NATIONAL SCIENCE FOUNDATION

Environmental Impact Statement for the Green Bank Observatory

Green Bank, West Virginia

Final
Appendixes

February 22, 2019

Appendix 3.1A

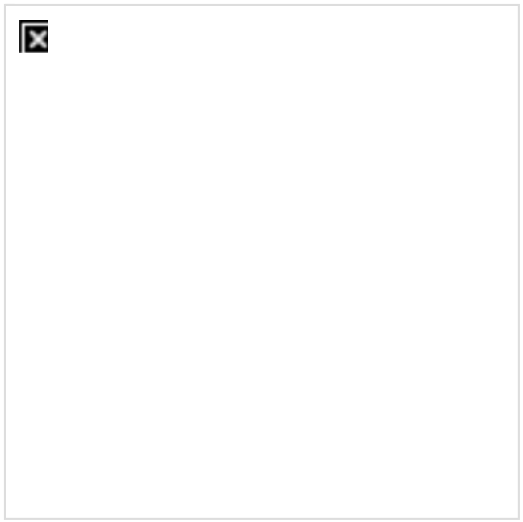
Information for Planning and Conservation Report

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

Location

Pocahontas County, West Virginia



Local office

West Virginia Ecological Services Field Office

(304) 636-6586
(304) 636-7824

694 Beverly Pike
Elkins, WV 26241-9475

http://www.fws.gov/westvirginiafieldoffice/

Endangered species

This resource list is for informational purposes only and should not be used for planning or analyzing project level impacts.

Section 7 of the Endangered Species Act **requires** Federal agencies to *"request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action"* for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list either from the Regulatory Review section in IPaC or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by creating a project and making a request from the Regulatory Review section.

Listed species

[1] are managed by the Endangered Species Program of the U.S. Fish and Wildlife Service.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.

The following species are potentially affected by activities in this location:

Amphibians

NAME	STATUS
Cheat Mountain Salamander Plethodon nettingi **No critical habitat** has been designated for this species. http://ecos.fws.gov/ecp/species/6057	Threatened

Fishes

NAME	STATUS
Diamond Darter Crystallaria cincotta There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. http://ecos.fws.gov/ecp/species/6921	Endangered

Flowering Plants

NAME	STATUS
Northeastern Bulrush *Scirpus ancistrochaetus* **No critical habitat** has been designated for this species. http://ecos.fws.gov/ecp/species/6715	Endangered
Running Buffalo Clover *Trifolium stoloniferum* **No critical habitat** has been designated for this species. http://ecos.fws.gov/ecp/species/2529	Endangered
Shale Barren Rock Cress *Arabis serotina* **No critical habitat** has been designated for this species. http://ecos.fws.gov/ecp/species/6018	Endangered
Virginia Spiraea *Spiraea virginiana* **No critical habitat** has been designated for this species. http://ecos.fws.gov/ecp/species/1728	Threatened

Mammals

NAME	STATUS
Indiana Bat *Myotis sodalis* **No critical habitat** has been designated for this species. http://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat *Myotis septentrionalis* **No critical habitat** has been designated for this species. http://ecos.fws.gov/ecp/species/9045	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Birds are protected under the Migratory Bird Treaty Act

[1] and the Bald and Golden Eagle Protection Act[2].

Any activity that results in the take (to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct) of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service

[3]. There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data http://www.birdscanada.org/birdmon/default/datasummaries.jsp

The migratory birds species listed below are species of particular conservation concern (e.g. Birds of Conservation Concern) that may be potentially affected by activities in this location, not a list of every bird species you may find in this location. Although it is important to try to avoid and minimize impacts to all birds, special attention should be made to avoid and minimize impacts to birds of priority concern. To view available data on other bird species that may occur in your project area, please visit the AKN Histogram Tools and Other Bird Data Resources.

NAME	SEASON(S)
Bald Eagle Haliaeetus leucocephalus http://ecos.fws.gov/ecp/species/1626	Year-round

Bewick's Wren Thryomanes bewickii ssp. bewickii	Breeding
Black-billed Cuckoo Coccyzus erythropthalmus http://ecos.fws.gov/ecp/species/9399	Breeding
Black-capped Chickadee Poecile atricapillus	Year-round
Blue-winged Warbler Vermivora pinus	Breeding
Canada Warbler Wilsonia canadensis	Breeding
Cerulean Warbler Dendroica cerulea http://ecos.fws.gov/ecp/species/2974	Breeding
Fox Sparrow Passerella iliaca	Wintering
Golden-winged Warbler Vermivora chrysoptera http://ecos.fws.gov/ecp/species/8745	Breeding
Kentucky Warbler Oporornis formosus	Breeding
Louisiana Waterthrush Parkesia motacilla	Breeding
Northern Saw-whet Owl Aegolius acadicus	Year-round
Olive-sided Flycatcher Contopus cooperi http://ecos.fws.gov/ecp/species/3914	Breeding
Peregrine Falcon Falco peregrinus http://ecos.fws.gov/ecp/species/8831	Breeding
Pied-billed Grebe Podilymbus podiceps	Breeding
Prairie Warbler Dendroica discolor	Breeding

Red Crossbill Loxia curvirostra http://ecos.fws.gov/ecp/species/8743	Year-round
Red-headed Woodpecker Melanerpes erythrocephalus	Breeding
Rusty Blackbird Euphagus carolinus	Wintering
Short-eared Owl Asio flammeus http://ecos.fws.gov/ecp/species/9295	Wintering
Willow Flycatcher Empidonax traillii http://ecos.fws.gov/ecp/species/3482	Breeding
Wood Thrush Hylocichla mustelina	Breeding
Worm Eating Warbler Helmitheros vermivorum	Breeding
Yellow-bellied Sapsucker sphyrapicus varius http://ecos.fws.gov/ecp/species/8792	Breeding

What does IPaC use to generate the list of migratory bird species potentially occurring in my specified location?

Landbirds:

Migratory birds that are displayed on the IPaC species list are based on ranges in the latest edition of the National Geographic Guide, Birds of North America (6th Edition, 2011 by Jon L. Dunn, and Jonathan Alderfer). Although these ranges are coarse in nature, a number of U.S. Fish and Wildlife Service migratory bird biologists agree that these maps are some of the best range maps to date. These ranges were clipped to a specific Bird Conservation Region (BCR) or USFWS Region/Regions, if it was indicated in the 2008 list of Birds of Conservation Concern (BCC) that a species was a BCC species only in a particular Region/Regions. Additional modifications have been made to some ranges based on more local or refined range information and/or information provided by U.S. Fish and Wildlife Service biologists with species expertise. All migratory birds that show in areas on land in IPaC are those that appear in the 2008 Birds of Conservation Concern report.

Atlantic Seabirds:

Ranges in IPaC for birds off the Atlantic coast are derived from species distribution models developed by the National Oceanic and Atmospheric Association (NOAA) National Centers for Coastal Ocean Science (NCCOS) using the best available seabird survey data for the offshore Atlantic Coastal region to date. NOAANCCOS assisted USFWS in developing seasonal species ranges from their models for specific use in IPaC. Some of these birds are not BCC species but were of interest for inclusion because they

may occur in high abundance off the coast at different times throughout the year, which potentially makes them more susceptible to certain types of development and activities taking place in that area. For more refined details about the abundance and richness of bird species within your project area off the Atlantic Coast, see the Northeast Ocean Data Portal. The Portal also offers data and information about other types of taxa that may be helpful in your project review.

About the NOAANCCOS models: the models were developed as part of the NOAANCCOS project: Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf. The models resulting from this project are being used in a number of decision-support/mapping products in order to help guide decision-making on activities off the Atlantic Coast with the goal of reducing impacts to migratory birds. One such product is the Northeast Ocean Data Portal, which can be used to explore details about the relative occurrence and abundance of bird species in a particular area off the Atlantic Coast.

All migratory bird range maps within IPaC are continuously being updated as new and better information becomes available.

Can I get additional information about the levels of occurrence in my project area of specific birds or groups of birds listed in IPaC?

Landbirds:

The Avian Knowledge Network (AKN) provides a tool currently called the "Histogram Tool", which draws from the data within the AKN (latest,survey, point count, citizen science datasets) to create a view of relative abundance of species within a particular location over the course of the year. The results of the tool depict the frequency of detection of a species in survey events, averaged between multiple datasets within AKN in a particular week of the year. You may access the histogram tools through the Migratory Bird Programs AKN Histogram Tools webpage.

The tool is currently available for 4 regions (California, Northeast U.S., Southeast U.S. and Midwest), which encompasses the following 32 states: Alabama, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Jersey, New York, North, Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin.

In the near future, there are plans to expand this tool nationwide within the AKN, and allow the graphs produced to appear with the list of trust resources generated by IPaC, providing you with an additional level of detail about the level of occurrence of the species of particular concern potentially occurring in your project area throughout the course of the year.

Atlantic Seabirds:

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAANCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Facilities

Wildlife refuges

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGES AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

This location overlaps the following wetlands:

> The area of this project is too large for IPaC to load all NWI wetlands in the area. The list below may be incomplete. Please contact the local U.S. Fish and Wildlife Service office or visit the NWI map for a full list.

FRESHWATER EMERGENT WETLAND

- PEM1C
- PEM1A
- PEM1Cb
- PEM1Ba

PEM1Ad
PEM1Eb
PEM/SS1C
PEM1Fb
PEM1B
PEM1E
PEM/SS1Cb
PEM/SS1A
PEM1Cd
PEM1Ch
PEM1/UBFb
PEM/FO1C
PEM1Fh
PEM1/FO4Cb
PEM1F
PEM1Eh

FRESHWATER FORESTED/SHRUB WETLAND

PFO1A
PSS1E
PSS1A
PFO1C
PFO4E
PFO4/1A
PSS1/FO4B
PFO4/1E
PSS/EM1E
PSS/EM1A
PFO4C
PSS1C
PFO/SS1A
PFO1/4E
PSS1/FO4E
PFO1/4A
PFO4Ba
PFO4/SS3E
PSS/EM1C
PSS1/FO4C
PFO1Cb
PFO5/4Cb
PFO1E
PFO4A

PFO4/SS1E
PSS3E
PSS1Ch
PSS/EM1Ad
PSS1B
PFO4/SS1A
PSS1Cb
PFO1/4C
PFO1Eb
PSS4E
PSS/EM1Cb
PSS1Fb

FRESHWATER POND
PUBHh
PUBFb
PUBFh
PUBHx
PUBF
PUBKHh
PUBH
PABHx
PABF
PUBKh
PUB/EM1Fh
PAB3F
PUBFx

LAKE
L1UBHh

RIVERINE
R2UBH
R5UBH
R2USA
R3UBH
R3USA
R5USA
R4USA

A full description for each wetland code can be found at the National Wetlands Inventory website: https://ecos.fws.gov/ipac/wetlands/decoder

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix 3.1B

Biology Correspondence

United States Department of the Interior

FISH AND WILDLIFE SERVICE

West Virginia Field Office
694 Beverly Pike
Elkins, West Virginia 26241

April 13, 2017

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Boulevard, Suite 1045
Arlington, Virginia 22230

Re: Green Bank Observatory, Green Bank, Pocahontas County, West Virginia
(FWS File #: 2017-I-0068)

Dear Ms. Pentecost:

This responds to your request of March 16, 2017, for information regarding the potential occurrence of federally listed threatened and endangered species with regards to proposed changes to the operations of Green Bank Observatory, a National Science Foundation (NSF) funded facility. In a correspondence dated October 20, 2016, the U.S. Fish and Wildlife Service (Service) determined that the Green Bank Observatory is within a known use area for the federally listed endangered Indiana bat (*Myotis sodalist*) and threatened northern long-eared bat (*Myotis septentrionalis*), and that proposed changes had the potential to affect these species. The proposed Alternatives for the draft Environmental Impact Statement will each be evaluated for these impacts. These comments are provided pursuant to the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

The Alternatives are: A: Collaboration with interested parties for science- and education-focused operations with reduced NSF-funded scope; B: Collaboration with interested parties for operation as a technology and education park; C: Mothballing of facilities (suspension of operations in a manner such that operations could resume efficiently at a later date); D: Deconstruction and site restoration; and a No-Action Alternative, with continued NSF investment for science-focused operations. None of the five Alternatives would involve tree clearing; therefore, the Service concurs with NSF's determination that any Alternative selected by NSF would have no effect on federally listed bat species, and no biological assessment or further section 7 consultation under the ESA is required with the Service.

Should project plans change or amendments be proposed that we have not considered in your proposed action, or if additional information on listed and proposed species becomes available, or if new species become listed or critical habitat is designated, this assessment may be reconsidered. If you have any questions regarding this letter, please contact Amanda Selnick of my staff at (304) 636-6586, Ext. 24, or at the letterhead address.

Sincerely,

John E. Schmidt
Field Supervisor

United States Department of the Interior

FISH AND WILDLIFE SERVICE

West Virginia Field Office
694 Beverly Pike
Elkins, West Virginia 26241

Contact Name: Elizabeth Pentecost

Email Address or Fax Number: epenteco@nsf.gov

FWS File # 2017-I-0068 All future correspondence should clearly reference this file #.

Project: Green Bank Observatory Changes, Pocahontas County

Date of Letter Request: March 17, 2017

This is in response to your letter requesting threatened and endangered species information in regard to the proposed project listed above. These comments are provided pursuant to the Endangered Species Act (ESA, 87 Stat. 884, as amended; 16 U. S. C. 1531 *et seq.*).

We have made a "no effect" determination that the project will not affect federally listed endangered or threatened species. Therefore no biological assessment or further section 7 consultation under the ESA is required with the Fish and Wildlife Service. Should project plans change or amendments be proposed that we have not considered in your proposed action, or if additional information on listed and proposed species becomes available, or if new species become listed or critical habitat is designated, this determination may be reconsidered.

Definitive determinations of the presences of waters of the United States, including wetlands, in the project area and the need for permits, if any, are made by the U.S. Army Corps of Engineers. They may be contacted at Huntington District, Regulatory Branch, 502 Eighth Street, Huntington, West Virginia, 25701, telephone (304) 399-5710.

03/28/2017
Reviewer's signature and date

3/29/2017
Field Supervisor's signature and date

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

DIVISION OF ASTRONOMICAL SCIENCES

March 16, 2017

Ms. Elizabeth Stout, Biologist
U.S. Fish and Wildlife Service
West Virginia Ecological Services Field Office
694 Beverly Pike
Elkins, WV 26241

Subject: Determination of Impacts for Proposed Changes to Green Bank Observatory, Green Bank, West Virginia

Dear Ms. Stout:

In October 2016, the National Science Foundation (NSF) requested input on relevant issues that would influence the scope of the environmental analysis needed to evaluate NSF's proposed operational changes due to funding constraints for the Green Bank Observatory, in Green Bank, West Virginia. Figure 1 provides the location of the Observatory.

The U.S. Fish and Wildlife Service (the Service) response, dated October 20, 2016, indicated that the NSF Proposed Action would have the potential to affect the endangered Indiana bat (*Myotis sodalis*) and the threatened northern long-eared bat (*Myotis septentrionalis*). No other species were identified by the Service as being potentially affected by the Proposed Action. Further, no critical habitat was identified by the Service in the project area.

There are four Action Alternatives, in addition to the No-Action Alternative (continued NSF investment for science-focused operations), that are under consideration by NSF, including the following:

- Collaboration with interested parties for science- and education-focused operations with reduced NSF-funded scope.
- Collaboration with interested parties for operation as a technology and education park.
- Mothballing of facilities (suspension of operations in a manner such that operations could resume efficiently at some future date).
- Deconstruction and site restoration.

The attached *Alternatives Considered* document provides descriptions of the considered action alternatives. Figure 2 shows the structures that are on the Observatory.

The Indiana bat and the northern long-eared bat were identified as potentially using the general area for foraging and roosting between April 1 and November 15. In addition, the Service identified that the Observatory was within an Indiana bat hibernacula known use area.

Via a site evaluation, NSF has determined that deconstruction, including staging and support areas, under the considered alternatives would be confined to existing disturbed areas where vegetation is landscaped

and maintained in a mowed state. See Figure 3 for photographs that depict the landscape at the Observatory. Undeveloped portions of the Observatory property would not be disturbed under any of the alternatives. No removal of trees greater than 3-inch diameter breast height and no disturbance to forested habitats would occur. Additionally, based on field observations there are no caves or mine openings at or adjacent to any of the structures that would be deconstructed. Foraging habitat is not likely to be affected due to the lack of meaningful habitat around the structures to be deconstructed and because no forest clearing would occur as part of the Proposed Action.

Because NSF is avoiding impacts to the Indiana bat, an Indiana Bat Conservation Plan has not been developed. Forested areas will be clearly marked as off limits during construction.

Because there would be no tree removal, no disturbance of forested habitats, and no disturbance of caves or mine openings, NSF has determined that its Proposed Action would not affect the endangered Indiana bat or the threatened northern long-eared bat.

No critical habitat has been designated within the Observatory boundary. There would be no potential for adverse modification of critical habitat for any listed species under the Proposed Action.

The NSF requests concurrence with this no effect determination. Because there would be no effects to listed species, additional consultation under Section 7 of the Endangered Species Act is not necessary for this project.

The NSF point-of-contact for the NEPA analysis is Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Boulevard, Arlington, Virginia 22230; telephone: (703) 292-4907; email: epenteco@nsf.gov.

We appreciate your assistance in this matter and look forward to your response. If you require any additional information or documentation, please contact Ms. Pentecost.

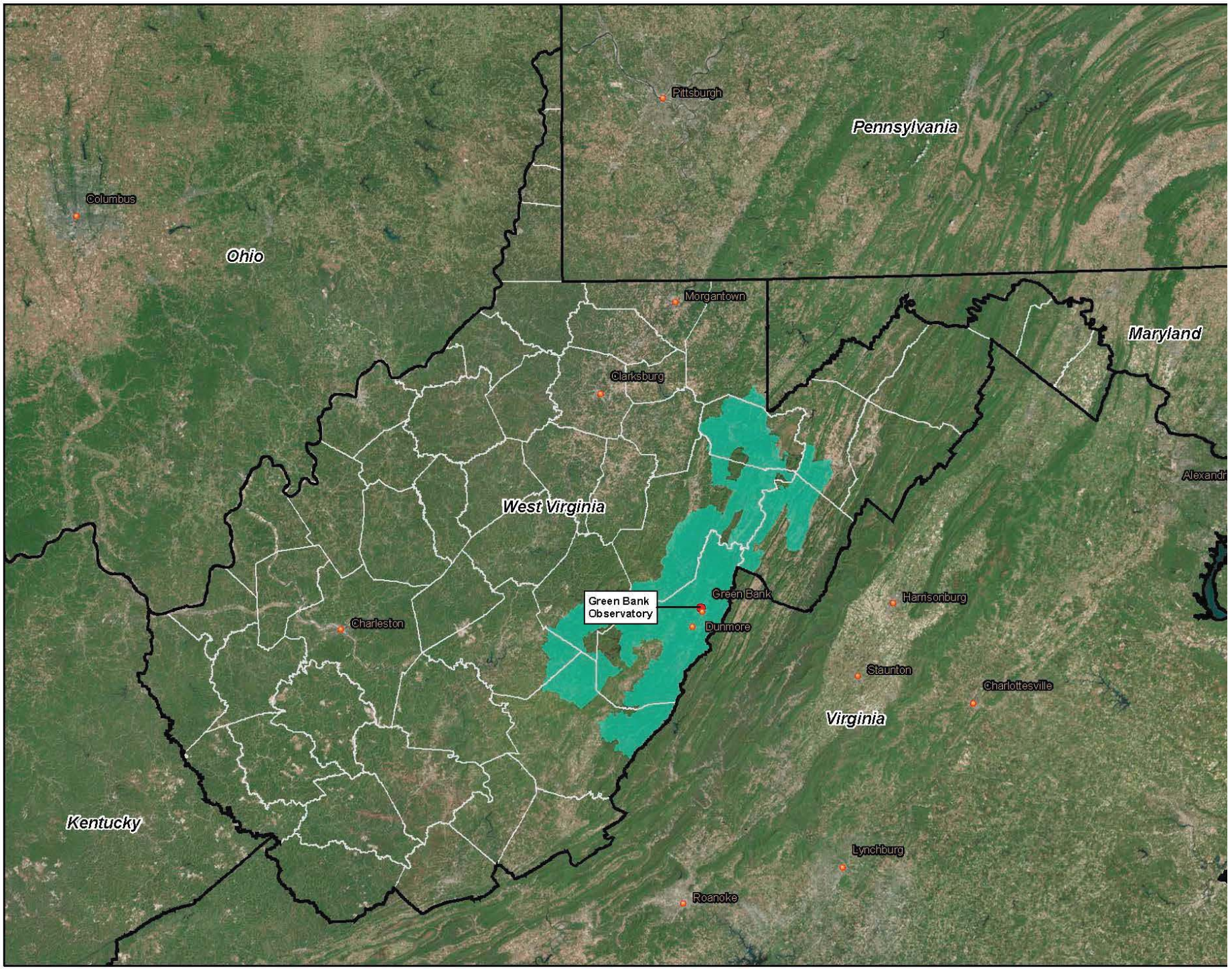
Sincerely,

Ralph Gaume

Ralph A. Gaume
Acting Division Director

Enclosure: Figure 1 Project Location Map
Figure 2 Site Layout
Figure 3 Photographs
Description of Alternatives

Cc: K. Hamilton
M. Rau



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Alternatives Considered

This section describes the proposed Alternatives to be considered in the Draft Environmental Impact Statement (DEIS). The basis for these proposed Alternatives was input received from the scientific community.

Action Alternative A: Collaboration with Interested Parties for Science- and Education-focused Operations with reduced NSF-funded Scope

Action Alternative A would involve collaborations with new stakeholder(s) who would use and maintain Green Bank Observatory (GBO) for science- and education-focused operations. The National Science Foundation (NSF) would reduce its funding of the Observatory and the new stakeholder(s) would be responsible for future maintenance and upgrades. Action Alternative A would involve the least change to the current facility and would retain the Green Bank Telescope, other appropriate telescopes, and appropriate supporting facilities for education and research as determined by NSF and the new and/or existing stakeholder(s). Any structures not needed to meet the anticipated operational goals would be safe-abandoned[1], mothballed[2], or deconstructed as appropriate, and the resulting implementation activities are anticipated to be like those found under Action Alternatives C and D (discussed below) for those structures.

This proposed Alternative is defined by the reduction of NSF funding and the continuance of science- and education- focused operations, not the disposition of any one facility or structure. Because reduction of NSF funding may require the safe-abandonment, mothballing, or deconstruction of facilities, this DEIS describes this proposed Alternative under the most conservative (highest impact) scenario in terms of NSF's analysis of potential changes to facilities, so that it may be inclusive of the full range of potential environmental impacts. Table 1 provides a detailed list of facilities identified for potential retention, deconstruction, safe-abandonment, or mothballing under this Alternative, for the purpose of NSF's environmental review. However, it must be emphasized that a collaboration may not require the full extent of activities analyzed, and could involve none of the activities listed in Table 1, or a subset of the activities. NSF's Record of Decision would contain an explanation of which components of any selected proposed Alternative would be implemented.

The anticipated activities to implement any required deconstruction under Action Alternative A include the following:

- Prepare buildings and structures to be mothballed and turn off non-essential utilities. See Table 1 for a list of facilities to be mothballed.
- Prepare facilities to be safe-abandoned, including installing security fencing and turning off utilities.
- 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 using hammerhoes, jackhammers, and other heavy equipment.

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[1] Safe-Abandonment: To remove a building or facility from service without demolishing it. This includes removing furnishings, disconnecting utilities, and isolating the structure from public access by fencing or other means to reduce fall and tripping hazards and preclude vandalism. The structure is also made secure from environmental damage due to wind, rain, humidity, and temperature extremes. Pest and insect damage must also be taken into account and biodegradable items must be removed to the maximum extent practicable. Under safe-abandonment, the structures would never be brought back to operational status.

[2] Mothball: To remove a facility or structure from daily use while maintaining the general condition for a defined period. Equipment and structures are kept in working order but are not used.

- Segregate, load, and transport waste materials to appropriate offsite landfills and recycling centers.
- Establish soil in areas where buildings were removed from bedrock and landscape areas of bare soil.

The period for any required deconstruction for Action Alternative A is expected to last 21 weeks. All structures that would be deconstructed are within areas that are maintained with mowed landscape grasses. Additional maintained areas are available for staging and support during deconstruction. No tree removal or disturbances to unmaintained areas would be necessary to deconstruct the structures.

Operations would be expected to continue at non-affected facilities during any scheduled deconstruction activities. Deconstruction activities that could interfere with the use of the Green Bank Telescope and other telescopes and data collection would be coordinated with GBO staff to minimize the potential for disrupting scientific work.

Operations after any scheduled deconstruction activities would be similar to current operations.

This proposed Alternative would meet the purpose and need of reducing the funding required from NSF, while allowing continued benefits to the scientific and educational communities. However, implementation of this proposed Alternative could only occur if new and/or existing collaborators come forward to participate as collaborating parties with viable proposed plans to provide additional non-NSF funding in support of their science- and education-focused operations. Collaborators are being sought and could include agencies, educational institutions, industrial or commercial ventures, or private individuals.

Action Alternative B: Collaboration with Interested Parties for Operation as a Technology and Education Park

Action Alternative B would involve collaborating with outside entities to operate and maintain GBO as a Technology and Education Park. In this scenario, the site would have more of a tourism and local attraction focus and the Science Center, residential hall, cafeteria, and 40-foot telescope would remain.

This Alternative is defined by the reduction of NSF funding and the use of the site as a technology and education park. Because reduction of NSF funding may require the safe-abandonment, mothballing, or deconstruction of facilities, this DEIS describes this Alternative under the most conservative (highest impact) scenario in terms of NSF's analysis of potential changes to facilities, so that it may be inclusive of the full range of potential environmental impacts. Table 1 provides a detailed list of facilities identified for potential retention, deconstruction, safe-abandonment, or mothballing under this proposed Alternative, for the purpose of NSF's environmental review. However, it must be emphasized that a collaboration may not require the full extent of activities analyzed, and could involve none of the activities listed in Table 1, or a subset of the activities. NSF's Record of Decision would contain an explanation of which components of any selected proposed Alternative would be implemented.

The anticipated activities to implement deconstruction activities associated with Action Alternative B include the following:

- Prepare buildings and structures to be mothballed and turn off non-essential utilities.
- Prepare facilities to be safe-abandoned, including installing fencing and turning off utilities.
- Conduct a hazardous materials assessment for ACM, LBP, and other conditions of concern for structures to be deconstructed. Remediate as necessary.

- Deconstruct or safe-abandon facilities that are no longer needed. Concrete buildings would be removed using hammerhoes, jackhammers, and other heavy equipment.
- Segregate, load, and transport waste materials to appropriate offsite landfills and recycling centers.
- Establish soil in areas where buildings were removed from bedrock. Landscape areas of bare soil.

The deconstruction period for Action Alternative B is expected to last 22 weeks. All structures that would be deconstructed are within areas that are maintained with mowed landscape grasses. Additional maintained areas are available for staging and support during deconstruction. No tree removal or disturbances to unmaintained areas would be necessary to deconstruct the structures.

Operations would be expected to continue during deconstruction activities. Deconstruction activities that could interfere with the use of the 40-foot telescope and data collection would be coordinated with GBO staff to minimize the potential for disrupting scientific work.

Operations after deconstruction would be comparable to current operations. It is anticipated that a staff comparable in size to current operations would work onsite under this proposed Alternative.

Action Alternative C: Mothballing of Facilities

Action Alternative C would involve mothballing (preservation of) essential buildings, telescopes, and other equipment, with periodic maintenance to keep them in working order. This method would allow the facility to suspend operations in a manner that would permit operations to resume efficiently at some time in the future. It is not known what type of operations would be implemented when the mothball phase ends. Operations at the time of resumption could be similar to current operations, other science-based operations, education-based operations, or some other type of operations. Because of this uncertainty, it is assumed impacts after resumption of operations would be similar to Alternatives A and B and the resumption of operations under Alternative C is not considered part of this proposed Alternative.

Supporting structures would be evaluated to determine whether they are critical to the operation of the telescopes. Based on input NSF received from the scientific community, up to nine structures and facilities may be determined to be obsolete and not needed. Any such structures would be removed. Table 1 provides a detailed list of the nine facilities that would be removed, and the 45 facilities that would be mothballed under this proposed Alternative.

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, keeping roofs and gutters cleaned of debris, and performing ground maintenance and pest control, would be implemented. Lubrication and other deterioration-preventing measures would be required on the remaining telescopes.

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 not needed for periodic maintenance would be removed from the site. Equipment, tools, machinery, furniture, and ancillary items that would not be needed for resumption of operations and that have salvage value would be disposed of in accordance with federal law.

Site restoration to establish landscaping where buildings were previously located would occur. Gates and fencing would be evaluated to determine whether upgrades would be needed to provide appropriate security and access around portions of the site that would require protection.

The anticipated activities to implement the deconstruction components of Action Alternative C include the following:

- Prepare buildings and structures to be mothballed and turn off non-essential utilities.
- Conduct a 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 using hammerhoes, jackhammers, and other heavy equipment.
- Segregate, load, and transport waste materials to appropriate offsite landfills and recycling centers.
- Establish soil in disturbed areas where buildings were removed from bedrock. Landscape areas of bare soil.
- Complete other limited site restoration activities.
- Establish site security and facilities maintenance.

The deconstruction period for Action Alternative C is expected to last 24 weeks. All structures that would be deconstructed are within areas that are maintained with mowed landscape grasses. Additional maintained areas are available for staging and support during deconstruction. No tree removal or disturbances to unmaintained areas would be necessary to deconstruct the structures.

Landscaped areas would be maintained during the mothball period. All infrastructure related to the telescopes would be conditioned for safe storage to prevent degradation of equipment and allow operations to be restarted. Regular vegetation maintenance would be implemented to keep vegetation from overgrowing the dishes.

For purposes of the analyses in this DEIS, it is assumed operations would be suspended for an indefinite time and then resumed at some point in the future. It is anticipated that technical staff responsible for operating the telescopes, scientific support staff, and cafeteria workers would not be retained. However, it is expected that current staffing levels for facilities maintenance would mostly remain the same under this proposed Alternative due to the level of maintenance required to keep the infrastructure operable.

Action Alternative D: Deconstruction and Site Restoration

Action Alternative D involves the removal of all structures. Table 1 provides a list of all of the facilities that would be removed under Action Alternative D.

Deconstruction would be accomplished using conventional demolition equipment (cranes, hydraulic excavator equipped with hydraulic-operated shears, grapplers, and hoe rams), other conventional heavy and light duty construction equipment, trades personnel, and trained demolition crews. For safe demolition of the Green Bank Telescope, 43-meter telescope, and water tower, initial demolition (bringing structures to ground level) would be accomplished using explosives (in the form of shaped charges) and conventional demolition/construction equipment.

Equipment, tools, machinery, furniture, and ancillary items that have a salvage value could be transported to another NSF facility, sold, or donated by GBO prior to demolition activities. All remaining facilities and structures (with exception of existing perimeter fencing) would be demolished including exposed below grade structures (to a maximum of 4 feet to enable the restoration of the ground surface topography without limiting future surface operations or activities where foundations exist to beyond that depth).

The anticipated activities to implement the deconstruction activities of Action Alternative D include the following:

- Turn off and cap utilities.
- Conduct a hazardous materials assessment for ACM, LBP, and other conditions of concern for structures to be deconstructed. Remediate as necessary.
- Demolish structures identified in Table 1.
- Flush or otherwise clean and drain wastewater treatment pond. Evaluate need to remove sludge from bottom and fill pond in with soil.
- Demolish all ancillary structures including roads, airstrip, building, sheds, fences (except for perimeter), and gates.
- Segregate, load, and transport waste materials 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.

The deconstruction period for Action Alternative D is expected to last 36 weeks. All structures that would be deconstructed are within areas that are maintained with mowed landscape grasses. Additional maintained areas are available for staging and support during deconstruction. No tree removal or disturbance to unmaintained areas would be necessary to accomplish deconstruction.

Areas revegetated following deconstruction activities would be maintained for a period of up to 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 GBO would cease. It is anticipated that under this proposed Alternative that staffing levels would not be maintained.

yzed in this DEIS, by Alternative

on Alternative A: Collaboration with Interested s for Science- and Education-focused Operations with Reduced NSF-funded Scope	Action Alternative B: Collaboration with Interested Parties for Operation as a Technology and Education Park	Action Alternative C: Mothballing of Facilities	Action Alternative D: Complete Deconstruction and Site Restoration
hat the deconstruction, safe-abandoning, and alling activities described below are meant to e the most inclusive and conservative (in terms of nmental impacts) scenario, but none of these es, or a subset of these activities, may ultimately sen based on the needs of the collaboration, this proposed Alternative be selected.	Note that the deconstruction, safe-abandoning, and mothballing activities described below are meant to describe the most inclusive and conservative (in terms of environmental impacts) scenario, but none of these activities, or a subset of these activities, may ultimately be chosen based on the needs of the collaboration, should this proposed Alternative be selected.		
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-foot Telescope 00-foot Telescope Control Building (Laser Lab) elescope 85-1 (Tatel Telescope) elescope 85-2 elescope 85-3 ontrol Building -1 Control Building terferometer Range Barns terferometer Range Concrete Slab iscellaneous Yard Items including the Calibration orn aint Shop Building ecreation Area ut Bin innaberry acey House eard House ll House ouse 2 ouse 3 ouse 4 ouse 5 ouse 6 ouse 7 ouse 8	1. 45-foot Telescope 2. 300-foot Telescope Control Building (Laser Lab) 3. Coaxial Cable Building 4. Telescope 85-1 (Tatel Telescope) 5. Telescope 85-2 6. Telescope 85-3 7. Control Building 8. 85-1 Control Building 9. Interferometer Range Barns 10. Interferometer Range Concrete Slab 11. Miscellaneous Yard Items including the Calibration Horn 12. Paint Shop Building 13. Recreation Area 14. Nut Bin 15. Shinnaberry 16. Redwood House 17. Tracey House 18. Riley House 19. Beard House 20. Hill House 21. Hannah House 22. House 2 23. House 3 24. House 4	1. Telescope 85-1 (Tatel Telescope) 2. Telescope 85-2 3. Telescope 85-3 4. Control Building 5. 85-1 Control Building 6. Interferometer Range Barns 7. Interferometer Range Concrete Slab 8. Miscellaneous Yard Items including the Calibration Horn 9. Beard House	1. 20-meter Telescope 2. 40-foot Telescope 3. 43-meter Telescope (140-foot Telescope) 4. 45-foot Telescope 5. 300-foot Telescope Control Building (Laser Lab) 6. Coaxial Cable Building 7. Bunk House (Dormitory) 8. Green Bank Telescope 9. Reber Radio Telescope 10. Jansky Replica Antenna 11. Ewen-Purcell Horn 12. Telescope 85-1 (Tatel Telescope) 13. Telescope 85-2 14. Telescope 85-3 15. Control Building 16. 85-1 Control Building 17. Interferometer Range Barns 18. Interferometer Range Concrete Slab 19. New and Old Jansky Laboratory 20. Maintenance Lot (Laydown Yard) 21. Miscellaneous Yard Items including the Calibration Horn 22. Paint Shop Building (Paint Booth) 23. Science Center

yzed in this DEIS, by Alternative

on Alternative A: Collaboration with Interested s for Science- and Education-focused Operations with Reduced NSF-funded Scope	Action Alternative B: Collaboration with Interested Parties for Operation as a Technology and Education Park	Action Alternative C: Mothballing of Facilities	Action Alternative D: Complete Deconstruction and Site Restoration
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-meter Telescope -meter Telescope (140-foot Telescope)	1. 20-meter Telescope 2. 43-meter Telescope (140-foot Telescope) 3. Green Bank Telescope	None	None
eber Radio Telescope nsky Replica Antenna wen-Purcell Horn	1. Reber Radio Telescope 2. Jansky Replica Antenna 3. Ewen-Purcell Horn	1. 20-meter Telescope 2. 40-foot Telescope 3. 43-meter Telescope (140-foot Telescope) 4. 45-foot Telescope 5. 300-foot Telescope Control Building	None

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From:	Pentecost, Elizabeth A.
To:	Rau, Michelle/COS
Subject:	FW: Notice of Intent To Prepare an Environmental Impact Statement and Initiate Consultation for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia; Notice of Public Scoping Meetings and Comment Period [EXTERNAL]
Date:	Thursday, October 20, 2016 8:55:26 AM

FYI

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." <epenteco@nsf.gov>
Date: Wednesday, October 19, 2016 at 1:51 PM
To: "Schmidt, John" <john_schmidt@fws.gov>
Cc: Caroline Blanco <cblanco@nsf.gov>, "Hamilton, Kristen" <KRIHAMIL@nsf.gov>, "Pentecost, Elizabeth A." <epenteco@nsf.gov>
Subject: Re: Notice of Intent To Prepare an Environmental Impact Statement and Initiate Consultation for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia; Notice of Public Scoping Meetings and Comment Period

Dear Mr. Schmidt,

Thank you for your email regarding the EIS for Green Bank Observatory. Tree removal could occur if necessary to implement the alternative that is ultimately chosen. Because certain alternatives require deconstruction activities (which may or may not involve tree removal), it would be helpful for NSF to hear about any resource concerns relating to trees (or trees as habitat) in the project area so we can be sure to accurately assess potential impacts in the EIS. Given that we expect to consult with your office per Section 7 of ESA, we'd be happy to coordinate a teleconference with you if that might be helpful at any point in this process.

We look forward to working with your office on this 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: "Schmidt, John" <john_schmidt@fws.gov>
Date: Wednesday, October 19, 2016 at 11:36 AM
To: "Pentecost, Elizabeth A." <epenteco@nsf.gov>
Subject: Re: Notice of Intent To Prepare an Environmental Impact Statement and Initiate Consultation for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia; Notice of Public Scoping Meetings and Comment Period

Elizabeth,

Will there be any tree clearing associated with activities associated covered by the EIS?

John Schmidt

John E. Schmidt
Field Supervisor
U.S. Fish and Wildlife Service
West Virginia Field Office
694 Beverly Pike
Elkins, WV 26241
304-636-6586 x 16
304-904-8611 work cell
http://www.fws.gov/westvirginiafieldoffice/index.html

On Wed, Oct 19, 2016 at 10:58 AM, Pentecost, Elizabeth A. <epenteco@nsf.gov> wrote:

> Dear interested party:
>
> Please see the attached Notice of Intent (NOI) to Prepare an Environmental Impact Statement and Initiate Section 106 Consultation for Proposed Changes to Green Bank Observatory, Green Bank, WV and Notice of Public Scoping Meetings and Comment Period. As indicated in the NOI, scoping comments may be submitted to the National Science Foundation during the public comment period, which extends through November 19, 2016, via this email (envcomp-AST-greenbank@nsf.gov) or via mail to Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite 1045, 4210 Wilson Blvd, Arlington VA 22230. Comments may also be provided during the public scoping meeting scheduled for November 9, 2016 at the following location:

November 9, 2016, 3:00 p.m. - 5:00 p.m. and 6:00 pm – 8:00 p.m.
Green Bank Science Center
155 Observatory Road
Green Bank, WV 24915
Tel: 304-456-2011

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

If you wish to be removed from or added to this email distribution list, please reply to this email indicating as such.

Appendix 3.2A

Cultural Resource Evaluation

FINAL

Cultural Resources Evaluation

Green Bank Observatory
Green Bank, West Virginia

Prepared for

National Science Foundation

May 2016

ch2m

Executive Summary

This Cultural Resources Evaluation has been prepared for the Green Bank Observatory (GBO), a National Science Foundation facility located near Green Bank, West Virginia. Evaluation of the property is being conducted to assess potential effects on historic built environment properties from future divestment activities or alternate operational agreements.

Several of the telescopes at GBO are notable because they are more than 50 years old and have contributed to the development of astronomical research; some telescopes may also be notable due to their engineering design. The study of potential built environment resources in the project area was undertaken in order to characterize future needs with regard to cultural resource management and the effects of any divestment alternatives. The project's Area of Potential Effects (APE) was defined as the boundary of the existing GBO property. No archaeological work was included in the scope of this project. As such, this document only addresses the built environment. The background research included a search in the National Register Information System to identify any built environment resources within the proposed APE that had already been evaluated for inclusion in the National Register of Historic Places (NRHP). The field survey encompassed standing structures built in or before 1969, which is 46 years from the present year (2015). Archival research and interviews with observatory staff were conducted at GBO. Further online research was performed in order to produce a historic context for the observatory and surrounding region. All potential built environment resources that had not been previously evaluated within the GBO boundary were surveyed and assessed, including a determination of eligibility for listing in the NRHP. Buildings and structures were evaluated individually as well as part of a potential historic district.

The background research indicated that there is one NRHP-listed structure within the APE. The field work concluded that there are four telescope instruments on the property that are individually eligible for listing in the NRHP, including the Interferometer, which includes three large telescopes. Additionally, the GBO is an NRHP-eligible historic district. There are 44 built environment resources that contribute to the NRHP-eligible historic district. Therefore, there is a potential for adverse effects to historic properties from the divestment of the GBO site.

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Contents

Tables

Figures

Acronyms and Abbreviations

APE	Area of Potential Effects
CFR	Code of Federal Regulations
GBO	Green Bank Observatory
GBT	Robert C. Byrd Green Bank Telescope
NHPA	National Historic Preservation Act
NPS	National Park Service
NSF	National Science Foundation
NRAO	National Radio Astronomy Observatory
NRHP	National Register of Historic Places
NRQZ	National Radio Quiet Zone
SETI	Search for Extra-Terrestrial Intelligence
SHPO	State Historic Preservation Officer
USNO	United States Naval Observatory

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SECTION 1

Introduction

The National Science Foundation (NSF) is an independent federal agency created by Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense…" (NSF, 2014). NSF is the funding source for approximately 20 percent of all federally supported basic research conducted by America's colleges and universities (NSF, 2014). NSF fulfills its mission chiefly by issuing limited-term grants (currently about 10,800 new awards per year, with an average duration of 3 years) to fund specific research proposals that have been judged the most promising by a rigorous and objective merit-review system (NSF, 2014). Most of these awards go to institutions supporting individual investigators or small groups of investigators. Others provide funding for research centers, instruments, and facilities that allow scientists, engineers, and students to work at the outermost frontiers of knowledge.

NSF also funds equipment and infrastructure that is needed by scientists and engineers, but that is often too expensive for any one group or researcher to afford; examples of such major research equipment include optical and radio telescopes. NSF's Division of Astronomical Sciences is the primary supporter of the United States' ground-based astronomy efforts.

NSF's Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences, through a series of academic community-based reviews, 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. Facilities under consideration for divestment options include several telescopes and related structures located at Green Bank Observatory (GBO) in West Virginia.

GBO is part of the National Radio Astronomy Observatory (NRAO), a federally funded research and development center. GBO's primary instrument, the Robert C. Byrd Green Bank Telescope (GBT), is used by scientists around the world to study astronomy, chemistry, physics, and radar receiving by passively detecting radio waves.

GBO is a highly visible technical asset in the state of West Virginia. West Virginia University identifies astronomy as an important area of research and depends significantly on the observing capabilities of GBT. West Virginia University committed $1 million in fiscal year 2014-2015 to support astronomical research with GBT. The Green Bank facility also has a long history of science, technology, engineering, and mathematics education, including student training and mentorships through the outreach and training opportunities offered at the NRAO Center for Science Education, which is based at the Green Bank site. In all, more than 40,000 visitors each year pass through the Green Bank Science Center, including thousands of students, educators, and the general public who stay on site to take advantage of the educational facilities. The Green Bank facility holds numerous educational workshops and programs each year aimed at middle school- through post-graduate-age training, and the site mentors on average 10-15 undergraduate and graduate students each year (O'Neil, 2014).

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SECTION 2

Proposed Project

2.1 Project Description

NSF is looking for innovative and viable divestment options for GBO. This report provides NSF with the detailed information needed to assist with decision-making regarding appropriate divestment of the facilities. In order to characterize future needs with regard to cultural resource management and the effects of any divestment alternatives on historic properties, an evaluation was conducted of historic built environment resources at GBO for use in determining their potential eligibility for listing in the National Register of Historic Places (NRHP). The evaluation included all facilities that are more than 45 years old and have not yet been assessed for eligibility.

2.2 Area of Potential Effects

The Area of Potential Effects (APE) for this project is defined as the property boundary of GBO (Figure 2-1). The total geographic area of the observatory was determined as the APE to encompass all buildings and structures on the property that are 45 years old or older (at the time of this report) in order to determine if the GBO constituted a potential historic district that could be affected by the activities associated with the potential divestment of the site.

2.3 Property Setting

GBO is located on approximately 2,200 acres in Pocahontas County, West Virginia on federal land adjacent to the Monongahela National Forest. This land is owned by NSF and includes multiple parcels that were acquired by the U.S. Army Corps of Engineers in the 1950s, when GBO was formed as the first (and then, only) site of the National Radio Astronomy Observatory. GBO is located in the National Radio Quiet Zone, where all radio transmissions are limited. Having telescopes within the Radio Quiet Zone allows for the detection of faint scientific signals that otherwise would be drowned-out by man-made signals.

Pocahontas County has a population of approximately 9,000; the total population of Green Bank is 143, but a few hundred to several thousand more people live nearby in unincorporated areas, such as Arbovale. With approximately 120 people employed at NRAO-Green Bank, GBO is a significant employer and driver of the local economy, both through the local employees and a significant program of tourism and education. Approximately 40,000 visitors per year are served by the Green Bank Science Center, located on the grounds of GBO.

Green Bank is the anchor and administrative site of the 13,000-square-mile National Radio Quiet Zone (NRQZ). The Sugar Grove Research Facility of the Department of Defense is also located within the NRQZ; GBO personnel administer the NRQZ on behalf of Sugar Grove. In addition, there are individuals seeking to avoid health effects that they perceive from electromagnetic radiation who have chosen to live in the NRQZ as a “safe haven” from that radiation.

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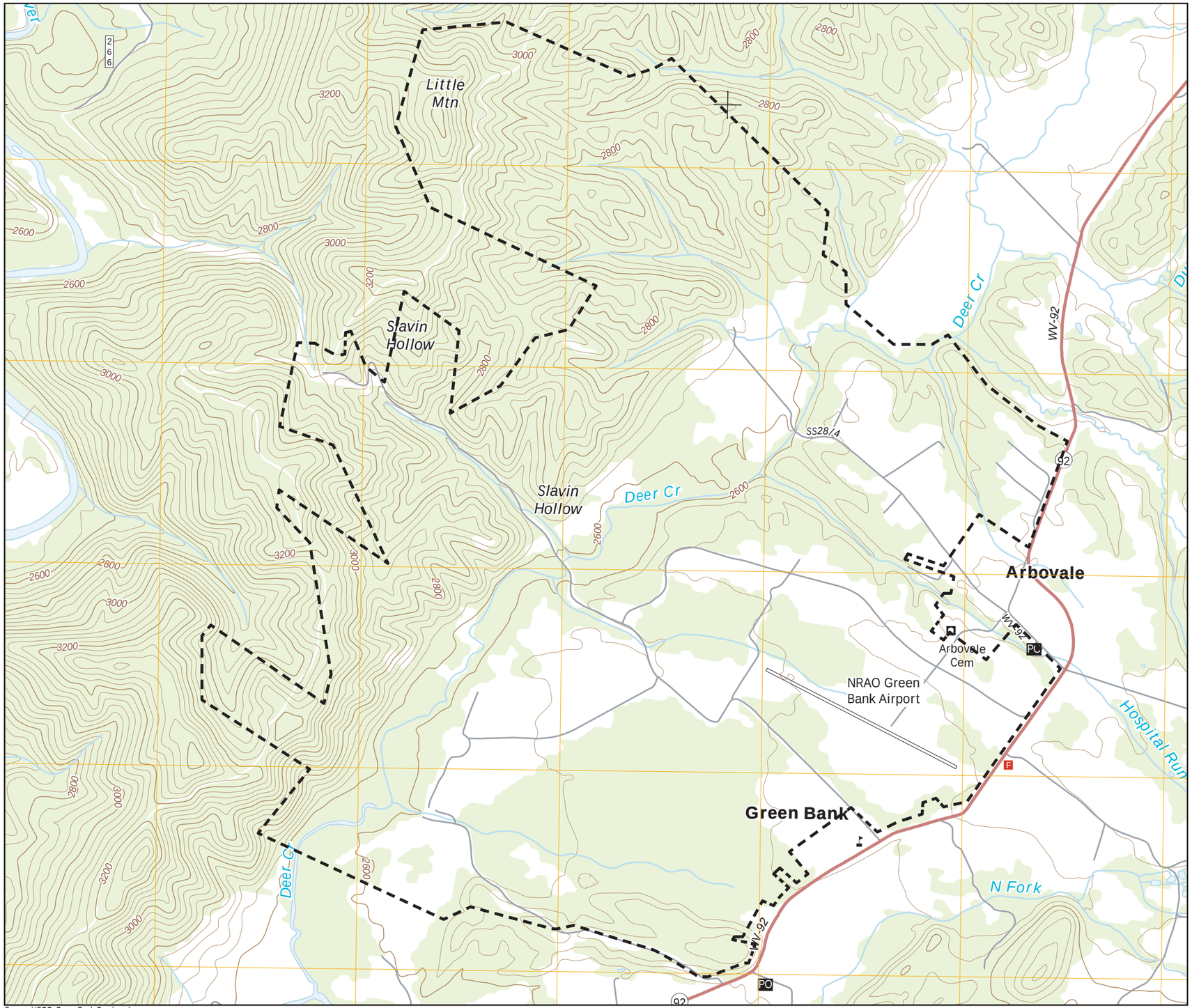

LEGEND

Area of Potential Effects (APE)

North

0 1,700

Approximate scale in feet

FIGURE 2-1
Area of Potential Effects (APE)
Green Bank Observatory
Green Bank, West Virginia

Source: USGS, Green Bank Quadrangle

ES111914104429SAC area_potential_effects_greenbank.ai 12-08-14 dash

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SECTION 3

Research and Field Methodology

MaryNell Nolan-Wheatley, a Secretary of the Interior-qualified architectural historian with CH2M HILL, checked the federal historic properties database in October 2014. A search in the NRHP online database, known as the National Register Information System, showed that the Reber Radio Telescope is the only structure or building located within GBO that is listed in the NRHP.

Field investigations were conducted at GBO October 6-9, 2014. The site visit to GBO was also used to engage GBO staff in informal interviews and to conduct archival research, including the review of historic photographs and narratives, newspaper articles, construction records, and architectural drawings.

Using aerial photographs of GBO and information provided by GBO staff, 47 built environment resources that had been constructed in or before 1969 were identified as extant within the APE. These include: Five telescope structures (one of which contains three large telescopes), 2 horn instruments, 1 antenna, 1 airstrip, 1 water tower, 1 recreation area, 24 residential buildings, and 12 operational and administrative buildings. As noted above, one of these telescopes, the Reber Radio Telescope, was previously evaluated; the Reber Radio Telescope was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The remaining 46 built environment resources in the APE built in or before 1969 were photographed and evaluated for NRHP eligibility. The year 1969 was chosen as it is 45 years from the year of the site visit (2014). The standard NRHP age threshold is 50 years; however, using 45 years as the cutoff allows a 5-year buffer for the execution of the Divestment Options Study. Data collected through the background research and field investigations were analyzed to determined NRHP eligibility of the 46 surveyed built environment resources individually. In addition, the GBT, which was constructed after 1969, was evaluated individually due to the exceptional importance to radio astronomy over the last 50 years. All 47 historic-era properties (constructed in or before 1969, including the Reber Radio Telescope) and the GBT were also evaluated as a potential historic district. Properties surveyed in 2014 are listed in Attachment A. The results of the survey are presented in Section 5 and Figure 5-1 shows the locations of all previously evaluated and surveyed built environment resources.

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SECTION 4

Historic Context

4.1 West Virginia and Pocahontas County

The first European Americans to settle west of the Allegheny Mountains, in what would become Pocahontas County, West Virginia, were Jacob Marlin and Stephen Sewell. The two settlers were living in what is today Marlinton, West Virginia, when Andrew Lewis, a surveyor hired by the Greenbrier Company, arrived in 1751 to conduct a land grant survey. According to legend, Sewell was living in a hollow sycamore tree when Lewis arrived. The early Euro American settlers in the area were met with significant opposition from the native population who had historically used the region for hunting. Numerous violent encounters ensued as Euro Americans continued to intrude into Native American territory well into the nineteenth century (Pocahontas County, 2013).

Originally, West Virginia was part of Virginia. During the Civil War, the eastern section of the state, which relied more heavily on a slave-based economy, seceded with the Confederacy while 50 counties in the northwestern part of the state, including Pocahontas County, joined the Union and were subsequently granted statehood in 1863 as West Virginia (Pocahontas County, 2013). The arrival of the railroad at the turn of the twentieth century allowed for a booming commercial timber and coal industry in West Virginia. Small railroad towns emerged throughout the region. Today, Pocahontas County is known for its natural beauty; the "Land is rich, forests are thick, and waters are abundant and clean" (Pocahontas County, 2013).

4.2 The Origins of Radio Astronomy (Karl G. Jansky and Grote Reber)

Until the twentieth century, astronomers were limited to what they could see or photograph in the visible spectrum of light – a relatively narrow band of wavelengths. This all changed in 1932, when Karl Jansky, a radio engineer at Bell Laboratories in Holmdel, New Jersey, was the first to establish that radiation at radio wavelengths was reaching the earth from interstellar space (Butowsky, 1989).

Karl G. Jansky started working for Bell Laboratories in New Jersey in 1928. While there, he became interested in static and other types of noise interference that were detectable in the Bell System transoceanic radio-telephone circuits. In order to explore his interest in static radio noise, Jansky constructed a rotating, 14.6-meter directional antenna system. Research he conducted using his antenna allowed him to detect three distinct categories of noise: Noise from local thunderstorms, noise from faraway thunderstorms, and a "steady hiss of static, the origin of which was unknown" (Butowsky, 1989). This mysterious third category of noise, the derivation of which was neither earth nor the solar system, spurred Jansky to continue his research in 1932. Jansky noted that changes in the hissing noise occurred every 23 hours and 56 minutes rather than every 24 hours. This time interval marks one rotation of the earth, or one day, when measured by the location of the stars instead of the sun. Jansky deduced from this information that the noise traveled from beyond our solar system, and instead originated in the center of the Milky Way galaxy. With this finding, Jansky had discovered "the existence of interstellar radio waves… [and] liberated astronomers from the confines of optical astronomy" (Butowsky, 1989). Despite the importance of Jansky's research, his discovery did not garner much initial interest from the science community.

Grote Reber was born in Chicago, Illinois in 1911. Electronics piqued Reber's interest throughout his childhood and when he was 16, he was awarded an amateur radio license that was signed by Secretary of the Interior Herbert Hoover. He studied electrical engineering and graduated in 1933 from the Illinois Institute of Technology, formerly known as the Armour Institute of Technology (Kellermann, 2002). Post-graduation, Reber worked at several Chicago-based companies, such as Stewart-Warner and Belmont Radio Corporation. Reber read about Jansky's discovery of interstellar radio waves in 1933 and set to work trying to further Jansky's research. Reber approached other astronomers to aid in his endeavor, but received little encouragement. However, Reber was undeterred. Later, when discussing this pivotal moment in his career, Reber stated: "In my estimation it was obvious that Jansky had made a fundamental and very important discovery. Furthermore, he had exploited it to the limit of his equipment facilities. If great progress were to be made it would be necessary to construct new and different equipment especially designed to measure the cosmic static" (Butowsky, 1989).

To continue Jansky's studies, Reber needed a new type of technology: a radio telescope. With no financial support from other astronomers or research institutions, Reber was left to construct this new equipment on his own. In preparation, he enrolled in several astronomy courses at the University of Chicago and took a hiatus from his job during the summer of 1937. He constructed the telescope himself by hand in his backyard in Wheaton, Illinois, the town where he had grown up. Four months and $4,000 later, Reber had constructed the first radio telescope for radio astronomical observations (Butowsky, 1989).

For 10 years after the completion of his telescope, Reber "worked practically alone in the field of radio astronomy" (Butowsky, 1989). His research established that Jansky's deductions were accurate and that the Milky Way indeed emits radio radiation. Reber published his findings and the first contour maps that showed the radio brightness of the Milky Way in the *Astrophysical Journal* in 1944. The telescope remained in use by Reber until 1948, when the National Bureau of Standards relocated the structure to a site in Sterling, Virginia and mounted it on a turntable. The telescope was moved again in 1952 to an observatory in Boulder, Colorado before it was purchased in 1957 by the NRAO and re-erected in Green Bank between 1959 and 1960. Reber oversaw the re-assembly of the historic structure in Green Bank. The Reber Radio Telescope was listed in the NRHP under Criteria A and C in 1972 and in 1989 it was designated a National Historic Landmark. The telescope's nomination form for designation as a National Historic Landmark states that the Reber Radio Telescope "demonstrated the importance of Jansky's discovery, and forever changed the science of astronomy" (Butowsky, 1989). An exact replica of the Jansky antenna (the Karl Guthe Jansky Replica Antenna) that was made in 1964 is also currently located in Green Bank, very near to the Reber Radio Telescope.

In addition to the Karl Guthe Jansky Replica Antenna and the Reber Radio Telescope, the GBO is also home to the Ewen-Purcell horn. The significantly smaller structure was the instrument used by Harold I. Ewen and Edward M. Purcell at the Lyman Laboratory of Physics at Harvard University to discovery free hydrogen gas in the Milky Way at a wavelength of 21 centimeters (in situ plaque). The structure was constructed in 1957 and relocated to GBO in 1963 (Lockman et al., 2007).

4.3 National Radio Astronomy Observatory

The radio receiver technology that became available during World War II was more complex and stable than any previous equipment used by Jansky or Reber. After the war, furthering the field of radio astronomy became an important scientific mission for countries around the world. The United States, however, lagged behind other nations, many of which had quickly established competitive radio astronomy programs. During an international radio astronomy conference that occurred in Washington, D.C. in January 1954, participants debated ways to spur progress in radio astronomy within the United States. Although universities and other research institutions were keen to participate in radio astronomy studies, the associated tools and equipment were often prohibitively expensive. Out of discussions

regarding this financial quagmire, the idea for the NRAO was formed, "The suggestion was made that a National Radio Astronomy Observatory [NRAO] be established, equipped with the expensive research tools not obtainable by other institutions, which would be available to all qualified scientists" (NSF, 1959). By May of that same year, the NSF agreed to fund a study done by the Associated Universities, Inc. on the feasibility of establishing the NRAO.

The feasibility study resulted in a report produced in 1956 entitled "Plan for a Radio Astronomy Observatory" in which various topics were discussed, including potential sites for the observatory, types of required equipment, and organizational and operational plans. As a result of the study, "The National Science Board decided that special Federal support of radio astronomy was required and that part of this support would be in the form of a national observatory" (NSF, 1959). The Associated Universities, Inc., which was contracted by the NSF, moved forward with the construction of the NRAO on November 17, 1956 (NSF, 1959). Also in 1956, the West Virginia Radio Astronomy Zone was established by state legislation that was the "first legislation in the world intended specifically to protect basic research" (Bouton, 2013). This was just 2 years before the Federal Communications Commission established the 13,000-square-mile NRQZ, which overlapped with the West Virginia Radio Astronomy Zone, in order to protect the radio receiving facilities in Green Bank and in Sugar Grove on a federal level (Bouton, 2013).

