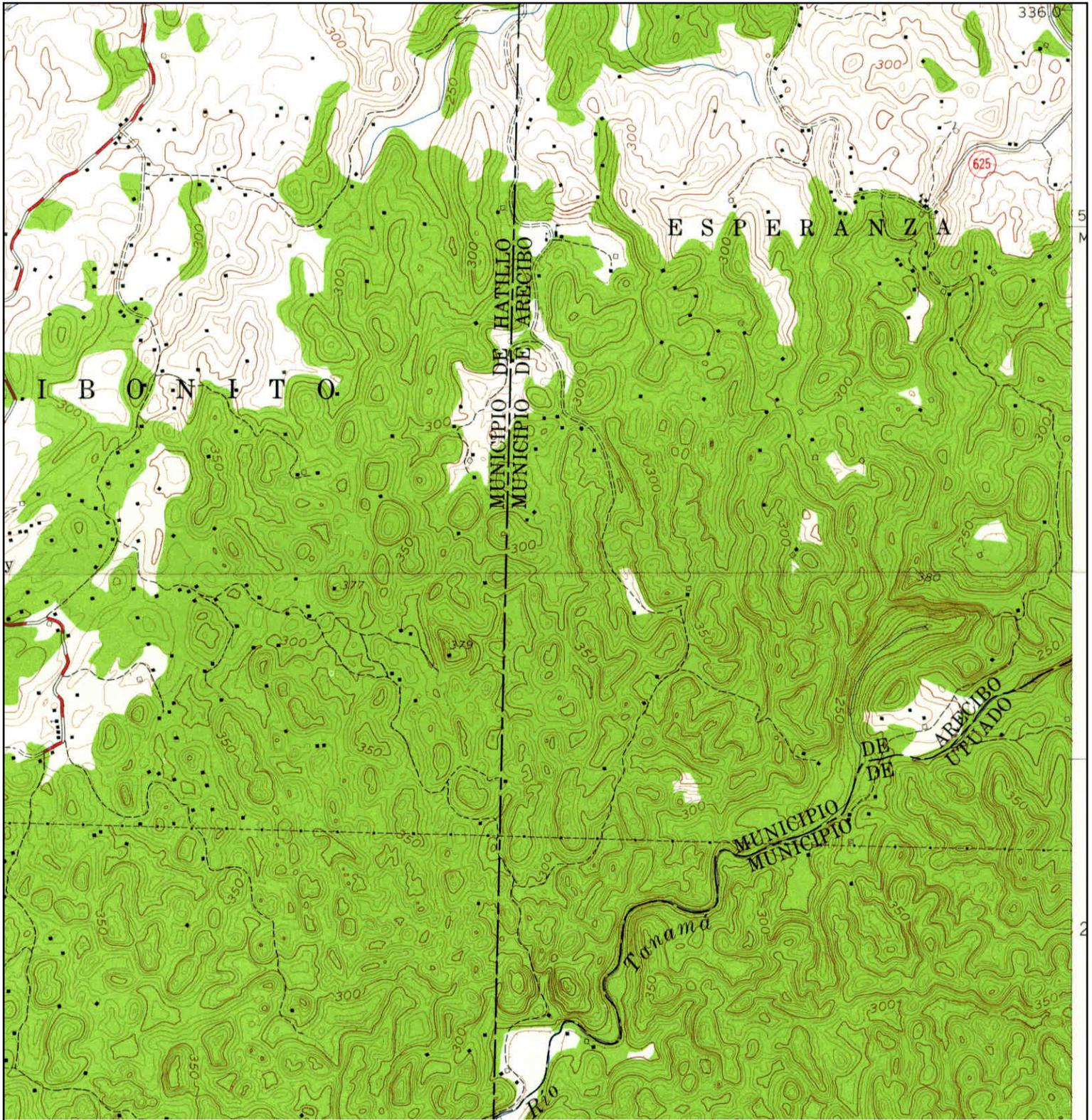
	TARGET QUAD	SITE NAME: Arecibo Observatory	CLIENT: CH2M Hill, Inc.
	NAME: BAYANEY NE	ADDRESS: PR-625	CONTACT: Jean Bossart
	MAP YEAR: 1947	LAT/LONG: 18.3458 / -66.7525	INQUIRY#: 4107925.4
	SERIES: 7.5		RESEARCH DATE: 10/16/2014
	SCALE: 1:10000		

Historical Topographic Map



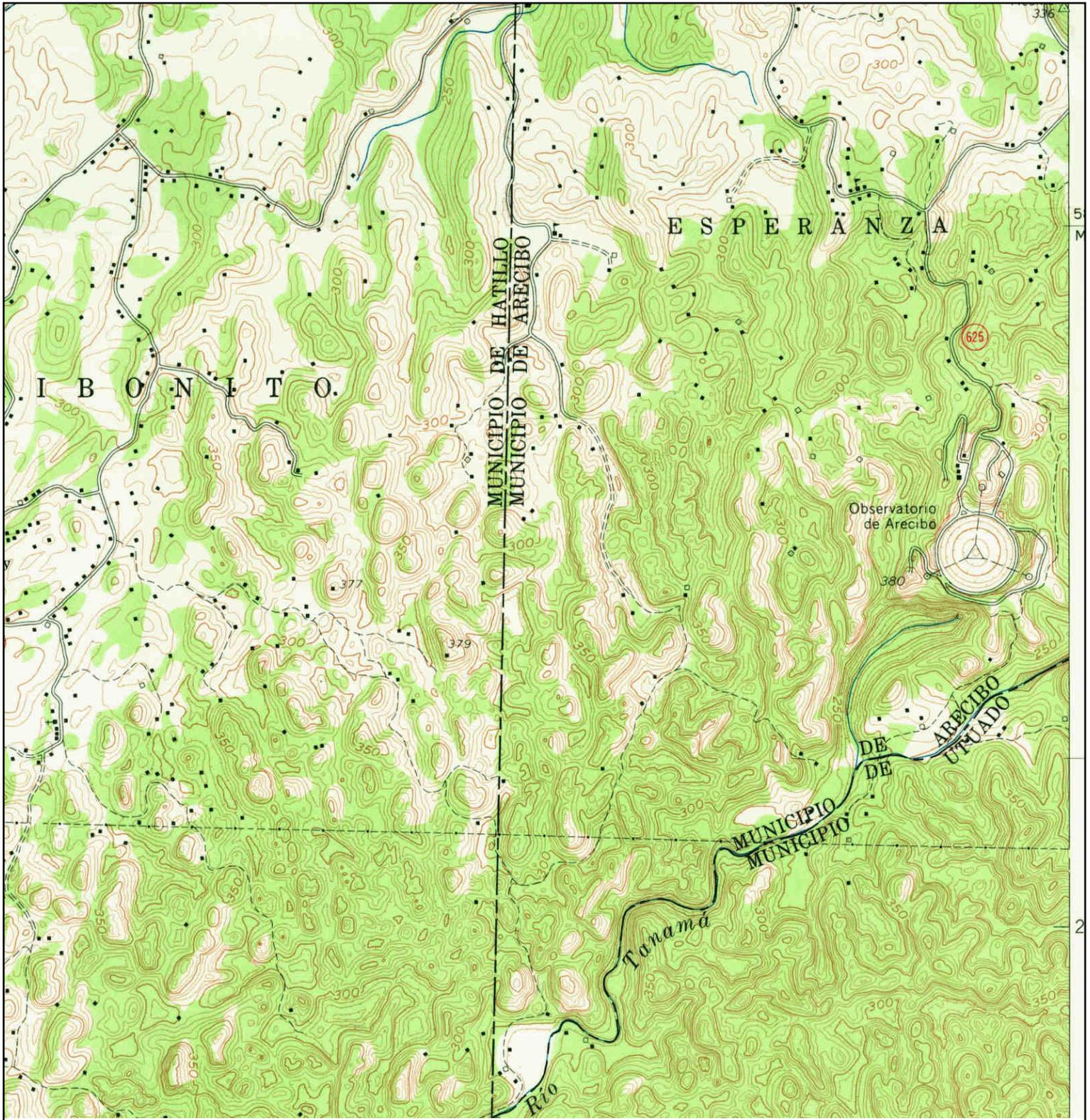
	TARGET QUAD	SITE NAME: Arecibo Observatory	CLIENT: CH2M Hill, Inc.
	NAME: BAYANEY	ADDRESS: PR-625	CONTACT: Jean Bossart
	MAP YEAR: 1952	Arecibo, PR 00612	INQUIRY#: 4107925.4
	SERIES: 7.5	LAT/LONG: 18.3458 / -66.7525	RESEARCH DATE: 10/16/2014
	SCALE: 1:30000		

Historical Topographic Map



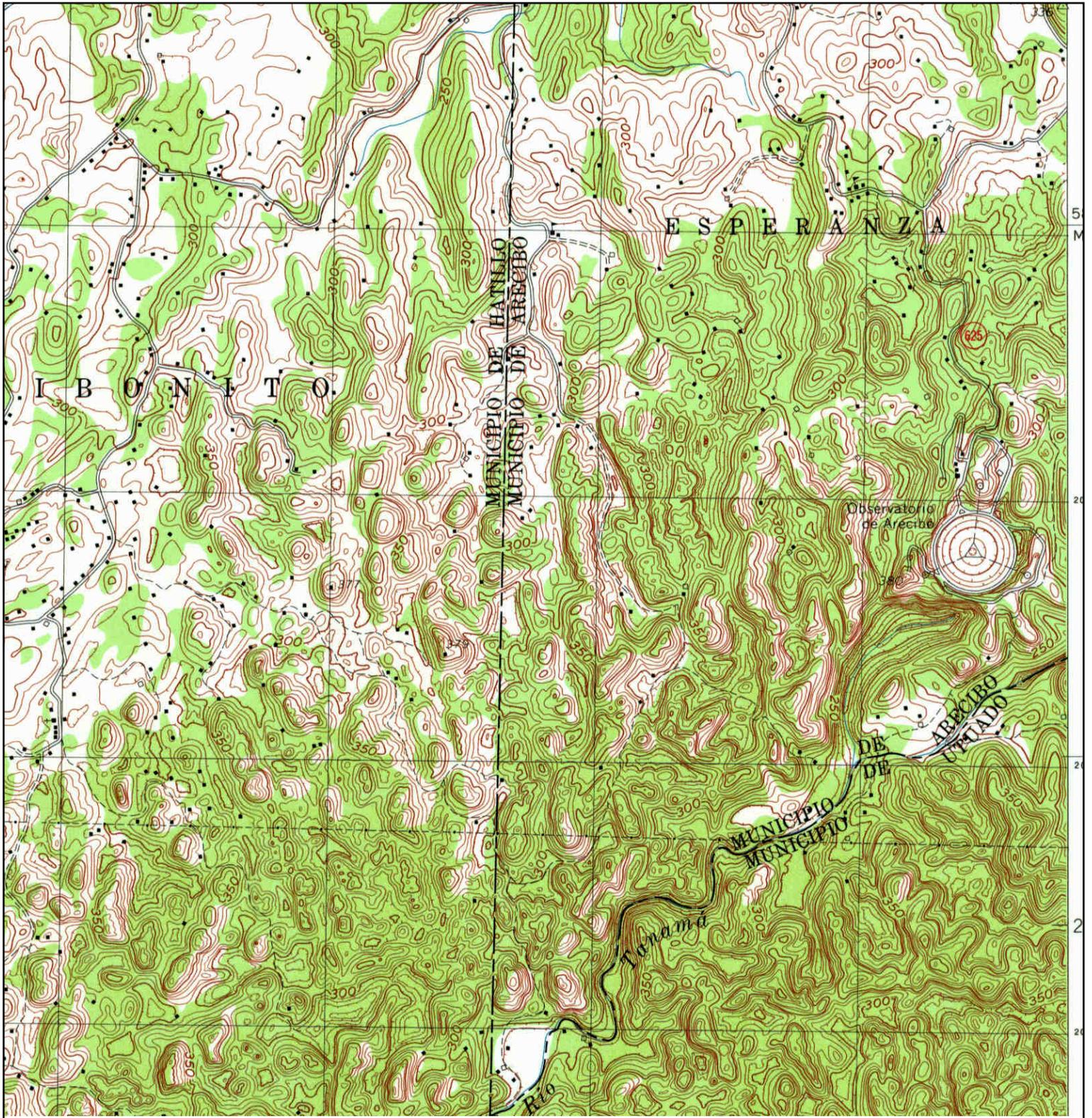
	TARGET QUAD	SITE NAME: Arecibo Observatory	CLIENT: CH2M Hill, Inc.
	NAME: BAYANEY	ADDRESS: PR-625	CONTACT: Jean Bossart
	MAP YEAR: 1957	Arecibo, PR 00612	INQUIRY#: 4107925.4
	SERIES: 7.5	LAT/LONG: 18.3458 / -66.7525	RESEARCH DATE: 10/16/2014
	SCALE: 1:20000		

Historical Topographic Map



	TARGET QUAD	SITE NAME: Arecibo Observatory	CLIENT: CH2M Hill, Inc.
	NAME: BAYANEY	ADDRESS: PR-625	CONTACT: Jean Bossart
	MAP YEAR: 1970	LAT/LONG: 18.3458 / -66.7525	INQUIRY#: 4107925.4
	SERIES: 7.5		RESEARCH DATE: 10/16/2014
	SCALE: 1:20000		

Historical Topographic Map



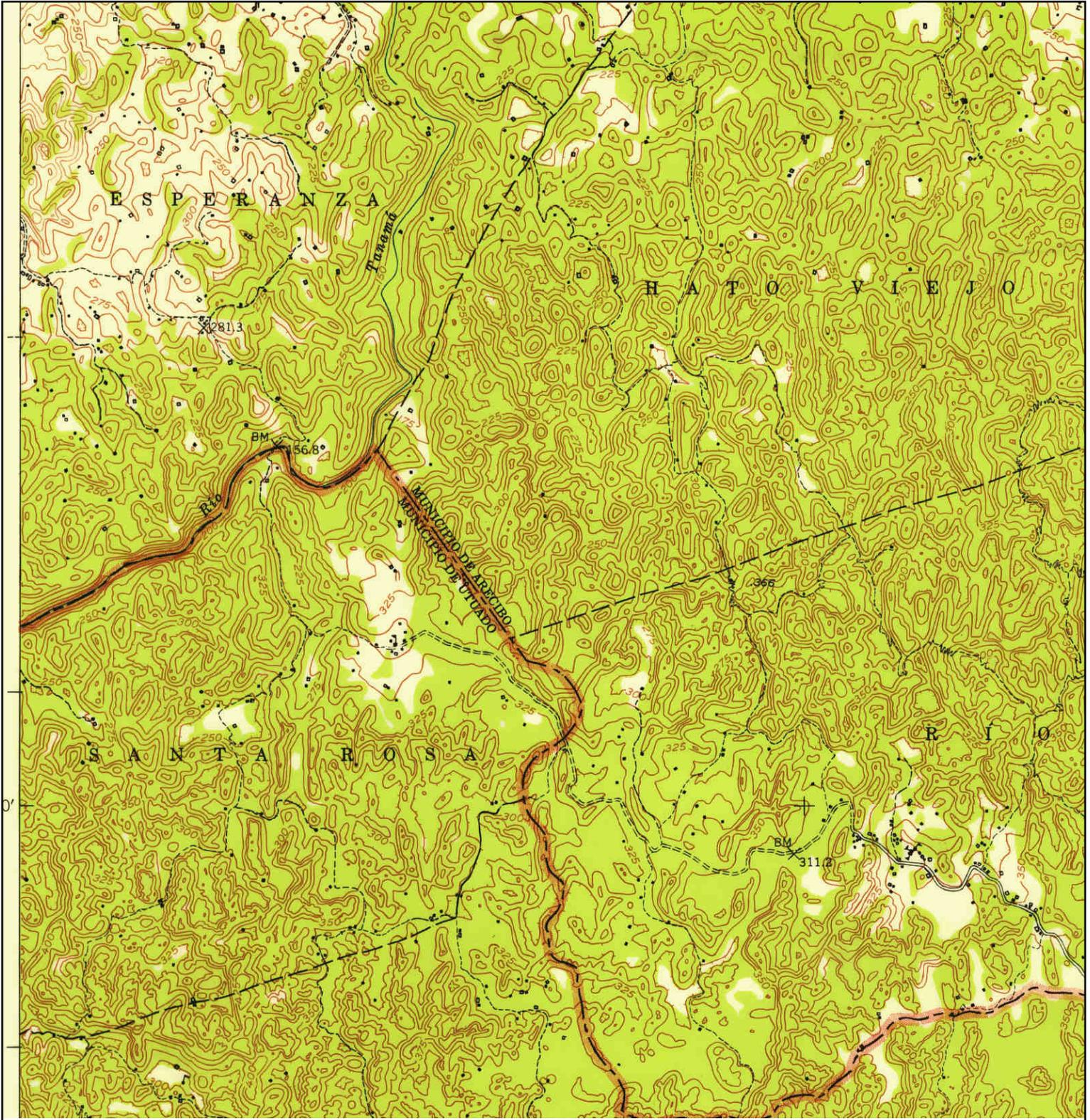
<p>N</p> 	TARGET QUAD	SITE NAME: Arecibo Observatory	CLIENT: CH2M Hill, Inc.
	NAME: BAYANEY	ADDRESS: PR-625	CONTACT: Jean Bossart
	MAP YEAR: 1982	Arecibo, PR 00612	INQUIRY#: 4107925.4
	PHOTOREVISED FROM :1970	LAT/LONG: 18.3458 / -66.7525	RESEARCH DATE: 10/16/2014
	SERIES: 7.5		
	SCALE: 1:20000		

Historical Topographic Map



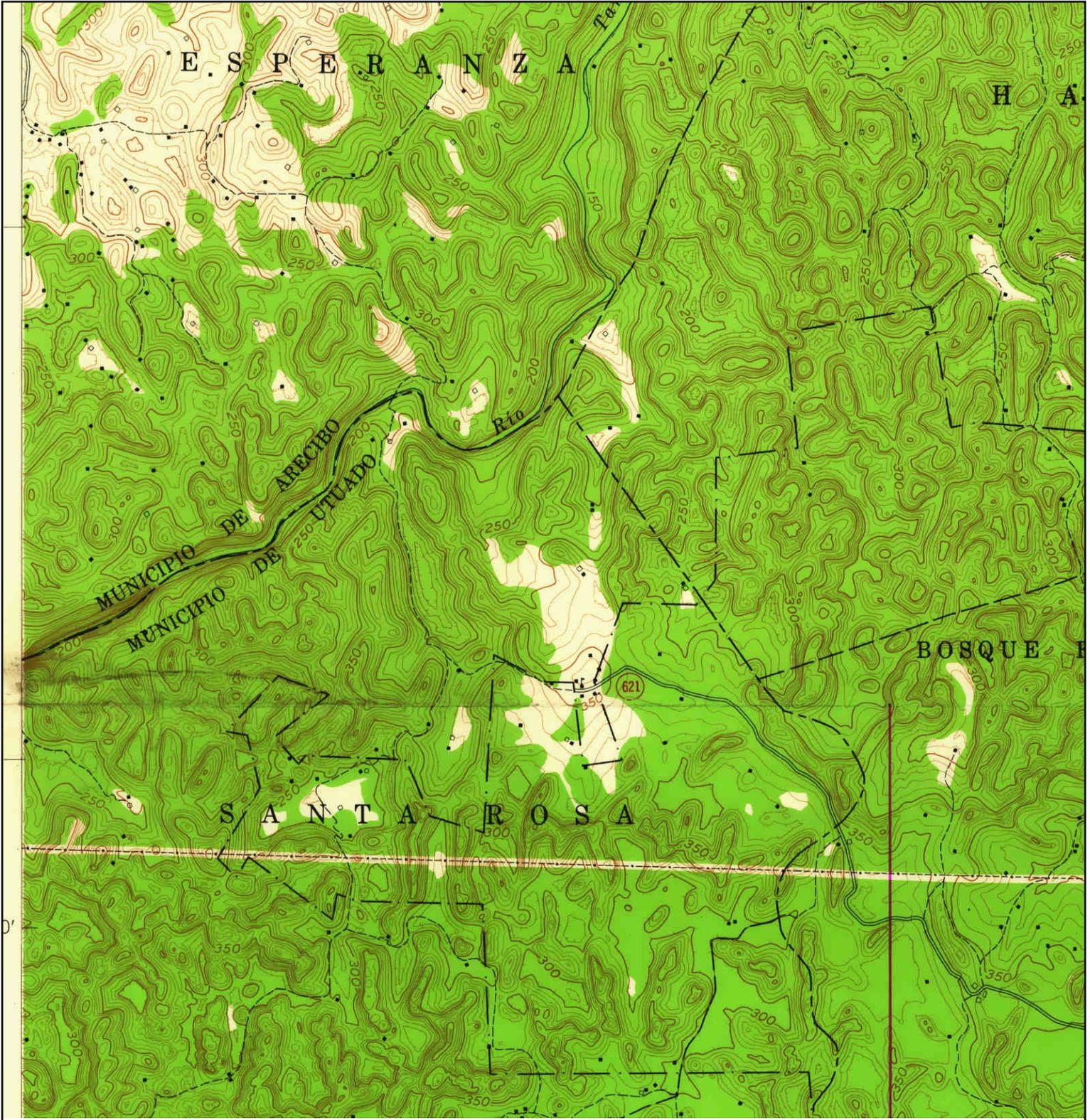
	ADJOINING QUAD	SITE NAME: Arecibo Observatory	CLIENT: CH2M Hill, Inc.
	NAME: UTUADO	ADDRESS: PR-625	CONTACT: Jean Bossart
	MAP YEAR: 1946	Arecibo, PR 00612	INQUIRY#: 4107925.4
	SERIES: 7.5	LAT/LONG: 18.3458 / -66.7525	RESEARCH DATE: 10/16/2014
	SCALE: 1:30000		

Historical Topographic Map



	ADJOINING QUAD		
	NAME: UTUADO	SITE NAME: Arecibo Observatory	CLIENT: CH2M Hill, Inc.
	MAP YEAR: 1952	ADDRESS: PR-625	CONTACT: Jean Bossart
	SERIES: 7.5	Arecibo, PR 00612	INQUIRY#: 4107925.4
	SCALE: 1:30000	LAT/LONG: 18.3458 / -66.7525	RESEARCH DATE: 10/16/2014

Historical Topographic Map



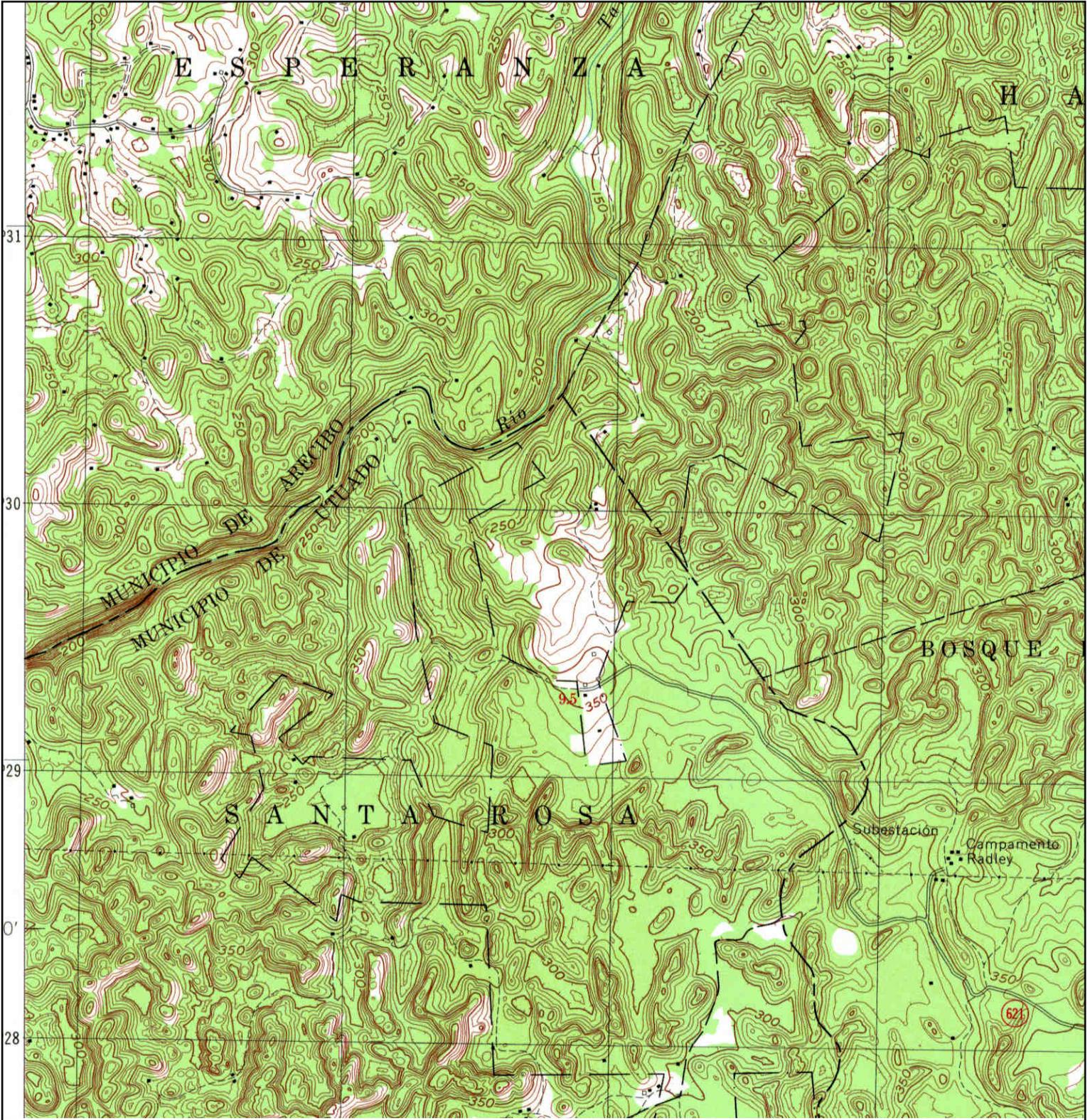
	ADJOINING QUAD		
	NAME: UTUADO	SITE NAME: Arecibo Observatory	CLIENT: CH2M Hill, Inc.
	MAP YEAR: 1957	ADDRESS: PR-625	CONTACT: Jean Bossart
	SERIES: 7.5	Arecibo, PR 00612	INQUIRY#: 4107925.4
	SCALE: 1:20000	LAT/LONG: 18.3458 / -66.7525	RESEARCH DATE: 10/16/2014

Historical Topographic Map



 N	ADJOINING QUAD	SITE NAME:	CLIENT:
	NAME: UTUADO	Arecibo Observatory	CH2M Hill, Inc.
	MAP YEAR: 1972	ADDRESS: PR-625	CONTACT: Jean Bossart
	SERIES: 7.5	Arecibo, PR 00612	INQUIRY#: 4107925.4
	SCALE: 1:20000	LAT/LONG: 18.3458 / -66.7525	RESEARCH DATE: 10/16/2014

Historical Topographic Map



N 	ADJOINING QUAD	SITE NAME:	CLIENT:
	NAME: UTUADO	Arecibo Observatory	CH2M Hill, Inc.
	MAP YEAR: 1982	ADDRESS: PR-625	CONTACT: Jean Bossart
	PHOTOREVISED FROM :1972	Arecibo, PR 00612	INQUIRY#: 4107925.4
	SERIES: 7.5	LAT/LONG: 18.3458 / -66.7525	RESEARCH DATE: 10/16/2014
	SCALE: 1:20000		