4.4 Green Bank Observatory: Origins and Development (NRHP-Eligible Historic District Facilities)

The sensitive nature of radio telescopes limits the number of potential locations to establish an observatory. Man-made radio noise from earth can interfere with signals from space, making it difficult to distinguish between various types of data collected. Additionally, severe weather can interfere with the functionality of radio telescopes. Geographic barriers, such as mountains, help isolate radio signals from space, making valleys an ideal location for the placement of radio telescopes. Green Bank in the Deer Creek Valley had several other appealing characteristics, in addition to its geographic location encircled by mountains, such as its rural surroundings, small population, and mild climate. A book produced by the NSF in 1959 titled *The National Radio Astronomy Observatory*, which provides a historical narrative of the early years of the NRAO site, states: "The large site was selected so that a number of telescopes could be installed and operated without mutual interference" (NSF, 1959). The decision to locate the observatory in Green Bank brought a great sense of pride to the region. A special dispatch in the *Pocahontas Times* dated July 26, 1956 is titled "Green Bank Assured of Great Astronomy Center: And How Truly Thankful We All Are!" and states that "West Virginia will become the world centre of research in radio-astronomy; when the National Science Foundation [NSF] constructs its new 'window to the Universe' at the site Green Bank" (*Pocahontas Times*, 1956).

The land for the "window to the Universe" was purchased by the U.S. Army Corps of Engineers on behalf of the NSF (NSF, 1959). Most of the land was purchased from families that had multi-generational farms established in the mid- to late-nineteenth century. The earliest pioneer in the area was Adam Arbogast who had settled most of the NRAO land in 1796 (Lockman et al., 2007). A field office was established in May 1957 and construction on an access road soon proceeded. On October 17, 1957, groundbreaking ceremonies were held and one year later, on October 16, 1958, the site's first telescope, the 85-foot Howard E. Tatel Telescope, was dedicated. The rotating Howard E. Tatel Telescope was erected on a polar mount by the Radio Construction Corporation under sub-contract with the Blaw-Knox Company (NSF, 1959; Lockman et al., 2007). The telescope's control building was constructed at the same time. Dr. Frank Drake used the Tatel Telescope to search for extra-terrestrial intelligence and subsequently, the "Tatel became famous in 1960 for performing the world's first SETI (Search for Extra-Terrestrial Intelligence) observations (Project Ozma)" (Stoke, 2014).

Following the dedication of the Tatel Telescope in 1958, construction on several buildings and structures on the site was initiated, including the 43-meter Telescope (also referred to as the 140-foot Telescope), the Calibration Horn, the Karl G. Jansky Laboratory, the residence hall, the works area building, the airstrip, and the renovations of pre-existing farm houses. The 43-meter Telescope was designed by Ned L. Ashton and the E.W. Bliss Company was the prime contractor. The drive and control system of the 210-foot-tall concrete telescope was constructed by the Electric Boat Division of General Dynamics Corporation. The telescope was described as "a steerable parabaloid more than one-third of an acre in area, capable of being pointed with a precision of a small fraction of a minute of arc" (NSF, 1959). The telescope operates through a hydraulic power system and the structure rotates on a massive, 17.5-foot diameter, steel ball-bearing that was designed by Stone and Webster. General Steel Industries poured the steel for the ball-bearing (Lockman et al., 2007). Although the foundation for the 43-meter Telescope was poured in 1958, the last surface panel was not secured on the dish until 1964 and dedication occurred in 1965. With its smooth, curving concrete exterior walls and tubular shaft, the structure has a ship-like, vaguely Streamline Moderne appearance. The construction of the telescope was an engineering feat with its massive parts fabricated off site and brought to rural Green Bank by truck for assembly. According to GBO staff, bridges over creeks and rivers in the area were reinforced to allow for the arrival of these massive parts. An elevated service tower that operates on tracks was constructed adjacent to the structure for maintenance purposes in 1970. Today, the telescope stands as both an engineering and scientific achievement – the "largest [telescope] in the world of any kind to use an equatorial (for polar-aligned) mount, so that it can follow objects in the sky by rotating on one axis, rather than a minute series of up-down, left-right movements, which is much easier to build" (Stoke, 2014).

The Calibration Horn, designed by Dr. John Findlay and known as "Little Big Horn," was also constructed in this early phase of site development by the Plant Maintenance Division (Lockman et al., 2007). Positioned at a 30-degree angle, the NSF historical narrative of the NRAO published in 1959 describes it as "a radio telescope of somewhat unusual design. It is technically known as a horn antenna…[that] is fixed in such a position that it can observe the strong radio source in Cassiopeia once each day, and will be used to measure accurately the energy of the incoming radio waves" (NSF, 1959). In this way, the horn's measurements were used for comparative purposes, to calibrate and standardize the other telescopes.

The Jansky Laboratory, completed in 1959, provided 5,000 square feet of electronic laboratory space. Scientists working in the Jansky Laboratory Building had access to electronic test and repair equipment; office, conference, and seminar rooms; and technical and computing assistance, "both human and mechanical" (NSF, 1959). A large addition was added to the laboratory in 1994-1996, although the original building is still visible and retains much of its original fabric. The works area building was also completed between 1958 and 1959, with an adjacent 100,000-gallon, elevated water tank (Bouton, 2013). The original drawings for the building were completed by Irving Bowman and Associates. Soon after the building was occupied in 1959, alterations were made in 1963 including the removal of two windows, replacement of other windows, and the addition of a concrete apron (Tippetts et al., 1963). The building has historically functioned as a machine shop, auto shop, and general maintenance facility.

The residence hall, completed in 1959, included a cafeteria, 16 dormitory rooms, a lounge, and four apartments. When the NRAO property was purchased in 1957, seven residential homes, including the Nut Bin, Hannah House, Beard House, Shinnaberry House, Tracy House, Hill House, and Riley House were located within the property boundary. Most of these had been constructed in the early twentieth century, with the exception of Hill House, which was constructed circa 1896. These properties were renovated and turned into residences for the onsite staff. The 1959 history of the NRAO notes that the renovated houses "are available to visiting scientists, and also newly arrived staff members until such time as permanent housing can be found in the neighboring communities" (NSF, 1959). The Nut Bin was used for administrative purposes and as an electronics lab from 1958 to 1960. Originally constructed in

1901-1902 by Irbe Beard, a descendent of early settlers in the area, the Nut Bin was moved to its current location south of the Presbyterian Church on Route 92 in 1969, at which point it also became a staff residence (Lockman et al., 2007). An addition was constructed on to Beard House and was used briefly in the 1960s as an experiment station, although currently the building is vacant.

Construction on the NRAO site continued during the early 1960s. The 300-foot telescope and its associated control building (now called the Laser Lab), which was shielded by steel mesh so as to not interfere with the massive instrument, were constructed in 1961-1962 (Ralston, 1961). In 1971, a 1,000-square foot addition to the control building was constructed. In 1988, the 300-foot telescope collapsed, crushing part of the control building. Although the telescope was completely destroyed, the control building was repaired and its use was changed to the Laser Lab for the range finder. In 1962, more telescopes, administration facilities, and residential buildings were added to the site. The 40-foot Telescope was constructed in 1962 and was the first fully automated radio telescope in the world (Lockman et al., 2007). The bermed, underground control room was constructed at the same time, along with several small pump houses, and the Radio Frequency Interference trailer. The warehouse (now used as a daycare facility) adjacent to the works area building, was constructed in 1963 (Hahn, 1963).

Two more 85-foot telescopes (85'-2 and 85'-3) were constructed in 1963-1964 and 1965-1968, respectively. Together with the original 85-foot telescope (hereafter referred to as 85'-1), the three structures formed the Interferometer: "Beginning in the late 1960s these [three] telescopes operated in unison as one single instrument serving to prove that the technique called 'interferometry' could be used to combine dishes to form immense telescopes" (Stoke, 2014). The 85'-2 and 85'-3 telescopes were identical to the 85'-1 telescope, except that they were on wheels. This design feature allowed the two structures to move along a linear axis. The Interferometer control building was constructed in 1967-1968 (HDMK, 1966). From the late 1960s, the Interferometer allowed NRAO scientists to perform aperture synthesis observations until 1978 when management of its operation was reassigned to the United States Naval Observatory (USNO). The three-telescope instrument's new task was to monitor the earth's rotation and polar motion (Bouton, 2013). The USNO used the equipment for this task until 1987, at which point the 85'-1 and 85'2 telescopes were used to monitor extragalactic and galactic variable sources. The Interferometer was shut down in 1996 for a few months, before a cooperative agreement was established between several institutions, including the NRAO and USNO, to observe galactic variable sources. In 2000, the Interferometer Range was closed (Bouton, 2013).

Construction of a collection of new houses was initiated in 1962 and completed by 1963. Seventeen of these remain extant. Of the existing residential buildings constructed circa 1962, 13 are nearly identical ranch houses with only slight variations in cladding or floor plan. The remaining four are nearly identical two-story, Colonial Revival houses that employ similar materials and design elements as the neighboring ranch houses. These ranch and Colonial Revival houses are mainly concentrated along the northeastern boundary of the NRAO site. The ranch style Redwood House (House #1) is located near the entrance to the NRAO site and historically served as the director's house. The house was added on to in 1975 and remodeled in 1977. Ten houses (Houses #2-11) are located in an area known as the Rabbit Patch just off of Route 92. The remaining houses (Houses # 14, 16, 19, 21, 23, and 24) are located on Hannah Run Road. Drawings for some of the houses were located in the Green Bank Archives and are signed by P. Hahn.

A recreation area was also constructed in the early 1960s and eventually included a basketball court (1963), swimming pool (circa 1964), picnic area (1964), shooting range (circa 1963), golf driving range, and small ski slope with ski lift (the driving range and ski slope with lift have since been removed). The recreation area was designed as a draw for scientists and their spouses and children. Family photos taken between 1960 and 1964 by scientist Bertil Hoglund and archived at GBO depict daily life for his wife and children at the NRAO site in Green Bank during the early years of the site's operation. According to the photos, it appears the Hoglund Family spent some time living in the Riley House and

participated in many jovial occasions in the recreation area, enjoying picnics, three-legged races for the children, and athletic competitions for the adults.

As described above, the 300-foot telescope collapsed in 1988. The Green Bank Telescope, later named as the Robert C. Byrd Green Bank Telescope, was conceived to replace the 300-foot Telescope and was funded via an appropriation from the U.S. Congress. Construction on the GBT started in 1991. The structure was dedicated in 2000. The GBT is the largest fully-steerable single-reflector telescope in the world and was a groundbreaking innovation in the world of radio astronomy (Stoke, 2013).

4.5 Green Bank Observatory: Today

By explaining the nature of the universe around him, the study of astronomy helped to dispel man's dependence on magic and superstition, to unfetter his mind, and to direct his imagination into useful and creative channels (NSF, 1959).

Hoglund's photographs capture life in the early years of the NRAO site and illustrate the strong sense of place that was established following its construction in 1958. The observatory was a small-scale yet fully functioning community, complete with scientific equipment, administrative buildings, laboratories, residences, and recreation facilities. Today, the collection of telescopes demonstrates a comprehensive, linear history of radio astronomical observation starting with Jansky's antenna and ending with the GBT. The 1959 historical narrative of the NRAO notes that "it is anticipated that the National Radio Astronomy Observatory [NRAO], in the heart of the populous eastern states, will attract fully as many" visitors, as other well-known observatories such as Mount Wilson and Palomar Observatories have, and predicts that "as the number of visitors grows, [the public education program] will be expanded" (NSF, 1959). This vision has indeed been fulfilled. Today, the GBO's operations include scientific operation in addition to development programs, observer community programming, and publications. There are five large, functioning telescopes in use and the site hosts 40,000 visitors per year, including students, educators, and the general public who generally stay on site for more than one night to take advantage of the educational facilities. The GBO facility is host to multiple educational workshops and programs each year for middle school through post-graduate student training, and an average of 10 to 15 undergraduate and graduate students are mentored at the facility each year.

SECTION 5

Results

5.1 Previously Identified Cultural Resources

One previously evaluated built environment resource is located within the APE. The Reber Radio Telescope was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986 (Table 5-1). The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

TABLE 5-1. Previously Evaluated Built Environment Properties within the APE
Cultural Resources Evaluation, GBO, West Virginia

Building/Structure Name	Year Built	Location	Status
Reber Radio Telescope	1937	Entrance to GBO	NRHP listed 1972; National Historic Landmark 1986

5.2 Survey

To be eligible for inclusion in the NRHP, a property must meet the requirements of at least one of the four primary NRHP criteria (National Park Service, 1997). Historic properties are those:

a) That are associated with events that have made a significant contribution to the broad patterns of our history; or

b) That are associated with the lives of persons significant in our past; or

c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

d) That have yielded or may be likely to yield, information important in prehistory or history.

In addition, properties must retain enough integrity to demonstrate their significance under the criteria. The NRHP recognizes seven aspects of integrity: setting, feeling, association, location, materials, design, and workmanship. Even if a property meets the criteria, it must retain sufficient integrity to convey that significance in order to be eligible for listing in the NRHP. Generally, properties must be at least 50 years of age to be eligible for the NRHP, unless they are proven to have exceptional importance. Criterion Consideration G applies to buildings that have achieved significance within the past 50 years.

Background research determined that one historic built environment resource, the Reber Radio Telescope, is listed in the NRHP (1972) and is a National Historic Landmark (1986) (Photograph 1).

5.2.1 Individual Resource Eligibility Determinations

Within the historical context of NRAO/GBO, there are four telescope instruments that are individually eligible for listing in the NRHP: The Interferometer Range, the 40-foot Telescope, the 43-meter Telescope, and the GBT (Photographs 2-5 and Table 5-2).

Photo 1: NRHP-listed and National Historic Landmark Reber Radio Telescope, entrance of GBO.

Photos 2-5 (clockwise from top left): The Green Bank Interferometer with the 85'-2 and 85'-3 Telescopes visible; 40-foot Telescope; a section of the 2.3-acre collecting dish of the GBT; and 43-meter Telescope.

TABLE 5-2. NRHP-Eligible Built Environment Resources within the APE
Cultural Resources Evaluation, GBO, West Virginia

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
GBO Historic District	1958-2000	Collection of administrative/operational structures, residential buildings, and radio astronomy equipment associated with the NRAO/GBO.	Eligible (Historic District); 44 contributing resources (Attachment A)
Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building	1958-1959 1963-1964 1965-1968	The Tatel Telescope (85'-1) was the first telescope constructed by the NRAO and performed the world's first SETI observations. The Interferometer Range connected two nearly identical telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the construction of the Very Large Array telescope in New Mexico in the 1970s.	Individually eligible and contributing to GBO Historic District
40-foot Telescope and control building	1962	First fully automated radio telescope in the world. Currently operates as an educational telescope for visiting students.	Individually eligible and contributing to GBO Historic District
43-meter Telescope	1958-1965	Largest telescope in the world to use an equatorial (for polar aligned) mount. Currently used as part of the Russian Radioastron project.	Individually eligible and contributing to GBO Historic District
Robert C. Byrd Green Bank Telescope (GBT)	1991-2000	Largest moving structure on land in the world; tilt and point design that can rotate a full 360 degrees; highly sensitive data collection is "unmatched" by any other telescope in the world (Stoke, 2014).	Individually eligible and contributing to GBO Historic District

The Interferometer Range (including the Tatel [85'-1] Telescope, 85'-2 Telescope, and 85'-3 Telescope), the 40-foot Telescope, and the 43-meter Telescope are all eligible under Criterion A for their important association with events that have made a significant contribution to radio astronomy. The 43-meter Telescope is also eligible under Criterion C for its design and engineering. These telescopes maintain all seven aspects of integrity, including materials, design, workmanship, feeling, association, location, and setting. The GBT is eligible under Criteria A and C, Consideration G for achieving exceptional importance within the last 50 years thanks to its remarkable design and function. The GBT is eligible under Criterion A for its important association with recent scientific developments in radio astronomy. The result of years of radio astronomy innovation at GBO, the GBT has realized unparalleled capabilities, including "unmatched sensitivity to diffuse clouds of gas and dust that feed star and galaxy formation" (Stoke, 2014). The massive instrument is able to collect data a total of 6,500 hours each year and interact with other, distant astronomy instruments to amass unprecedented amounts of information used by scientists around the world (NRAO, 2014b). A slideshow presentation prepared by the NRAO called "NRAO's Green Bank WV Site: The History of Radio Astronomy on Display" states that the GBT is "'historic' in that it represents the likely culmination of the era of enormous single dishes in radio astronomy" (Stoke, 2014). It is able to fulfill its function thanks to the structure's innovative and noteworthy design including its massive collecting dish with 2,200 aluminum panels that can rise and fall by 1 inch, its complex welded steel shaft structure, its ability to fully rotate 360 degrees, its unblocked

aperture, and its single focal plane. All of these design features combine to form a highly sensitive instrument that can retrieve data from 85 percent of the "celestial sphere" (NRAO, 2014b). Therefore, the GBT is eligible for the NRHP under Criteria A and C.

Three radio astronomy instruments and one telescope located within the boundaries of GBO are significant for their association with important events or people related to radio astronomy or for their design, but are not individually eligible for listing in the NRHP due to a lack of integrity. These include: the Calibration Horn, the Jansky Replica Antenna, the Ewen-Purcell Horn, and the 45-foot Telescope (Photographs 6-9).

Photographs 6-9 (clockwise from top left): Calibration Horn; Karl Guthe Jansky Replica Antenna; 45-foot Telescope; and Ewen-Purcell Horn. These structures have significant historic associations but are not individually NRHP-eligible.

The Calibration Horn (1958) is a significant instrument within the history of the NRAO, as it was the standard by which all other measurements at the observatory were made. However, the horn is currently unused and is heavily obscured by vegetation. As a non-functioning instrument in an overgrown condition, the horn has lost integrity of setting and feeling, and due to a lack of maintenance the structure has lost some integrity of materials and workmanship. The horn remains a significant element in the history of radio astronomy and an important educational tool for the observatory but does not retain sufficient integrity to be individually eligible for the NRHP. The Jansky Replica Antenna (1964) is an important educational tool at GBO; it represents the discovery of radio astronomy and has a significant association with Karl Jansky. However, the antenna was built at GBO as a replica for display. The structure does incorporate some parts from Jansky's original antenna, but most of the materials are not from the original 1933 instrument. Additionally, it is not located in the same site as the 1933 original, nor does it have the same setting. The replica is now more than 50 years old; however, the replica has not achieved individual significance apart from its connection to the original 1933 structure. The replica is used as an educational display to demonstrate Jansky's work in the 1930s, but it does not reveal significant information about the period when it was reconstructed (1964). Therefore, the replica antenna is not individually eligible for listing in the NRHP. The Ewen-Purcell Horn (1957) was used to make an important scientific discovery and is associated with two significant astronomers. However, the

horn was relocated to GBO from its original location in the Boston-Cambridge area. The relatively small horn is currently used as a display piece, mounted on stone piers; while it serves as an important educational tool within the GBO site, it is a piece of equipment that has lost integrity of location, feeling, and setting due to its relocation. Therefore, it does not retain sufficient integrity to be individually eligible for listing in the NRHP. Lastly, the 45-foot Telescope (circa 1965), which was relocated to GBO in 1972, was part of a pair of telescopes that functioned together as a larger Interferometer instrument. The 45-foot Telescope was separated from its pair and no longer functions as part of an Interferometer. Therefore, it lacks integrity of location, feeling, setting, and association and is not individually eligible for listing in the NRHP.

The 39 remaining surveyed buildings and structures are not individually eligible for listing in the NRHP. They include: 12 administrative/operational facilities, 1 water tower, 1 airstrip, 1 recreational area, and 24 residential buildings. The buildings and structures are not eligible for listing in the NRHP because they are not individually significant in terms of the historical development of the observatory nor the field of radio astronomy. No particular events are known to directly link the buildings and structures to any important historic events; therefore, the 39 remaining buildings and structures are not individually eligible for listing in the NRHP under Criterion A.

To be eligible for the NRHP under Criterion B, a property must be directly associated with a person considered significant within a historic context, whose specific contributions to history have been both identified and documented. There is no evidence to indicate that these 39 buildings and structures have important associations with historically significant individuals. While many important scientists used these buildings, there are other structures on the site (such as the scientific instruments) that better convey the significant work accomplished or associated with such individuals. Therefore, they are not individually eligible under Criterion B.

In terms of design, the 39 remaining surveyed buildings and structures are primarily unremarkable residential buildings or simple utilitarian structures that resemble designs for other administrative, operational, or maintenance facilities around the world (Photographs 10-11). The late-nineteenth century and early twentieth century farm houses are modest, unexceptional, wood frame residences. The residences that were constructed 1962-1963 are undistinguished, ranch style buildings that were widely replicated around the country. In addition, the majority of the buildings within GBO have been altered, including small additions and the replacement of original windows and siding. None of the administrative or residential properties embody the distinctive characteristics of a type, period, or method of construction; they do not represent the work of a master nor do they possess high artistic value. Therefore, these 39 buildings and structures are not individually eligible under Criterion C.

Due to the standard construction and design of these 39 built environment resources, the ordinariness of the materials used and their lack of a direct, significant association to important historic people or events, the properties are unlikely to individually provide further information significant to prehistory or history. Therefore, these 39 surveyed resources are not individually eligible under Criterion D, which requires that structures have yielded or may be likely to yield information important in prehistory or history.

Photos 10-11 (left to right): Typical GBO support buildings - a residential property (House #4) and the works administration building.

In summary, out of the 47 surveyed resources, four telescope instruments (one of which is composed of three telescopes) are individually eligible for listing in the NRHP for their significant association with scientific events and developments in radio astronomy or for their design. An additional four structures are considered historically significant, but do not retain sufficient integrity to convey that significance and are not individually eligible for listing in the NRHP. The 39 remaining resources are not associated with events that have made significant contributions to the broad patterns of local, regional, or national history; are not directly associated with any persons considered important in local, state, or national history; are all unremarkable or utilitarian designs that do not represent a unique style; and are not likely to yield information important in prehistory or history. In total, 43 of the 47 surveyed resources either do not meet the NRHP criteria or do not retain sufficient integrity to convey that significance and for this reason are not individually eligible for listing in the NRHP.

5.2.2 District Eligibility Determination

All of the evaluated resources are located within Green Bank in Pocahontas County and within the NRQZ. With several exceptions, including the farm houses and barns that predate the NRAO, the Reber Radio Telescope (1937), and the GBT (2000), the vast majority (34 resources) of the buildings and structures located within the GBO boundaries were constructed during the first decade of the NRAO between 1958 and 1968.

The National Park Service (NPS) Bulletin entitled *How to Complete the National Register Registration Form* defines a historic district as "possess[ing] a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development." The bulletin also clarifies that "a district may contain noncontiguous elements only where the historic interrelationship of a group of resources does not depend on visual continuity and physical proximity" (NPS, 1997). The built environment resources that are 45 years of age or older on GBO have significant commonalities: They were all used to further the field of radio astronomy and for the most part have functioned continuously as part of an observatory for over five decades (Photograph 12). In addition, many of the buildings employ similar materials and construction techniques. These similarities link them in a significant way and unite them both historically and in some instances, aesthetically. Although many of the resources have undergone additions and alterations to accommodate changes in radio astronomy technology, as well as other developments within the NRAO/GBO, these changes have not resulted in a significant loss of physical integrity; as a result, the buildings and structures are still able to convey their historical association and significance as a district.

Photo 12: GBO administrative area and airstrip, view from the top of the GBT.

There are 44 resources within the APE that are recommended as contributing to the proposed GBO historic district, the boundaries of which coincide with the site's property boundaries (and the APE) (Table 5-2, Figure 5-1, and Attachment A). Contributing elements include eight administrative/operational buildings, one airstrip, one water tower, one recreational area, 24 residential buildings, two horns, one antenna, and six telescopes (the Interferometer includes three large telescopes). The scientific instruments within the APE are a collection of telescopes, horns, and antenna that are significant for their role in the development of radio astronomy and in several instances as remarkable feats of engineering. Four of these historic telescopes remain in operation and retain excellent integrity of materials, workmanship, design, feeling, association, setting, and location. The Interferometer has been closed for several years and has suffered some deterioration from rust, but the three associated telescopes retain most of their physical integrity and their setting. As a whole, the majority of the components that make up the potential district's historic character possess integrity, even though many of the buildings are individually undistinguished.

Four buildings within the APE were identified as non-contributing resources. These include: three barns and one cellar building, all of which date from the early twentieth century. The four non-contributing buildings pre-date the establishment of the NRAO and have been primarily left vacant or used as miscellaneous storage facilities. No records indicate a direct involvement between these buildings and the function of the observatory, historically or presently.

The administrative and operations buildings and structures within the GBO are primarily utilitarian buildings or structures with simple designs executed using practical and standard materials, such as metal and concrete, often with brick or permastone veneer. These elements create an unassuming, though cohesive, visual unit that emphasizes their historically linked function as support for the observatory. The resources were built rapidly during the first decade of NRAO's operation often with a common plan and common design theme.

As a group, the 44 contributing built environment resources are a distinct and well-preserved representation of the early years of the NRAO, complete with scientific instruments, administration/operational facilities, recreation area, and residential buildings. Additionally, the scientific instruments present on site illustrate a linear, historical narrative of the history of radio astronomy from the Jansky Replica Antenna and Reber Radio Telescope to the monumental GBT. The resources share a distinct and significant history that is unique in both time and place. Individually, many of the resources are not representative examples of a type, period, or method of construction. However, together, the buildings and structures form a singular community and history that could never be replicated. The resources possess a significant linkage or continuity that is united historically by function, plan, and physical development.

The GBO is a collection of buildings and structures mostly built between 1958 and 1968, and most of which are still functioning, that captures the early history of radio astronomy in the United States and illustrates the subsequent development of the field. Therefore, the GBO is eligible as a historic district for representing an important time in science history and for its significant contribution to the advancement of radio astronomy.

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Building / Structure Name

Administrative / Operational

1. Karl Guthe Jansky Laboratory
2. Cafeteria Building and Residence
3. Warehouse
4. Water Tower
5. Works Area Building
6. Telescope Mechanics Office (formerly Cable Storage Warehouse)
7. Millimeter Array Experiment Building
8. Outdoor Test Building
9. Laser Lab (formerly 300' Telescope Control Building)
10. Airstrip
11. Recreation Area
12. Barn
13. Barn
14. Barn
15. Slaven Hollow Orchard Cellar Building

Residential Buildings

16. Redwood House (House #1; Director's House)
17. House #2 (Rabbit Patch)
18. House #3 (Rabbit Patch)
19. House #4 (Rabbit Patch)
20. House #5 (Rabbit Patch)
21. House #6 (Rabbit Patch)
22. House #7 (Rabbit Patch)
23. House #8 (Rabbit Patch)
24. House #9 (Rabbit Patch)
25. House #10 (Rabbit Patch)
26. House #11 (Rabbit Patch)
27. House #16
28. House #14
29. House #19
30. House #21
31. House #23
32. House #24
33. Shinnaberry House
34. Nut Bin
35. Riley House (#15)
36. Hill House (#17)
37. Tracy House (#18)
38. Beard House
39. Hannah House

Structures / Telescopes

40. Calibration Horn
41. Karl Guthe Jansky Replica Antenna
42. Ewen-Purcell Horn
43. Green Bank Interferometer: Includes Howard E. Tatel (85'-1) Telescope & 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer Control Building
44. 40' Telescope & 40' Telescope Control Building
45. 140' Telescope (43m Telescope) & maintenance structure
46. 45' Telescope
47. Robert C. Byrd Green Bank Telescope (GBT)
48. Reber Radio Telescope

LEGEND

- NRHP Contributing
- NRHP Non-Contributing
- NRHP Individually Eligible
- NRHP Individually Listed
- Surveyed Property
- Area of Potential Effects (APE)

Aerial photo source: Google ©2014, modified by CH2M HILL

North

0 1,000

Approximate scale in feet

FIGURE 5-1
Built Environment Resources
Green Bank Observatory
Green Bank, West Virginia

CH2MHILL

ES111914104429SAC built_environment_greenbank.ai 12-08-14 dash

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SECTION 6

Conclusion

There are 47 built environment resources within the APE that are 45 years of age or older at the time of this report. One of these, the Reber Radio Telescope, was previously listed in the NRHP and determined a National Historic Landmark. The remaining 46 historic-era built environment properties were surveyed for this technical report. Despite the fact that the GBT is less than 50 years old, the telescope was surveyed and evaluated due to its exceptional significance. Four telescopes were identified within the APE as individually eligible for listing in the NRHP. One of these is the Interferometer which encompasses three large telescopes. The remaining built environment properties do not meet the NRHP criteria or do not retain sufficient integrity to be individually eligible for listing. The GBO was also surveyed as a potential historic district and was found to be eligible for listing in the NRHP. Forty-four resources within the APE were identified as contributing to the historic district.

These findings indicate that there are historic properties (44 NRHP-listed, NRHP-eligible, or contributing buildings and structures and one historic district) located within the APE, and therefore, any alterations or demolitions that may occur as part of the site's divestment could result in an adverse effect on historic properties. If any activities associated with the divestment are determined to affect identified historic properties, consultation with the West Virginia Division of Culture and History (SHPO) would be required under Section 106 of the NHPA.

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SECTION 7

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Attachment A
Surveyed Built Environment Resources

Building/ Structure Name	Year Built	Description	Function	Alterations	NRHP Status	Contributing to Historic District?
ADMINISTRATIVE/ OPERATIONAL						
Karl Guthe Jansky Laboratory	1959	Steel-column frame, administration building	Supports the telescopes: electronics lab, administrative offices, astronomer's controls	Addition (1994-1996)	Not individually eligible	Yes
Cafeteria Building and Residence	1959	Concrete block, residence hall	Temporary residence and administrative functions	Addition (2003)	Not individually eligible	Yes
Warehouse	1963	Utilitarian: Flat roof, brick veneer	Currently day care facility; historically warehouse and cryogenics lab	N/A	Not individually eligible	Yes
Water Tower	1958	Steel, elevated water tank	Water storage	N/A	Not individually eligible	Yes
Works Area Building	1959	Utilitarian: Flat roof, brick and permastone veneer	Machine shop, auto shop, general maintenance	Alterations (1963); Addition (date unknown)	Not individually eligible	Yes
Telescope Mechanics Office (formerly Cable Storage Warehouse)	Circa 1960	Utilitarian: corrugated metal	Maintenance	Addition (2002)	Not individually eligible	Yes
Millimeter Array Experiment Building	1962-1963	Small, concrete block and permastone veneer	Vacant	N/A	Not individually eligible	Yes
Outdoor Test Building	Circa 1960	Utilitarian: concrete block and face brick, flat roof	Equipment building	N/A	Not individually eligible	Yes
Laser Lab (formerly 300' Telescope Control Building)	1961-1962	Concrete block and face brick, side gabled roof	Laser Lab for range finder	Addition (1971); Repairs and renovation (circa 1988)	Not individually eligible	Yes
Airstrip	1958-1960	Paved airstrip	Closed	N/A	Not individually eligible	Yes
Recreation Area	1963-1964	Picnic area, swimming pool, basketball court, shooting range	Recreation	Addition to Picnic Area (circa 1998); Shooting range buildings demolished and recently rebuilt; Ski lift and golf driving range removed.	Not individually eligible	Yes
Barn	Early twentieth century	Wood frame barn with gambrel roof	Vacant/Storage	N/A	Not individually eligible	No
Barn	Early twentieth century	Wood frame barn with gable roof	Vacant/Storage	N/A	Not individually eligible	No
Barn	Early twentieth century	Wood frame barn, concrete foundation, painted white	Vacant/Storage	N/A	Not individually eligible	No
Slaven Hollow Orchard Cellar Building	Early twentieth century	Wood frame, cellar building	Vacant	N/A	Not individually eligible	No

Building/ Structure Name	Year Built	Description	Function	Alterations	NRHP Status	Contributing to Historic District?
RESIDENTIAL BUILDINGS						
Redwood House (House #1; Director's House)	1962	Wood frame ranch house	Residential	Addition (1975); Remodel (1977)	Not individually eligible	Yes
House #2 (Rabbit Patch)	1962	Wood frame ranch house	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
House #3 (Rabbit Patch)	1962	Wood frame ranch house	Residential	Alterations (windows)	Not individually eligible	Yes
House #4 (Rabbit Patch)	1962	Wood frame ranch house	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
House #5 (Rabbit Patch)	1962	Wood frame ranch house	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
House #6 (Rabbit Patch)	1962	Wood frame, two-story Colonial Revival house	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
House #7 (Rabbit Patch)	1962	Wood frame, two-story Colonial Revival house	Residential	Alterations (windows)	Not individually eligible	Yes
House #8 (Rabbit Patch)	1962	Wood frame ranch house	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
House #9 (Rabbit Patch)	1962	Wood frame ranch house	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
House #10 (Rabbit Patch)	1962	Wood frame ranch house	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
House #11 (Rabbit Patch)	1962	Wood frame ranch house	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
House #14	1962	Wood frame ranch house	Vacant	Alterations (cladding, windows)	Not individually eligible	Yes
House #16	1962	Wood frame ranch house	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
House #19	1963	Wood frame, two-story Colonial Revival house	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
House #21	1963	Wood frame ranch house	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
House #23	1963	Wood frame ranch house	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
House #24	1963	Wood frame, two-story Colonial Revival house	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
Shinnaberry House	Circa 1940	Wood frame farm house	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
Nut Bin	1901-1902	Wood frame farm house with vinyl siding	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
Riley House (#15)	Early twentieth century	Wood frame farm house	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
Hill House (#17)	Circa 1896	Wood frame farm house	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
Tracy House (#18)	Early twentieth century	Wood frame farm house	Residential	Alterations (cladding, windows)	Not individually eligible	Yes
Beard House	Early twentieth century	Wood frame farm house	Vacant (used as an experiment station in the 1960s)	Addition (circa 1960s)	Not individually eligible	Yes
Hannah House	Early twentieth century	Wood frame farm house	Residence for summer school students	Heavily altered, Renovation (2000-2003)	Not individually eligible	Yes

Building/ Structure Name	Year Built	Description	Function	Alterations	NRHP Status	Contributing to Historic District?
STRUCTURES/TELESCOPES						
Calibration Horn	1958-1959	Aluminum with welded seams horn with a concrete shed and a wood frame support structure	Display	N/A	Not individually eligible	Yes
Karl Guthe Jansky Replica Antenna	1964	Antenna replica	Display	N/A	Not individually eligible	Yes
Ewen-Purcell Horn	1957	Horn for collecting radio waves	Display	Relocated to GBO in 1963	Not individually eligible	Yes
Green Bank Interferometer: Includes Howard E. Tatel (85'-1) Telescope & 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer Control Building	1958-1959 [85'-1 and control building]; 1963-1964 [85'-2]; 1965-1968 [85'-3]; 1967-1968 [Interferometer control bldg]	Telescopes	Closed	N/A	Individually eligible	Yes
40' Telescope & 40' Telescope Control Building	1962	Telescope	In operation - Education Telescope	N/A	Individually eligible	Yes
140' Telescope (43m Telescope) & maintenance structure	1958-1965/1970	Telescope	In operation	N/A	Individually eligible	Yes
45' Telescope	Circa 1965	Telescope	In operation	Moved to GBO in 1972	Not individually eligible	Yes
Robert C. Byrd Green Bank Telescope (GBT)	1991-2000	Telescope	In operation	N/A	Individually eligible	Yes

Appendix 3.6A

Environmental Baseline Study

FINAL

Environmental Baseline Study

Green Bank Observatory
Green Bank, West Virginia

Prepared for

National Science Foundation

May 2016

ch2m

Executive Summary

This Environmental Baseline Study (EBS) has been prepared to document the current environmental conditions on the approximately 2,200-acre contiguous parcel (herein referred to as the subject property) located near Green Bank, West Virginia. The National Science Foundation requested an EBS be completed to determine the environmental condition of the property prior to any future divestment activities or alternate operational agreements are evaluated. 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 pedestrian surveys.

The following Recognized Environmental Conditions (RECs) were found on the subject property:

- A 1,000-gallon gasoline underground storage tank was abandoned in place (emptied and filled with a cement slurry) in 1991 after water was found in the gasoline. Soil samples were not collected to determine if there was a release.
- The shooting range may have lead in soil at the target areas and gunpowder residues, including polycyclicaromatic hydrocarbons, may have reached the soil at the firing line.

The following Historical RECs were found on the subject property:

- The 300-foot telescope oil pond closure. Soil at the bottom and walls of the oil pond were bio-remediated. A closure letter was issued on December 23, 1999.
- Fuel oil was found leaking from a newly installed underground storage tank at the Jansky Laboratory Building. The tank and contaminated soil were excavated. Soil sample analysis showed that the contaminated soil was removed.

The following de minimis conditions were identified on the subject property:

- 20-gallon drum of lubricant leaked on an absorbent pad in the 43-meter Telescope (also referred to as the 140-foot Telescope).
- Staining on the concrete floor of the Green Bank Telescope Warehouse.
- Staining on the concrete floor in the Works Area garage.
- Staining on the tile floor in the shed southwest of 85-1.

The following are other conditions on the subject property that are not considered RECs, but are worth disclosing:

- According to the 1989 Asbestos Management Plan, 9 buildings were surveyed for asbestos-containing materials (ACM). Other buildings including residential homes were not surveyed. ACM was found at the following buildings: 43-meter Telescope, 85-1 Control Building, Works Area Building, Jansky Laboratory Building, Residence Hall, Interferometer Building, Warehouse Building, and the Cable Building.

- A burn pile of scrap wood, brush, and furniture is located at the junkyard. The West Virginia Department of Natural Resources recommended removing the wastes, disposing of the wastes in the county landfill, and returning the land to its natural slope and drainage. The Environmental Log states this was done; however, there is a burn pile with scrap material at the location of the former junkyard.
- A military-style fuel truck was staged north of the telescope area off of Slavin Hollow Road. The truck is permanently parked on a hillside and is used as a diesel aboveground storage tank. No secondary containment was observed under the filling port behind the truck. Spills from the truck would immediately impact the soil.

To assess the potential for adjacent properties to affect the property, a records search and database search of RECs within 1 mile of the subject property was performed for this EBS assessment (see Attachment B). No other neighboring properties appear to have the potential to environmentally affect the subject property.

Contents

Attachments

Tables

Figures

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Acronyms and Abbreviations

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
DOT	department of transportation
EBS	Environmental Baseline Study
EDR	Environmental Data Resources, Inc.
GBT	Robert C. Byrd Green Bank Telescope
HREC	Historical Recognized Environmental Condition
LBP	lead-based paint
LUST	leaking underground storage tank
NOV	Notice of Violation
NPL	National Priorities List
NSF	National Science Foundation
PCB	polychlorinated biphenyl
pCi/L	picocurie per liter
REC	recognized environmental condition
RTE	rare, threatened, or endangered
TSCA	Toxic Substances Control Act
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	underground storage tank
VSI	visual site inspection
WVDEP	West Virginia Department of Environmental Protection
WVDNR	West Virginia Division of Natural Resources

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SECTION 1

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 (BPA) NSFDACS14B1186. This document describes the Environmental Baseline Study (EBS) assessment portion of the task order for the approximately 2,200-acre property of the Green Bank Observatory, hereinafter referred to as the subject property, located near Green Bank, West Virginia. 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 Baseline Study

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 Study Report

The information contained in this EBS report was obtained through a records search, visual site inspections (VSIs), physical site inspections, and interviews. The records search included an analysis of historical aerial photographs (Attachment A) 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 2,200-acre subject property, which is located near Green Bank, West Virginia. The general location and the subject property are illustrated in Figures 1-1 and 1-2.

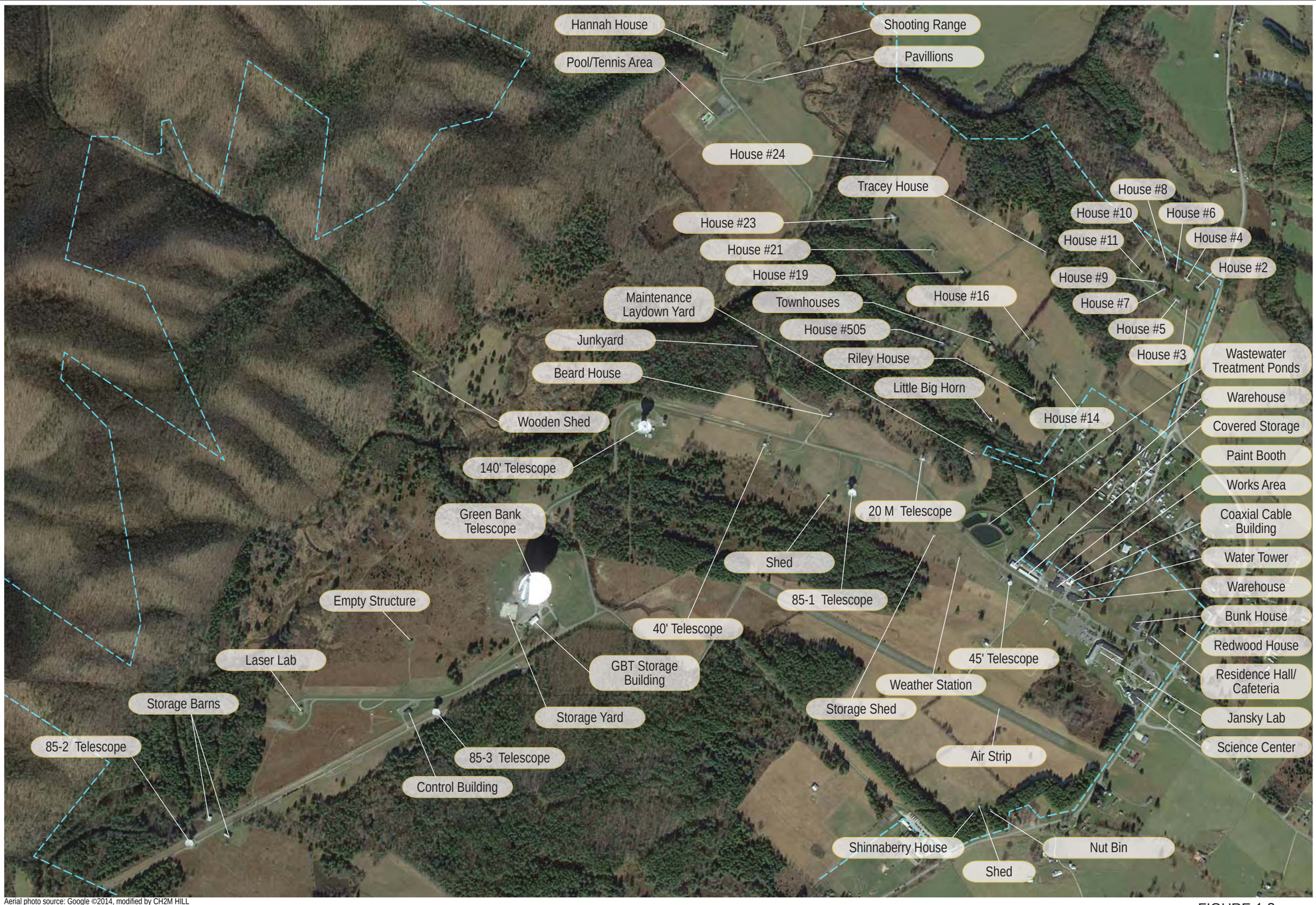
Aerial photo source: Google ©2014, modified by CH2M HILL

North

0 10

Approximate scale in miles

FIGURE 1-1
Project Location Map
Green Bank Observatory
Green Bank, West Virginia



Aerial photo source: Google ©2014, modified by CH2M HILL

Green Bank Observatory Boundary

North

0 1,000

Approximate scale in feet

FIGURE 1-2
Subject Property
Green Bank Observatory
Green Bank, West Virginia

CH2MHILL

Database and pedestrian surveys were conducted for several properties adjacent to the subject properties. 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.

1.2 Survey Methodology

1.2.1 Site Reconnaissance

VSIs were conducted on October 6-9, 2014. The VSIs included an escorted walk-through of accessible areas of buildings and 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 was visually inspected; however, the interiors of some buildings were not visually inspected during the site reconnaissance (see Section 1.4.1)

1.2.2 Records Search and Review

The onsite records search was performed October 6-9, 2014, and was facilitated by Mr. Johnny Samples. Mr. Samples provided environmental documentation including asbestos records and the 300-foot telescope oil pond release.

1.2.3 Interviews

Interviews were conducted on October 6-9, 2014, with the site personnel who were knowledgeable of the environmental issues with the subject property. Section 6 lists the individuals who interviewed.

1.2.4 Review of Special Resources

No special resources were reviewed

1.3 Significant Assumptions

There were no significant assumptions.

1.4 Limitations, Exceptions, and Data Gaps

1.4.1 Limitations

The interior of all residential housing, the storage shed between the 45-foot telescope and the 85-1 telescope, the two small storage sheds near the wastewater treatment pond, the Beard House, the shed behind the Shinnaberry House, and the wooden shed on Slavin Hollow Road were inaccessible and not surveyed. The property lines along the northern and western portions of the property were not viewed as there were no access roads and dense vegetation limited line of sight.

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 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, Green Bank Observatory, West Virginia

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 multiple storage sheds (see Section 1.4.1)	The interior of residential houses and multiple sheds were not surveyed due to inaccessibility	Low – Historic use of the facilities for residential and storage purposes is unlikely to have had a significant environmental impact on the subject property.

SECTION 2

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 2,200 acres located in Pocahontas County near Green Bank, West Virginia (Figure 1-1 and 1-2). It lies approximately 200 miles west of Washington, D.C. adjacent to the Monongahela National Forest. The property is owned by NSF and is home to the Green Bank Observatory component of the National Radio Astronomy Observatory.

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 current use of each building is presented in Table 2-1.

Table 2-1. Uses of Buildings and Structures
Environmental Baseline Study, Green Bank Observatory, West Virginia

Building/Structure	Current Use	Photograph Number
GBT	Radio Astronomy Research	1
43-meter Telescope	Occasionally used	2
Storage Shed near 43-meter Telescope	Storage	3
20-meter telescope	Not currently being used	4
45-foot telescope	Occasionally used	5
40-foot telescope	Education in Radio Astronomy	6
Interferometer 85-1 telescope	Not currently being used	7
Interferometer 85-2 telescope	Not currently being used	8
Interferometer 85-3 telescope	Not currently being used	9
Laser Lab (Formerly the 300-foot telescope control building)	Not currently being used	10
Former Interferometer Control Building	Currently used or records/drawings storage	11
Gabel Barn	Storage of large wire spools	12
Gambrel Barn	Storage of large wire spools	13
Old experiment structure	Not currently being used	14
Slavin Barn	Not currently being used	15
GBT storage building	Equipment storage for the GBT	16-17

Table 2-1. Uses of Buildings and Structures
Environmental Baseline Study, Green Bank Observatory, West Virginia

Building/Structure	Current Use	Photograph Number
GBT storage yard	Equipment/material storage for the GBT	18-19
Beard House	Not currently being used	20-21
Wooden shed near 85-1	Storage	22
Metal shed near 85-1	Storage	22
Junkyard	Storage of scrap material to be recycled	23-25
Science Center	Exhibit hall and educational use, café, administration offices.	26
Jansky Laboratory	Administration offices, telescope controls, and instrumentation.	27
Storage building in storage yard near works area.	Storage	28-29
Covered storage in works area.	Storage	30
Warehouse	Storage	31
Works	Storage and maintenance shops	32
Paint booth	Painting	33
Bunk house	Guest housing	34
Residence hall/cafeteria	Guest housing and cafeteria	35
Redwood House	Guest housing	36
House #2	Employee housing	37
House #3	Employee housing	38
House #4	Employee housing	39
House #5	Employee housing	40
House #6	Employee housing	41
House #7	Employee housing	42
House #8	Employee housing	43
House #9	Employee housing	44
House #10	Employee housing	45
House #11	Employee housing	46
House #14	Employee housing	47
House #16	Employee housing	48
House #19	Employee housing	49
House #21	Employee housing	50
House #23	Employee housing	51
House #24	Employee housing	52

Table 2-1. Uses of Buildings and Structures
Environmental Baseline Study, Green Bank Observatory, West Virginia

Building/Structure	Current Use	Photograph Number
Hill House	Employee housing	53
Tracey House	Employee housing	54
Riley House	Employee housing	55
Nut Bin House	Employee housing	56
Shinnaberry House	Employee housing	57
Townhouses	Employee housing	58
Hannah House	Guest housing	59
Recreation area	Showers/restrooms/pavilion/tennis	60-62
Shooting range shed	Not currently being used	63
Barn near airstrip	Storage	64
Shed East of 85-1 telescope	Storage	65
Shed Southwest of 85-1	Storage including oil/lubricants	66
Weather Station	Weather instrumentation	67
43-meter Telescope sheds	Storage	68-69
Little Big Horn Calibration Antenna	Not currently being used	70-71

GBT = Robert C. Byrd Green Bank Telescope

2.3 Description of Structures, Roads, and Other Improvements

The subject property consists of radio telescopes, control buildings, storage and maintenance facilities, and residential facilities for onsite workers. Table 2-1 describes the uses of each of the buildings and structures on the property.

The subject property is divided into three main areas: The telescope area, the upper area, and the employee housing area. The telescope area consists of eight telescopes: The Robert C. Byrd Green Bank Telescope (GBT), 43-meter Telescope, 20-meter telescope, 40-foot telescope, 45-foot telescope, and the interferometer telescopes (85-1, 85-2, and 85-3). Buildings in the telescope area include the laser lab, the interferometer control building, two storage barns, the GBT warehouse, the GBT storage yard, Beard House, an empty structure from a former experiment, and a junkyard.

The upper area consist of the Jansky Laboratory, the works building, warehouses, storage yards and sheds, a residence hall, a cafeteria, and a science center. The water supply wells and water tower for the facilities is located in this area (Photographs 72 and 73). Wastewater treatment ponds (Photograph 74) are located just north of the upper area.

The employee housing area consists of 10 houses on Rabbit Patch Road and 9 houses and a townhouse building on Hannah Run Road. Two additional employee houses, the Nut Bin House and the Shinnaberry House, are located off Potomac-Highland Trail. The employee recreation area is located at the northeast portion of the property and includes a swimming pool, tennis courts, pavilion, and a shooting range (Photograph 75).

A paved road runs from the southern boundary at Potomac-Highland Trail through the upper area and through the telescope areas. Slavin Run Road is an unpaved road that runs northwest-southeast through the property. An airstrip (Photograph 76) is located in the middle of the subject property running northwest–southeast.

Further descriptions of the buildings are presented in the Divestment Options Study Report.

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

Two onsite drinking water wells provide water to the facilities on the subject property. Water is stored in a 100,000-gallon elevated water storage tank. The two water wells are tested daily per West Virginia Health and Human Services Department.

2.4.2 Wastewater

Wastewater treatment and disposal for the subject property is provided by an onsite sewer lagoon system. The upper site sewer/lagoon system is in compliance with the West Virginia Department of Environmental Quality. The site has a discharge permit and quarterly testing is submitted to the state. No Notice of Violations (NOVs) were found. Treated water is discharged at an outfall (Photograph 77) that leads to Hospital Run which flows into Deer Creek.

The Laser Lab, interferometer control building, GBT Warehouse, and 43-meter Telescope are not connected to the upper site sewer system and have their own septic systems. All of the houses except for Houses #7, #9, and #11 have their own septic systems. Houses #7, #9, and #11 are connected to one septic system that services the three houses.

2.4.3 Stormwater

Stormwater runoff on the subject property generally flows to ditches and swales, which then flows to Deer Creek along the northern part of the property or to Hospital Run along the eastern part of the property.

2.4.4 Electric

Electric service is provided by Monongahela Power. The power lines enter the property along Slavin Hollow Road to a substation located on the property (Photograph 78).

2.5 Current Use of the Adjoining Subject Property

The majority of the northern and western boundaries are vacant forested land.

SECTION 3

Site History

The site was purchased in 1957. The subject property is owned by NSF.

3.1 Previous Environmental Baseline Surveys

No previous EBSs were available for review.

3.2 Historical Use Information of the Subject Property

3.2.1 Aerial Photographs

Available historical aerial photographs from 1958 through 2011 were reviewed. Table 3-1 summarizes the aerial photographs reviewed for the property and surrounding area.

Table 3-1. Historical Aerial Photograph Findings
Environmental Baseline Study, Green Bank Observatory, West Virginia

Year	Subject Property	Adjacent and Surrounding Properties
1958	The central part of the property appears to be farm fields. Slavin Hollow Road runs through the central part of the property north-south.	A farm house is located near the western edge of the subject property. The town of Arbovale is visible at the eastern boundary. A building is visible near the southern boundary.
1973	Road to the telescopes is visible. Each of the telescopes are visible except the GBT and 300-foot telescope. The laboratory, residence hall, works building, warehouse building, airstrip, and each of the residential homes are visible.	Additional homes are visible to the south and east of the subject property.
1991	Image is not clear, but appears to be similar to the 1973 photograph.	Image is not clear, but appears to be similar to the 1973 photograph.
1997	The 300-foot telescope is no longer visible. The GBT appears to be under construction. The Jansky Lab has an additional wing and a new parking area.	No significant changes are observed from the 1991 aerial photograph.
1998	Similar to the 1997 photograph.	No significant changes are observed from the 1997 aerial photograph.
2001	Only the western portion of the subject property is shown on this photograph and it is similar to the previous photographs.	No significant changes are observed from the 1998 aerial photograph.
2006	The wastewater treatment ponds, Bunk House, and the Science Center are now visible.	No significant changes are observed from the 2001 aerial photograph.
2007	No significant changes are observed from the 2006 aerial photograph.	No significant changes are observed from the 2006 aerial photograph.
2009	No significant changes are observed from the 2007 aerial photograph.	No significant changes are observed from the 2007 aerial photograph.
2011	No significant changes are observed from the 2009 aerial photograph.	No significant changes are observed from the 2009 aerial photograph.

3.2.2 Topographic Maps

Available topographic maps from 1898 through 1995 were reviewed. Table 3-2 summarizes the topographic maps reviewed for the property and surrounding area.

Table 3-2. Historical Topographical Map Findings
Environmental Baseline Study, Green Bank Observatory, West Virginia

Year	Subject Property	Adjacent and Surrounding Properties
1898	10 structures are visible on the subject property. A few roads and creeks are present.	A few roads and creeks are present along with several structures (most likely homesteads) scattered around the subject property.
1901	Similar to 1898 maps.	Similar to 1898 maps.
1924	12 structures are present along Deer Creek. Several structures are now visible on Hannah Run and Slavin Hollow Roads.	Many structures are now visible in Arbovale.
1960	4 telescopes and the calibration antenna are visible. The works building, Jansky Lab, residence hall, and the water tower are visible.	The high school, church, and bank are visible south of the property. A cemetery is shown east of the works building.
1979	10 homes at Rabbit Patch at the east end are visible. The landing strip is visible.	Similar to 1960 map.
1995	The interferometer range and 300-foot telescopes are now shown.	Similar to 1979 map.

3.2.3 City Directories

No properties were identified on the city directories.

3.3 Environmental Records

3.3.1 Federal Records

No environmental database listings were found to be on the subject property.

3.3.2 State and Tribal Records

No environmental database listings were found to be on the subject property.

3.3.3 Discussion EDR Database Search Results

No environmental database listings were found to be on the subject property.

SECTION 4

Findings: Subject Property

4.1 Environmental Setting

The entrance to the subject property is located at Potomac Highland Trail and Slavin Hollow Road, Cass, in Pocahontas County, West Virginia 24927. It is located at the following coordinates: Latitude 38° 26’ 8.52’’N and Longitude 79° 50’ 16.80’’W. The approximate elevation of the property is 2,645 feet above mean sea level. The subject property sits on approximately 2,200 acres.

4.1.1 Climate

According to National Oceanic and Atmospheric Administration, the average monthly temperature ranges from 28 degrees Fahrenheit in January to 68 degrees Fahrenheit in July. The annual average precipitation is about 60 inches (Northeastern Regional Climate Center, 2014).

4.1.2 Land Use

The land surrounding the subject property is rural countryside in eastern Western Virginia. The main industries for Pocahontas County are health care, retail/trade, manufacturing, and transportation. The county is home to the headwaters of eight rivers. Deer Creek, a tributary of the North Fork River, runs through the center of the subject property. The Monongahela National Forest protects much of the river headwaters.

The subject property facilities are divided into three areas: telescope area, administration area, and residential/housing area. The facilities layout is shown on Figure 1-2.

4.1.3 Regional Physiography and Topography

The subject property is located in the North Fork Drainage Basin in Pocahontas County. The North Fork Area lies in the Allegheny Mountains section of the Appalachian Plateau Province. The North Fork comprises a headwater of the Deer Creek watershed, which in turn forms a tributary to the Greenbrier River. Regional topography is characterized by dissected uplands and V-shaped valleys.

The general topography gradient across the subject property is from the northwest to the southeast. The approximate elevation of the property is 2,645 feet above mean sea level

4.1.4 Geology

According to the Soil Survey of Pocahontas County, West Virginia, the geology of the Green Bank area containing the oldest rock in the county starts at Green Bank and extends southwestward, generally staying between West Virginia Routes 28 and 92 and extending south to Greenbrier County. This area is highly folded and is comprised of lower Devonian-, Silurian-, and Ordovician-aged rocks (National Resource Conservation Service [NRCS], 1992).

The observatory is located to the east of the Greenbrier River and, except for the area that extends from Green Bank southwestward into Greenbrier County, the material here is of upper and middle Devonian age. It includes the Chemung Group, the Brallier Formation, and the Millboro Shales (NRCS, 1992).

The highly karsified Greenbrier Limestone is located to the west of the subject property along the US 219 corridor, but extends throughout the county. Sinkholes and caves provide a conduit for water and contaminants into the subsurface with little opportunity for filtration (Pocahontas County Water Resources Management Plan, 2012).

4.1.5 Soils and Groundwater

According to the National Cooperative Soil Survey, the subject property is underlain by Allegheny, Weikert, Purdy, and Atkins soil types. These soils are loam to silty loam. Allegheny and Weikert are well to moderately drained, while Purdy and Atkins are poorly drained.

The Chemung Group is the largest expanse of geologic material exposed in the county. It consists of yellowish brown interbedded sandstone and shale. The sandstone ranges from lenses to massive ledges. Berks, Weikert, and Macove soils are on this formation. Mandy, Snowdog, and Trussel soils are at the higher elevations in the northeastern section of the county where the Chemung Group outcrops.

The Brallier Formation is comprised mainly of gray shale, but it includes some siltstone and fine grained sandstone. This formation weathers to form low, rounded hills that parallel the major drains. Weikert soils are on the residual portions of this geologic formation, and Macove and Allegheny soils are on foot slopes and stream terraces, respectively.

The Millboro Shales are comprised of black and greenish gray fissile shales, some of which are the most erodible rocks in the county. These areas are frequently covered by alluvial soils, such as Orrville, Lobdell, Tioga, and Potomac soils, and terrace soils, such as Allegheny and Chavies soils. They are in the main valleys east of the Greenbrier River, along creeks such as Knapps Creek, North Fork of Anthony Creek, Browns Creek, and Deer Creek, which flows through the subject property. Weikert soils are in the residual areas, which are usually low and rolling hills.

The regional groundwater flow direction is to the southwest (Pocahontas County Water Resources Management Plan, 2012). Locally, groundwater flow direction is impacted by topography, hydrogeology, soil characteristics, and nearby waterbodies. Groundwater flow in areas of the subject property adjacent to Deer Creek flow locally towards the creek and other surface water bodies. The subject property is not located in the 100-year or 500-year flood zones, as defined by the Federal Emergency Management Agency.

According to EDR, four groundwater wells are listed as being located on the subject property. All four wells are public water supply wells. No well construction information was available. Eleven wells registered to U.S. Geological Survey (USGS) are located within a 1-mile radius. The depths of these wells ranged from 35 feet below ground surface to 160 feet below ground surface.

4.1.6 Surface Water and Wetlands

A wetland and stream delineation and jurisdictional determination of Waters of the U.S. were not included in this effort. A desktop analysis was completed using the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (USFWS, 2014), USGS quadrangle maps (USGS; Green Bank, West Virginia), Natural Resources Conservation Service Web Soil Survey (NRCS, 1992), and available aerial photography to identify potential wetlands and waterbodies.

Deer Creek is a perennial waterbody located at the base of Deer Creek Valley that extends along the northern portion of the subject property. Several ephemeral tributaries to Deer Creek extend through the subject property based on review of USGS quadrangle maps and available aerial photography.

A freshwater forested wetland system is located within the forested area south of the subject property and freshwater emergent wetlands are present along Deer Creek north of the subject property based on USFWS National Wetland Inventory mapping and available aerial photography.

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. Publically available sources of information regarding federal and state-listed RTE species that may be found on or in the vicinity of the subject property were evaluated as part of a desktop review. Sources included the USFWS Threatened and Endangered Species System internet database and the West Virginia Division of Natural Resources (WVDNR) Natural Heritage Database. State legislation for RTE species has not been established in West Virginia, therefore, RTE species management and regulatory protections are generally limited to those listed by the USFWS.

Six RTE species are listed by the USFWS as potentially occurring in Pocahontas County, West Virginia. A general habitat description and desktop evaluation of the potential utilization of the subject property by RTE species are summarized for each of the 5 species in **Table 4-1**. Impacts to RTE species is not anticipated because activities would be generally limited to previously disturbed areas within the subject property.

Table 4-1. Federally Protected Species
Environmental Baseline Study, Green Bank Observatory, West Virginia

Group	Name	Federal Status [a]	Habitat Description	Desktop Assessment
Amphibians	Cheat Mountain salamander (*Plethodon nettingi*)	Threatened	Red spruce-yellow birch or spruce-dominated forests; occasionally collected in mixed deciduous hardwoods	Unlikely; no activity proposed in forested areas.
Birds	Red knot (*Calidris canutus rufa*)	Proposed Threatened	Intertidal, marine habitats during non-breeding seasons. Breeds in the middle and high-Arctic areas of northern Canada.	Unlikely; potential stopover habitat only; marine and intertidal habitat not present.
Flowering Plants	Running buffalo clover (*Trifolium stoloniferum*)	Endangered	Mesic woodlands in partial to filtered sunlight with frequent ground disturbance. Often underlain with limestone or other calcareous bedrock.	Unlikely; no activity proposed in forested areas.
Mammals	Indiana bat (*Myotis sodalis*)	Endangered	Hibernates in caves; maternity sites generally behind loose bark of dead or dying trees or in tree cavities. Foraging habitats include riparian areas, upland forests, ponds, and fields	Unlikely; no caves are known to be present; no activity proposed in forested areas.
Mammals	Northern Long-Eared Bat (*Myotis septentrionalis*)	Threatened	Roosts during summer in colonies underneath bark, in cavities, or in crevices of both live and dead trees, caves and mines, or structures. Winter hibernacula includes caves and mines. Foraging habitat includes the understory of forested hillsides and ridges.	Unlikely; no caves are known to be present; no activity proposed in forested areas.
Mammals	Virginia northern flying Squirrel (*Glaucomys sabrinus fuscus*)	Recovery	Spruce, fir, spruce-hardwood, and northern hardwood forests, with well-developed understory.	Unlikely; no activity proposed in forested areas.

Sources:
USFWS Threatened and Endangered Species System (http://ecos.fws.gov/tess_public/)
West Virginia Division of Natural Resources Natural Heritage Database (http://www.wvdnr.gov/Wildlife/Endangered.shtm)
NatureServe (http://explorer.natureserve.org/index.htm)
[a] State legislation for RTE species has not been established in West Virginia; RTE species management and regulatory protections are generally limited to those listed by the USFWS.

4.2 Environmental Factors

The following sections discuss environmental factors that may affect the subject property.

4.2.1 Hazardous Material/Petroleum Product Management

There is no single storage area for hazardous materials and petroleum products. The products were stored at a building where they intend to be used. Hazardous material/petroleum product inventory lists were not available. However, the following materials were observed:

- 20-meter telescope: One 55-gallon drum of synthetic gear oil and one drum of automatic transmission fluid. (Photograph 80)
- 85-1: Flammable locker with three 1-gallon cans of paint thinner, one 100-pound container of copper polish. (Photograph 81)
- Shed southwest of 85-1: One 55-gallon drum of automatic transmission fluid, one 55-gallon drum of motor oil, two 55-gallon drums of gear oil, five 5-gallon cans of oil. (Photograph 82)
- Inside 43-meter Telescope: Flammable locker with oils and lubricants, seven 55-gallon drums of hydraulic oil, one 5-gallon can of mineral spirits, one 55-gallon drum of antifreeze, two 55-gallon drums of automatic transmission fluid. (Photograph 83)
- Shed outside 43-meter Telescope: Twenty four 55-gallon drums of transmission fluid, eight 55-gallon drums of gear oil, and 15 5-gallon cans of lubricants. (Photographs 84-85)
- Warehouse outside storage shed: One 55-gallon drum label petroleum distillates, three 55-gallon drums of lubricant. (Photograph 86)
- Works Building: Four flammable lockers with spray paints, lubricants, cleaners, and solvents. (Photograph 87-90)
- Works Area garage: Small containers of spray paint, lubricants, cleaners, and solvents. Three 55-gallon drums of motor oil. (Photograph 91)
- Warehouse at works area: Six 55-gallon drums of lubricant. (Photograph 92)
- Paint Booth: Over 100 1-gallon cans of paint, flammable locker with paint and thinner. (Photograph 93)
- GBT warehouse: Twelve 55-gallon drums of synthetic lubricant, flammable locker with cleaners and lubricants. (Photograph 94)
- GBT storage yard: Thirty five 55-gallon drums of synthetic lubricant. (Photograph 95)

Fuel oil is also stored in aboveground storage tanks (ASTs) and underground storage tanks (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:

- 20-gallon drum of lubricant leaked on an absorbent pad in the 43-meter Telescope. (Photograph 96)
- Staining on the concrete floor of the GBT warehouse. (Photograph 97)
- Staining on the concrete floor in the Works Area garage (Photograph 91)
- Staining on the tile floor in the shed west of 85-1. (Photograph 81)

4.2.2 Aboveground Storage Tanks

There are four ASTs on the subject property (Photographs 98-101) and are described on Table 4-2.

Table 4-2. ASTs Located on the Subject Property
Environmental Baseline Study, Green Bank Observatory, West Virginia

AST Location	Capacity	Contents	Photograph
Elevated Water Tank	100,000 gallons	Water	73
Warehouse	500 gallons	Diesel	98
Works Area	2-350 gallons	Used oil	99-100
Fuel truck[a]	~1000 gallons	Diesel	101

[a] A fuel truck was staged on a hill near Slavin Hollow Road.

A military-style fuel truck was staged north of the telescope area off of Slavin Hollow Road. The truck is permanently parked on a hillside and is used as a diesel AST. No secondary containment was observed under the filling ports behind the truck.

4.2.3 Underground Storage Tanks

A former fill station was located in front of the warehouse building. In 1991, water was found in the 1,000-gallon gasoline UST. Supply records showed that no gasoline was lost. The gasoline UST was emptied and filled with a cement slurry in 1991. The 3,000-gallon diesel UST was closed and filled with sand in 1994 when it was determined that regulation required the separation of over-the–road fuel from heating oil. Seven active heating oil USTs are located on the subject property. (NRAO, 2000). Table 4-3 summarizes the USTs on the subject property.

Table 4-3. USTs Located on the Subject Property
Environmental Baseline Study, Green Bank Observatory, West Virginia

Building	Capacity	Contents	Status
Warehouse	3,000 gallons	Diesel	Closed in place in 1994 and filled with sand.
Warehouse	1,000 gallons	Gasoline	Closed in place in 1991 and filled with a cement slurry.
Warehouse	2,000 gallons	Heating Oil	Active
Jansky Laboratory	10,000 gallons	Heating Oil	Active
Residence Hall	6,000 gallons	Heating Oil	Active
Works Area	5,000 gallons	Heating Oil	Active
Riley House	350 gallons	Heating Oil	Active
Nut Bin House	350 gallons	Heating Oil	Active
Shinnaberry House	350 gallons	Heating Oil	Active

4.2.4 Environmental Investigations

Soil contamination was discovered at the oil pond for the former 300-foot telescope after the telescope's collapse in 1989. The pond was drained and soil from the pond's bottom and sides were bio-

remediated. The West Virginia Department of Environmental Protection (WVDEP) issued a closure letter dated December 23, 1999 (NRAO, 2000).

In 1996, a fuel oil spill was found in the interstitial space between the newly installed UST at the Jansky Laboratory addition. The tank was improperly installed and the contractor replaced it and excavated the contaminated soil. Soil sample analysis confirmed that the contaminated soil was removed (NRAO, 2000). Photograph 102 shows the vent pipes of the UST at the Jansky Laboratory building.

A burn pile of scrap wood, brush, and furniture is located at the junkyard (Photograph 25). The WVDNR recommended removing the wastes, disposing of the wastes in the county landfill, and returning the land to its natural slope and drainage. The Environmental Log states this was done; however, there is a burn pile with scrap material at the location of the former junkyard.

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 asbestos-containing materials (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.

According to records, ACM surveys were performed in 1989 at the following buildings: 43-meter Telescope, 85-1 Control Building, Works Area Building, Jansky Laboratory Building, Residence Hall, Interferometer building, Warehouse Building, former 300-foot Telescope control building (now the Laser Lab in Table 2-1), and the Cable Building. Table 4-4 presents the ACM at the subject property. (Brackenrich & Associates, Inc., 1989)

Table 4-4. Confirmed ACM
Environmental Baseline Study, Green Bank Observatory, West Virginia

Building	ACM	Friable/Non-friable
43-meter Telescope	Ceiling plaster	Friable
	Air duct splicing	Non-friable
	Pipe insulation	Friable
85-1 Control Building	9”x9” floor tiles	Non-friable
	Dry wall	Friable
	Pipe insulation	Friable
Works Area Building	9”x9” floor tiles	Non-friable
	1’ x 1’ floor tiles	Non-friable
	Transite wall panels	Non-friable
	Pipe insulation	Friable
	Pipe elbow insulation	Friable

Table 4-4. Confirmed ACM
Environmental Baseline Study, Green Bank Observatory, West Virginia

Building	ACM	Friable/Non-friable
	Drain pipe insulation	Friable
	Drain pipe elbow insulation	Friable
Jansky Laboratory Building	9”x9” floor tiles	Non-friable
	Pipe insulation	Friable
	Pipe elbow insulation	Friable
Residence Hall	9”x9” floor tiles	Non-friable
	1’ x 1’ floor tiles	Non-friable
	Pipe insulation	Friable
	Pipe elbow insulation	Friable
Interferometer Control Building	9”x9” floor tiles	Non-friable
	Pipe insulation	Friable
	Air unit jacket	Friable
	Air duct splice	Non-friable
Warehouse Building	9”x9” floor tiles	Non-friable
	1’ x 1’ floor tiles	Non-friable
Cable Building	9”x9” floor tiles	Non-friable

Source: Brackenrich & Associates, Inc., 1989

No records of ACM surveys of other structures including the residential homes were found or known to exist. Asbestos encapsulation was performed on friable asbestos pipe insulation at the pool room, the Jansky Laboratory Building (Photograph 103), and the cafeteria basement in 1991. ACM was removed from the Jansky Laboratory crawl space, portico roof, and the west end first floor corridor air lock in 1995 (NRAO, 2000).

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 U.S. Environmental Protection Agency (USEPA). Sources of exposure to lead include paint, dust, and soil.

Exposure to lead-based paint (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.

No LBP surveys were available for review. Significant peeling paint was not observed during the site reconnaissance and no paint chips were observed on the ground surfaces.

4.3.3 Polychlorinated Biphenyls

Electrical transformers, electrical equipment, light ballasts, and machinery with hydraulic systems are potential sources of polychlorinated biphenyl (PCB)-containing oil. A PCB survey was completed in October 1988. As a result of the survey, all transformers, capacitors, and switches containing PCBs were replaced with non-PCB oil.

Pole-mounted and pad-mounted transformers were located throughout the subject property and are associated with the buildings currently being used. These transformers were not labeled to indicate the presence or absence of PCBs. They appeared to be in good condition and no leaks, soil staining, or stressed vegetation was observed around the poles or pads.

Light ballasts in the buildings were not checked to determine if they contain PCBs.

4.3.4 Radon

In July 1994, a radon survey was conducted at basements of the main buildings. Only the Laser Lab had radon levels above 4 picoCuries per liter (pCi/L). The remedy was to keep the heating, ventilation, and air conditioning system on and keep the doors between the areas open. Subsequent tests resulted in radon levels below 4 pCi/L. In 1997, residential houses with basements were tested for radon. The Shinnaberry House, Nut Bin House, and the Tracy House were above 4 pCi/L and were outfitted with sub-slab ventilation systems.

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

A shooting range is located at the northeast corner of the property for employee recreational use. The range is still active (Photograph 104). Casings from small caliber bullets were found at the firing points (Photograph 105). The shooting range may have lead in soil at the target areas and gunpowder residues, including polycyclicaromatic hydrocarbons, may have reached the soil at the firing line.

SECTION 5

Findings: Adjacent Properties

5.1 Land Use

More than half of the land in Pocahontas County is managed by the U.S. Forest Service and owned by the federal government, with another 6 percent in state park land. The primary land uses in the county are forest and agriculture. The land use adjacent to the subject property is low density, rural residential/agricultural with commercial/retail strip development along Route 28 and 92. Employment is tied to agriculture, forestry, and tourism. Nearby Snowshoe Mountain attracts visitors for winter sports.

5.2 Surveyed Properties

CH2M 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
- Pocahontas County Water Resources Management Plan. 2012
- WVDEP Agency Geospatial Technologies. Open Dump Website. http://www.dep.wv.gov/gis-and-maps/Pages/default.aspx. Accessed November 24, 2014.
- WVDEP Database of all Leaking Underground Storage Tank sites. Accessed November 24, 2014.

The following databases were searched and provided in 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 10/25/13)
- USEPA Delisted NPL site list (last updated 10/25/13)
- USEPA Proposed NPL site list (last updated 10/25/13)
- 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)
- Treatment, storage, and disposal facilities (RCRA-TSDF) (last updated 06/10/2014)
- USEPA RCRA large-quantity, small-quantity, and conditionally exempt small-quantity generators (last updated 06/10/2014)
- U.S. Engineering Controls: Federal institutional control and engineering control registries (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 9/30/13)
- Federal Emergency Management Agency 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)
- USEPA 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)
- USEPA Toxic Substances Control Act (TSCA) database, which identifies manufacturers and importers of chemical substances (last updated 12/31/2006)
- USEPA Office of Prevention, Pesticides and Toxic Substances Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA)/Federal TSCA Tracking System (FTTS), which tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA, and the Emergency Planning and Community Right-to-Know Act (last updated 04/09/2009)
- U.S. Mines Master Index File Department of Labor (last updated 01/30/2014)
- 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 06/30/14)
- 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. 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 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 05/06/2014)
- 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 06/01/13)
- EPA 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 USEPA for radiation and radioactivity (last updated 07/07/14)
- USEPA 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 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)
- EPA Risk Management Plans (RMP) chemical accident prevention at facilities using extremely hazardous substances (last updated 04/01/2014)
- EPA Biennial Reporting System (BRS) database, which collects detailed data regarding large-quantity generators and treatment, storage, and disposal facilities (last updated 12/31/2011)
- State Underground Injection Wells (UIC) (last updated 07/15/2014)
- EPA 2020 Corrective Action List, (COR ACTION) a RCRA cleanup baseline includes facilities expected to need corrective action (last updated 11/11/2011)
- EPA Lead Smelter Sites a listing of former lead smelter locations (last updated 06/04/14)
- EPA Potentially Responsible Parties (PRP) a listing of verified potential responsible parties (last updated 10/25/13)
- EPA 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 10/23/2013)
- US AIRS MINOR Air Facility Systems Data is a listing of minor source facilities (last updated 10/23/2013)
- 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)

- EPA Watch List on enforcement matters (last updated 08/30/2013)
- Uranium Mill Tailings Sites locations (last updated 09/14/2010)

5.2.2 State 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)
- Solid Waste Facilities/Landfill Sites (SWF/LF) contains an inventory of solid waste disposal facilities or landfills in West Virginia (last updated 01/16/2014)
- Landfill Closure Program (LCP) database on non-lined landfills required to close (last updated 12/31/2013)
- Leaking Underground Storage Tank (LUST) database contains an inventory of reported LUST incidents (last updated 05/07/2014)
- UST database contains data regarding registered USTs (last updated 06/04/2014)
- State institutional control (INST CONTROL) registries (last updated 05/01/2014)
- Voluntary Cleanup, Oversight, and Assistance Program (VCP) allows the opportunity to work proactively with state government to address necessary cleanup of a property to return it to productive use (last updated 05/01/2014)
- Brownfields listings in West Virginia (last updated 05/14/2013)
- State Clandestine Drug Labs (CDL) WVDEP (last updated 11/26/12)
- State Dry Cleaners Listing (DRYCLEANERS) of locations that use perchloroethylene (last updated 05/19/2014)
- Coal ash (COAL ASH) landfill sites list (last updated 04/07/2011)
- State Spills (SPILLS) listing of spills locations (last updated 07/28/2014)
- State Coalition for remediation of drycleaners (SCRD DRYCLEANERS) (last updated 03/07/2011)
- National Pollutant Discharge Elimination System (NPDES) permitted wastewater discharges (last updated 01/19/2010)
- AIRS contains a list of permitted sources by the WVDEP (last updated 01/29/2014)
- State Financial Assurance List (last updated 03/05/2013)

5.2.3 Additional Environmental Site Information

Although the subject property was not listed in any of the databases searched by EDR, adjacent properties were listed in the LUST, UST, FTTS, Historical Federal TSCA Tracking System (HIST FTTS), Underground Injection Control (UIC), and Financial Assistance databases in the EDR report as shown in Table 5-1. Distances of the sites ranged from the boundary of the subject property to 1 mile from the subject property boundary.

The LUST site had soil contamination only and remediation was completed in July 2007. No information was available for the UIC at the Green Bank Elementary-Middle School.

Table 5-1. EDR Database Listings
Environmental Baseline Study, Green Bank Observatory, West Virginia

Site Name	Database(s)	Site Address	Location Relative to Site
Ryder's Chevron - Arbovale	LUST, UST, Financial Assistance	16811 Potomac Highlands Trail, Arbovale, WV 24915	Approximately 0.4 miles east of the nearest property line of the property
Green Bank Elementary-Middle School	UIC	5917 Potomac Highlands Trail, Green Bank, WV 24944	Approximately 0.4 miles east of the nearest property line of the property
Lamp of Youth Christian - Green Bank	FTTS, HIST FTTS	Route 28, Green Bank, WV 24944	Approximately 0.6 miles east of the nearest property line of the property

Although, the EDR Report did not identify any orphan properties (unknown locations), a review of the WVDEP petroleum cleanup database identified the locations listed in Table 5-2 in addition to Ryder's Chevron in Arbovale.

Table 5-2. WVDEP Petroleum Database Listings
Environmental Baseline Study, Green Bank Observatory, West Virginia

Site Name	Database(s)	Site Address
Green Bank Sub Station 08382 - Green Bank	WVDEP LUST – Cleanup completed 09/10/2014	Route 28 and 92, Green Bank, WV 24944
Green Bank Sub Station 08382 - Green Bank	WVDEP LUST – Cleanup completed 06/30/2008	Route 28 and 92, Green Bank, WV 24944
Moore's Ready Mix - Green Bank	WVDEP LUST – Cleanup completed 06/09/2008	Unknown, Green Bank, WV 24944
Cass Scenic Railroad - Cass	WVDEP LUST – release 03/19/2004	Unknown, Cass, WV 24927
Old General Store	WVDEP LUST – Cleanup completed 06/28/1994	Unknown, Cass, WV 24927
Moore's Store	WVDEP LUST – Cleanup completed 08/03/1995	Unknown, Cass, WV 24927
Mountain State Telephone	WVDEP LUST – Cleanup completed 06/16/1995	Route 92, Arbovale, WV 24944

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SECTION 6

Interviews

Interviews were conducted on October 6-9, 2014 with the personnel listed in Table 6-1.

Table 6-1. Personnel Interviewed during the Site Visit
Environmental Baseline Study, Green Bank Observatory, West Virginia

Personnel	Title or Department	Information or Services Provided
Mr. Johnny Samples	Safety and Environmental Manager/NRAO	Provided historical documentation related to the subject property, particularly asbestos reports and the 300-foot telescope oil pond release. He is unaware of any environmental issues that could affect the environmental condition of property.
Mr. Michael Holstine	Green Bank Observatory Business Manager	Provided UST information.
Mr. Jody Bolyard	NRAO Environmental Safety and Security (ES&S) Manager	Point of contact for the site reconnaissance. Provided the environmental log.

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SECTION 7

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 subject property has been classified into property category types.

7.1 Environmental Condition Factors

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.

7.1.1 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.

The following RECs were found on the subject property:

- A 1,000-gallon gasoline underground storage tank was abandoned in place (emptied and filled with a cement slurry) in 1991 after water was found in the gasoline. Soil samples were not collected to determine if there was a release.
- The shooting range may have lead in soil at the target areas and gunpowder residues including polycyclicaromatic hydrocarbons may have reached the soil at the firing line.

7.1.2 Historical Recognized Environmental Conditions

A Historical Recognized Environmental Condition (HREC) is one that in the past would have been considered a REC, but 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. The following HRECs were found on the subject property:

- The 300-foot telescope oil pond closure. Soil at the bottom and walls of the oil pond were bio-remediated. A closure letter was issued on December 23, 1999.
- Fuel oil was found leaking from a newly installed UST at the Jansky Laboratory building. The tank and contaminated soil was excavated. Soil sample analysis showed that the contaminated soil was removed.

7.1.3 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:

- 20-gallon drum of lubricant leaked on an absorbent pad in the 43-meter Telescope
- Staining on the concrete floor of the GBT warehouse
- Staining on the concrete floor in the Works Area garage
- Staining on the tile floor in the shed southwest of 85-1

7.1.4 Other Conditions of Note

The following are other conditions on the subject property that are not considered RECs, but are worth disclosing:

- According to the 1989 Asbestos Management Plan, 9 buildings were surveyed for asbestos-containing materials (ACM). Other buildings including residential homes were not surveyed. ACM was found at the following buildings: 43-meter Telescope, 85-1 Control Building, Works Area Building, Jansky Laboratory Building, Residence Hall, Interferometer Control Building, Warehouse Building, and the Cable Building.
- A burn pile of scrap wood, brush, and furniture is located at the junkyard. The WVDNR recommended removing the wastes, disposing of the wastes in the county landfill, and returning the land to its natural slope and drainage. The Environmental Log states this was done; however, there is a burn pile with scrap material at the location of the former junkyard.
- A military-style fuel truck was staged north of the telescope area off of Slavin Hollow Road. The truck is permanently parked on a hillside and is used as a diesel AST. No secondary containment was observed under the filling port behind the truck. Spills from the truck would immediately impact the soil.

To assess the potential for adjacent properties to affect the property, a records search and database search of RECs within 1 mile of the subject property was performed for this EBS assessment (see Attachment B). No other neighboring properties appear to have the potential to environmentally affect the subject property.

SECTION 8

Certification for the Green Bank EBS

CH2M has performed an EBS for the approximately 2,200-acre subject property located in Pocahontas County, West Virginia. 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'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

Date

_____ _____

David Stieb
Senior Technical Reviewer
CH2M

Date

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SECTION 9

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West Virginia Division of Natural Resources. 2014. Natural Heritage Database http://www.wvdnr.gov/Wildlife/Endangered.shtm. Accessed December 2014.

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Attachment A
Site Reconnaissance Photographs

Photo 1: Green Bank Telescope facing north.

Photo 2: 43-meter Telescope facing east.

Photo 3: Sheds next to 43-meter Telescope

Photo 4: 20-meter telescope facing north.

Photo 5: 45-foot telescope south.

Photo 6: 40-foot telescope facing south.

Photo 7: 85-1 interferometer facing south.

Photo 8: 85-2 interferometer facing northeast.

Photo 9: 85-3 interferometer facing south.

Photo 10: Laser lab facing west.

Photo 11: Former interferometer control building facing north.

Photo 12: Gabel Barn

Photo 13: Gambrel barn

Photo 14: Old experiment building facing northwest.

Photo 15: Slavin Barn facing north.

Photo 16: GBT storage building facing west.

Photo 17: Inside GBT storage building facing west.

Photo 18: GBT storage yard facing west.

Photo 19: GBT storage yard shed facing east.

Photo 20: Beard House facing north.

Photo 21: Beard House facing south.

Photo 22: Shed at 85-1 facing northeast.

Photo 23: Scrap metal at junkyard facing north.

Photo 24: Waste tires facing northeast.

Photo 25: Burn pile facing west.

Photo 26: Science Center building facing north.

Photo 27: Jansky Laboratory facing northeast.

Photo 28: Storage warehouse at works area facing west.

Photo 29: Inside storage warehouse at works area facing northwest.

Photo 30: Covered storage at works area facing west.

Photo 31: Warehouse building facing north.

Photo 32: Works building facing northeast.

Photo 33: Paint booth facing north.

Photo 34: Bunk house facing north.

Photo 35: Residence hall/cafeteria facing northeast.

Photo 36: Redwood house facing north.

Photo 37: House #2 facing southwest.

Photo 38: House #3 facing northeast.

Photo 39: House # 4 facing southwest.

Photo 40: House #5 facing northeast.

Photo 41: House #6 facing southwest.

Photo 42: House #7 facing northeast.

Photo 43: House #8 facing southwest.

Photo 44: House #9 facing northeast.

Photo 45: House #10 facing southwest.

Photo 46: House #11 facing northeast.

Photo 47: House #14 facing northeast.

Photo 48: House #16 facing northeast.

Photo 49: House #19 facing northeast.

Photo 50: House #21 facing northeast.

Photo 51: House #23 facing northeast.

Photo 52: House #24 facing northeast.

Photo 53: Hill House facing west.

Photo 54: Tracey House facing northeast.

Photo 55: Riley House facing south.

Photo 56: Nut Bin facing north.

Photo 57: Shinnaberry House facing northwest.

Photo 58: Townhouses facing southwest.

Photo 59: Hannah House facing north.

Photo 60: Swimming pool facing south.

Photo 61: Pavilion facing north.

Photo 62: Tennis courts facing southeast.

Photo 63: Shooting range facing north.

Photo 64: Barn near airstrip facing northwest.

Photo 65: Sheds east of 85-1.

Photo 66: Sheds southwest of 85-1.

Photo 67: Weather station facing north.

Photo 68: 140-telescope sheds facing east.

Photo 69: 140-telescope sheds facing east.

Photo 70: Top of Little Big Horn antenna facing southwest.

Photo 71: Base of Little Big Horn antenna facing north.

Photo 72: Drinking water wells facing north.

Photo 73: 100,000-gallon water tower facing northwest.

Photo 74: Wastewater treatment ponds facing west.

Photo 75: Shooting range shed facing northeast.

Photo 76: Airstrip facing northwest.

Photo 77: Outfall at wastewater treatment ponds facing south.

Photo 78: Electrical substation facing north.

Photo 79: Deer Creek at Hannah Run Road facing east.

Photo 80: Drums at 20-meter telescope facing southwest.

Photo 81: Flammable locker at 85-1.

Photo 82: Inside shed southwest of 85-1.

Photo 83: Inside 43-meter Telescope.

Photo 84: Shed outside 43-meter Telescope.

Photo 85: Inside garage at 43-meter Telescope.

Photo 86: Inside shed behind warehouse building facing north.

Photo 87: Flammable locker in Works building.

Photo 88: Flammable locker in Works building.

Photo 89: Flammable locker in Works building.

Photo 90: Flammable locker in Works building.

Photo 91: Inside Works Area garage.

Photo 92: Inside warehouse north of Works building.

Photo 93: Inside Paint booth storage room.

Photo 94: Inside GBT Warehouse.

Photo 95: Drums at GBT storage yard.

Photo 96: Drum leak at 43-meter Telescope.

Photo 97: Staining of concrete floor inside GBT warehouse.

Photo 98: Diesel fuel AST behind Warehouse.

Photo 99: Waste oil AST at Work Area outside storage yard.

Photo 100: Waste oil AST at Work Area outside storage yard.

Photo 101: Tanker truck used to store diesel fuel north of 43-meter Telescope facing north.

Photo 102: UST at Jansky Laboratory.

Photo 103: Encapsulated ACM at Jansky Laboratory.

Photo 104: Shooting range facing north.

Photo 105: Bullet casings at shooting range.

Attachment B
Environmental Data Resources, Inc., Radius Map Reports with Geocheck

Green Bank
Potomac Highland Trail and Slavin Hollow Rd
Cass, WV 24927

Inquiry Number: 4103240.2s
October 29, 2014

The EDR Radius Map™ Report with GeoCheck®

Prepared using the EDR FieldCheck® System

EDR® Environmental Data Resources Inc

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of the environmental records was conducted by Environmental Data Resources, Inc. (EDR). CH2M HILL, INC. used the EDR FieldCheck System to review and/or revise the results of this search, based on independent data verification by CH2M HILL, INC.. 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

POTOMAC HIGHLAND TRAIL AND SLAVIN HOLLOW RD
CASS, WV 24927

COORDINATES

Latitude (North):	38.4357000 - 38° 26' 8.52''
Longitude (West):	79.8380000 - 79° 50' 16.80''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	601418.1
UTM Y (Meters):	4254591.5
Elevation:	2645 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	38079-D7 GREEN BANK, WV
Most Recent Revision:	1998

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20111006
Source:	USDA

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No sites were identified in following databases.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL---------- National Priority List

EXECUTIVE SUMMARY

Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

Federal CERCLIS list

CERCLIS ---------- Comprehensive Environmental Response, Compensation, and Liability Information System
FEDERAL FACILITY ---------- Federal Facility Site Information listing

Federal CERCLIS NFRAP site List

CERC-NFRAP ---------- CERCLIS No Further Remedial Action Planned

Federal RCRA CORRACTS facilities list

CORRACTS ---------- Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ---------- RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ---------- RCRA - Large Quantity Generators
RCRA-SQG ---------- RCRA - Small Quantity Generators
RCRA-CESQG ---------- RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

US ENG CONTROLS ---------- Engineering Controls Sites List
US INST CONTROL ---------- Sites with Institutional Controls
LUCIS ---------- Land Use Control Information System

Federal ERNS list

ERNS ---------- Emergency Response Notification System

State- and tribal - equivalent CERCLIS

SHWS ---------- This state does not maintain a SHWS list. See the Federal CERCLIS list and Federal NPL list.

State and tribal landfill and/or solid waste disposal site lists

SWF/LF ---------- List of M.S.W. Landfills/Transfer Station Listing
LCP ---------- Landfill Closure Program

State and tribal leaking storage tank lists

INDIAN LUST ---------- Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

INDIAN UST ---------- Underground Storage Tanks on Indian Land

FEMA UST ---------- Underground Storage Tank Listing

State and tribal institutional control / engineering control registries

INST CONTROL ---------- Sites with Institutional Controls

State and tribal voluntary cleanup sites

INDIAN VCP ---------- Voluntary Cleanup Priority Listing
VCP ---------- Voluntary Remediation Sites

State and tribal Brownfields sites

BROWNFIELDS ---------- Brownfields Sites Listing

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ---------- A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9 ---------- Torres Martinez Reservation Illegal Dump Site Locations
ODI ---------- Open Dump Inventory
INDIAN ODI ---------- Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL ---------- Clandestine Drug Labs
CDL ---------- Drug Lab Site Locations
US HIST CDL ---------- National Clandestine Laboratory Register

Local Land Records

LIENS 2 ---------- CERCLA Lien Information

Records of Emergency Release Reports

HMIRS ---------- Hazardous Materials Information Reporting System
SPILLS ---------- Spills Listing

Other Ascertainable Records

RCRA NonGen / NLR ---------- RCRA - Non Generators / No Longer Regulated
DOT OPS ---------- Incident and Accident Data
DOD ---------- Department of Defense Sites
FUDS ---------- Formerly Used Defense Sites
CONSENT ---------- Superfund (CERCLA) Consent Decrees
ROD ---------- Records Of Decision
UMTRA ---------- Uranium Mill Tailings Sites
US MINES ---------- Mines Master Index File
TRIS ---------- Toxic Chemical Release Inventory System
TSCA ---------- Toxic Substances Control Act

SSTS Section 7 Tracking Systems
ICIS Integrated Compliance Information System
PADS PCB Activity Database System
MLTS Material Licensing Tracking System
RADINFO Radiation Information Database
FINDS Facility Index System/Facility Registry System
RAATS RCRA Administrative Action Tracking System
RMP Risk Management Plans
DRYCLEANERS Listing of Drycleaner Locations
NPDES Wastewater Discharge Permits Listing
AIRS Permitted Facility and Emissions Listing
INDIAN RESERV Indian Reservations
SCRD DRYCLEANERS State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR Financial Assurance Information
COAL ASH EPA Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER PCB Transformer Registration Database
COAL ASH Coal Ash Landills
EPA WATCH LIST EPA WATCH LIST
LEAD SMELTERS Lead Smelter Sites
2020 COR ACTION 2020 Corrective Action Program List
US AIRS Aerometric Information Retrieval System Facility Subsystem
PRP Potentially Responsible Parties
COAL ASH DOE Steam-Electric Plant Operation Data

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP EDR Proprietary Manufactured Gas Plants
EDR US Hist Auto Stat EDR Exclusive Historic Gas Stations
EDR US Hist Cleaners EDR Exclusive Historic Dry Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF Recovered Government Archive Solid Waste Facilities List
RGA LUST Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS 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. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

STANDARD ENVIRONMENTAL RECORDS

State and tribal leaking storage tank lists

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the Department of Commerce, Labor & Environmental Resources' Leaking Underground Storage Tanks database.

An online review and analysis by CH2M HILL, INC. of the LUST list,
as provided by EDR, and dated 05/07/2014 has revealed that there is 1 LUST site
within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
RYDERS CHEVRON	*16811 POTOMAC HIGHLANDS*	*E 1/4 - 1/2 (0.350 mi.)*	*1*	*7*

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Commerce, Labor & Environmental Resources.

An online review and analysis by CH2M HILL, INC. of the UST list,
as provided by EDR, and dated 06/04/2014 has revealed that there is 1 UST site
within approximately 1.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
RYDERS CHEVRON	*16811 POTOMAC HIGHLANDS*	*E 1/4 - 1/2 (0.350 mi.)*	*1*	*7*

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

FTTS: FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act) over the previous five years. To maintain currency, EDR contacts the Agency on a quarterly basis.

An online review and analysis by CH2M HILL, INC. of the FTTS list,
as provided by EDR, and dated 04/09/2009 has revealed that there is 1 FTTS site
within approximately 1 mile of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
LAMP OF YOUTH CHRISTIAN	*RTE 28*	*S 1/2 - 1 (0.628 mi.)*	*3*	*17*

EXECUTIVE SUMMARY

HIST FTTS: A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

An online review and analysis by CH2M HILL, INC. of the HIST FTTS list,
as provided by EDR, and dated 10/19/2006 has revealed that there is 1 HIST FTTS site
within approximately 1 mile of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
LAMP OF YOUTH CHRISTIAN	***RTE 28***	***S 1/2 - 1 (0.628 mi.)***	***3***	***17***

UIC: A listing of underground injection well locations.

An online review and analysis by CH2M HILL, INC. of the UIC list,
as provided by EDR, and dated 07/15/2014 has revealed that there is 1 UIC site
within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
GREEN BANK ELEMENTARY-MIDDLE S		SE 1/4 - 1/2 (0.446 mi.)	2	16

Financial Assurance: A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

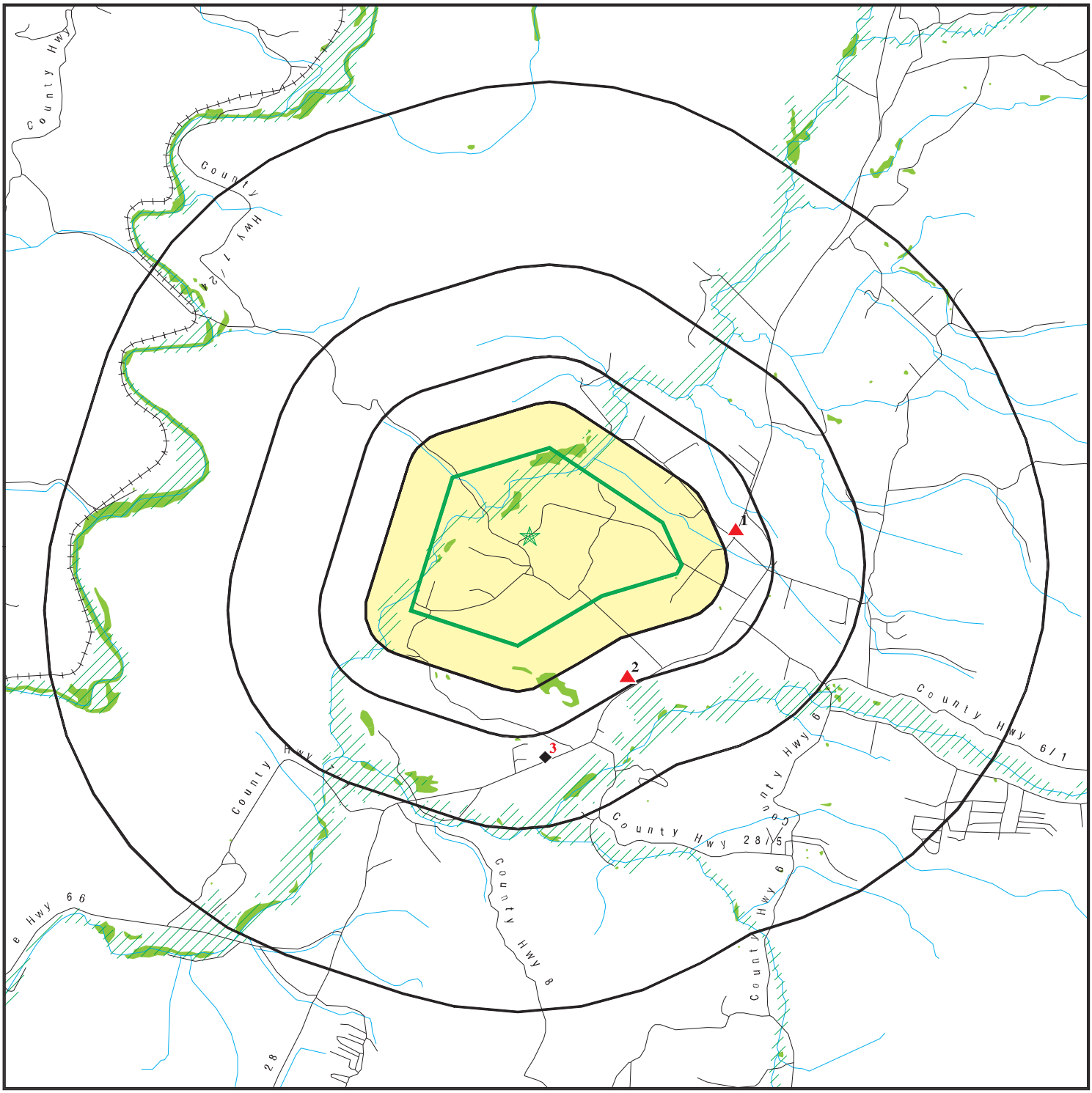
An online review and analysis by CH2M HILL, INC. of the Financial Assurance list,
as provided by EDR, and dated 03/05/2013 has revealed that there is 1 Financial Assurance site
within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
RYDERS CHEVRON	***16811 POTOMAC HIGHLAND***	***SE 1/4 - 1/2 (0.350 mi.)***	***1***	***7***

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

OVERVIEW MAP - 4103240.2S



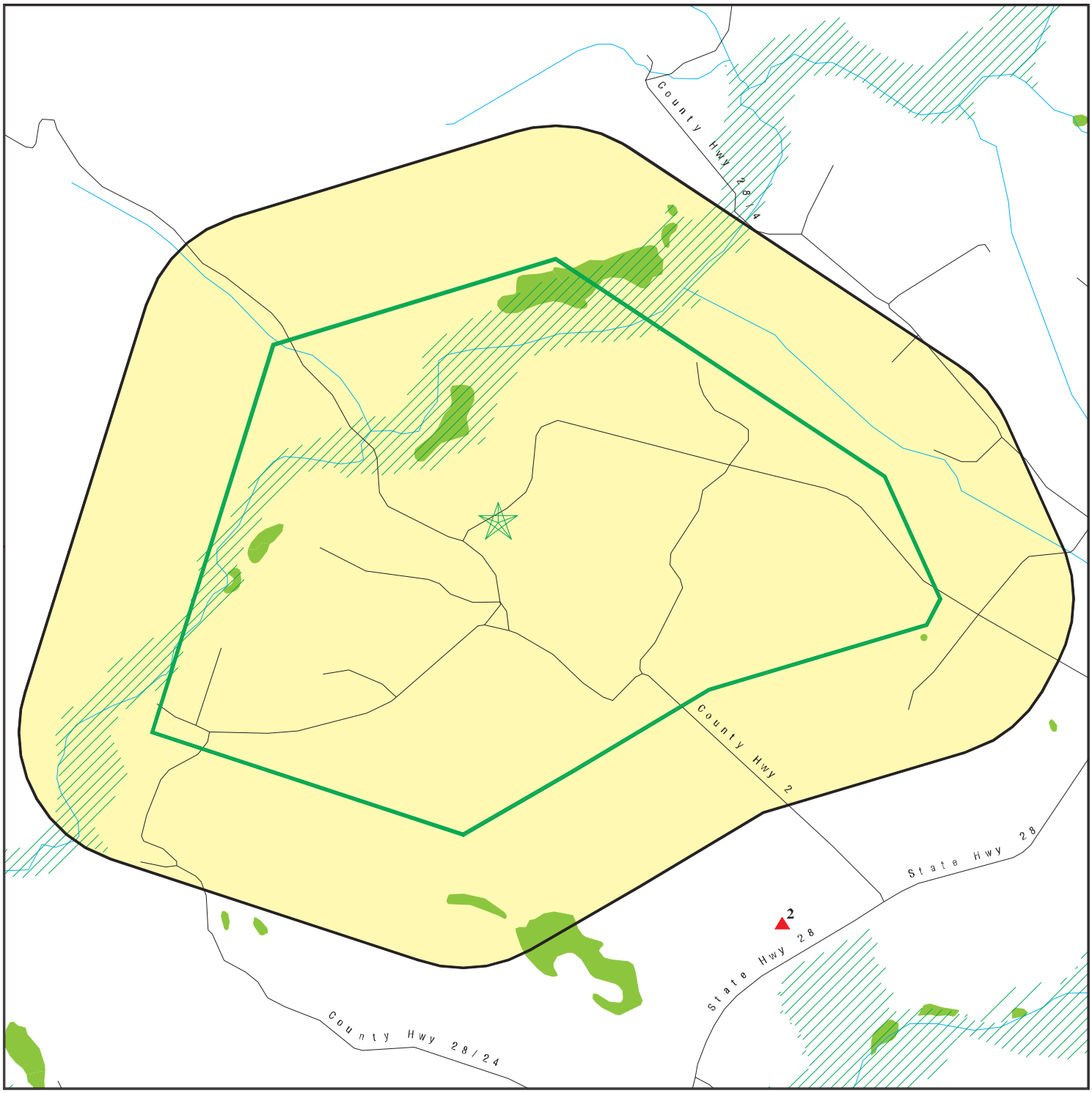
0 3/4 1 1/2 3 Miles

- 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
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory

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: Green Bank	CLIENT: CH2M Hill, Inc.
ADDRESS: Potomac Highland Trail and Slavin Hollow Rd Cass WV 24927	CONTACT: Mike Brose
LAT/LONG: 38.4357 / -79.838	INQUIRY #: 4103240.2s DATE: October 29, 2014 1:09 pm

DETAIL MAP - 4103240.2S



- 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
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory

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: Green Bank	CLIENT: CH2M Hill, Inc.
ADDRESS: Potomac Highland Trail and Slavin Hollow Rd Cass WV 24927	CONTACT: Mike Brose
LAT/LONG: 38.4357 / -79.838	INQUIRY #: 4103240.2s DATE: October 29, 2014 1:10 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								
Federal NPL site list								
NPL	2.000		0	0	0	0	0	0
Proposed NPL	2.000		0	0	0	0	0	0
NPL LIENS	1.000		0	0	0	0	NR	0
Federal Delisted NPL site list								
Delisted NPL	2.000		0	0	0	0	0	0
Federal CERCLIS list								
CERCLIS	1.500		0	0	0	0	0	0
FEDERAL FACILITY	1.500		0	0	0	0	0	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP	1.500		0	0	0	0	0	0
Federal RCRA CORRACTS facilities list								
CORRACTS	2.000		0	0	0	0	0	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	1.500		0	0	0	0	0	0
Federal RCRA generators list								
RCRA-LQG	1.250		0	0	0	0	0	0
RCRA-SQG	1.250		0	0	0	0	0	0
RCRA-CESQG	1.250		0	0	0	0	0	0
Federal institutional controls / engineering controls registries								
US ENG CONTROLS	1.500		0	0	0	0	0	0
US INST CONTROL	1.500		0	0	0	0	0	0
LUCIS	1.500		0	0	0	0	0	0
Federal ERNS list								
ERNS	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
SHWS	N/A		N/A	N/A	N/A	N/A	N/A	N/A
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	1.500		0	0	0	0	0	0
LCP	2.000		0	0	0	0	0	0
State and tribal leaking storage tank lists								
LUST	1.500		0	0	1	0	0	1
INDIAN LUST	1.500		0	0	0	0	0	0
State and tribal registered storage tank lists								
UST	1.250		0	0	1	0	0	1

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
INDIAN UST	1.250		0	0	0	0	0	0
FEMA UST	1.250		0	0	0	0	0	0
State and tribal institutional control / engineering control registries								
INST CONTROL	1.500		0	0	0	0	0	0
State and tribal voluntary cleanup sites								
INDIAN VCP	1.500		0	0	0	0	0	0
VCP	1.500		0	0	0	0	0	0
State and tribal Brownfields sites								
BROWNFIELDS	1.250		0	0	0	0	0	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	1.500		0	0	0	0	0	0
Local Lists of Landfill / Solid Waste Disposal Sites								
DEBRIS REGION 9	1.500		0	0	0	0	0	0
ODI	1.500		0	0	0	0	0	0
INDIAN ODI	1.500		0	0	0	0	0	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL	1.000		0	0	0	0	NR	0
CDL	1.000		0	0	0	0	NR	0
US HIST CDL	1.000		0	0	0	0	NR	0
Local Land Records								
LIENS 2	1.000		0	0	0	0	NR	0
Records of Emergency Release Reports								
HMIRS	1.000		0	0	0	0	NR	0
SPILLS	1.000		0	0	0	0	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	1.250		0	0	0	0	0	0
DOT OPS	1.000		0	0	0	0	NR	0
DOD	2.000		0	0	0	0	0	0
FUDS	2.000		0	0	0	0	0	0
CONSENT	2.000		0	0	0	0	0	0
ROD	2.000		0	0	0	0	0	0
UMTRA	1.500		0	0	0	0	0	0
US MINES	1.250		0	0	0	0	0	0
TRIS	1.000		0	0	0	0	NR	0
TSCA	1.000		0	0	0	0	NR	0
FTTS	1.000		0	0	0	1	NR	1

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
HIST FTTS	1.000		0	0	0	1	NR	1
SSTS	1.000		0	0	0	0	NR	0
ICIS	1.000		0	0	0	0	NR	0
PADS	1.000		0	0	0	0	NR	0
MLTS	1.000		0	0	0	0	NR	0
RADINFO	1.000		0	0	0	0	NR	0
FINDS	1.000		0	0	0	0	NR	0
RAATS	1.000		0	0	0	0	NR	0
RMP	1.000		0	0	0	0	NR	0
UIC	1.000		0	0	1	0	NR	1
DRYCLEANERS	1.250		0	0	0	0	0	0
NPDES	1.000		0	0	0	0	NR	0
AIRS	1.000		0	0	0	0	NR	0
INDIAN RESERV	2.000		0	0	0	0	0	0
SCRD DRYCLEANERS	1.500		0	0	0	0	0	0
US FIN ASSUR	1.000		0	0	0	0	NR	0
COAL ASH EPA	1.500		0	0	0	0	0	0
Financial Assurance	1.000		0	0	1	0	NR	1
PCB TRANSFORMER	1.000		0	0	0	0	NR	0
COAL ASH	1.250		0	0	0	0	0	0
EPA WATCH LIST	1.000		0	0	0	0	NR	0
LEAD SMELTERS	1.000		0	0	0	0	NR	0
2020 COR ACTION	1.250		0	0	0	0	0	0
US AIRS	1.000		0	0	0	0	NR	0
PRP	1.000		0	0	0	0	NR	0
COAL ASH DOE	1.000		0	0	0	0	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	2.000		0	0	0	0	0	0
EDR US Hist Auto Stat	1.250		0	0	0	0	0	0
EDR US Hist Cleaners	1.250		0	0	0	0	0	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA LF	1.000		0	0	0	0	NR	0
RGA LUST	1.000		0	0	0	0	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.

1
East
1/4-1/2
0.350 mi.
1850 ft.

RYDERS CHEVRON
16811 POTOMAC HIGHLANDS TRAIL
ARBOVALE, WV 24915

LUST **U004135518**
UST **N/A**
Financial Assurance

Relative:
Higher

Actual:
2733 ft.