3.9-A Employment and Median Earnings

APPENDIX 3.9-A

**Employment and Median Earnings for 2009 and 2014 by Occupation for the Esperanza Barrio, Municipality of
Arecibo and Commonwealth of Puerto Rico^a**

	Esperanza Barrio					Arecibo Municipality					Puerto Rico				
	2009 Estimate	2014 Estimate	2014 % Distribution	2009 - 2014 % Change	2014 Median earnings (dollars)	2009 Estimate	2014 Estimate	2014 % Distribution	2009 - 2014 % Change	2014 Median earnings (dollars)	2009 Estimate	2014 Estimate	2014 % Distribution	2009 - 2014 % Change	2014 Median earnings (dollars)
Civilian employed population 16 years and over	290	391		35%	\$ 11,973	27111	24369		-10%	\$ 18,024	1208908	1,081,146		-11%	\$ 17,754
Management, business, science, and arts occupations:	73	44	11%	-40%	\$ 23,636	7595	7,245	30%	-5%	\$ 26,175	352087	338,802	31%	-4%	\$ 29,271
Management, business, and financial occupations:	8	8	18%	0%	-	2534	2,221	31%	-12%	\$ 29,334	132489	123,686	37%	-7%	\$ 32,448
Management occupations	0	0	0%	-	-	1476	1,210	54%	-18%	\$ 31,859	76807	72,923	59%	-5%	\$ 35,652
Business and financial operations occupations	8	8	100%	0%	-	1058	1,011	46%	-4%	\$ 24,645	55682	50,763	41%	-9%	\$ 29,609
Computer, engineering, and science occupations:	65	6	14%	-91%	-	609	677	9%	11%	\$ 34,792	36109	33,136	10%	-8%	\$ 39,264
Computer and mathematical occupations	0	0	0%	-	-	81	169	25%	109%	\$ 24,893	10107	10,888	33%	8%	\$ 38,447
Architecture and engineering occupations	8	0	0%	-100%	-	204	255	38%	25%	\$ 38,456	16346	13,612	41%	-17%	\$ 42,854
Life, physical, and social science occupations	0	6	100%	100%	-	324	253	37%	-22%	\$ 36,046	9656	8,636	26%	-11%	\$ 36,042
Education, legal, community service, arts, and media occupations:	57	30	68%	-47%	\$ 23,409	3088	2,726	38%	-12%	\$ 24,766	128266	120,071	35%	-6%	\$ 24,826
Community and social services occupations	0	11	37%	100%	-	657	583	21%	-11%	\$ 22,793	18219	16,648	14%	-9%	\$ 23,839
Legal occupations	0	0	0%	-	-	201	146	5%	-27%	\$ 39,219	11830	10,939	9%	-8%	\$ 50,763
Education, training, and library occupations	57	19	63%	-67%	-	2056	1,752	64%	-15%	\$ 25,660	83519	78,640	65%	-6%	\$ 24,367
Arts, design, entertainment, sports, and media occupations	0	0	0%	-	-	174	245	9%	41%	\$ 19,375	14698	13,844	12%	-6%	\$ 20,932
Healthcare practitioner and technical occupations:	0	0	0%	-	-	1364	1,621	22%	19%	\$ 24,847	55223	61,909	18%	12%	\$ 27,300
Health diagnosing and treating practitioners and other technical occupations	0	0	-	-	-	1015	1,119	69%	10%	\$ 32,951	39127	42,891	69%	10%	\$ 32,104
Health technologists and technicians	0	0	-	-	-	349	502	31%	44%	\$ 18,160	16096	19,018	31%	18%	\$ 19,705
Service occupations:	61	147	38%	141%	\$ 10,393	5052	4,721	19%	-7%	\$ 14,295	234365	222,320	21%	-5%	\$ 13,347
Healthcare support occupations	0	18	12%	100%	-	278	318	7%	14%	\$ 15,165	17726	14,257	6%	-20%	\$ 14,029
Protective service occupations:	0	33	22%	100%	\$ 31,094	1717	1,675	35%	-2%	\$ 18,968	60958	58,417	26%	-4%	\$ 19,350
Firefighting and prevention, and other protective service workers including supervisors	0	0	0%	-	-	775	997	60%	29%	\$ 14,148	32494	33,466	57%	3%	\$ 15,100
Law enforcement workers including supervisors	0	33	100%	100%	\$ 31,094	942	678	40%	-28%	\$ 30,417	28464	24,951	43%	-12%	\$ 28,853
Food preparation and serving related occupations	8	41	28%	413%	\$ 2,500	1145	1,132	24%	-1%	\$ 11,455	58848	56,725	26%	-4%	\$ 11,087
Building and grounds cleaning and maintenance occupations	0	55	37%	100%	\$ 11,080	1309	1,133	24%	-13%	\$ 15,370	66033	62,040	28%	-6%	\$ 12,045
Personal care and service occupations	53	0	0%	-100%	-	603	463	10%	-23%	\$ 7,460	30800	30,881	14%	0%	\$ 9,507
Sales and office occupations:	58	113	29%	95%	\$ 8,313	7643	7,117	29%	-7%	\$ 16,477	334475	302,378	28%	-10%	\$ 16,629
Sales and related occupations	20	93	82%	365%	\$ 6,985	3085	3,266	46%	6%	\$ 12,394	145400	134,770	45%	-7%	\$ 14,209
Office and administrative support occupations	38	20	18%	-47%	\$ 16,111	4558	3,851	54%	-16%	\$ 18,621	189075	167,608	55%	-11%	\$ 18,068
Natural resources, construction, and maintenance occupations:	39	69	18%	77%	\$ 15,804	2,961	1,932	8%	-35%	\$ 16,599	139724	104,668	10%	-25%	\$ 15,385
Farming, fishing, and forestry occupations	14	30	43%	114%	\$ 11,974	375	168	9%	-55%	\$ 12,298	10650	9,241	9%	-13%	\$ 9,089
Construction and extraction occupations	25	39	57%	56%	-	1517	857	44%	-44%	\$ 15,156	79717	52,585	50%	-34%	\$ 14,645
Installation, maintenance, and repair occupations	0	0	0%	-	-	1069	907	47%	-15%	\$ 21,011	49357	42,842	41%	-13%	\$ 17,455
Production, transportation, and material moving occupations:	59	18	5%	-69%	-	3860	3,354	14%	-13%	\$ 16,602	148257	112,978	10%	-24%	\$ 16,227
Production occupations	16	11	61%	-31%	-	2465	2,239	67%	-9%	\$ 17,581	84031	62,193	55%	-26%	\$ 17,077
Transportation occupations	0	7	39%	100%	-	754	613	18%	-19%	\$ 15,826	37782	29,964	27%	-21%	\$ 15,986
Material moving occupations	43	0	0%	-100%	-	641	502	15%	-22%	\$ 14,488	26444	20,821	18%	-21%	\$ 13,408

Sources: USCB, 2009, 2014b.

Note:

^a In 2014 inflation-adjusted dollars, which are calculated using the average Consumer Price Index for a given calendar year and represent the change "buying power" because of the increases in the prices of all goods and services purchased by consumers.

4.1-A Biological Assessment



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Caribbean Ecological Services

Field Office

P.O. Box 491

Boqueron, PR 00622

JUN 23 2017

In Reply Refer To:

FWS/R4/CESFO/72-013-035

Ralph A. Gaume
Acting Division Director
National Science Foundation
4201 Wilson Boulevard
Arlington, Virginia 22230

Re: Biological Assessment and
request for concurrence in operations
of the Arecibo Observatory

Dear Mr. Gaume:

We have reviewed your Section 7 concurrence request for the Biological Assessment of the Arecibo Observatory, Arecibo Puerto Rico. Our comments are provided under the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 United States Code 1531 *et seq.*), and in accordance with the Fish and Wildlife Coordination Act (47 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*).

On December 2, 2016, the U.S. Fish and Wildlife Service (Service) reviewed and provided technical assistance to the Draft Environmental Impact Statement (DEIS) prepared by the National Science Foundation (NSF) to analyze the potential environmental impacts associated with the potential funding changes for Arecibo Observatory (AO). The five action alternatives analyzed in the DEIS are: 1) collaboration with interested parties for continued science-focused operations (NSF-preferred alternative), 2) collaboration with interested parties for transition to education-focused operations, 3) mothballing of facilities, 4) partial deconstruction and site restoration, and 5) complete deconstruction and site restoration.

The BA recognizes the presence or potential presence of the following federally listed species in the area:

1. Puerto Rican boa (*Epicrates inornatus*)
2. Puerto Rican broad-winged hawk (*Buteo platypterus brunnescens*)
3. Puerto Rican parrot (*Amazon vittata*)
4. Puerto Rican sharp-shinned hawk (*Accipiter striatus venator*)
5. Tectaria estremerana (no common name)
6. Beautiful goetzea (*Goetzea elegans*)

7. Chupacallos (*Pleodendron macranthum*)
8. Erubia (*Solanum drymophilum*)
9. *Myrcia paganii* (no common name)
10. *Schoepfia arenaria* (no common name)
11. *Cordia bellonis* (no common name)
12. Palo de nigua (*Cronutia obovate*)
13. Palo de rosa (*Ottoschulzia rhodoxylon*)
14. Uvillo (*Eugenia haematocarpa*)
15. *Daphnopsis hellerana* (no common name)
16. *Thelypteris verecunda* (no common name)

After the technical assistance offered and site visits conducted, the NSF developed a Biological Assessment (BA) addressing potential impacts and providing measures to minimize possible effects to protected species associated with five (5) different alternatives under consideration for proposed operational changes and made determination for each one. The effects and determinations by alternative are as follows:

Alternative 1: Continued Science-focused Operations and deconstruction of 26 structures in the facilities. Debris from the deconstruction would be recycled to the extent possible. Debris that could not be recycled would be hauled from the site for disposal landfill in Ponce. No new construction would occur.

Determination: **No effect** on the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, *Tectaria estremerana*, the Puerto Rican parrot, beautiful goetzia, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana* and *Thelypteris verecunda*.

May affect but is not likely to adversely affect the Puerto Rican boa. Conservation measures and protocols will be implemented to minimize effects of deconstruction activities to the boa.

Alternative 2: Transition to an Education-focused operation and deconstruction of 27 structures. Debris from the deconstruction would be recycled to the extent possible. Debris that could not be recycled would be hauled from the site for disposal landfill in Ponce. No new construction would occur.

Determination: **No effect** on the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, *Tectaria estremerana*, the Puerto Rican parrot, beautiful goetzia, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana* and *Thelypteris verecunda*.

May affect but is not likely to adversely affect the Puerto Rican boa. Conservation measures and protocols will be implemented to minimize effects of deconstruction activities to the boa.

Alternative 3:

Mothballing of the facility and deconstruction of 14 structures. Debris from the deconstruction would be recycled to the extent possible. Debris that could not be recycled would be hauled from the site for landfill disposal in Ponce. The observatory would be closed for a number of years with routine maintenance of buildings and equipment performed until funding is available. If during the mothballing NSF decide to resume the operations of the observatory with a different focus operations or proposed construction in the site, NSF would re-initiate Section 7 consultation with the Service.

Determination:

No effect on the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, *Tectaria estremerana*, the Puerto Rican parrot, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana* and *Thelypteris verecunda*.

May affect but is not likely to adversely affect the Puerto Rican boa. Conservation measures and protocols will be implemented to minimize effects of deconstruction activities to the boa.

Alternative 4:

Partial deconstruction and site restoration. The NSF would deconstruct all structures on the observatory except the towers, catwalk anchors, and the rim wall and foundation infrastructure for the 305-meter-diameter radio telescope dish. Debris that could not be recycled would be hauled from the site for landfill disposal in Ponce. No future operations would occur on the site except for maintenance of the safety lights on the safe abandoned towers and installation of security fencing.

Determination:

No effect on the *Tectaria estremerana*, Puerto Rican sharp-shinned hawk, the Puerto Rican parrot, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana* and *Thelypteris verecunda*.

May affect but is not likely to adversely affect the Puerto Rican boa and the Puerto Rican broad-winged hawk. Conservation measures and protocols will be implemented to minimize effects of deconstruction activities to the boa. For the Puerto Rican broad-winged hawk, nest survey would be conducted to determine if nesting or young-rearing is occurring prior the deconstruction

activities start. Deconstruction of the 305-meter-diameter reflector dish and the safe abandonment of the rim wall and foundation infrastructure would not be allowed from the time nesting behavior is initiated until after the young had fledged (typically December through May).

Alternative 5: Full deconstruction and site restoration. NSF would deconstruct all structures on the Observatory. Debris from the deconstruction would be recycled to the extent possible. Debris that could not be recycled would be hauled from the site for landfill disposal in Ponce, except concrete from towers and anchors. No future operations would occur on the site.

Determination: **May affect but is not likely to adversely affect** the Puerto Rican boa, the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, *Tectaria estremerana*, the Puerto Rican parrot, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uவில்lo, *Daphnopsis hellerana* and *Thelypteris verecunda*.

NSF commits to further consult with the USFWS should Alternative 5 be selected. This consultation will be completed prior to starting intrusive work under Alternative 5. It is not possible to quantify the potential effects for impacts to these species until after an award is made and the selected contractor develops a work plan. This process could take two or more years following the conclusion of the National Environmental Policy Act (NEPA) process. Because of the time involved before any work would begin, surveys for the Puerto Rican broad-winged hawk will not be completed until closer to the time for the start of work. Appropriate timing for surveys, to provide relevant information prior to the start of work, will be determined through consultation with USFWS.

The BA does not include a land transfer under any of the alternatives being evaluated. Should the Arecibo Observatory be transferred out of federal control in the future, this would be a new federal action subject to environmental review, including consultation under Section 7 of the ESA. NSF, in consultation with USFWS, would consider the appropriate land use controls for the natural areas on the Observatory at that time. The Service agrees with the approach of land transfer for conservation of forested lands as an action to be assessed as part of Alternative 5.

Based on the above, we concur with the effect determinations for the five (5) proposed alternatives in the Biological Assessment. Alternative 3 and Alternative 5 include language for re-initiating section 7 consultation to assess effects that were not previously considered. Therefore, no further consultation is required. Nevertheless, if the project is

modified or if information on impacts to listed species becomes available this office should be contacted concerning the need for the initiation of consultation under section 7 of the Act.

Thank you for the opportunity to comment on this project. We appreciate your interest in protecting endangered species and their habitats. It is the Service's mission to work with others to conserve, protect, and enhance marine life, wildlife, plants and their habitats for the continuing benefit of our people. Please do not hesitate to contact Jose Cruz at 787-851-7297, should you have any questions concerning our comments.

Sincerely yours,



Edwin E. Muñiz
Field Supervisor

agcs

cc:
DNER, San Juan
Kristen Hamilton, email

BIOLOGICAL ASSESSMENT

National Science Foundation's Proposed Changes to Operations at Arecibo Observatory

Arecibo Observatory
Arecibo, Puerto Rico

May 2017

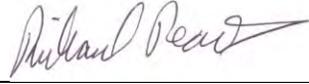
Prepared for

National Science Foundation

ch2m.
Atlanta, Georgia

Biological Assessment
for
National Science Foundation Proposed Changes to Operations at Arecibo Observatory
Arecibo, Puerto Rico

Prepared by:



Date

3 May 2017

Richard Reaves, Ph.D.
Endangered Species Biologist
CH2M

Reviewed by:

Date

NSF

Date

Contents

1	Summary of Determinations	1-1
2	Introduction	2-1
3	Proposed Action.....	3-1
3.1	Alternative 1 – Collaboration with Interested Parties for Continued Science-focused Operations	3-1
3.2	Alternative 2 – Collaboration with Interested Parties for Transition to Education-focused Operations	3-3
3.3	Alternative 3 – Mothballing of Facilities	3-5
3.4	Alternative 4 – Partial Deconstruction and Site Restoration	3-6
3.5	Alternative 5 – Full Deconstruction and Site Restoration	3-9
4	Location and Setting Description.....	4-1
4.1	Location.....	4-1
4.2	Setting Description	4-1
5	Species Descriptions	5-1
5.1	<i>Epicrates inornatus</i> (Puerto Rican Boa).....	5-1
5.2	<i>Buteo platypterus brunnescens</i> (Puerto Rican Broad-winged Hawk)	5-1
5.3	<i>Amazona vittata</i> (Puerto Rican Parrot).....	5-2
5.4	<i>Accipiter striatus venator</i> (Puerto Rican Sharp-shinned Hawk)	5-2
5.5	<i>Tectaria estremarana</i> (No Common Name).....	5-2
5.6	<i>Goetzea elegans</i> (Beautiful Goetzea)	5-3
5.7	<i>Pleodendron macranthum</i> (Chupacallos).....	5-3
5.8	<i>Solanum drymophilum</i> (Erubia)	5-3
5.9	<i>Myrcia paganii</i> (No Common Name)	5-4
5.10	<i>Schoepfia arenaria</i> (No Common Name)	5-4
5.11	<i>Cordia bellonis</i> (No Common Name)	5-4
5.12	<i>Cornutia obovata</i> (Palo De Nigua)	5-5
5.13	<i>Ottoschulzia rhodoxylon</i> (Palo De Rosa)	5-5
5.14	<i>Daphnopsis hellerana</i> (No Common Name).....	5-5
5.15	<i>Eugenia haematocarpa</i> (Uvillo).....	5-6
5.16	<i>Thelypteris verecunda</i> (No Common Name)	5-6
6	Effects of Proposed Action Implementation	6-1
6.1	Alternative 1 – Collaboration with Interested Parties for Continued Science-focused Operations	6-1
6.1.1	Direct Impacts	6-1
6.1.2	Indirect Impacts	6-3
6.1.3	Cumulative Impacts.....	6-4
6.2	Alternative 2 – Collaboration with Interested Parties for Transition to Education-focused Operations	6-4
6.2.1	Direct Impacts	6-4
6.2.2	Indirect Impacts.....	6-5
6.2.3	Cumulative Impacts.....	6-5
6.3	Alternative 3 – Mothballing of Facilities	6-5
6.3.1	Direct Impacts	6-5
6.3.2	Indirect Impacts	6-6

	6.3.3	Cumulative Impacts	6-7
6.4		Alternative 4 – Partial Deconstruction and Site Restoration	6-7
	6.4.1	Direct Impacts	6-7
	6.4.2	Indirect Impacts	6-8
	6.4.3	Cumulative Impacts	6-8
6.5		Alternative 5 – Full Deconstruction and Site Restoration	6-8
	6.5.1	Direct Impacts	6-8
	6.5.2	Indirect Impacts	6-10
	6.5.3	Cumulative Impacts	6-11
7		Conclusions.....	7-1
8		Review of Literature and Other Information.....	8-1

Tables

1	Conditions in Proposed Work Areas for Buildings and Infrastructure to be Deconstructed under Alternative 1
2	Conditions in Proposed Work Areas for Buildings and Infrastructure to be Deconstructed under Alternative 2
3	Conditions in Proposed Work Areas for Buildings and Infrastructure to be Deconstructed under Alternative 3
4	Conditions in Proposed Work Areas for Buildings and Infrastructure to be Deconstructed under Alternative 4
5	Conditions in Proposed Work Areas for Buildings and Infrastructure to be Deconstructed under Alternative 5

Figures

1	Arecibo Observatory Location
2	Buildings Potentially Deconstructed under Alternative 1
3	Buildings Potentially Deconstructed under Alternative 2
4	Buildings Potentially Deconstructed under Alternative 3
5	Buildings Potentially Deconstructed under Alternative 4
6	Buildings Potentially Deconstructed under Alternative 5

Attachment

1	Puerto Rican Boa Protocols to be Implemented Prior to Intrusive Work at Arecibo Observatory, Puerto Rico
---	--

List of Acronyms and Abbreviations

ACM	asbestos-containing material
BA	biological assessment
BMP	best management practice
BO	biological opinion
ESA	Endangered Species Act
LBP	lead-based paint
NEPA	National Environmental Policy Act
NSF	National Science Foundation
SWPPP	stormwater pollution prevention plan
U.S.	United States
USFWS	U.S. Fish and Wildlife Service
USRA	Universities Space Research Association

Summary of Determinations

This National Science Foundation (NSF) biological assessment (BA) contains a determination regarding the potential effects on the federally listed Puerto Rican boa (*Epicrates inornatus*), the Puerto Rican broad-winged hawk (*Buteo platypterus brunnescens*), *Tectaria estremerana*, the Puerto Rican parrot (*Amazona vittata*), the Puerto Rican sharp-shinned hawk (*Accipiter striatus venator*), beautiful goetzea (*Goetzea elegans*), chupacallos (*Pleodendron macranthum*), erubia (*Solanum drymophilum*), *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua (*Cornutia obovata*), palo de rosa (*Ottoschulzia rhodoxylon*), uvillo (*Eugenia haematocarpa*), *Daphnopsis hellerana*, and *Thelypteris verecunda* from the reduction of funding at the Arecibo Observatory under implementation of the following alternatives:

- Alternative 1: Collaboration with Interested Parties for Continued Science-focused Operations. NSF would deconstruct up to 26 structures (see Table 1). Debris from the deconstruction would be recycled to the extent possible. Debris that could not be recycled would be hauled from the site for disposal in a landfill in Poncé. The Observatory would continue to operate as a science-focused research facility. Educational activities would continue at current levels and tourism at the facility would continue. No new construction would occur.
- Alternative 2: Collaboration with Interested Parties for Transition to Education-focused Operations. NSF would deconstruct up to 27 structures (see Table 2). Debris from the deconstruction would be recycled to the extent possible. Debris that could not be recycled would be hauled from the site for disposal in a landfill in Poncé. The Observatory would be converted to education-focused operations. The 305-meter-diameter radio telescope would be rendered inoperable, but its physical structure would be retained. The 12-meter-diameter radio telescope would remain functional to support limited research in addition to the education functions. Educational activities would increase above current levels and tourism at the facility would continue. No new construction would occur.
- Alternative 3: Mothballing of Facilities. NSF would deconstruct 14 structures and mothball the facility for a number of years (see Table 3). Debris from the deconstruction would be recycled to the extent possible. Debris that could not be recycled would be hauled from the site for disposal in a landfill in Poncé. The Observatory would not operate for a number of years, but routine maintenance of buildings and equipment would be performed, including maintaining the 305-meter-diameter radio telescope dish, the Gregorian dome, and the 12-meter-diameter radio telescope. After the mothball phase, operation of the Observatory would resume. At that time, operations may be similar to current operations, other science-based operations, education-based operations, or some other type of operations. If the focus of operations would be different from resumption of current operations or operations assessed under other alternatives in this document, then NSF would conduct additional consultation with the U.S. Fish and Wildlife Service (USFWS) prior to the restart.
- Alternative 4: Partial Deconstruction and Site Restoration. NSF would deconstruct all structures on the Observatory except the towers, tower and catwalk anchors, and the rim wall and foundation infrastructure for the 305-meter-diameter radio telescope dish (see Table 4). Debris from the deconstruction would be recycled to the extent possible. Debris that could not be recycled would be hauled from the site for disposal in a landfill in Poncé. No future operations would occur on the site except for maintenance of the safety lights on the safe-abandoned towers and security fencing.
- Alternative 5: Full Deconstruction and Site Restoration. NSF would deconstruct all structures on the Observatory (see Table 5). Debris from the deconstruction would be recycled to the extent

possible. Debris that could not be recycled would be hauled from the site for disposal in a landfill in Poncé, except that concrete from the deconstruction of the towers and anchors would not be hauled to a landfill. This concrete would be reduced to 3-inch diameter or less, the iron rebar would be removed and recycled, and the reduced concrete would be used as backfill onsite to restore grades or fill holes resulting from deconstruction activities. No future operations would occur on the site.

The Puerto Rican boa, the Puerto Rican broad-winged hawk, and *Tectaria estremerana* are known to occur on the Arecibo Observatory. Palo de nigua occurs just north of the Arecibo Observatory property by the entrance and there is potentially suitable habitat for this species on the grounds. The Puerto Rican parrot, the Puerto Rican sharp-shinned hawk, beautiful goetza, Chupacallos, Erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de rosa, uவில், *Daphnopsis hellerana*, and *Thelypteris verecunda* are known from the general area and there is potentially suitable habitat for these species on the Arecibo Observatory. These latter species may occur on the Observatory, but no surveys for these species have been conducted.

Potential impacts to these species could result from the deconstruction activities proposed under each Alternative or during subsequent operation of the facility. Each proposed Alternative was considered based on the magnitude and intensity of impacts that would occur if that proposed Alternative was implemented. Consideration was given to direct, indirect, and cumulative impacts.

Under all of the proposed Alternatives, the Puerto Rican Boa Protocols (see Attachment 1) would be implemented during deconstruction activities and during subsequent operations, as applicable. Also, each proposed Alternative would include implementation of stormwater management measures during deconstruction to minimize the potential for offsite movement of runoff. Additional site-specific protection measures would be developed and implemented as appropriate during work.

NSF requests USFWS concurrence with the following determinations of this analysis regarding the proposed Alternatives under consideration to reduce funding to the Arecibo Observatory:

- Alternative 1: Alternative 1 would have **no effect** on the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, *Tectaria estremerana*, the Puerto Rican parrot, beautiful goetza, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uவில், *Daphnopsis hellerana*, or *Thelypteris verecunda*.

With implementation of the Puerto Rican Boa Protocols, the deconstruction activities that would be implemented under Alternative 1 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa.

Operations under Alternative 1 would have **no effect** on the Puerto Rican boa, the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, *Tectaria estremerana*, the Puerto Rican parrot, beautiful goetza, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uவில், *Daphnopsis hellerana*, or *Thelypteris verecunda*. No cumulative impacts would result under Alternative 1.

- Alternative 2: Alternative 2 would have **no effect** on the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, *Tectaria estremerana*, the Puerto Rican parrot, beautiful goetza, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uவில், *Daphnopsis hellerana*, or *Thelypteris verecunda*.

With implementation of the Puerto Rican Boa Protocols, the deconstruction activities that would be implemented under Alternative 2 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa.

Operations under Alternative 2 would have **no effect** on the Puerto Rican boa, the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, *Tectaria estremerana*, the Puerto

Rican parrot, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, or *Thelypteris verecunda*. No cumulative impacts would result under Alternative 2.

- Alternative 3: Alternative 3 would have **no effect** on the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, *Tectaria estremerana*, the Puerto Rican parrot, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, or *Thelypteris verecunda*.

With implementation of the Puerto Rican Boa Protocols, the deconstruction activities that would be implemented under Alternative 3 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa.

Operations under Alternative 3 would have **no effect** on the Puerto Rican boa, the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, *Tectaria estremerana*, the Puerto Rican parrot, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, or *Thelypteris verecunda*.

No cumulative impacts would result under Alternative 3.

- Alternative 4: Deconstruction under Alternative 4 would have **no effect** on *Tectaria estremerana*, the Puerto Rican sharp-shinned hawk, the Puerto Rican parrot, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, or *Thelypteris verecunda*.

With implementation of specific measures to avoid impacts during the nesting period, Alternative 4 **may affect**, but is **unlikely to adversely affect**, the Puerto Rican broad-winged hawk.

With implementation of the Puerto Rican Boa Protocols, the deconstruction activities that would be implemented under Alternative 4 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa.

Operations under Alternative 4 would be limited to maintenance of security lighting on towers and on security fencing. Operations would have **no effect** on the Puerto Rican boa, the Puerto Rican broad-winged hawk, *Tectaria estremerana*, the Puerto Rican parrot, the Puerto Rican sharp-shinned hawk, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, or *Thelypteris verecunda*.