LUST:

Facility ID:	3-804534
Leak Number:	99-044
Priority:	Soil contamination only
Project Manager:	Sutphin Mike
Confirmed Release Date:	03/05/1999
Cleanup Initiated Date:	03/05/1999
Cleanup Complete Date:	07/11/2007
EDR Link ID:	3-804534

UST:

Facility ID:	3804534
Owner:	FISHER, ANGELA
Owner Address:	14245 STAUTON PARKERSBURG TPK
Owner Address 2:	Not reported
Owner City,St,Zip:	BARTOW, WV 24920
Owner Telephone:	(304) 456-4308
Tank ID:	3
Tank Status:	**Currently in Use**
Tank Substance:	Gasoline
Tank Capacity:	6000
Date Last Used:	Not reported
Date Closed:	Not reported
Closure Status:	Not listed
Tank Material:	Fiberglass Reinforced Plastic
Piping Material:	Fiberglass Reinforced Plastic
Overfill Installed:	Yes
Installed Spill Protection:	Yes
Cathodic Protection Method:	Yes
Tank ID:	4
Tank Status:	**Currently in Use**
Tank Substance:	Gasoline
Tank Capacity:	6000
Date Last Used:	Not reported
Date Closed:	Not reported
Closure Status:	Not listed
Tank Material:	Fiberglass Reinforced Plastic
Piping Material:	Fiberglass Reinforced Plastic
Overfill Installed:	Yes
Installed Spill Protection:	Yes
Cathodic Protection Method:	Yes
Tank ID:	D1
Tank Status:	**Permanently Out of Service**
Tank Substance:	Gasoline
Tank Capacity:	2000
Date Last Used:	02/20/1999
Date Closed:	03/05/1999
Closure Status:	Tank removed from ground

RYDERS CHEVRON (Continued) **U004135518**

Tank Material:	Asphalt Coated or Bare Steel
Piping Material:	Unprotected Steel
Overfill Installed:	No
Installed Spill Protection:	No
Cathodic Protection Method:	No

Tank ID:	D2
Tank Status:	**Permanently Out of Service**
Tank Substance:	Gasoline
Tank Capacity:	3000
Date Last Used:	02/20/1999
Date Closed:	03/05/1999
Closure Status:	Tank removed from ground
Tank Material:	Asphalt Coated or Bare Steel
Piping Material:	Unprotected Steel
Overfill Installed:	No
Installed Spill Protection:	No
Cathodic Protection Method:	No

WV Financial Assurance:

Policy:	USC 5863703
Id #:	3-804534
Owner Name:	RYDER, VIOLET L
Owner Address:	HC 63 BOX 50
Owner Address:	Not reported
Owner City:	ARBOVALE
Owner State:	WV
Owner Zip:	24915
Owner Phone:	304-456-4308
Tank Id #:	3
Tank Capacity:	6000
Begin Date:	10/21/2008
End Date:	10/21/2009
Cancel Date:	Not reported
Policy Name:	ZURICH INSURANCE COMPANY
Tank Material:	Fiberglass Reinforced Plastic
Tank Option:	None
Pipe Material:	Fiberglass Reinforced Plastic
Pipe Option:	Double-Walled

Policy:	USC 5863703 06
Id #:	3-804534
Owner Name:	RYDER, VIOLET L
Owner Address:	HC 63 BOX 50
Owner Address:	Not reported
Owner City:	ARBOVALE
Owner State:	WV
Owner Zip:	24915
Owner Phone:	(304) 456-4308
Tank Id #:	4
Tank Capacity:	6000
Begin Date:	10/21/2010
End Date:	10/21/2011
Cancel Date:	Not reported
Policy Name:	ZURICH INSURANCE COMPANY
Tank Material:	Fiberglass Reinforced Plastic

RYDERS CHEVRON (Continued) **U004135518**

Tank Option: None
Pipe Material: Fiberglass Reinforced Plastic
Pipe Option: Double-Walled

Policy: USC 5863703
Id #: 3-804534
Owner Name: RYDER, VIOLET L
Owner Address: HC 63 BOX 50
Owner Address: Not reported
Owner City: ARBOVALE
Owner State: WV
Owner Zip: 24915
Owner Phone: 304-456-4308
Tank Id #: 4
Tank Capacity: 6000
Begin Date: 10/21/2008
End Date: 10/21/2009
Cancel Date: Not reported
Policy Name: ZURICH INSURANCE COMPANY
Tank Material: Fiberglass Reinforced Plastic
Tank Option: None
Pipe Material: Fiberglass Reinforced Plastic
Pipe Option: Double-Walled

Policy: USC 5863703
Id #: 3-804534
Owner Name: RYDER, VIOLET L
Owner Address: HC 63 BOX 50
Owner Address: Not reported
Owner City: ARBOVALE
Owner State: WV
Owner Zip: 24915
Owner Phone: (304) 456-4308
Tank Id #: 4
Tank Capacity: 6000
Begin Date: 10/21/2008
End Date: 10/21/2009
Cancel Date: Not reported
Policy Name: ZURICH INSURANCE COMPANY
Tank Material: Fiberglass Reinforced Plastic
Tank Option: None
Pipe Material: Fiberglass Reinforced Plastic
Pipe Option: Double-Walled

Policy: USC 5863703 05
Id #: 3-804534
Owner Name: RYDER, VIOLET L
Owner Address: HC 63 BOX 50
Owner Address: Not reported
Owner City: ARBOVALE
Owner State: WV
Owner Zip: 24915
Owner Phone: 304-456-4308
Tank Id #: 3
Tank Capacity: 6000
Begin Date: 10/21/2009
End Date: 10/21/2010

RYDERS CHEVRON (Continued) **U004135518**

Cancel Date: Not reported
Policy Name: ZURICH INSURANCE COMPANY
Tank Material: Fiberglass Reinforced Plastic
Tank Option: None
Pipe Material: Fiberglass Reinforced Plastic
Pipe Option: Double-Walled

Policy: USC 5863703 05
Id #: 3-804534
Owner Name: RYDER, VIOLET L
Owner Address: HC 63 BOX 50
Owner Address: Not reported
Owner City: ARBOVALE
Owner State: WV
Owner Zip: 24915
Owner Phone: (304) 456-4308
Tank Id #: 3
Tank Capacity: 6000
Begin Date: 10/21/2009
End Date: 10/21/2010
Cancel Date: Not reported
Policy Name: ZURICH INSURANCE COMPANY
Tank Material: Fiberglass Reinforced Plastic
Tank Option: None
Pipe Material: Fiberglass Reinforced Plastic
Pipe Option: Double-Walled

Policy: USC 5863703 05
Id #: 3-804534
Owner Name: RYDER, VIOLET L
Owner Address: HC 63 BOX 50
Owner Address: Not reported
Owner City: ARBOVALE
Owner State: WV
Owner Zip: 24915
Owner Phone: 304-456-4308
Tank Id #: 4
Tank Capacity: 6000
Begin Date: 10/21/2009
End Date: 10/21/2010
Cancel Date: Not reported
Policy Name: ZURICH INSURANCE COMPANY
Tank Material: Fiberglass Reinforced Plastic
Tank Option: None
Pipe Material: Fiberglass Reinforced Plastic
Pipe Option: Double-Walled

Policy: USC 5863703 05
Id #: 3-804534
Owner Name: RYDER, VIOLET L
Owner Address: HC 63 BOX 50
Owner Address: Not reported
Owner City: ARBOVALE
Owner State: WV
Owner Zip: 24915
Owner Phone: (304) 456-4308
Tank Id #: 4

RYDERS CHEVRON (Continued) **U004135518**

Tank Capacity: 6000
Begin Date: 10/21/2009
End Date: 10/21/2010
Cancel Date: Not reported
Policy Name: ZURICH INSURANCE COMPANY
Tank Material: Fiberglass Reinforced Plastic
Tank Option: None
Pipe Material: Fiberglass Reinforced Plastic
Pipe Option: Double-Walled

Policy: USC 5863703
Id #: 3-804534
Owner Name: RYDER, VIOLET L
Owner Address: HC 63 BOX 50
Owner Address: Not reported
Owner City: ARBOVALE
Owner State: WV
Owner Zip: 24915
Owner Phone: 304-456-4308
Tank Id #: 3
Tank Capacity: 6000
Begin Date: 10/21/2007
End Date: 10/21/2008
Cancel Date: Not reported
Policy Name: ZURICH INSURANCE COMPANY
Tank Material: Fiberglass Reinforced Plastic
Tank Option: None
Pipe Material: Fiberglass Reinforced Plastic
Pipe Option: Double-Walled

Policy: USC 5863703
Id #: 3-804534
Owner Name: RYDER, VIOLET L
Owner Address: HC 63 BOX 50
Owner Address: Not reported
Owner City: ARBOVALE
Owner State: WV
Owner Zip: 24915
Owner Phone: (304) 456-4308
Tank Id #: 3
Tank Capacity: 6000
Begin Date: 10/21/2007
End Date: 10/21/2008
Cancel Date: Not reported
Policy Name: ZURICH INSURANCE COMPANY
Tank Material: Fiberglass Reinforced Plastic
Tank Option: None
Pipe Material: Fiberglass Reinforced Plastic
Pipe Option: Double-Walled

Policy: USC 5863703
Id #: 3-804534
Owner Name: RYDER, VIOLET L
Owner Address: HC 63 BOX 50
Owner Address: Not reported
Owner City: ARBOVALE
Owner State: WV

RYDERS CHEVRON (Continued) **U004135518**

Owner Zip: 24915
Owner Phone: 304-456-4308
Tank Id #: 4
Tank Capacity: 6000
Begin Date: 10/21/2007
End Date: 10/21/2008
Cancel Date: Not reported
Policy Name: ZURICH INSURANCE COMPANY
Tank Material: Fiberglass Reinforced Plastic
Tank Option: None
Pipe Material: Fiberglass Reinforced Plastic
Pipe Option: Double-Walled

Policy: USC 5863703
Id #: 3-804534
Owner Name: RYDER, VIOLET L
Owner Address: HC 63 BOX 50
Owner Address: Not reported
Owner City: ARBOVALE
Owner State: WV
Owner Zip: 24915
Owner Phone: (304) 456-4308
Tank Id #: 4
Tank Capacity: 6000
Begin Date: 10/21/2007
End Date: 10/21/2008
Cancel Date: Not reported
Policy Name: ZURICH INSURANCE COMPANY
Tank Material: Fiberglass Reinforced Plastic
Tank Option: None
Pipe Material: Fiberglass Reinforced Plastic
Pipe Option: Double-Walled

Policy: 12345
Id #: 3-804534
Owner Name: RYDER, VIOLET L
Owner Address: HC 63 BOX 50
Owner Address: Not reported
Owner City: ARBOVALE
Owner State: WV
Owner Zip: 24915
Owner Phone: 304-456-4308
Tank Id #: 3
Tank Capacity: 6000
Begin Date: 10/01/1995
End Date: 10/01/1998
Cancel Date: Not reported
Policy Name: STATE INSURANCE FUND
Tank Material: Fiberglass Reinforced Plastic
Tank Option: None
Pipe Material: Fiberglass Reinforced Plastic
Pipe Option: Double-Walled

Policy: 12345
Id #: 3-804534
Owner Name: RYDER, VIOLET L
Owner Address: HC 63 BOX 50

RYDERS CHEVRON (Continued) **U004135518**

Owner Address:	Not reported
Owner City:	ARBOVALE
Owner State:	WV
Owner Zip:	24915
Owner Phone:	(304) 456-4308
Tank Id #:	3
Tank Capacity:	6000
Begin Date:	10/01/1995
End Date:	10/01/1998
Cancel Date:	Not reported
Policy Name:	STATE INSURANCE FUND
Tank Material:	Fiberglass Reinforced Plastic
Tank Option:	None
Pipe Material:	Fiberglass Reinforced Plastic
Pipe Option:	Double-Walled
Policy:	12345
Id #:	3-804534
Owner Name:	RYDER, VIOLET L
Owner Address:	HC 63 BOX 50
Owner Address:	Not reported
Owner City:	ARBOVALE
Owner State:	WV
Owner Zip:	24915
Owner Phone:	304-456-4308
Tank Id #:	4
Tank Capacity:	6000
Begin Date:	10/01/1995
End Date:	10/01/1998
Cancel Date:	Not reported
Policy Name:	STATE INSURANCE FUND
Tank Material:	Fiberglass Reinforced Plastic
Tank Option:	None
Pipe Material:	Fiberglass Reinforced Plastic
Pipe Option:	Double-Walled
Policy:	12345
Id #:	3-804534
Owner Name:	RYDER, VIOLET L
Owner Address:	HC 63 BOX 50
Owner Address:	Not reported
Owner City:	ARBOVALE
Owner State:	WV
Owner Zip:	24915
Owner Phone:	(304) 456-4308
Tank Id #:	4
Tank Capacity:	6000
Begin Date:	10/01/1995
End Date:	10/01/1998
Cancel Date:	Not reported
Policy Name:	STATE INSURANCE FUND
Tank Material:	Fiberglass Reinforced Plastic
Tank Option:	None
Pipe Material:	Fiberglass Reinforced Plastic
Pipe Option:	Double-Walled
Policy:	12345

RYDERS CHEVRON (Continued) **U004135518**

Id #:	3-804534
Owner Name:	RYDER, VIOLET L
Owner Address:	HC 63 BOX 50
Owner Address:	Not reported
Owner City:	ARBOVALE
Owner State:	WV
Owner Zip:	24915
Owner Phone:	304-456-4308
Tank Id #:	3
Tank Capacity:	6000
Begin Date:	01/01/1901
End Date:	Not reported
Cancel Date:	07/22/1999
Policy Name:	STATE INSURANCE FUND
Tank Material:	Fiberglass Reinforced Plastic
Tank Option:	None
Pipe Material:	Fiberglass Reinforced Plastic
Pipe Option:	Double-Walled

Policy:	12345
Id #:	3-804534
Owner Name:	RYDER, VIOLET L
Owner Address:	HC 63 BOX 50
Owner Address:	Not reported
Owner City:	ARBOVALE
Owner State:	WV
Owner Zip:	24915
Owner Phone:	(304) 456-4308
Tank Id #:	3
Tank Capacity:	6000
Begin Date:	01/01/1901
End Date:	Not reported
Cancel Date:	07/22/1999
Policy Name:	STATE INSURANCE FUND
Tank Material:	Fiberglass Reinforced Plastic
Tank Option:	None
Pipe Material:	Fiberglass Reinforced Plastic
Pipe Option:	Double-Walled

Policy:	12345
Id #:	3-804534
Owner Name:	RYDER, VIOLET L
Owner Address:	HC 63 BOX 50
Owner Address:	Not reported
Owner City:	ARBOVALE
Owner State:	WV
Owner Zip:	24915
Owner Phone:	304-456-4308
Tank Id #:	4
Tank Capacity:	6000
Begin Date:	01/01/1901
End Date:	Not reported
Cancel Date:	07/22/1999
Policy Name:	STATE INSURANCE FUND
Tank Material:	Fiberglass Reinforced Plastic
Tank Option:	None
Pipe Material:	Fiberglass Reinforced Plastic

RYDERS CHEVRON (Continued) **U004135518**

Pipe Option: Double-Walled

Policy: 12345
Id #: 3-804534
Owner Name: RYDER, VIOLET L
Owner Address: HC 63 BOX 50
Owner Address: Not reported
Owner City: ARBOVALE
Owner State: WV
Owner Zip: 24915
Owner Phone: (304) 456-4308
Tank Id #: 4
Tank Capacity: 6000
Begin Date: 01/01/1901
End Date: Not reported
Cancel Date: 07/22/1999
Policy Name: STATE INSURANCE FUND
Tank Material: Fiberglass Reinforced Plastic
Tank Option: None
Pipe Material: Fiberglass Reinforced Plastic
Pipe Option: Double-Walled

Policy: USC 5863703 06
Id #: 3-804534
Owner Name: RYDER, VIOLET L
Owner Address: HC 63 BOX 50
Owner Address: Not reported
Owner City: ARBOVALE
Owner State: WV
Owner Zip: 24915
Owner Phone: 304-456-4308
Tank Id #: 3
Tank Capacity: 6000
Begin Date: 10/21/2010
End Date: 10/21/2011
Cancel Date: Not reported
Policy Name: ZURICH INSURANCE COMPANY
Tank Material: Fiberglass Reinforced Plastic
Tank Option: None
Pipe Material: Fiberglass Reinforced Plastic
Pipe Option: Double-Walled

Policy: USC 5863703 06
Id #: 3-804534
Owner Name: RYDER, VIOLET L
Owner Address: HC 63 BOX 50
Owner Address: Not reported
Owner City: ARBOVALE
Owner State: WV
Owner Zip: 24915
Owner Phone: (304) 456-4308
Tank Id #: 3
Tank Capacity: 6000
Begin Date: 10/21/2010
End Date: 10/21/2011
Cancel Date: Not reported
Policy Name: ZURICH INSURANCE COMPANY

RYDERS CHEVRON (Continued) **U004135518**

Tank Material:	Fiberglass Reinforced Plastic
Tank Option:	None
Pipe Material:	Fiberglass Reinforced Plastic
Pipe Option:	Double-Walled
Policy:	USC 5863703 06
Id #:	3-804534
Owner Name:	RYDER, VIOLET L
Owner Address:	HC 63 BOX 50
Owner Address:	Not reported
Owner City:	ARBOVALE
Owner State:	WV
Owner Zip:	24915
Owner Phone:	304-456-4308
Tank Id #:	4
Tank Capacity:	6000
Begin Date:	10/21/2010
End Date:	10/21/2011
Cancel Date:	Not reported
Policy Name:	ZURICH INSURANCE COMPANY
Tank Material:	Fiberglass Reinforced Plastic
Tank Option:	None
Pipe Material:	Fiberglass Reinforced Plastic
Pipe Option:	Double-Walled
Policy:	USC 5863703
Id #:	3-804534
Owner Name:	RYDER, VIOLET L
Owner Address:	HC 63 BOX 50
Owner Address:	Not reported
Owner City:	ARBOVALE
Owner State:	WV
Owner Zip:	24915
Owner Phone:	(304) 456-4308
Tank Id #:	3
Tank Capacity:	6000
Begin Date:	10/21/2008
End Date:	10/21/2009
Cancel Date:	Not reported
Policy Name:	ZURICH INSURANCE COMPANY
Tank Material:	Fiberglass Reinforced Plastic
Tank Option:	None
Pipe Material:	Fiberglass Reinforced Plastic
Pipe Option:	Double-Walled

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2 **GREEN BANK ELEMENTARY-MIDDLE SCHOOL** **UIC** **S110133327**
SE **N/A**
1/4-1/2 **POCAHONTAS (County), WV**
0.446 mi.
2355 ft.

Relative:
Higher

Actual:
2686 ft.

UIC:

Permit Id:	0840-04-075
Responsible Party Name:	POCAHONTAS COUNTY SCHOOLS
Latitude Degrees:	38
Latitude Minutes:	25
Latitude Seconds:	29.039999999999999
Longitude Degrees:	79

GREEN BANK ELEMENTARY-MIDDLE SCHOOL (Continued) **S110133327**

Longitude Minutes:	49
Longitude Seconds:	41.399999999999999
Expiration Date:	1/10/2011 00:00:00
SIC Code:	4952
Priority Flag:	Y
Design Flow Quantity:	Not reported
Average Flow Quantity:	0.0028
Disturbed Acres:	Not reported
Extension Date:	Not reported
Number of Customers:	Not reported
Number Injection Points:	2
Permit Type:	UICS
Attention:	Dr. J. Patrick Law, Supt.
Address Street 1:	926 5TH AVE.
Address Street 2:	Not reported
Address City/State/Zip:	MARLINTON, WV 24954
Address Phone Number:	3047994505
API:	Not reported
Last Permit Issue Date for Well:	Not reported
Completion Date:	Not reported
Surface Owner:	Not reported
Well Number:	Not reported
Current Operator:	Not reported
Well Status:	Not reported
Well Type:	Not reported
Latitude:	Not reported
Longitude:	Not reported

3
South
1/2-1
0.628 mi.
3315 ft.

LAMP OF YOUTH CHRISTIAN **FTTS** **1009517205**
RTE 28 **HIST FTTS** **N/A**
GREENBANK, WV 24944

Relative:
Lower

Actual:
2631 ft.

FTTS INSP:

Inspection Number:	19950330WV014 1
Region:	03
Inspection Date:	03/30/95
Inspector:	PARKER
Violation occurred:	No
Investigation Type:	AHERA, Enforcement, State Conducted
Investigation Reason:	Neutral Scheme, State
Legislation Code:	TSCA
Facility Function:	User

HIST FTTS INSP:

Inspection Number:	19950330WV014 1
Region:	03
Inspection Date:	Not reported
Inspector:	PARKER
Violation occurred:	No
Investigation Type:	AHERA, Enforcement, State Conducted
Investigation Reason:	Neutral Scheme, State
Legislation Code:	TSCA
Facility Function:	User

Count: 0 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
		NO SITES FOUND			

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 01/28/2014
Number of Days to Update: 78

Source: EPA
Telephone: N/A
Last EDR Contact: 10/08/2014
Next Scheduled EDR Contact: 01/19/2015
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 01/28/2014
Number of Days to Update: 78

Source: EPA
Telephone: N/A
Last EDR Contact: 10/08/2014
Next Scheduled EDR Contact: 01/19/2015
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 01/28/2014
Number of Days to Update: 78

Source: EPA
Telephone: N/A
Last EDR Contact: 10/08/2014
Next Scheduled EDR Contact: 01/19/2015
Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 02/13/2014
Number of Days to Update: 94

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 08/28/2014
Next Scheduled EDR Contact: 12/08/2014
Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 07/21/2014
Date Data Arrived at EDR: 10/07/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 13

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 10/07/2014
Next Scheduled EDR Contact: 01/19/2015
Data Release Frequency: Varies

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 02/13/2014
Number of Days to Update: 94

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 08/28/2014
Next Scheduled EDR Contact: 12/08/2014
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 06/10/2014
Date Data Arrived at EDR: 07/02/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 78

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 10/01/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 06/10/2014
Date Data Arrived at EDR: 07/02/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 78

Source: Environmental Protection Agency
Telephone: 800-438-2474
Last EDR Contact: 10/01/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/10/2014
Date Data Arrived at EDR: 07/02/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 78

Source: Environmental Protection Agency
Telephone: 800-438-2474
Last EDR Contact: 10/01/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 06/10/2014
Date Data Arrived at EDR: 07/02/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 78

Source: Environmental Protection Agency
Telephone: 800-438-2474
Last EDR Contact: 10/01/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/10/2014
Date Data Arrived at EDR: 07/02/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 78

Source: Environmental Protection Agency
Telephone: 800-438-2474
Last EDR Contact: 10/01/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Varies

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 09/18/2014
Date Data Arrived at EDR: 09/19/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 09/08/2014
Next Scheduled EDR Contact: 12/22/2014
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 09/18/2014
Date Data Arrived at EDR: 09/19/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 09/08/2014
Next Scheduled EDR Contact: 12/22/2014
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 08/29/2014
Date Data Arrived at EDR: 10/09/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 11

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 08/14/2014
Next Scheduled EDR Contact: 12/01/2014
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 09/30/2013
Date Data Arrived at EDR: 10/01/2013
Date Made Active in Reports: 12/06/2013
Number of Days to Update: 66

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 09/30/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Annually

State- and tribal - equivalent CERCLIS

SHWS: This state does not maintain a SHWS list. See the Federal CERCLIS list and Federal NPL list.

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: Department of Environmental Protection
Telephone: 304-926-0455
Last EDR Contact: 09/22/2014
Next Scheduled EDR Contact: 12/08/2014
Data Release Frequency: N/A

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: List of M.S.W. Landfills/Transfer Station Listing

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 01/16/2014
Date Data Arrived at EDR: 07/10/2014
Date Made Active in Reports: 09/08/2014
Number of Days to Update: 60

Source: Division of Environmental Protection
Telephone: 304-926-0499
Last EDR Contact: 09/29/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Varies

LCP: Landfill Closure Program

The WV DEP's LCAP aids the owners/permittees of landfills that were required to cease operations because of certain statutory closure deadlines for non-composite lined facilities

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 04/08/2014
Number of Days to Update: 18

Source: Department of Environmental Protection
Telephone: 304-926-0499
Last EDR Contact: 09/08/2014
Next Scheduled EDR Contact: 12/22/2014
Data Release Frequency: Annually

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tanks

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 05/07/2014
Date Data Arrived at EDR: 06/05/2014
Date Made Active in Reports: 06/09/2014
Number of Days to Update: 4

Source: Division of Environmental Protection
Telephone: 304-926-0455
Last EDR Contact: 09/04/2014
Next Scheduled EDR Contact: 12/15/2014
Data Release Frequency: Semi-Annually

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land

Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 08/04/2014
Date Data Arrived at EDR: 08/05/2014
Date Made Active in Reports: 08/22/2014
Number of Days to Update: 17

Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 03/01/2013
Date Data Arrived at EDR: 03/01/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 42

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Quarterly

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 08/13/2014
Date Data Arrived at EDR: 08/15/2014
Date Made Active in Reports: 08/22/2014
Number of Days to Update: 7

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Quarterly

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 05/22/2014
Date Data Arrived at EDR: 08/22/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 27
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 05/14/2014
Date Data Arrived at EDR: 05/15/2014
Date Made Active in Reports: 07/15/2014
Number of Days to Update: 61
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 07/30/2014
Date Data Arrived at EDR: 08/12/2014
Date Made Active in Reports: 08/22/2014
Number of Days to Update: 10
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Semi-Annually

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 02/01/2013
Date Data Arrived at EDR: 05/01/2013
Date Made Active in Reports: 11/01/2013
Number of Days to Update: 184
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 08/01/2014
Next Scheduled EDR Contact: 11/10/2014
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 05/20/2014
Date Data Arrived at EDR: 06/10/2014
Date Made Active in Reports: 08/22/2014
Number of Days to Update: 73
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Quarterly

State and tribal registered storage tank lists

UST: Underground Storage Tank Database
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 06/04/2014
Date Data Arrived at EDR: 06/05/2014
Date Made Active in Reports: 06/09/2014
Number of Days to Update: 4
Source: Division of Environmental Protection
Telephone: 304-926-0495
Last EDR Contact: 09/02/2014
Next Scheduled EDR Contact: 12/15/2014
Data Release Frequency: Annually

INDIAN UST R4: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 07/30/2014
Date Data Arrived at EDR: 08/12/2014
Date Made Active in Reports: 08/22/2014
Number of Days to Update: 10

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 08/04/2014
Date Data Arrived at EDR: 08/05/2014
Date Made Active in Reports: 08/22/2014
Number of Days to Update: 17

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 07/25/2014
Date Data Arrived at EDR: 07/28/2014
Date Made Active in Reports: 08/22/2014
Number of Days to Update: 25

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Semi-Annually

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 02/01/2013
Date Data Arrived at EDR: 05/01/2013
Date Made Active in Reports: 01/27/2014
Number of Days to Update: 271

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 08/01/2014
Next Scheduled EDR Contact: 11/10/2014
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 08/20/2014
Date Data Arrived at EDR: 08/22/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 27

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 05/20/2014
Date Data Arrived at EDR: 06/10/2014
Date Made Active in Reports: 08/15/2014
Number of Days to Update: 66

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 08/13/2014
Date Data Arrived at EDR: 08/15/2014
Date Made Active in Reports: 08/22/2014
Number of Days to Update: 7

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Quarterly

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 08/14/2014
Date Data Arrived at EDR: 08/15/2014
Date Made Active in Reports: 08/22/2014
Number of Days to Update: 7

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Quarterly

FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 10/10/2014
Next Scheduled EDR Contact: 01/26/2015
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

INST CONTROL: Sites with Institutional Controls

Sites that have institutional controls in place.

Date of Government Version: 05/01/2014
Date Data Arrived at EDR: 05/28/2014
Date Made Active in Reports: 06/09/2014
Number of Days to Update: 12

Source: Department of Environmental Protection
Telephone: 304-558-2508
Last EDR Contact: 08/20/2014
Next Scheduled EDR Contact: 12/08/2014
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

VCP: Voluntary Remediation Sites

Sites involved in the Voluntary Remediation Program.

Date of Government Version: 05/01/2014
Date Data Arrived at EDR: 05/28/2014
Date Made Active in Reports: 06/09/2014
Number of Days to Update: 12

Source: Department of Environmental Protection
Telephone: 304-558-2745
Last EDR Contact: 08/20/2014
Next Scheduled EDR Contact: 12/08/2014
Data Release Frequency: Semi-Annually

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 05/30/2014
Date Data Arrived at EDR: 07/01/2014
Date Made Active in Reports: 08/15/2014
Number of Days to Update: 45

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 10/01/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Sites Listing

Brownfields are abandoned, idle or underused commercial or industrial properties, where the expansion or redevelopment is hindered by real or perceived contamination. Brownfields vary in size, location, age, and past use -- they can be anything from a five-hundred acre automobile assembly plant to a small, abandoned corner gas station.

Date of Government Version: 05/14/2013
Date Data Arrived at EDR: 07/05/2013
Date Made Active in Reports: 08/15/2013
Number of Days to Update: 41

Source: Department of Environmental Protection
Telephone: 304-926-0455
Last EDR Contact: 10/03/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 09/22/2014
Date Data Arrived at EDR: 09/23/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 09/23/2014
Next Scheduled EDR Contact: 01/05/2015
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 10/24/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: No Update Planned

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52
Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 08/01/2014
Next Scheduled EDR Contact: 11/17/2014
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 07/25/2014
Date Data Arrived at EDR: 09/09/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 41
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 09/03/2014
Next Scheduled EDR Contact: 12/15/2014
Data Release Frequency: Quarterly

CDL: Drug Lab Site Locations
A listing of clandestine drug lab site locations.

Date of Government Version: 11/26/2012
Date Data Arrived at EDR: 11/29/2012
Date Made Active in Reports: 12/18/2012
Number of Days to Update: 19
Source: Department of Environmental Protection
Telephone: 304-926-0499
Last EDR Contact: 09/17/2014
Next Scheduled EDR Contact: 12/01/2014
Data Release Frequency: Varies

US HIST CDL: National Clandestine Laboratory Register
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 07/25/2014
Date Data Arrived at EDR: 09/09/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 41
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 09/03/2014
Next Scheduled EDR Contact: 12/15/2014
Data Release Frequency: No Update Planned

Local Land Records

LIENS 2: CERCLA Lien Information
A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/18/2014
Date Data Arrived at EDR: 03/18/2014
Date Made Active in Reports: 04/24/2014
Number of Days to Update: 37
Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 06/30/2014
Date Data Arrived at EDR: 07/01/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 79

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 10/01/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Annually

SPILLS: Spills Listing

A listing of spills and releases reported to the Office of Emergency Services, they do not include any TRI information.

Date of Government Version: 07/28/2014
Date Data Arrived at EDR: 07/28/2014
Date Made Active in Reports: 09/17/2014
Number of Days to Update: 51

Source: Office of Emergency Services
Telephone: 304-558-5380
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 06/10/2014
Date Data Arrived at EDR: 07/02/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 78

Source: Environmental Protection Agency
Telephone: 800-438-2474
Last EDR Contact: 10/01/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 08/06/2014
Next Scheduled EDR Contact: 11/17/2014
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 10/24/2014
Next Scheduled EDR Contact: 01/26/2015
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 06/06/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 8

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 09/10/2014
Next Scheduled EDR Contact: 12/22/2014
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 01/24/2014
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 31

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 09/30/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 11/25/2013
Date Data Arrived at EDR: 12/12/2013
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 74

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 09/09/2014
Next Scheduled EDR Contact: 12/22/2014
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/07/2011
Date Made Active in Reports: 03/01/2012
Number of Days to Update: 146

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 08/20/2014
Next Scheduled EDR Contact: 12/08/2014
Data Release Frequency: Varies

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 01/30/2014
Date Data Arrived at EDR: 03/05/2014
Date Made Active in Reports: 07/15/2014
Number of Days to Update: 132

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 09/04/2014
Next Scheduled EDR Contact: 12/15/2014
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 07/31/2013
Date Made Active in Reports: 09/13/2013
Number of Days to Update: 44

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 08/29/2014
Next Scheduled EDR Contact: 12/08/2014
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 64

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 09/26/2014
Next Scheduled EDR Contact: 01/05/2015
Data Release Frequency: Every 4 Years

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/19/2014
Next Scheduled EDR Contact: 12/08/2014
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/19/2014
Next Scheduled EDR Contact: 12/08/2014
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems
Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 05/06/2014
Date Data Arrived at EDR: 05/16/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 10/10/2014
Next Scheduled EDR Contact: 01/26/2015
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 06/01/2013
Date Data Arrived at EDR: 07/17/2013
Date Made Active in Reports: 11/01/2013
Number of Days to Update: 107

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 10/15/2014
Next Scheduled EDR Contact: 01/26/2015
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 07/22/2013
Date Data Arrived at EDR: 08/02/2013
Date Made Active in Reports: 11/01/2013
Number of Days to Update: 91

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 09/08/2014
Next Scheduled EDR Contact: 12/22/2014
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 10/07/2014
Date Data Arrived at EDR: 10/08/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 12

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 10/08/2014
Next Scheduled EDR Contact: 01/19/2015
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 08/16/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40

Source: EPA
Telephone: (215) 814-5000
Last EDR Contact: 09/10/2014
Next Scheduled EDR Contact: 12/22/2014
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 05/23/2014
Date Made Active in Reports: 07/28/2014
Number of Days to Update: 66

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 02/26/2013
Date Made Active in Reports: 04/19/2013
Number of Days to Update: 52

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 08/29/2014
Next Scheduled EDR Contact: 12/08/2014
Data Release Frequency: Biennially

UIC: Underground Injection Wells

A listing of underground injection well locations.

Date of Government Version: 07/15/2014
Date Data Arrived at EDR: 07/16/2014
Date Made Active in Reports: 09/08/2014
Number of Days to Update: 54

Source: Department of Environmental Protection
Telephone: 304-926-0499
Last EDR Contact: 10/16/2014
Next Scheduled EDR Contact: 01/26/2015
Data Release Frequency: Varies

DRYCLEANERS: Listing of Drycleaner Locations

A listing of drycleaners which use perchloroethylene.

Date of Government Version: 05/19/2014
Date Data Arrived at EDR: 05/20/2014
Date Made Active in Reports: 06/09/2014
Number of Days to Update: 20

Source: Department of Environmental Protection
Telephone: 304-926-0475
Last EDR Contact: 08/15/2014
Next Scheduled EDR Contact: 12/01/2014
Data Release Frequency: Varies

NPDES: Wastewater Discharge Permits Listing

A listing of wastewater discharge permits.

Date of Government Version: 01/19/2010
Date Data Arrived at EDR: 01/21/2010
Date Made Active in Reports: 02/25/2010
Number of Days to Update: 35

Source: Department of Environmental Protection
Telephone: 304-926-0495
Last EDR Contact: 10/20/2014
Next Scheduled EDR Contact: 02/02/2015
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

AIRS: Permitted Facility and Emissions Listing
Permitted facility and emissions information listing.

Date of Government Version: 01/29/2014
Date Data Arrived at EDR: 01/29/2014
Date Made Active in Reports: 04/08/2014
Number of Days to Update: 69

Source: Department of Environmental Protection
Telephone: 304-926-0499
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

INDIAN RESERV: Indian Reservations
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 10/24/2014
Next Scheduled EDR Contact: 01/26/2015
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing
The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 10/20/2014
Next Scheduled EDR Contact: 02/02/2015
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands
Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 10/24/2014
Next Scheduled EDR Contact: 01/26/2015
Data Release Frequency: N/A

2020 COR ACTION: 2020 Corrective Action Program List
The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 11/11/2011
Date Data Arrived at EDR: 05/18/2012
Date Made Active in Reports: 05/25/2012
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 08/15/2014
Next Scheduled EDR Contact: 11/24/2014
Data Release Frequency: Varies

PRP: Potentially Responsible Parties
A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 10/17/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 3

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 09/30/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Quarterly

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 06/04/2014
Date Data Arrived at EDR: 06/12/2014
Date Made Active in Reports: 07/28/2014
Number of Days to Update: 46

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 10/06/2014
Next Scheduled EDR Contact: 01/19/2015
Data Release Frequency: Varies

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 08/15/2014
Next Scheduled EDR Contact: 11/24/2014
Data Release Frequency: Quarterly

COAL ASH: Coal Ash Landills

A listing of coal ash landfill site locations.

Date of Government Version: 04/07/2011
Date Data Arrived at EDR: 04/27/2011
Date Made Active in Reports: 06/02/2011
Number of Days to Update: 36

Source: Department of Environmental Protection
Telephone: 304-926-0499
Last EDR Contact: 10/14/2014
Next Scheduled EDR Contact: 01/26/2015
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database

The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 10/19/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 83

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 08/01/2014
Next Scheduled EDR Contact: 11/10/2014
Data Release Frequency: Varies

Financial Assurance: Financial Assurance Informtion Listing

A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 03/05/2013
Date Data Arrived at EDR: 03/07/2013
Date Made Active in Reports: 04/05/2013
Number of Days to Update: 29

Source: Department of Environmental Protection
Telephone: 304-926-0499
Last EDR Contact: 09/02/2014
Next Scheduled EDR Contact: 12/15/2014
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 09/04/2014
Date Data Arrived at EDR: 09/04/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 46

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 08/14/2014
Next Scheduled EDR Contact: 12/01/2014
Data Release Frequency: Quarterly

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 09/10/2014
Next Scheduled EDR Contact: 12/22/2014
Data Release Frequency: Varies

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/23/2013
Date Data Arrived at EDR: 11/06/2013
Date Made Active in Reports: 12/06/2013
Number of Days to Update: 30

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/29/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Annually

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/23/2013
Date Data Arrived at EDR: 11/06/2013
Date Made Active in Reports: 12/06/2013
Number of Days to Update: 30

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/29/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Annually

COAL ASH DOE: Sleam-Electric Plan Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 10/17/2014
Next Scheduled EDR Contact: 01/26/2015
Data Release Frequency: Varies

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR US Hist Auto Stat: EDR Exclusive Historic Gas Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR US Hist Cleaners: EDR Exclusive Historic Dry Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Division of Environmental Protection in West Virgina.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/20/2014
Number of Days to Update: 203

Source: Division of Environmental Protection
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank
The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Division of Environmental Protection in West Virgina.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/30/2013
Number of Days to Update: 182

Source: Division of Environmental Protection
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

NJ MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 07/19/2012
Date Made Active in Reports: 08/28/2012
Number of Days to Update: 40

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 10/10/2014
Next Scheduled EDR Contact: 01/26/2015
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 08/01/2014
Date Data Arrived at EDR: 08/07/2014
Date Made Active in Reports: 10/17/2014
Number of Days to Update: 71

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 08/07/2014
Next Scheduled EDR Contact: 11/17/2014
Data Release Frequency: Annually

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 07/21/2014
Date Made Active in Reports: 08/25/2014
Number of Days to Update: 35

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 10/20/2014
Next Scheduled EDR Contact: 02/02/2015
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 07/15/2014
Date Made Active in Reports: 08/13/2014
Number of Days to Update: 29

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 08/26/2014
Next Scheduled EDR Contact: 12/08/2014
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 06/20/2014
Date Made Active in Reports: 08/07/2014
Number of Days to Update: 48

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 09/15/2014
Next Scheduled EDR Contact: 12/29/2014
Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Day Care Center List
Source: Office of Social Services
Telephone: 304-558-7980

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.

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.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

GREEN BANK
POTOMAC HIGHLAND TRAIL AND SLAVIN HOLLOW RD
CASS, WV 24927

TARGET PROPERTY COORDINATES

Latitude (North):	38.4357 - 38° 26' 8.52''
Longitude (West):	79.838 - 79° 50' 16.80''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	601418.1
UTM Y (Meters):	4254591.5
Elevation:	2645 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	38079-D7 GREEN BANK, WV
Most Recent Revision:	1998

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).

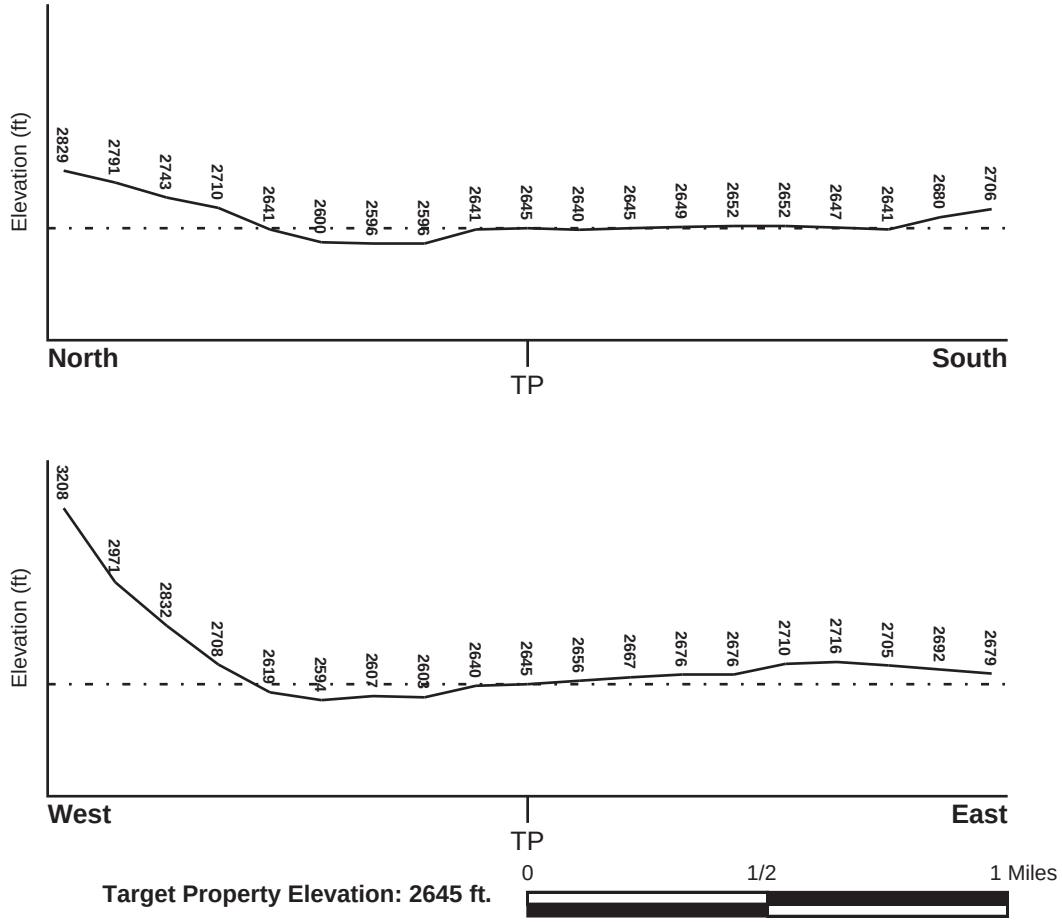
TOPOGRAPHIC INFORMATION

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 NW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Target Property Elevation: 2645 ft.

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	FEMA Flood Electronic Data
POCAHONTAS, WV	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 54075C - FEMA DFIRM Flood data

Additional Panels in search area: Not Reported

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
GREEN BANK	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.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
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

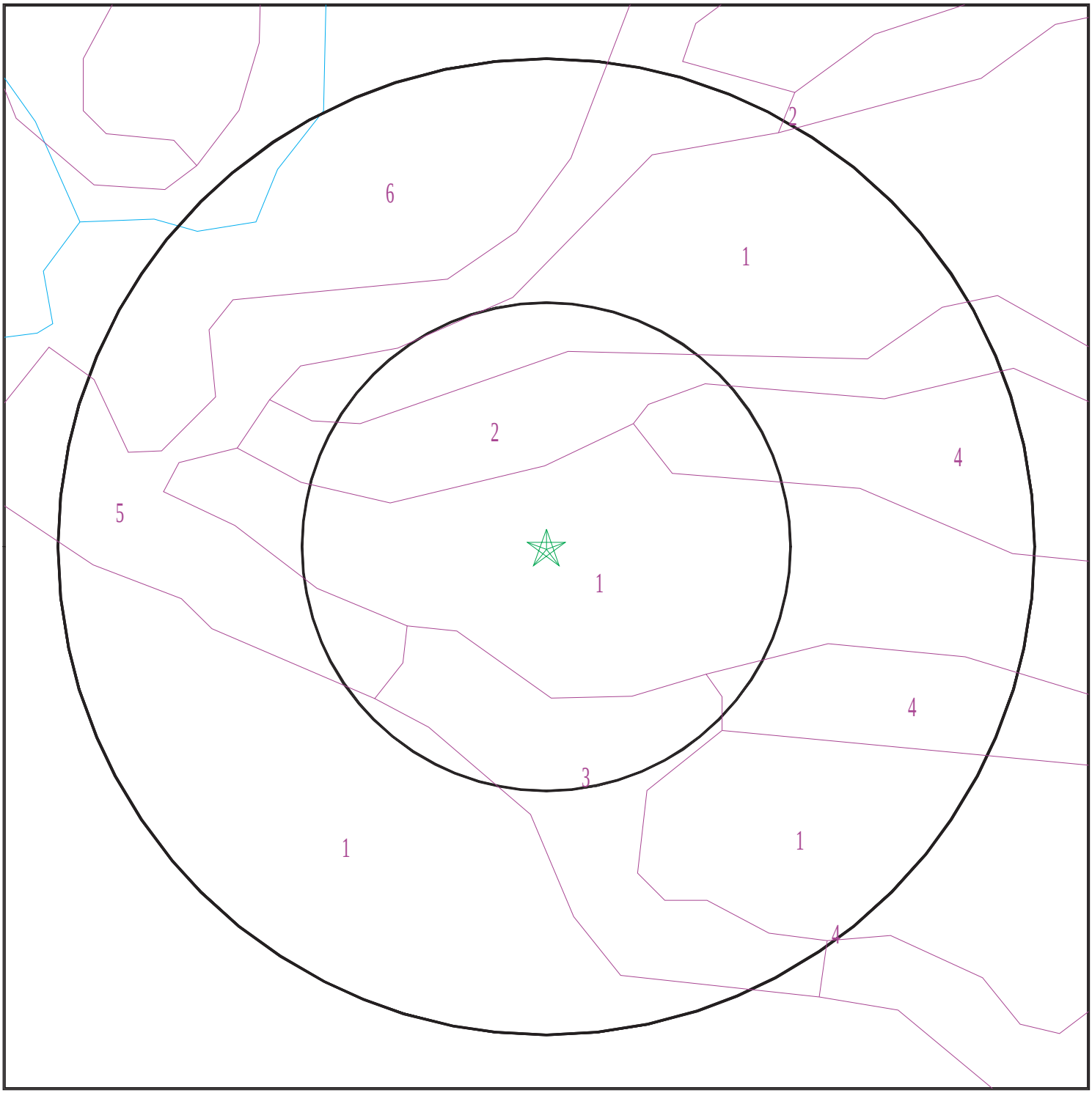
Era:	Paleozoic
System:	Devonian
Series:	Devonian
Code:	D *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratified Sequence

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).

SSURGO SOIL MAP - 4103240.2s



Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

SITE NAME:	Green Bank	CLIENT:	CH2M Hill, Inc.
ADDRESS:	Potomac Highland Trail and Slavin Hollow Rd Cass WV 24927	CONTACT:	Mike Brose
LAT/LONG:	38.4357 / -79.838	INQUIRY #:	4103240.2s
		DATE:	October 29, 2014 1:10 pm

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

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. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Allegheny

Soil Surface Texture: loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Unknown

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	loam	Not reported	Not reported	Max: 14 Min: 4	Max: 5.5 Min: 3.6
2	7 inches	40 inches	loam	Not reported	Not reported	Max: 14 Min: 4	Max: 5.5 Min: 3.6
3	40 inches	64 inches	extremely gravelly fine sandy loam	Not reported	Not reported	Max: 14 Min: 4	Max: 5.5 Min: 3.6

Soil Map ID: 2

Soil Component Name: Allegheny

Soil Surface Texture: loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Unknown

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	loam	Not reported	Not reported	Max: 14 Min: 4	Max: 5.5 Min: 3.6
2	7 inches	40 inches	loam	Not reported	Not reported	Max: 14 Min: 4	Max: 5.5 Min: 3.6
3	40 inches	64 inches	extremely gravelly fine sandy loam	Not reported	Not reported	Max: 14 Min: 4	Max: 5.5 Min: 3.6

Soil Map ID: 3

Soil Component Name: Weikert

Soil Surface Texture: very channery silt loam

Hydrologic Group: Class B/D - Drained/undrained hydrology class of soils that can be drained and are classified.

Soil Drainage Class: Somewhat excessively drained

Hydric Status: Unknown

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	5 inches	very channery silt loam	Not reported	Not reported	Max: 42 Min: 14	Max: 5.5 Min: 4.5

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	5 inches	14 inches	very channery silt loam	Not reported	Not reported	Max: 42 Min: 14	Max: 5.5 Min: 3.6
3	14 inches	18 inches	unweathered bedrock	Not reported	Not reported	Max: 141 Min: 4	Max: Min:

Soil Map ID: 4

Soil Component Name: Purdy

Soil Surface Texture: silt loam

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: Poorly drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 30 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	5 inches	silt loam	Not reported	Not reported	Max: 4 Min: 1.4	Max: 5.5 Min: 3.6
2	5 inches	37 inches	silty clay	Not reported	Not reported	Max: 1.4 Min: 0.42	Max: 5.5 Min: 3.6
3	37 inches	64 inches	very gravelly silty clay loam	Not reported	Not reported	Max: 1.4 Min: 0.42	Max: 5.5 Min: 3.6

Soil Map ID: 5

Soil Component Name: Weikert

Soil Surface Texture: very channery silt loam

Hydrologic Group: Class B/D - Drained/undrained hydrology class of soils that can be drained and are classified.

Soil Drainage Class: Somewhat excessively drained

Hydric Status: Unknown

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	5 inches	very channery silt loam	Not reported	Not reported	Max: 42 Min: 14	Max: 5.5 Min: 4.5
2	5 inches	14 inches	very channery silt loam	Not reported	Not reported	Max: 42 Min: 14	Max: 5.5 Min: 3.6
3	14 inches	18 inches	unweathered bedrock	Not reported	Not reported	Max: 141 Min: 4	Max: Min:

Soil Map ID: 6

Soil Component Name: Atkins

Soil Surface Texture: silt loam

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: Poorly drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 15 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	3 inches	silt loam	Not reported	Not reported	Max: 14 Min: 4	Max: 5.5 Min: 4.5
2	3 inches	25 inches	silt loam	Not reported	Not reported	Max: 14 Min: 0.42	Max: 5.5 Min: 4.5

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
3	25 inches	64 inches	gravelly silt loam	Not reported	Not reported	Max: 42 Min: 1.4	Max: 5.5 Min: 4.5

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

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1.000 miles
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	USGS40001297503	1/8 - 1/4 Mile SSW
2	USGS40001297531	1/4 - 1/2 Mile East
3	USGS40001297498	1/2 - 1 Mile WSW
4	USGS40001297529	1/2 - 1 Mile East
5	USGS40001297502	1/2 - 1 Mile ESE
B8	USGS40001297451	1/2 - 1 Mile SE
C10	USGS40001297453	1/2 - 1 Mile SE
B11	USGS40001297449	1/2 - 1 Mile SE
B12	USGS40001297450	1/2 - 1 Mile SE
D14	USGS40001297501	1/2 - 1 Mile East
C15	USGS40001297448	1/2 - 1 Mile SE

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

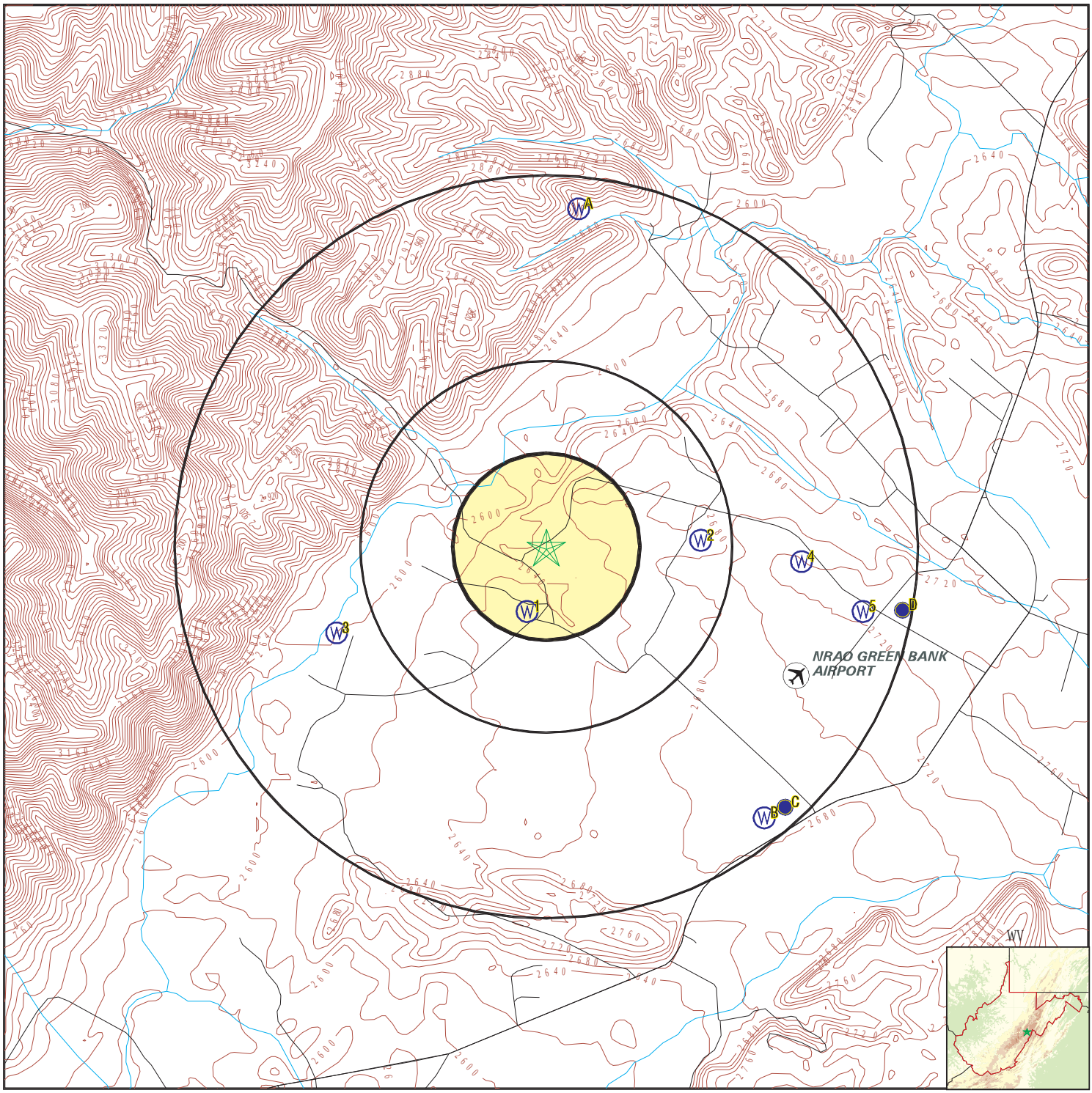
Note: PWS System location is not always the same as well location.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
A6	WVWELL0874	1/2 - 1 Mile North
A7	WVWELL0087	1/2 - 1 Mile North
C9	WVWELL0082	1/2 - 1 Mile SE
D13	WVWELL1255	1/2 - 1 Mile East

PHYSICAL SETTING SOURCE MAP - 4103240.2s



- County Boundary
- Major Roads
- Contour Lines
- Airports
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- Oil, gas or related wells

SITE NAME:	Green Bank	CLIENT:	CH2M Hill, Inc.
ADDRESS:	Potomac Highland Trail and Slavin Hollow Rd Cass WV 24927	CONTACT:	Mike Brose
LAT/LONG:	38.4357 / -79.838	INQUIRY #:	4103240.2s
		DATE:	October 29, 2014 1:10 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

1
SSW **FED USGS** **USGS40001297503**
1/8 - 1/4 Mile
Higher

Org. Identifier:	USGS-WV		
Formal name:	USGS West Virginia Water Science Center		
Monloc Identifier:	USGS-382559079502101		
Monloc name:	Poc-0107		
Monloc type:	Well		
Monloc desc:	Orig staname was 4401006/E P SHINABERRY		
Huc code:	05050003	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	38.4331738
Longitude:	-79.8389466	Sourcemap scale:	Not Reported
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	2640.00
Vert measure units:	feet	Vertacc measure val:	50
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Valley and Ridge aquifers		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19510101	Welldepth:	65
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

2
East **FED USGS** **USGS40001297531**
1/4 - 1/2 Mile
Higher

Org. Identifier:	USGS-WV		
Formal name:	USGS West Virginia Water Science Center		
Monloc Identifier:	USGS-382609079495001		
Monloc name:	Poc-0110		
Monloc type:	Well		
Monloc desc:	Original station name was 4401008/MARY BEARD		
Huc code:	05050003	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	38.4359515
Longitude:	-79.8303351	Sourcemap scale:	Not Reported
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	2700.00
Vert measure units:	feet	Vertacc measure val:	50
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Valley and Ridge aquifers		
Formation type:	Not Reported		

Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	35
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

3
WSW **FED USGS** **USGS40001297498**
1/2 - 1 Mile
Lower

Org. Identifier:	USGS-WV		
Formal name:	USGS West Virginia Water Science Center		
Monloc Identifier:	USGS-382556079505501		
Monloc name:	Poc-0105		
Monloc type:	Well		
Monloc desc:	Original staname was 4401007/LUCY CLOWE		
Huc code:	05050003	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	38.4323403
Longitude:	-79.8483914	Sourcemap scale:	Not Reported
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	2630.00
Vert measure units:	feet	Vertacc measure val:	50
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19510101	Welldepth:	60
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

4
East **FED USGS** **USGS40001297529**
1/2 - 1 Mile
Higher

Org. Identifier:	USGS-WV		
Formal name:	USGS West Virginia Water Science Center		
Monloc Identifier:	USGS-382606079493201		
Monloc name:	Poc-0109		
Monloc type:	Well		
Monloc desc:	Orig staname 4401015/AMERICAN ASSOC UNIVERSITY		
Huc code:	05050003	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	38.4351183
Longitude:	-79.8253349	Sourcemap scale:	Not Reported
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	2725.00
Vert measure units:	feet	Vertacc measure val:	50
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Valley and Ridge aquifers		
Formation type:	Upper-Middle Devonian Series		

Aquifer type:	Not Reported		
Construction date:	19590101	Welldepth:	100
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1964-06-01	20.00	

5
ESE
1/2 - 1 Mile
Higher

FED USGS **USGS40001297502**

Org. Identifier:	USGS-WV		
Formal name:	USGS West Virginia Water Science Center		
Monloc Identifier:	USGS-382559079492101		
Monloc name:	Poc-0106		
Monloc type:	Well		
Monloc desc:	Orig staname was 4401010/AMER ASSOC UNIV		
Huc code:	05050003	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	38.4331739
Longitude:	-79.8222792	Sourcemap scale:	Not Reported
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	2700.00
Vert measure units:	feet	Vertacc measure val:	50
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Valley and Ridge aquifers		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19570101	Welldepth:	100
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

A6
North
1/2 - 1 Mile
Higher

WV WELLS **WVWELL0874**

Id number:	2182	Pwsid:	WV9938030
Sys name:	NATIONAL RADIO AST. OBSERVATORY		
Facility id:	566620		
Fac name:	WELL #2		
City:	GREEN BANK	County:	POCAHONTAS
Act status:	A	Water type:	Groundwater
Owner type:	Local	Daily prod:	0
Sys popula:	25	Sys type:	Non Community
Latitude:	38.448889	Longitude:	-79.836389
Elevation:	0	Updated:	Not Reported
Wdate:	Not Reported		
Descriptio:	Not Reported		
User initi:	Not Reported	Gudi statu:	No
Sourcetype:	Not Reported	Whp radius:	500
Prod gpd:	1250	Conv facto:	50
Calc pop:	25	Seasonbegi:	4/1/00
Season end:	9/30/00	Facility type:	Well

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

A7
North
1/2 - 1 Mile
Higher | **WV WELLS** | **WVWELL0087**

Id number:	1136	Pwsid:	WV9938030
Sys name:	NATIONAL RADIO AST. OBSERVATORY		
Facility id:	566620		
Fac name:	WELL #1		
City:	GREEN BANK	County:	POCAHONTAS
Act status:	A	Water type:	Groundwater
Owner type:	Local	Daily prod:	0
Sys popula:	25	Sys type:	Non Community
Latitude:	38.448889	Longitude:	-79.836389
Elevation:	0	Updated:	Not Reported
Wdate:	Not Reported		
Descriptio:	Not Reported		
User initi:	Not Reported	Gudi statu:	No
Sourcetype:	Not Reported	Whp radius:	500
Prod gpd:	1250	Conv facto:	50
Calc pop:	25	Seasonbegi:	4/1/00
Season end:	9/30/00	Facility type:	Well

B8
SE
1/2 - 1 Mile
Higher | **FED USGS** | **USGS40001297451**

Org. Identifier:	USGS-WV		
Formal name:	USGS West Virginia Water Science Center		
Monloc Identifier:	USGS-382530079494001		
Monloc name:	Poc-0102		
Monloc type:	Well		
Monloc desc:	Original station name was GREEN BANK SCH3		
Huc code:	05050003	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	38.4251185
Longitude:	-79.8275571	Sourcemap scale:	Not Reported
Horiz Acc measure:	10	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	2700.00
Vert measure units:	feet	Vertacc measure val:	50
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Valley and Ridge aquifers		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19400101	Welldepth:	160
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

Database | EDR ID Number

C9
SE
1/2 - 1 Mile
Higher

WV WELLS **WVWELL0082**

Id number:	1129	Pwsid:	WV9938019
Sys name:	GREEN BANK SCHOOL		
Facility id:	566609		
Fac name:	WELL #1		
City:	MARLINTON	County:	POCAHONTAS
Act status:	A	Water type:	Groundwater
Owner type:	Local	Daily prod:	0
Sys popula:	431	Sys type:	Non Transient Non Community
Latitude:	38.425833	Longitude:	-79.826389
Elevation:	0	Updated:	Not Reported
Wdate:	Not Reported		
Descriptio:	Not Reported		
User initi:	Not Reported	Gudi statu:	No
Sourcetype:	Not Reported	Whp radius:	1500
Prod gpd:	10775	Conv facto:	25
Calc pop:	431	Seasonbegi:	Not Reported
Season end:	Not Reported	Facility type:	Well

C10
SE
1/2 - 1 Mile
Higher

FED USGS **USGS40001297453**

Org. Identifier:	USGS-WV		
Formal name:	USGS West Virginia Water Science Center		
Monloc Identifier:	USGS-382533079493401		
Monloc name:	Poc-0193		
Monloc type:	Well		
Monloc desc:	Original station name was JB048		
Huc code:	05050003	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	38.4259518
Longitude:	-79.8258904	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	2700.
Vert measure units:	feet	Vertacc measure val:	20
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Valley and Ridge aquifers		
Formation type:	Marcellus Shale		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	144
Welldepth units:	ft	Wellholedepth:	144
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 0

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

B11
SE
1/2 - 1 Mile
Higher

FED USGS **USGS40001297449**

Org. Identifier:	USGS-WV		
Formal name:	USGS West Virginia Water Science Center		
Monloc Identifier:	USGS-382530079493801		
Monloc name:	Poc-0007		
Monloc type:	Well		
Monloc desc:	Original station name was 4401004		
Huc code:	05050003	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	38.4251185
Longitude:	-79.8270015	Sourcemap scale:	Not Reported
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	2700.00
Vert measure units:	feet	Vertacc measure val:	20
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Valley and Ridge aquifers		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19530101	Welldepth:	160
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

B12
SE
1/2 - 1 Mile
Higher

FED USGS **USGS40001297450**

Org. Identifier:	USGS-WV		
Formal name:	USGS West Virginia Water Science Center		
Monloc Identifier:	USGS-382530079493802		
Monloc name:	Poc-0008		
Monloc type:	Well		
Monloc desc:	Original station name was 4401005		
Huc code:	05050003	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	38.4251185
Longitude:	-79.8270015	Sourcemap scale:	Not Reported
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	2100.00
Vert measure units:	feet	Vertacc measure val:	20
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Valley and Ridge aquifers		
Formation type:	Not Reported		

Aquifer type:	Not Reported		
Construction date:	19180101	Welldepth:	120
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

D13
East
1/2 - 1 Mile
Higher

WV WELLS **WVWELL1255**

Id number:	2562	Pwsid:	WV9938029
Sys name:	NTNL RADIO ASTRONOMY		
Facility id:	566619		
Fac name:	WORK AREA WELL (SDWIS #5)		
City:	GREEN BANK	County:	POCAHONTAS
Act status:	A	Water type:	Groundwater
Owner type:	Local	Daily prod:	0
Sys popula:	100	Sys type:	Non Transient Non Community
Latitude:	38.433286	Longitude:	-79.820317
Elevation:	0	Updated:	Y
Wdate:	4/6/01		
Descriptio:	SDWIS Well names included		
User initi:	RWW	Gudi statu:	No
Sourcetype:	Not Reported	Whp radius:	750
Prod gpd:	5000	Conv facto:	50
Calc pop:	100	Seasonbegi:	Not Reported
Season end:	Not Reported	Facility type:	Well

D14
East
1/2 - 1 Mile
Higher

FED USGS **USGS40001297501**

Org. Identifier:	USGS-WV		
Formal name:	USGS West Virginia Water Science Center		
Monloc Identifier:	USGS-382559079491401		
Monloc name:	Poc-0197		
Monloc type:	Well		
Monloc desc:	Original station name was JB044		
Huc code:	05050003	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	38.4331739
Longitude:	-79.8203347	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	2730.
Vert measure units:	feet	Vertacc measure val:	20
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Valley and Ridge aquifers		
Formation type:	Marcellus Shale		

Aquifer type:	Not Reported		
Construction date:	19590000	Welldepth:	100
Welldepth units:	ft	Wellholedepth:	100
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 0

C15
SE
1/2 - 1 Mile
Higher

FED USGS **USGS40001297448**

Org. Identifier:	USGS-WV		
Formal name:	USGS West Virginia Water Science Center		
Monloc Identifier:	USGS-382529079493501		
Monloc name:	Poc-0101		
Monloc type:	Well		
Monloc desc:	Original station name was GREEN BANK SCH2		
Huc code:	05050003	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	38.4248408
Longitude:	-79.8261681	Sourcemap scale:	Not Reported
Horiz Acc measure:	10	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	2700.00
Vert measure units:	feet	Vertacc measure val:	50
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Valley and Ridge aquifers		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	20
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

EPA Region 3 Statistical Summary Readings for Zip Code: 24927

Number of sites tested: 1.

Maximum Radon Level: 0.3 pCi/L.
Minimum Radon Level: 0.3 pCi/L.

pCi/L <4	pCi/L 4-10	pCi/L 10-20	pCi/L 20-50	pCi/L 50-100	pCi/L >100
1 (100.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)

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.

STATE RECORDS

West Virginia Water Well Information
Source: Bureau of Public Health
Telephone: 304-558-6765

OTHER STATE DATABASE INFORMATION

West Virginia Oil and Gas Well Database
Source: Department of Environmental Protection
Telephone: 304-926-0450
Oil and Gas well locations in the state.

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.

EPA Region 3 Statistical Summary Readings
Source: Region 3 EPA
Telephone: 215-814-2082
Radon readings for Delaware, D.C., Maryland, Pennsylvania, Virginia and West Virginia.

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

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

Attachment C
Aerial Photographs and Topographic Maps

Green Bank
Potomac Highland Trail and Slavin Hollow Rd
Cass, WV 24927

Inquiry Number: 4103240.4
October 13, 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. EDRs 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.

Historical Topographic Map

N	TARGET QUAD NAME: MONTEREY MAP YEAR: 1898 SERIES: 30 SCALE: 1:125000	SITE NAME: Green Bank ADDRESS: Potomac Highland Trail and Slavin Hollow Rd Cass, WV 24927 LAT/LONG: 38.4357 / -79.838	CLIENT: CH2M Hill, Inc. CONTACT: Mike Brose INQUIRY#: 4103240.4 RESEARCH DATE: 10/13/2014

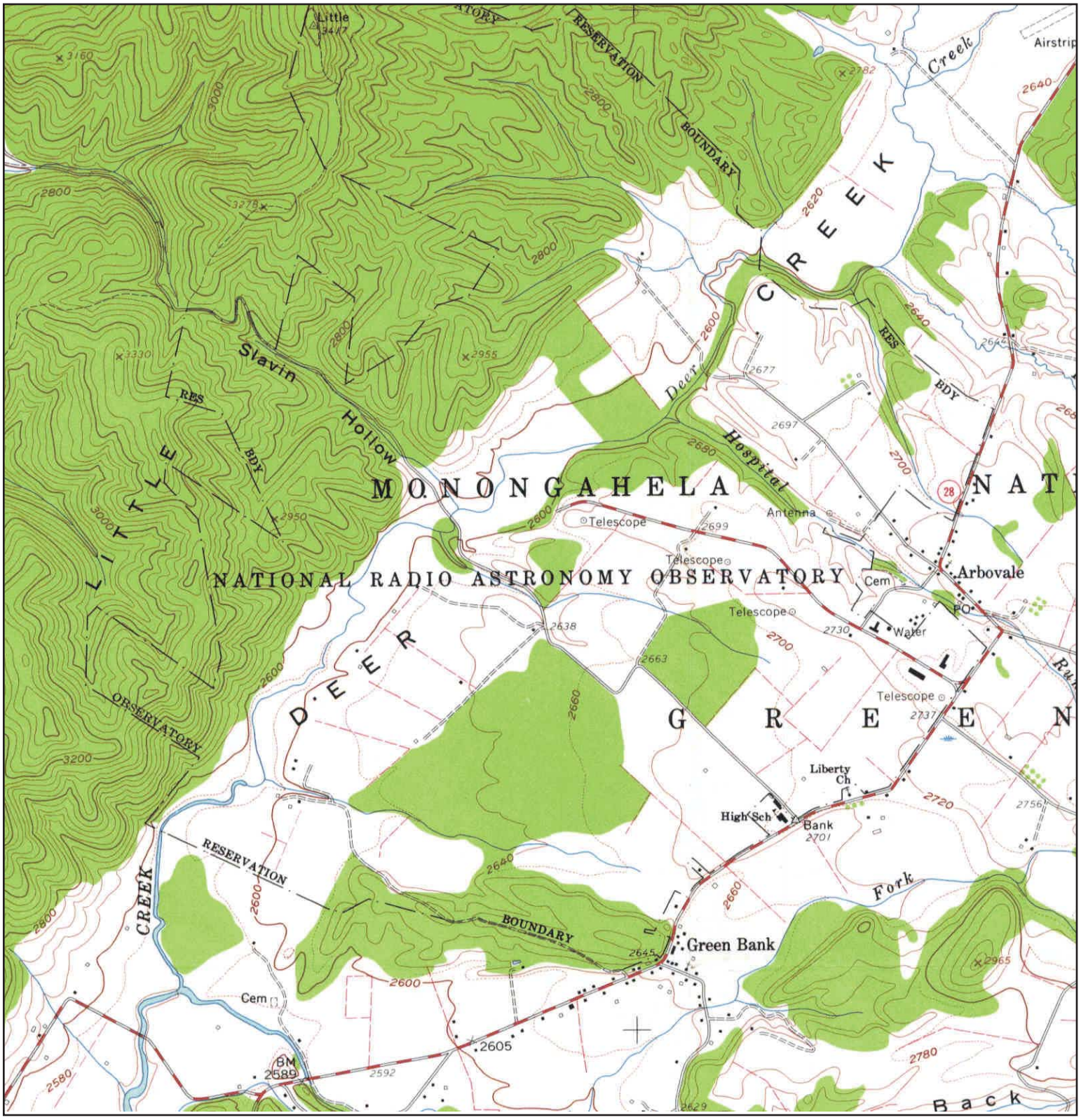
Historical Topographic Map

N	TARGET QUAD NAME: MONTEREY MAP YEAR: 1901 SERIES: 30 SCALE: 1:125000	SITE NAME: Green Bank ADDRESS: Potomac Highland Trail and Slavin Hollow Rd Cass, WV 24927 LAT/LONG: 38.4357 / -79.838	CLIENT: CH2M Hill, Inc. CONTACT: Mike Brose INQUIRY#: 4103240.4 RESEARCH DATE: 10/13/2014

Historical Topographic Map

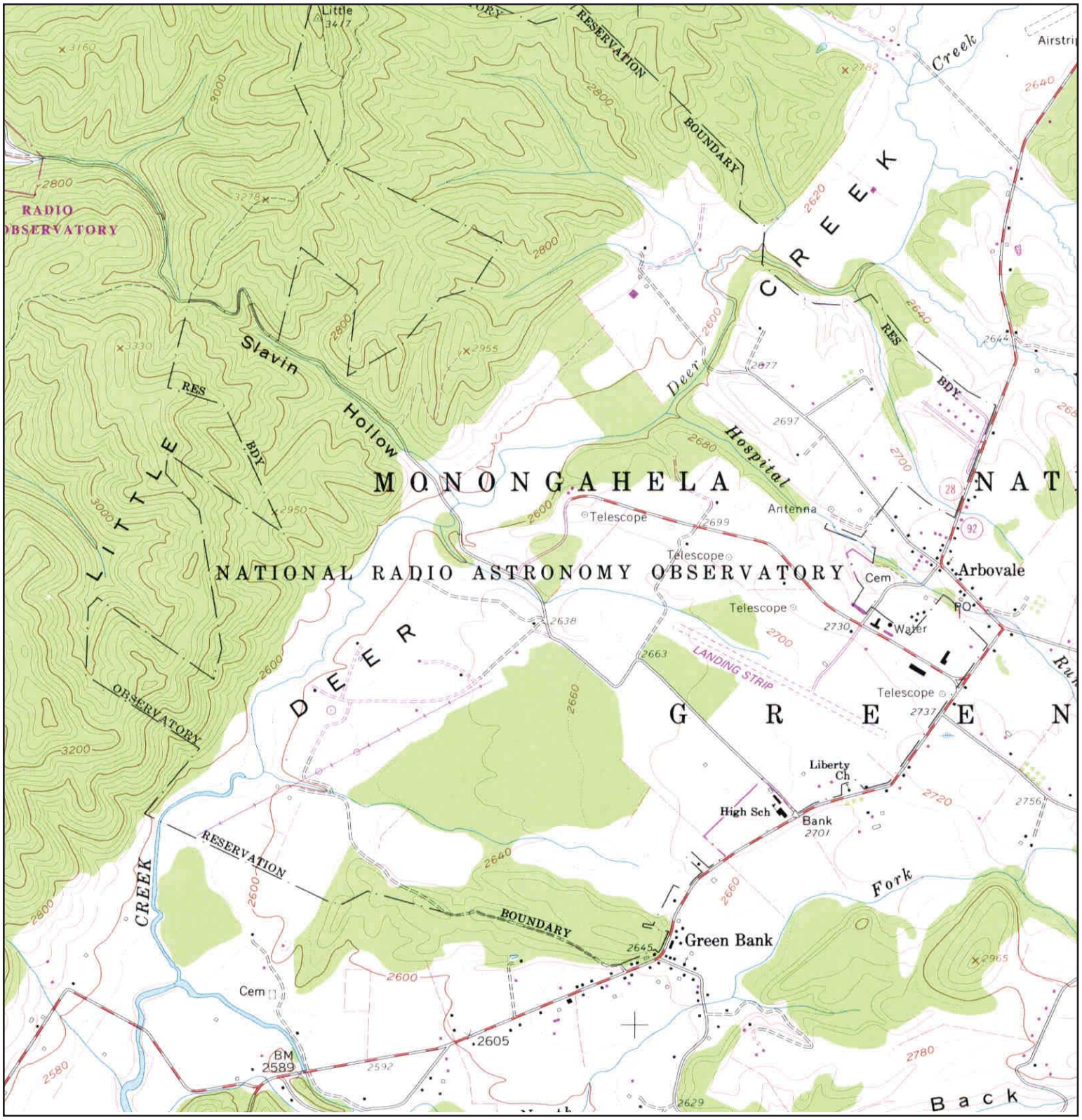
N	TARGET QUAD			
	NAME:	CASS	SITE NAME: Green Bank	CLIENT: CH2M Hill, Inc.
	MAP YEAR:	1924	ADDRESS: Potomac Highland Trail and Slavin Hollow Rd	CONTACT: Mike Brose
			Cass, WV 24927	INQUIRY#: 4103240.4
	SERIES:	15	LAT/LONG: 38.4357 / -79.838	RESEARCH DATE: 10/13/2014
	SCALE:	1:62500		

Historical Topographic Map



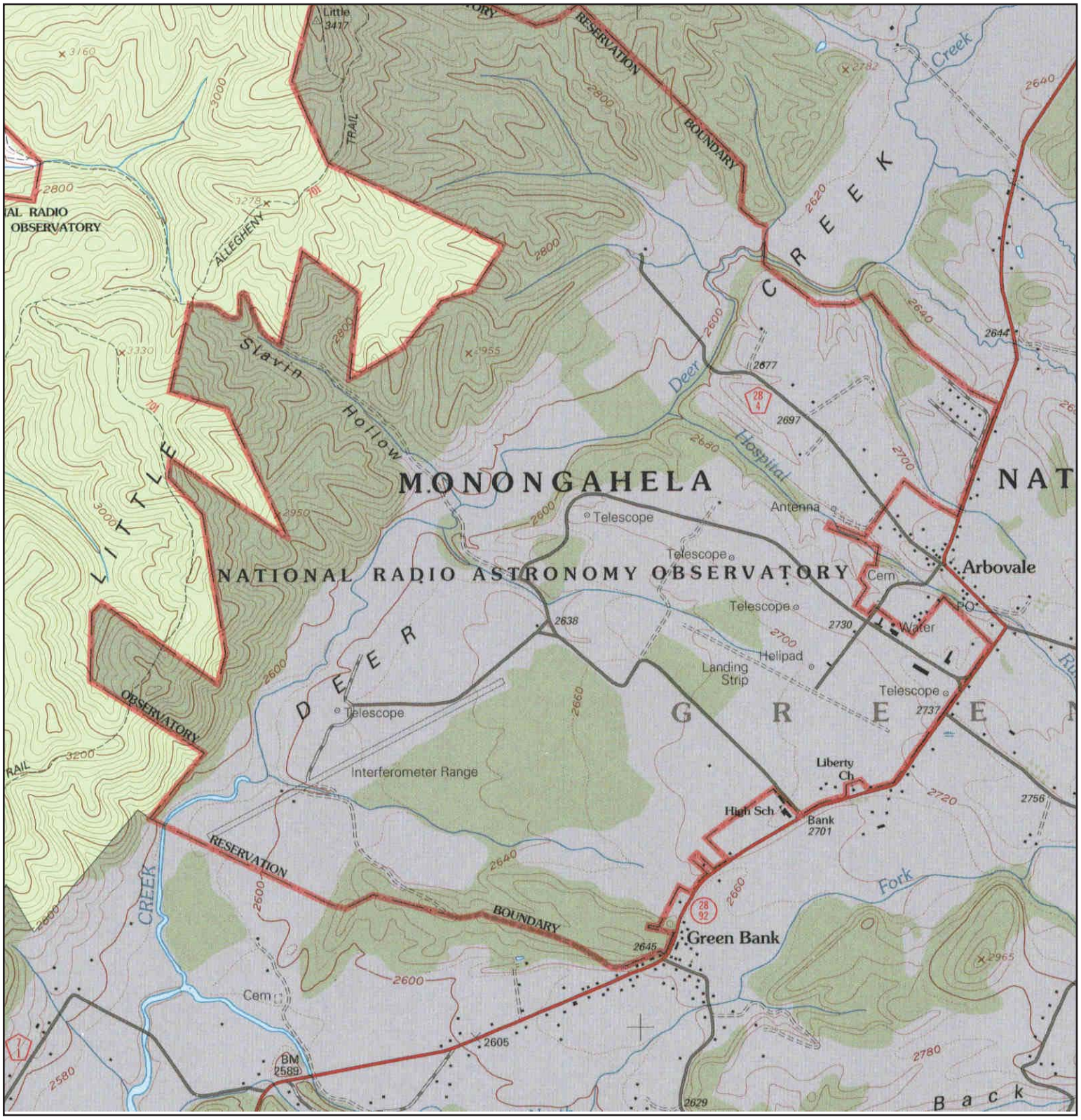
N	TARGET QUAD					
	NAME:	GREEN BANK	SITE NAME:	Green Bank	CLIENT:	CH2M Hill, Inc.
	MAP YEAR:	1960	ADDRESS:	Potomac Highland Trail and Slavin Hollow Rd	CONTACT:	Mike Brose
				Cass, WV 24927	INQUIRY#:	4103240.4
	SERIES:	7.5	LAT/LONG:	38.4357 / -79.838	RESEARCH DATE:	10/13/2014
	SCALE:	1:24000				

Historical Topographic Map



N	TARGET QUAD					
	NAME:	GREEN BANK	SITE NAME:	Green Bank	CLIENT:	CH2M Hill, Inc.
	MAP YEAR:	1979	ADDRESS:	Potomac Highland Trail and Slavin Hollow Rd	CONTACT:	Mike Brose
	PHOTOREVISED FROM :	1960		Cass, WV 24927	INQUIRY#:	4103240.4
	SERIES:	7.5	LAT/LONG:	38.4357 / -79.838	RESEARCH DATE:	10/13/2014
	SCALE:	1:24000				

Historical Topographic Map



N	TARGET QUAD NAME: GREEN BANK MAP YEAR: 1995 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Green Bank ADDRESS: Potomac Highland Trail and Slavin Hollow Rd Cass, WV 24927 LAT/LONG: 38.4357 / -79.838	CLIENT: CH2M Hill, Inc. CONTACT: Mike Brose INQUIRY#: 4103240.4 RESEARCH DATE: 10/13/2014

Green Bank
Potomac Highland Trail and Slavin Hollow Rd
Cass, WV 24927

Inquiry Number: 4103240.9
October 14, 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.

Date EDR Searched Historical Sources:

Aerial Photography October 14, 2014

Target Property:

Potomac Highland Trail and Slavin Hollow Rd
Cass, WV 24927

Year	***Scale***	***Details***	***Source***
1958	Aerial Photograph. Scale: 1"=750'	Flight Date: April 09, 1958	EDR
1958	Aerial Photograph. Scale: 1"=750'	Flight Date: April 09, 1958	EDR
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1973	Aerial Photograph. Scale: 1"=750'	Flight Date: May 06, 1973	EDR
1991	Aerial Photograph. Scale: 1"=750'	Flight Date: April 16, 1991	EDR
1991	Aerial Photograph. Scale: 1"=750'	Flight Date: April 16, 1991	EDR
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1997	Aerial Photograph. Scale: 1"=500'	DOQQ - acquisition dates: April 10, 1997	USGS/DOQQ
1997	Aerial Photograph. Scale: 1"=500'	DOQQ - acquisition dates: April 10, 1997	USGS/DOQQ
1997	Aerial Photograph. Scale: 1"=500'	DOQQ - acquisition dates: April 10, 1997	USGS/DOQQ
1997	Aerial Photograph. Scale: 1"=500'	DOQQ - acquisition dates: April 10, 1997	USGS/DOQQ
1997	Aerial Photograph. Scale: 1"=500'	DOQQ - acquisition dates: April 10, 1997	USGS/DOQQ
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1998	Aerial Photograph. Scale: 1"=750'	Flight Date: April 06, 1998	EDR
2001	Aerial Photograph. Scale: 1"=750'	Flight Date: April 14, 2001	EDR
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2006	Aerial Photograph. Scale: 1"=500'	Flight Year: 2006	USDA/NAIP
2006	Aerial Photograph. Scale: 1"=500'	Flight Year: 2006	USDA/NAIP
2006	Aerial Photograph. Scale: 1"=500'	Flight Year: 2006	USDA/NAIP

Year	*Scale*	*Details*	*Source*
2006	Aerial Photograph. Scale: 1"=500'	Flight Year: 2006	USDA/NAIP
2006	Aerial Photograph. Scale: 1"=500'	Flight Year: 2006	USDA/NAIP
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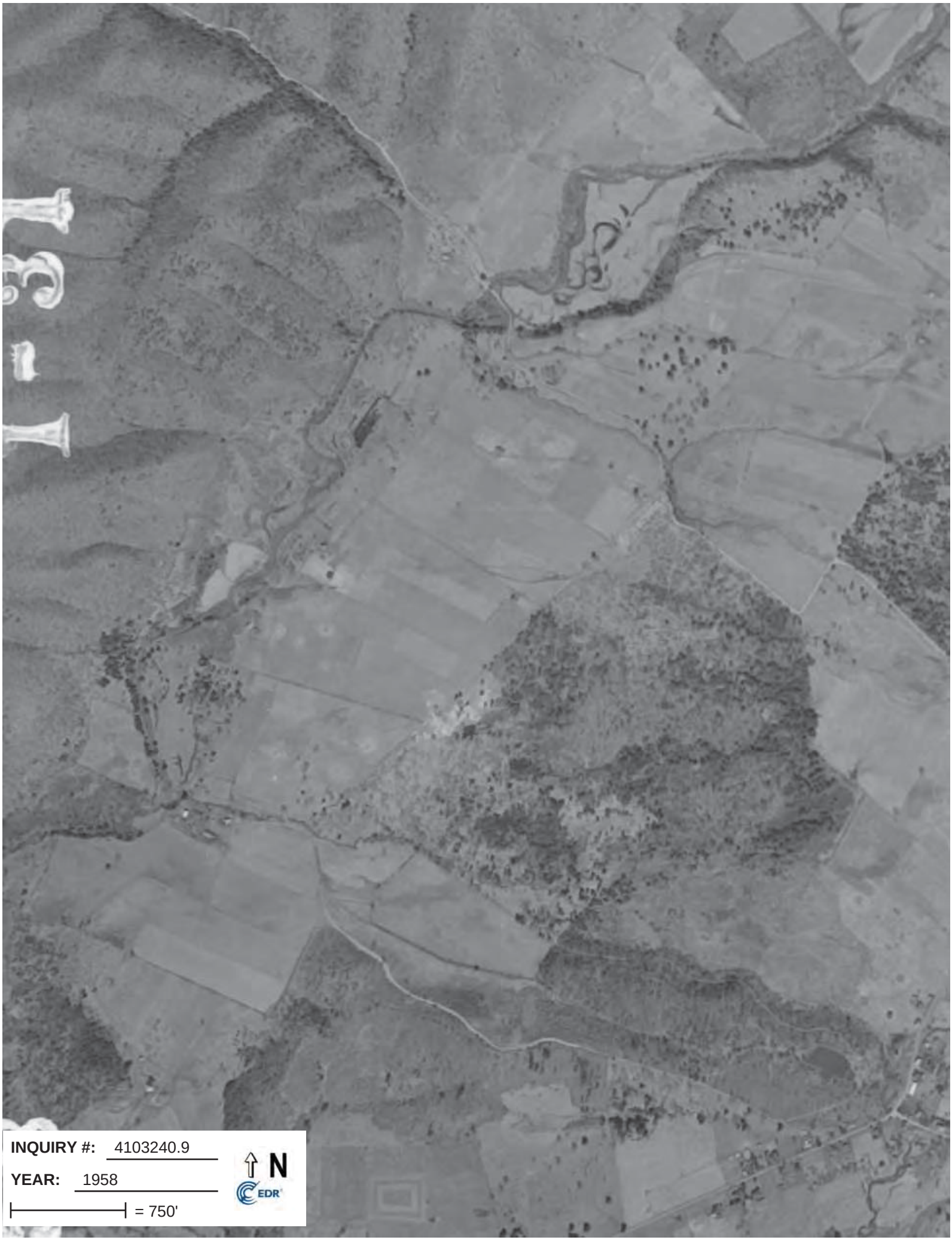
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= 750'
N
EDR


INQUIRY #: 4103240.9
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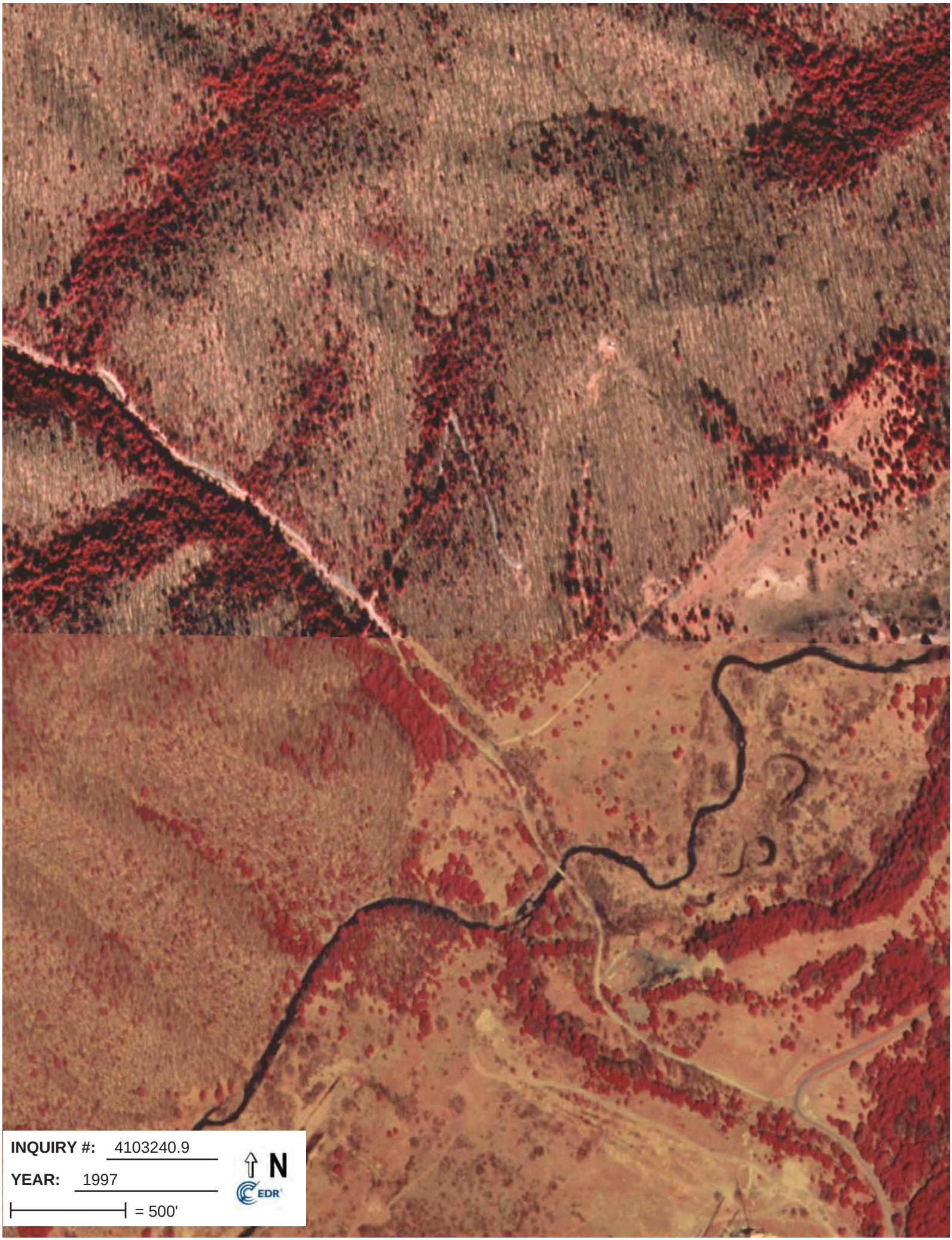
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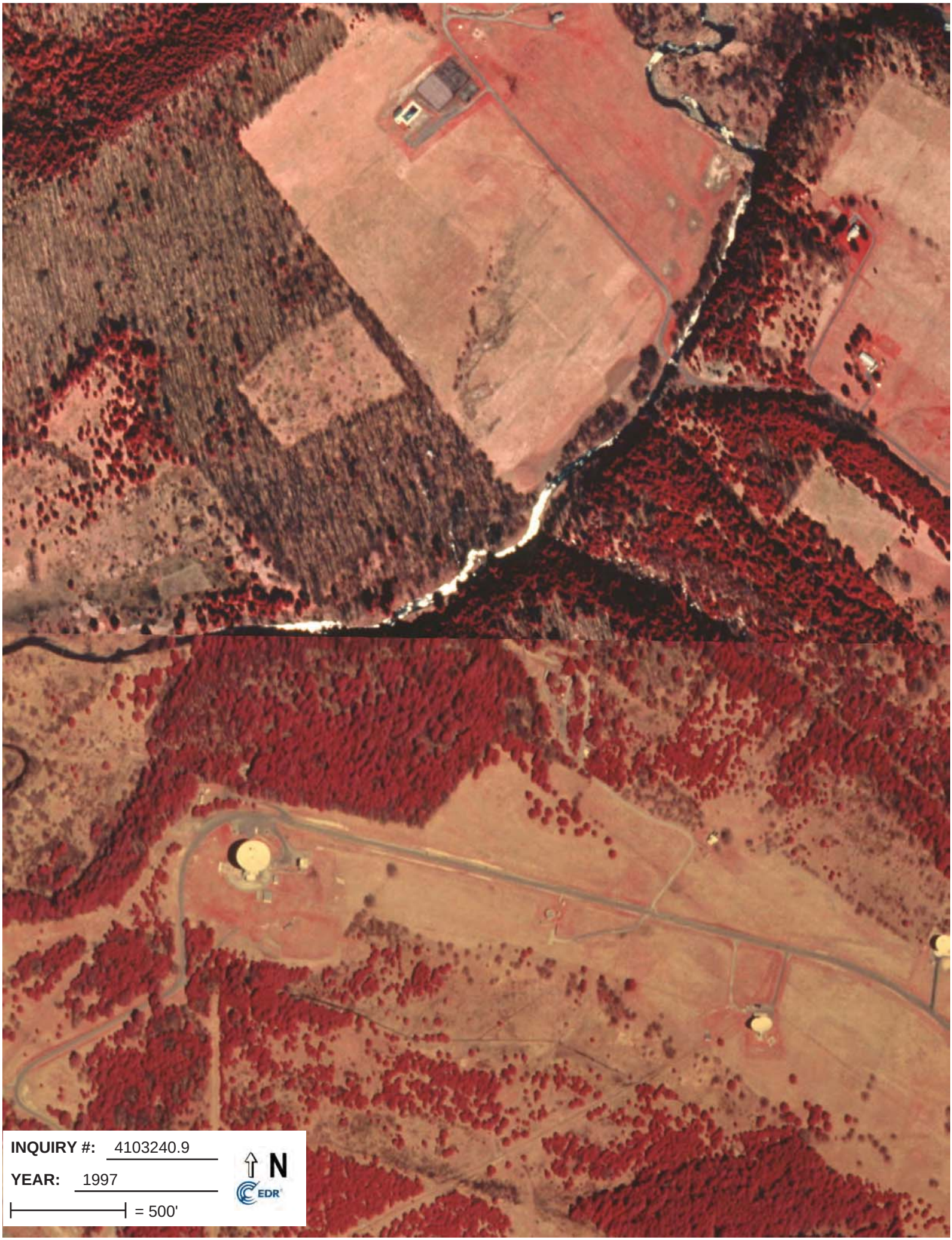
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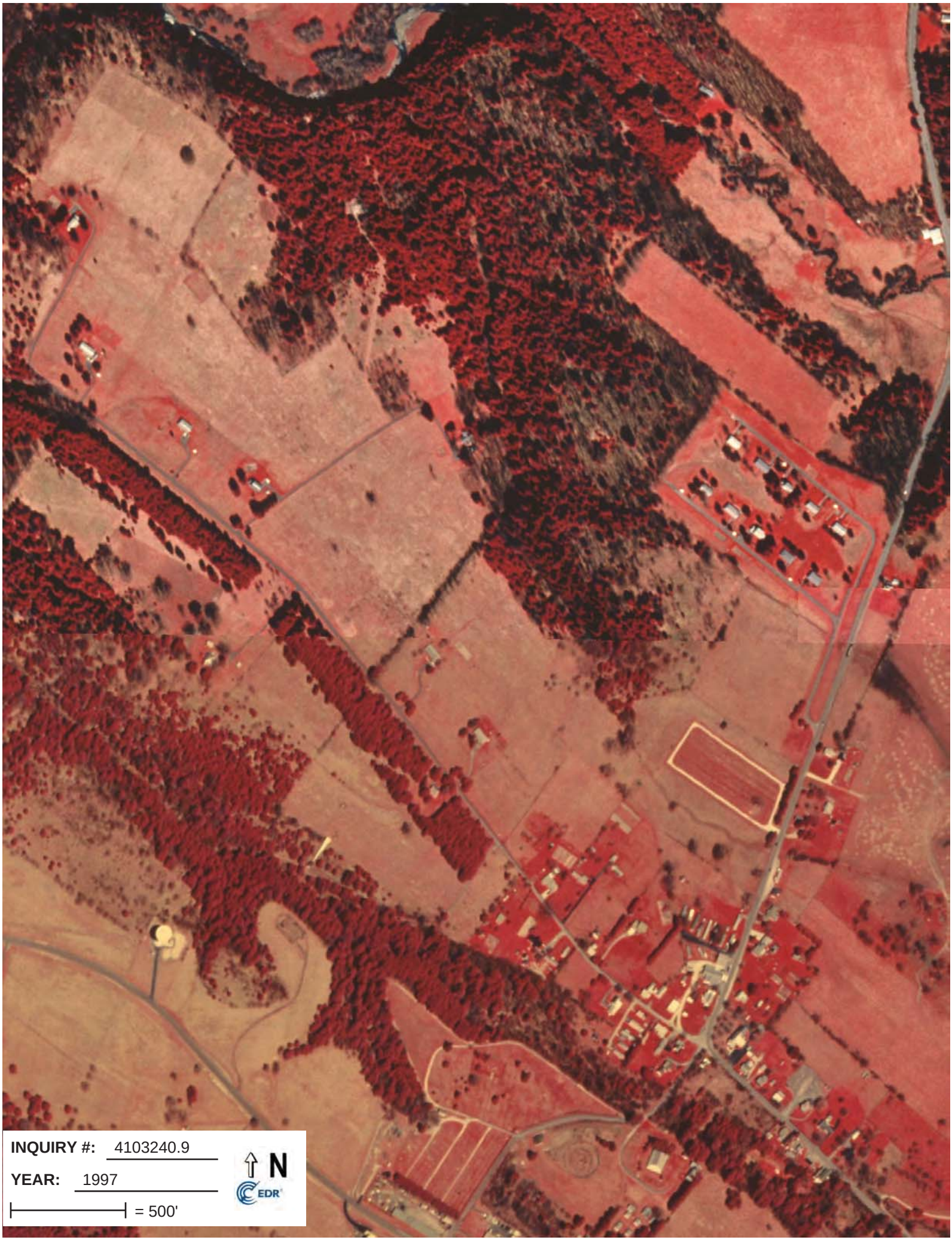
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EDR


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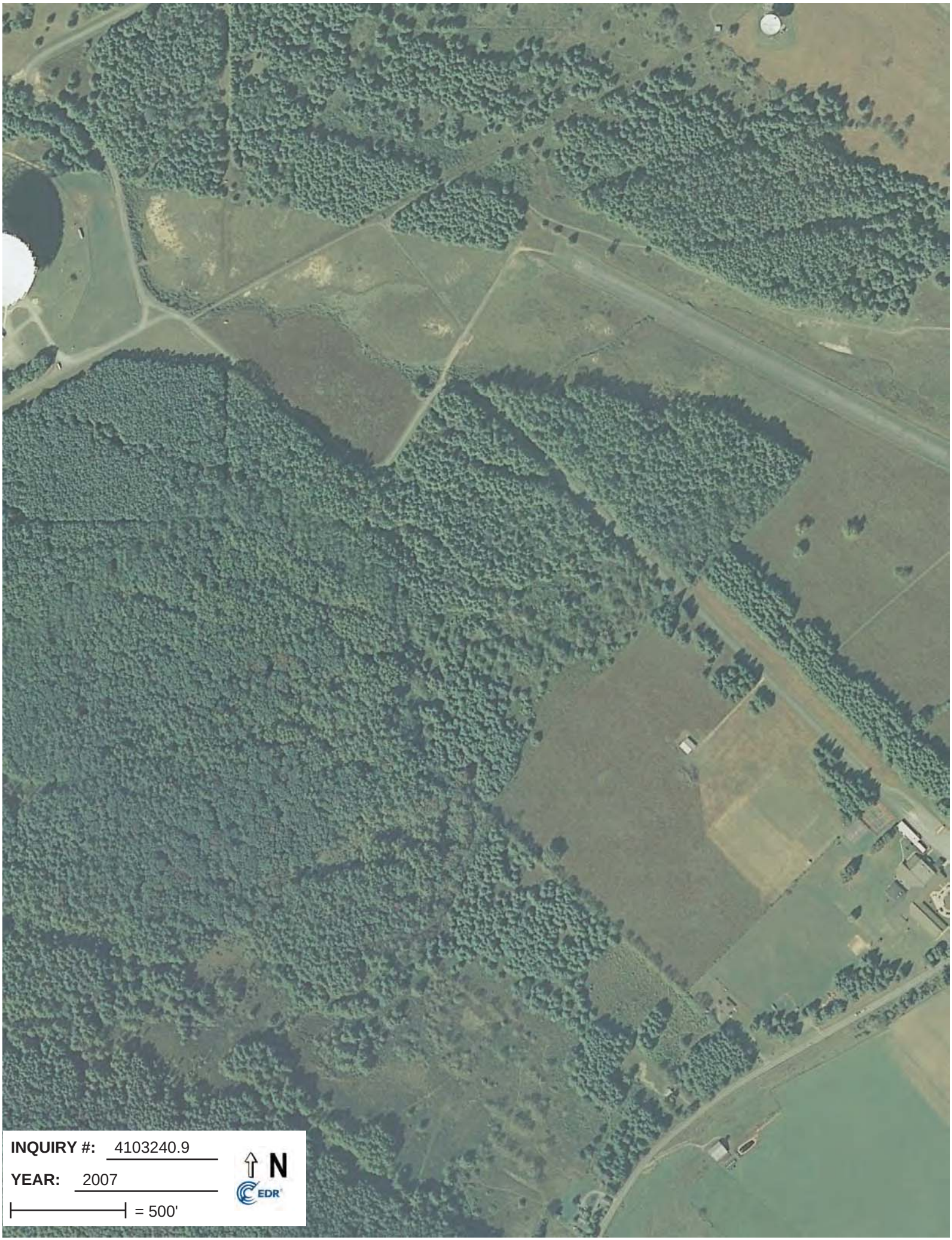
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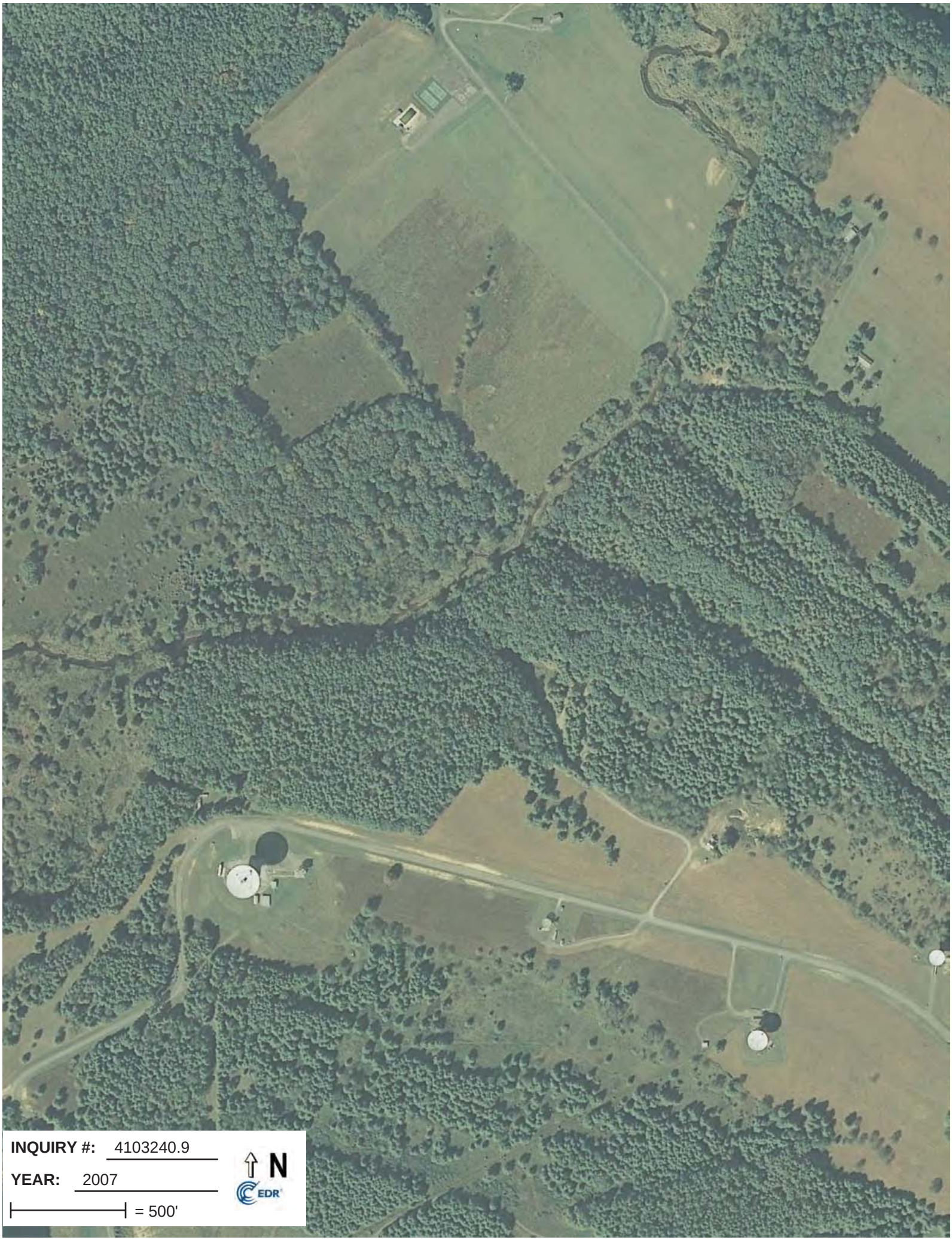
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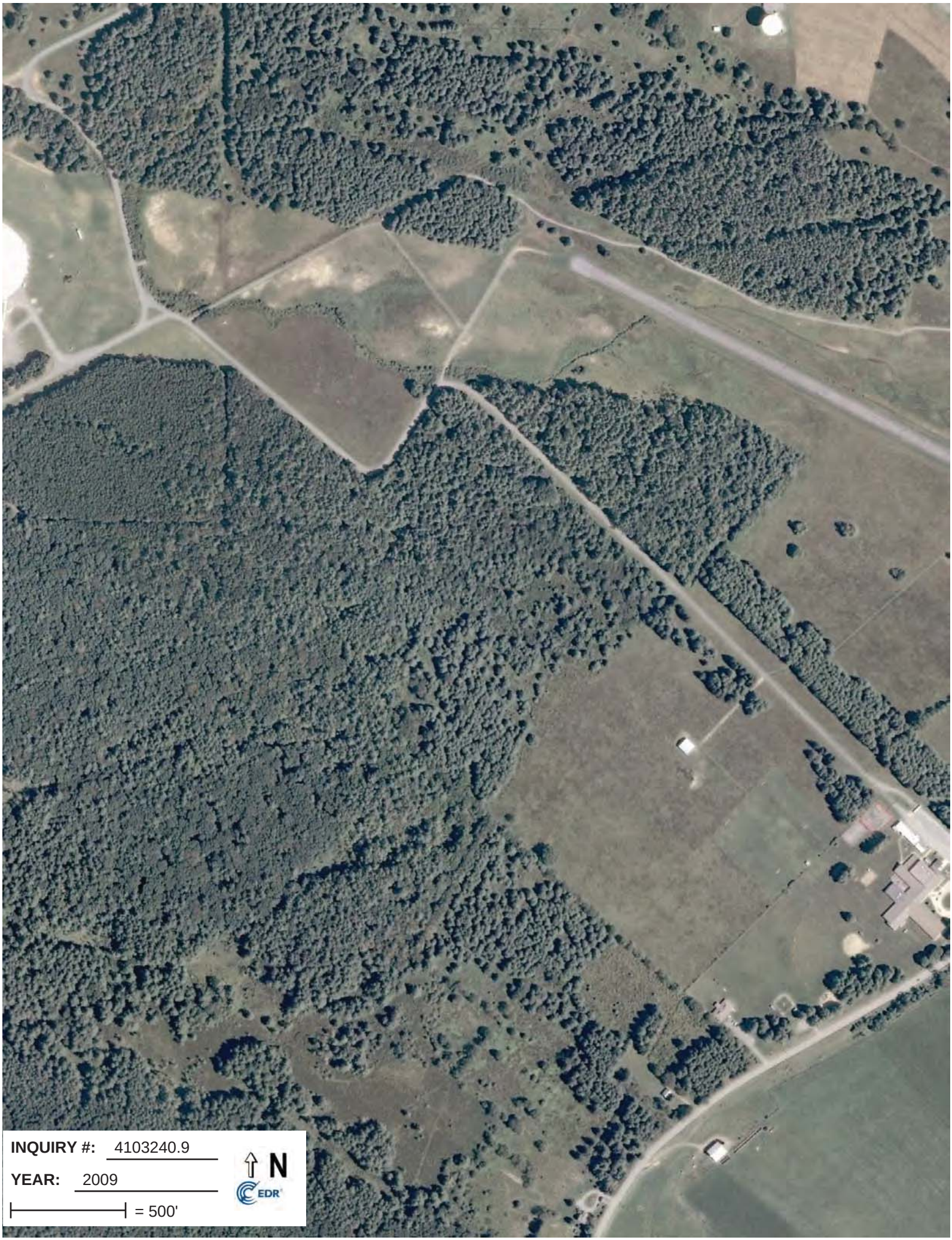
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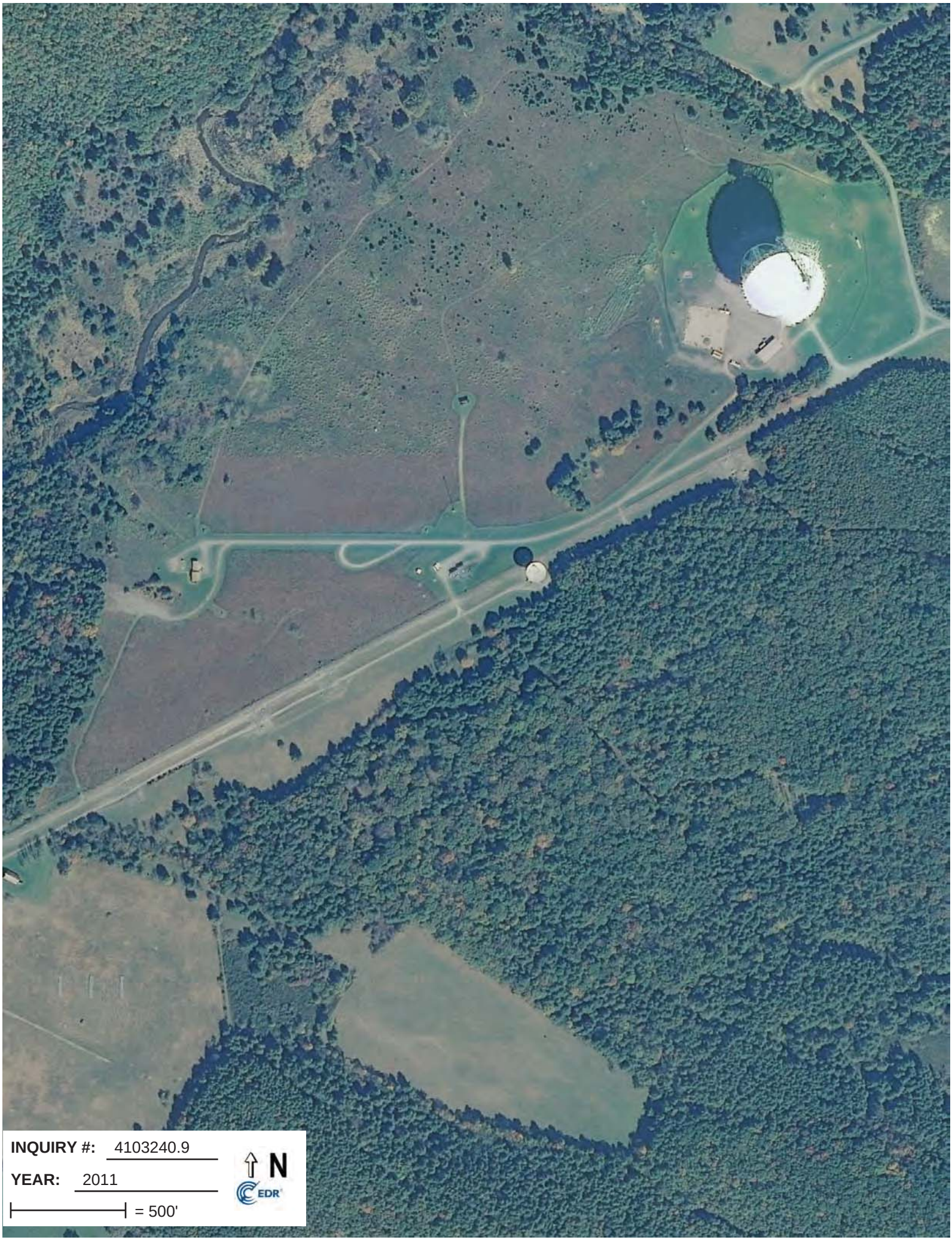
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INQUIRY #: 4103240.9
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EDR

Appendix 3.11A

Temporary Housing Options

Appendix 3.11A Temporary Housing Options

Location	Name	Type	Units
Green Bank	Green Bank Cabins & Country Store	Cabins	3
Boyer	Boyer Station Motel	Motel / RV Campground	20 rooms & 50 hookups
Cass			
	Bear Creek Lodge	Inn	8 rooms
	Cass Scenic Railroad State Park	Cottages and Cabooses	Twenty 3, 4, 5 and 6 bedroom vacation cottages plus Caboose rentals
	Whittaker Campground	Campground	40 tent sites / 62 trailer sites
Dunmore			
	Chestnut Ridge Country Inn	Inn	5 rooms
	E.J.'s Cottages and Horse Stables	Cottages / Stables	2 units
	Seneca State Forest Cabins	Cabins / Campground	5 units and 10 campsites
	White Oak Village	Campground	12 camp sites
Town of Marlinton			
	Carriage House Inn	Inn	5 rooms
	Locust Hill Inn	Inn	4 rooms
	Old Clark Inn	Inn	
	Marlinton Motor Inn	Motel	72 rooms
	Eden in the Alleghenies Ambassadors for Christ (AFC)	Lodge	80 – 110 person capacity
	Appalachian Sports Lodge	Lodge	3 condominiums
	Watoga State Park Cabins	Cabins / RV Campground	34 cabins and 88 camp / trailer sites
	Allegheny Lodge and Cabins	Cabins	
	Country River Cabins	Cabins	
	Handley Wildlife Management Area	RV Campground	13 tent / trailer sites
	Riverside RV Park	RV Campground	16 sites
	Tea Creek Campground	RV Campground	20 tent / trailer sites
	Pocahontas Campground	Campground	9 primitive sites
	The Lodge on the Greenbrier River	Lodge	4 rooms
	Jerico B & B and Pre-Civil War Cabins	Cabins	3 cabins
Snowshoe Resort			
	Snowshoe Mountain Resort		1,150 rooms
	Silver Creek Lodge		240 rooms
	Inn at Snowshoe		150 rooms
	Condos East	Condominiums	20 units

Appendix 3.11A Temporary Housing Options

Location	Name	Type	Units
	First Tracts Rentals	Condominiums	110 units
	Mountaintop Condos	Condominiums	14 units
Others			
	The Inn at Mountain Quest in Frost, WV	Inn	12 rooms
	Greenbrier Suites in Durdin		

Cass Scenic RR SP, 2017, PC CVB, 2017b

Appendix 3.11B

Employment and Median Earnings for 2010 and 2015

Appendix 3.11B

Employment and Median Earnings for 2010 and 2015 by Occupation for the CDPs of Green Bank and Arbovale, Pocahontas County and the State of West Virginia (in 2015 inflation-adjusted dollars)

	Green Bank CDP					Arbovale CDP (2010 not available)			Pocahontas County					West Virginia				
	2010 Estimate	2015 Estimate	2015 % Distribution	2010 - 2015 % Change	2015 Median earnings (dollars)	2015 Estimate	2015 % Distribution	2015 Median earnings (dollars)	2010 Estimate	2015 Estimate	2015 % Distribution	2010 - 2015 % Change	2015 Median earnings (dollars)	2010 Estimate	2015 Estimate	2015 % Distribution	2010 - 2015 % Change	2015 Median earnings (dollars)
Civilian employed population 16 years and over	38	71		87%	$32,708.00	60		$52,692.00	3584	3723		4%	$22,454	763691	751252		-2%	$30,618
Management, business, science, and arts occupations:	24	44	62%	83%	$26,944.00	39	65%	$54,712.00	893	1119	30%	25%	$35,080	229188	241587	32%	5%	$44,320
Management, business, and financial occupations:	0	11	25%	100%	-	8	21%	-	315	528	47%	68%	$32,315	77354	79703	33%	3%	$50,613
Management occupations	0	11	100%	100%	-	8	100%	-	263	440	83%	67%	$38,514	53533	55613	70%	4%	$52,194
Business and financial operations occupations	0	0	0%	--	-	0	0%	-	52	88	17%	69%	$21,250	23821	24090	30%	1%	$46,434
Computer, engineering, and science occupations:	24	0	0%	-100%	-	18	46%	-	131	130	12%	-1%	$50,833	25304	29555	12%	17%	$60,171
Computer and mathematical occupations	0	0	0%	--	-	18	100%	-	78	82	63%	5%	$37,206	9366	12201	41%	30%	$61,482
Architecture and engineering occupations	0	0	0%	--	-	0	0%	-	0	10	8%	100%	-	9899	11020	37%	11%	$65,077
Life, physical, and social science occupations	24	0	0%	-100%	-	0	0%	-	53	38	29%	-28%	$52,000	6039	6334	21%	5%	$49,620
Education, legal, community service, arts, and media occupations:	0	33	75%	--	$33,958.00	13	33%	-	362	379	34%	5%	$30,417	76035	75661	31%	0%	$36,538
Community and social services occupations	0	9	27%	--	-	0	0%	-	87	104	27%	20%	$26,778	13872	14104	19%	2%	$31,879
Legal occupations	0	0	0%	--	-	0	0%	-	0	9	2%	100%	-	8891	8642	11%	-3%	$53,657
Education, training, and library occupations	0	20	61%	100%	-	13	100%	-	255	237	63%	-7%	$38,344	44649	44624	59%	0%	$37,734
Arts, design, entertainment, sports, and media occupations	0	4	12%	--	-	0	0%	-	20	29	8%	45%	$9,327	8623	8291	11%	-4%	$26,302
Healthcare practitioner and technical occupations:	0	0	0%	--	-	0	0%	-	85	82	7%	-4%	$31,250	50495	56668	23%	12%	$45,320
Health diagnosing and treating practitioners and other technical occupations	0	0	0%	--	-	0	0%	-	39	48	59%	23%	$52,000	31417	35482	63%	13%	$54,803
Health technologists and technicians	0	0	0%	--	-	0	0%	-	46	34	41%	-26%	$23,125	19078	21186	37%	11%	$31,289
Service occupations:	0	11	15%	--	-	21	35%	-	693	844	23%	22%	$15,393	139861	141436	19%	1%	$16,089
Healthcare support occupations	0	0	0%	--	-	0	0%	-	64	67	8%	5%	$16,688	21323	21973	16%	3%	$20,184
Protective service occupations:	0	0	0%	--	-	0	0%	-	117	117	14%	0%	$30,938	17137	17505	12%	2%	$33,024
Fire fighting and prevention, and other protective service workers including supervisors	0	0	0%	--	-	0	0%	-	4	56	48%	1300%	$31,167	9262	8921	51%	-4%	$23,212
Law enforcement workers including supervisors	0	0	0%	--	-	0	0%	-	113	61	52%	-46%	$30,250	7875	8584	49%	9%	$41,900
Food preparation and serving related occupations	0	0	0%	--	-	4	19%	-	233	210	25%	-10%	$17,917	45088	43709	31%	-3%	$11,734
Building and grounds cleaning and maintenance occupations	0	0	0%	--	-	17	81%	-	178	347	41%	95%	$10,492	29113	30161	21%	4%	$17,328
Personal care and service occupations	0	11	100%	--	-	0	0%	-	101	103	12%	2%	$11,083	27200	28088	20%	3%	$14,358
Sales and office occupations:	14	0	0%	-100%	-	0	0%	-	711	688	18%	-3%	$19,899	188558	181570	24%	-4%	$23,692
Sales and related occupations	0	0	0%	--	-	0	0%	-	383	205	30%	-46%	$27,545	82147	80531	44%	-2%	$20,319
Office and administrative support occupations	14	0	0%	-100%	-	0	0%	-	328	483	70%	47%	$19,184	106411	101039	56%	-5%	$25,326
Natural resources, construction, and maintenance occupations:	0	0	0%	--	-	0	0%	-	751	599	16%	-20%	$25,434	99923	89595	12%	-10%	$41,684
Farming, fishing, and forestry occupations	0	0	0%	--	-	0	0%	-	73	63	11%	-14%	$25,078	3673	3340	4%	-9%	$20,434
Construction and extraction occupations	0	0	0%	--	-	0	0%	-	434	363	61%	-16%	$24,609	64474	56448	63%	-12%	$44,754
Installation, maintenance, and repair occupations	0	0	0%	--	-	0	0%	-	244	173	29%	-29%	$29,519	31776	29807	33%	-6%	$39,767
Production, transportation, and material moving occupations:	0	16	23%	100%	-	0	0%	-	536	473	13%	-12%	$31,012	106161	97064	13%	-9%	$32,527
Production occupations	0	16	100%	100%	-	0	0%	-	238	222	47%	-7%	$36,480	45729	43052	44%	-6%	$36,378
Transportation occupations	0	0	0%	--	-	0	0%	-	209	151	32%	-28%	$22,404	35898	32925	34%	-8%	$35,509
Material moving occupations	0	0	0%	--	-	0	0%	-	89	100	21%	12%	$23,542	24534	21087	22%	-14%	$24,731

Appendix 3.11C

Education Program Summary

Green Bank Observatory EPO Summary

Current Programs	Level	Length	Focus
Public Tour Program, student field trips, scout badge weekends, special events like STARQUEST, SARA	All ages 45,000 annually	1 hour – several days	Inspire wonder and learning in the sciences through lectures, tours, and hands-on activities
Radio Astronomer for a Day	K-16: 2,500 students annually	1 – 3 days	Expose large number of students to inquiry based science and engineering
Space Public Outreach (SPOT) Collaboration with WV Space Grant and NASA	K-12 50 schools, 5,000 students reached per year.	Ambassador training = 2.5 days. Classroom outreach: 1-4 hours	Undergraduate students receive professional development, then deliver Astronomy/Engineering themed presentations to K-12 schools in WV.
Research Experience for Teachers ● Formerly an addition to the NRAO REU program ● New RET begins 2017-WVU is the PI	Teachers (6-12) 10 teachers/ year	6-8 weeks	Summer internships. New program through WVU-funded by NSF engineering 10 teachers/year 2017-2019.
Earth/Space Science Passport Collaboration with Fairmont State University, NASA IVV Center. http://esspassport.org/	Teachers (5-12) 36 teachers each cohort x 3 years.	Year 1: Two week workshop at GBO. Year 2: one week workshop at FSU	2 year Summer/academic year program to prepare WV teachers to teach newly mandated ESS course, and to engage them in using the NexGen standards. Funded by WV's Math Science Partnership program.
Pulsar Search Collaboratory pulsarsearchcollaboratory.org PIs are WVU, and Green Bank. Inclusion of ~ 12 hub college/universities	9^{th} – 12^{th} grade, plus teachers, undergraduate student mentors	1+ years of engagement with teachers and students.	Authentic research experience to advance understanding of science research and to encourage students to enter STEM careers (NSF funded 2008-2014, 2016-2018)
Skynet Junior Scholars skynetjuniorscholars.org PIs: University of Chicago, Green Bank, University of NC	5-12 grade students, formal and	1+years engagement with	Online inquiry-based activities and access to robotic telescopes for youth in out-of-school-time programs-

ASP is a subcontract	informal educators. 135 educators 1440 youth.	educators and youth	(NSF funded 2012-2016., sustainable program post funding)
Workforce Development Internships for high school students	10^{th} – 12^{th} grade students 4-8/year	40-80 hours	Mostly local apprenticeship/mentoring program providing workforce preparatory experience for careers in science, technology and machining. We also accommodated a few high school students in a summer internship experience.
Cooperative Education Program (funded by NRAO)	Undergrad 1-2 students/ year	Up to 2 years	Semester-long work experience offered as part of student's coursework. New focus on engineering students from West Virginia colleges and universities
Student Research Assistantships	Undergrad ~ 10 students /year	10-12 weeks	Summer long course for upper level undergraduate and graduate students, where they apprentice with scientists and engineers
Undergraduate workshops: ALFALFA, NANOGRAV, REU Bootcamp, ERIRA	~20 students at each workshop.	1 week long	Radio Astronomy projects, using telescopes and astronomical software etc.
Post-doctoral Fellowships	Recent Ph.D graduates ~3 on staff at one time	2-3 years	Formulate and carry out investigations either independently or in collaboration with others within the wide framework of interests of the Observatory.
Chautauqua Short Course	College faculty 20-25/year	3 days	Professional development for faculty from small colleges and community colleges on cutting edge radio astronomy research topics. Ongoing in Green Bank annually since 1988.
Just Funded Program			
FIRST TWO: Improving STEM persistence in the first two years of college. NSF INCLUDES. Large collaboration—includes WV	Undergrad, first gen, in 1^{st} 2 years of school	2 year NSF funded	PILOT –1) Development of a 2-week internship program coupled with academic year freshmen courses aimed to retaining students in STEM majors during their 1^{st} 2 years

Dept of Ed, Higher Education Policy Commission, several universities, informal education, researchers, plus other national labs.			of school. 2) Development of a research study. May lead to large project in 2 years.
Past Programs- not currently funded			
WV Governor's School for Math & Science	Rising 9th g 60 students/ year for 10 years.	2 weeks	Provide the time and opportunity to think and work like scientists. Will re-apply to hosts GSMS in 2017.
Science, Technology and Engineering School (May Term) NOW part of INCLUDES Pilot Project	Undergrad 20 students	2 weeks	Pilot program to expose underrepresented freshmen/sophomore students to cutting edge STEM activities at the Green Bank Observatory (generally before they are eligible for other internships)

The Green Bank Observatory Education program includes observatory tours for casual visitors, development of interactive exhibits for the public, outreach to teachers, students and the public, resident courses for college professors, K-12 teachers and their students, and special programs for K-16 students, scouts and families. The Tour program draws roughly 45,000 visitors each year, a remarkable number for such a remote location. Visitors experience interactive displays, hear presentations about radio astronomy take tours around the Observatory. Special events are also held including annual open house events, multi-day Star Parties and school field trips throughout the year.