No adverse cumulative impacts would result under Alternative 4. Long-term beneficial impacts would be expected as natural habitats mature following restoration of the site.

- Alternative 5: Deconstruction under Alternative 5 **may affect**, but is **unlikely to adversely affect**, *Tectaria estremerana*, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, or *Thelypteris verecunda*.

With implementation of specific measures to avoid impacts during the nesting period, Alternative 5 **may affect**, but is **unlikely to adversely affect**, the Puerto Rican parrot or the Puerto Rican sharp-shinned hawk.

Alternative 5 **may affect**, and is **likely to adversely affect**, the Puerto Rican broad-winged hawk. It is not possible to know the full potential for impacts to this species until after an award is made and the selected contractor develops a work plan. This process could take two or more years following the conclusion of the National Environmental Policy Act (NEPA) process. Because of the time involved before any work would begin, surveys for the Puerto Rican broad-winged hawk will not be completed until closer to the time for the start of work. Appropriate timing for

surveys, to provide relevant information prior to the start of work, will be determined through consultation with USFWS. NSF commits to further consultation with the USFWS should Alternative 5 be selected. This consultation will be completed prior to starting intrusive work under Alternative 5. As part of that consultation, NSF will implement appropriate mitigation specified in the biological opinion (BO) issued by USFWS.

Deconstruction that would be implemented under Alternative 5 **may affect**, and is **likely to adversely affect**, the Puerto Rican boa. Because the full potential for impacts to the Puerto Rican boa cannot be known until after the contractor work plan is developed, NSF commits to further consultation with USFWS regarding the Puerto Rican boa should Alternative 5 be selected. This consultation will be completed prior to starting intrusive work under Alternative 5. As part of that consultation, NSF will implement the appropriate mitigation specified in the BO issued by USFWS.

There would be no operations under Alternative 5. Therefore, operations would have **no effect** on the Puerto Rican boa, the Puerto Rican broad-winged hawk, *Tectaria estremerana*, the Puerto Rican parrot, the Puerto Rican sharp-shinned hawk, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, or *Thelypteris verecunda*. Long-term beneficial impacts would be expected as natural habitats mature following restoration of the site.

No cumulative impacts to the Puerto Rican boa, the Puerto Rican broad-winged hawk, *Tectaria estremerana*, the Puerto Rican sharp-shinned hawk, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, or *Thelypteris verecunda* would likely occur under Alternative 5.

Minor incremental adverse cumulative impacts to the Puerto Rican parrot reintroduction effort would likely occur under Alternative 5.

Implementation of any of the proposed Alternatives would not threaten the continued existence of protected species known to occur or with potential to occur on the Arecibo Observatory.

There is no critical habitat designated on or adjacent to the Arecibo Observatory. NSF has determined that there would be **no adverse modification** of designated critical habitat.

Land transfer is not included under any of the alternatives being evaluated. Should the Arecibo Observatory be transferred out of federal control in the future, this would be a new federal action subject to environmental review, including consultation under Section 7 of the Endangered Species Act (ESA). NSF, in consultation with USFWS, would consider the appropriate land use controls (*e.g.*, deed restriction, conservation easement) for the natural areas on the Observatory at that time.

Introduction

This document is being submitted to fulfill requirements under Section 7 of the ESA. This BA by NSF addresses potential impacts to protected species associated with the alternatives under consideration for proposed operational changes at the Arecibo Observatory in Arecibo, Puerto Rico, due to funding constraints. At present, the Arecibo Observatory serves a variety of scientific user communities in astronomy, aeronomy, and planetary science, and is funded for all three activities as well as an active education and public outreach program. However, a series of science community evaluations have indicated that the science capability of the Arecibo Observatory is lower in priority than other science capabilities NSF funds. In a funding-constrained environment, NSF needs to maintain a balanced research portfolio with the largest science return for the taxpayer dollar. In response to the Notice of Intent to prepare an Environmental Impact Statement for this Proposed Action, the USFWS identified 16 protected species of plants and animals that could be impacted by one or more of the proposed Alternatives.

The Arecibo Observatory is an NSF-owned scientific research and education facility. In 2011, NSF awarded a 5-year Cooperative Agreement to SRI International, which together with Universities Space Research Association (USRA) and Universidad Metropolitana formed the Arecibo Management Team to operate and maintain the Arecibo Observatory for the benefit of research communities. The Arecibo Observatory enables research in three scientific disciplines: space and atmospheric sciences, radio astronomy, and solar system radar studies; the last of these is largely funded through a research award to USRA from the National Aeronautics and Space Administration. An education and public outreach program complements the Arecibo Observatory scientific program. A key component of the Arecibo Observatory research facility is a 305-meter-diameter, fixed, spherical reflector. The Arecibo Observatory infrastructure includes instrumentation for radio and radar astronomy and ionospheric physics, office and laboratory buildings, a heavily used visitor and education facility, and lodging facilities for visiting scientists.

The Puerto Rican boa (*Epicrates inornatus*), the Puerto Rican broad-winged hawk (*Buteo platypterus brunnescens*), and the fern *Tectaria estremezana* are known from the Arecibo Observatory. The Puerto Rican boa is regularly observed by Observatory staff and it may occur in karst areas, buildings, and openings in undeveloped forest on the property. There is a Puerto Rican broad-winged hawk nest in a Maria tree above the 305-meter-diameter radio telescope dish on its south side. Observation during the January 2017 vegetation survey indicated this nest was inactive during the 2017 nesting period. Seven observations of the Puerto Rican broad-winged hawk were made during the vegetation survey, encompassing at least three distinct birds. It also appeared that there was an active nesting pair near the entrance to the Observatory. The Puerto Rican broad-winged hawk would be expected to utilize the undeveloped forested area on and around the Arecibo Observatory. *Tectaria estremezana* is known from a population approximately 200 meters south of the 305-meter-diameter radio telescope dish and could occur in other mesic to supra-mesic forest areas on the Observatory.

USFWS has identified 13 other listed species as potentially occurring on or adjacent to the Arecibo Observatory, as follows:

- Puerto Rican parrot (*Amazona vittata*)
- Puerto Rican sharp-shinned hawk (*Accipiter striatus venator*)
- Beautiful goetzea (*Goetzea elegans*)
- Chupacallos (*Pleodendron macranthum*)
- Erubia (*Solanum drymophilum*)
- *Myrcia paganii*
- *Schoepfia arenaria*

- *Cordia bellonis*
- Palo de nigua (*Cornutia obovata*)
- Palo de rosa (*Ottoschulzia rhodoxylon*)
- Uvillo (*Eugenia haematocarpa*)
- *Daphnopsis hellerana*
- *Thelypteris verecunda*

These species are known from the general area and there is potentially suitable habitat for these species on undeveloped portions of the Arecibo Observatory. No surveys for these species have been conducted. These species could occur in undeveloped areas on the Observatory or on lands adjacent to the Observatory.

The Arecibo Observatory is in the western portion of the Island of Puerto Rico, approximately 10 miles (16.1 kilometers) south of the City of Arecibo at the southern terminus of Puerto Rico Road 625 (PR-625; Figure 1).

Proposed Action

NSF has defined options for the possible divestment of the Arecibo Observatory necessitated by the need to significantly decrease or eliminate NSF funding of the Observatory. Alternatives were developed based on viable concepts of operations from the scientific community and on comments received in response to the Notice of Intent published in the *Federal Register* on May 23, 2016. These proposed Alternatives under consideration in the Environmental Impact Statement are described below.

3.1 Alternative 1 – Collaboration with Interested Parties for Continued Science-focused Operations

Alternative 1 would involve collaborations with new stakeholder(s) who would use and maintain the Observatory for continued science-focused operations. NSF would reduce funding of the Observatory and the new stakeholder(s) would be responsible for future maintenance and upgrades. Alternative 1 would involve the least change to the current facility and would retain the 305-meter-diameter radio telescope and 12-meter-diameter radio telescope and supporting facilities for research. This proposed Alternative includes deconstruction activities that would remove up to 26 buildings from the site. Specific buildings that would be removed cannot be known until after a collaborative agreement is in place. NSF identified the 26 structures that may be removed through interaction with the scientific community. The analysis assumes that all 26 structures would be removed, as that represents the maximum amount of disturbance that would result. No new construction would occur.

Most onsite housing, recreation facilities, and other buildings determined to be obsolete would be deconstructed. Paved roads serving areas that would no longer be used would be removed. Deconstruction of buildings and infrastructure would include physical dismantling of structures and the use of heavy equipment to break up and remove concrete portions. Deconstruction debris would be recycled and reused to the extent possible, and any remaining materials would be properly disposed of in a commercial landfill. Haul trucks would transport the deconstruction debris from the Observatory to recycle/reuse centers in nearby municipalities and the remaining debris to a landfill in Poncé.

Table 1 provides a list of the 26 buildings and infrastructure that could be removed under this alternative and provides a summary of the conditions in the area around these structures that would be within the potential area of disturbance during deconstruction. Modular buildings (trailers) make up 11 of the 26 structures that could be removed. Figure 2 shows the locations of the structures that could be removed.

Equipment, tools, machinery, furniture, and ancillary items with salvage value that are no longer needed for the collaboration to operate would be disposed of in accordance with federal law. Gates and fencing would be evaluated to determine if upgrades are needed to provide appropriate security/access around portions of the site that would require protection. Existing utilities would be maintained, and limited site restoration would occur. Site restoration would include reestablishing landscaping in areas where buildings have been deconstructed and may involve transport of soils to the site to support landscaping in areas where building foundations or excavated bedrock would prevent vegetation establishment.

Table 1
Conditions in Proposed Work Areas for Buildings and Infrastructure to be Deconstructed under Alternative 1
(2) Administration Building – paved
(10) Swimming Pool/Recreation Area – mowed grass and paved
(11) Lewis Building – hardscape only
(13) Bowl Shack – under dish, area surveyed for plants
(17) Warehouse Building – mowed grass, gravel, and paved
(21) Antenna Testing Building – paved and landscaped
(25) Paint and Flammable Material Storage – mowed grass, gravel, and paved
(34) S-Band High Voltage Power Supply Building – paved
(60) Antenna Receiving Testing Building – paved
(65) Shielded Trailer – modular building, paved
(66) Atmospheric Science Trailer – modular building, paved
(68) Scientific Office Trailer – modular building, paved
(73) HF Transmitter Building – paved and mowed grass
(78) Coffee Hut – landscaped and paved
(62) HFF Storage Trailer – modular building, mowed grass and gravel (in storage yard)
(71) Electronics Cable Trailer – modular building, mowed grass and gravel (in storage yard)
(72) Electronic Trailer – modular building, mowed grass and gravel (in storage yard)
(59) Visitor Center Trailer – modular building, mowed grass and gravel (in storage yard)
(70) Computer Trailer – modular building, mowed grass and gravel (in storage yard)
(63) Ionosonde Trailer – modular building, mowed grass and gravel (in storage yard)
(67) Electronic Trailer (Waveguide) – modular building, paved
(69) Electronic Trailer (Cryogenic) – modular building, mowed grass, and gravel (in storage yard)
(41) West Hill Bachelor Unit 1 – mowed grass, landscaped, and paved
(42) West Hill Bachelor Unit 2 – mowed grass, landscaped, and paved
(43) West Hill Family Unit 1 – mowed grass, landscaped, and paved
(44) West Hill Family Unit 2 – mowed grass, landscaped, and paved

The anticipated activities to implement deconstruction under Alternative 1 include the following:

- Conduct a hazardous materials assessment for asbestos-containing material (ACM), lead-based paint (LBP), and other conditions of concern for structures to be deconstructed. Remediate as necessary.
- Deconstruct buildings and structures that are no longer needed. Concrete buildings would be removed through use of hammerhoe, jackhammer, and other heavy equipment.
- Remove pavement from roads to and from parking areas serving buildings that were removed.
- Segregate waste, load, and transport waste materials to appropriate offsite landfills and recycling centers.
- Establish soils in areas where buildings were removed from bedrock. Landscape areas of bare soils.

The deconstruction period for Alternative 1 is expected to last 12 weeks; depending on the availability of funds, activities may be spread out over multiple fiscal years. All deconstruction work would be within the developed areas of the Observatory and there would be no need to construct new access routes to haul debris away. No widening or other improvements to existing roads would occur.

Landscaped areas would be maintained during operations. All infrastructure related to the 12-meter-diameter radio telescope and the 305-meter-diameter radio telescope would be maintained during operations to prevent degradation of the instruments and to prevent vegetation from overgrowing the dishes.

Operations would be expected to continue during deconstruction. Deconstruction activities that could interfere with the experimental use of the telescopes and data collection would be coordinated with Observatory staff to minimize the potential for disrupting scientific work.

Operations after deconstruction would be comparable to current operations. It is anticipated that onsite staff would be retained under the new employer(s).

3.2 Alternative 2 – Collaboration with Interested Parties for Transition to Education-focused Operations

Alternative 2 would involve collaborating with outside entities to operate and maintain the Arecibo Observatory as an education-focused operation. The Observatory would be transferred, rented, or an official partnership would be created to keep the science center open for students and visitors. The visitor center, learning center, and 12-meter-diameter radio telescope would remain operational. The 305-meter-diameter radio telescope would be made inoperable, but retained for visual/historical interest. Retaining the 305-meter radio telescope dish would require that it be secured and regularly maintained so that structural elements would not degrade and that it would not be overgrown by vegetation.

Structures not needed to meet anticipated operational goals would be safe-abandoned or deconstructed. Safe abandonment removes a building or facility from service without deconstructing it and includes removing furnishings, disconnecting utilities, isolating the structure from public access by fencing or other means, and securing the building from environmental damage. Most residential housing and recreational facilities likely would not be retained. Table 2 provides a list of the buildings and infrastructure that could be removed under this proposed Alternative, which include the 26 items (including 11 modular buildings) identified under Alternative 1 plus Building 1 (Operations Building). Table 2 also provides a summary of the conditions in the area around these structures that would be within the potential area of disturbance during deconstruction. Figure 3 shows the locations of the structures that could be removed.

Specific buildings that would be removed cannot be known until after a collaborative agreement is in place. NSF identified the 27 structures that may be removed through interaction with the scientific community. The analysis assumes that all 27 structures would be removed, as that represents the maximum amount of disturbance that would result. Specific buildings that would be removed cannot be known until after a collaborative agreement is in place. No new construction would occur.

The facilities that would be safe-abandoned under this proposed Alternative include the reflector dish and 305-meter-diameter radio telescope, the foundation for the 305-meter-diameter reflector dish and rim wall supporting infrastructure for the 305-meter-diameter radio telescope, the three support towers, the six tower anchors plus the catwalk anchor, and the cable car house.

As part of the transfer activities, NSF would remove all equipment, tools, machinery, furniture, and ancillary items no longer needed for educational operations. Gates and fencing would be evaluated to determine if upgrades are needed to provide appropriate security/access around portions of the site that would require protection. Existing utilities would be maintained. There would be limited site restoration to establish landscaping where buildings were previously located.

Table 2
Conditions in Proposed Work Areas for Buildings and Infrastructure to be Deconstructed under Alternative 2
<p>(1) Operations Building – paved (2) Administration Building – paved (10) Swimming Pool/Recreation Area – mowed grass and paved (11) Lewis Building – hardscape only (13) Bowl Shack – under dish, area surveyed for plants (17) Warehouse Building – mowed grass, gravel, and paved (21) Antenna Testing Building – paved and landscaped (25) Paint and Flammable Material Storage – mowed grass, gravel, and paved (34) S-Band High Voltage Power Supply Building – paved (60) Antenna Receiving Testing Building – paved (65) Shielded Trailer – modular building, paved (66) Atmospheric Science Trailer – modular building, paved (68) Scientific Office Trailer – modular building, paved (73) HF Transmitter Building – paved and mowed grass (78) Coffee Hut – landscaped and paved (62) HFF Storage Trailer – modular building, mowed grass, and gravel (in storage yard) (71) Electronics Cable Trailer – modular building, mowed grass, and gravel (in storage yard) (72) Electronic Trailer – modular building, mowed grass, and gravel (in storage yard) (59) Visitor Center Trailer – modular building, mowed grass, and gravel (in storage yard) (70) Computer Trailer – modular building, mowed grass, and gravel (in storage yard) (63) Ionosonde Trailer – modular building, mowed grass, and gravel (in storage yard) (67) Electronic Trailer (Waveguide) – modular building, paved (69) Electronic Trailer (Cryogenic) – modular building, mowed grass, and gravel (in storage yard) (41) West Hill Bachelor Unit 1 – mowed grass, landscaped, and paved (42) West Hill Bachelor Unit 2 – mowed grass, landscaped, and paved (43) West Hill Family Unit 1 – mowed grass, landscaped, and paved (44) West Hill Family Unit 2 – mowed grass, landscaped, and paved</p>

The anticipated activities to implement deconstruction activities associated with Alternative 2 include the following:

- Conduct hazardous materials assessment for ACM, LBP, and other conditions of concern for structures to be deconstructed. Remediate as necessary.
- Deconstruct or safe-abandon buildings and infrastructure that are no longer needed. Concrete buildings would be removed through use of hammerhoe, jackhammer, and other heavy equipment.
- Remove pavement from roads to and from parking areas serving buildings that were removed.
- Segregate waste, load, and transport waste materials to appropriate offsite landfills and recycling centers.
- Establish soils in areas where buildings were removed from bedrock. Landscape areas of bare soils.

The deconstruction period for Alternative 2 is expected to last 12 weeks; depending on the availability of funds, activities may be spread out over multiple fiscal years. All deconstruction work would be within the developed areas of the Observatory and there would be no need to construct new access routes to haul debris away. No widening or other improvements to existing roads would occur.

Landscaped areas would be maintained during operations. Infrastructure that physically supports the 12-meter-diameter radio telescope and the 305-meter-diameter radio telescope, as well as the physical

structures of these instruments, would be maintained during operations to prevent degradation. Vegetation maintenance around and beneath these instruments would be continued to prevent the vegetation from overgrowing the dishes.

Operations would be expected to continue during deconstruction. Deconstruction activities that could interfere with experimental use of the telescopes and data collection would be coordinated with Observatory staff to minimize the potential for disrupting scientific work.

Operations after deconstruction would be comparable to current operations. It is anticipated that technical staff responsible for operation and maintenance of the 305-meter-diameter radio telescope would not be retained but that other onsite staff would be retained under the new employer(s).

3.3 Alternative 3 – Mothballing of Facilities

Alternative 3 would involve mothballing of essential buildings, telescopes, and other equipment with periodic maintenance to keep them in working order. Mothballing removes structures from daily use while maintaining them in working order while not being used for a defined period. This allows the facility to suspend operations for a period and then efficiently resume operations in the future. Supporting structures would be evaluated to determine if they are critical to the operation of the telescope. Structures and facilities that are obsolete and not needed would be removed. Table 3 provides a list of the 14 buildings and infrastructure, including eight modular buildings, that could be removed under this proposed Alternative. The table also provides a summary of the conditions in the area around these structures that would be within the potential area of disturbance during deconstruction. Figure 4 shows the locations of the structures that could be removed.

Specific buildings that would be removed cannot be known until after a collaborative agreement is in place. NSF identified the 14 structures that may be removed through interaction with the scientific community. The analysis assumes that all 14 structures would be removed, as that represents the maximum amount of disturbance that would result. No new construction would occur.

Table 3 Conditions in Proposed Work Areas for Buildings and Infrastructure to be Deconstructed under Alternative 3
(51) Grease Pit – paved (78) Coffee Hut – landscaped and paved (62) HFF Storage Trailer – modular building, mowed grass, and gravel (in storage yard) (71) Electronics Cable Trailer – modular building, mowed grass, and gravel (in storage yard) (72) Electronic Trailer – modular building, mowed grass, and gravel (in storage yard) (59) Visitor Center Trailer – modular building, mowed grass, and gravel (in storage yard) (70) Computer Trailer – modular building, mowed grass, and gravel (in storage yard) (63) Ionosonde Trailer – modular building, mowed grass, and gravel (in storage yard) (67) Electronic Trailer (Waveguide) – modular building, paved (69) Electronic Trailer (Cryogenic) – modular building, mowed grass, and gravel (in storage yard) (41) West Hill Bachelor Unit 1 – mowed grass, landscaped, and paved (42) West Hill Bachelor Unit 2 – mowed grass, landscaped, and paved (43) West Hill Family Unit 1 – mowed grass, landscaped, and paved (44) West Hill Family Unit 2 – mowed grass, landscaped, and paved

A maintenance program would be required to protect the facilities from deterioration, vandalism, and other damage. Regular security patrols would be performed to monitor the site. Common mothballing measures, such as providing proper ventilation, ground maintenance, keeping roofs and gutters cleaned of debris, and pest control would be implemented. During the mothball phase, maintenance

would be conducted on the 305-meter-diameter radio telescope reflector dish, the Gregorian dome, and the 12-meter-diameter radio telescope to keep these items protected and in a condition that would allow their use to be resumed after the mothball phase.

Visitor housing and recreational areas would be closed indefinitely, with water lines drained and electricity turned off. All supplies, books, photographs, furnishings and other items that are needed for periodic maintenance would be removed from the site. Equipment, tools, machinery, furniture, and ancillary items no longer needed for operations and that have salvage value would be transported to another NSF facility or donated.

Limited site restoration to establish landscaping where buildings were previously located would occur. Gates and fencing would be evaluated to determine if upgrades are needed to provide appropriate security or access around portions of the site that would require protection.

The anticipated activities to implement the deconstruction components of Alternative 3 include the following:

- Ready buildings and structures to be mothballed and turn off non-essential utilities.
- Conduct hazardous materials assessment for ACM, LBP, and other conditions of concern for structures to be deconstructed. Remediate as necessary.
- Deconstruct structures and buildings that are no longer needed. Concrete buildings would be removed through use of hammerhoe, jackhammer, and other heavy equipment.
- Segregate waste, load, and transport waste materials to appropriate offsite landfills and recycling centers.
- Establish soils in disturbed areas where buildings were removed from bedrock. Landscape areas of bare soils.
- Complete other limited site restoration activities.
- Establish site security and facilities maintenance.

The deconstruction period for Alternative 3 is expected to last 15 weeks; depending on the availability of funds, activities may be spread out over multiple fiscal years. All deconstruction work would be within the developed areas of the Observatory and there would be no need to construct new access routes to haul debris away. No widening or other improvements to existing roads would occur.

Landscaped areas would be maintained during the mothball phase. Infrastructure related to the 12-meter-diameter and 305-meter-diameter radio telescopes would be conditioned for safe storage to prevent degradation of the equipment and to allow restart of operations. Regular vegetation maintenance would be implemented to prevent vegetation from overgrowing the dishes.

At the end of the mothball phase, operation of the Arecibo Observatory would resume. Operations may be similar to current operations, other science-based operations, education-based operations, or some other type of operations. If the focus of operations would be different from resumption of current operations or operations assessed under other alternatives in this document, then NSF would conduct additional consultation with USFWS prior to the restart.

3.4 Alternative 4 – Partial Deconstruction and Site Restoration

Alternative 4 involves the deconstruction of all abovegrade structures, except the large concrete structures (towers, tower and catwalk anchors, and rim-wall infrastructure). All belowgrade foundations would be stabilized and filled in.

Table 4 provides a list of the buildings and infrastructure that would be removed under Alternative 4 and provides a summary of the conditions in the area around these structures that would be within the potential area of disturbance during deconstruction. There are 13 modular buildings included in the structures that would be demolished. Figure 5 shows the locations of the structures that would be removed. The following facilities would be safe abandoned: the 305-meter-diameter radio telescope dish foundation, the rim wall infrastructure supporting the 305-meter-diameter radio telescope dish, the three towers, the six tower anchors, and the catwalk anchor.

Specific deconstruction methods cannot be known until after a contract is awarded and the selected contractor develops a work plan. This analysis is based on presumed contract conditions that will require the contractor to complete deconstruction within the existing maintained and disturbed areas around buildings and to use existing paved/gravel parking areas and the existing storage yard as staging areas to support deconstruction.

Equipment, tools, machinery, furniture and ancillary items that have salvage value would be transported to another NSF facility or donated. Demolition of the telescope and other structures would be conducted during the same time frame. Once completed, ownership of the deconstructed site would be transferred to one or more interested parties. It is unknown at this time who the interested party may be.

The anticipated activities to implement the deconstruction activities of Alternative 4 include the following:

- Conduct hazardous materials assessment for ACM, LBP, and other conditions of concern for structures to be deconstructed. Remediate as necessary.
- Utilities crew will turn off and cap utilities.
- Remove the 305-meter-diameter radio telescope ground screen and reflector dish.
- Remove the platform, all instrumentation, and support structures suspended above the 305-meter-diameter reflector dish. The suspended infrastructure would be lowered to the ground to allow removal of instrumentation.
- Sequential demolition of the concrete structures through use of hammerhoe, jackhammer, and other heavy equipment.
- Deconstruct other structures on the site.
- Remove pavement from roads and parking areas.
- Segregate waste, load, and transport to appropriate offsite landfills and recycling centers.
- Conduct site restoration work: re-grade affected areas to desired elevations and contours; use available concrete rubble as necessary; bring in fill as needed to establish grade.
- Install soil and vegetation: place soil where needed to support growth of desired vegetation; seed and transplant native species; install temporary erosion control (biodegradable fiber mats) where needed; maintain (appropriate watering as needed and weed control) until desired vegetation is established.
- Install security fencing around the three towers and the anchors for the southeastern and southwestern towers and conduct measures appropriate to secure the site.

The deconstruction period for Alternative 4 is expected to last 28 weeks; depending on the availability of funds, activities may be spread out over multiple fiscal years. All deconstruction work would be within the developed areas of the Observatory or in the area of the 305-meter-diameter

radio telescope ground screen and reflector dish. There would be no need to construct new access routes to haul debris away. No widening or other improvements to existing roads would occur.

Table 4
Conditions in Proposed Work Areas for Buildings and Infrastructure to be Deconstructed under Alternative 4
<p>(no numbers) Reflector Dish and 305-meter-diameter Radio Telescope (77) Phase Reference Antenna (12-meter) (1) Operations Building – paved (2) Administration Building – paved (10) Swimming Pool/Recreation Area – mowed grass and paved (11) Lewis Building – hardscape only (13) Bowl Shack – under dish, area surveyed for plants (17) Warehouse Building – mowed grass, landscaped, and paved (21) Antenna Testing Building – paved and landscaped (25) Paint and Flammable Material Storage – mowed grass, gravel, and paved (34) S-Band High Voltage Power Supply Building – paved (60) Antenna Receiving Testing Building – paved (65) Shielded Trailer – modular building, paved (66) Atmospheric Science Trailer – modular building, paved (68) Scientific Office Trailer – modular building, paved (73) HF Transmitter Building – paved and mowed grass (3) Visiting Scientist Quarters/Cafeteria – mowed grass, landscaped, and paved (4) Entrance Guard House – paved (5) Cable Car House – paved and mowed grass (6) Pump House – paved and mowed grass (12) Maintenance Building – mowed grass, gravel, and paved (27) Photometry Shack/Optical Lab – paved and landscaped (35) Cummings Generator Control Building – paved and gravel (80) Cummings Generator Building – paved and gravel (47) Main Gate Restroom – paved (51) Grease Pit – paved (53) 750-kilowatt Emergency Generator Building – paved and landscaped (54) Visitor Center – paved and landscaped (55) Lidar Laboratory – paved and mowed grass (61) Learning Center – paved and landscaped (67) Cryogenics Laboratory Trailer – mowed grass, landscaped, and paved (76) Inspiration for Science Office Trailer – modular structure, paved and landscaped (78) Coffee Hut – landscaped and paved (62) HFF Storage Trailer – modular building, mowed grass, and gravel (in storage yard) (71) Electronics Cable Trailer – modular building, mowed grass, and gravel (in storage yard) (72) Electronic Trailer – modular building, mowed grass, and gravel (in storage yard) (59) Visitor Center Trailer – modular building, mowed grass, and gravel (in storage yard) (70) Computer Trailer – modular building, mowed grass, and gravel (in storage yard) (63) Ionosonde Trailer – modular building, mowed grass, and gravel (in storage yard) (67) Electronic Trailer (Waveguide) – modular building, paved (69) Electronic Trailer (Cryogenic) – modular building, mowed grass, and gravel (in storage yard) (41) West Hill Bachelor Unit 1 – mowed grass, landscaped, and paved (42) West Hill Bachelor Unit 2 – mowed grass, landscaped, and paved (43) West Hill Family Unit 1 – mowed grass, landscaped, and paved (44) West Hill Family Unit 2 – mowed grass, landscaped, and paved (57) North VSQ Building – mowed grass, landscaped, and paved (no number) Tank Farm – paved</p>

Areas revegetated following deconstruction activities would be maintained for a period of 18 months, less if target revegetation (80 percent cover by desired species) is achieved sooner. A vegetation maintenance staff would be retained through this period.