In-depth field trips in Green Bank involve the use of the 40-Foot telescope—a working radio telescope outfitted specifically for use by students and teachers. It is the centerpiece of a hands-on research experience offered by the Observatory. Each year more than 2000 scouts, students and teachers visit Green Bank, typically in small groups of a few dozen students with their teachers, for sessions lasting several days. They are housed in the Observatory "bunkhouse" and take meals in the cafeteria. They receive in-depth tours of the electronics labs, training, use of the 40-Foot Telescope, and interactions with the Observatory staff.

A brief outline of several long running programs follows in Section A, followed by a more in-depth description of three externally funded programs that target K-12 students. Section C contains an outline of the evaluation methods used on the programs described.

A. Programs for Special Audiences

Research Experience for Teachers.

The Research Experience for Teachers program has been in place from 2000-2013, and 2016-2019. Originally modeled after the Undergraduate summer student program, teachers worked one-on-one with Green Bank astronomers during an 8-week residential program. Thirty teachers participated in RET programs in West Virginia. In 2015 we coauthored a proposal with Engineering faculty at West Virginia University to start an RET site with a cohort of 10 teachers/year for 3 years. Teachers will be engaged in software defined radio projects, in which they will construct and program software defined radio systems to detect and decode radio data, and other signals such as NOAA weather satellites.

Chautauqua Short Courses.
Beginning in 1988, the Observatory has hosted three-day workshops each spring/summer for science faculty of undergraduate colleges. The purpose of the program is to update their content knowledge, and awareness of current research in the field. (http://campus.udayton.edu/~physics/gkm/chau/). In the several dozen years of the program over 650 undergraduate faculty have participated. Chautauqua short course are hosted in New Mexico and West Virginia.

STARQUEST and SARA .
Two multi-day "conferences" are organized by amateur optical and radio astronomy groups respectively. About 150 people attend STARQUEST every year, and 60 avid amateur radio astronomers convene for SARA.

Undergraduate Programs.
Green Bank has hosted a summer student program for undergraduates since its founding. In recent years we have focused additional attention on early undergraduates and host several workshops for them. Other groups (Cornell University, NANOGrav Consortium, University of North Carolina) host 1-2 week workshops at the Green Bank Observatory was well.

The newly funded INCLUDES program builds on these efforts and aims to address STEM persistence in the first two years of college through early research experiences and the development of first and second year courses /clubs within colleges and universities in the state of WV.

B. Preparing Students for STEM Careers.

1. **Governor's School for Math and Science**
   The Observatory and the National Youth Science Foundation®, Inc. (NYSF) jointly operated the Governor's School for Mathematics and Science (GSMS) at the Green Bank Observatory for 10 years. (The NYSF operates the National Youth Science Camp®, a program that has served the nation's brightest graduating high school students since its inception in 1963.) The State of West Virginia funds this program. Six hundred rising ninth graders participated in the program at Green Bank from 2005-2014. We hope to successfully compete for funding to host the program in the future.

   The goal of the GSMS was to build academic research skills and cultivate interest in STEM (science, technology, engineering, and mathematics) careers among young students. Assessment was a strong and integral component of this program. Through the use of evaluation instruments and open-ended questionnaires, the immediate impact the GSMS experience on students' research skills, their attitudes toward inquiry, and their confidence their ability to conduct research in STEM was assessed. Results of this assessment indicate that:
   - GSMS increases participants' research skills and confidence in conducting research. Prior to beginning the GSMS, students indicated concerns about conducting research. They were afraid they would not be able to get the right answer to the problem presented to them, or have the necessary background. After GSMS, participants were more confident in their ability to do research. They were less fearful of appearing foolish or ignorant to their peers and placed greater value on collaboration.
   - GSMS advances participants' understanding of the nature of science and inquiry. Students believed initially that science is unchanging and that what is known in science should not be questioned. After GSMS, students recognized that science is about testing.

2. **Physics Inspiring the Next Generation (PING)**
   Our success with the GSMS program led us to develop a similar national program for underrepresented youth. A central component of PING is a 2-week summer camp. Like GSMS, in PING Camp, the central theme is radio astronomy research with exposure to topics in science, technology, engineering, and mathematics. Students are on location at the Observatory and immersed in the research activities of this national research center.

While in residence, students work in small teams led by a teacher and supported by a student mentor and a Green Bank staff scientist (astronomer, physicist, engineer, etc.) to conduct research by observing the universe with a 40-foot diameter radio telescope and the 20 Meter Telescope. Supporting material in chemistry, physics, mathematics, and engineering are provided. At the conclusion of PING Camp, the student groups present their findings to each other, and Green Bank scientists, and guests in an academic colloquium that reinforces the need for ongoing research and exploration. Supplemental educational activities, including field research in ecology, bench experiences building electronic circuits, and data analysis using computer-based image processing software, complement the primary research theme. Outdoor activities, and fun hands-on seminars round out the experience. The program is currently smaller in scope than GSMS. We select 20 rising ninth graders for the program and hire 2-4 undergraduate mentors. PING has been funded by AUI/NRAO with a modest supplement from the West Virginia Space Grant Consortium to support one undergraduate mentor.

PING undergraduate mentors are chosen from among the applicants for the general REU program. We seek role models for the students—making a conscious effort to increase the diversity of the Green Bank REU student cadre, in the process.

3. **Pulsar Search Collaboratory**

The Pulsar Search Collaboratory (NSF # 0737641, #1516269), is a collaboration between the Green Bank Observatory and West Virginia University. The Pulsar Search Collaboratory project (PSC) engages high school teachers and students in world class research in radio astronomy through the analysis of data collected using the Robert C. Byrd Green Bank Telescope (GBT). Using the interconnectivity of the internet, high school students and teachers assist astronomers in analyzing large data sets collected specifically for the purpose of discovering new pulsars. Not only do students engage with information technology and its role in astronomical data reduction, they also actively participate in cutting-edge scientific research and contribute to the advancement of science.

The PSC is part formal education program and part after school "club". Teachers and high school students participate in online workshops. Once they demonstrate competence in analyzing pulsar plots, PSC members gain access to over 50 terabytes of raw data collected by the GBT. They work independently at school, home or at places like public libraries to analyze this data. They meet regularly as a team after school to discuss their findings. And they interact with undergraduate mentors who meet with them virtually and through visits to their school.

This research culminates in student presentations during an annual Capstone Seminar held at a hub university. Follow-up residential summer institutes are held each summer at the Green Bank Observatory where students, teachers and undergraduate mentors form research teams, and work with astronomers to learn the advanced skills and techniques in pulsar research.

Results and statistics from the original PSC include:

- **seventeen hundred students** were exposed to astronomical research;
- **one hundred-six teachers** and 191 students from 18 states participated in summer workshops;
- **eight hundred and eleven students** became full PSC members (396 girls, 415 boys);
- as of 2/1/2016, PSC students have analyzed **2,151,270 pieces of data;**
- **six pulsars and one transient object have been discovered.**
- Rigorous external evaluation has shown that the PSC significantly **increases interest in STEM Careers in all students; increases self-efficacy and scientific identity in girls, two key predictors of future success in completing STEM majors.**

And finally, **Little Green Men: A Documentary Film about the Pulsar Search Collaboratory** was funded by a CRPA award NSF # 1137082, and was premiered September 29, 2016 in Morgantown. See a trailer for the movie at www.lgmfilm.com.

In 2015, we were successful in obtaining scale up funding for the PSC though an AISL grant called "Collaborative Research: Developing STEM self-efficacy and science identities through authentic astrophysics research in online and face-to-face environments (STEM-ID)". Twelve Hub universities have been established around the country which will serve as loci for PSC clubs in their region. Undergraduate mentors have been identified at each hub, who interact with PSC clubs in their areas, and help organize capstone events at their schools. See pulsarsearchcollaboratory.org for more information.

4. Skynet Junior Scholars

In partnership with the University of Chicago, the University of North Carolina and the Astronomical Society of the Pacific , the Green Bank Observatory (NSF Award # 1223345) created Skynet Junior Scholars, a program for 4-H youth, and other informal STEM groups, that leverages research-grade robotic telescopes, astronomers and support staff to motivate youth to enter and persist on STEM career paths.

Through SJS, middle-school-aged youth take remote control of the Green Bank 20-meter-diameter telescope, bringing the excitement of hands-on research to young people via 4-H, the nation's largest youth development organization. Skynet Junior Scholars have provided some 135 informal/formal science educators and 1,400 youth with access to robotically-operated, research-grade telescopes. Over 88,000 optical images and 17,000 radio images have been requested by SJS participants from Skynet Telescopes.

They use the telescopes to survey galaxies, track asteroids, monitor variable stars, and learn first-hand how scientific research is done. In addition to the Green Bank 20-meter radio telescope, the network also includes optical telescopes in California, Wisconsin, North Carolina, Canada, Chile and Australia.

Projects that we create, and that youth participate in, develop their confidence and skills in doing science, and convince them that STEM is something they can see themselves doing as a career. We have also made sure that our materials are accessible to blind and visually impaired and deaf and hard of hearing students, and continue to work with experts in this field to achieve a high level of accessibility in an often very visual science.

Components of the project include:

- Access to the UNC, Yerkes and Green Bank Skynet telescopes and data analysis tools and sustained interaction with scientists and engineers.
- Inquiry-based "Explorations" modules for middle school-aged children that meet national standards and 4-H curriculum requirements.
- Age-appropriate, accessible web-interface to Skynet telescopes and data-processing software, and a safe web-portal for learning, communication and collaboration.
- Face-to-face and online professional development for 4-H leaders and informal science educators with online support throughout the year.
- Research and evaluation on the effectiveness of SJS in meeting the project goals of increased STEM interest and self-efficacy.

Evaluation and research studies of the SJS program indicate significant gains in career interest and STEM identity development, among students. Our intent is that SJS will be accepted as a national curriculum for 4-H and will be selected as the National 4-H Science Experiment in the future. Visit skynetjuniorscholars.org to learn more.

5. **West Virginia Science Public Outreach Team**
Supported through a joint partnership between the Green Bank Observatory and NASA, the West Virginia Science Public Outreach Team (SPOT) recruits and trains undergraduate college ambassadors to bring presentations about current West Virginia space science, technology, and engineering to West Virginia K-12 classrooms, museums, and youth programs. In 2016, we broadened the focus of the program to include other STEM areas, the first being water quality. Last year (2015/2016), in its 3rd year, SPOT ambassadors reached 49 schools in West Virginia, and impacted 4839 K-12 students. Each September Green Bank hosts a 2 day professional development for potential SPOT ambassadors. They see a SPOT show delivered by an expert presenter, learn hands-on activities, and begin the process of learning a show themselves. SPOT shows are highly interactive, scripted powerpoint presentations, that have been vetted by science experts as well as a SPOT advisory group beforehand. Visit wvspot.org to learn more.

C. Evaluating EPO Programs at the Green Bank Observatory.

Program	**Evaluation Methods and/or Metrics**
Teacher Workshops Residential, summer Target group: K-12 Teachers	Quasi-experimental studies which include validated pre/post instruments, concept mapping, gauges changes in teachers' nature of science knowledge, under- standing of inquiry-based learning , content knowledge.
Chautauqua Short Course Program 3 day, summer, residential Target group: Undergraduate Faculty	Evaluation Survey asks participants for feedback on each course component.
Research Experience for Teachers 6-8-week residential program Target group: Secondary Science Teachers	Summative presentation by teachers (measures teachers knowledge of scientific research). Evaluation survey provides feedback on program components. External Evaluation.
Pulsar Search Collaboratory summer and academic year program Target group: teachers and students NSF funded	Quasi-experimental studies which include a validated suite of pre/post instruments. External evaluator conducts statistical analysis to determine pre/post gains in students' self-efficacy, identity with STEM professions, interest in STEM careers. NEW Grant has a large research component
Skynet Junior Scholars Target Group: youth in informal settings.	Evaluation surveys administered to youth leaders, surveys and case studies of youth groups. Several publications underway.
WV Governor's School for Math and Science, PING Summer residential astronomy camp Target group: rising high school freshmen	Pre/post instruments, plus open-ended questionnaire. Statistical analysis show pre/post gains in students' self-efficacy, identity with STEM professions, self confidence, nature of science knowledge.
Tours and Field Trips Day trips, extended tours, overnight groups, scout badge weekends, special events	Success is measured simply by determining if the number of visits/year increases. In cases where we've spent State grant funds to attract school groups we additionally determine how groups learned about NRAO educational opportunities.

Appendix 3.11D

Community Resources

APPENDIX 3-11D

Community Resources in the County but outside of the Vicinity

Name	Type
1. Advent Church, Hillsboro	Community Gathering Place
2. Alexander Memorial Presbyterian Church, Clover Lick	Community Gathering Place
3. Bartow Post Office	Community Services
4. Bartow-Frank-Durbin Fire & Rescue 2	Community Services
5. Baxter Presbyterian Church, Clover Lick	Community Gathering Place
6. Bear Creek Lodge, Cass	Community Commercial
7. Beaver Creek Church, Lake Sherwood	Community Gathering Place
8. Bethel United Methodist Church, Durbin	Community Gathering Place
9. Big Springs Linwood Presbyterian Church, Mingo	Community Gathering Place
10. Boyer Hill Mennonite Church	Community Gathering Place
11. Boyer Motel, Restaurant, and Campground	Community Commercial
12. Browns Creek Church, Minnehaha Springs	Community Gathering Place
13. Buffalo Run Lodge	Community Commercial
14. Cass Ambulance Service	Community Services
15. Cass Depot and Scenic Railroad State Park	Community Gathering Place
16. Cass Inn	Community Commercial
17. Cass Post Office	Community Services
18. Cass United Methodist Church	Community Gathering Place
19. Central Union Church, Edray	Community Gathering Place
20. Chestnut Ridge Country Inn, Dunmore	Community Commercial
21. Cochran Creek Church, Mountain Grove	Community Gathering Place
22. Cummings Creek Church, Marlinton	Community Gathering Place
23. Dunmore Post Office	Community Services
24. Dunmore United Methodist Church, Clover Lick	Community Gathering Place
25. Durbin & Greenbrier Valley Railroad	Community Gathering Place
26. Durbin Art Center	Community Gathering Place
27. Durbin United Methodist Church	Community Gathering Place
28. East Fork Campground, Durbin	Community Commercial

APPENDIX 3-11D

Community Resources in the County but outside of the Vicinity

29. Edray United Methodist Church, Edray	Community Gathering Place
30. Emmanuel Church, Lobelia	Community Gathering Place
31. Fairview Church, Edray	Community Gathering Place
32. First Baptist Church, Marlinton	Community Gathering Place
33. Frank African Methodist Episcopal Church, Durbin	Community Gathering Place
34. Frost United Methodist Church, Clover Lick	Community Gathering Place
35. Grace Church, Droop	Community Gathering Place
36. Hamlin United Methodist Church, Edray	Community Gathering Place
37. Hills Chapel, Droop	Community Gathering Place
38. Huntersville Presbyterian Church, Marlinton	Community Gathering Place
39. Huntersville United Methodist Church, Marlinton	Community Gathering Place
40. Judi's Flower and Gift Boutique, Bartow	Community Commercial
41. Kinders Market, Durbin	Community Commercial
42. Little Yellow House, Dunmore	Community Gathering Place
43. Mace United Methodist Church, Mingo	Community Gathering Place
44. Marlinton Presbyterian Church	Community Gathering Place
45. Marlinton United Methodist	Community Gathering Place
46. Marvin United Methodist Church, Hillsboro	Community Gathering Place
47. Marys Chapel, Edray	Community Gathering Place
48. Mount Carmel Church, Minnehaha Springs	Community Gathering Place
49. Mount Olivet United Methodist Church, Droop	Community Gathering Place
50. Mount Pleasant Church, Edray	Community Gathering Place
51. Mount Zion Church, Clover Lick	Community Gathering Place
52. Mount Zion United Methodist Church, Droop	Community Gathering Place
53. Murphy's Body & Repair Shop & Wrecker Service, Durbin	Community Commercial
54. NAPA / Wilson Brothers Auto Parts, Bartow	Community Commercial
55. New Hope Church, Paddy Knob	Community Gathering Place
56. Old Droop Church Denmar	Community Gathering Place
57. Pocahontas Center Board of Education	Community Services

APPENDIX 3-11D

Community Resources in the County but outside of the Vicinity

58. Pocahontas Center Nursing Home	Community Services
59. Pocahontas County Career Center, Marlinton	Community Services
60. Pocahontas County Emergency Operations Center	Community Services
61. Pocahontas County Health Department	Community Services
62. Pocahontas County Opera House	Community Gathering Place
63. Pocahontas Memorial Hospital	Community Services
64. Pocahontas Times	Community Commercial
65. Rotary Club of Marlinton	Community Gathering Place
66. Ryder's Chevron Restaurant	Community Commercial
67. St. John Catholic Church, Marlinton	Community Gathering Place
68. St. Johns Episcopal Church, Marlinton	Community Gathering Place
69. St. Mark the Evangelist Catholic Church, Durbin	Community Gathering Place
70. Seebert United Methodist Church, Hillsboro	Community Gathering Place
71. Slatyfork Methodist Church, Mingo	Community Gathering Place
72. Stony Creek Presbyterian Church, Edray	Community Gathering Place
73. Swago Church, Hillsboro	Community Gathering Place
74. The Outhouse, Inc, Cass	Community Commercial
75. Thornwood Community Church, Thornwood	Community Gathering Place
76. Trent's General Store, Bartow	Community Commercial
77. Wanless United Methodist Church, Cass	Community Gathering Place
78. Wesley Chapel, Paddy Knob	Community Gathering Place
79. West Union Church, Woodrow	Community Gathering Place
80. Westminster Presbyterian Church, Minnehaha Springs	Community Gathering Place
81. White Church, Woodrow	Community Gathering Place
82. Wilson Chapel, Edray	Community Gathering Place
83. Woodrow Church of the Nazarene, Woodrow	Community Gathering Place
84. Woods-Poage Chapel, Edray	Community Gathering Place

Sources: PCAC, 2017; WV HometownLocator, 2017b; Region 4 Planning and Development Council, 2016a.

Appendix 4.2A

Section 106 Programmatic Agreement

PROGRAMMATIC AGREEMENT
AMONG
THE NATIONAL SCIENCE FOUNDATION,
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND
THE WEST VIRGINIA STATE HISTORIC PRESERVATION OFFICER
REGARDING
POTENTIAL CHANGES TO
GREEN BANK OBSERVATORY OPERATIONS
IN GREEN BANK, WEST VIRGINIA

WHEREAS, Green Bank Observatory is a federal facility owned and funded by the National Science Foundation (NSF), a federal agency, and as of the date of this Programmatic Agreement (PA), Associated Universities, Inc. (AUI) receives funding from NSF via a Cooperative Agreement to operate and maintain Green Bank Observatory for the benefit of research communities;

WHEREAS, NSF relies on formal processes within the scientific community (e.g., decadal surveys, senior-level reviews, and other advisory committees subject to the Federal Advisory Committee Act), to provide input on science priorities. The Portfolio Review Committee, a subcommittee of the NSF Mathematical and Physical Sciences Advisory Committee composed solely of external members of the scientific community, was charged with recommending a balanced portfolio to maximize the science recommended by National Academy of Sciences surveys of the field, which are carried out every decade (NASEM, 2016). To enable NSF to better address decadal survey science, the resulting Portfolio Review Committee Report (NSF AST, 2012), released in August 2012, recommended divestment of the 100-meter Robert C. Byrd Green Bank Telescope (GBT), which is a key component of the Observatory, and subsequent reports by the Astronomy and Astrophysics Advisory Committee and the National Academies' mid-decadal survey recommended that the divestment recommendations of the Portfolio Review Report be carried out expeditiously in order to maintain scientific program balance;

WHEREAS, such divestment would be achieved through significant reduction in NSF's contribution to the funding of Green Bank Observatory, and, based on the input NSF received from the scientific community and during National Environmental Policy Act (42 U.S.C. § 4321, *et seq.*) (NEPA) public scoping, NSF developed preliminary alternatives to address changes to operations from reduced NSF funding for Green Bank Observatory and is analyzing these alternatives via a Draft Environmental Impact Statement (EIS) and Final EIS;

WHEREAS, alternatives evaluated include Collaboration with Interested Parties for Continued Science- and Education-focused Operations with Reduced NSF Funding (Alternative A in the Draft EIS, and NSF's Preferred Alternative), Collaboration with Interested Parties for Operation as a Technology and Education Park (Alternative B in the Draft EIS), Mothballing of Facilities, defined as suspending operations in a manner that would permit operations to resume efficiently at some time in the future (Alternative C in the Draft EIS), and Demolition and Site Restoration (Alternative D in the Draft EIS);

WHEREAS, NSF has identified its Preferred Alternative as "Collaboration with Interested Parties for Continued Science- and Education-focused Operations with Reduced NSF Funding" (Alternative A in the Draft EIS), because this would reduce the funding required from NSF and allow for continued benefits to the scientific and educational communities by having new operations partners contribute funding that compensates for the reduction from NSF;

WHEREAS, the proposed decision regarding the potential changes to operations at Green Bank Observatory with reduced NSF funding is considered a federal undertaking and triggers compliance with

Sections 106 and 110(f) (54 United States Code [U.S.C.] Sections [§] 306108 and 306107) of the National Historic Preservation Act of 1966, as amended (54 U.S.C. § 300101, *et seq.*) (NHPA), and the NHPA's implementing regulations, "Protection of Historic Properties" (Title 36 *Code of Federal Regulations* [C.F.R.] Part 800);

WHEREAS, Green Bank Observatory contains the Reber Radio Telescope, which was listed in the National Register of Historic Places (NRHP) in 1972 under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber; the Reber Radio Telescope, which was constructed in 1937, was moved to Green Bank Observatory in 1959–1960 to be displayed at the entrance to the Observatory, at which time some elements of the structure, including deteriorated wood pieces, were replaced; the Reber Radio Telescope was designated a National Historic Landmark (NHL) in 1986;

WHEREAS, NSF has determined that Green Bank Observatory is eligible for listing in the NRHP as a historic district with 44 contributing resources, including four telescopes that are individually eligible for listing in the NRHP: the Interferometer Range (which includes the Howard E. Tatel Telescope, two other nearly identical telescopes, and two control buildings), the 40-foot telescope (which includes an associated control building), the 43-meter (also referred to as the "140-foot") telescope (which includes a maintenance structure), and the GBT (see Attachment A for a table of evaluated resources with identification of those that are contributing); NSF's determination of eligibility was based on an evaluation of all resources built prior to 1969 within the Green Bank Observatory boundary, as well as the GBT due to its exceptional contribution to radio astronomy;

WHEREAS, NSF has conducted its Section 106 consultation process concurrently with, but separate from, its NEPA review process;

WHEREAS, under Alternatives A, B, and C as identified in the Draft EIS, some historic properties (contributing resources to the NRHP-eligible historic district and individually eligible historic properties) would be retained and some contributing resources could be demolished and/or safe abandoned (removal of a building or facility from service without demolishing it, with no intention that the building or facility would be brought back to operational status), depending on the needs of any collaborator(s) and/or in order to reduce costs of maintaining and operating the facilities; under Alternative D as identified in the Draft EIS, all contributing resources, with the exception of the Reber Radio Telescope, would be demolished; in addition, under Alternatives A, B, and C, NSF may retain or transfer ownership of Green Bank Observatory, depending, in part, on the needs of any new collaborator(s), which could be a federal or a non-federal entity or entities;

WHEREAS, on December 2, 2016, NSF formally initiated Section 106 consultation with the West Virginia State Historic Preservation Officer (SHPO) and established the area of potential effects (APE) as defined at 36 C.F.R. 800.16(d), included as Attachment B, and the SHPO agreed with the APE in a letter dated December 22, 2016;

WHEREAS, on December 12, 2016, NSF initiated Section 106 consultation with the following Native American tribes: Absentee Shawnee Tribe, Cayuga Nation, Cherokee Nation, Delaware Tribe of Indians, Eastern Band of Cherokee Indians, Eastern Shawnee Tribe of Oklahoma, Oneida Indian Nation, Oneida Nation, Onondaga Nation, Seneca Nation of Indians, Seneca-Cayuga Nation, St. Regis Mohawk Tribe, Shawnee Tribe, Tonawanda Band of Seneca, Tuscarora Nation, and United Keetoowah Band of Cherokee Indians in Oklahoma; NSF provided follow-up telephone calls and emails on December 29, 2016; Delaware Nation received an invitation letter on August 7, 2017 and responded on August 24, 2017 that it would be a consulting party; the Eastern Band of Cherokee Indians responded via email that the

proposed action would occur outside the traditional aboriginal territory of the Cherokee and referred the proposed action to the Shawnee; no other responses were received;

WHEREAS, the SHPO concurred with the determinations of individual NRHP-eligibility for four telescopes at Green Bank Observatory on December 22, 2016; further, based on 48 Historic Property Inventory forms completed and submitted by NSF on May 18, 2017, the SHPO concurred with the determination of Green Bank Observatory as eligible for listing on the NRHP as a historic district with 44 contributing resources on June 12, 2017;

WHEREAS, additional Consulting Parties identified for this undertaking and invited to participate include: Karen O'Neil, Daryl and Deana White, Grayg Ralphsnyder, Pocahontas County Landmarks Commission, Preservation Alliance of West Virginia, and Pocahontas County Historical Society;

WHEREAS, the public has had the opportunity to participate in the Section 106 process through the *Notice of Intent to Prepare an Environmental Impact Statement and Initiate Section 106 Consultation for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia and Notice of Public Scoping Meetings and Comment Period*, published on October 19, 2016, as well as during the public scoping meeting on November 9, 2016, and the public meeting on the Draft EIS on November 30, 2017, which included a presentation on the Section 106 process and an explanation that any public comments on historic properties would be considered during both the NEPA and the Section 106 reviews;

WHEREAS, the *Proposed Changes to Green Bank Observatory Operations: Historic Properties Assessment of Effects* (CH2M HILL, 2017) was prepared on behalf of NSF and provided to the SHPO and the other Consulting Parties on October 31, 2017; adverse effects identified include those that would occur if eligible historic properties were demolished or safe abandoned, as well as in the case NSF transfers ownership to a non-federal entity, since the federal consultation process under Section 106 would no longer be applicable to future actions by such a new owner; in the case that NSF transfers ownership to a federal entity for continued operations, the transfer would not have an adverse effect, since the Section 106 consultation process would be applicable to future actions by such a new owner;

WHEREAS, on December 4, 2017, the SHPO concurred that the undertaking would have an adverse effect on historic properties within Green Bank Observatory and requested continued consultation on measures to avoid, minimize, and/or mitigate the adverse effect;

WHEREAS, in accordance with 36 C.F.R. 800.6(a)(1)(i)(C), NSF has provided the Advisory Council on Historic Preservation (ACHP) the required documentation and invited it to participate in the Section 106 consultation process; the ACHP notified NSF that it would participate in the consultation via a letter dated December 22, 2017;

WHEREAS, in accordance with 36 C.F.R. 800.10, *Special requirements for protecting National Historic Landmarks*, NSF has provided the National Park Service (NPS) with information about the undertaking and how it relates to the NHL Reber Radio Telescope and invited participation in the Section 106 consultation process; the NPS notified NSF that it would participate in the consultation during a teleconference on March 16, 2018;

WHEREAS, NSF recognizes that continued operation of Green Bank Observatory can occur only if a collaborator(s) comes forward with viable plans to provide additional non-NSF funding in support of continued operations; therefore, in order to cover a range of possible outcomes, this PA addresses the potential effects of all alternatives currently being evaluated under the NEPA review;

WHEREAS, given that implementation of the alternatives described above could result in a range of potential outcomes depending on the needs of the collaborator(s), this PA has been prepared in

compliance with 36 C.F.R. 800.14(b)(1)(ii) to determine appropriate measures to cover the range of potential outcomes, including demolition or safe abandonment of some contributing resources and transfer of ownership;

WHEREAS, technical terms related to the NHPA are included in Attachment C, "References and Definitions," along with references for citations in the PA and links to those references;

WHEREAS, NSF has consulted with the SHPO, the ACHP, the NPS, and the other Consulting Parties on ways to avoid, minimize, and/or mitigate the adverse effects that the proposed undertaking could have on historic properties, including the NHL, pursuant to the regulations implementing Section 106 of the NHPA, 36 C.F.R. Part 800;

WHEREAS, the SHPO, the ACHP, the NPS, and the other Consulting Parties participated in the development of this PA; NSF, the SHPO and ACHP are Signatories herein; the NPS and other Consulting Parties have been asked to execute this PA as Concurring Parties;

NOW, THEREFORE, NSF, the SHPO, and the ACHP agree that NSF will ensure that, if the Preferred Alternative (*Collaboration with Interested Parties for Continued Science- and Education-focused Operations with Reduced NSF Funding*) or one of the other Alternatives is selected, the following Stipulations are implemented to address adverse effects of the proposed undertaking on historic properties and agree that these Stipulations will govern the undertaking and all of its parts.

STIPULATIONS

NSF will ensure that the following measures are carried out:

The following Stipulations address adverse effects to historic properties associated with: continued operation of Green Bank Observatory under federal ownership (Stipulation I.A.) and demolition (partial or full), safe abandonment, or transfer to a non-federal entity (Stipulation I.B.)

I. Preservation Provisions

A. **To the extent that Green Bank Observatory operations continue under NSF or new federal ownership:**

1. **Avoidance of Adverse Effects.** NSF will make every effort to avoid adverse effects on historic properties by encouraging any collaborator(s) with operational responsibilities or new federal owner(s) to use as many historic properties as practicable, provided that such use facilitates continued operations.
2. **Preservation of the Reber Radio Telescope.** Provided that NSF continues to own Green Bank Observatory, NSF will ensure that any new collaborator(s) with operational responsibilities continue a program of cyclical maintenance to preserve the structural integrity and historic fabric of the NHL Reber Radio Telescope and that any telescope parts that need replacement in the future shall, to the extent feasible, be replaced in kind provided that NSF has sufficient resources available to reasonably carry-out such preservation activities. NSF will require that any new collaborator(s) submit a condition update on the NHL Reber Radio Telescope every two years. If long-term preservation of the NHL Reber Radio Telescope in place as set forth herein is

determined by NSF not to be feasible, NSF will consult with the NPS and SHPO on possible relocation of the NHL Reber Radio telescope. As part of that consultation, NSF will provide, in writing, the status of the NHL and the reason why long-term preservation is not feasible. NSF will encourage any new federal owner to preserve the NHL Reber Radio Telescope in accordance with this Stipulation.

3. **Preservation of the Janksy Replica Antenna, Ewen-Purcell Horn, and Calibration Horn.** Provided that NSF continues to own Green Bank Observatory, NSF will ensure that any new collaborator(s) with operational responsibilities continue a program of cyclical maintenance to preserve the structural integrity and historic fabric of the Janksy Replica Antenna, Ewen-Purcell Horn, and Calibration Horn, and that any parts that need replacement in the future shall, to the extent feasible, be replaced in kind provided that NSF has sufficient resources available to reasonably carry-out such preservation activities. NSF will require that any new collaborator(s) submit a condition update on the Janksy Replica Antenna, Ewen-Purcell Horn, and Calibration Horn to NSF every two years. NSF will encourage any new federal owner to preserve the Jansky Replica Antenna, Ewen-Purcell Horn, and Calibration Horn in accordance with this Stipulation.

4. **Consultation on Preservation Principles and Management Strategies.** As soon as practicable following selection of a new collaborator, NSF will consult with the SHPO and any new collaborator(s) with operational responsibilities to discuss the development and implementation of preservation principles and management strategies that permit continued science- and education-focused operations at Green Bank Observatory while preserving its historic integrity. The consultation would include consideration of modifications to instruments or buildings that may be needed to accommodate the operational needs of the facility.

5. **Training.** NSF will ensure that the key facility staff of any new collaborator with operational responsibilities receive an initial, one-time historic preservation awareness training to encourage awareness of the historic significance of Green Bank Observatory and to minimize the potential for adverse effects to historic properties. Such training, which will be funded by NSF, will be administered by a qualified historic preservation professional who is familiar with and knowledgeable about the Green Bank Observatory, and will occur within 180 days (or as soon as practicable thereafter) of the selection of the new collaborator. The training will be based on the Preservation Principles and Strategies that result from implementation of Stipulation I.A.4. NSF will provide the SHPO an opportunity to comment on the content of such training and to participate in the training..

6. **Mothballing in Accordance with Historic Preservation Standards.** In the event NSF identifies the need to temporarily mothball historic properties with the intent that operations would resume in the near future, NSF will follow the guidance in the NPS Preservation Brief 31, *"Mothballing Historic Buildings"* and *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring*

and Reconstructing Historic Buildings, as appropriate, with implementation of the following measures:

a. All exterior elevations of the building or structure will be photographed, including at least one context photo. Archival-quality digital photographs will be produced in accordance with professional standards as set forth in the NRHP Photograph Policy Factsheet (dated 5/15/2013).

b. To avoid an adverse effect caused by demolition by neglect, a cyclical maintenance plan that includes repairs as needed will be prepared and implemented.

c. NSF will submit a condition update on any of the properties subject to this Stipulation to the SHPO every two years, for the duration of time there are mothballed properties at Green Bank Observatory.

B. **To the extent that demolition (partial or full), safe abandonment, or transfer to a non-federal entity occurs:**

1. **Preservation of the Reber Radio Telescope.** Prior to a change in disposition of the Reber Radio Telescope (or as soon as practicable thereafter), NSF will consult with the NPS, the SHPO, and any new collaborator with operational responsibilities on preservation principles and management strategies regarding the long-term preservation of the NHL Reber Radio Telescope. Should long-term preservation in place not be feasible or desirable, NSF will consult with the NPS and the SHPO on possible relocation of the Reber Radio Telescope, either onsite or offsite. If relocation to a suitable location is not feasible, then NSF will consider appropriate documentation for the Reber Radio Telescope, in consultation with the NPS and the SHPO. Such documentation would occur before any demolition or dismantling of the telescope.

2. **Documentation Required for the NRHP-Eligible Historic District.** Prior to a change in disposition (whether it be demolition, safe abandonment, or transfer to a non-federal entity) of any eligible property, NSF will ensure, in addition to the Historic Property Inventory Forms previously provided to the SHPO, that the following documentation occurs:

a. NSF will prepare appropriate and reasonable documentation (similar in level of effort to a National Register nomination form prepared in accordance with the National Register Bulletin, "Guidelines for Completing National Register of Historic Places Form" and consistent with Part 2 of the West Virginia National Register and Architecture/History Survey Manual) of the historic property. NSF will develop an approach to the documentation in the form of an outline of a report and will consult with the SHPO on the approach and outline. The documentation will include a discussion of the significance of the National Radio Quiet Zone in contributing to the setting of Green Bank Observatory and to the

important research accomplished there, as well as other locations on site such as the Drake Lounge where certain influential ideas in astronomy germinated.

b. NSF will survey those buildings and structures built after 1969 that were not previously surveyed, including the 20-meter telescope, and will evaluate them for NRHP eligibility under Criterion Consideration G (a property achieving significance within the past 50 years if it is of exceptional importance). Historic Property Inventory Forms will be prepared for each resource. They will be evaluated for individual significance and as contributing elements to the Green Bank Observatory Historic District. NSF will submit the Historic Property Inventory Forms to the SHPO and request concurrence on the eligibility determinations.

3. **Effort to Reuse or Donate Historically Significant Equipment and Artifacts.** In the event that NSF issues a final agency decision regarding changes to operations at Green Bank Observatory in which demolition, transfer, or mothballing of historic properties occurs, NSF will, prior to a change in disposition of the historic properties (or as soon as practicable thereafter), identify any historically significant equipment and artifacts associated with historic properties that will not be repurposed for further scientific or educational use, and if feasible, NSF will:

    a. Contact relevant scientific/educational institutions for possible reuse of the equipment and artifacts; or

    b. Contact an appropriate museum to determine if any of the equipment and/or artifacts can be donated to the museum's collection.

4. **Consultation on Preservation Principles and Management Strategies.** Prior to transfer to a non-federal entity (or as soon thereafter as practicable), NSF will consult with the SHPO and the new owner to discuss the development and implementation of preservation principles and management strategies that permit continued science- and education-focused operations at Green Bank Observatory while preserving its historic integrity.

5. **Training.** NSF will ensure that the key facility staff of any new owner will receive an initial, one-time historic preservation awareness training to encourage awareness of the historic significance of Green Bank Observatory and to minimize the potential for adverse effects to historic properties. Such training, which will be funded by NSF, will be administered by a qualified historic preservation professional who is familiar with and knowledgeable about the Green Bank Observatory, and will occur within 180 days (or as soon as practicable thereafter) of the transfer. The training will be based on the Preservation Principles and Strategies that result from implementation of Stipulation I.B.4. NSF will provide the SHPO an opportunity to comment on the content of such training and to participate in the training.

II. DELAYED TRANSFER OF OWNERSHIP

In the event NSF issues an award to a collaborator(s) to manage and operate Green Bank Observatory, and NSF plans to transfer ownership of Green Bank Observatory to a non-federal collaborator(s), Stipulation I.A. shall apply prior to the transfer, until reasonably practicable, at which point only Stipulation I.B. shall apply.

III. NEW FEDERAL OWNERSHIP AND SECTION 106

Should NSF transfer ownership to a new federal entity for continued operations, that entity would be required to comply with the NHPA for future undertakings and this PA would expire upon such a transfer, as stated in Section XII. A new federal entity, however, may elect to enter into a new PA that adopts the provisions of this PA in whole or in part.

IV. UNANTICIPATED EFFECTS

If unanticipated effects on historic properties occur during implementation of the undertaking, NSF will, in compliance with 36 C.F.R. § 800.13(b)(3), determine actions that it can take to resolve potential adverse effects and notify via phone and email the SHPO and other Consulting Parties, as appropriate, within two business days of NSF's awareness of the effects. The notification will describe the eligibility of the property and proposed actions to resolve any adverse effects. The SHPO and other Consulting Parties will respond with any comments within two business days of the notification by phone or email. NSF will take into account the Consulting Parties' recommendations regarding NRHP eligibility and proposed actions, and then carry out appropriate actions. NSF will provide the SHPO and other Consulting Parties, as appropriate, with a report of the actions when they are completed. This Stipulation shall not apply if NSF is no longer the owner of Green Bank Observatory.

V. POST-AGREEMENT DISCOVERIES

If NSF continues to own Green Bank Observatory and it is managed by a collaborator(s), all unanticipated discoveries of historic properties and human or burial remains within the APE revealed during any activity associated with implementation of the proposed undertaking will be addressed in the following manner:

A. The contractor/collaborator(s) carrying out any such activities will promptly notify NSF, who will notify the SHPO of the discovery.

B. If NSF determines, in consultation with the SHPO, that the discovery is eligible for listing in the NRHP, NSF will initiate consultation with the Consulting Parties to draft a plan with measures that will avoid, minimize, and/or mitigate adverse effects. If agreement is reached regarding such a plan, NSF will implement the plan. If the discovery is made during demolition activities (if any), demolition in the affected area must cease until the discovery process in this Stipulation has been concluded either through a finding that the property is not eligible for listing in the NRHP or through finalization of the plan referenced herein.

C. If the Consulting Parties cannot reach agreement regarding the development of a treatment or mitigation plan, then the matter will be referred to the ACHP for guidance. NSF will address the ACHP's guidance in reaching a final decision regarding implementation of the plan.

D. If any previously unidentified human or burial remains are discovered during implementation of the undertaking, the contractor/collaborator(s) will immediately cease any demolition work and adhere to applicable state and federal laws regarding the treatment of human or burial remains.

VI. RESPONSE TO EMERGENCY

A. In the event NSF proposes an emergency undertaking as an essential and immediate response to a disaster or emergency declared by the President, or the Governor of West Virginia, or in response to another immediate threat to life or property, NSF shall notify the SHPO via telephone and email within two business days of commencing the emergency undertaking.

B. NSF shall include a summary of all emergency undertakings in the status report required in Stipulation VII.

C. This Stipulation applies only to undertakings that are implemented within 30 calendar days after the disaster or emergency has been formally declared by the appropriate authority. NSF may request an extension of the period of applicability from the ACHP prior to the expiration of the 30 calendar days.

D. Immediate rescue and salvage operations conducted to preserve life or property are exempt from the provisions of Section 106 and this PA.

VII. REPORTING

A. To keep the public and Consulting Parties apprised of the status of the implementation of the Stipulations in this PA, NSF will maintain a status report on the NSF Division of Astronomical Sciences website with relevant information, including any planned demolitions.

B. Meetings or conference calls regarding the undertaking and/or implementation of the Stipulations in this PA may be requested at any time by the Signatories for the duration of this PA.

C. If Green Bank Observatory is transferred out of NSF ownership, the terms of this Stipulation shall not apply after transfer.

VIII. DISPUTE RESOLUTION

A. Signatories

In the event one of the Signatories objects to the manner in which any term of this PA is implemented, the following dispute resolution process will be followed:

1. The objecting Signatory will notify all other Signatories to this PA, in writing, of the objection or disagreement, request written comments on the objection or disagreement within ten (10) business days following receipt of such notification, and then proceed to consult with the Signatories to resolve the objection. If at any time during consultation, NSF determines that the objection or disagreement cannot be resolved through consultation, NSF will forward all documentation relevant to the dispute to the SHPO, or if the objection is raised by the SHPO, NSF will forward all documentation relevant to the dispute to the ACHP. Within 30 calendar days after receipt of all pertinent documentation, the SHPO or, as appropriate, the ACHP, will provide NSF with comments and recommendations, which NSF will take into account in reaching a final decision

regarding the dispute. Any comment provided by the SHPO or, as appropriate, the ACHP, will be understood to pertain only to the subject of the dispute. All other actions under this PA that are not the subject of the dispute will remain unchanged.

2. Unless all Signatories agree that the dispute warrants a cessation of work, neither NSF nor its collaborator(s) will be required to cease work on the proposed undertaking while the dispute is being reviewed.

B. Continued Participation by the Public and Concurring Parties

At any time during the implementation of the Stipulations set forth in this PA, any member of the public, including any Consulting Party who has decided not to sign this PA as a Concurring Party, and any Concurring Party may continue to participate in the Section 106 consultation process as follows:

1. Any member of the public may raise an objection to NSF pertaining to the treatment of an historic property associated with implementation of the proposed undertaking, provided that title to Green Bank Observatory is retained by NSF. In the event such an objection is raised, NSF will consult with the SHPO regarding the objection, and following such consultation, will provide the objecting member of the public with a decision on the objection.

2. Any Concurring Party may raise an objection to NSF and the SHPO pertaining to the treatment of an historic property associated with implementation of the proposed undertaking. In the event such an objection is raised, NSF and the SHPO will consult regarding how to resolve the objection. If NSF and the SHPO are unable to resolve the objection, they will consult with the ACHP. NSF will consider any recommendation on the objection provided by the ACHP before making a final decision on the matter. NSF will communicate such a final decision to the objecting Concurring Party and the SHPO.

If an objection is made pursuant to either Stipulation VIII.B.1. or VIII.B.2., NSF, in consultation with the SHPO, will determine whether the objection warrants a cessation of work (if any) on the proposed undertaking while the objection is being reviewed.

C. This Stipulation shall not apply if NSF is no longer the owner of Green Bank Observatory.

IX. PROFESSIONAL QUALIFICATIONS

All work carried out pursuant to this PA will be developed and/or implemented by or under the direct supervision of a person or persons meeting or exceeding the minimum professional qualifications, appropriate to the affected resource(s), listed in the *Secretary of the Interior's Professional Qualification Standards* (36 CFR Part 61, Appendix A) and amended in 1992.

X. ELECTRONIC COPIES

NSF will provide the SHPO, ACHP, and each Consulting Party with one legible, full-color, electronic copy of the fully executed PA and its Attachments no more than 30 calendar days after execution. If the electronic copy is too large to send via email, NSF will provide each Consulting Party with a copy of the executed PA via a CD, or in any reasonable medium available.

XI. AMENDMENT

Any Signatory may request that this PA be amended by informing NSF in writing of the reason for the request and the proposed amendment language. After receiving the request, NSF will notify all

Consulting Parties of the proposed amendment and consult to reach agreement. The amendment will be effective on the date a copy signed by all the Signatories is filed by NSF with the ACHP.

XII. EXPIRATION

If NSF retains ownership of Green Bank Observatory, this PA will expire ten years from the Effective Date of this PA as defined in Stipulation XV., herein. If ownership of Green Bank Observatory is transferred to a non-federal entity, upon completion of the terms in Stipulation I.B. this PA shall expire. If ownership of Green Bank Observatory is transferred to a federal entity, this PA shall expire upon transfer. Prior to such expiration date, NSF may consult with the SHPO and ACHP to reconsider the terms of this PA and amend it in accordance with Stipulation XI. If unresolved issues remain within two years of the expiration date of this PA, NSF will, at that time, consult with the SHPO and ACHP regarding the progress of implementation of this PA and consider the appropriateness of developing a subsequent agreement or amendment to the PA.

XIII. COMPLIANCE WITH APPLICABLE LAW AND ANTI-DEFICIENCY ACT PROVISION

This PA will be carried out consistent with all applicable federal and state laws. No provision of this PA will be implemented in a manner that would violate the Anti-Deficiency Act. NSF shall make reasonable and good faith efforts to secure the necessary funds to implement this PA in its entirety. All obligations on the part of NSF will be subject to the availability and allocation of appropriated funds for such purposes. Nothing in this PA may be construed to obligate NSF to any current or future expenditure of resources in advance of the availability of appropriations. Should NSF be unable to fulfill the terms of this PA due to funding constraints or priorities, NSF will immediately notify and consult with the SHPO and ACHP to determine whether to amend or terminate this PA pending the availability of resources.

XIV. TERMINATION

If any Signatory to this PA determines that the terms of this PA will not or cannot be carried out, that Signatory will immediately consult with the other Signatories to develop an amendment to this PA pursuant to Section XI., above. If this PA is not amended following that consultation, then it may be terminated by any Signatory through written notice to the other Signatories. Within 30 calendar days following any such termination and prior to work continuing on the undertaking, NSF will notify the SHPO and ACHP whether it will initiate consultation to execute a new PA under 36 C.F.R. § 800.14(b)(1)(ii) or request and consider the comments of the ACHP under 36 C.F.R. § 800.7 and proceed accordingly.

XV. EFFECTIVE DATE

This PA will be executed in counterparts, with a separate page for each Signatory, and NSF will ensure that each Signatory is provided with a fully executed copy. This PA will become effective upon obtaining the signatures of NSF, the SHPO, and the ACHP.

Execution of this PA by NSF, the SHPO, and the ACHP evidences that NSF has taken into account the effects of this proposed undertaking on historic properties and has afforded the ACHP an opportunity to comment on the proposed undertaking.

SIGNATORY PAGE

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AMONG
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THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND
THE WEST VIRGINIA STATE HISTORIC PRESERVATION OFFICER
REGARDING
POTENTIAL CHANGES TO
GREEN BANK OBSERVATORY OPERATIONS
IN GREEN BANK, WEST VIRGINIA

Signatory:

National Science Foundation

Richard F. Green, Ph.D., Division Director
Division of Astronomical Sciences

Date 3 Aug, 2018

SIGNATORY PAGE

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POTENTIAL CHANGES TO
GREEN BANK OBSERVATORY OPERATIONS
IN GREEN BANK, WEST VIRGINIA

Signatory:

Advisory Council on Historic Preservation

for Valerie Hauser Date 8-3-18

John M. Fowler, Executive Director

SIGNATORY PAGE

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Signatory:

West Virginia Division of Culture and History's State Historic Preservation Office

Randall Reid-Smith, State Historic Preservation Officer

Date August 2, 2018

CONCURRING PARTY SIGNATURE PAGE

PROGRAMMATIC AGREEMENT
AMONG
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POTENTIAL CHANGES TO
GREEN BANK OBSERVATORY OPERATIONS
IN GREEN BANK, WEST VIRGINIA

Concurring Party:

National Park Service

Shaun Eyring Date 8.2.19

Shaun Eyring, Chief of Cultural Resources
Northeast Regional Office

CONCURRING PARTY SIGNATURE PAGE

PROGRAMMATIC AGREEMENT
AMONG
THE NATIONAL SCIENCE FOUNDATION,
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND
THE WEST VIRGINIA STATE HISTORIC PRESERVATION OFFICER
REGARDING
POTENTIAL CHANGES TO
GREEN BANK OBSERVATORY OPERATIONS
IN GREEN BANK, WEST VIRGINIA

Concurring Party:

Green Bank Observatory

K— O'N.l Date: 2018.08.02 08:21:07 -04'00'

Karen O'Neil, Ph.D., Director

Date _____

CONCURRING PARTY SIGNATURE PAGE

PROGRAMMATIC AGREEMENT
AMONG
THE NATIONAL SCIENCE FOUNDATION,
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND
THE WEST VIRGINIA STATE HISTORIC PRESERVATION OFFICER
REGARDING
POTENTIAL CHANGES TO
GREEN BANK OBSERVATORY OPERATIONS
IN GREEN BANK, WEST VIRGINIA

Concurring Party:

Dean White Date 8/2/18

Deana White

CONCURRING PARTY SIGNATURE PAGE

PROGRAMMATIC AGREEMENT
AMONG
THE NATIONAL SCIENCE FOUNDATION,
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND
THE WEST VIRGINIA STATE HISTORIC PRESERVATION OFFICER
REGARDING
POTENTIAL CHANGES TO
GREEN BANK OBSERVATORY OPERATIONS
IN GREEN BANK, WEST VIRGINIA

Concurring Party:

Ellie White Date 8/2/2018

Ellie White

CONCURRING PARTY SIGNATURE PAGE

PROGRAMMATIC AGREEMENT
AMONG
THE NATIONAL SCIENCE FOUNDATION,
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND
THE WEST VIRGINIA STATE HISTORIC PRESERVATION OFFICER
REGARDING
POTENTIAL CHANGES TO
GREEN BANK OBSERVATORY OPERATIONS
IN GREEN BANK, WEST VIRGINIA

Concurring Party:

CITIZEN SCIENTIST

W grayg Ralphsnyder Date 2018AUG01

Grayg Ralphsnyder

CONCURRING PARTY SIGNATURE PAGE

PROGRAMMATIC AGREEMENT
AMONG
THE NATIONAL SCIENCE FOUNDATION,
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND
THE WEST VIRGINIA STATE HISTORIC PRESERVATION OFFICER
REGARDING
POTENTIAL CHANGES TO
GREEN BANK OBSERVATORY OPERATIONS
IN GREEN BANK, WEST VIRGINIA

Concurring Party:

Pocahontas County Landmarks Commission

Robert Sheets Date 8/1/18

Robert Sheets

Attachment A
Evaluated Resources

Evaluated Architectural Resources at Green Bank Observatory

HPI Site Number	Resource Type	Resource Name	NRHP Status
PH-0907	Administrative/ Operational	Karl Guthe Jansky Laboratory	Eligible as a contributing resource to the GBO Historic District
PH-0908	Administrative/ Operational	Cafeteria Building and Residence	Eligible as a contributing resource to the GBO Historic District
PH-0909	Administrative/ Operational	Warehouse	Eligible as a contributing resource to the GBO Historic District
PH-0910	Other	Water Tower	Eligible as a contributing resource to the GBO Historic District
PH-0911	Administrative/ Operational	Works Area Building	Eligible as a contributing resource to the GBO Historic District
PH-0912	Administrative/ Operational	Telescope Mechanics Office (formerly Cable Storage Warehouse)	Eligible as a contributing resource to the GBO Historic District
PH-0913	Administrative/ Operational	Millimeter Array Experiment Building	Eligible as a contributing resource to the GBO Historic District
PH-0914	Administrative/ Operational	Outdoor Test Building	Eligible as a contributing resource to the GBO Historic District
PH-0915	Administrative/ Operational	Laser Lab (formerly 300' Telescope Control Building)	Eligible as a contributing resource to the GBO Historic District
PH-0916	Other	Airstrip	Eligible as a contributing resource to the GBO Historic District
PH-0917	Other	Recreation Area	Eligible as a contributing resource to the GBO Historic District
PH-0918	Other/Storage	Barn	Not eligible/non-contributing
PH-0919	Other/Storage	Barn	Not eligible/non-contributing
PH-0920	Other/Storage	Barn	Not eligible/non-contributing
PH-0921	Vacant	Slaven Hollow Orchard Cellar Building	Not eligible/non-contributing
PH-0922	Residential	Redwood House; Director's House (House 1)	Eligible as a contributing resource to the GBO Historic District

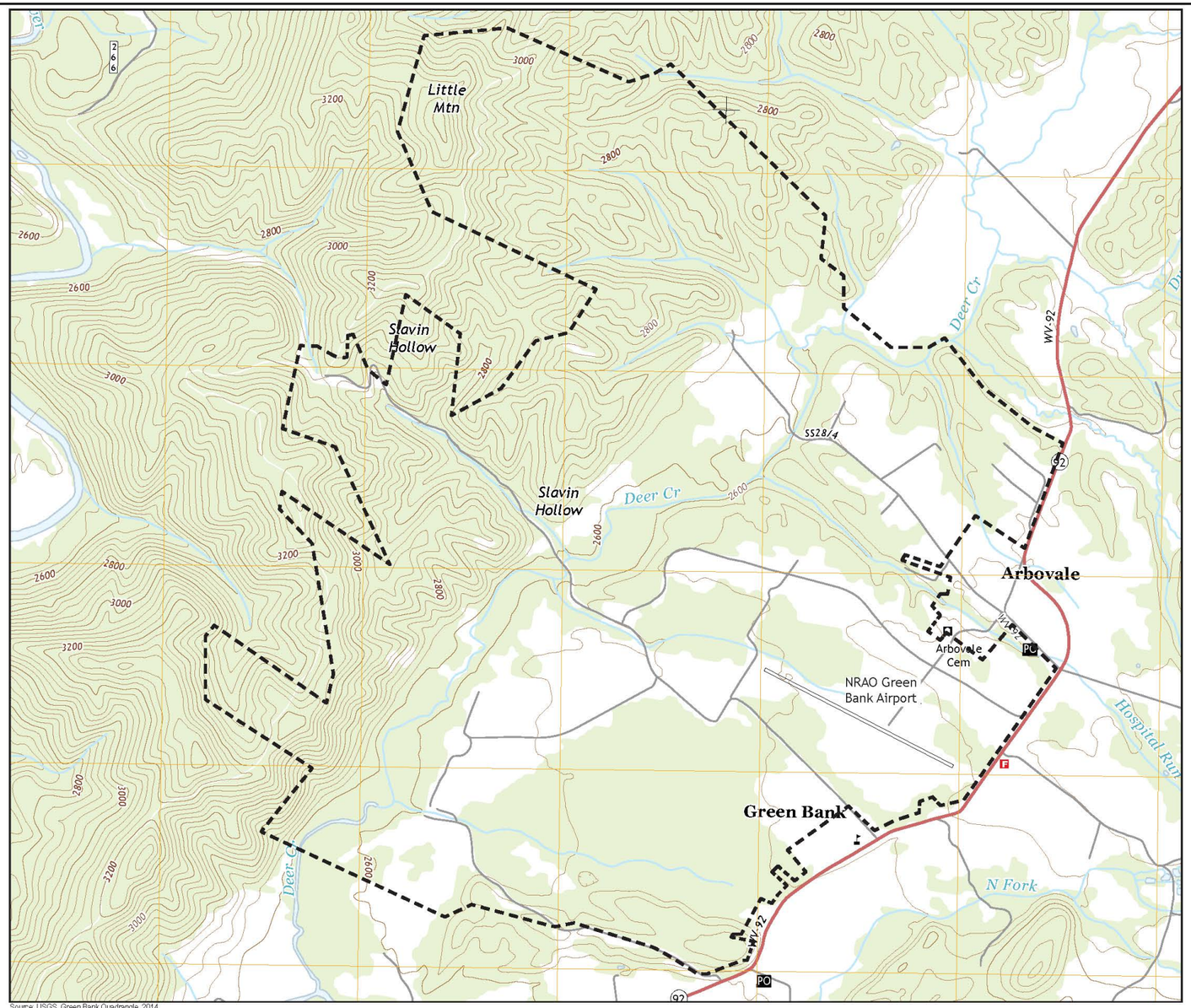
GBO = Green Bank Observatory
HPI = Historic Property Inventory
NHL = National Historic Landmark
NRHP = National Register of Historic Places

HPI Site Number	Resource Type	Resource Name	NRHP Status
PH-0923	Residential	House 2 (Rabbit Patch) - 2 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0924	Residential	House 3 (Rabbit Patch) - 3 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0925	Residential	House 4 (Rabbit Patch) - 4 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0926	Residential	House 5 (Rabbit Patch) - 5 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0927	Residential	House 6 (Rabbit Patch) - 6 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0928	Residential	House 7 (Rabbit Patch) - 7 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0929	Residential	House 8 (Rabbit Patch) - 8 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0930	Residential	House 9 (Rabbit Patch) - 9 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0931	Residential	House 10 (Rabbit Patch) - 10 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0932	Residential	House 11 (Rabbit Patch) - 11 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0933	Residential	House 14 - 14 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District
PH-0934	Residential	House 16 - 16 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District
PH-0935	Residential	House 19 - 19 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District
PH-0936	Residential	House 21 - 21 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District
PH-0937	Residential	House 23 - 23 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District

HPI Site Number	Resource Type	Resource Name	NRHP Status
PH-0938	Residential	House No. 24 - 24 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District
PH-0939	Residential	Shinnaberry House - 20 Route 28	Eligible as a contributing resource to the GBO Historic District
PH-0940	Residential	Nut Bin	Eligible as a contributing resource to the GBO Historic District
PH-0331 Updated	Residential	Riley House (15) - 15 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District
PH-0941	Residential	Hill House (17) - 17 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District
PH-0942	Residential	Tracy House (No. 18) - 18 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District
PH-0943	Vacant	Beard House	Eligible as a contributing resource to the GBO Historic District
PH-0944	Residential	Hannah House	Eligible as a contributing resource to the GBO Historic District
PH-0945	Telescope/ Instrument (no longer in active use)	Calibration Horn	Eligible as a contributing resource to the GBO Historic District
PH-0946	Telescope/ Instrument (display)	Karl Guthe Jansky Replica Antenna	Eligible as a contributing resource to the GBO Historic District
PH-0947	Telescope/ Instrument (display)	Ewen-Purcell Horn	Eligible as a contributing resource to the GBO Historic District
PH-0948	Telescope/ Instrument (no longer in active use)	Interferometer Range: Includes Howard E. Tatel (85'-1) Telescope and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer Control Building	Individually eligible under Criterion A; contributes to the GBO Historic District
PH-0949	Telescope/ Instrument	40-foot Telescope and 40-foot Telescope Control Building	Individually eligible under Criterion A; contributes to the GBO Historic District
PH-0950	Telescope/ Instrument	140-foot Telescope (43-meter Telescope)	Individually eligible under Criteria A and C; contributes to the GBO Historic District
PH-0951	Telescope/ Instrument	45-foot Telescope	Eligible as a contributing resource to the GBO Historic District

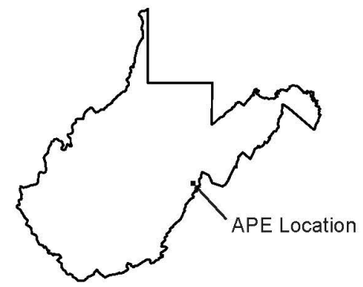
HPI Site Number	Resource Type	Resource Name	NRHP Status
PH-0952	Telescope/ Instrument	Robert C. Byrd Green Bank Telescope (GBT)	Individually eligible under Criteria A and C and Criterion Consideration G; contributes to the GBO Historic District
PH-0953	Telescope/ Instrument (display)	Reber Radio Telescope	Listed in the NRHP in 1972; named a NHL in 1986; contributes to the GBO Historic District

Attachment B
Area of Potential Effects Map



Source: USGS, Green Bank Quadrangle, 2014

ES11191410423SAC area_potential_effects_greenbank.ai 03-09-17 dash



LEGEND

Area of Potential Effects (APE)

North

0 1,700

Approximate scale in feet

FIGURE 1
Area of Potential Effects (APE)
Green Bank Observatory
Pocahontas County
Green Bank, West Virginia

ch2m:

Attachment C
References and Definitions

PA References:

Proposed Changes to Green Bank Observatory Operations: Historic Properties Assessment of Effects (CH2M HILL, 2017). https://www.nsf.gov/mps/ast/env_impact_reviews/greenbank/section106/NSF_transmittal_of_historic_assess_of_effects_report_to_SHPO.pdf

Park, Sharon C. 1993. *Preservation Brief 31: Mothballing Historic Buildings*, U.S. Department of the Interior, National Park Service. September. https://www.nps.gov/tps/how-to-preserve/briefs/31-mothballing.htm

Grimmer, Anne E. 2017. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings.* U.S. Department of the Interior, National Park Service, Technical Preservation Services, Washington, D.C. https://www.nps.gov/tps/standards/treatment-guidelines-2017.pdf

National Academies of Sciences, Engineering, and Medicine (NASEM). 2016. *New Worlds, New Horizons: A Midterm Assessment*. Washington, DC: The National Academies Press. https://doi.org/10.17226/23560

National Science Foundation (NSF) Division of Astronomical Sciences (AST). 2012. *Advancing Astronomy in the Coming Decade: Opportunities and Challenges* (Portfolio Review Committee Report). Prepared by the Portfolio Review Committee. August 14. https://www.nsf.gov/mps/ast/portfolioreview/reports/ast_portfolio_review_report.pdf

U.S. Department of the Interior, National Park Service. 2013. *Photograph Policy Factsheet*. Updated May 2013. https://www.nps.gov/Nr/publications/bulletins/photopolicy/index.htm

PA Definitions:

Adverse Effect: a change to the characteristics that qualify a historic property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (36 CFR 800.5(a)).

Area of Potential Effects (APE): the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking (36 CFR 800.16(d)). It is important to understand that the effects pertain to the effects on physical historic properties (eligible for or listed in the National Register of Historic Places [NRHP]) in a specific area.

Concurring Party: Any consulting party that has been invited by the federal agency (NSF) to concur in the PA. Concurring parties have the same rights with regard to seeking amendment or termination of the PA as other signatories. The refusal of any party invited to concur in the PA does not invalidate the document (36 CFR 800.16(d)).

Consultation: the process of seeking, discussing, and considering the views of other participants, and, where feasible, seeking agreement with them regarding matters arising in the Section 106 process (36 CFR 800.16(f)).

Consulting Party: Section 106 term that refers to organizations and/or individuals with a demonstrated interest in the undertaking 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. The participation of consulting parties is subject to approval by the federal agency (in this case, NSF). Consulting parties are actively informed of and able to participate in the Section 106 process, including consultation meetings. The views of consulting parties are actively sought by NSF during the Section 106 consultation process. (36 CFR 800.2(c)(5))

Effect: an alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the NRHP (36 CFR 800.16(i)).

Historic Property: Any resource, such as a building, structure, or historic district, included in or eligible for inclusion in the NRHP, maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the NRHP criteria (36 CFR 800.16(l)).

Signatory: Signatories include the federal agency (NSF), PR SHPO, and ACHP, and they have the sole authority to execute, amend, or terminate the PA (36 CFR 800.6(c)(1)).

Programmatic Agreement (PA): A document that records the terms and conditions agreed upon to resolve the potential adverse effects of a federal agency program or complex undertaking. For this undertaking, a PA is used to document the ways in which adverse effects are addressed because the result of the 2017 solicitation for new collaborators is undetermined and the needs of any new collaborator(s) are unknown (36 CFR 800.14(b)).

Undertaking: A project, activity, or program funded in whole or in part by a federal agency (36 CFR 800.16(y)).

Appendix 4.2B

Cultural Resources Correspondence

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

DIVISION OF ASTRONOMICAL SCIENCES

October 20, 2016

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

Subject: NEPA Analysis for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

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 Green Bank Observatory, in Green Bank, West Virginia. The Notice of Intent for this EIS was published in the Federal Register on October 19, 2016 to initiate the public scoping for the EIS.

At present, alternatives under consideration for inclusion in the EIS include the following:

- Continued NSF investment for science-focused operations (No-Action Alternative)
- Collaboration with interested parties for science-and education-focused operations with reduced NSF-funded scope
- Collaboration with interested parties for operation as a technology and education park
- Mothballing of facilities (suspension of operations in a manner such that operations could resume efficiently at some future date).
- Deconstruction and site restoration

At this time, NSF is soliciting scoping comments from your agency 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 conduct scoping meetings on Wednesday November 9, 2016 at 3:00-5:00pm and at 6:00-8:00pm at the following location:

Green Bank Science Center
155 Observatory Road
Green Bank, WV 24915
304-456-2011

Your agency may provide comments at any time during the development of the EIS. However, if you would like your comments to be considered and included in the Draft EIS that will be provided for public and agency review, please provide your comments by November 19, 2016.

NSF will be conducting consultation under Section 106 of the National Historic Preservation Act concurrent to the NEPA review and will be initiating that process in the near future.

Information about the NEPA and Section 106 processes will be posted at www.nsf.gov/ast under "AST Facilities - Environmental Reviews." If you or your representative(s) would like to be included on emails regarding notices and meetings, please provide the relevant contact information.

The NSF point of contact for the NEPA analysis is 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.

We appreciate your assistance in this matter and look forward to your response. If you require any additional information or documentation, please contact Ms. Pentecost.

Sincerely,

James S Ulvestad

James S. Ulvestad
Division Director
Division of Astronomical Sciences

Cc: Caroline Blanco, NSF/OGC
Kristin Hamilton, NSF/OGC
Elizabeth Pentecost, NSF/AST
Michelle Rau, CH2M

Enclosure:
Project Location Map

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

DIVISION OF ASTRONOMICAL SCIENCES

October 20, 2016

Ms. Susan Pierce
Director and Deputy State Historic Preservation Officer
WV State Historical Preservation Office
1900 Kanawha Boulevard E
Charleston, WV 25305

Subject: NEPA Analysis for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Ms. Pierce:

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 Green Bank Observatory, in Green Bank, West Virginia. The Notice of Intent for this EIS was published in the Federal Register on October 19, 2016 to initiate the public scoping for the EIS.

At present, alternatives under consideration for inclusion in the EIS include the following:

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- Collaboration with interested parties for operation as a technology and education park
- Mothballing of facilities (suspension of operations in a manner such that operations could resume efficiently at some future date).
- Deconstruction and site restoration

At this time, NSF is soliciting scoping comments from your agency 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.

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304-456-2011

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NSF will be conducting consultation under Section 106 of the National Historic Preservation Act concurrent to the NEPA review and will initiate consultation with your office in the near future.

Information about the NEPA and Section 106 processes will be posted at www.nsf.gov/ast under "AST Facilities - Environmental Reviews." If you or your representative(s) would like to be included on emails regarding notices and meetings, please provide the relevant contact information.

The NSF point of contact for the NEPA analysis is 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.

We appreciate your assistance in this matter and look forward to your response. If you require any additional information or documentation, please contact Ms. Pentecost.

Sincerely,

James S Ulvestad

James S. Ulvestad
Division Director
Division of Astronomical Sciences

Cc: Caroline Blanco, NSF/OGC
Kristin Hamilton, NSF/OGC
Elizabeth Pentecost, NSF/AST
Michelle Rau, CH2M

Enclosure:
Project Location Map

Subject: RE: Notice of Intent To Prepare an Environmental Impact Statement and Initiate Consultation for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia; Notice of Public Scoping Meetings and Comment Period

Date: Monday, November 7, 2016 at 12:01:52 PM Eastern Standard Time

From: Lamarre, Lora A

To: Hamilton, Kristen

Hi Kristen,

I put together a list of tribes who have historic ties to WV. I don't know that any of them will be interested in the proposed Green Bank project, especially since, as you said, archaeology isn't likely to be a huge issue. But these are tribes that my agency has invited to consultation for other, non-Section 106 issues. The list does not include the Catawba or the Osage, both of whom have indicated they are not interested in projects in Pocahontas County. Please let me know if you have any questions or if we can be of further assistance. The list is below.

Sincerely,

Lora A Lamarre-DeMott
Senior Archaeologist
WV SHPO
The Cultural Center
1900 Kanawha Blvd., East
Charleston, WV 25305-0300
304-558-0220 x711 (p)
304-558-2779 (f)

Iroquoian Tribes:
Tuscarora Nation
Tonawanda Band of Seneca
Seneca Nation of Indians
St. Regis Mohawk Tribe
Onondaga Indian Nation
Seneca-Cayuga Tribe of Oklahoma
Oneida Nation of New York
Oneida Tribe of Wisconsin
Cayuga Nation

Cherokee Tribes:
Eastern Band of Cherokee Indians
Cherokee Nation
United Keetoowah Band of Cherokee Indians

Algonquian Tribes:
Absentee Shawnee Tribe
Eastern Shawnee Tribe of Oklahoma
Shawnee Tribe
Delaware Nation
Delaware Tribe of Indians

From:	Jeffrey M. Mears
To:	"epenteco@nsf.gov"
Cc:	Patrick J. Pelky
Subject:	Notice of Intent To Prepare an Environmental Impact Statement and Initiate Consultation for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia
Date:	Wednesday, November 09, 2016 7:06:17 AM
Attachments:	image001.png image002.png

Hi Elizabeth,

The Oneida Nation, located in Wisconsin, is not interested in participating as a consulting party at this time.

I can serve as the Point of Contact for any questions. Please see my contact information listed below.

From: Pentecost, Elizabeth A. [mailto:epenteco@nsf.gov]
Sent: Monday, November 07, 2016 12:00 PM
To: Communications_Department
Subject: Notice of Intent To Prepare an Environmental Impact Statement and Initiate Consultation for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia; Notice of Public Scoping Meetings and Comment Period

To Whom It May Concern,

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 operational changes due to funding constraints for Green Bank Observatory, in Green Bank, West Virginia. On October 19, 2016, NSF announced the beginning of the scoping process to solicit public comments and identify issues to be analyzed in the EIS. At this juncture, NSF welcomes public comments on the preliminary proposed alternatives and resource areas identified for analysis. NSF also intends to initiate consultation under Section 106 of the National Historic Preservation Act to evaluate potential effects, if any, on historic properties as a result of the Proposed Action.

NSF invites the Oneida Tribe of Wisconsin to participate in this EIS process. We would appreciate a Point of Contact and email address so that we can provide the Oneida Tribe with additional information and ask if they would like participate as a Consulting Party in the EIS process.

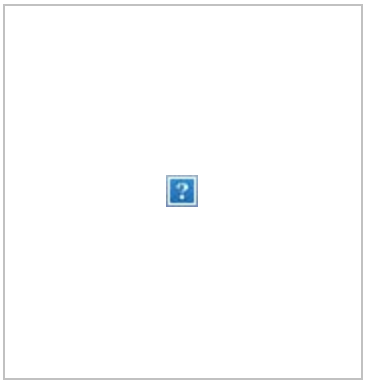
Sincerely,

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

Yaw^ko (Thank you),

Jeffrey M. Mears, MPA
Environmental Area Manager
Oneida Nation
Environmental Health & Safety Division
P.O. Box 365
Oneida, WI 54155
Office 920/869-4555
Cell 920/639-7457
jmears@oneidanation.org



NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 2, 2016

Mr. Randall Reid-Smith
State Historic Preservation Officer
West Virginia Division of Culture and History
Historic Preservation Office
1900 Kanawha Boulevard East
Charleston, West Virginia 25305

RE: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Mr. Reid-Smith:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. The decision regarding the potential changes to GBO operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act (NHPA), NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. With this letter, NSF is formally initiating Section 106 consultation under the NHPA, transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (Enclosure 1) for your review and comment, and requesting concurrence on determinations of eligibility for properties surveyed at GBO.

Project Location and Background

GBO is located on federal lands adjacent to the Monongahela National Forest. This land is owned by NSF and consists of numerous parcels that were acquired/condemned by the U.S. Army Corps of Engineers in the 1950s when GBO was formed as the first (and then, only) site of the National Radio Astronomy Observatory (NRAO). The GBO is the anchor and

Telephone (703) 292-8060 FAX (703) 292-9242

administrative site of the 13,000-square-mile National Radio Quiet Zone (NRQZ) and is situated on approximately 2,200 acres in the NRQZ, where all radio transmissions are limited. The GBO facility has a long history of science, technology, engineering, and mathematics education, ranging from student training and mentorships through the outreach and training opportunities offered through the NRAO Center for Science Education, which is based at the GBO site. More than 40,000 visitors each year pass through the Green Bank Science Center, including students, educators, and the general public who generally stay on site for more than one night to take advantage of the educational facilities. The GBO facility is host to multiple educational workshops and programs each year for middle school through post-graduate student training, and an average of 10 to 15 undergraduate and graduate students are mentored at the facility each year.

GBO facilities include the Green Bank Telescope; 43-meter telescope (also referred to as the 140-foot telescope); Green Bank Solar Radio Burst Spectrometer (45-foot telescope); Interferometer Range (includes three 85-foot diameter telescopes); 20-meter Geodetic Telescope; 40-foot telescope; three non-operational historical telescopes (Jansky Replica Antenna, Reber Radio Telescope, and Ewen-Purcell Horn); and other support facilities and infrastructure.

Project Description

NSF's Division of Astronomical Sciences (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 funding for the GBO has been established through a number of reviews and surveys conducted by the science community.

In 2014, CH2M conducted a Cultural Resources Evaluation for the architectural resources at the GBO. The results of the survey are included below under "Determinations of Eligibility." The associated technical report, entitled *Cultural*

Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia, is attached for reference (Enclosure 1).

A range of preliminary proposed Alternatives is being considered for evaluation. These preliminary proposed Alternatives, which will be refined through public input, include the following:

- Continued NSF investment for science-focused operations (No-Action Alternative).
- Collaboration with interested parties for science- and education-focused operations with reduced NSF-funded scope (Agency-Preferred Alternative).
- Collaboration with interested parties for operation as a technology and education park.
- Mothballing of facilities (suspension of operations in a manner such that operations could resume efficiently at some future date).
- Deconstruction and site restoration.

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

Proposed Area of Potential Effects

The Area of Potential Effects (APE) being proposed for the project is defined as the property boundary of GBO. The total geographic area of the Observatory was chosen as the APE to encompass all buildings and structures on the property. This inclusive APE enables a determination of whether GBO constitutes a potential historic district that could be affected by the activities associated with the proposed changes to operations at the Observatory. Figure 2-1 included in Enclosure 1 shows the boundaries of the APE. We invite your comments on this proposed APE.

Public Involvement

A Notice of Intent (NOI) was published in the Federal Register on October 19, 2016 to initiate the public scoping process for the EIS. A revised NOI was published on November 1, 2016. Two public scoping meetings were conducted on November 9, 2016, at GBO. Section 106 public outreach was addressed as part of the public meeting,

and participants were invited to identify whether they would like to participate in Section 106 as a consulting party. Concurrent to the mailing of this letter, NSF will email these potential consulting parties a description of the role of a consulting party and requesting that they confirm their interest. A separate Section 106 consulting party meeting will be scheduled following the release of the Draft EIS this spring. Follow-up discussions with consulting parties will occur as needed.

Tribal Involvement

Your office provided a list of tribes with historic ties to West Virginia (email correspondence from Ms. Lora Lamarre, November 7, 2016, see Enclosure 2). These tribes were provided email notice of the proposal during NEPA scoping, and we will be providing them with letters inviting them to participate in Section 106 consultation.

Previously Identified Historic Properties

A literature review was conducted through the West Virginia State Historic Preservation Office (SHPO) Interactive Map on November 7, 2016. The literature review focused on the APE and included a 0.5-mile study area.

The Reber Radio Telescope is the only structure or building located within GBO that is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

One residence within the APE, the Riley House (House #15), was previously recorded in 2011. The associated survey form states that the early twentieth-century wood-frame farm house does not appear to be significant under NRHP Criterion C. The literature review did not identify any prior cultural resources surveys that have occurred within the APE. Two archaeological sites and nine architectural resources have been recorded outside of the APE, along State Routes 28 and 92, directly adjacent to the eastern boundary of the Observatory. The two previously recorded archaeological resources were not evaluated for the NRHP. One of the architectural resources, the Liberty Presbyterian Church on State Route 92 that was constructed in 1851, is described as significant as an excellent example of Greek Revival architecture, although no formal NRHP evaluation is included with the survey form. The church was recorded on two West Virginia Historic Property Inventory Forms (PH-0002 and PH-0037-0018). Four architectural resources were evaluated as not eligible for the NRHP and three buildings

were recorded, but not evaluated for the NRHP. The cultural resources that have been previously recorded within or directly adjacent to the APE are listed below in Table 1. In addition, two surveys (a bridge survey and a cultural resources survey) have occurred and 34 additional cultural resources have been identified within the 0.5-mile study area.

TABLE 1. Previously Recorded Cultural Resources Within and Directly Adjacent to the APE*

Resource Name	Description	Status	Recorded by
Reber Radio Telescope	1937 telescope located at the entrance to GBO within APE	NRHP listed 1972; National Historic Landmark 1986	National Register of Historic Places Registration Form
Riley House (House #15) PH-0331	Circa 1915 farm house within APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Liberty Presbyterian Church PH-0002 PH-0037-0018	1851 Greek Revival Church adjacent to APE	Not formally evaluated for the NRHP, but described as "significant as an excellent example of Greek Revival architecture in the area"	Michael Gioulis (Historic Preservation Consultant); 1993
George Porter Kerr House – Historic Orlan Shears House PH-0037-0040	Circa 1901 residence adjacent to APE	Not evaluated for the NRHP	Sherron Waybright; 1986
Dr. J.P. Mooumau House PH-0037-0044	1873 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986

Hamed House PH-0037-0048	1910 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986
Jack Nelson House PH-0209	Circa 1900 residence adjacent to the APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
Jerry Thortnon House PH-0210	Circa 1880-1890 vernacular residence adjacent to APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
PH-0326	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0327	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0332	1949 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Shinaberry's Fifth Grade Site 46-PH-64	Prehistoric open archaeological site adjacent to APE	Not evaluated for the NRHP	Dick Reigel; 1987
Sheets Site 46-PH-27	Prehistoric campsite adjacent to APE	Not evaluated for the NRHP	Stephen Davis; 1977

* Shaded rows indicate previously recorded resources within the APE.

Determination of Eligibility

A Secretary of the Interior-qualified architectural historian with CH2M conducted an intensive architectural survey at the GBO from October 6-9, 2014. The site visit to GBO was also used to engage GBO staff in informal interviews and to conduct archival research, including the review of historic photographs and narratives, newspaper articles, construction records, and architectural drawings.

The field survey encompassed standing structures built in or before 1969, which is 47 years from the present year. The standard NRHP age threshold is 50 years; however, using 47 years as the cutoff allowed a buffer for the execution of the proposed Alternatives. All built environment resources from 1969 or earlier within the GBO boundary were surveyed and assessed, including a determination of eligibility for listing in the NRHP, except for the Reber Radio Telescope. Buildings and structures were evaluated individually as well as part of a potential historic district.

Using aerial photographs of GBO and information provided by GBO staff, 47 built environment resources that had been constructed in or before 1969 were identified as extant within the APE. These include: 5 telescope structures (one of which contains three large telescopes), 2 horn instruments, 1 antenna, 1 airstrip, 1 water tower, 1 recreation area, 24 residential buildings, and 12 operational and administrative buildings. As noted above, one of these telescopes, the Reber Radio Telescope, was previously evaluated. The remaining 46 built environment resources in the APE built in or before 1969 were photographed and evaluated for NRHP eligibility. Data collected through the background research and field investigations were analyzed to determine NRHP eligibility of the 46 surveyed built environment resources individually. In addition, the Green Bank Telescope, which was constructed after 1969, was evaluated individually due to its exceptional importance to radio astronomy over the last 50 years. All 47 historic-era properties (constructed in or before 1969, including the Reber Radio Telescope) and the GBT were also evaluated as a potential historic district. Properties surveyed in 2014 are listed in Attachment A of Enclosure 1. Figure 5-1, included in Enclosure 1, shows the location of each evaluated built environment resource.

NSF has determined that within the historical context of NRAO/GBO, there are four telescope instruments that are individually eligible for listing in the NRHP: the Interferometer Range, the 40-foot Telescope, the 43-meter Telescope, and the Green Bank Telescope. In addition, NSF has determined that GBO is eligible as a historic district for representing an important time in science history and for its significant contribution to the advancement of radio astronomy. There are 44 resources within the APE that are recommended as contributing to the proposed GBO historic district, the boundaries of which coincide with the site's property boundaries (and the APE). Contributing elements include 8 administrative/operational buildings, 1 airstrip, 1 water tower, 1 recreational area, 24 residential buildings, 2 horns, 1 antenna, and 6 telescopes (the Interferometer includes 3 large telescopes) (Table 2).

The scientific instruments within the APE are a collection of telescopes, horns, and antenna that are significant for their role in the development of radio astronomy and, in several instances, as remarkable feats of engineering. As a whole, the majority of the components that make up the potential district's historic character possess integrity, even though many of the buildings are individually undistinguished. The administrative and operations buildings and structures within the GBO are primarily utilitarian buildings or structures with simple designs executed using practical and standard materials. These elements create a cohesive, visual unit that emphasizes their historically linked function as support for the observatory. As a group, the 44 contributing built environment resources are a distinct and well-preserved representation of the early years of the NRAO, complete with scientific instruments, administration/operational facilities, recreation area, and residential buildings. Additionally, the scientific instruments present on site illustrate a linear, historical narrative of the history of radio astronomy from the Jansky Replica Antenna and Reber Radio Telescope to the monumental Green Bank Telescope. Four buildings within the APE were identified as non-contributing resources. These include three barns and one cellar building, all of which pre-date the establishment of the NRAO and have been primarily left vacant or used as miscellaneous storage facilities.

Table 2 lists the properties at the GBO that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
GBO Historic District	1958-2000	Collection of administrative/operational structures, residential buildings, and radio astronomy equipment associated with the NRAO/GBO.	Eligible (Historic District); 44 contributing resources (Attachment A in Enclosure 1)
Interferometer Range:	85'-1: 1958-1959	The Tatel Telescope (85'-1) was the first telescope	Individually eligible and contributing to

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building	85'-2: 1963-1964 85'-3: 1965-1968 Interferometer control building: 1967-1968	constructed by the NRAO and performed the world's first Search For Extra Terrestrial Intelligence (SETI) observations. The Interferometer Range connected two nearly identical telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the construction of the Very Large Array telescope in New Mexico in the 1970s.	GBO Historic District
40-foot Telescope and control building	1962	First fully automated radio telescope in the world. Currently operates as an educational telescope for visiting students.	Individually eligible and contributing to GBO Historic District
43-meter Telescope	1958-1965	Largest telescope in the world to use an equatorial (for polar aligned) mount. Currently used as part of the Russian Radioastron project.	Individually eligible and contributing to GBO Historic District

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
Robert C. Byrd Green Bank Telescope (Green Bank Telescope)	1991-2000	Largest moving structure on land in the world; tilt and point design that can rotate a full 360 degrees; performs highly sensitive data collection.	Individually eligible and contributing to GBO Historic District

Request for Concurrence

NSF requests your input on the proposed APE and concurrence with the determination that there are four telescopes at the GBO that are individually eligible for listing in the NRHP (one of which is the Interferometer which encompasses three large telescopes) and that the GBO is eligible for the NRHP as a historic district, containing 44 contributing resources.

Initiation of Section 106 Consultation

The GBO is a federally-owned property that contains historic properties. Therefore the Proposed Action has the potential to affect historic properties. In compliance with 36 Code of Federal Regulations (CFR) 800.3(c), NSF is initiating consultation with the West Virginia State Historic Preservation Officer (SHPO) on the proposed changes to GBO operations. Please respond within 30 days from receipt of this letter to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

NSF is also transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (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. Information about this proposal will be posted, throughout the NEPA and Section 106 processes, at www.nsf.gov/AST (click on "AST Facilities-Environmental Reviews," the "Green Bank Observatory.") We look forward to further consultation on this proposed undertaking.

Regards,

Caroline M. Blanco

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

Enclosures:

1. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*
2. Email from SHPO's office with list of tribes with potential interest in West Virginia projects

Nolan-Wheatley, Marynell/NYC

From: Price, Lori/TPA
Sent: Thursday, August 10, 2017 5:32 PM
To: Nolan-Wheatley, Marynell/NYC
Subject: FW: replacement report for our recent letter initiating consultation, Green Bank Observatory, NSF [EXTERNAL]
Attachments: Enclosure 1_NSF_GBO_Cultural Resources TM 050616_FOR SHPO.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Is this it?

From: Hamilton, Kristen [mailto:KRIHAMIL@nsf.gov]
Sent: Thursday, December 08, 2016 11:27 AM
To: susan.m.pierce@wv.gov
Subject: replacement report for our recent letter initiating consultation, Green Bank Observatory, NSF [EXTERNAL]

Good morning Susan,

We provided your office with a letter (mailed Friday) initiating Section 106 consultation and asking for your concurrence or input on our determinations of eligibility, including Green Bank Observatory as a historic district, along with your thoughts on the APE. We enclosed a report that provides these determinations, but it also contains our effects findings, which is jumping the gun a bit. This report was prepared for us last year as part of a feasibility study, when we asked our contractor to evaluate eligibility and describe potential Section 106 implications/findings, just so we had an idea of what would be involved in environmental and cultural reviews. However, both the alternatives described and the findings themselves are liable to change as a result of both scoping under NEPA and input from your office, consulting parties, and tribes (all of whom are being contacted this week or next) regarding historic properties identification.

So in order to not do things out of order in terms of the basic Section 106 steps and not have you review something that could ultimately change, I'm sending the version of the report that focuses on historic properties identification only for you to review. Sorry for this mix up, and if you prefer that I send this via a formal letter, I'm happy to do so. Once historic properties are properly identified, we will, of course then update our analysis as needed and consult with you on a formal finding of effect. Give me a ring if you'd like to discuss.

Thanks,
Kristen

Kristen Hamilton
Environmental Compliance Officer
Office of the General Counsel
National Science Foundation
4201 Wilson Boulevard, Suite 1265
Arlington, VA 22230
(703)292-4820
krihamil@nsf.gov

Subject: EIS for Green Bank Observatory - Identification of Consulting Parties
Date: Thursday, December 8, 2016 at 5:07:41 PM Eastern Standard Time
From: Pentecost, Elizabeth A.
To: bsimon@nrao.edu

December 8, 2016

Subject: Identification of Consulting Parties for Section106 Compliance for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Mr. Simon:

Please disregard the earlier email. There was a cut/paste error. At this time NSF has not identified a preferred alternative.

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. NSF has initiated consultation under Section 106 of the National Historic Preservation Act (NHPA).

The Reber Radio Telescope located within GBO is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

NSF will be conducting an Environmental Impact Statement (EIS) 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 science- and education-focused operations with reduced NSF-funded scope.
- Collaboration with interested parties for operation as a technology and education park.
- 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 CFR Part 800.2[5]). You indicated an interest in participating as a consulting party at the NEPA scoping meeting on November 9, 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 potential 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 January 5, 2017 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 time frame, you may request consulting party status in the future; however, the project may advance without your input and you won't have an opportunity to comment on the previous steps. If you are requesting consulting party status as part of an organization, 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 epenteco@nsf.gov.

Sincerely,

Elizabeth Pentecost
Project Management Administrator
Division of Astronomical Sciences

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

Subject: EIS for Green Bank Observatory - Identification of Consulting Parties
Date: Thursday, December 8, 2016 at 5:07:23 PM Eastern Standard Time
From: Pentecost, Elizabeth A.
To: Charles.garretson@gmail.com

December 8, 2016

Subject: Identification of Consulting Parties for Section106 Compliance for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Mr. Garretson:

Please disregard the earlier email. There was a cut/paste error. At this time NSF has not identified a preferred alternative.

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. NSF has initiated consultation under Section 106 of the National Historic Preservation Act (NHPA).

The Reber Radio Telescope located within GBO is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

NSF will be conducting an Environmental Impact Statement (EIS) 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 science- and education-focused operations with reduced NSF-funded scope.
- Collaboration with interested parties for operation as a technology and education park.
- 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 CFR Part 800.2[5]). You indicated an interest in participating as a consulting party at the NEPA scoping meeting on November 9, 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 potential 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 January 5, 2017 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 time frame, you may request consulting party status in the future; however, the project may advance without your input and you won't have an opportunity to comment on the previous steps. If you are requesting consulting party status as part of an organization, 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 epenteco@nsf.gov.

Sincerely,

Elizabeth Pentecost
Project Management Administrator
Division of Astronomical Sciences

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

Subject: EIS for Green Bank Observatory - Identification of Consulting Parties
Date: Thursday, December 8, 2016 at 5:08:20 PM Eastern Standard Time
From: Pentecost, Elizabeth A.
To: Darylwhite1@icloud.com

December 8, 2016

Subject: Identification of Consulting Parties for Section106 Compliance for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Mr. White:

Please disregard the earlier email. There was a cut/paste error. At this time NSF has not identified a preferred alternative.

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. NSF has initiated consultation under Section 106 of the National Historic Preservation Act (NHPA).

The Reber Radio Telescope located within GBO is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

NSF will be conducting an Environmental Impact Statement (EIS) 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 science- and education-focused operations with reduced NSF-funded scope.
- Collaboration with interested parties for operation as a technology and education park.
- 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 CFR Part 800.2[5]). You indicated an interest in participating as a consulting party at the NEPA scoping meeting on November 9, 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 potential 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 January 5, 2017 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 time frame, you may request consulting party status in the future; however, the project may advance without your input and you won't have an opportunity to comment on the previous steps. If you are requesting consulting party status as part of an organization, 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 epenteco@nsf.gov.

Sincerely,

Elizabeth Pentecost
Project Management Administrator
Division of Astronomical Sciences

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

Subject: EIS for Green Bank Observatory - Identification of Consulting Parties
Date: Thursday, December 8, 2016 at 5:08:47 PM Eastern Standard Time
From: Pentecost, Elizabeth A.
To: Erica@livesnowshoe.com

December 8, 2016

Subject: Identification of Consulting Parties for Section106 Compliance for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Ms. Engquist:

Please disregard the earlier email. There was a cut/paste error. At this time NSF has not identified a preferred alternative.

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. NSF has initiated consultation under Section 106 of the National Historic Preservation Act (NHPA).

The Reber Radio Telescope located within GBO is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

NSF will be conducting an Environmental Impact Statement (EIS) 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:

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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 CFR Part 800.2[5]). You indicated an interest in participating as a consulting party at the NEPA scoping meeting on November 9, 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 potential 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 January 5, 2017 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 time frame, you may request consulting party status in the future; however, the project may advance without your input and you won't have an opportunity to comment on the previous steps. If you are requesting consulting party status as part of an organization, 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 epenteco@nsf.gov.

Sincerely,

Elizabeth Pentecost
Project Management Administrator
Division of Astronomical Sciences

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

Subject: EIS for Green Bank Observatory - Identification of Consulting Parties
Date: Thursday, December 8, 2016 at 5:07:10 PM Eastern Standard Time
From: Pentecost, Elizabeth A.
To: grayg.ralphsnyder@draglobal.com

December 8, 2016

Subject: Identification of Consulting Parties for Section106 Compliance for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Mr. Ralphsnyder:

Please disregard the earlier email. There was a cut/paste error. At this time NSF has not identified a preferred alternative.

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. NSF has initiated consultation under Section 106 of the National Historic Preservation Act (NHPA).

The Reber Radio Telescope located within GBO is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

NSF will be conducting an Environmental Impact Statement (EIS) 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 science- and education-focused operations with reduced NSF-funded scope.
- Collaboration with interested parties for operation as a technology and education park.
- 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 CFR Part 800.2[5]). You indicated an interest in participating as a consulting party at the NEPA scoping meeting on November 9, 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 potential 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 January 5, 2017 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 time frame, you may request consulting party status in the future; however, the project may advance without your input and you won't have an opportunity to comment on the previous steps. If you are requesting consulting party status as part of an organization, we do ask that your organization nominate one representative and an

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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 epenteco@nsf.gov.

Sincerely,

Elizabeth Pentecost

Elizabeth Pentecost
Project Management Administrator

Subject: EIS for Green Bank Observatory - Identification of Consulting Parties
Date: Thursday, December 8, 2016 at 5:07:56 PM Eastern Standard Time
From: Pentecost, Elizabeth A.
To: Greg.Boso@wvsenate.gov

December 8, 2016

Subject: Identification of Consulting Parties for Section106 Compliance for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Senator Boso:

Please disregard the earlier email. There was a cut/paste error. At this time NSF has not identified a preferred alternative.

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. NSF has initiated consultation under Section 106 of the National Historic Preservation Act (NHPA).

The Reber Radio Telescope located within GBO is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

NSF will be conducting an Environmental Impact Statement (EIS) 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 science- and education-focused operations with reduced NSF-funded scope.
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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 CFR Part 800.2[5]). You indicated an interest in participating as a consulting party at the NEPA scoping meeting on November 9, 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.

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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 epenteco@nsf.gov.

Sincerely,

Elizabeth Pentecost
Project Management Administrator
Division of Astronomical Sciences

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

DIVISION OF ASTRONOMICAL SCIENCES

December 9, 2016

Ms. B. J. Sharp-Gudmundsson
Historic Preservation Officer
Preserving Pocahontas
1200 2nd Avenue
Marlinton, WV 24954

Subject: Identification of Consulting Parties for Section106 Compliance for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Ms. Gudmundsson:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. NSF has initiated consultation under Section 106 of the National Historic Preservation Act (NHPA).

The Reber Radio Telescope located within GBO is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

NSF will be conducting an Environmental Impact Statement (EIS) 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 science- and education-focused operations with reduced NSF-funded scope.
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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 CFR Part 800.2[5]). 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 potential 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 January 5, 2017 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 time frame, you may request consulting party status in the future; however, the project may advance without your input and you won't have an opportunity to comment on the previous steps. If Preserving Pocahontas is interested in participating, 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 epenteco@nsf.gov.

Sincerely,

Elizabeth Pentecost

Elizabeth Pentecost
Project Management Administrator

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

DIVISION OF ASTRONOMICAL SCIENCES

December 9, 2016

Mr. Wayne Gillispie
Chairman
Pocahontas County Historic Landmarks Commission
900 Tenth Avenue
Marlinton, WV 24954

Subject: Identification of Consulting Parties for Section106 Compliance for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Mr. Gillispie:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. NSF has initiated consultation under Section 106 of the National Historic Preservation Act (NHPA).

The Reber Radio Telescope located within GBO is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

NSF will be conducting an Environmental Impact Statement (EIS) 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).
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As a consulting party, you will be actively informed of and able to participate in the Section 106 process, including potential 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 January 5, 2017 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 time frame, you may request consulting party status in the future; however, the project may advance without your input and you won't have an opportunity to comment on the previous steps. If Pocahontas County Historic Landmarks Commission is interested in participating, 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 epenteco@nsf.gov.

Sincerely,

Elizabeth Pentecost

Elizabeth Pentecost
Project Management Administrator

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 12, 2016

Mr. Eric Oosahwee-voss
Tribal Historic Preservation Office
United Keetoowah Band of Cherokee Indians
PO Box 746
Tahlequah, OK 74465

RE: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Mr. Oosahwee-voss:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. The decision regarding the potential changes to GBO operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act (NHPA), NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. With this letter, NSF is formally initiating Section 106 consultation under the NHPA and transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (Enclosure 1) for your review and comment.

Project Location and Background

GBO is located on federal lands adjacent to the Monongahela National Forest. This land is owned by NSF and consists of numerous parcels that were acquired/condemned by the U.S. Army Corps of Engineers in the 1950s when GBO was formed as the first (and then, only) site of the National Radio Astronomy Observatory (NRAO). The GBO is the anchor and administrative site of the 13,000-square-mile National Radio Quiet Zone (NRQZ) and is situated on approximately 2,200 acres in the NRQZ, where all radio transmissions are limited. The GBO facility has a long history of science, technology, engineering, and mathematics education, ranging from student training and mentorships through the outreach and training opportunities offered through the NRAO Center for

Science Education, which is based at the GBO site. More than 40,000 visitors each year pass through the Green Bank Science Center, including students, educators, and the general public who generally stay on site for more than one night to take advantage of the educational facilities. The GBO facility is host to multiple educational workshops and programs each year for middle school through post-graduate student training, and an average of 10 to 15 undergraduate and graduate students are mentored at the facility each year.

GBO facilities include the Green Bank Telescope; 43-meter telescope (also referred to as the 140-foot telescope); Green Bank Solar Radio Burst Spectrometer (45-foot telescope); Interferometer Range (includes three 85-foot diameter telescopes); 20-meter Geodetic Telescope; 40-foot telescope; three non-operational historical telescopes (Jansky Replica Antenna, Reber Radio Telescope, and Ewen-Purcell Horn); and other support facilities and infrastructure.

Project Description

NSF's Division of Astronomical Sciences (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 funding for the GBO has been established through a number of reviews and surveys conducted by the science community.

In 2014, CH2M conducted a Cultural Resources Evaluation for the architectural resources at the GBO. The results of the survey are included below under "Determinations of Eligibility." The associated technical report, entitled *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*, is attached for reference (Enclosure 1).

A range of preliminary proposed Alternatives is being considered for evaluation. These preliminary proposed Alternatives, which will be refined through public input, include the following:

- Continued NSF investment for science-focused operations (No-Action Alternative).

- Collaboration with interested parties for science- and education-focused operations with reduced NSF-funded scope.

- Collaboration with interested parties for operation as a technology and education park.

- Mothballing of facilities (suspension of operations in a manner such that operations could resume efficiently at some future date).

- Deconstruction and site restoration.

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

Proposed Area of Potential Effects

The Area of Potential Effects (APE) being proposed for the project is defined as the property boundary of GBO. The total geographic area of the Observatory was chosen as the APE to encompass all buildings and structures on the property. This inclusive APE enables a determination of whether GBO constitutes a potential historic district that could be affected by the activities associated with the proposed changes to operations at the Observatory. Figure 2-1 included in Enclosure 1 shows the boundaries of the APE.

Public Involvement

A Notice of Intent (NOI) was published in the Federal Register on October 19, 2016 to initiate the public scoping process for the EIS. A revised NOI was published on November 1, 2016. Two Public Scoping Meetings were conducted on November 9, 2016, at GBO. Section 106 public outreach was addressed as part of the public meeting, and participants were invited to identify whether they would like to participate in Section 106 as a consulting party. Concurrent to the mailing of this letter, NSF will email these potential consulting parties a description of the role of a consulting party and requesting that they confirm their interest. A separate Section 106 consulting party meeting will be scheduled following the release of the Draft EIS this spring. Follow-up discussions with consulting parties will occur as needed.

Previously Identified Historic Properties

A literature review was conducted through the West Virginia State Historic Preservation Office (SHPO) Interactive Map on November 7, 2016. The literature review focused on the APE and included a 0.5-mile study area.

The Reber Radio Telescope is the only structure or building located within GBO that is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

One residence within the APE, the Riley House (House #15), was previously recorded in 2011. The associated survey form states that the early twentieth-century wood-frame farm house does not appear to be significant under NRHP Criterion C. The literature

review did not identify any prior cultural resources surveys that have occurred within the APE. Two archaeological sites and nine architectural resources have been recorded outside of the APE, along State Routes 28 and 92, directly adjacent to the eastern boundary of the Observatory. The two previously recorded archaeological resources were not evaluated for the NRHP. One of the architectural resources, the Liberty Presbyterian Church on State Route 92 that was constructed in 1851, is described as significant as an excellent example of Greek Revival architecture, although no formal NRHP evaluation is included with the survey form. The church was recorded on two West Virginia Historic Property Inventory Forms (PH-0002 and PH-0037-0018). Four architectural resources were evaluated as not eligible for the NRHP and three buildings were recorded, but not evaluated for the NRHP. The cultural resources that have been previously recorded within or directly adjacent to the APE are listed below in Table 1. In addition, two surveys (a bridge survey and a cultural resources survey) have occurred and 34 additional cultural resources have been identified within the 0.5-mile study area.

TABLE 1. Previously Recorded Cultural Resources Within and Directly Adjacent to the APE*

Resource Name	Description	Status	Recorded by
Reber Radio Telescope	1937 telescope located at the entrance to GBO within APE	NRHP listed 1972; National Historic Landmark 1986	National Register of Historic Places Registration Form
Riley House (House #15) PH-0331	Circa 1915 farm house within APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Liberty Presbyterian Church PH-0002 PH-0037-0018	1851 Greek Revival Church adjacent to APE	Not formally evaluated for the NRHP, but described as "significant as an excellent example of Greek Revival architecture in the area"	Michael Gioulis (Historic Preservation Consultant); 1993
George Porter Kerr House – Historic Orlan Shears House PH-0037-0040	Circa 1901 residence adjacent to APE	Not evaluated for the NRHP	Sherron Waybright; 1986

Dr. J.P. Moomau House PH-0037-0044	1873 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986
Hamed House PH-0037-0048	1910 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986
Jack Nelson House PH-0209	Circa 1900 residence adjacent to the APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
Jerry Thortnon House PH-0210	Circa 1880-1890 vernacular residence adjacent to APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
PH-0326	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0327	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0332	1949 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Shinaberry's Fifth Grade Site 46-PH-64	Prehistoric open archaeological site adjacent to APE	Not evaluated for the NRHP	Dick Reigel; 1987
Sheets Site 46-PH-27	Prehistoric campsite adjacent to APE	Not evaluated for the NRHP	Stephen Davis; 1977

* Shaded rows indicate previously recorded resources within the APE.

Determination of Eligibility

A Secretary of the Interior-qualified architectural historian with CH2M conducted an intensive architectural survey at the GBO from October 6-9, 2014. The site visit to GBO was also used to engage GBO staff in informal interviews and to conduct archival research, including the review of historic photographs and narratives, newspaper articles, construction records, and architectural drawings.

The field survey encompassed standing structures built in or before 1969, which is 47 years from the present year. The standard NRHP age threshold is 50 years; however, using 47 years as the cutoff allowed a buffer for the execution of the proposed Alternatives. All built environment resources from 1969 or earlier within the GBO boundary were surveyed and assessed, including a determination of eligibility for listing in the NRHP, except for the Reber Radio Telescope. Buildings and structures were evaluated individually as well as part of a potential historic district.

Using aerial photographs of GBO and information provided by GBO staff, 47 built environment resources that had been constructed in or before 1969 were identified as extant within the APE. These include: 5 telescope structures (one of which contains three large telescopes), 2 horn instruments, 1 antenna, 1 airstrip, 1 water tower, 1 recreation area, 24 residential buildings, and 12 operational and administrative buildings. As noted above, one of these telescopes, the Reber Radio Telescope, was previously evaluated. The remaining 46 built environment resources in the APE built in or before 1969 were photographed and evaluated for NRHP eligibility. Data collected through the background research and field investigations were analyzed to determine NRHP eligibility of the 46 surveyed built environment resources individually. In addition, the Green Bank Telescope, which was constructed after 1969, was evaluated individually due to its exceptional importance to radio astronomy over the last 50 years. All 47 historic-era properties (constructed in or before 1969, including the Reber Radio Telescope) and the GBT were also evaluated as a potential historic district. Properties surveyed in 2014 are listed in Attachment A of Enclosure 1. Figure 5-1, included in Enclosure 1, shows the location of each evaluated built environment resource.

NSF has determined that within the historical context of NRAO/GBO, there are four telescope instruments that are individually eligible for listing in the NRHP: the Interferometer Range, the 40-foot Telescope, the 43-meter Telescope, and the Green Bank Telescope. In addition, NSF has determined that GBO is eligible as a historic district for representing an important time in science history and for its significant contribution to the advancement of radio astronomy. There are 44 resources within the APE that are recommended as contributing to the proposed GBO historic district, the boundaries of which coincide with the site's property boundaries (and the APE). Contributing elements include 8 administrative/operational buildings, 1 airstrip, 1 water tower, 1 recreational area, 24 residential buildings, 2 horns, 1 antenna, and 6 telescopes (the Interferometer includes 3 large telescopes) (Table 2).

The scientific instruments within the APE are a collection of telescopes, horns, and antenna that are significant for their role in the development of radio astronomy and, in several instances, as remarkable feats of engineering. As a whole, the majority of the components that make up the potential district's historic character possess integrity, even though many of the buildings are individually undistinguished. The administrative and operations buildings and structures within the GBO are primarily utilitarian buildings or structures with simple designs executed using practical and standard materials. These elements create a cohesive, visual unit that emphasizes their historically linked function

as support for the observatory. As a group, the 44 contributing built environment resources are a distinct and well-preserved representation of the early years of the NRAO, complete with scientific instruments, administration/operational facilities, recreation area, and residential buildings. Additionally, the scientific instruments present on site illustrate a linear, historical narrative of the history of radio astronomy from the Jansky Replica Antenna and Reber Radio Telescope to the monumental Green Bank Telescope. Four buildings within the APE were identified as non-contributing resources. These include three barns and one cellar building, all of which pre-date the establishment of the NRAO and have been primarily left vacant or used as miscellaneous storage facilities.

Table 2 lists the properties at the GBO that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
GBO Historic District	1958-2000	Collection of administrative/operational structures, residential buildings, and radio astronomy equipment associated with the NRAO/GBO.	Eligible (Historic District); 44 contributing resources (Attachment A in Enclosure 1)
Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building	85'-1: 1958-1959 85'-2: 1963-1964 85'-3: 1965-1968 Interferometer control building: 1967-1968	The Tatel Telescope (85'-1) was the first telescope constructed by the NRAO and performed the world's first Search For Extra Terrestrial Intelligence (SETI) observations. The Interferometer Range connected two nearly identical telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the	Individually eligible and contributing to GBO Historic District

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
		construction of the Very Large Array telescope in New Mexico in the 1970s.	
40-foot Telescope and control building	1962	First fully automated radio telescope in the world. Currently operates as an educational telescope for visiting students.	Individually eligible and contributing to GBO Historic District
43-meter Telescope	1958-1965	Largest telescope in the world to use an equatorial (for polar aligned) mount. Currently used as part of the Russian Radioastron project.	Individually eligible and contributing to GBO Historic District
Robert C. Byrd Green Bank Telescope (Green Bank Telescope)	1991-2000	Largest moving structure on land in the world; tilt and point design that can rotate a full 360 degrees; performs highly sensitive data collection.	Individually eligible and contributing to GBO Historic District

Initiation of Section 106 Consultation

The GBO is a federally-owned property that contains historic properties. Therefore the Proposed Action has the potential to affect historic properties. In compliance with 36 Code of Federal Regulations (CFR) 800.2(c)(2)(ii), NSF is initiating consultation with you on the proposed changes to GBO operations. NSF is also seeking your input on any cultural resources in the project area or any cultural resources concerns you may have related to this undertaking.

We respectfully request your response within 30 days from receipt of this letter indicating your interest in participating in consultation for this undertaking. Please respond to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

NSF is also transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (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 undertaking.

Regards,

Caroline M. Blanco

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

Enclosures:
1. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 12, 2016

Chief Leo Henry
Tuscarora Nation
5616 Walmore Road
Lewiston, NY 14092

RE: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Chief Henry:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. The decision regarding the potential changes to GBO operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act (NHPA), NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. With this letter, NSF is formally initiating Section 106 consultation under the NHPA and transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (Enclosure 1) for your review and comment.

Project Location and Background

GBO is located on federal lands adjacent to the Monongahela National Forest. This land is owned by NSF and consists of numerous parcels that were acquired/condemned by the U.S. Army Corps of Engineers in the 1950s when GBO was formed as the first (and then, only) site of the National Radio Astronomy Observatory (NRAO). The GBO is the anchor and administrative site of the 13,000-square-mile National Radio Quiet Zone (NRQZ) and is situated on approximately 2,200 acres in the NRQZ, where all radio transmissions are limited. The GBO facility has a long history of science, technology, engineering, and mathematics education, ranging from student training and mentorships through the outreach and training opportunities offered through the NRAO Center for Science Education, which is based at the GBO site. More than 40,000 visitors each year

Telephone (703) 292-8060 FAX (703) 292-9242

pass through the Green Bank Science Center, including students, educators, and the general public who generally stay on site for more than one night to take advantage of the educational facilities. The GBO facility is host to multiple educational workshops and programs each year for middle school through post-graduate student training, and an average of 10 to 15 undergraduate and graduate students are mentored at the facility each year.

GBO facilities include the Green Bank Telescope; 43-meter telescope (also referred to as the 140-foot telescope); Green Bank Solar Radio Burst Spectrometer (45-foot telescope); Interferometer Range (includes three 85-foot diameter telescopes); 20-meter Geodetic Telescope; 40-foot telescope; three non-operational historical telescopes (Jansky Replica Antenna, Reber Radio Telescope, and Ewen-Purcell Horn); and other support facilities and infrastructure.

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In 2014, CH2M conducted a Cultural Resources Evaluation for the architectural resources at the GBO. The results of the survey are included below under "Determinations of Eligibility." The associated technical report, entitled *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*, is attached for reference (Enclosure 1).

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

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The Area of Potential Effects (APE) being proposed for the project is defined as the property boundary of GBO. The total geographic area of the Observatory was chosen as the APE to encompass all buildings and structures on the property. This inclusive APE enables a determination of whether GBO constitutes a potential historic district that could be affected by the activities associated with the proposed changes to operations at the Observatory. Figure 2-1 included in Enclosure 1 shows the boundaries of the APE.

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One residence within the APE, the Riley House (House #15), was previously recorded in 2011. The associated survey form states that the early twentieth-century wood-frame farm house does not appear to be significant under NRHP Criterion C. The literature review did not identify any prior cultural resources surveys that have occurred within the APE. Two archaeological sites and nine architectural resources have been recorded

outside of the APE, along State Routes 28 and 92, directly adjacent to the eastern boundary of the Observatory. The two previously recorded archaeological resources were not evaluated for the NRHP. One of the architectural resources, the Liberty Presbyterian Church on State Route 92 that was constructed in 1851, is described as significant as an excellent example of Greek Revival architecture, although no formal NRHP evaluation is included with the survey form. The church was recorded on two West Virginia Historic Property Inventory Forms (PH-0002 and PH-0037-0018). Four architectural resources were evaluated as not eligible for the NRHP and three buildings were recorded, but not evaluated for the NRHP. The cultural resources that have been previously recorded within or directly adjacent to the APE are listed below in Table 1. In addition, two surveys (a bridge survey and a cultural resources survey) have occurred and 34 additional cultural resources have been identified within the 0.5-mile study area.

TABLE 1. Previously Recorded Cultural Resources Within and Directly Adjacent to the APE*

Resource Name	Description	Status	Recorded by
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Dr. J.P. Moomau House PH-0037-0044	1873 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986
Hamed House PH-0037-0048	1910 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986
Jack Nelson House PH-0209	Circa 1900 residence adjacent to the APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
Jerry Thortnon House PH-0210	Circa 1880-1890 vernacular residence adjacent to APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
PH-0326	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0327	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0332	1949 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Shinaberry's Fifth Grade Site 46-PH-64	Prehistoric open archaeological site adjacent to APE	Not evaluated for the NRHP	Dick Reigel; 1987
Sheets Site 46-PH-27	Prehistoric campsite adjacent to APE	Not evaluated for the NRHP	Stephen Davis; 1977

* Shaded rows indicate previously recorded resources within the APE.

Determination of Eligibility

A Secretary of the Interior-qualified architectural historian with CH2M conducted an intensive architectural survey at the GBO from October 6-9, 2014. The site visit to GBO was also used to engage GBO staff in informal interviews and to conduct archival research, including the review of historic photographs and narratives, newspaper articles, construction records, and architectural drawings.

The field survey encompassed standing structures built in or before 1969, which is 47 years from the present year. The standard NRHP age threshold is 50 years; however, using 47 years as the cutoff allowed a buffer for the execution of the proposed Alternatives. All built environment resources from 1969 or earlier within the GBO boundary were surveyed and assessed, including a determination of eligibility for listing in the NRHP, except for the Reber Radio Telescope. Buildings and structures were evaluated individually as well as part of a potential historic district.

Using aerial photographs of GBO and information provided by GBO staff, 47 built environment resources that had been constructed in or before 1969 were identified as extant within the APE. These include: 5 telescope structures (one of which contains three large telescopes), 2 horn instruments, 1 antenna, 1 airstrip, 1 water tower, 1 recreation area, 24 residential buildings, and 12 operational and administrative buildings. As noted above, one of these telescopes, the Reber Radio Telescope, was previously evaluated. The remaining 46 built environment resources in the APE built in or before 1969 were photographed and evaluated for NRHP eligibility. Data collected through the background research and field investigations were analyzed to determine NRHP eligibility of the 46 surveyed built environment resources individually. In addition, the Green Bank Telescope, which was constructed after 1969, was evaluated individually due to its exceptional importance to radio astronomy over the last 50 years. All 47 historic-era properties (constructed in or before 1969, including the Reber Radio Telescope) and the GBT were also evaluated as a potential historic district. Properties surveyed in 2014 are listed in Attachment A of Enclosure 1. Figure 5-1, included in Enclosure 1, shows the location of each evaluated built environment resource.

NSF has determined that within the historical context of NRAO/GBO, there are four telescope instruments that are individually eligible for listing in the NRHP: the Interferometer Range, the 40-foot Telescope, the 43-meter Telescope, and the Green Bank Telescope. In addition, NSF has determined that GBO is eligible as a historic district for representing an important time in science history and for its significant contribution to the advancement of radio astronomy. There are 44 resources within the APE that are recommended as contributing to the proposed GBO historic district, the boundaries of which coincide with the site's property boundaries (and the APE). Contributing elements include 8 administrative/operational buildings, 1 airstrip, 1 water tower, 1 recreational area, 24 residential buildings, 2 horns, 1 antenna, and 6 telescopes (the Interferometer includes 3 large telescopes) (Table 2).

The scientific instruments within the APE are a collection of telescopes, horns, and antenna that are significant for their role in the development of radio astronomy and, in several instances, as remarkable feats of engineering. As a whole, the majority of the components that make up the potential district's historic character possess integrity, even though many of the buildings are individually undistinguished. The administrative and operations buildings and structures within the GBO are primarily utilitarian buildings or structures with simple designs executed using practical and standard materials. These elements create a cohesive, visual unit that emphasizes their historically linked function

as support for the observatory. As a group, the 44 contributing built environment resources are a distinct and well-preserved representation of the early years of the NRAO, complete with scientific instruments, administration/operational facilities, recreation area, and residential buildings. Additionally, the scientific instruments present on site illustrate a linear, historical narrative of the history of radio astronomy from the Jansky Replica Antenna and Reber Radio Telescope to the monumental Green Bank Telescope. Four buildings within the APE were identified as non-contributing resources. These include three barns and one cellar building, all of which pre-date the establishment of the NRAO and have been primarily left vacant or used as miscellaneous storage facilities.

Table 2 lists the properties at the GBO that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
GBO Historic District	1958-2000	Collection of administrative/operational structures, residential buildings, and radio astronomy equipment associated with the NRAO/GBO.	Eligible (Historic District); 44 contributing resources (Attachment A in Enclosure 1)
Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building	85'-1: 1958-1959 85'-2: 1963-1964 85'-3: 1965-1968 Interferometer control building: 1967-1968	The Tatel Telescope (85'-1) was the first telescope constructed by the NRAO and performed the world's first Search For Extra Terrestrial Intelligence (SETI) observations. The Interferometer Range connected two nearly identical telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the	Individually eligible and contributing to GBO Historic District

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		construction of the Very Large Array telescope in New Mexico in the 1970s.	
40-foot Telescope and control building	1962	First fully automated radio telescope in the world. Currently operates as an educational telescope for visiting students.	Individually eligible and contributing to GBO Historic District
43-meter Telescope	1958-1965	Largest telescope in the world to use an equatorial (for polar aligned) mount. Currently used as part of the Russian Radioastron project.	Individually eligible and contributing to GBO Historic District
Robert C. Byrd Green Bank Telescope (Green Bank Telescope)	1991-2000	Largest moving structure on land in the world; tilt and point design that can rotate a full 360 degrees; performs highly sensitive data collection.	Individually eligible and contributing to GBO Historic District

Initiation of Section 106 Consultation

The GBO is a federally-owned property that contains historic properties. Therefore the Proposed Action has the potential to affect historic properties. In compliance with 36 Code of Federal Regulations (CFR) 800.2(c)(2)(ii), NSF is initiating consultation with you on the proposed changes to GBO operations. NSF is also seeking your input on any cultural resources in the project area or any cultural resources concerns you may have related to this undertaking.

We respectfully request your response within 30 days from receipt of this letter indicating your interest in participating in consultation for this undertaking. Please respond to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

NSF is also transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (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 undertaking.

Regards,

Caroline M. Blanco

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

Enclosures:
1. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 12, 2016

Ms. Rosanna Sheppard
Director
Environmental & Natural Resources Dept.
Shawnee Tribe
PO Box 189, 29 S Hwy 69A
Miami, OK 74355

RE: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Ms. Sheppard:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. The decision regarding the potential changes to GBO operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act (NHPA), NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. With this letter, NSF is formally initiating Section 106 consultation under the NHPA and transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (Enclosure 1) for your review and comment.

Project Location and Background

GBO is located on federal lands adjacent to the Monongahela National Forest. This land is owned by NSF and consists of numerous parcels that were acquired/condemned by the U.S. Army Corps of Engineers in the 1950s when GBO was formed as the first (and then, only) site of the National Radio Astronomy Observatory (NRAO). The GBO is the anchor and administrative site of the 13,000-square-mile National Radio Quiet Zone (NRQZ) and is situated on approximately 2,200 acres in the NRQZ, where all radio transmissions are limited. The GBO facility has a long history of science, technology, engineering, and mathematics education, ranging from student training and mentorships

through the outreach and training opportunities offered through the NRAO Center for Science Education, which is based at the GBO site. More than 40,000 visitors each year pass through the Green Bank Science Center, including students, educators, and the general public who generally stay on site for more than one night to take advantage of the educational facilities. The GBO facility is host to multiple educational workshops and programs each year for middle school through post-graduate student training, and an average of 10 to 15 undergraduate and graduate students are mentored at the facility each year.