Operations at the Arecibo Observatory would cease. All staff positions would be eliminated. There would be occasional maintenance of the security lighting on the towers that would be safe-abandoned.

3.5 Alternative 5 – Full Deconstruction and Site Restoration

Alternative 5 involves the deconstruction of all abovegrade structures, including the large concrete structures (towers, anchors, and rim-wall infrastructure). Table 5 provides a list of the buildings and infrastructure that would be removed under Alternative 5 and provides a summary of the conditions in the area around these structures that would be within the potential area of disturbance during deconstruction. There are 13 modular buildings included in the structures that would be demolished. Figure 6 shows the locations of the structures that would be removed.

Specific deconstruction methods cannot be known until after a contract is awarded and the selected contractor develops a work plan. This analysis is based on presumed contract conditions that will require the contractor to complete deconstruction within the existing maintained and disturbed areas around buildings and to use existing paved/gravel parking areas and the existing storage yard as staging areas to support deconstruction. Additional work space likely will be required for large concrete structures (three towers, six tower anchors, catwalk anchor, rim wall foundations and infrastructure). Due to the need for additional workspace, undisturbed areas surrounding the southeastern and southwestern towers and their associated anchors may be cleared to support deconstruction. Additionally, some areas beneath the 305-meter-diameter reflector dish also may be cleared to support deconstruction of the rim wall foundations and infrastructure.

Belowgrade foundations would be removed and the areas backfilled. Explosives would be used to deconstruct the three towers, the six tower anchors, the catwalk anchor, and perhaps some of the rim and wall infrastructure supporting the 305-meter-diameter reflector dish. Explosive use would be limited to low-force shaped charges designed to transfer the explosive force only to the structure being removed. It is expected that the each of six tower anchors would be broken up by a single explosive event, that one or two explosive events would be used to bring each of the towers down, and that up to four explosive events may be used on rim wall foundations and infrastructure. An explosive event may be a single charge or a close sequence of charges lasting less than two seconds. Up to 16 explosive events would occur. The mass and density of the concrete structures would provide some dampening of the noise of the explosions and maximum sound pressure of less than 160 decibels would be expected.

Equipment, tools, machinery, furniture and ancillary items that have salvage value would be transported to another NSF facility or donated. Facilities and structures remaining following salvage would be deconstructed. Demolition of the telescope and other structures would be conducted during the same time frame. Once completed, the deconstructed site ownership would be transferred to one or more interested parties. It is unknown at this time who the interested party may be.

The anticipated activities to implement Alternative 5 are the following:

- Utilities crew will turn off and cap utilities.
- Conduct hazardous materials assessment for ACM, LBP and other conditions of concern for structures to be deconstructed. Remediate as necessary.
- Remove the 305-meter-diameter radio telescope ground screen and reflector dish.

Table 5
Conditions in Proposed Work Areas for Buildings and Infrastructure to be Deconstructed under Alternative 5
(no numbers) Reflector Dish and 305-meter-diameter Radio Telescope
(no numbers) Foundation and Rim Wall Infrastructure
(no numbers) Towers (northern, southeastern, and southwestern)
(no numbers) Tower Anchors (6) and Catwalk Anchor
(77) Phase Reference Antenna (12-meter)
(1) Operations Building – paved
(2) Administration Building – paved
(10) Swimming Pool/Recreation Area – mowed grass and paved
(11) Lewis Building – hardscape only
(13) Bowl Shack – under dish, area surveyed for plants
(17) Warehouse Building – mowed grass, gravel, and paved
(21) Antenna Testing Building – paved and landscaped
(25) Paint and Flammable Material Storage – mowed grass, gravel, and paved
(34) S-Band High Voltage Power Supply Building – paved
(60) Antenna Receiving Testing Building – paved
(65) Shielded Trailer – modular building, paved
(66) Atmospheric Science Trailer – modular building, paved
(68) Scientific Office Trailer - modular building, paved
(73) HF Transmitter Building – paved and mowed grass
(3) Visiting Scientist Quarters/Cafeteria – mowed grass, landscaped, and paved
(4) Entrance Guard House – paved
(5) Cable Car House – paved and mowed grass
(6) Pump House – paved and mowed grass
(12) Maintenance Building – mowed grass, gravel, and paved
(27) Photometry Shack/Optical Lab – paved and landscaped
(35) Cummings Generator Control Building – paved and gravel
(80) Cummings Generator Building – paved and gravel
(47) Main Gate Restroom – paved
(51) Grease Pit – paved
(53) 750-kilowatt Emergency Generator Building – paved and landscaped
(54) Visitor Center – paved and landscaped
(55) Lidar Laboratory – paved and mowed grass
(61) Learning Center – paved and landscaped
(67) Cryogenics Laboratory Trailer – mowed grass, landscaped, and paved
(76) Inspiration for Science Office Trailer – modular structure, paved, and landscaped
(78) Coffee Hut – landscaped and paved
(62) HFF Storage Trailer – modular building, mowed grass, and gravel (in storage yard)
(71) Electronics Cable Trailer – modular building, mowed grass, and gravel (in storage yard)
(72) Electronic Trailer – modular building, mowed grass, and gravel (in storage yard)
(59) Visitor Center Trailer – modular building, mowed grass, and gravel (in storage yard)
(70) Computer Trailer – modular building, mowed grass, and gravel (in storage yard)
(63) Ionosonde Trailer – modular building, mowed grass, and gravel (in storage yard)
(67) Electronic Trailer (Waveguide) – modular building, paved
(69) Electronic Trailer (Cryogenic) – modular building, mowed grass, and gravel (in storage yard)
(41) West Hill Bachelor Unit 1 – mowed grass, landscaped, and paved
(42) West Hill Bachelor Unit 2 – mowed grass, landscaped, and paved
(43) West Hill Family Unit 1 – mowed grass, landscaped, and paved
(44) West Hill Family Unit 2 – mowed grass, landscaped, and paved
(57) North VSQ Building – mowed grass, landscaped, and paved
(no number) Tank Farm – paved

- Remove the platform, all instrumentation, and support structures suspended above the 305-meter-diameter reflector dish. The suspended infrastructure would be lowered to the ground to allow removal of instrumentation. Sequential demolition of the smaller concrete structures through use of hammerhoe, jackhammer, and other heavy equipment.
- Remove belowgrade structures through use of hammerhoe, jackhammer, and other heavy equipment.
- Remove 305-meter-diameter radio telescope reflector dish foundation and rim wall infrastructure (may entail use of explosives in addition to hammerhoe, jackhammer, and other heavy equipment).
- Deconstruct towers (may entail use of large cranes and explosives in addition to hammerhoe, jackhammer, and other heavy equipment).
- Deconstruct tower and catwalk anchors (may entail use of large cranes and explosives in addition to hammerhoe, jackhammer, and other heavy equipment).
- Fill and safe-abandon concrete foundations that cannot be removed.
- Remove pavement from roads and parking areas.
- Segregate waste, load, and transport to appropriate offsite landfills and recycling centers.
- Conduct site restoration work: re-grade affected areas to desired elevations and contours; use available concrete rubble as necessary; bring in fill as needed to establish grade.
- Install soil and vegetation: place soil where needed to support growth of desired vegetation; seed and transplant native species; install temporary erosion control (biodegradable fiber mats) where needed; maintain (appropriate watering as needed and weed control) until desired vegetation is established.
- Conduct measures appropriate to secure the site.

The deconstruction period for Alternative 5 is expected to last 38 weeks; depending on the availability of funds, activities may be spread out over multiple fiscal years. No new roads would be constructed to support deconstruction. Access to the southern towers and tower anchors would be from roads on the east and west sides of the 305-meter-diameter radio telescope reflector dish. The road on the south side of the reflector dish between the two southern towers would not be used by deconstruction equipment or haul trucks. It is not expected that roads would be widened to accommodate deconstruction equipment at the southern towers and tower anchors.

Areas revegetated following deconstruction activities would be maintained for a period of 18 months, less if target revegetation (80 percent cover by desired species) is achieved sooner. A vegetation maintenance staff would be retained through this period.

Operations at the Arecibo Observatory would cease. All staff positions would be eliminated. No maintenance activities would be performed, as all infrastructure would be removed.

Location and Setting Description

4.1 Location

The Arecibo Observatory is in the mountains in the southern part of the municipality of Arecibo (Figure 1).

4.2 Setting Description

The Arecibo Observatory is within an area of limestone bedrock known as the North Karstic Zone. Geologic process and weathering on and near the site have produced topographic features including sinkholes and characteristic hills called mogotes. The Arecibo Observatory is approximately 3,200 feet (975 meters) from north to south and approximately 2,000 feet (610 meters) east to west, with an approximate area of 125 acres. Elevations on Arecibo Observatory range from approximately 780 feet (235 meters) below the center of the 305-meter-diameter radio telescope reflector dish to approximately 1,160 feet (355 meters) at the tops of mogotes. The Observatory site reflects the karst geology of the region. The 305-meter-diameter radio telescope reflector dish is in an engineered basin created by using explosives to remove portions of mogotes and that contains a sinkhole connected to the Tanama River through karst. There are at least three additional sinkholes on the eastern side of the Observatory property that likely also connect with the Tanama River. Most of the mogotes within the property boundary have been historically altered, either to create the basin for the 305-meter-diameter radio telescope reflector dish or for the placement of towers and anchors to support the platform above the dish. The 12-meter-diameter radio telescope was placed on the top of a mogote, as was the visitor center and some of the scientist housing buildings. The eastern side of the Observatory property consists of maturing second growth forest on slopes and floors between mogotes. This forested area provides potentially suitable habitat for the listed species with potential to occur in the area.

Species Descriptions

5.1 *Epicrates inornatus* (Puerto Rican Boa)

The endangered Puerto Rican boa is the largest snake native to Puerto Rico, reaching lengths of up to 9 feet. The Puerto Rican boa is generally nocturnal and typically remains dormant during the day, retreating to caves, rocky areas along streams, or trees for concealment. Adult prey items include small mammals, birds, and bats. Juveniles feed on smaller prey items, including lizards and insects.

Large-scale habitat destruction and the introduction of exotic mammalian predators are considered the likely causes of population declines, although human predation to obtain their oil as a folk remedy also has contributed to the decline. Introduced rats and feral cats predate upon the eggs and young.

The Puerto Rican boa is known to occur in a wide variety of habitats, from subtropical dry forest to wet montane forests. Within the Luquillo National Forest, boas have been found in the virgin forest areas that have experienced a large degree of human disturbance. The most common occurrence is within the northern limestone karst belt that extends from Carolina west to Aguadilla. The most common habitat types where they have been observed are tree branches, rotting stumps, solution cavities, cave entrances, forest edges, and interior forest light gaps. The species has been recorded on the forested hills surrounding the Arecibo Observatory as well as within the property. Puerto Rican boas are also known to occur in nearby caves. This species was observed during a site visit on July 2016 and is reported as regularly seen by Observatory staff sunning on rockfaces, fences, and other infrastructure.

No critical habitat has been designated for the Puerto Rican boa.

5.2 *Buteo platypterus brunnescens* (Puerto Rican Broad-winged Hawk)

The endangered Puerto Rican broad-winged hawk range extends from montane forests along the Cordillera Central to Sierra de Cayey and Sierra de Luquillo. At present, the Puerto Rican broad-winged hawk is known to occur in the Río Abajo Commonwealth Forest, Carite Commonwealth Forest, and the Caribbean National Forest. The Puerto Rican broad-winged hawk is a dark chocolate brown, measuring approximately 39 centimeters in length. Breeding has been documented in the Río Abajo and the Caribbean National Forest. Nesting occurs from February through July in secondary growth forests in plantations dominated by in Maria trees (*Calophyllum calaba*), teca (*Tectona grandis*), caoba hondurena (*Swietenia macrophylla*), guaraguao (*Guarea Guidonia*), and mahoe (*Hibiscus elatus*).

Destruction and modification of forest habitats from timber harvest, poor management practices in public forests, road construction, increase of public disturbance from recreational activities, illegal shooting, and loss of genetic variation have contributed to the low population levels.

The preferred habitat for this species includes subtropical wet forest and subtropical rain forest life zones, including the tabonuco, palo colorado, caimitillo, granadillo, and slope forest types.

The Puerto Rican broad-winged hawk is known from nearby the Río Abajo Commonwealth Forest. The species has recently been recorded at the Arecibo Observatory. A nest of the Puerto Rican broad-winged hawk was observed in a Maria tree on the southern rim wall above the 305-meter-diameter radio telescope reflector dish during a site visit to the Arecibo Observatory in July 2016 and the species was heard calling in the forest on the eastern side of the Observatory during this visit.

No critical habitat has been designated for the Puerto Rican broad-winged hawk.

5.3 *Amazona vittata* (Puerto Rican Parrot)

The endangered Puerto Rican parrot is considered to be one of the 10 most endangered birds in the world. This species is the only native parrot in the United States. It is estimated that 25 to 28 individuals live in the El Yunque National Forest and 22 to 28 individuals occur in the Río Abajo Commonwealth Forest. The habitat occupied in the El Yunque National Forest is within two different forest zones, the palo colorado (*Cyrilla racemiflora*) and the tabonuco (*Dacryodes excels*). Almost all clutches are produced in late February or early March.

The Puerto Rican parrot is a cavity-nesting, frugivorous species that is rarely seen far from the forest. The species requires large trees with cavities in mature forests. Large-scale habitat destruction such as deforestation has been the leading driver for declines in the parrot's population due to the limited availability of cavity trees and lack of new nesting areas. A population was reintroduced in the Río Abajo Commonwealth Forest and the population appears to be expanding.

The species has been recorded on the forested hills surrounding the Arecibo Observatory. USFWS has indicated that this species could occur on or near the Arecibo Observatory and will include the Observatory in its next parrot monitoring effort.

No critical habitat has been designated for the Puerto Rican parrot.

5.4 *Accipiter striatus venator* (Puerto Rican Sharp-shinned Hawk)

The endangered Puerto Rican sharp-shinned hawk is known from three forests, including the Río Abajo Commonwealth Forest, and is restricted to montane forests. The Puerto Rican sharp-shinned hawk typically ranges from 28 to 33 centimeters in length. Breeding has been documented in the Maricao Commonwealth Forest, Toro Negro Commonwealth Forest, Guilarte Commonwealth Forest, Carite Commonwealth Forest, and Caribbean National Forest. Nesting occurs from March through July in secondary growth forests in plantations dominated by Maria trees, teca, caoba hondurena, guaraguao, and mahoe.

Destruction and modification of forest habitats from timber harvest, poor management practices in public forests, road construction, increase of public disturbance from recreational activities, illegal shooting, and loss of genetic variation has contributed to the low population levels.

Its preferred habitat is described as subtropical wet and subtropical lower montane wet forest life zones, including the caimitillo-granadill, elfin woodland, sierra palm, and tabonuco forest types. In addition, activity has been observed in the palo colorado forest type in the lower montane life zone. USFWS has indicated that this species could use habitat near the Arecibo Observatory.

No critical habitat has been designated for the Puerto Rican sharp-shinned hawk.

5.5 *Tectaria estremerana* (No Common Name)

Tectaria estremerana is an endangered endemic terrestrial fern that is only known to occur in the limestone hills of northern Puerto Rico. The preferred habitat is among limestone boulders in moist shaded humus on wooded rocky hillsides 250 to 300 meters in elevation. Populations have been observed within semi-evergreen seasonal forest of subtropical moist forest life zone.

Historical deforestation and modification of natural mogote systems may have contributed to the decline of this species or it may be a naturally rare species.

A population of this species was identified within the property of the Arecibo Observatory, approximately 200 meters south of the 305-meter-diameter radio telescope reflector dish. The species

also is known to occur in the Río Abajo Commonwealth Forest. Multiple *Tectaria* species were observed during the July 2016 site visit. Based on the habitat quality and abundance of related species, USFWS indicated that *Tectaria estremerana* was likely to occur at the Observatory in addition to the known population.

No critical habitat has been designated for *Tectaria estremerana*.

5.6 *Goetzea elegans* (Beautiful Goetzea)

The endangered beautiful goetzea is a small evergreen endemic tree known from near Guajactac Gorge and a ravine east of Quebradillas. The species reaches a height of 9 meters with a stem diameter of 13 centimeters, and contains funnel-shaped flowers yellow in color. The beautiful goetzea flowers and sets fruit between April and August. The preferred habitat is in semi-evergreen forests of the subtropical moist forest zone below 200 meters in elevation.

Extensive deforestation and human occupation of its remaining suitable habitat have led to its population decline.

Beautiful goetzea has been documented from several locations on the northern side of Puerto Rico along the karst and foothill regions. The three known extant populations of beautiful goetzea include two populations on land owned by the Commonwealth of Puerto Rico and one population on privately owned land. USFWS has indicated that this species could occur on or near the Arecibo Observatory.

No critical habitat has been designated because of the possibility of over collection for scientific purposes and ornamental value.

5.7 *Pleodendron macranthum* (Chupacallos)

Chupacallos is an endangered endemic tree species known from the Caribbean National Forest, Río Abajo Commonwealth Forest, and near the Carite Commonwealth Forest. Chupacallos is a small to medium aromatic evergreen species that reaches 10 meters in height and 20 centimeters in diameter. The species has hairless slender twigs with whitish solitary flowers. The purplish black fruit is approximately 2 centimeters across. Little is known about reproduction in this species. Flowers have been collected in February as well as from April to June. Fruits have been observed from June through August.

This species has experienced population declines due to hurricanes, certain forest management practices, habitat modification and destruction from urban development and agriculture, and trail maintenance.

Other than one small population on private land adjacent to the Carite Commonwealth Forest in Sierra de Cayey, this species is only known to occur on federal and Commonwealth land. This species has fewer than 21 individuals remaining at five locations in two different habitat life zones: subtropical wet forest zone and subtropical lower montane wet forest zone. USFWS has indicated that this species could occur on or near the site.

No critical habitat has been designated for chupacallos.

5.8 *Solanum drymophilum* (Erubia)

The endangered erubia is a small spiny shrub historically known from Las Tetas de Cayey, Sierra de Cayey central, and from the eastern mountains. Erubia reaches 5.5 meters in height with inflorescences and flowers with long whitish star-shaped hairs. The spines are sharp and stiff and are yellowish in color. Erubia has been observed to flower and fruit throughout the year.

Today the reasons for population declines are urban and rural expansion of communication infrastructure along high peaks. Historically, it is thought that this species was intentionally eradicated to avoid injury to cattle from its spines.

This species' preferred habitat is within evergreen forests in the subtropical wet forest life zone on volcanic soils at elevations of 300 to 900 meters. Today erubia is known to occur only in a single locality on the Tetas de Cayey. USFWS has indicated that this species could occur on or near the site.

No critical habitat has been designated for erubia.

5.9 *Myrcia paganii* (No Common Name)

The endangered *Myrcia paganii* is a small evergreen tree known to occur in the Biafara-Arrozal area south of Arecibo and in Quebradillas in the limestone region of northwestern Puerto Rico. This species reaches 9 meters in height and 13 centimeters in diameter. Plants have flaky and mottled outer bark, with an orange-brown inner bark. Leaves are opposite, aromatic, simple, and entire. The leaves are coriaceous and glandular punctate below. Little is known about the reproduction in this species because it has not been collected while fruiting or flowering. Seedlings have never been observed.

The species is threatened due to its rarity and restricted distribution. The effects of development for agriculture, tourism as well as general rural and urban development are the primary threats to the species.

The preferred habitat is within seasonal evergreen or semi-evergreen forest type within the subtropical moist forest life zone. At present, only two populations are known. USFWS has indicated that this species could occur on or near the site.

Due to the risk of vandalism, critical habitat has not been designated for *Myrcia paganii*.

5.10 *Schoepfia arenaria* (No Common Name)

Schoepfia arenaria is a threatened evergreen shrub or small tree known from Isabela, Piñones, Fajardo, and the Río Abajo Commonwealth Forest. The species also has been reported from the Tortuguero Lagoon Natural Reserve. *Schoepfia arenaria* reaches up to 6 meters in height with multiple trunks from the base measuring 10 centimeters in diameter. The upper surface of the leaves is slightly shiny green and the lower surface is light green. Flowers have been observed in the spring and fall and fruits in the summer and winter.

The primary threats to this species are industrial, urban and tourism expansion, illegal land acquisitions, and development of San Isabela.

The preferred habitat is evergreen and semi-evergreen forests in limestone hills at low elevation varying from 150 to 350 meters. USFWS has indicated that this species could occur on or near the site.

No critical habitat has been designated for *Schoepfia arenaria*.

5.11 *Cordia bellonis* (No Common Name)

The endangered *Cordia bellonis* is an endemic shrub species known from the Maricao and Susúa Commonwealth Forests. It occurs in serpentine soils at road edges, river margins and on steep slopes. It is also found in the Río Abajo Commonwealth Forest along sunny banks, dirt roads with thick vegetation, and in open saddles between limestone hills. *Cordia bellonis* reaches approximately 1 to 2 meters in height with slender twigs and short hairs. The flowers are white axillary, and unisexual. The fruits are a pointed drupe approximately 5 millimeters in length.

Habitat destruction and modifications, forest management practices, and the restricted distribution of the species are believed to be the cause of the population decline of *Cordia bellonis*.

USFWS has indicated that this species could occur on or near the Arecibo Observatory.

No critical habitat has been designated for *Cordia bellonis*.

5.12 *Cornutia obovata* (Palo De Nigua)

The endangered palo de nigua is an evergreen tree known to occur in limestone hillsides in the Río Abajo Commonwealth Forest and along the limestone hillsides near the Arecibo Observatory. Recently this species also has been observed in the Susúa Commonwealth forest in the serpentine soils of southwest Puerto Rico. Palo de nigua reaches 10 to 15 meters in height and 25 centimeters in diameter. Its leaves range from 5 to 14 centimeters in length and 4 to 8 centimeters in width. The flowers are perfect and have only one plane of symmetry. Flowers range from 8 to 30 centimeters in length and area clustered in a terminal panicle. The purplish drupe fruits contain three to four seeds.

Deforestation and destruction of the limestone hills of northwest Puerto Rico for construction materials are considered the primary causes of population declines. Expansion of the Barranquitas communication facilities, agriculture, and extensive development for urbanization, tourism, and industry also contribute to its decline.

Specimens have been found in the semi-evergreen forest of the subtropical moist forest life zone, most often at elevations between 150 and 350 meters. In karst regions, palo de nigua prefers limestone hill sites with well drained, shallow, alkaline soils and interspersed between outcrops of hard limestone. A single specimen of this species is known from near the Arecibo Observatory and USFWS has indicated that this species could occur on or near the site.

No critical habitat has been designated for palo de nigua.

5.13 *Ottoschulzia rhodoxylon* (Palo De Rosa)

The endangered palo de rosa is a small endemic tree of Puerto Rico and Hispaniola. Populations are known from seven areas of western Puerto Rico, but not from the vicinity of the Arecibo Observatory. This species reaches 15 meters in height and 41 centimeters in diameter. The leaves are thick, leathery, entire, and rounded or blunt at both the apex and base. Leaves range from 3 to 6 centimeters wide and 5 to 9 centimeters long. Very little is known about the reproduction of this species due to its infrequent fruiting and flowering.

Overutilization for fence posts and overharvest for its valuable reddish-colored wood have contributed to the decline of this species.

Habitat requirements include serpentine and limestone derived soils with a narrow moisture tolerance. USFWS has indicated that this species could occur on or near the site.

No critical habitat has been designated for palo de rosa due to the risk of over collection and vandalism.

5.14 *Daphnopsis hellerana* (No Common Name)

The threatened *Daphnopsis hellerana* is a small evergreen shrub or tree endemic to the limestone hills of northern Puerto Rico west of San Juan. This species reaches approximately 6 meters in height and 5 centimeters in diameter. The leaves are simple and alternate, ranging from 3 to 13 centimeters in length and 1.5 to 6 centimeters in width. Leaves are blunt or round at the apex and obovate to elliptic in shape. When young both leaves and twigs are golden hairy. Male flowers are stalkless with four scale-like petals and eight stalkless stamens attached in two rings. The female flowers are smaller and

the calyx is bell-shaped. Fruits are a white one-seeded berry that is elliptic in shape. *Daphnopsis hellerana* flowers between February and April and fruits during the same interval.

Deforestation and destruction of the limestone hills of northwest Puerto Rico are considered the primary threats to this species. Limestone quarrying, landfills, and extensive expansion of urban areas, tourism, and industrial area also have contributed to the population decline.

The four known populations occur in the area of Isabela/Quebradillas, Río Lajas hills of Toa Baja, Nevarez limestone hill and on the National Institute of health near Sabana Seca. Populations have been observed in semi-evergreen and evergreen seasonal forest at elevations of 100 to 350 meters. USFWS has indicated that this species could occur on or near the site.

No critical habitat has been designated for *Daphnopsis hellerana*.

5.15 *Eugenia haematocarpa* (Uvillo)

The endangered uvillo is an endemic tree species only known from the Luquillo Mountains of the Caribbean National Forest on private property adjacent to the Carite Commonwealth Forest in Sierra de Cayey. Uvillo reaches 6 meters in height and 12 to 13 centimeters in diameter. The bark sheds in plates and is smooth, grey or whitish in color. Leave are oblong to elliptical ranging from 13 to 18 centimeters long and 6 to 8 centimeters wide, and are thick and leathery. Flowers are produced on the trunk in clusters, slender, with nearly equal stalks. Flowers consist of a four-lobed calyx and four rounded pink petals with stamens and pistil in the inferior ovary. The fruit is a round berry, red in color containing one brown seed. Fruiting has been observed in March to July.

Deforestation and destruction of forest areas are considered the primary threats to this species. Extensive urbanization, agricultural development, and forest management practices also have contributed to its population decline.

The preferred habitat is the subtropical lower montane wet forest life zone. USFWS has indicated that this species could occur on or near the site.

No critical habitat has been designated for uvillo.

5.16 *Thelypteris verecunda* (No Common Name)

The threatened *Thelypteris verecunda* is an endemic fern known from three locations on private land, with occurrences known from Quebradillas, Hatillo and San Sebastián. This species has 2- to 3-millimeter-thick rhizomes with brown scales at the apex. The blades are round-oblong with the pinnae with simple veins, two to four pairs of short-stalked. The blades are attenuate to linear.

Threats to this species are its extremely limited distribution, over-collecting, and the potential for development of any of the three private properties it is known to occur on.

The preferred habitat is moist, shady rock banks, humus on steep slopes, and limestone ledges at high elevations. USFWS has indicated that this species could occur on or near the site.

No critical habitat has been designated for *Thelypteris verecunda*.

Effects of Proposed Action Implementation

Sixteen federally protected species were identified as having potential to occur on the Arecibo Observatory. Based on known occurrences and current environmental conditions, NSF determined that the Puerto Rican boa, the Puerto Rican broad-winged hawk, and *Tectaria estremerana* occur on the Arecibo Observatory. Further, NSF has determined that the Puerto Rican parrot, the Puerto Rican sharp-shinned hawk, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, and *Thelypteris verecunda* potentially occur on the Arecibo Observatory.

A vegetation survey was conducted in January 2017 in areas with potential to support listed plant species where deconstruction could occur under one or more of the alternatives. Surveys included the area beneath the 305-meter-diameter reflector dish and around the southeastern tower, the southwestern tower and the anchors for these two towers. These areas contained potentially suitable habitat for protected plant species. The survey determined that beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, and *Thelypteris verecunda* do not occur in or adjacent to proposed work areas.

Incidental to the survey, a single palo de nigua tree was observed just north of the Observatory by the entrance during the January 2017 survey. The analysis provided for each alternative incorporates the results of this survey as appropriate. Also, incidental to the survey, there were seven sightings of the Puerto Rican broad-winged hawk, with at least three individual birds observed. None of the sightings were in or adjacent to proposed work areas.

The activities described under the Proposed Action have the potential to affect the 16 federally protected species that occur or that may occur on the Arecibo Observatory. The effects analysis in this document focuses on the elements associated with each alternative and the potential impacts to these species. The following discussion of potential impacts is divided by individual proposed Alternative.

No areas of critical habitat have been designated on or immediately adjacent to the Arecibo Observatory. There is no potential for adverse modification of critical habitat under any of the alternatives considered. Therefore, no additional evaluation of potential impacts to critical habitat is conducted in this document.

6.1 Alternative 1 – Collaboration with Interested Parties for Continued Science-focused Operations

6.1.1 Direct Impacts

6.1.1.1 Deconstruction

There would be little potential for adverse impacts to listed species during deconstruction activities under Alternative 1. Of the buildings that may be deconstructed, only Building 13 (the bowl shack) is within an area that contains potentially suitable habitat for listed species (see Table 2, Figure 2). Building 13 is beneath the 305-meter-diameter reflector dish and this area was included in the January 2017 vegetation survey. No listed plant species were observed around Building 13.

Deconstruction of other structures would occur in areas that have been previously disturbed and that lack potentially suitable habitat for listed species (see Table 2, Figure 2). These 25 structures are surrounded by pavement, graveled parking, mowed grass, and maintained landscaped vegetation. No forested areas or other areas of unmaintained vegetation would be cleared or disturbed during deconstruction of these structures. Modular buildings make up 11 of the 26 structures that may be

deconstructed (see Table 1). Removal of modular buildings would not involve extensive use of heavy equipment. Other than Building 13 and several modular buildings that have been placed in a storage yard (see Figure 2), the structures that may be deconstructed are in areas that experience high levels of human activity on a regular basis, which would tend to deter use of these areas by protected animal species.

The areas where deconstruction would occur, including any areas where pavement would be removed, contain no known occurrences of and do not provide potentially suitable habitat for any of the listed plant species, the Puerto Rican parrot, or the Puerto Rican sharp-shinned hawk. No direct impacts to these species from deconstruction activities would occur. Deconstruction under Alternative 1 would have **no effect** on *Tectaria estremerana*, the Puerto Rican parrot, the Puerto Rican sharp-shinned hawk, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, or *Thelypteris verecunda*.

The Puerto Rican broad-winged hawk nest above the 305-meter-diameter reflector dish is not in proximity to any of the structures that would be removed under Alternative 1. Building 13, which is beneath the reflector dish, is the closest structure that would be removed and is shielded from the nest location by the reflector dish. It is more than 1,000 feet from the nest to the next nearest potential work area, and there is intervening topography and vegetation between the nest and these potential work areas. No deconstruction would occur near the entrance of the Arecibo Observatory where there appeared to be an active nest during the 2017 nesting period. This area experiences a high level of vehicle and pedestrian traffic at present, and it is not expected that deconstruction-related vehicle traffic would affect the Puerto Rican broad-winged hawk because any birds utilizing this portion of the Observatory are acclimatized to vehicle traffic. No increase in pedestrian activity would result from deconstruction. Nesting activity by this species would not be impacted by deconstruction because deconstruction would not occur from the time nesting behavior is initiated until after the young have fledged (typically December through May). Foraging areas used by this species are not in proximity to proposed work areas and Puerto Rican broad-winged hawk foraging behavior or habitat would not be impacted by deconstruction activities under Alternative 1. Deconstruction activities that would be implemented under Alternative 1 would have **no effect** on the Puerto Rican broad-winged hawk.

The Puerto Rican boa is regularly observed at the Arecibo Observatory and could occur within or in proximity to the structures that would be deconstructed. It also is possible that snakes could enter equipment left onsite overnight. NSF has developed protocols for conducting deconstruction activities in areas where boas may occur (see Attachment 1). These procedures were developed from similar protocols developed by the U.S. Navy for removal of vegetation, structures, and debris from the former Roosevelt Roads Naval Station and protocols developed by the U.S. Army for operations at Fort Buchanan. The following procedures would be implemented prior to and during deconstruction activities:

- Personnel would be trained in the species that may be encountered on the site, the importance of protecting boas and other listed species, and penalties for harassing or harming protected species.
- Boundaries of work areas and protected areas will be clearly marked prior to start of intrusive work
- Work areas (including buildings), areas adjacent to work areas, and any equipment left onsite overnight would be inspected for presence of boas by a qualified person each day prior to the start of work. If a boa is found, work will be delayed until after the boa is relocated following procedures specified in the Puerto Rican Boa Protocols or until the snake has voluntarily left the work area.

- If a boa is observed onsite during the workday, work will stop in the area of the boa until after the boa is relocated following procedures specified in the Puerto Rican Boa Protocols or until the snake has voluntarily left the work area.
- If a boa is relocated, it would be relocated to suitable habitat outside the work areas and on the Arecibo Observatory property.
- Encounters with boas will be recorded and reported to USFWS and the Puerto Rico Department of Natural and Environmental Resources as specified in the Puerto Rican Boa Protocols.

Additional appropriate site-specific protective measures specified in the site work plan that would be developed after the collaborator is identified also would be implemented.

Impacts to the Puerto Rican boa would be limited to the relocation of boas, if any are observed in the proposed work areas. With implementation of the Puerto Rican Boa Protocols, the deconstruction activities that would be implemented under Alternative 1 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa.

6.1.1.2 Operations

Operations at the Arecibo Observatory would not change under Alternative 1. Undeveloped portions of the Observatory would remain undeveloped.

There would be no potential to impact listed plants or the Puerto Rican parrot and the Puerto Rican sharp-shinned hawk avian species in the undeveloped areas of the Arecibo Observatory. Operations under Alternative 1 would have **no effect** on *Tectaria estremeana*, the Puerto Rican parrot, the Puerto Rican sharp-shinned hawk, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uவில்lo, *Daphnopsis hellerana*, or *Thelypteris verecunda*.

Operational activity would be comparable to and not distinguishable from the typical activity during current operation of the Arecibo Observatory. The Puerto Rican broad-winged hawk uses areas on the Arecibo Observatory with this level of activity occurring and no impacts would be expected from future operations. Normal operations at the Arecibo Observatory would not impact Puerto Rican broad-winged hawk behavior or habitat. Operation of the Observatory under Alternative 1 would have **no effect** on the Puerto Rican broad-winged hawk.

Puerto Rican boas are regularly observed by the Arecibo Observatory maintenance staff during the course of their normal work activity. The Puerto Rican boa protocols developed by NSF would be implemented, as appropriate, during operations to minimize the potential for adverse impacts to the species during general maintenance and operation of the Observatory. Normal operations at the Arecibo Observatory would not impact Puerto Rican boa foraging behavior or habitat. Management and operation of the Observatory under Alternative 1 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa.

6.1.2 Indirect Impacts

Stormwater runoff could move offsite resulting in degradation of habitats from erosion or sedimentation. Construction stormwater best management practices (BMPs), as specified in the site-specific stormwater pollution prevention plan (SWPPP) that would be developed and implemented for the deconstruction activities under Alternative 1 would minimize the potential for offsite impacts from construction stormwater. Areas disturbed during deconstruction would be stabilized and have vegetation consistent with site landscaping re-established to minimize the potential for scour from subsequent rain events. With implementation of appropriate construction stormwater BMPs and stabilization/vegetation of disturbed areas, including removed pavement, no adverse impacts to offsite habitats would be expected and no indirect impacts to listed species or their habitats would occur.

No indirect impacts to protected species would be expected from operation of the Observatory after deconstruction is complete. Operation would be comparable to current operations and measures in place to minimize the potential for environmental impacts, such as the use of biodegradable lubricants for equipment, would be continued.

6.1.3 Cumulative Impacts

USFWS has recently implemented a reintroduction of the Puerto Rican parrot into the Río Abajo Commonwealth Forest. No other recently completed, ongoing, or proposed actions are known from the project area.

Because the implementation of Alternative 1 would not result in any changes to habitat in undeveloped areas on the Arecibo Observatory, there would be no potential for incremental cumulative impacts to the Puerto Rican parrot reintroduction effort.

Because there are no projects that would interact with the Proposed Action to create cumulative impacts to listed species or designated critical habitat, no cumulative impacts would be expected under Alternative 1.

6.2 Alternative 2 – Collaboration with Interested Parties for Transition to Education-focused Operations

6.2.1 Direct Impacts

6.2.1.1 Deconstruction

The magnitude and intensity of disturbance under Alternative 2 would be comparable to that described for Alternative 1. Deconstruction activities would be limited to the previously disturbed areas around the 27 structures identified for removal. Building 1 (Operations Building) is the only additional structure that may be removed in addition to the 26 structures analyzed under Alternative 1 and this structure is surrounded by pavement. Modular buildings make up 11 of the 27 structures that may be deconstructed (see Table 2). Removal of modular buildings would not involve extensive use of heavy equipment. Safe abandonment of the reflector dish and 305-meter-diameter radio telescope, the foundation for the 305-meter-diameter reflector dish and rim wall supporting infrastructure for the 305-meter-diameter radio telescope, the three support towers, the six tower anchors, the catwalk anchor, and the cable car house would not involve ground disturbance. No work would occur in undisturbed areas on the Arecibo Observatory or in proximity to the Puerto Rican broad-winged hawk nest. Protective measures, as described for Alternative 1, would be implemented.

Deconstruction, including safe abandonment of selected structures, under Alternative 2 would have **no effect** on *Tectaria estremerana*, the Puerto Rican parrot, the Puerto Rican sharp-shinned hawk, beautiful goetzia, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, or *Thelypteris verecunda*.

Deconstruction activities that would be implemented under Alternative 2 would not occur in areas where the Puerto Rican broad-winged hawk has been observed and would not occur from the time nesting behavior is initiated until after the young have fledged (typically December through May). Exterior activities to implement safe abandonment of the reflector dish and 305-meter-diameter radio telescope would not occur from the time nesting behavior is initiated until after the young have fledged. Other safe-abandonment preparations would not have potential to impact the Puerto Rican broad-winged hawk. Deconstruction, including safe abandonment of selected structures, under Alternative 2 would have **no effect** on the Puerto Rican broad-winged hawk.

Boas may be encountered in buildings to be deconstructed. It also is possible that snakes could enter equipment left onsite overnight. Boas also may be encountered during activities to implement safe

abandonment of structures. With implementation of the Puerto Rican Boa Protocols, the deconstruction activities, including safe abandonment of selected structures, that would be implemented under Alternative 2 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa.

6.2.1.2 Operations

Under Alternative 2, operations after deconstruction is complete would have a comparable potential for impacts to protected species as described for Alternative 1.

Operations under Alternative 2 would have **no effect** on *Tectaria estremerana*, the Puerto Rican broad-winged hawk, the Puerto Rican parrot, the Puerto Rican sharp-shinned hawk, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uவில்lo, *Daphnopsis hellerana*, or *Thelypteris verecunda*.

The Puerto Rican Boa Protocols would be implemented during operations, as appropriate. Operation of the Arecibo Observatory under Alternative 2 **may affect**, but is **unlikely to adversely affect**, the Puerto Rican boa.

6.2.2 Indirect Impacts

Construction stormwater BMPs, as specified in the site-specific SWPPP that would be developed and implemented for the deconstruction activities under Alternative 2, would minimize the potential for offsite impacts from construction stormwater. Areas disturbed during deconstruction would be stabilized and have vegetation consistent with site landscaping re-established to minimize the potential for scour from subsequent rain events. With implementation of appropriate construction stormwater BMPs and stabilization/vegetation of disturbed areas, including removed pavement, no adverse impacts to offsite habitats would be expected and no indirect impacts to listed species or their habitats would occur.

No indirect impacts to protected species would be expected from operation of the after deconstruction is complete. Because the 305-meter-diameter radio telescope reflector dish would be inoperable, less maintenance activity would be conducted if the facility as operated focused on education. The potential for indirect impacts would be comparable to those described for Alternative 1. No indirect impacts to protected species would occur during operations under Alternative 2.

6.2.3 Cumulative Impacts

As was noted under Alternative 1, there are no projects planned or recently completed that would interact with the Proposed Action to create cumulative impacts to listed species or designated critical habitat. Because the implementation of Alternative 2 would not result in any changes to habitat in undeveloped areas on the Arecibo Observatory, no cumulative impacts would be expected under Alternative 2.

6.3 Alternative 3 – Mothballing of Facilities

6.3.1 Direct Impacts

6.3.1.1 Deconstruction

The magnitude and intensity of disturbance under Alternative 3 would be similar to, but less than, that described for Alternative 1. Deconstruction activities would be limited to the previously disturbed areas around the 14 structures identified for potential removal and to existing disturbed areas where mothballing of existing structures is proposed. Eight of the 14 structures that would be removed are modular buildings and would not involve extensive use of heavy equipment during deconstruction (see Table 3). No work would occur in undisturbed areas on the Arecibo Observatory or in areas that

provide potentially suitable habitat for listed plant species. Protective measures, as described for Alternative 1, would be implemented.

Deconstruction under Alternative 3 would have **no effect** on *Tectaria estremerana*, the Puerto Rican broad-winged hawk, the Puerto Rican parrot, the Puerto Rican sharp-shinned hawk, beautiful goetza, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, or *Thelypteris verecunda*.

Nesting activity by the Puerto Rican broad-winged hawk species would not be impacted by deconstruction because deconstruction would not occur from the time nesting behavior is initiated until after the young have fledged (typically December through May). Puerto Rican broad-winged hawk foraging behavior or habitat would not be impacted by deconstruction activities under Alternative 3. Deconstruction activities that would be implemented under Alternative 3 would have **no effect** on the Puerto Rican broad-winged hawk.

Puerto Rican boas may be encountered in buildings to be deconstructed or on other infrastructure that would be mothballed. It also is possible that snakes could enter equipment left onsite overnight. With implementation of the Puerto Rican Boa Protocols, the deconstruction activities that would be implemented under Alternative 3 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa.

6.3.1.2 Operations

Under Alternative 3, operations after deconstruction is complete would be suspended for a number of years and only necessary maintenance would occur during this period. Maintenance activity would be limited to work on existing infrastructure.

Operations during the mothball phase under Alternative 3 would be limited to grounds maintenance and routine maintenance to ensure that structures and infrastructure are kept in condition to be reactivated. The level of activity would be somewhat less than during operations under Alternatives 1 or 2 and would have **no effect** on *Tectaria estremerana*, the Puerto Rican broad-winged hawk, the Puerto Rican parrot, the Puerto Rican sharp-shinned hawk, beautiful goetza, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, or *Thelypteris verecunda*.

The Puerto Rican Boa Protocols would be implemented for maintenance activities during the mothball phase, as appropriate. Operations during the mothball phase and during subsequent resumption of normal operation of the Arecibo Observatory under Alternative 3 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa.

Following the mothball phase, operations may be similar to current operations, other science-based operations, education-based operations, or some other type of operations. If the focus of operations would be different from resumption of current operations or operations assessed under other alternatives in this document, then NSF would conduct additional consultation with USFWS prior to the restart.

6.3.2 Indirect Impacts

Construction stormwater BMPs, as specified in the site-specific SWPPP that would be developed and implemented for the deconstruction activities under Alternative 3, would minimize the potential for offsite impacts from construction stormwater. Areas disturbed during deconstruction would be stabilized and have vegetation consistent with site landscaping re-established to minimize the potential for scour from subsequent rain events. With implementation of appropriate construction stormwater BMPs and stabilization/vegetation of disturbed areas, including removed pavement, no adverse impacts to offsite habitats would be expected and no indirect impacts to listed species or their habitats would occur.

No indirect impacts to protected species would be expected from maintenance during the mothball phase, as only routine maintenance would be performed. No indirect impacts to protected species would occur during the mothball phase under Alternative 3.

6.3.3 Cumulative Impacts

As was noted under Alternative 1, there are no projects planned or recently completed that would interact with the Proposed Action to create cumulative impacts to listed species or designated critical habitat. Because the implementation of Alternative 3 would not result in any changes to habitat in the undeveloped areas on the Observatory, no cumulative impacts would be expected under Alternative 3.

6.4 Alternative 4 – Partial Deconstruction and Site Restoration

6.4.1 Direct Impacts

6.4.1.1 Deconstruction

The magnitude and intensity of disturbance under Alternative 4 would be substantially greater than that described for Alternative 1, but still would be confined to previously disturbed areas. Thirteen of the structures that would be demolished are modular buildings and would not involve extensive use of heavy equipment during deconstruction.

Deconstruction activities would encompass approximately twice as many structures and would generate approximately six times the debris as described for Alternative 1. Deconstruction activities would be limited to previously disturbed areas around the structures identified for removal or safe abandonment. No work would occur in undisturbed areas on the Arecibo Observatory. Protective measures, as described for Alternative 1, would be implemented.

While the level of deconstruction disturbance would be greater under Alternative 4 than for Alternatives 1 through 3, the disturbance still would be limited to previously disturbed areas (paved, landscaped, graveled, or mowed grass) that do not provide suitable habitat for listed species and to areas where listed species do not occur based on the results of the January 2017 survey.

Deconstruction under Alternative 4 would have **no effect** on *Tectaria estremezana*, the Puerto Rican parrot, the Puerto Rican sharp-shinned hawk, beautiful goetzia, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, or *Thelypteris verecunda*.

Removal of the 305-meter-diameter reflector dish and safe abandonment of its rim wall and foundation infrastructure would require work in proximity to the Puerto Rican broad-winged hawk nest that was inactive in 2017. Because the level of activity associated with this deconstruction and safe abandonment would be much greater than during normal operational activity, it is likely that nest abandonment would occur if the birds were nesting at the time of the work. The nest would be assessed to determine if nesting or young-rearing was occurring prior to the start of deconstruction/safe abandonment. Deconstruction of the 305-meter-diameter reflector dish and the safe abandonment of the rim wall and foundation infrastructure would not be allowed from the time nesting behavior is initiated until after the young had fledged (typically December through May). By implementing this avoidance measure, there would be no direct impacts to the Puerto Rican broad-winged hawk nesting and nest abandonment would not occur. Other deconstruction activities that would occur under Alternative 4 would not impact the Puerto Rican broad-winged hawk or its habitat because the disturbance would be limited to previously disturbed areas that are not used by the Puerto Rican broad-winged hawk. However, removal of the 305-meter-diameter reflector dish would alter the visual character of the area, as the metal reflector dish would be removed allowing the vegetated area beneath the dish to be seen. This change to the visual character of the area may be perceived by the

Puerto Rican broad-winged hawk as sufficiently substantial that hawks may abandon the area or it may be perceived as additional foraging habitat. Deconstruction activities that would be implemented under Alternative 4, with the nesting avoidance measures previously described, **may affect**, but are **unlikely to adversely affect**, the Puerto Rican broad-winged hawk.

Boas may be encountered in buildings to be deconstructed or on other infrastructure that would be deconstructed or safe-abandoned. It also is possible that snakes could enter equipment left onsite overnight. With implementation of the Puerto Rican Boa Protocols, the deconstruction activities that would be implemented under Alternative 4 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa.

6.4.1.2 Operations

There would be no operations and no regular human activity on the site following completion of deconstruction activities. The only onsite activity would be maintenance of the safety lighting on the three towers and maintenance of security fencing around the towers and the southeastern tower anchors. No adverse impacts to listed species would result from maintenance of the safety lighting and fencing.

6.4.2 Indirect Impacts

Construction stormwater BMPs, as specified in the site-specific SWPPP that would be developed and implemented for the deconstruction activities under Alternative 4, would minimize the potential for offsite impacts from construction stormwater. Areas disturbed during deconstruction would be stabilized and revegetated with native species to the extent practicable to minimize the potential for scour from subsequent rain events. With implementation of appropriate construction stormwater BMPs and stabilization/vegetation of disturbed areas, including removed pavement, no adverse impacts to offsite habitats would be expected and no indirect impacts to listed species or their habitats would occur from deconstruction activities.

6.4.3 Cumulative Impacts

USFWS has recently implemented a reintroduction of the Puerto Rican parrot into the Río Abajo Commonwealth Forest. No other recently completed, ongoing, or proposed actions are known from the project area.

Because the implementation of Alternative 4 would not result in any changes to habitat in the undeveloped areas on the Observatory, there would be no potential for incremental cumulative impacts to the Puerto Rican parrot reintroduction effort.

No cumulative impacts would be expected to occur to any of the listed species or their habitats under Alternative 4.

As natural habitats become established and mature after deconstruction, there could be beneficial cumulative impacts to listed species through increased habitat availability.

6.5 Alternative 5 – Full Deconstruction and Site Restoration

6.5.1 Direct Impacts

6.5.1.1 Deconstruction

The magnitude and intensity of disturbance under Alternative 5 would be substantially greater than that described for the other proposed Alternatives. Thirteen of the structures that would be

demolished are modular buildings and would not involve extensive use of heavy equipment during deconstruction.

Deconstruction activities would encompass approximately four times as many structures and would generate approximately eight times the debris as described for Alternative 1. Deconstruction activities would generally be limited to previously disturbed areas around the structures identified for removal. However, additional work space would be required in currently undisturbed areas to deconstruct the southeastern and southwestern towers and the four anchors associated with these towers.

Deconstruction of the southeastern and southwestern towers and the four associated anchors could result in large boulder-sized concrete debris falling from the site and into the ravines to the east of the southeastern tower and to the west of the southwestern tower. This debris could cause landslides and removal of mature forest vegetation below the towers and off the Observatory property. Such actions could result in injury or mortality to any of the 16 protected species with potential to occur on or in proximity to the Observatory; however, the potential for any such injury would be unlikely.

Deconstruction of the southeastern and southwestern towers and the four associated anchors would not be allowed during the primary nesting periods for the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, and the Puerto Rican parrot (December through July) to minimize the potential for accidental destruction of a nest tree from debris falling offsite.

Protective measures, as described for Alternative 1, would be implemented. Site-specific protective measures for the deconstruction of the towers and anchors would be developed after a contract is awarded and would be implemented to minimize the potential for impacts to listed species.

Other than the Puerto Rican broad-winged hawk and the Puerto Rican boa, listed species do not occur in the areas that would be disturbed by deconstruction activities. The other 14 listed species could occur in areas surrounding proposed work sites that may experience incidental disturbance. No injury or mortality that would affect population levels of these species would be expected. Therefore, deconstruction under Alternative 5 **may affect**, but is **unlikely to adversely affect**, *Tectaria estremarana*, the Puerto Rican parrot, the Puerto Rican sharp-shinned hawk, beautiful goetzia, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uவில்lo, *Daphnopsis hellerana*, and *Thelypteris verecunda*.

The use of explosives for deconstruction of the towers, tower and catwalk anchors, and the 305-meter-diameter radio telescope rim wall and foundation infrastructure could impact the Puerto Rican boa and the Puerto Rican broad-winged hawk. Explosives would be used directly beneath the Puerto Rican broad-winged hawk nest tree. The disturbance could cause nest abandonment and vibrations could affect the structural stability of the nest. The status of the nest would be determined prior to starting deconstruction. Deconstruction of the 305-meter-diameter reflector dish rim wall and foundation infrastructure would not be allowed from the time nesting behavior is initiated until after the young had fledged (typically December through May). By implementing this avoidance measure, there would be no impacts to broad-winged hawk nesting and nest abandonment would not occur. If explosives were used to remove rim wall and foundation infrastructure, the charges would be small and directional. Because small, directional charges would be used, any damage to the nest from removal of rim wall and foundation infrastructure would be expected to be negligible. Other deconstruction activities that would occur under Alternative 5 would not impact the Puerto Rican broad-winged hawk or its habitat.

Boas may be encountered in buildings to be deconstructed or on other infrastructure that would be deconstructed. It also is possible that snakes could enter equipment left onsite overnight. The Puerto Rican boa protocols identified under Alternative 1 would be implemented throughout the deconstruction activity period. However, survey of all areas in proximity to the towers and tower anchors will not be possible due to the very steep terrain and the presence of numerous karst features (fractures and voids) that cannot be fully investigated. It is likely that some Puerto Rican boas would

not be observed and would then be subject to injury or mortality from pressure waves emanating from deconstruction activities involving the use of explosives for the towers and anchors. If fractures or voids collapse, boas could be crushed or trapped, resulting in eventual death. If a gravid female is crushed or trapped, its offspring would not survive. Mortality of Puerto Rican boas would be expected as a result of deconstruction under Alternative 5. The loss of individuals would be exacerbated through reduced reproduction from a smaller population. Because any potential mortality would be confined to the area of the southeastern and southwestern towers, no long-term population effects would be expected. Even with implementation of the Puerto Rican Boa Protocols to minimize the potential for impacts, the deconstruction that would be implemented under Alternative 5 **may affect**, and is **likely to adversely affect**, the Puerto Rican boa. Because the full potential for impacts to the Puerto Rican boa cannot be known until after the contractor work plan is developed, NSF commits to further consultation with the USFWS regarding the Puerto Rican boa should Alternative 5 be selected. This consultation will be completed prior to starting intrusive work under Alternative 5. As part of that consultation, it is anticipated that USFWS will issue a BO and NSF will implement the appropriate mitigation specified in the BO.

Alternative 5 **may affect**, and is **likely to adversely affect**, the Puerto Rican broad-winged hawk. It is not possible to know the full potential for impacts to this species until after an award is made and the selected contractor develops a work plan. This process could take two or more years following the conclusion of the NEPA process. Because of the time involved before any work would begin, surveys for the Puerto Rican broad-winged hawk will not be completed until closer to the time for the start of work. Appropriate timing for surveys, to provide relevant information prior to the start of work, will be determined through consultation with USFWS. NSF commits to further consultation with the USFWS regarding the Puerto Rican broad-winged hawk should Alternative 5 be selected. This consultation will be completed prior to starting intrusive work under Alternative 5. As part of that consultation, it is anticipated that USFWS will issue a BO and NSF will implement appropriate mitigation specified in the BO.

6.5.1.2 Operations

There would be no operations and no regular human activity on the site following completion of deconstruction activities because all site infrastructure would be removed. No adverse impacts to listed species would result because there would be no operations.

6.5.2 Indirect Impacts

Construction stormwater BMPs, as specified in the site-specific SWPPP that would be developed and implemented for the deconstruction activities under Alternative 5, would minimize the potential for offsite impacts from construction stormwater. Areas disturbed during deconstruction would be stabilized and revegetated with native species to the extent practicable to minimize the potential for scour from subsequent rain events. With implementation of appropriate construction stormwater BMPs and stabilization/vegetation of disturbed areas, including removed pavement, no adverse impacts to offsite habitats would be expected and no indirect impacts to listed species or their habitats would occur from stormwater runoff deconstruction activities.

Deconstruction of the southeastern and southwestern towers and the four anchors associated with these two towers could result in large boulder-sized concrete debris falling from the work areas and into the ravines to the east of the southeastern tower and to the west of the southwestern tower or into the central basin where the 305-meter-diameter reflector dish was removed. This debris could cause landslides and removal of mature forest vegetation below the towers and off the Observatory property, which could reduce habitat quality for all 16 protected species with potential to occur on or in proximity to the Arecibo Observatory. Reduced habitat quality could result in lower recruitment. However, because any such impacts would likely be localized, no population-level impacts would be expected.

Indirect impacts under Alternative 5 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa, *Tectaria estremezana*, the Puerto Rican parrot, the Puerto Rican sharp-shinned hawk, the Puerto Rican broad-winged hawk, beautiful goetza, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, and *Thelypteris verecunda*.

6.5.3 Cumulative Impacts

Because the implementation of Alternative 5 could result in changes to habitat used by the Puerto Rican parrot on land adjacent to the Arecibo Observatory, there would be potential for minor incremental adverse cumulative impacts to the Puerto Rican parrot reintroduction effort due to habitat degradation.

Because adverse effects on *Tectaria estremezana*, the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, beautiful goetza, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, and *Thelypteris verecunda* or their habitats would not occur under Alternative 5, and because there are no activities that would interact with Alternative 5 with regard to these species, no cumulative impacts would be expected.

Under Alternative 5, reduction in habitat quality and quantity for the Puerto Rican boa would be expected and mortality of this species would be likely, which would result in reduced reproduction. However, Alternative 5 would not interact with any other project. Therefore, no cumulative impacts to the Puerto Rican boa would occur under Alternative 5.

As natural habitats become established and mature after deconstruction, there could be beneficial cumulative impacts to listed species through increased habitat availability.

Conclusions

NSF proposes to reduce funding at the Arecibo Observatory and is considering five proposed Alternatives for this purpose. Through this BA, NSF has formulated a determination regarding the potential effects on the federally listed Puerto Rican boa, the Puerto Rican broad-winged hawk, *Tectaria estremerana*, the Puerto Rican parrot, the Puerto Rican sharp-shinned hawk, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, and *Thelypteris verecunda* from the reduction of funding at the Arecibo Observatory under implementation of the each of the considered alternatives.

Under all proposed Alternatives, the Puerto Rican Boa Protocols (see attachment 1) would be implemented during deconstruction activities and during subsequent operations, as applicable. In addition, each proposed Alternative would include implementation of stormwater management measures during deconstruction to minimize the potential for offsite movement of runoff. Additional site-specific protection measures would be developed and implemented as appropriate during work.

The NSF requests USFWS concurrence with the following determinations of findings of this analysis regarding the proposed Alternatives under consideration to reduce funding to the Arecibo Observatory:

- Alternative 1: Alternative 1 would have **no effect** on the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, *Tectaria estremerana*, the Puerto Rican parrot, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, or *Thelypteris verecunda*. Deconstruction work would not occur during the period from the time nesting behavior is initiated until after the young had fledged (typically December through May).

With implementation of the Puerto Rican Boa Protocols, the deconstruction activities that would be implemented under Alternative 1 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa.

Operations under Alternative 1 would have **no effect** on the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, *Tectaria estremerana*, the Puerto Rican parrot, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, or *Thelypteris verecunda*.

With implementation of the Puerto Rican Boa Protocols, the operations under Alternative 1 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa.

No cumulative impacts would result under Alternative 1.

- Alternative 2: Alternative 2 would have **no effect** on the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, *Tectaria estremerana*, the Puerto Rican parrot, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, or *Thelypteris verecunda*. Deconstruction work would not occur during the period from the time nesting behavior by the Puerto Rican broad-winged hawk is initiated until after the young had fledged (typically December through May).

With implementation of the Puerto Rican Boa Protocols, the deconstruction activities that would be implemented under Alternative 2 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa.

Operations under Alternative 2 would have **no effect** on the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, *Tectaria estremerana*, the Puerto Rican parrot, beautiful

goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uவில், *Daphnopsis hellerana*, or *Thelypteris verecunda*.

With implementation of the Puerto Rican Boa Protocols, the operations under Alternative 2 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa.

No cumulative impacts would result under Alternative 2.

- Alternative 3: Alternative 3 would have **no effect** on the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, *Tectaria estremerana*, the Puerto Rican parrot, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uவில், *Daphnopsis hellerana*, or *Thelypteris verecunda*. Deconstruction work would not occur during the period from the time nesting behavior by the Puerto Rican broad-winged hawk is initiated until after the young had fledged (typically December through May).

With implementation of the Puerto Rican Boa Protocols, the deconstruction activities that would be implemented under Alternative 3 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa.

Operations under Alternative 3 would have **no effect** on the Puerto Rican broad-winged hawk, the Puerto Rican sharp-shinned hawk, *Tectaria estremerana*, the Puerto Rican parrot, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uவில், *Daphnopsis hellerana*, and *Thelypteris verecunda*.

With implementation of the Puerto Rican Boa Protocols, the operations under Alternative 3 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa.

No cumulative impacts would result under Alternative 3.

- Alternative 4: Deconstruction under Alternative 4 would have **no effect** on *Tectaria estremerana*, the Puerto Rican sharp-shinned hawk, the Puerto Rican parrot, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uவில், *Daphnopsis hellerana*, or *Thelypteris verecunda*.

With implementation of specific measures to avoid impacts during the nesting period, Alternative 4 **may affect**, but is **unlikely to adversely affect**, the Puerto Rican broad-winged hawk.

With implementation of the Puerto Rican Boa Protocols, the deconstruction activities that would be implemented under Alternative 4 **may affect**, but are **unlikely to adversely affect**, the Puerto Rican boa.

Operations under Alternative 4 would have **no effect** on the Puerto Rican boa, the Puerto Rican broad-winged hawk, *Tectaria estremerana*, the Puerto Rican parrot, the Puerto Rican sharp-shinned hawk, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uவில், *Daphnopsis hellerana*, or *Thelypteris verecunda*.

Beneficial impacts would be expected as natural habitats mature following restoration of the site.

No adverse cumulative impacts would result under Alternative 4.

- Alternative 5: Deconstruction under Alternative 5 **may affect**, but is **unlikely to adversely affect**, *Tectaria estremerana*, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uவில், *Daphnopsis hellerana*, and *Thelypteris verecunda*.

With implementation of specific measures to avoid impacts during the nesting period, Alternative 5 **may affect**, but is **unlikely to adversely affect**, the Puerto Rican parrot and the Puerto Rican sharp-shinned hawk.

Alternative 5 **may affect**, and is **likely to adversely affect**, the Puerto Rican broad-winged hawk. It is not possible to know the full potential for impacts to this species until after an award is made and the selected contractor develops a work plan. This process could take two or more years following the conclusion of the NEPA process. Because of the time involved before any work would begin, surveys for the Puerto Rican broad-winged hawk will not be completed until closer to the time for the start of work. Appropriate timing for surveys, to provide relevant information prior to the start of work, will be determined through consultation with USFWS. NSF commits to further consultation with the USFWS should Alternative 5 be selected. This consultation will be completed prior to starting intrusive work under Alternative 5. As part of that consultation, it is anticipated that USFWS will issue a BO and NSF will implement appropriate mitigation specified in the BO.

Deconstruction that would be implemented under Alternative 5 **may affect**, and is **likely to adversely affect**, the Puerto Rican boa. Because the full potential for impacts to the Puerto Rican boa cannot be known until after the contractor work plan is developed, NSF commits to further consultation with the USFWS regarding the Puerto Rican boa should Alternative 5 be selected. This consultation will be completed prior to starting intrusive work under Alternative 5. As part of that consultation, it is anticipated that USFWS will issue a BO and NSF will implement appropriate mitigation specified in the BO.

Operations under Alternative 5 would have **no effect** on the Puerto Rican boa, the Puerto Rican broad-winged hawk, *Tectaria estremerana*, the Puerto Rican parrot, the Puerto Rican sharp-shinned hawk, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, or *Thelypteris verecunda*.

Beneficial impacts would be expected as natural habitats mature following restoration of the site.

No cumulative impacts to the Puerto Rican boa, the Puerto Rican broad-winged hawk, *Tectaria estremerana*, the Puerto Rican sharp-shinned hawk, beautiful goetzea, chupacallos, erubia, *Myrcia paganii*, *Schoepfia arenaria*, *Cordia bellonis*, palo de nigua, palo de rosa, uvillo, *Daphnopsis hellerana*, and *Thelypteris verecunda* would likely occur under Alternative 5.

Minor incremental adverse cumulative impacts to the Puerto Rican parrot reintroduction effort would likely occur under Alternative 5.

Implementation of any of the considered alternatives would not threaten the continued existence of protected the species known to occur or with potential to occur on the Arecibo Observatory.

There is no critical habitat designated on or adjacent to the Arecibo Observatory. NSF has determined that there would be **no adverse modification** of designated critical habitat.

Land transfer is not included under any of the alternatives being evaluated. Should the Arecibo Observatory be transferred out of federal control in the future, this would be a new federal action subject to environmental review, including consultation under Section 7 of the ESA. NSF, in consultation with USFWS, would consider the appropriate land use controls (*e.g.*, deed restriction, conservation easement) for the natural areas on the Observatory at that time.

Review of Literature and Other Information

All pertinent literature was reviewed. The following summary indicates the primary references used during preparation of this BA.

CH2M HILL, Inc. (CH2M). 2016. Field Site Visit Observations by Dr. Rich Reaves and Tunch Orsoy (CH2M) at Arecibo Observatory, Arecibo, Puerto Rico. July.

Cornell University. 2016. eBird checklists for Arecibo Observatory.
<http://ebird.org/ebird/view/checklist/S28471271>;
<http://ebird.org/ebird/hotspot/L682836?yr=all&m=&rank=mrec>; and
<http://ebird.org/ebird/printableList?regionCode=L682836&yr=all&m=>. Accessed July 21, 2016.

Federal Register. Volume 42, Number 184. Page 47842. September 22, 1977.

Federal Register. Volume 73, Number 34. Pages 9407-9433. February 20, 2008.

Gavilan, J.V. 2017. Vegetation Survey, Arecibo Observatory, Arecibo, PR. February 2017.

Lugo, A.E., L.M. Astro, A. Vale, T. del Mar Lopez, and E. H. Prieto. 2001. Puerto Rican Karst – A Vital Resource. U.S. Department of Agriculture Forest Service General Technical Report WO-65.

Regan, D.P. 1984. Ecology of the Puerto Rican Boa (*Epicrates inornatus*) in the Luquillo Mountains of Puerto Rico. *Caribbean Journal of Science* 20: (3-4).

U.S. Fish and Wildlife Service (USFWS). 1986b. *Puerto Rican Boa Recovery Plan*. Atlanta, GA. March 27.

U.S. Fish and Wildlife Service (USFWS). 1987. *Beautiful Goetzea Recovery Plan*. Atlanta, GA. April 28.

U.S. Fish and Wildlife Service (USFWS). 1992c. *Solanum drymophilum Recovery Plan*. Prepared by Susan Silander for USFWS. Atlanta, GA. July 9.

U.S. Fish and Wildlife Service (USFWS). 1992d. *Recovery Plan for Schoepfia arenaria*. Atlanta, GA. January 10.

U.S. Fish and Wildlife Service (USFWS). 1992e. *Calyptronoma rivalis (palma de manaca) Recovery Plan*. Atlanta, GA. June 25.

U.S. Fish and Wildlife Service (USFWS). 1992f. *Recovery Plan for Cornutia obovata and Daphnopsis hellerana*. Atlanta, GA. August 7.

U.S. Fish and Wildlife Service (USFWS). 1994. *Ottoschulzia rhodoxylon (palo de rosa) Recovery Plan*. Atlanta, GA. September 20.

U.S. Fish and Wildlife Service (USFWS). 1995a. *Recovery Plan Puerto Rican Endangered Ferns*.

U.S. Fish and Wildlife Service (USFWS). 1995b. Biological Opinion for Federal Highway Administration Project NH-10(33) and NH-10(37), Highway PR-10, Utuado, Puerto Rico. April 26, 1995.

U.S. Fish and Wildlife Service (USFWS). 1997a. *Puerto Rican Broad-Winged Hawk and Puerto Rican Sharp-Shinned Hawk Recovery Plan*. Atlanta, GA. September 8.

- U.S. Fish and Wildlife Service (USFWS). 1997b. *Myrcia paganii* and *Auerodendron pauciflorum* Recovery Plan. Atlanta, GA. September 29.
- U.S. Fish and Wildlife Service (USFWS). 1998. Recovery Plan for *Pleodendron macranthum* and *Eugenia haematocarpa*. Atlanta, GA. September 11.
- U.S. Fish and Wildlife Service (USFWS). 1999. Recovery Plan for *Cordia bellonis*. Atlanta, GA. October 1.
- U.S. Fish and Wildlife Service (USFWS). 2006. *Environmental Assessment, Reintroduction of the Puerto Rican Parrot, Rio Abajo Commonwealth Forest, Puerto Rico*. August.
- U.S. Fish and Wildlife Service (USFWS). 2009. Recovery Plan for the Puerto Rican Parrot (*Amazona vittata*). Atlanta, GA. May 9.
- U.S. Fish and Wildlife Service (USFWS). 2016a. *Puerto Rican Karst*. Available online: <https://www.fws.gov/southeast/prparrot/pdf/pr-karst.pdf>.
- U.S. Fish and Wildlife Service (USFWS). 2016b. National Wetlands Inventory Map. Accessed June 22, 2016. <https://www.fws.gov/wetlands/data/mapper.html>.
- U.S. Fish and Wildlife Service (USFWS). 2016c. IPaC Trust Report. Accessed April 8, 2016. <https://ecos.fws.gov/ipac/project/TSDG7I2PGVG7VEBR5X27QZ6KJM>.
- U.S. Fish and Wildlife Service (USFWS). 2016d. NOI response letter from Caribbean Ecological Services Field Office.
- U.S. Forest Service (USFS), U.S. Department of Agriculture. 2009. *Guide to the Ecological Systems of Puerto Rico*. Prepared by Gary L. Miller and Ariel E. Lugo. International Institute of Tropical Forestry, General Technical Report, IITF-GTR-35. June.
- USFWS. 1986b. Puerto Rican Boa Recovery Plan.
- USFWS. 1987. Beautiful Goetzea Recovery Plan.
- USFWS. 1992c. Recovery Plan *Solanum drymophilum*.
- USFWS. 1992d. Recovery Plan *Schoepfia arenaria*.
- USFWS. 1992e. Recovery Plan Palma De Manaca, *Calyptronoma rivalis*.
- USFWS. 1992f. Recovery Plan *Cornutia obovata* and *Daphnopsis hellerana*.
- USFWS. 1994. Recovery Plan Palo de Rosa.
- USFWS. 1995. Recovery Plan Puerto Rican Endangered Ferns.
- USFWS. 1997a. Puerto Rican Broad-Winged Hawk and Puerto Rican Sharp-Shinned Hawk Recovery Plan.
- USFWS. 1997b. Recovery Plan for the *Myrcia paganii* and *Auerodendron pauciflorum*.
- USFWS. 1998. Recovery Plan for *Pleodendron macranthum* and *Eugenia haematocarpa*.
- USFWS. 1999. Recovery Plan for *Cordia bellonis*.
- USFWS. 2006. Environmental Assessment for Reintroduction of the Puerto Rican Parrot, Rio Abajo Commonwealth Forest, Puerto Rico.
- USFWS. 2009. Recovery Plan for the Puerto Rican Parrot.
- USFWS. 2016a. Puerto Rican Karst.

USFWS. 2016b. National Wetlands Inventory Map. <https://www.fws.gov/wetlands/data/mapper.html>.
Accessed June 22, 2016.

USFWS. 2016d. NOI response letter from Caribbean Ecological Services Field Office.

Figures

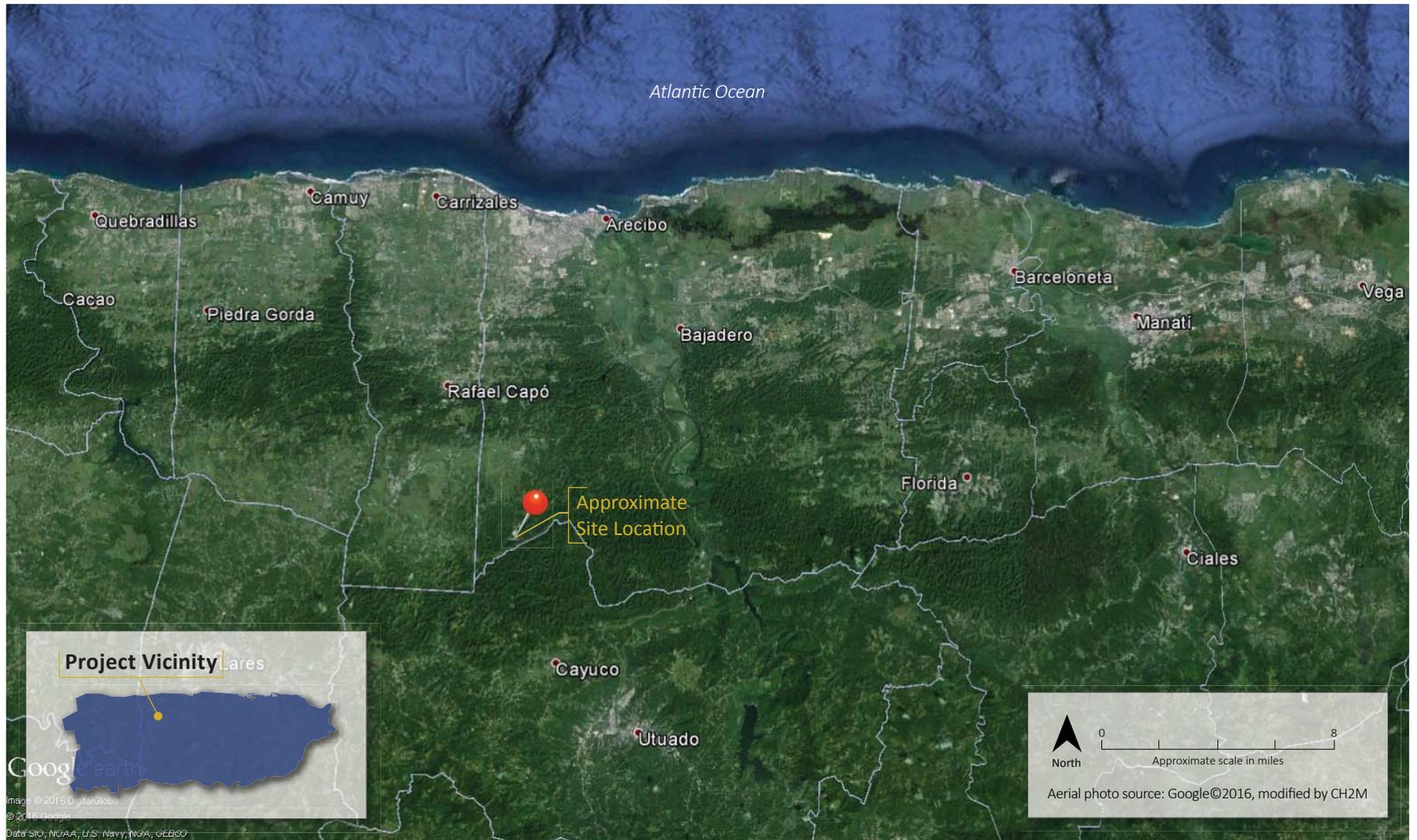
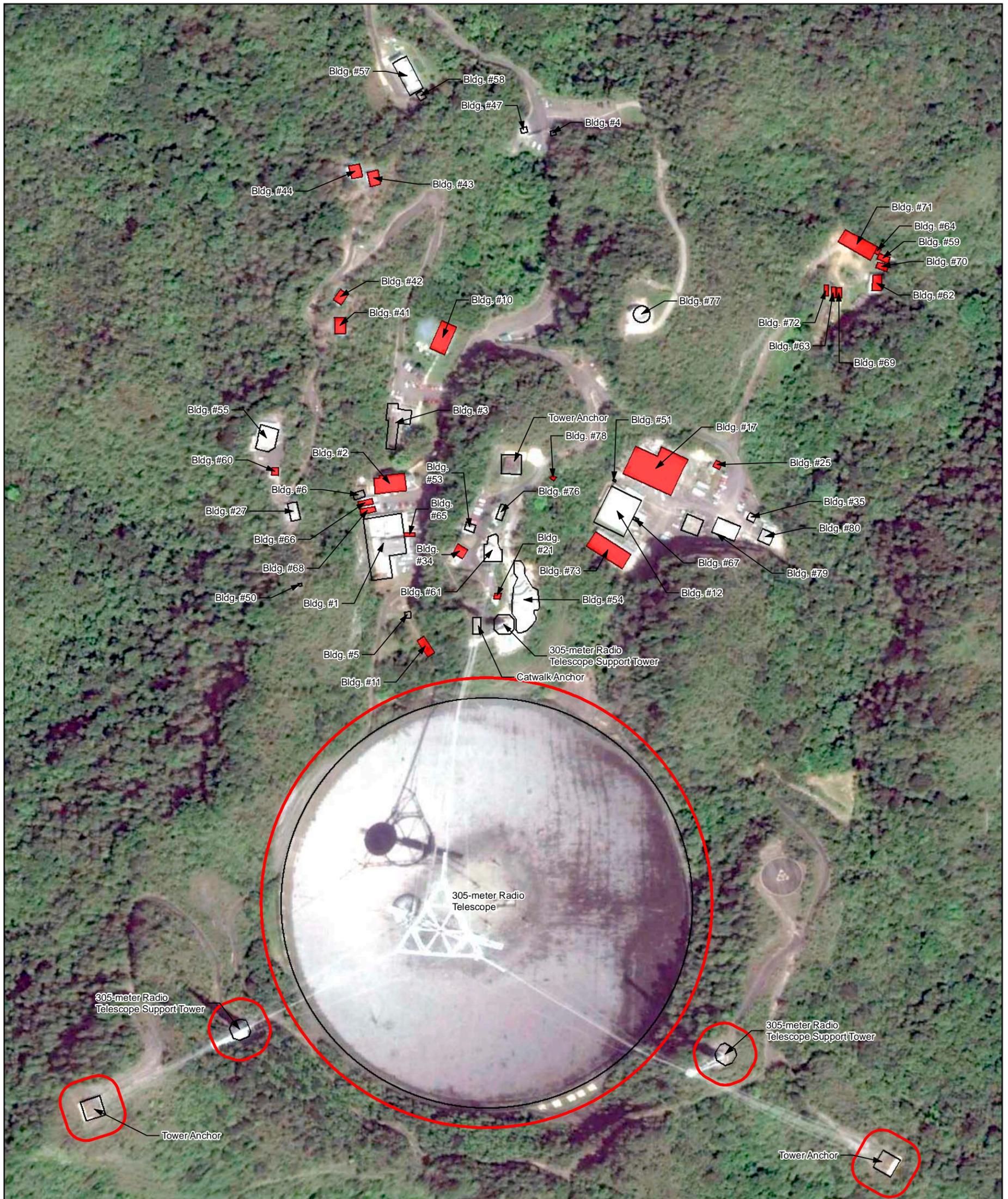


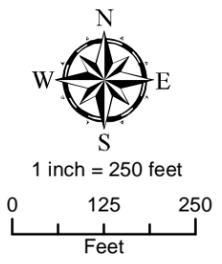
Figure 1.
Project Location
 Arcibo Observatory
 Puerto Rico





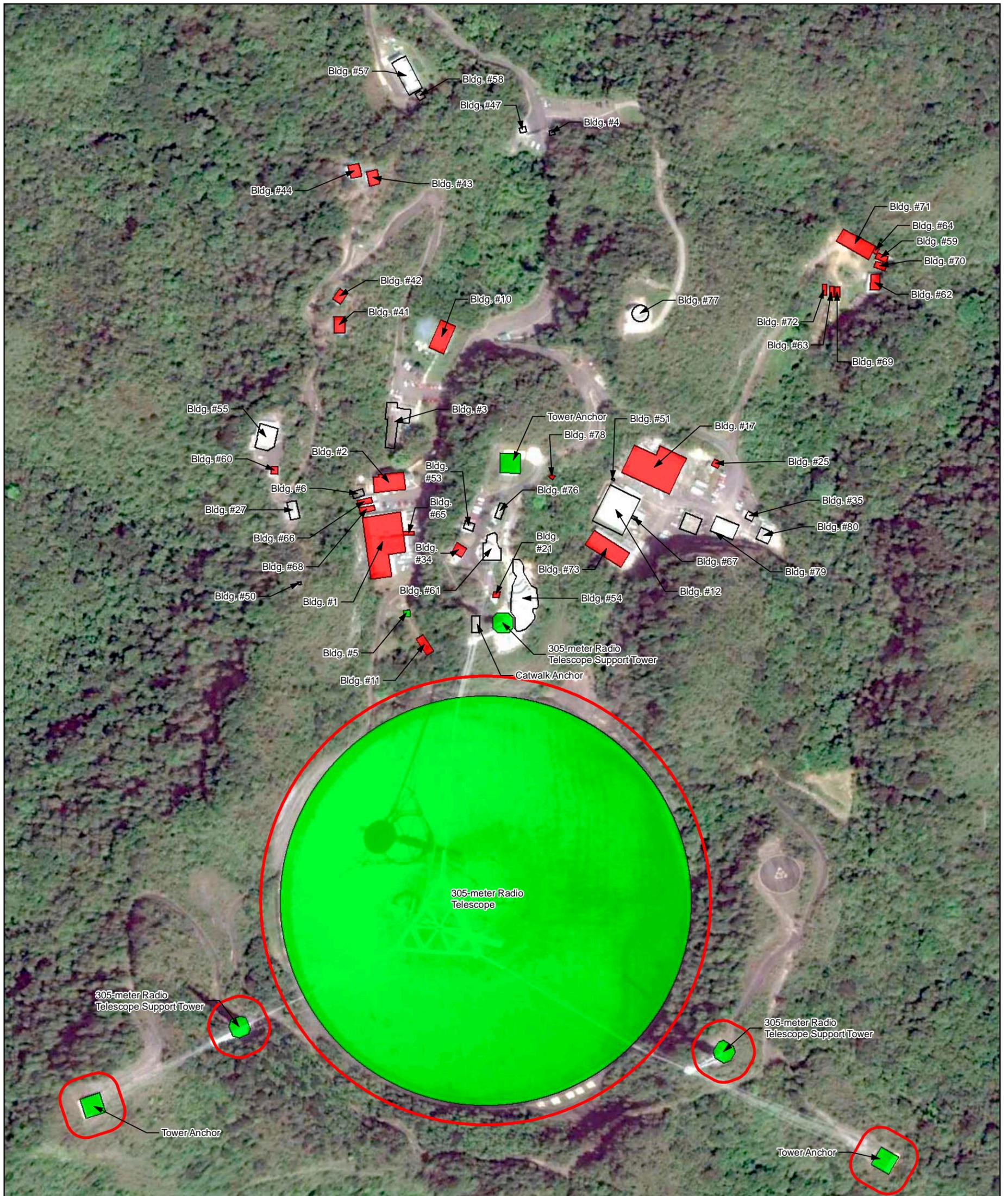
BUILDING NO. DESCRIPTION			
1. OPERATIONS BUILDING (1963)	34. HIGH VOLTAGE POWER SUPPLY BLDG. (1973)	60. ANT. RECE. TESTING BLDG. (Late 1990's)	77. PHASE REFERENCE ANTENNA (12M) (2010)
2. ADMINISTRATION BUILDING (1963)	35. CUMMINGS GENERATOR CONTROL BLDG. (2010)	61. LEARNING CENTER (2001)	78. COFFEE HUT (2000's)
3. VISITING SCIENTIST QUARTERS AND CAFETERIA (1963)	41. WEST HILL V.S.Q. BACHELOR UNIT NO. 1 (1990's)	62. HFF STORAGE TRAILER	79. ENGINEERING OFFICE BUILDING (2000's)
4. ENTRANCE GUARD HOUSE (1963)	42. WEST HILL V.S.Q. BACHELOR UNIT NO. 2 (1990's)	63. IONOSONDE TRAILER	80. CUMMINGS DIESEL GENERATOR (2010)
5. CABLE CAR HOUSE (1963)	43. WEST HILL V.S.Q. FAMILY UNIT NO. 1 (1990's)	64. ELECTRONIC TRAILER	
6. PUMP HOUSE/WATER TREATMENT BLDG. (1963)	44. WEST HILL V.S.Q. FAMILY UNIT NO. 2 (1990's)	65. SHIELDED TRAILER (1983)	
10. SWIMMING POOL/RESTROOMS (Mid 1960's)	47. MAIN GATE RESTROOM (1963)	66. ATMOSPHERIC SCIENCE TRAILER	
11. LEWIS BUILDING-RIGGING LOFT (Mid 1960's)	50. INTERFERENCE MONITORING SHACK	67. CRYOGENICS LAB TRAILER (1967)	
12. MAINTENANCE SHOPS (1967)	51. GREASE PIT	68. SCIENTIFIC OFFICES TRAILER	
13. BOWL SHACK (1963)	53. EMERGENCY GENERATOR BLDG.	69. ELECTRONIC TRAILER (WAVEGUIDE)	
17. WAREHOUSE (1967)	54. VISITOR CENTER BLDG. (1997)	70. COMPUTER TRAILER	
21. ANTENNA TESTING RANGE	55. LIDAR LABORATORY BLDG. (1996)	71. ELECTRONICS CABLE TRAILER	
25. PAINT STORAGE BUILDING (Circa 2010)	57. NORTH V.S.Q. BLDG. (2002)	72. ELECTRONIC TRAILER (CRYOGENICS)	
27. OPTICAL LABS (1985/1997)	58. NORTH V.S.Q. UTILITY BLDG. (2002)	73. HF TRANSMITTER BUILDING (2000's)	
	59. VISITOR CENTER TRAILER	76. INSPIRATION FOR SCIENCE TRAILER (2000's)	

- Building/Structure
- Building/Infrastructure to be Deconstructed
- Vegetation Survey Area



Note: All deconstruction work would be within developed areas of Arecibo Observatory and there would be no need to construct new access routes to haul debris away. No widening or other improvements to existing roads would occur.

Figure 2
Alternative 1: Collaboration with Interested Parties for Continued Science-focused Operations
 Arecibo Observatory
 Puerto Rico



BUILDING NO. DESCRIPTION			
1. OPERATIONS BUILDING (1963)	34. HIGH VOLTAGE POWER SUPPLY BLDG. (1973)	60. ANT. RECE. TESTING BLDG. (Late 1990's)	77. PHASE REFERENCE ANTENNA (12M) (2010)
2. ADMINISTRATION BUILDING (1963)	35. CUMMINGS GENERATOR CONTROL BLDG. (2010)	61. LEARNING CENTER (2001)	78. COFFEE HUT (2000's)
3. VISITING SCIENTIST QUARTERS AND CAFETERIA (1963)	41. WEST HILL V.S.Q. BACHELOR UNIT NO. 1 (1990's)	62. HFF STORAGE TRAILER	79. ENGINEERING OFFICE BUILDING (2000's)
4. ENTRANCE GUARD HOUSE (1963)	42. WEST HILL V.S.Q. BACHELOR UNIT NO. 2 (1990's)	63. IONOSONDE TRAILER	80. CUMMINGS DIESEL GENERATOR (2010)
5. CABLE CAR HOUSE (1963)	43. WEST HILL V.S.Q. FAMILY UNIT NO. 1 (1990's)	64. ELECTRONIC TRAILER	
6. PUMP HOUSE/WATER TREATMENT BLDG. (1963)	44. WEST HILL V.S.Q. FAMILY UNIT NO. 2 (1990's)	65. SHIELDED TRAILER (1983)	
10. SWIMMING POOL/RESTROOMS (Mid 1960's)	47. MAIN GATE RESTROOM (1963)	66. ATMOSPHERIC SCIENCE TRAILER	
11. LEWIS BUILDING-RIGGING LOFT (Mid 1960's)	50. INTERFERENCE MONITORING SHACK	67. CRYOGENICS LAB TRAILER (1967)	
12. MAINTENANCE SHOPS (1967)	51. GREASE PIT	68. SCIENTIFIC OFFICES TRAILER	
13. BOWL SHACK (1963)	53. EMERGENCY GENERATOR BLDG.	69. ELECTRONIC TRAILER (WAVEGUIDE)	
17. WAREHOUSE (1967)	54. VISITOR CENTER BLDG. (1997)	70. COMPUTER TRAILER	
21. ANTENNA TESTING RANGE	55. LIDAR LABORATORY BLDG. (1996)	71. ELECTRONICS CABLE TRAILER	
25. PAINT STORAGE BUILDING (Circa 2010)	57. NORTH V.S.Q. BLDG. (2002)	72. ELECTRONIC TRAILER (CRYOGENICS)	
27. OPTICAL LABS (1985/1997)	58. NORTH V.S.Q. UTILITY BLDG. (2002)	73. HF TRANSMITTER BUILDING (2000's)	
	59. VISITOR CENTER TRAILER	76. INSPIRATION FOR SCIENCE TRAILER (2000's)	

- Building/Structure
- Building/Infrastructure to be Deconstructed
- Building/Infrastructure to be Safe-abandoned
- Vegetation Survey Area

Note: All deconstruction work would be within developed areas of Arecibo Observatory and there would be no need to construct new access routes to haul debris away. No widening or other improvements to existing roads would occur.

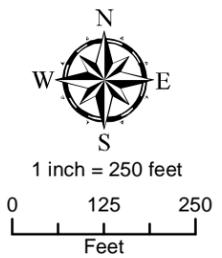
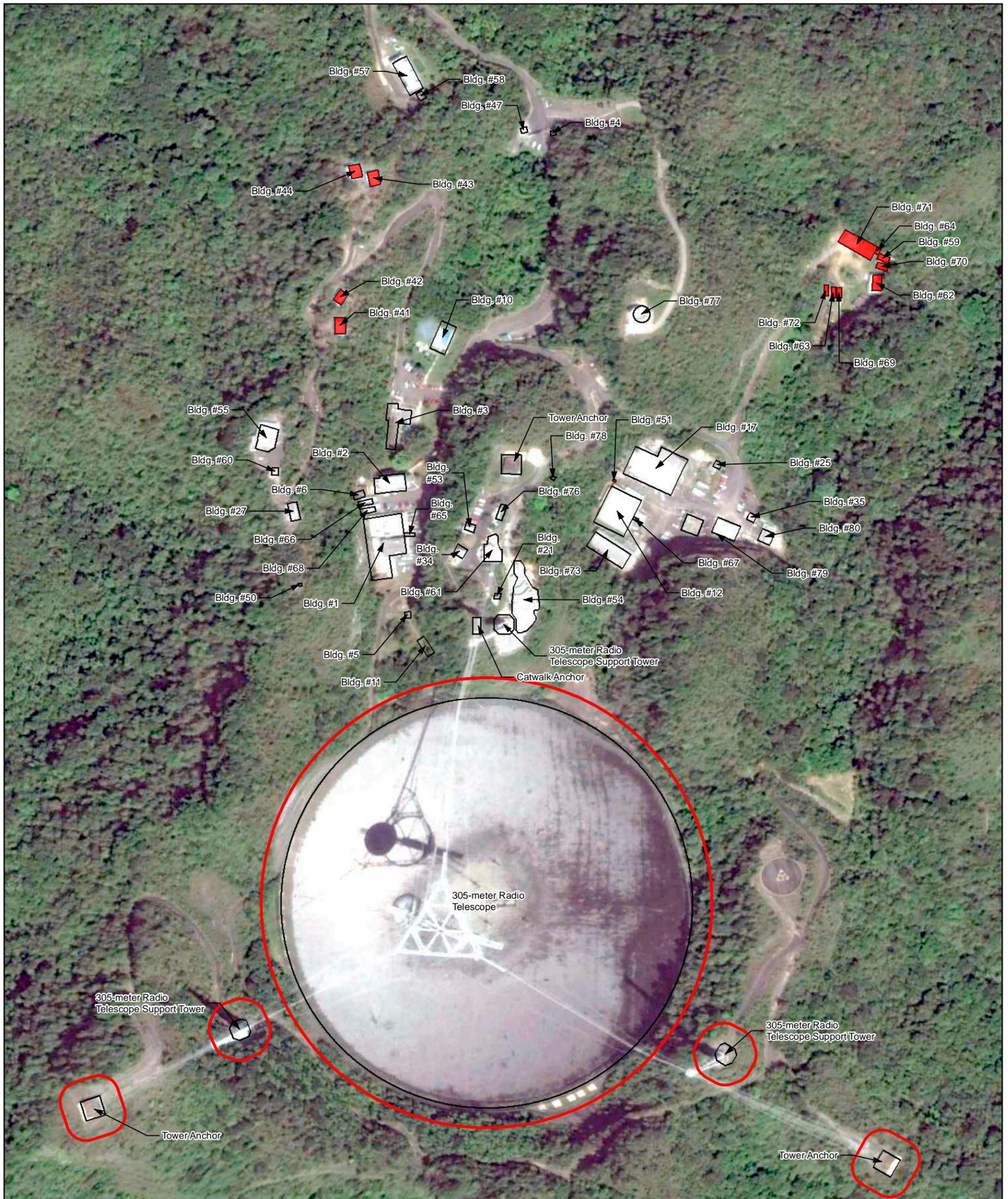


Figure 3
Alternative 2: Collaboration with Interested Parties for Transition to Education-focused Operations
 Arecibo Observatory
 Puerto Rico



BUILDING NO.	DESCRIPTION	BUILDING NO.	DESCRIPTION	BUILDING NO.	DESCRIPTION
1.	OPERATIONS BUILDING (1963)	34.	HIGH VOLTAGE POWER SUPPLY BLDG. (1973)	60.	ANT. RECE. TESTING BLDG. (Late 1990's)
2.	ADMINISTRATION BUILDING (1963)	35.	CUMMINGS GENERATOR CONTROL BLDG. (2010)	61.	LEARNING CENTER (2001)
3.	VISITING SCIENTIST QUARTERS AND CAFETERIA (1963)	41.	WEST HILL V.S.Q. BACHELOR UNIT NO. 1 (1990's)	62.	HFF STORAGE TRAILER
4.	ENTRANCE GUARD HOUSE (1963)	42.	WEST HILL V.S.Q. BACHELOR UNIT NO. 2 (1990's)	63.	IONOSONDE TRAILER
5.	CABLE CAR HOUSE (1963)	43.	WEST HILL V.S.Q. FAMILY UNIT NO. 1 (1990's)	64.	ELECTRONIC TRAILER
6.	PUMP HOUSE/WATER TREATMENT BLDG. (1963)	44.	WEST HILL V.S.Q. FAMILY UNIT NO. 2 (1990's)	65.	SHIELDED TRAILER (1983)
10.	SWIMMING POOL/RESTROOMS (Mid 1960's)	47.	MAIN GATE RESTROOM (1963)	66.	ATMOSPHERIC SCIENCE TRAILER
11.	LEWIS BUILDING-RIGGING LOFT (Mid 1960's)	50.	INTERFERENCE MONITORING SHACK	67.	CRYOGENICS LAB TRAILER (1967)
12.	MAINTENANCE SHOPS (1967)	51.	GREASE PIT	68.	SCIENTIFIC OFFICES TRAILER
13.	BOWL SHACK (1963)	53.	EMERGENCY GENERATOR BLDG.	69.	ELECTRONIC TRAILER (WAVEGUIDE)
17.	WAREHOUSE (1967)	54.	VISITOR CENTER BLDG. (1997)	70.	COMPUTER TRAILER
21.	ANTENNA TESTING RANGE	55.	LIDAR LABORATORY BLDG. (1996)	71.	ELECTRONICS CABLE TRAILER
25.	PAINT STORAGE BUILDING (Circa 2010)	57.	NORTH V.S.Q. BLDG. (2002)	72.	ELECTRONIC TRAILER (CRYOGENICS)
27.	OPTICAL LABS (1985/1997)	58.	NORTH V.S.Q. UTILITY BLDG. (2002)	73.	HF TRANSMITTER BUILDING (2000's)
		59.	VISITOR CENTER TRAILER	76.	INSPIRATION FOR SCIENCE TRAILER (2000's)
				77.	PHASE REFERENCE ANTENNA (12M) (2010)
				78.	COFFEE HUT (2000's)
				79.	ENGINEERING OFFICE BUILDING (2000's)
				80.	CUMMINGS DIESEL GENERATOR (2010)

- Building/Structure
- Building/Infrastructure to be Deconstructed
- Building/Infrastructure to be Safe-abandoned
- Vegetation Survey Area

Note: All deconstruction work would be within developed areas of Arecibo Observatory and there would be no need to construct new access routes to haul debris away. No widening or other improvements to existing roads would occur.

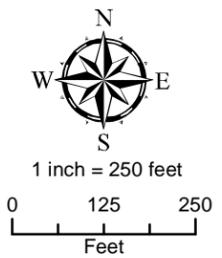
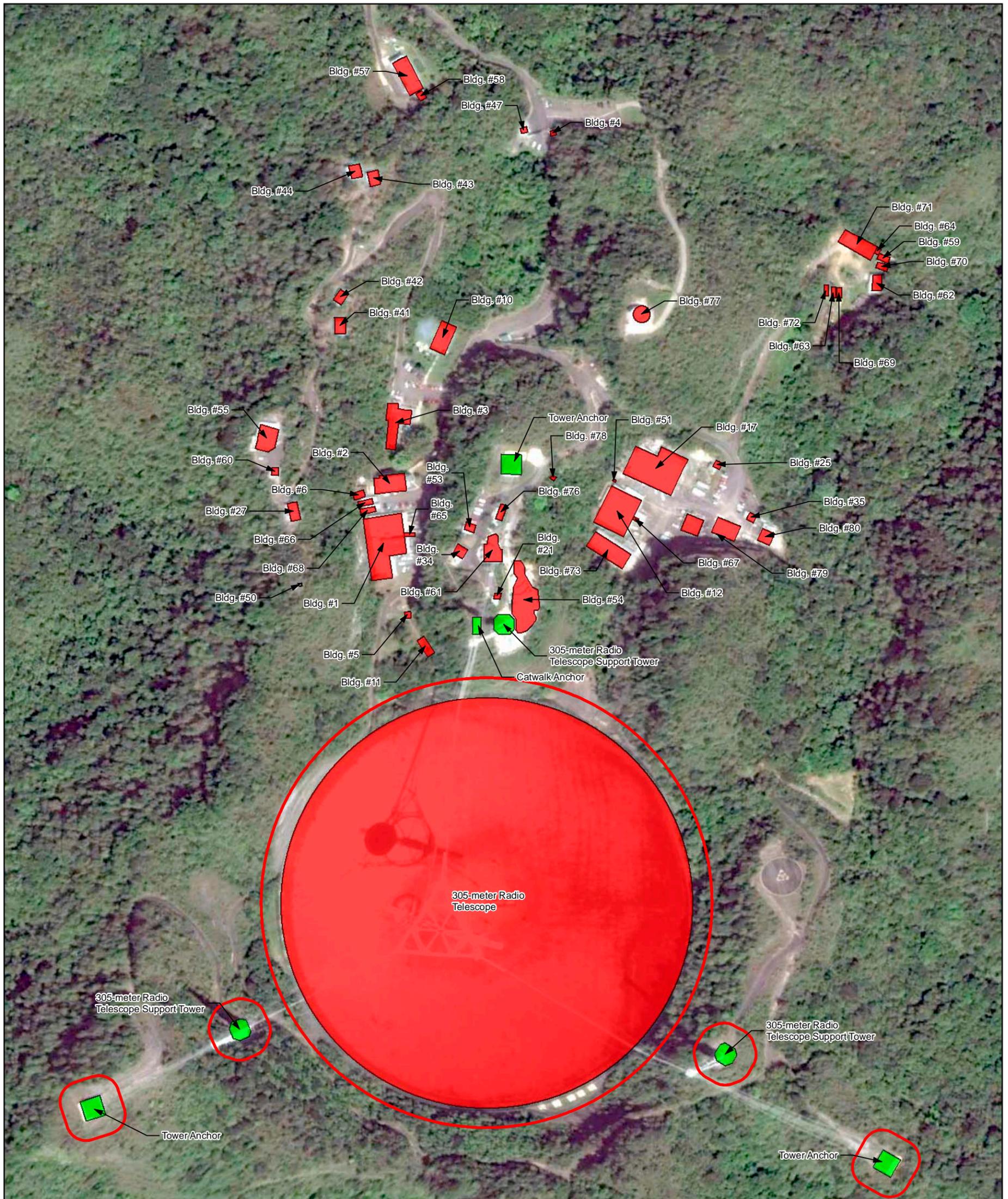


Figure 4
Alternative 3: Mothballing of Facilities
 Arecibo Observatory
 Puerto Rico



BUILDING NO. DESCRIPTION			
1. OPERATIONS BUILDING (1963)	34. HIGH VOLTAGE POWER SUPPLY BLDG. (1973)	60. ANT. RECE. TESTING BLDG. (Late 1990's)	77. PHASE REFERENCE ANTENNA (12M) (2010)
2. ADMINISTRATION BUILDING (1963)	35. CUMMINGS GENERATOR CONTROL BLDG. (2010)	61. LEARNING CENTER (2001)	78. COFFEE HUT (2000's)
3. VISITING SCIENTIST QUARTERS AND CAFETERIA (1963)	41. WEST HILL V.S.Q. BACHELOR UNIT NO. 1 (1990's)	62. HFF STORAGE TRAILER	79. ENGINEERING OFFICE BUILDING (2000's)
4. ENTRANCE GUARD HOUSE (1963)	42. WEST HILL V.S.Q. BACHELOR UNIT NO. 2 (1990's)	63. IONOSONDE TRAILER	80. CUMMINGS DIESEL GENERATOR (2010)
5. CABLE CAR HOUSE (1963)	43. WEST HILL V.S.Q. FAMILY UNIT NO. 1 (1990's)	64. ELECTRONIC TRAILER	
6. PUMP HOUSE/WATER TREATMENT BLDG. (1963)	44. WEST HILL V.S.Q. FAMILY UNIT NO. 2 (1990's)	65. SHIELDED TRAILER (1983)	
10. SWIMMING POOL/RESTROOMS (Mid 1960's)	47. MAIN GATE RESTROOM (1963)	66. ATMOSPHERIC SCIENCE TRAILER	
11. LEWIS BUILDING-RIGGING LOFT (Mid 1960's)	50. INTERFERENCE MONITORING SHACK	67. CRYOGENICS LAB TRAILER (1967)	
12. MAINTENANCE SHOPS (1967)	51. GREASE PIT	68. SCIENTIFIC OFFICES TRAILER	
13. BOWL SHACK (1963)	53. EMERGENCY GENERATOR BLDG.	69. ELECTRONIC TRAILER (WAVEGUIDE)	
17. WAREHOUSE (1967)	54. VISITOR CENTER BLDG. (1997)	70. COMPUTER TRAILER	
21. ANTENNA TESTING RANGE	55. LIDAR LABORATORY BLDG. (1996)	71. ELECTRONICS CABLE TRAILER	
25. PAINT STORAGE BUILDING (Circa 2010)	57. NORTH V.S.Q. BLDG. (2002)	72. ELECTRONIC TRAILER (CRYOGENICS)	
27. OPTICAL LABS (1985/1997)	58. NORTH V.S.Q. UTILITY BLDG. (2002)	73. HF TRANSMITTER BUILDING (2000's)	
	59. VISITOR CENTER TRAILER	76. INSPIRATION FOR SCIENCE TRAILER (2000's)	

- Building/Structure
- Building/Infrastructure to be Deconstructed
- Building/Infrastructure to be Safe-abandoned
- Vegetation Survey Area

Note: Rimwall infrastructure would be safe abandoned. All deconstruction work would be within developed areas of Arecibo Observatory and there would be no need to construct new access routes to haul debris away. No widening or other improvements to existing roads would occur.

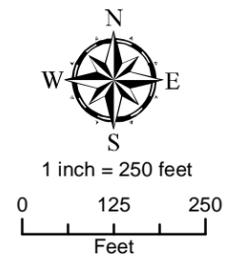
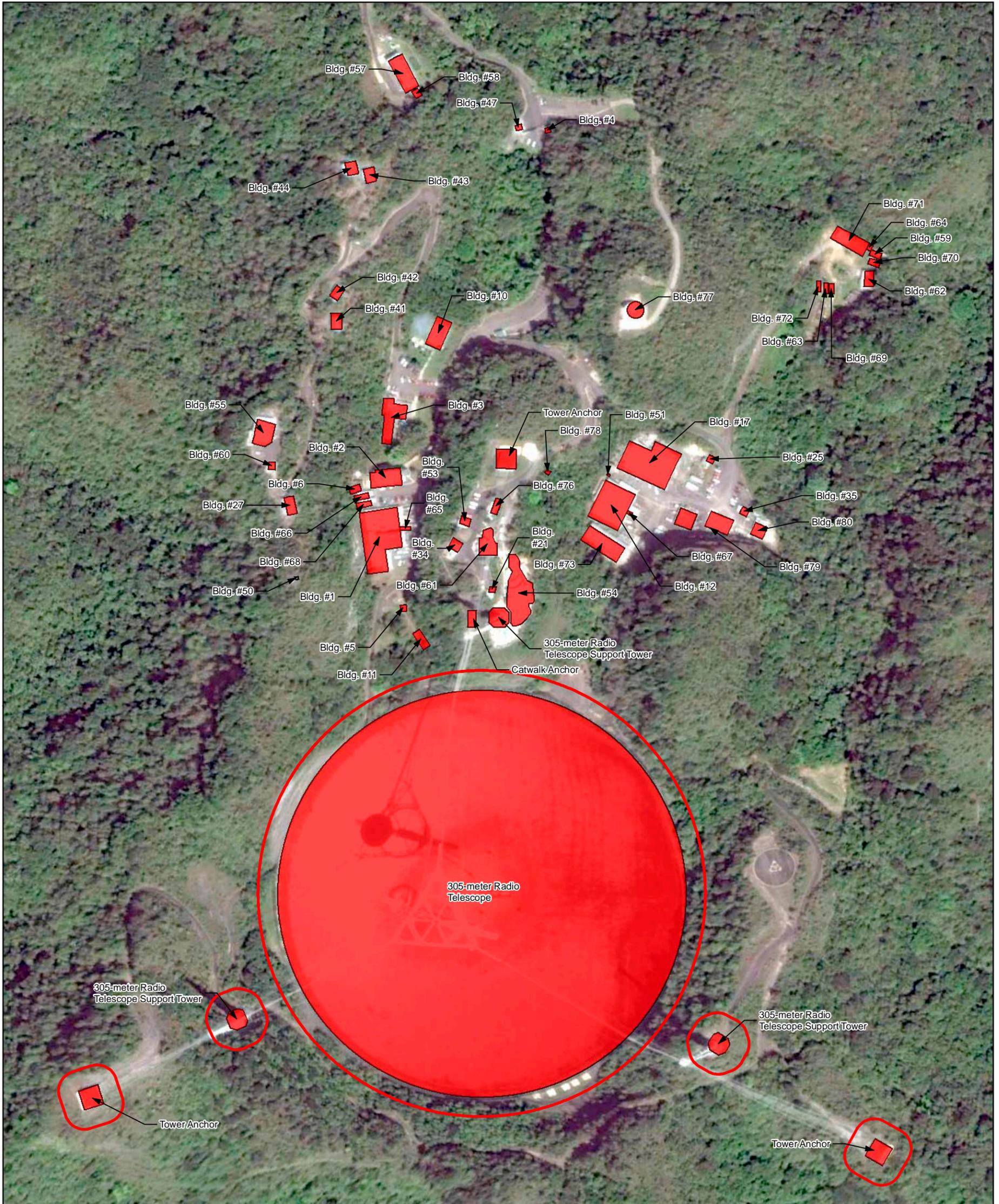


Figure 5
Alternative 4: Partial
Deconstruction and Site
Restoration
 Arecibo Observatory
 Puerto Rico



BUILDING NO.	DESCRIPTION	BUILDING NO.	DESCRIPTION	BUILDING NO.	DESCRIPTION
1.	OPERATIONS BUILDING (1963)	34.	HIGH VOLTAGE POWER SUPPLY BLDG. (1973)	60.	ANT. RECE. TESTING BLDG. (Late 1990's)
2.	ADMINISTRATION BUILDING (1963)	35.	CUMMINGS GENERATOR CONTROL BLDG. (2010)	61.	LEARNING CENTER (2001)
3.	VISITING SCIENTIST QUARTERS AND CAFETERIA (1963)	41.	WEST HILL V.S.Q. BACHELOR UNIT NO. 1 (1990's)	62.	HFF STORAGE TRAILER
4.	ENTRANCE GUARD HOUSE (1963)	42.	WEST HILL V.S.Q. BACHELOR UNIT NO. 2 (1990's)	63.	IONOSONDE TRAILER
5.	CABLE CAR HOUSE (1963)	43.	WEST HILL V.S.Q. FAMILY UNIT NO. 1 (1990's)	64.	ELECTRONIC TRAILER
6.	PUMP HOUSE/WATER TREATMENT BLDG. (1963)	44.	WEST HILL V.S.Q. FAMILY UNIT NO. 2 (1990's)	65.	SHIELDED TRAILER (1983)
10.	SWIMMING POOL/RESTROOMS (Mid 1960's)	47.	MAIN GATE RESTROOM (1963)	66.	ATMOSPHERIC SCIENCE TRAILER
11.	LEWIS BUILDING-RIGGING LOFT (Mid 1960's)	50.	INTERFERENCE MONITORING SHACK	67.	CRYOGENICS LAB TRAILER (1967)
12.	MAINTENANCE SHOPS (1967)	51.	GREASE PIT	68.	SCIENTIFIC OFFICES TRAILER
13.	BOWL SHACK (1963)	53.	EMERGENCY GENERATOR BLDG.	69.	ELECTRONIC TRAILER (WAVEGUIDE)
17.	WAREHOUSE (1967)	54.	VISITOR CENTER BLDG. (1997)	70.	COMPUTER TRAILER
21.	ANTENNA TESTING RANGE	55.	LIDAR LABORATORY BLDG. (1996)	71.	ELECTRONICS CABLE TRAILER
25.	PAINT STORAGE BUILDING (Circa 2010)	57.	NORTH V.S.Q. BLDG. (2002)	72.	ELECTRONIC TRAILER (CRYOGENICS)
27.	OPTICAL LABS (1985/1997)	58.	NORTH V.S.Q. UTILITY BLDG. (2002)	73.	HF TRANSMITTER BUILDING (2000's)
		59.	VISITOR CENTER TRAILER	76.	INSPIRATION FOR SCIENCE TRAILER (2000's)
				77.	PHASE REFERENCE ANTENNA (12M) (2010)
				78.	COFFEE HUT (2000's)
				79.	ENGINEERING OFFICE BUILDING (2000's)
				80.	CUMMINGS DIESEL GENERATOR (2010)

- Building/Structure
- Building/Infrastructure to be Deconstructed
- Building/Infrastructure to be Safe-abandoned
- Vegetation Survey Area

Note: All deconstruction work would be within developed areas of Arcicbo Observatory and there would be no need to construct new access routes to haul debris away. No widening or other improvements to existing roads would occur.

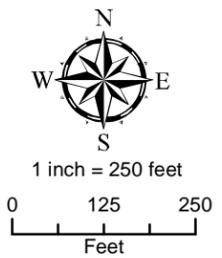


Figure 6
Alternative 5: Complete
Deconstruction and Site
Restoration Arcicbo
Observatory Puerto Rico

Attachment 1
Puerto Rican Boa Protocols to be
Implemented Prior to Intrusive Work
at Arecibo Observatory, Puerto Rico

Puerto Rican Boa Protocols to be Implemented Prior to Intrusive Work at Arecibo Observatory, Puerto Rico

The National Science Foundation (NSF) has developed these protocols to provide training to Arecibo Observatory staff on the value of protected species, including the Puerto Rican boa, to provide guidance for staff conducting normal operations, and to provide training and guidance to persons conducting deconstruction activities on the Observatory. Puerto Rican boas are known to occur on the Arecibo Observatory and are regularly seen by personnel during their routine work assignments. The species also could be encountered in areas where deconstruction work occurs, including vegetation clearing to prepare a site for work.

The federally endangered Puerto Rican boa (*Epicrates inornatus*) is the largest snake native to Puerto Rico, reaching mature lengths of up to 7.5 feet. The color of the Puerto Rican boa is variable, usually ranging from tan to very dark brown (sometimes grayish), with 70 to 80 dorsal blotches (indistinct cross-bars) from neck to vent. The Puerto Rican boa is nocturnal, while retreating to caves/crevices, rocky areas along streams, or trees for resting and concealment during the day. Adult prey items include small mammals, birds, and bats. Juvenile Puerto Rican boas feed on smaller prey items including lizards and insects.

Large-scale habitat destruction and the introduction of exotic mammalian predators are considered the causes of population declines. Introduced rats and feral cats feed on the eggs and young Puerto Rican boas. Human predation of Puerto Rican boas for their oil as a folk remedy also has contributed to population declines for the species.

The Puerto Rican boa is known to occur on Arecibo Observatory. The most suitable habitat for the Puerto Rican boa Arecibo Observatory is the forested areas on the eastern portion of the property and fractured karst areas. Because of the potential for disturbance to snakes or snake habitat from routine operations in the developed portions of Arecibo Observatory, any potential relocations of the species would be into the undeveloped forested areas on the east side of the property.

This document describes the procedures that will be implemented at Arecibo Observatory to avoid impacts to the Puerto Rican boa. The extent and type of disturbance varies among projects. With implementation of the measures described below, routine ongoing work and activities associated with future operation of the Arecibo Observatory are unlikely to adversely affect the Puerto Rican boa.

Prior to vegetation clearing, mechanized ground-disturbing activities, or intrusive activities at any location, site-specific environmental protection mitigation steps will be implemented to eliminate potential impacts to this species. Through application of the measures specified in this document and any additional site-specific measures that may be identified in the environmental protection plan, NSF anticipates no adverse impacts to the Puerto Rican boa from its routine maintenance activities at the Arecibo Observatory. Measures to mitigate the potential for impacts to this species for specific site-related activities are provided.

Puerto Rican Boa Interaction Protocols

Training

Field personnel will receive training about the conservation of the Puerto Rican boa and other listed species, the species that may be encountered on the site, the importance of protecting boas and other listed species, and penalties for harassing or harming protected species. Training will be required for

onsite staff who work in areas where the Puerto Rican boa may be encountered and any workers (staff or contractors) who would be involved in deconstruction activities. For contractors, the training would be required prior to the start of onsite work.

Training will be conducted by a qualified wildlife biologist experienced with the Puerto Rican boa and Endangered Species Act compliance.

Relocation Protocols

Unless otherwise specified, the following procedures will be implemented if a Puerto Rican boa is found in a work area:

1. A Puerto Rico Department of Natural and Environmental Resources (DNER)-permitted biologist or other trained person permitted by DNER to handle Puerto Rican boas will capture the boa, following accepted procedures, and relocate the boa to suitable habitat outside of the work area; or
2. Work will be delayed until after the Puerto Rican boa has voluntarily moved outside of the work area.
3. If a boa is observed, maintain visual contact with the boa so that it does not become lost in the vegetation until the boa has voluntarily left the work area or the permitted biologist arrives to assess relocation. Flag a buffer 100 feet (30.5) around any observed boa to prevent persons or equipment from entering the area where the snake is.

The process of relocating a Puerto Rican boa must be safe for the person relocating the boa and for the boa. If there is a hazard to either, the work will be delayed until the Puerto Rican boa has voluntarily moved outside of the work area or moved into a portion of the work area where relocation could occur without causing harm.

Boundary Marking

Prior to any vegetation clearing, grubbing, or heavy-equipment operations, project area boundaries will be clearly identified in the site-specific work plan and marked in the field. All areas that would be avoided and protected during proposed work will be clearly identified in the site-specific work plan and marked in the field.

Equipment Operation

Onsite heavy equipment, either deconstruction equipment or tractors and other equipment used in routine maintenance, in proximity to suitable boa habitat will be inspected prior to operation each day. Snakes may enter equipment housing seeking warmth or shelter and can be injured during equipment start-up. If a boa is found in equipment, operation of the equipment will be delayed until the boa voluntarily leaves the machinery or until the boa is relocated following the procedures specified above if it is moving into the work area.

Vegetation Clearing or Vegetation Cutting to Establish Line-of-Sight

Vegetation may be cleared or selectively cut to establish a line-of-sight to accommodate land surveys, geophysical surveys, or as part of site preparation for other site work. Vegetation clearing may be done by hand or with mechanized equipment, depending on site-specific conditions and the site-specific work plan.

Each day that vegetation clearing is conducted, prior to the start of that day's vegetation clearing, a qualified and trained person will examine the area that is to be cleared on that day to determine if Puerto Rican boas are present. If a Puerto Rican boa is found within the planned work area, work will be delayed until the boa is relocated or it voluntarily moves from the work area.

In addition to the pre-clearing surveys for boas, workers conducting vegetation clearing will be trained by a qualified and trained person to recognize the Puerto Rican boa while performing vegetation clearing. Should workers encounter a snake, work will stop in that area and a qualified and trained person will confirm the identity of the snake. If the snake is a Puerto Rican boa, work would remain stopped until the boa is relocated following the procedures specified above or the snake voluntarily moved from the work area.

If mowing or brush-hogging is required to reduce the height vegetation prior to work, the area to be mowed will be examined by a qualified and trained person to determine if Puerto Rican boas are present prior to mowing. If a Puerto Rican boa is observed in the area to be mowed, mowing will be delayed until the boa voluntarily leaves the work area, if the boa is moving away from the work area or until the boa is relocated following the procedures specified above if it is moving into the work area.

Excavation, Grubbing, and Grading

Some work sites may require excavations, grubbing, or other site grading as part of deconstruction. Excavation may be accomplished using a heavy equipment and/or hand tools. Prior to any use of excavating, earthmoving, or grading equipment in areas where boas may occur, the work area will be examined by a qualified and trained person to determine if boas are present. If a Puerto Rican boa is found within the proposed work area, work will be delayed until the boa is relocated following the procedures specified above or the snake voluntarily moved from the work area.

Where vegetation removal is necessary to allow operation of excavating, earthmoving, or grading equipment, vegetation will be hand-cleared, following the process outlined above, to provide time for any boa to be observed or to move away from the area prior to operation of the machinery.

Excavations of any type may remain open overnight but will require temporary construction fencing completely enclosing the excavation to deter Puerto Rican boas from falling into the excavation and becoming entrapped. Where feasible, the excavation will be sloped to create a ramp allowing egress for a snake or small items will be placed in the excavation to allow Puerto Rican boas to voluntarily leave the excavation. Prior to work the following day, excavations will be examined by a qualified and trained person to determine if a Puerto Rican boa entered the pit overnight. If a Puerto Rican boa is discovered in the excavation, the boa either will be relocated by a DNER-authorized person following the procedures specified above or no work in the excavation will occur until after the Puerto Rican boa voluntarily leaves the excavation. When work is complete, excavations will be backfilled.

Disturbance or Removal of Debris

It will be necessary to remove deconstruction debris. However, debris may remain onsite for some time prior to hauling away. A Puerto Rican boa may rest under or within debris that is stockpiled for eventual transport. Prior to any movement or disturbance of stockpiled debris, the debris will be examined by a qualified and trained person to determine if Puerto Rican boas are present. If a Puerto Rican boa is found within the planned work area, work would be delayed until the boa is relocated following the procedures specified above or it voluntarily moved from the work area.

Deconstruction

Structures (includes buildings, tanks, culverts, or other man-made objects that could provide shelter to a Puerto Rican boa) on the Arecibo Observatory, with many of these structures occurring within or adjacent to areas where work may occur. Potential work areas may be in proximity to karst features, such as fissures or crevices, in shallow or exposed limestone bedrock where the Puerto Rican boa may seek shelter. Prior to conducting deconstruction, a qualified and trained person will inspect the structure to determine if boas are present. If a Puerto Rican boa is found within a structure that would

be demolished or filled, work will be delayed until the boa is relocated or it voluntarily moved from the work area.

Structures and karst features adjacent to work areas may house resting Puerto Rican boas that could inadvertently enter the work area following a startle response to operation of equipment. To minimize the potential for a resting boa to be startled and subsequently enter the work area, abandoned structure is within 33 feet (10 meters) of the immediate area where mechanized vegetation clearing, mechanized ground-disturbing activities, deconstruction, or filling will commence will be examined by a qualified and trained person to determine if boas are present. This examination will occur for the period beginning 15 minutes prior to start of disturbing activities and ending 15 minutes after the disturbing activity has begun and will be done on the first work day of each week and on the first day of work following any other non-work day. If a Puerto Rican boa is found within an adjacent structure, a barricade will be placed to prevent the boa from entering the work area or the boa will be relocated away from the work area following the procedures specified above.

Placement of Fill Material

Prior to placement of fill material, the area to be covered or filled will be examined by a qualified and trained person to determine if Puerto Rican boas are present. Any use of these areas by Puerto Rican boas likely will be limited to transitional movement because of the lack of cover and foraging habitat. If a Puerto Rican boa is found within the proposed work area, work will be delayed until the boa is relocated following the procedures specified above or it voluntarily moved from the work area.

Reporting

Encounters with Puerto Rican boas will be recorded and full details of the encounter will be reported to the U.S. Fish and Wildlife Service and to DNER. Encounters during normal maintenance activities and operations will be reported by Arecibo Observatory Facilities Operations. Responsibility of reporting incidents during deconstruction will be specified in contract documents for the work.

If the encounter results in injury or mortality to the snake, the report must be filed within 24 hours. If the encounter does not result in injury or mortality to the snake, the report must be filed within 2 weeks. Agency points of contact are provided below.

US Fish and Wildlife Service Point of Contact:

Marelisa Rivera
Deputy Field Supervisor
U.S. Fish and Wildlife Service
Caribbean Ecological Services Field Office
P.O. Box 491 / Road 301, Km 5.1
Boquerón, Puerto Rico 00622
(787) 851-7297 x 206 (direct)
(787) 510-5207 (mobile)
marelisa_rivera@fws.gov

PR DNER Points of Contact

DNER Ranger Corps Regional Office, Arecibo: (787) 880-0656.

DNER Ranger Corps Headquarters, San Juan: (787) 724-5700.

DNER's Habitats and Biodiversity Research and Conservation Bureau, Terrestrial Ecology Division: (787) 772-2028. Note: This office should be contacted only in the event that the Ranger Corps cannot be contacted, and only during DNER working hours: Monday to Friday, 7:30 AM-12:00 PM, 1:00-4:00 PM (AST/EDT).

4.6-A Solid Waste Calculations

Ponce landfill - Aida Clas 8-5-16

Friday, August 05, 2016

3:23 PM

Kristine MacKinnon sent an email to Aida Clas - Republic Waste Services, Ponce landfill asking if the Ponce landfill could handle 14,000 metric tons of construction waste.

Ms. Clas called back and said the Ponce landfill is licensed for another 30 years, so they would have the capacity for that quantity of waste.

Ms. Clas said they usually measure the waste by cubic yards, but she has priced a few jobs by the metric ton. Metric tons are only used for heavier materials, cubic yards used for lighter materials. Kristine said she could convert to cubic yards if necessary.

Ms. Clas added that the Salinas landfill can also take special waste

Ms. Clas confirmed that the Ponce landfill will take asbestos and lead-based paint waste

She can send the permit for the Ponce facility. Will need to provide proof that are sending waste to a licensed facility.

She can contract any dump trucks and roll offs that would be needed.

The Ponce landfill can take wastewater. They have a solidification facility. Can receive liquid waste by the ton, in drums or totes. They can provide transportation.

Metals recycling can be done through another firm - Schnitzer (sp?). They are the largest scrap metal recycler in Puerto Rico. They have a facility in Salinas. Phone number is 787-824-6133

Electrical equipment - they have an agreement with an electronics recycler, can help facilitate.

Aida is in charge of all special waste in Puerto Rico for republic services. Can assist with any projects on the island.

Truck Loads Per Alternative

	Full Demolition			Demolition - Partial			Mothball			Education Park			Partnership		
	Alternative 5			Alternative 4			Alternative 3			Alternative 2			Alternative 1		
	truck loads	metric ton	cubic meters	truck loads	metric ton	cubic meters	truck loads	metric ton	cubic meters	truck loads	metric ton	cubic meters	truck loads	metric ton	cubic meters
¹ Demolition Debris	347	6,940	7,287	341	6,820	7,161	31	620	651	128	2,560	2,688	106	2,120	2,226
Asbestos Abatement	13	260	273	13	260	273	0	0	0	9	180	189	7	140	147
LBP	1	20	21	1	20	21	0	0	0	1	20	21	4	80	84
Universal Waste	2	40	42	2	40	42	1	20	21	1	20	21	1	20	21
² Electrical Equipment/Goods	5	100	105	5	100	105	1	20	21	4	80	84	2	40	42
³ Liquid Waste, non-specific	11	220	231	11	220	231	5	100	105	6	120	126	6	120	126
OWS/Septic Liquid Waste	14	280	294	14	280	294	10	200	210	0	0	0	7	140	147
² Salvage/Recycle - Non-Ferrous	16	320	336	16	320	336	1	20	21	1	20	21	1	20	21
² Salvage/Recycle - Ferrous	340	6,800	7,140	219	4,380	4,599	2	40	42	85	1,700	1,785	15	300	315
⁴ Total:	749	14,980	15,729	622	12,440	13,062	51	1020	1071	235	4700	4935	149	2980	3129
⁵ Mobilization	18			12			2			4			4		

⁶Truck Route From Arecibo to Disposal/Ponce: start PR-625 to PR-635 to PR-651 to Ave Cludad De La Vega to Pso Los Olmos to PR-10 to PR-654 to Disposal/Ponce... +/- 50 miles.

¹ Combustable Material may qualify for waste to energy - estimated 30% of the loads. All concrete, masonry and pavement materials will be sized/ crushed to 3-in minus and will be utilized during restoration (fill and contouring) or available for off-site beneficial reuse.

²Salavage and/or Recycle

³ Petroleum products recycle. Household waste, paint, etc non-recycle disposal.

⁴Total truck passage is two times the load count

⁵ Equipment and materials delivery; no specific off-site point of origination

⁶The haul route is based on CH2M evaluation of the land routes available from the Arecibo site to the general Ponce, PR area (landfill location). NSF Sipulation that CH2M not reveal location, source and/or schedule for the required disposal service; no haul route was provided by the disposal and/or recycling facilities.

Assumptions fo metric ton and cubic meter calcuations:

20 metric tons/load	transportation estimate	
20 metric tons/20 cubic meters	dump truck load estimate	
20 metric tons/30 cubic meters	lightweight materials	roll-off cintainers
assume	90% dump truck	10% roll-offs

4.12-A EJSSCREEN Results

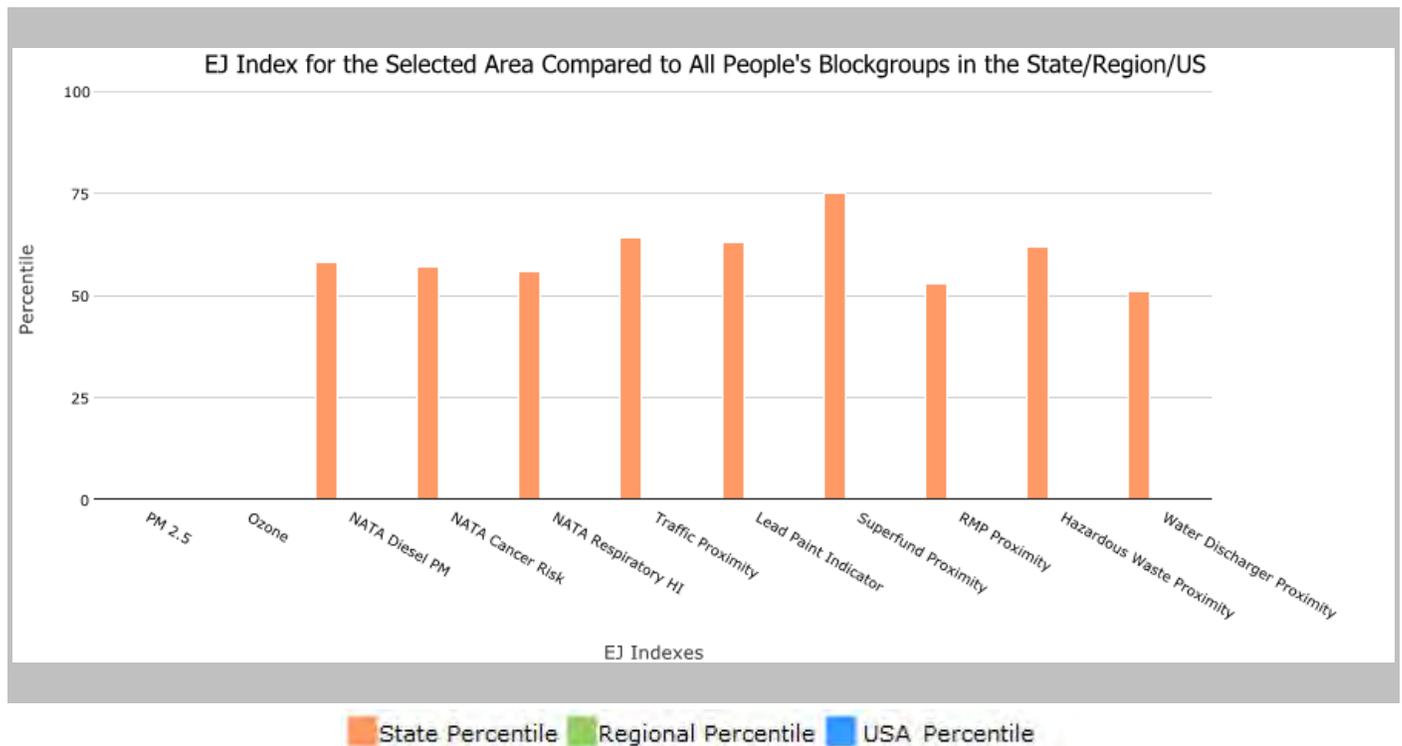
5 mile Ring Centered at 18.344262,-66.752703, PUERTO RICO, EPA Region 2

Approximate Population: 19,577

Input Area (sq. miles): 78.53

Arecibo Observatory

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	N/A	N/A	N/A
EJ Index for Ozone	N/A	N/A	N/A
EJ Index for NATA* Diesel PM	58	N/A	N/A
EJ Index for NATA* Air Toxics Cancer Risk	57	N/A	N/A
EJ Index for NATA* Respiratory Hazard Index	56	N/A	N/A
EJ Index for Traffic Proximity and Volume	64	N/A	N/A
EJ Index for Lead Paint Indicator	63	N/A	N/A
EJ Index for Proximity to NPL sites	75	N/A	N/A
EJ Index for Proximity to RMP sites	53	N/A	N/A
EJ Index for Proximity to TSDFs	62	N/A	N/A
EJ Index for Proximity to Major Direct Dischargers	51	N/A	N/A



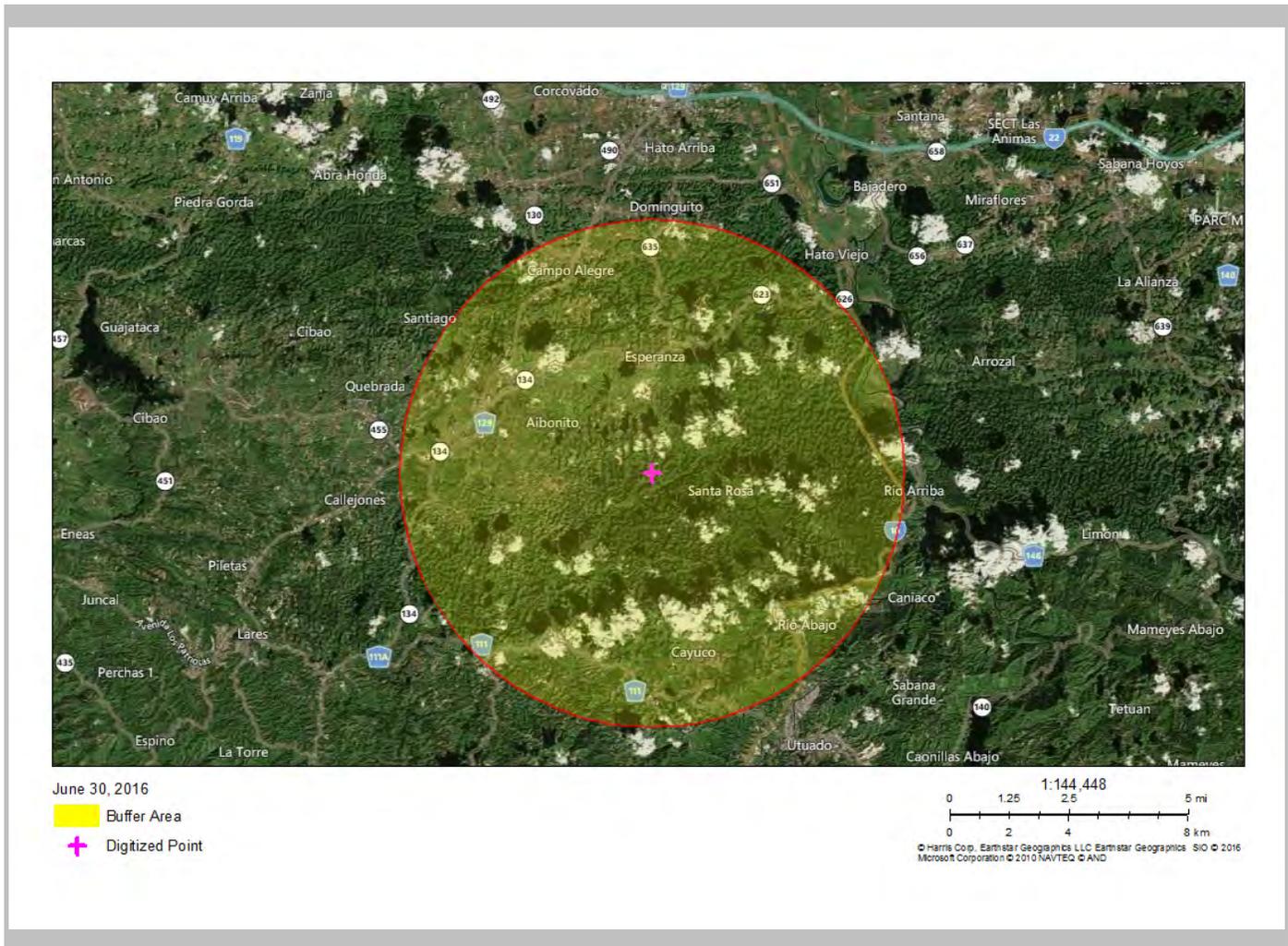
This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

5 mile Ring Centered at 18.344262,-66.752703, PUERTO RICO, EPA Region 2

Approximate Population: 19,577

Input Area (sq. miles): 78.53

Arecibo Observatory



Sites reporting to EPA	
Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDf)	0
National Pollutant Discharge Elimination System (NPDES)	0

EJSCREEN Report (Version 2016)



5 mile Ring Centered at 18.344262,-66.752703, PUERTO RICO, EPA Region 2

Approximate Population: 19,577

Input Area (sq. miles): 78.53

Arecibo Observatory

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in $\mu\text{g}/\text{m}^3$)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ozone (ppb)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA* Diesel PM ($\mu\text{g}/\text{m}^3$)	0.234	0.761	26	N/A	N/A	N/A	N/A
NATA* Cancer Risk (lifetime risk per million)	27	34	21	N/A	N/A	N/A	N/A
NATA* Respiratory Hazard Index	0.69	1.1	28	N/A	N/A	N/A	N/A
Traffic Proximity and Volume (daily traffic count/distance to road)	11	140	29	N/A	N/A	N/A	N/A
Lead Paint Indicator (% Pre-1960 Housing)	0.084	0.15	46	N/A	N/A	N/A	N/A
NPL Proximity (site count/km distance)	0.098	0.15	60	N/A	N/A	N/A	N/A
RMP Proximity (facility count/km distance)	0.13	0.51	22	N/A	N/A	N/A	N/A
TSDF Proximity (facility count/km distance)	0.039	0.053	62	N/A	N/A	N/A	N/A
Water Discharger Proximity (facility count/km distance)	0.12	0.41	15	N/A	N/A	N/A	N/A
Demographic Indicators							
Demographic Index	91%	86%	63	N/A	N/A	N/A	N/A
Minority Population	100%	99%	34	N/A	N/A	N/A	N/A
Low Income Population	82%	73%	62	N/A	N/A	N/A	N/A
Linguistically Isolated Population	82%	70%	78	N/A	N/A	N/A	N/A
Population With Less Than High School Education	39%	28%	79	N/A	N/A	N/A	N/A
Population Under 5 years of age	5%	6%	48	N/A	N/A	N/A	N/A
Population over 64 years of age	17%	16%	62	N/A	N/A	N/A	N/A

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: <https://www.epa.gov/national-air-toxics-assessment>.

For additional information, see: www.epa.gov/environmentaljustice

EJSCREEN is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. Users should keep in mind that screening tools are subject to substantial uncertainty in their demographic and environmental data, particularly when looking at small geographic areas. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location. EJSCREEN outputs should be supplemented with additional information and local knowledge before taking any action to address potential EJ concerns.