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We respectfully request your response within 30 days from receipt of this letter indicating your interest in participating in consultation for this undertaking. Please respond to:

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Regards,

Caroline M. Blanco

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

Enclosures:
1. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 12, 2016

Mr. Micco Emarthla
Tribal Historic Preservation Officer
Seneca-Cayuga Tribe of Oklahoma
23701 S. 655 Road
Grove, OK 74344

RE: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Mr. Emarthla:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. The decision regarding the potential changes to GBO operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act (NHPA), NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. With this letter, NSF is formally initiating Section 106 consultation under the NHPA and transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (Enclosure 1) for your review and comment.

Project Location and Background

GBO is located on federal lands adjacent to the Monongahela National Forest. This land is owned by NSF and consists of numerous parcels that were acquired/condemned by the U.S. Army Corps of Engineers in the 1950s when GBO was formed as the first (and then, only) site of the National Radio Astronomy Observatory (NRAO). The GBO is the anchor and administrative site of the 13,000-square-mile National Radio Quiet Zone (NRQZ) and is situated on approximately 2,200 acres in the NRQZ, where all radio transmissions are limited. The GBO facility has a long history of science, technology, engineering, and mathematics education, ranging from student training and mentorships through the outreach and training opportunities offered through the NRAO Center for

Science Education, which is based at the GBO site. More than 40,000 visitors each year pass through the Green Bank Science Center, including students, educators, and the general public who generally stay on site for more than one night to take advantage of the educational facilities. The GBO facility is host to multiple educational workshops and programs each year for middle school through post-graduate student training, and an average of 10 to 15 undergraduate and graduate students are mentored at the facility each year.

GBO facilities include the Green Bank Telescope; 43-meter telescope (also referred to as the 140-foot telescope); Green Bank Solar Radio Burst Spectrometer (45-foot telescope); Interferometer Range (includes three 85-foot diameter telescopes); 20-meter Geodetic Telescope; 40-foot telescope; three non-operational historical telescopes (Jansky Replica Antenna, Reber Radio Telescope, and Ewen-Purcell Horn); and other support facilities and infrastructure.

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In 2014, CH2M conducted a Cultural Resources Evaluation for the architectural resources at the GBO. The results of the survey are included below under "Determinations of Eligibility." The associated technical report, entitled *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*, is attached for reference (Enclosure 1).

A range of preliminary proposed Alternatives is being considered for evaluation. These preliminary proposed Alternatives, which will be refined through public input, include the following:

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The Area of Potential Effects (APE) being proposed for the project is defined as the property boundary of GBO. The total geographic area of the Observatory was chosen as the APE to encompass all buildings and structures on the property. This inclusive APE enables a determination of whether GBO constitutes a potential historic district that could be affected by the activities associated with the proposed changes to operations at the Observatory. Figure 2-1 included in Enclosure 1 shows the boundaries of the APE.

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review did not identify any prior cultural resources surveys that have occurred within the APE. Two archaeological sites and nine architectural resources have been recorded outside of the APE, along State Routes 28 and 92, directly adjacent to the eastern boundary of the Observatory. The two previously recorded archaeological resources were not evaluated for the NRHP. One of the architectural resources, the Liberty Presbyterian Church on State Route 92 that was constructed in 1851, is described as significant as an excellent example of Greek Revival architecture, although no formal NRHP evaluation is included with the survey form. The church was recorded on two West Virginia Historic Property Inventory Forms (PH-0002 and PH-0037-0018). Four architectural resources were evaluated as not eligible for the NRHP and three buildings were recorded, but not evaluated for the NRHP. The cultural resources that have been previously recorded within or directly adjacent to the APE are listed below in Table 1. In addition, two surveys (a bridge survey and a cultural resources survey) have occurred and 34 additional cultural resources have been identified within the 0.5-mile study area.

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Resource Name	Description	Status	Recorded by
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PH-0327	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0332	1949 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Shinaberry's Fifth Grade Site 46-PH-64	Prehistoric open archaeological site adjacent to APE	Not evaluated for the NRHP	Dick Reigel; 1987
Sheets Site 46-PH-27	Prehistoric campsite adjacent to APE	Not evaluated for the NRHP	Stephen Davis; 1977

* Shaded rows indicate previously recorded resources within the APE.

Determination of Eligibility

A Secretary of the Interior-qualified architectural historian with CH2M conducted an intensive architectural survey at the GBO from October 6-9, 2014. The site visit to GBO was also used to engage GBO staff in informal interviews and to conduct archival research, including the review of historic photographs and narratives, newspaper articles, construction records, and architectural drawings.

The field survey encompassed standing structures built in or before 1969, which is 47 years from the present year. The standard NRHP age threshold is 50 years; however, using 47 years as the cutoff allowed a buffer for the execution of the proposed Alternatives. All built environment resources from 1969 or earlier within the GBO boundary were surveyed and assessed, including a determination of eligibility for listing in the NRHP, except for the Reber Radio Telescope. Buildings and structures were evaluated individually as well as part of a potential historic district.

Using aerial photographs of GBO and information provided by GBO staff, 47 built environment resources that had been constructed in or before 1969 were identified as extant within the APE. These include: 5 telescope structures (one of which contains three large telescopes), 2 horn instruments, 1 antenna, 1 airstrip, 1 water tower, 1 recreation area, 24 residential buildings, and 12 operational and administrative buildings. As noted above, one of these telescopes, the Reber Radio Telescope, was previously evaluated. The remaining 46 built environment resources in the APE built in or before 1969 were photographed and evaluated for NRHP eligibility. Data collected through the background research and field investigations were analyzed to determine NRHP eligibility of the 46 surveyed built environment resources individually. In addition, the Green Bank Telescope, which was constructed after 1969, was evaluated individually due to its exceptional importance to radio astronomy over the last 50 years. All 47 historic-era properties (constructed in or before 1969, including the Reber Radio Telescope) and the GBT were also evaluated as a potential historic district. Properties surveyed in 2014 are listed in Attachment A of Enclosure 1. Figure 5-1, included in Enclosure 1, shows the location of each evaluated built environment resource.

NSF has determined that within the historical context of NRAO/GBO, there are four telescope instruments that are individually eligible for listing in the NRHP: the Interferometer Range, the 40-foot Telescope, the 43-meter Telescope, and the Green Bank Telescope. In addition, NSF has determined that GBO is eligible as a historic district for representing an important time in science history and for its significant contribution to the advancement of radio astronomy. There are 44 resources within the APE that are recommended as contributing to the proposed GBO historic district, the boundaries of which coincide with the site's property boundaries (and the APE). Contributing elements include 8 administrative/operational buildings, 1 airstrip, 1 water tower, 1 recreational area, 24 residential buildings, 2 horns, 1 antenna, and 6 telescopes (the Interferometer includes 3 large telescopes) (Table 2).

The scientific instruments within the APE are a collection of telescopes, horns, and antenna that are significant for their role in the development of radio astronomy and, in several instances, as remarkable feats of engineering. As a whole, the majority of the components that make up the potential district's historic character possess integrity, even though many of the buildings are individually undistinguished. The administrative and operations buildings and structures within the GBO are primarily utilitarian buildings or structures with simple designs executed using practical and standard materials. These elements create a cohesive, visual unit that emphasizes their historically linked function

as support for the observatory. As a group, the 44 contributing built environment resources are a distinct and well-preserved representation of the early years of the NRAO, complete with scientific instruments, administration/operational facilities, recreation area, and residential buildings. Additionally, the scientific instruments present on site illustrate a linear, historical narrative of the history of radio astronomy from the Jansky Replica Antenna and Reber Radio Telescope to the monumental Green Bank Telescope. Four buildings within the APE were identified as non-contributing resources. These include three barns and one cellar building, all of which pre-date the establishment of the NRAO and have been primarily left vacant or used as miscellaneous storage facilities.

Table 2 lists the properties at the GBO that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
GBO Historic District	1958-2000	Collection of administrative/operational structures, residential buildings, and radio astronomy equipment associated with the NRAO/GBO.	Eligible (Historic District); 44 contributing resources (Attachment A in Enclosure 1)
Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building	85'-1: 1958-1959 85'-2: 1963-1964 85'-3: 1965-1968 Interferometer control building: 1967-1968	The Tatel Telescope (85'-1) was the first telescope constructed by the NRAO and performed the world's first Search For Extra Terrestrial Intelligence (SETI) observations. The Interferometer Range connected two nearly identical telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the	Individually eligible and contributing to GBO Historic District

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The GBO is a federally-owned property that contains historic properties. Therefore the Proposed Action has the potential to affect historic properties. In compliance with 36 Code of Federal Regulations (CFR) 800.2(c)(2)(ii), NSF is initiating consultation with you on the proposed changes to GBO operations. NSF is also seeking your input on any cultural resources in the project area or any cultural resources concerns you may have related to this undertaking.

We respectfully request your response within 30 days from receipt of this letter indicating your interest in participating in consultation for this undertaking. Please respond to:

Ms. Elizabeth Pentecost
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Division of Astronomical Sciences
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epenteco@nsf.gov

NSF is also transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (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 undertaking.

Regards,

Caroline M. Blanco

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Federal Preservation Officer
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Enclosures:
1. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 12, 2016

Mr. Jay Todd
Tribal Historic Preservation Officer
Seneca Nation of Indians
90 Ohiyo Way
Salamanca, NY 14779

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Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 12, 2016

Ms. Christine Abrams
Tonawanda Band of Seneca
7027 Meadville Road
Basom, NY 14013

RE: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Ms. Abrams:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. The decision regarding the potential changes to GBO operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act (NHPA), NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. With this letter, NSF is formally initiating Section 106 consultation under the NHPA and transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (Enclosure 1) for your review and comment.

Project Location and Background

GBO is located on federal lands adjacent to the Monongahela National Forest. This land is owned by NSF and consists of numerous parcels that were acquired/condemned by the U.S. Army Corps of Engineers in the 1950s when GBO was formed as the first (and then, only) site of the National Radio Astronomy Observatory (NRAO). The GBO is the anchor and administrative site of the 13,000-square-mile National Radio Quiet Zone (NRQZ) and is situated on approximately 2,200 acres in the NRQZ, where all radio transmissions are limited. The GBO facility has a long history of science, technology, engineering, and mathematics education, ranging from student training and mentorships through the outreach and training opportunities offered through the NRAO Center for Science Education, which is based at the GBO site. More than 40,000 visitors each year

pass through the Green Bank Science Center, including students, educators, and the general public who generally stay on site for more than one night to take advantage of the educational facilities. The GBO facility is host to multiple educational workshops and programs each year for middle school through post-graduate student training, and an average of 10 to 15 undergraduate and graduate students are mentored at the facility each year.

GBO facilities include the Green Bank Telescope; 43-meter telescope (also referred to as the 140-foot telescope); Green Bank Solar Radio Burst Spectrometer (45-foot telescope); Interferometer Range (includes three 85-foot diameter telescopes); 20-meter Geodetic Telescope; 40-foot telescope; three non-operational historical telescopes (Jansky Replica Antenna, Reber Radio Telescope, and Ewen-Purcell Horn); and other support facilities and infrastructure.

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NSF's Division of Astronomical Sciences (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 funding for the GBO has been established through a number of reviews and surveys conducted by the science community.

In 2014, CH2M conducted a Cultural Resources Evaluation for the architectural resources at the GBO. The results of the survey are included below under "Determinations of Eligibility." The associated technical report, entitled *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*, is attached for reference (Enclosure 1).

A range of preliminary proposed Alternatives is being considered for evaluation. These preliminary proposed Alternatives, which will be refined through public input, include the following:

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- Collaboration with interested parties for science- and education-focused operations with reduced NSF-funded scope.
- Collaboration with interested parties for operation as a technology and education park.

- Mothballing of facilities (suspension of operations in a manner such that operations could resume efficiently at some future date).

- Deconstruction and site restoration.

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

Proposed Area of Potential Effects

The Area of Potential Effects (APE) being proposed for the project is defined as the property boundary of GBO. The total geographic area of the Observatory was chosen as the APE to encompass all buildings and structures on the property. This inclusive APE enables a determination of whether GBO constitutes a potential historic district that could be affected by the activities associated with the proposed changes to operations at the Observatory. Figure 2-1 included in Enclosure 1 shows the boundaries of the APE.

Public Involvement

A Notice of Intent (NOI) was published in the Federal Register on October 19, 2016 to initiate the public scoping process for the EIS. A revised NOI was published on November 1, 2016. Two Public Scoping Meetings were conducted on November 9, 2016, at GBO. Section 106 public outreach was addressed as part of the public meeting, and participants were invited to identify whether they would like to participate in Section 106 as a consulting party. Concurrent to the mailing of this letter, NSF will email these potential consulting parties a description of the role of a consulting party and requesting that they confirm their interest. A separate Section 106 consulting party meeting will be scheduled following the release of the Draft EIS this spring. Follow-up discussions with consulting parties will occur as needed.

Previously Identified Historic Properties

A literature review was conducted through the West Virginia State Historic Preservation Office (SHPO) Interactive Map on November 7, 2016. The literature review focused on the APE and included a 0.5-mile study area.

The Reber Radio Telescope is the only structure or building located within GBO that is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

One residence within the APE, the Riley House (House #15), was previously recorded in 2011. The associated survey form states that the early twentieth-century wood-frame farm house does not appear to be significant under NRHP Criterion C. The literature review did not identify any prior cultural resources surveys that have occurred within the APE. Two archaeological sites and nine architectural resources have been recorded

outside of the APE, along State Routes 28 and 92, directly adjacent to the eastern boundary of the Observatory. The two previously recorded archaeological resources were not evaluated for the NRHP. One of the architectural resources, the Liberty Presbyterian Church on State Route 92 that was constructed in 1851, is described as significant as an excellent example of Greek Revival architecture, although no formal NRHP evaluation is included with the survey form. The church was recorded on two West Virginia Historic Property Inventory Forms (PH-0002 and PH-0037-0018). Four architectural resources were evaluated as not eligible for the NRHP and three buildings were recorded, but not evaluated for the NRHP. The cultural resources that have been previously recorded within or directly adjacent to the APE are listed below in Table 1. In addition, two surveys (a bridge survey and a cultural resources survey) have occurred and 34 additional cultural resources have been identified within the 0.5-mile study area.

TABLE 1. Previously Recorded Cultural Resources Within and Directly Adjacent to the APE*

Resource Name	Description	Status	Recorded by
Reber Radio Telescope	1937 telescope located at the entrance to GBO within APE	NRHP listed 1972; National Historic Landmark 1986	National Register of Historic Places Registration Form
Riley House (House #15) PH-0331	Circa 1915 farm house within APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Liberty Presbyterian Church PH-0002 PH-0037-0018	1851 Greek Revival Church adjacent to APE	Not formally evaluated for the NRHP, but described as "significant as an excellent example of Greek Revival architecture in the area"	Michael Gioulis (Historic Preservation Consultant); 1993
George Porter Kerr House – Historic Orlan Shears House PH-0037-0040	Circa 1901 residence adjacent to APE	Not evaluated for the NRHP	Sherron Waybright; 1986

Dr. J.P. Mooumau House PH-0037-0044	1873 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986
Hamed House PH-0037-0048	1910 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986
Jack Nelson House PH-0209	Circa 1900 residence adjacent to the APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
Jerry Thortnon House PH-0210	Circa 1880-1890 vernacular residence adjacent to APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
PH-0326	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0327	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0332	1949 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Shinaberry's Fifth Grade Site 46-PH-64	Prehistoric open archaeological site adjacent to APE	Not evaluated for the NRHP	Dick Reigel; 1987
Sheets Site 46-PH-27	Prehistoric campsite adjacent to APE	Not evaluated for the NRHP	Stephen Davis; 1977

* Shaded rows indicate previously recorded resources within the APE.

Determination of Eligibility

A Secretary of the Interior-qualified architectural historian with CH2M conducted an intensive architectural survey at the GBO from October 6-9, 2014. The site visit to GBO was also used to engage GBO staff in informal interviews and to conduct archival research, including the review of historic photographs and narratives, newspaper articles, construction records, and architectural drawings.

The field survey encompassed standing structures built in or before 1969, which is 47 years from the present year. The standard NRHP age threshold is 50 years; however, using 47 years as the cutoff allowed a buffer for the execution of the proposed Alternatives. All built environment resources from 1969 or earlier within the GBO boundary were surveyed and assessed, including a determination of eligibility for listing in the NRHP, except for the Reber Radio Telescope. Buildings and structures were evaluated individually as well as part of a potential historic district.

Using aerial photographs of GBO and information provided by GBO staff, 47 built environment resources that had been constructed in or before 1969 were identified as extant within the APE. These include: 5 telescope structures (one of which contains three large telescopes), 2 horn instruments, 1 antenna, 1 airstrip, 1 water tower, 1 recreation area, 24 residential buildings, and 12 operational and administrative buildings. As noted above, one of these telescopes, the Reber Radio Telescope, was previously evaluated. The remaining 46 built environment resources in the APE built in or before 1969 were photographed and evaluated for NRHP eligibility. Data collected through the background research and field investigations were analyzed to determine NRHP eligibility of the 46 surveyed built environment resources individually. In addition, the Green Bank Telescope, which was constructed after 1969, was evaluated individually due to its exceptional importance to radio astronomy over the last 50 years. All 47 historic-era properties (constructed in or before 1969, including the Reber Radio Telescope) and the GBT were also evaluated as a potential historic district. Properties surveyed in 2014 are listed in Attachment A of Enclosure 1. Figure 5-1, included in Enclosure 1, shows the location of each evaluated built environment resource.

NSF has determined that within the historical context of NRAO/GBO, there are four telescope instruments that are individually eligible for listing in the NRHP: the Interferometer Range, the 40-foot Telescope, the 43-meter Telescope, and the Green Bank Telescope. In addition, NSF has determined that GBO is eligible as a historic district for representing an important time in science history and for its significant contribution to the advancement of radio astronomy. There are 44 resources within the APE that are recommended as contributing to the proposed GBO historic district, the boundaries of which coincide with the site's property boundaries (and the APE). Contributing elements include 8 administrative/operational buildings, 1 airstrip, 1 water tower, 1 recreational area, 24 residential buildings, 2 horns, 1 antenna, and 6 telescopes (the Interferometer includes 3 large telescopes) (Table 2).

The scientific instruments within the APE are a collection of telescopes, horns, and antenna that are significant for their role in the development of radio astronomy and, in several instances, as remarkable feats of engineering. As a whole, the majority of the components that make up the potential district's historic character possess integrity, even though many of the buildings are individually undistinguished. The administrative and operations buildings and structures within the GBO are primarily utilitarian buildings or structures with simple designs executed using practical and standard materials. These elements create a cohesive, visual unit that emphasizes their historically linked function

as support for the observatory. As a group, the 44 contributing built environment resources are a distinct and well-preserved representation of the early years of the NRAO, complete with scientific instruments, administration/operational facilities, recreation area, and residential buildings. Additionally, the scientific instruments present on site illustrate a linear, historical narrative of the history of radio astronomy from the Jansky Replica Antenna and Reber Radio Telescope to the monumental Green Bank Telescope. Four buildings within the APE were identified as non-contributing resources. These include three barns and one cellar building, all of which pre-date the establishment of the NRAO and have been primarily left vacant or used as miscellaneous storage facilities.

Table 2 lists the properties at the GBO that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
GBO Historic District	1958-2000	Collection of administrative/operational structures, residential buildings, and radio astronomy equipment associated with the NRAO/GBO.	Eligible (Historic District); 44 contributing resources (Attachment A in Enclosure 1)
Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building	85'-1: 1958-1959 85'-2: 1963-1964 85'-3: 1965-1968 Interferometer control building: 1967-1968	The Tatel Telescope (85'-1) was the first telescope constructed by the NRAO and performed the world's first Search For Extra Terrestrial Intelligence (SETI) observations. The Interferometer Range connected two nearly identical telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the	Individually eligible and contributing to GBO Historic District

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43-meter Telescope	1958-1965	Largest telescope in the world to use an equatorial (for polar aligned) mount. Currently used as part of the Russian Radioastron project.	Individually eligible and contributing to GBO Historic District
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Initiation of Section 106 Consultation

The GBO is a federally-owned property that contains historic properties. Therefore the Proposed Action has the potential to affect historic properties. In compliance with 36 Code of Federal Regulations (CFR) 800.2(c)(2)(ii), NSF is initiating consultation with you on the proposed changes to GBO operations. NSF is also seeking your input on any cultural resources in the project area or any cultural resources concerns you may have related to this undertaking.

We respectfully request your response within 30 days from receipt of this letter indicating your interest in participating in consultation for this undertaking. Please respond to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

NSF is also transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (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 undertaking.

Regards,

Caroline M. Blanco

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

Enclosures:
1. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 12, 2016

Mr. Arnold Printup
Tribal Historic Preservation Officer
St. Regis Mohawk Tribe
412 State Route 37
Akwesasne, NY 13655

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Table 2 lists the properties at the GBO that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

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Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building	85'-1: 1958-1959 85'-2: 1963-1964 85'-3: 1965-1968 Interferometer control building: 1967-1968	The Tatel Telescope (85'-1) was the first telescope constructed by the NRAO and performed the world's first Search For Extra Terrestrial Intelligence (SETI) observations. The Interferometer Range connected two nearly identical telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the	Individually eligible and contributing to GBO Historic District

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Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel

Enclosures:
1. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 12, 2016

Mr. Eric Oosahwee-voss
Tribal Historic Preservation Office
United Keetoowah Band of Cherokee Indians
PO Box 746
Tahlequah, OK 74465

RE: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Mr. Oosahwee-voss:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. The decision regarding the potential changes to GBO operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act (NHPA), NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. With this letter, NSF is formally initiating Section 106 consultation under the NHPA and transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (Enclosure 1) for your review and comment.

Project Location and Background

GBO is located on federal lands adjacent to the Monongahela National Forest. This land is owned by NSF and consists of numerous parcels that were acquired/condemned by the U.S. Army Corps of Engineers in the 1950s when GBO was formed as the first (and then, only) site of the National Radio Astronomy Observatory (NRAO). The GBO is the anchor and administrative site of the 13,000-square-mile National Radio Quiet Zone (NRQZ) and is situated on approximately 2,200 acres in the NRQZ, where all radio transmissions are limited. The GBO facility has a long history of science, technology, engineering, and mathematics education, ranging from student training and mentorships through the outreach and training opportunities offered through the NRAO Center for

Science Education, which is based at the GBO site. More than 40,000 visitors each year pass through the Green Bank Science Center, including students, educators, and the general public who generally stay on site for more than one night to take advantage of the educational facilities. The GBO facility is host to multiple educational workshops and programs each year for middle school through post-graduate student training, and an average of 10 to 15 undergraduate and graduate students are mentored at the facility each year.

GBO facilities include the Green Bank Telescope; 43-meter telescope (also referred to as the 140-foot telescope); Green Bank Solar Radio Burst Spectrometer (45-foot telescope); Interferometer Range (includes three 85-foot diameter telescopes); 20-meter Geodetic Telescope; 40-foot telescope; three non-operational historical telescopes (Jansky Replica Antenna, Reber Radio Telescope, and Ewen-Purcell Horn); and other support facilities and infrastructure.

Project Description

NSF's Division of Astronomical Sciences (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 funding for the GBO has been established through a number of reviews and surveys conducted by the science community.

In 2014, CH2M conducted a Cultural Resources Evaluation for the architectural resources at the GBO. The results of the survey are included below under "Determinations of Eligibility." The associated technical report, entitled *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*, is attached for reference (Enclosure 1).

A range of preliminary proposed Alternatives is being considered for evaluation. These preliminary proposed Alternatives, which will be refined through public input, include the following:

- Continued NSF investment for science-focused operations (No-Action Alternative).

- Collaboration with interested parties for science- and education-focused operations with reduced NSF-funded scope.

- Collaboration with interested parties for operation as a technology and education park.

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- Deconstruction and site restoration.

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

Proposed Area of Potential Effects

The Area of Potential Effects (APE) being proposed for the project is defined as the property boundary of GBO. The total geographic area of the Observatory was chosen as the APE to encompass all buildings and structures on the property. This inclusive APE enables a determination of whether GBO constitutes a potential historic district that could be affected by the activities associated with the proposed changes to operations at the Observatory. Figure 2-1 included in Enclosure 1 shows the boundaries of the APE.

Public Involvement

A Notice of Intent (NOI) was published in the Federal Register on October 19, 2016 to initiate the public scoping process for the EIS. A revised NOI was published on November 1, 2016. Two Public Scoping Meetings were conducted on November 9, 2016, at GBO. Section 106 public outreach was addressed as part of the public meeting, and participants were invited to identify whether they would like to participate in Section 106 as a consulting party. Concurrent to the mailing of this letter, NSF will email these potential consulting parties a description of the role of a consulting party and requesting that they confirm their interest. A separate Section 106 consulting party meeting will be scheduled following the release of the Draft EIS this spring. Follow-up discussions with consulting parties will occur as needed.

Previously Identified Historic Properties

A literature review was conducted through the West Virginia State Historic Preservation Office (SHPO) Interactive Map on November 7, 2016. The literature review focused on the APE and included a 0.5-mile study area.

The Reber Radio Telescope is the only structure or building located within GBO that is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

One residence within the APE, the Riley House (House #15), was previously recorded in 2011. The associated survey form states that the early twentieth-century wood-frame farm house does not appear to be significant under NRHP Criterion C. The literature

review did not identify any prior cultural resources surveys that have occurred within the APE. Two archaeological sites and nine architectural resources have been recorded outside of the APE, along State Routes 28 and 92, directly adjacent to the eastern boundary of the Observatory. The two previously recorded archaeological resources were not evaluated for the NRHP. One of the architectural resources, the Liberty Presbyterian Church on State Route 92 that was constructed in 1851, is described as significant as an excellent example of Greek Revival architecture, although no formal NRHP evaluation is included with the survey form. The church was recorded on two West Virginia Historic Property Inventory Forms (PH-0002 and PH-0037-0018). Four architectural resources were evaluated as not eligible for the NRHP and three buildings were recorded, but not evaluated for the NRHP. The cultural resources that have been previously recorded within or directly adjacent to the APE are listed below in Table 1. In addition, two surveys (a bridge survey and a cultural resources survey) have occurred and 34 additional cultural resources have been identified within the 0.5-mile study area.

TABLE 1. Previously Recorded Cultural Resources Within and Directly Adjacent to the APE*

Resource Name	Description	Status	Recorded by
Reber Radio Telescope	1937 telescope located at the entrance to GBO within APE	NRHP listed 1972; National Historic Landmark 1986	National Register of Historic Places Registration Form
Riley House (House #15) PH-0331	Circa 1915 farm house within APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Liberty Presbyterian Church PH-0002 PH-0037-0018	1851 Greek Revival Church adjacent to APE	Not formally evaluated for the NRHP, but described as "significant as an excellent example of Greek Revival architecture in the area"	Michael Gioulis (Historic Preservation Consultant); 1993
George Porter Kerr House – Historic Orlan Shears House PH-0037-0040	Circa 1901 residence adjacent to APE	Not evaluated for the NRHP	Sherron Waybright; 1986

Dr. J.P. Moomau House PH-0037-0044	1873 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986
Hamed House PH-0037-0048	1910 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986
Jack Nelson House PH-0209	Circa 1900 residence adjacent to the APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
Jerry Thortnon House PH-0210	Circa 1880-1890 vernacular residence adjacent to APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
PH-0326	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0327	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0332	1949 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Shinaberry's Fifth Grade Site 46-PH-64	Prehistoric open archaeological site adjacent to APE	Not evaluated for the NRHP	Dick Reigel; 1987
Sheets Site 46-PH-27	Prehistoric campsite adjacent to APE	Not evaluated for the NRHP	Stephen Davis; 1977

* Shaded rows indicate previously recorded resources within the APE.

Determination of Eligibility

A Secretary of the Interior-qualified architectural historian with CH2M conducted an intensive architectural survey at the GBO from October 6-9, 2014. The site visit to GBO was also used to engage GBO staff in informal interviews and to conduct archival research, including the review of historic photographs and narratives, newspaper articles, construction records, and architectural drawings.

The field survey encompassed standing structures built in or before 1969, which is 47 years from the present year. The standard NRHP age threshold is 50 years; however, using 47 years as the cutoff allowed a buffer for the execution of the proposed Alternatives. All built environment resources from 1969 or earlier within the GBO boundary were surveyed and assessed, including a determination of eligibility for listing in the NRHP, except for the Reber Radio Telescope. Buildings and structures were evaluated individually as well as part of a potential historic district.

Using aerial photographs of GBO and information provided by GBO staff, 47 built environment resources that had been constructed in or before 1969 were identified as extant within the APE. These include: 5 telescope structures (one of which contains three large telescopes), 2 horn instruments, 1 antenna, 1 airstrip, 1 water tower, 1 recreation area, 24 residential buildings, and 12 operational and administrative buildings. As noted above, one of these telescopes, the Reber Radio Telescope, was previously evaluated. The remaining 46 built environment resources in the APE built in or before 1969 were photographed and evaluated for NRHP eligibility. Data collected through the background research and field investigations were analyzed to determine NRHP eligibility of the 46 surveyed built environment resources individually. In addition, the Green Bank Telescope, which was constructed after 1969, was evaluated individually due to its exceptional importance to radio astronomy over the last 50 years. All 47 historic-era properties (constructed in or before 1969, including the Reber Radio Telescope) and the GBT were also evaluated as a potential historic district. Properties surveyed in 2014 are listed in Attachment A of Enclosure 1. Figure 5-1, included in Enclosure 1, shows the location of each evaluated built environment resource.

NSF has determined that within the historical context of NRAO/GBO, there are four telescope instruments that are individually eligible for listing in the NRHP: the Interferometer Range, the 40-foot Telescope, the 43-meter Telescope, and the Green Bank Telescope. In addition, NSF has determined that GBO is eligible as a historic district for representing an important time in science history and for its significant contribution to the advancement of radio astronomy. There are 44 resources within the APE that are recommended as contributing to the proposed GBO historic district, the boundaries of which coincide with the site's property boundaries (and the APE). Contributing elements include 8 administrative/operational buildings, 1 airstrip, 1 water tower, 1 recreational area, 24 residential buildings, 2 horns, 1 antenna, and 6 telescopes (the Interferometer includes 3 large telescopes) (Table 2).

The scientific instruments within the APE are a collection of telescopes, horns, and antenna that are significant for their role in the development of radio astronomy and, in several instances, as remarkable feats of engineering. As a whole, the majority of the components that make up the potential district's historic character possess integrity, even though many of the buildings are individually undistinguished. The administrative and operations buildings and structures within the GBO are primarily utilitarian buildings or structures with simple designs executed using practical and standard materials. These elements create a cohesive, visual unit that emphasizes their historically linked function

as support for the observatory. As a group, the 44 contributing built environment resources are a distinct and well-preserved representation of the early years of the NRAO, complete with scientific instruments, administration/operational facilities, recreation area, and residential buildings. Additionally, the scientific instruments present on site illustrate a linear, historical narrative of the history of radio astronomy from the Jansky Replica Antenna and Reber Radio Telescope to the monumental Green Bank Telescope. Four buildings within the APE were identified as non-contributing resources. These include three barns and one cellar building, all of which pre-date the establishment of the NRAO and have been primarily left vacant or used as miscellaneous storage facilities.

Table 2 lists the properties at the GBO that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
GBO Historic District	1958-2000	Collection of administrative/operational structures, residential buildings, and radio astronomy equipment associated with the NRAO/GBO.	Eligible (Historic District); 44 contributing resources (Attachment A in Enclosure 1)
Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building	85'-1: 1958-1959 85'-2: 1963-1964 85'-3: 1965-1968 Interferometer control building: 1967-1968	The Tatel Telescope (85'-1) was the first telescope constructed by the NRAO and performed the world's first Search For Extra Terrestrial Intelligence (SETI) observations. The Interferometer Range connected two nearly identical telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the	Individually eligible and contributing to GBO Historic District

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		construction of the Very Large Array telescope in New Mexico in the 1970s.	
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43-meter Telescope	1958-1965	Largest telescope in the world to use an equatorial (for polar aligned) mount. Currently used as part of the Russian Radioastron project.	Individually eligible and contributing to GBO Historic District
Robert C. Byrd Green Bank Telescope (Green Bank Telescope)	1991-2000	Largest moving structure on land in the world; tilt and point design that can rotate a full 360 degrees; performs highly sensitive data collection.	Individually eligible and contributing to GBO Historic District

Initiation of Section 106 Consultation

The GBO is a federally-owned property that contains historic properties. Therefore the Proposed Action has the potential to affect historic properties. In compliance with 36 Code of Federal Regulations (CFR) 800.2(c)(2)(ii), NSF is initiating consultation with you on the proposed changes to GBO operations. NSF is also seeking your input on any cultural resources in the project area or any cultural resources concerns you may have related to this undertaking.

We respectfully request your response within 30 days from receipt of this letter indicating your interest in participating in consultation for this undertaking. Please respond to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

NSF is also transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (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 undertaking.

Regards,

Caroline M. Blanco

Caroline M. Blanco
Federal Preservation Officer
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OFFICE OF THE
GENERAL COUNSEL

December 12, 2016

Chief Leo Henry
Tuscarora Nation
5616 Walmore Road
Lewiston, NY 14092

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Telephone (703) 292-8060 FAX (703) 292-9242

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Table 2 lists the properties at the GBO that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
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Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building	85'-1: 1958-1959 85'-2: 1963-1964 85'-3: 1965-1968 Interferometer control building: 1967-1968	The Tatel Telescope (85'-1) was the first telescope constructed by the NRAO and performed the world's first Search For Extra Terrestrial Intelligence (SETI) observations. The Interferometer Range connected two nearly identical telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the	Individually eligible and contributing to GBO Historic District

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43-meter Telescope	1958-1965	Largest telescope in the world to use an equatorial (for polar aligned) mount. Currently used as part of the Russian Radioastron project.	Individually eligible and contributing to GBO Historic District
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Arlington, Virginia 22230
epenteco@nsf.gov

NSF is also transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (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 undertaking.

Regards,

Caroline M. Blanco

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

Enclosures:
1. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 12, 2016

Ms. Robin Dushane
Tribal Historic Preservation Officer
Eastern Shawnee Tribe of Oklahoma
12755 S. 705 Road
Wyandotte, OK 74370

RE: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Ms. Dushane:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. The decision regarding the potential changes to GBO operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act (NHPA), NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. With this letter, NSF is formally initiating Section 106 consultation under the NHPA and transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (Enclosure 1) for your review and comment.

Project Location and Background

GBO is located on federal lands adjacent to the Monongahela National Forest. This land is owned by NSF and consists of numerous parcels that were acquired/condemned by the U.S. Army Corps of Engineers in the 1950s when GBO was formed as the first (and then, only) site of the National Radio Astronomy Observatory (NRAO). The GBO is the anchor and administrative site of the 13,000-square-mile National Radio Quiet Zone (NRQZ) and is situated on approximately 2,200 acres in the NRQZ, where all radio transmissions are limited. The GBO facility has a long history of science, technology, engineering, and mathematics education, ranging from student training and mentorships through the outreach and training opportunities offered through the NRAO Center for

Science Education, which is based at the GBO site. More than 40,000 visitors each year pass through the Green Bank Science Center, including students, educators, and the general public who generally stay on site for more than one night to take advantage of the educational facilities. The GBO facility is host to multiple educational workshops and programs each year for middle school through post-graduate student training, and an average of 10 to 15 undergraduate and graduate students are mentored at the facility each year.

GBO facilities include the Green Bank Telescope; 43-meter telescope (also referred to as the 140-foot telescope); Green Bank Solar Radio Burst Spectrometer (45-foot telescope); Interferometer Range (includes three 85-foot diameter telescopes); 20-meter Geodetic Telescope; 40-foot telescope; three non-operational historical telescopes (Jansky Replica Antenna, Reber Radio Telescope, and Ewen-Purcell Horn); and other support facilities and infrastructure.

Project Description

NSF's Division of Astronomical Sciences (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 funding for the GBO has been established through a number of reviews and surveys conducted by the science community.

In 2014, CH2M conducted a Cultural Resources Evaluation for the architectural resources at the GBO. The results of the survey are included below under "Determinations of Eligibility." The associated technical report, entitled *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*, is attached for reference (Enclosure 1).

A range of preliminary proposed Alternatives is being considered for evaluation. These preliminary proposed Alternatives, which will be refined through public input, include the following:

- Continued NSF investment for science-focused operations (No-Action Alternative).

- Collaboration with interested parties for science- and education-focused operations with reduced NSF-funded scope.

- Collaboration with interested parties for operation as a technology and education park.

- Mothballing of facilities (suspension of operations in a manner such that operations could resume efficiently at some future date).

- Deconstruction and site restoration.

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

Proposed Area of Potential Effects

The Area of Potential Effects (APE) being proposed for the project is defined as the property boundary of GBO. The total geographic area of the Observatory was chosen as the APE to encompass all buildings and structures on the property. This inclusive APE enables a determination of whether GBO constitutes a potential historic district that could be affected by the activities associated with the proposed changes to operations at the Observatory. Figure 2-1 included in Enclosure 1 shows the boundaries of the APE.

Public Involvement

A Notice of Intent (NOI) was published in the Federal Register on October 19, 2016 to initiate the public scoping process for the EIS. A revised NOI was published on November 1, 2016. Two Public Scoping Meetings were conducted on November 9, 2016, at GBO. Section 106 public outreach was addressed as part of the public meeting, and participants were invited to identify whether they would like to participate in Section 106 as a consulting party. Concurrent to the mailing of this letter, NSF will email these potential consulting parties a description of the role of a consulting party and requesting that they confirm their interest. A separate Section 106 consulting party meeting will be scheduled following the release of the Draft EIS this spring. Follow-up discussions with consulting parties will occur as needed.

Previously Identified Historic Properties

A literature review was conducted through the West Virginia State Historic Preservation Office (SHPO) Interactive Map on November 7, 2016. The literature review focused on the APE and included a 0.5-mile study area.

The Reber Radio Telescope is the only structure or building located within GBO that is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

One residence within the APE, the Riley House (House #15), was previously recorded in 2011. The associated survey form states that the early twentieth-century wood-frame farm house does not appear to be significant under NRHP Criterion C. The literature

review did not identify any prior cultural resources surveys that have occurred within the APE. Two archaeological sites and nine architectural resources have been recorded outside of the APE, along State Routes 28 and 92, directly adjacent to the eastern boundary of the Observatory. The two previously recorded archaeological resources were not evaluated for the NRHP. One of the architectural resources, the Liberty Presbyterian Church on State Route 92 that was constructed in 1851, is described as significant as an excellent example of Greek Revival architecture, although no formal NRHP evaluation is included with the survey form. The church was recorded on two West Virginia Historic Property Inventory Forms (PH-0002 and PH-0037-0018). Four architectural resources were evaluated as not eligible for the NRHP and three buildings were recorded, but not evaluated for the NRHP. The cultural resources that have been previously recorded within or directly adjacent to the APE are listed below in Table 1. In addition, two surveys (a bridge survey and a cultural resources survey) have occurred and 34 additional cultural resources have been identified within the 0.5-mile study area.

TABLE 1. Previously Recorded Cultural Resources Within and Directly Adjacent to the APE*

Resource Name	Description	Status	Recorded by
Reber Radio Telescope	1937 telescope located at the entrance to GBO within APE	NRHP listed 1972; National Historic Landmark 1986	National Register of Historic Places Registration Form
Riley House (House #15) PH-0331	Circa 1915 farm house within APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Liberty Presbyterian Church PH-0002 PH-0037-0018	1851 Greek Revival Church adjacent to APE	Not formally evaluated for the NRHP, but described as "significant as an excellent example of Greek Revival architecture in the area"	Michael Gioulis (Historic Preservation Consultant); 1993
George Porter Kerr House – Historic Orlan Shears House PH-0037-0040	Circa 1901 residence adjacent to APE	Not evaluated for the NRHP	Sherron Waybright; 1986
Dr. J.P. Mooumau House	1873 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986

PH-0037-0044			
Hamed House PH-0037-0048	1910 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986
Jack Nelson House PH-0209	Circa 1900 residence adjacent to the APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
Jerry Thortnon House PH-0210	Circa 1880-1890 vernacular residence adjacent to APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
PH-0326	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0327	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0332	1949 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Shinaberry's Fifth Grade Site 46-PH-64	Prehistoric open archaeological site adjacent to APE	Not evaluated for the NRHP	Dick Reigel; 1987
Sheets Site 46-PH-27	Prehistoric campsite adjacent to APE	Not evaluated for the NRHP	Stephen Davis; 1977

* Shaded rows indicate previously recorded resources within the APE.

Determination of Eligibility

A Secretary of the Interior-qualified architectural historian with CH2M conducted an intensive architectural survey at the GBO from October 6-9, 2014. The site visit to GBO was also used to engage GBO staff in informal interviews and to conduct archival research, including the review of historic photographs and narratives, newspaper articles, construction records, and architectural drawings.

The field survey encompassed standing structures built in or before 1969, which is 47 years from the present year. The standard NRHP age threshold is 50 years; however,

using 47 years as the cutoff allowed a buffer for the execution of the proposed Alternatives. All built environment resources from 1969 or earlier within the GBO boundary were surveyed and assessed, including a determination of eligibility for listing in the NRHP, except for the Reber Radio Telescope. Buildings and structures were evaluated individually as well as part of a potential historic district.

Using aerial photographs of GBO and information provided by GBO staff, 47 built environment resources that had been constructed in or before 1969 were identified as extant within the APE. These include: 5 telescope structures (one of which contains three large telescopes), 2 horn instruments, 1 antenna, 1 airstrip, 1 water tower, 1 recreation area, 24 residential buildings, and 12 operational and administrative buildings. As noted above, one of these telescopes, the Reber Radio Telescope, was previously evaluated. The remaining 46 built environment resources in the APE built in or before 1969 were photographed and evaluated for NRHP eligibility. Data collected through the background research and field investigations were analyzed to determine NRHP eligibility of the 46 surveyed built environment resources individually. In addition, the Green Bank Telescope, which was constructed after 1969, was evaluated individually due to its exceptional importance to radio astronomy over the last 50 years. All 47 historic-era properties (constructed in or before 1969, including the Reber Radio Telescope) and the GBT were also evaluated as a potential historic district. Properties surveyed in 2014 are listed in Attachment A of Enclosure 1. Figure 5-1, included in Enclosure 1, shows the location of each evaluated built environment resource.

NSF has determined that within the historical context of NRAO/GBO, there are four telescope instruments that are individually eligible for listing in the NRHP: the Interferometer Range, the 40-foot Telescope, the 43-meter Telescope, and the Green Bank Telescope. In addition, NSF has determined that GBO is eligible as a historic district for representing an important time in science history and for its significant contribution to the advancement of radio astronomy. There are 44 resources within the APE that are recommended as contributing to the proposed GBO historic district, the boundaries of which coincide with the site's property boundaries (and the APE). Contributing elements include 8 administrative/operational buildings, 1 airstrip, 1 water tower, 1 recreational area, 24 residential buildings, 2 horns, 1 antenna, and 6 telescopes (the Interferometer includes 3 large telescopes) (Table 2).

The scientific instruments within the APE are a collection of telescopes, horns, and antenna that are significant for their role in the development of radio astronomy and, in several instances, as remarkable feats of engineering. As a whole, the majority of the components that make up the potential district's historic character possess integrity, even though many of the buildings are individually undistinguished. The administrative and operations buildings and structures within the GBO are primarily utilitarian buildings or structures with simple designs executed using practical and standard materials. These elements create a cohesive, visual unit that emphasizes their historically linked function as support for the observatory. As a group, the 44 contributing built environment resources are a distinct and well-preserved representation of the early years of the NRAO,

complete with scientific instruments, administration/operational facilities, recreation area, and residential buildings. Additionally, the scientific instruments present on site illustrate a linear, historical narrative of the history of radio astronomy from the Jansky Replica Antenna and Reber Radio Telescope to the monumental Green Bank Telescope. Four buildings within the APE were identified as non-contributing resources. These include three barns and one cellar building, all of which pre-date the establishment of the NRAO and have been primarily left vacant or used as miscellaneous storage facilities.

Table 2 lists the properties at the GBO that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
GBO Historic District	1958-2000	Collection of administrative/operational structures, residential buildings, and radio astronomy equipment associated with the NRAO/GBO.	Eligible (Historic District); 44 contributing resources (Attachment A in Enclosure 1)
Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building	85'-1: 1958-1959 85'-2: 1963-1964 85'-3: 1965-1968 Interferometer control building: 1967-1968	The Tatel Telescope (85'-1) was the first telescope constructed by the NRAO and performed the world's first Search For Extra Terrestrial Intelligence (SETI) observations. The Interferometer Range connected two nearly identical telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the construction of the Very Large Array telescope in New	Individually eligible and contributing to GBO Historic District

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
		Mexico in the 1970s.	
40-foot Telescope and control building	1962	First fully automated radio telescope in the world. Currently operates as an educational telescope for visiting students.	Individually eligible and contributing to GBO Historic District
43-meter Telescope	1958-1965	Largest telescope in the world to use an equatorial (for polar aligned) mount. Currently used as part of the Russian Radioastron project.	Individually eligible and contributing to GBO Historic District
Robert C. Byrd Green Bank Telescope (Green Bank Telescope)	1991-2000	Largest moving structure on land in the world; tilt and point design that can rotate a full 360 degrees; performs highly sensitive data collection.	Individually eligible and contributing to GBO Historic District

Initiation of Section 106 Consultation

The GBO is a federally-owned property that contains historic properties. Therefore the Proposed Action has the potential to affect historic properties. In compliance with 36 Code of Federal Regulations (CFR) 800.2(c)(2)(ii), NSF is initiating consultation with you on the proposed changes to GBO operations. NSF is also seeking your input on any cultural resources in the project area or any cultural resources concerns you may have related to this undertaking.

We respectfully request your response within 30 days from receipt of this letter indicating your interest in participating in consultation for this undertaking. Please respond to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

NSF is also transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (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 undertaking.

Regards,

(Caroline) M. Blanco

Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
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Enclosures:
1. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 12, 2016

Ms. Anita Mathis
Director, Cultural Resources Dept.
Delaware Tribe of Indians
5100 Tuxedo Boulevard
Bartlesville, OK 74006

RE: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Ms. Mathis:

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Table 2 lists the properties at the GBO that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
GBO Historic District	1958-2000	Collection of administrative/operational structures, residential buildings, and radio astronomy equipment associated with the NRAO/GBO.	Eligible (Historic District); 44 contributing resources (Attachment A in Enclosure 1)
Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building	85'-1: 1958-1959 85'-2: 1963-1964 85'-3: 1965-1968 Interferometer control building: 1967-1968	The Tatel Telescope (85'-1) was the first telescope constructed by the NRAO and performed the world's first Search For Extra Terrestrial Intelligence (SETI) observations. The Interferometer Range connected two nearly identical telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the construction of the Very Large Array telescope in New	Individually eligible and contributing to GBO Historic District

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
		Mexico in the 1970s.	
40-foot Telescope and control building	1962	First fully automated radio telescope in the world. Currently operates as an educational telescope for visiting students.	Individually eligible and contributing to GBO Historic District
43-meter Telescope	1958-1965	Largest telescope in the world to use an equatorial (for polar aligned) mount. Currently used as part of the Russian Radioastron project.	Individually eligible and contributing to GBO Historic District
Robert C. Byrd Green Bank Telescope (Green Bank Telescope)	1991-2000	Largest moving structure on land in the world; tilt and point design that can rotate a full 360 degrees; performs highly sensitive data collection.	Individually eligible and contributing to GBO Historic District

Initiation of Section 106 Consultation

The GBO is a federally-owned property that contains historic properties. Therefore the Proposed Action has the potential to affect historic properties. In compliance with 36 Code of Federal Regulations (CFR) 800.2(c)(2)(ii), NSF is initiating consultation with you on the proposed changes to GBO operations. NSF is also seeking your input on any cultural resources in the project area or any cultural resources concerns you may have related to this undertaking.

We respectfully request your response within 30 days from receipt of this letter indicating your interest in participating in consultation for this undertaking. Please respond to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

NSF is also transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (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 undertaking.

Regards,

Caroline M. Blanco

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

Enclosures:
1. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 12, 2016

Ms. Jenne Schenandoah
Onondaga Nation
4040 Route 11
Nedrow, NY 13120

RE: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Ms. Schenandoah:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. The decision regarding the potential changes to GBO operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act (NHPA), NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. With this letter, NSF is formally initiating Section 106 consultation under the NHPA and transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (Enclosure 1) for your review and comment.

Project Location and Background

GBO is located on federal lands adjacent to the Monongahela National Forest. This land is owned by NSF and consists of numerous parcels that were acquired/condemned by the U.S. Army Corps of Engineers in the 1950s when GBO was formed as the first (and then, only) site of the National Radio Astronomy Observatory (NRAO). The GBO is the anchor and administrative site of the 13,000-square-mile National Radio Quiet Zone (NRQZ) and is situated on approximately 2,200 acres in the NRQZ, where all radio transmissions are limited. The GBO facility has a long history of science, technology, engineering, and mathematics education, ranging from student training and mentorships through the outreach and training opportunities offered through the NRAO Center for Science Education, which is based at the GBO site. More than 40,000 visitors each year

pass through the Green Bank Science Center, including students, educators, and the general public who generally stay on site for more than one night to take advantage of the educational facilities. The GBO facility is host to multiple educational workshops and programs each year for middle school through post-graduate student training, and an average of 10 to 15 undergraduate and graduate students are mentored at the facility each year.

GBO facilities include the Green Bank Telescope; 43-meter telescope (also referred to as the 140-foot telescope); Green Bank Solar Radio Burst Spectrometer (45-foot telescope); Interferometer Range (includes three 85-foot diameter telescopes); 20-meter Geodetic Telescope; 40-foot telescope; three non-operational historical telescopes (Jansky Replica Antenna, Reber Radio Telescope, and Ewen-Purcell Horn); and other support facilities and infrastructure.

Project Description

NSF's Division of Astronomical Sciences (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 funding for the GBO has been established through a number of reviews and surveys conducted by the science community.

In 2014, CH2M conducted a Cultural Resources Evaluation for the architectural resources at the GBO. The results of the survey are included below under "Determinations of Eligibility." The associated technical report, entitled *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*, is attached for reference (Enclosure 1).

A range of preliminary proposed Alternatives is being considered for evaluation. These preliminary proposed Alternatives, which will be refined through public input, include the following:

- Continued NSF investment for science-focused operations (No-Action Alternative).
- Collaboration with interested parties for science- and education-focused operations with reduced NSF-funded scope.
- Collaboration with interested parties for operation as a technology and education park.

- Mothballing of facilities (suspension of operations in a manner such that operations could resume efficiently at some future date).

- Deconstruction and site restoration.

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

Proposed Area of Potential Effects

The Area of Potential Effects (APE) being proposed for the project is defined as the property boundary of GBO. The total geographic area of the Observatory was chosen as the APE to encompass all buildings and structures on the property. This inclusive APE enables a determination of whether GBO constitutes a potential historic district that could be affected by the activities associated with the proposed changes to operations at the Observatory. Figure 2-1 included in Enclosure 1 shows the boundaries of the APE.

Public Involvement

A Notice of Intent (NOI) was published in the Federal Register on October 19, 2016 to initiate the public scoping process for the EIS. A revised NOI was published on November 1, 2016. Two Public Scoping Meetings were conducted on November 9, 2016, at GBO. Section 106 public outreach was addressed as part of the public meeting, and participants were invited to identify whether they would like to participate in Section 106 as a consulting party. Concurrent to the mailing of this letter, NSF will email these potential consulting parties a description of the role of a consulting party and requesting that they confirm their interest. A separate Section 106 consulting party meeting will be scheduled following the release of the Draft EIS this spring. Follow-up discussions with consulting parties will occur as needed.

Previously Identified Historic Properties

A literature review was conducted through the West Virginia State Historic Preservation Office (SHPO) Interactive Map on November 7, 2016. The literature review focused on the APE and included a 0.5-mile study area.

The Reber Radio Telescope is the only structure or building located within GBO that is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

One residence within the APE, the Riley House (House #15), was previously recorded in 2011. The associated survey form states that the early twentieth-century wood-frame farm house does not appear to be significant under NRHP Criterion C. The literature review did not identify any prior cultural resources surveys that have occurred within the APE. Two archaeological sites and nine architectural resources have been recorded

outside of the APE, along State Routes 28 and 92, directly adjacent to the eastern boundary of the Observatory. The two previously recorded archaeological resources were not evaluated for the NRHP. One of the architectural resources, the Liberty Presbyterian Church on State Route 92 that was constructed in 1851, is described as significant as an excellent example of Greek Revival architecture, although no formal NRHP evaluation is included with the survey form. The church was recorded on two West Virginia Historic Property Inventory Forms (PH-0002 and PH-0037-0018). Four architectural resources were evaluated as not eligible for the NRHP and three buildings were recorded, but not evaluated for the NRHP. The cultural resources that have been previously recorded within or directly adjacent to the APE are listed below in Table 1. In addition, two surveys (a bridge survey and a cultural resources survey) have occurred and 34 additional cultural resources have been identified within the 0.5-mile study area.

TABLE 1. Previously Recorded Cultural Resources Within and Directly Adjacent to the APE*

Resource Name	Description	Status	Recorded by
Reber Radio Telescope	1937 telescope located at the entrance to GBO within APE	NRHP listed 1972; National Historic Landmark 1986	National Register of Historic Places Registration Form
Riley House (House #15) PH-0331	Circa 1915 farm house within APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Liberty Presbyterian Church PH-0002 PH-0037-0018	1851 Greek Revival Church adjacent to APE	Not formally evaluated for the NRHP, but described as "significant as an excellent example of Greek Revival architecture in the area"	Michael Gioulis (Historic Preservation Consultant); 1993
George Porter Kerr House – Historic Orlan Shears House PH-0037-0040	Circa 1901 residence adjacent to APE	Not evaluated for the NRHP	Sherron Waybright; 1986

Dr. J.P. Mooumau House PH-0037-0044	1873 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986
Hamed House PH-0037-0048	1910 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986
Jack Nelson House PH-0209	Circa 1900 residence adjacent to the APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
Jerry Thortnon House PH-0210	Circa 1880-1890 vernacular residence adjacent to APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
PH-0326	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0327	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0332	1949 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Shinaberry's Fifth Grade Site 46-PH-64	Prehistoric open archaeological site adjacent to APE	Not evaluated for the NRHP	Dick Reigel; 1987
Sheets Site 46-PH-27	Prehistoric campsite adjacent to APE	Not evaluated for the NRHP	Stephen Davis; 1977

* Shaded rows indicate previously recorded resources within the APE.

Determination of Eligibility

A Secretary of the Interior-qualified architectural historian with CH2M conducted an intensive architectural survey at the GBO from October 6-9, 2014. The site visit to GBO was also used to engage GBO staff in informal interviews and to conduct archival research, including the review of historic photographs and narratives, newspaper articles, construction records, and architectural drawings.

The field survey encompassed standing structures built in or before 1969, which is 47 years from the present year. The standard NRHP age threshold is 50 years; however, using 47 years as the cutoff allowed a buffer for the execution of the proposed Alternatives. All built environment resources from 1969 or earlier within the GBO boundary were surveyed and assessed, including a determination of eligibility for listing in the NRHP, except for the Reber Radio Telescope. Buildings and structures were evaluated individually as well as part of a potential historic district.

Using aerial photographs of GBO and information provided by GBO staff, 47 built environment resources that had been constructed in or before 1969 were identified as extant within the APE. These include: 5 telescope structures (one of which contains three large telescopes), 2 horn instruments, 1 antenna, 1 airstrip, 1 water tower, 1 recreation area, 24 residential buildings, and 12 operational and administrative buildings. As noted above, one of these telescopes, the Reber Radio Telescope, was previously evaluated. The remaining 46 built environment resources in the APE built in or before 1969 were photographed and evaluated for NRHP eligibility. Data collected through the background research and field investigations were analyzed to determine NRHP eligibility of the 46 surveyed built environment resources individually. In addition, the Green Bank Telescope, which was constructed after 1969, was evaluated individually due to its exceptional importance to radio astronomy over the last 50 years. All 47 historic-era properties (constructed in or before 1969, including the Reber Radio Telescope) and the GBT were also evaluated as a potential historic district. Properties surveyed in 2014 are listed in Attachment A of Enclosure 1. Figure 5-1, included in Enclosure 1, shows the location of each evaluated built environment resource.

NSF has determined that within the historical context of NRAO/GBO, there are four telescope instruments that are individually eligible for listing in the NRHP: the Interferometer Range, the 40-foot Telescope, the 43-meter Telescope, and the Green Bank Telescope. In addition, NSF has determined that GBO is eligible as a historic district for representing an important time in science history and for its significant contribution to the advancement of radio astronomy. There are 44 resources within the APE that are recommended as contributing to the proposed GBO historic district, the boundaries of which coincide with the site's property boundaries (and the APE). Contributing elements include 8 administrative/operational buildings, 1 airstrip, 1 water tower, 1 recreational area, 24 residential buildings, 2 horns, 1 antenna, and 6 telescopes (the Interferometer includes 3 large telescopes) (Table 2).

The scientific instruments within the APE are a collection of telescopes, horns, and antenna that are significant for their role in the development of radio astronomy and, in several instances, as remarkable feats of engineering. As a whole, the majority of the components that make up the potential district's historic character possess integrity, even though many of the buildings are individually undistinguished. The administrative and operations buildings and structures within the GBO are primarily utilitarian buildings or structures with simple designs executed using practical and standard materials. These elements create a cohesive, visual unit that emphasizes their historically linked function

as support for the observatory. As a group, the 44 contributing built environment resources are a distinct and well-preserved representation of the early years of the NRAO, complete with scientific instruments, administration/operational facilities, recreation area, and residential buildings. Additionally, the scientific instruments present on site illustrate a linear, historical narrative of the history of radio astronomy from the Jansky Replica Antenna and Reber Radio Telescope to the monumental Green Bank Telescope. Four buildings within the APE were identified as non-contributing resources. These include three barns and one cellar building, all of which pre-date the establishment of the NRAO and have been primarily left vacant or used as miscellaneous storage facilities.

Table 2 lists the properties at the GBO that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
GBO Historic District	1958-2000	Collection of administrative/operational structures, residential buildings, and radio astronomy equipment associated with the NRAO/GBO.	Eligible (Historic District); 44 contributing resources (Attachment A in Enclosure 1)
Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building	85'-1: 1958-1959 85'-2: 1963-1964 85'-3: 1965-1968 Interferometer control building: 1967-1968	The Tatel Telescope (85'-1) was the first telescope constructed by the NRAO and performed the world's first Search For Extra Terrestrial Intelligence (SETI) observations. The Interferometer Range connected two nearly identical telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the	Individually eligible and contributing to GBO Historic District

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
		construction of the Very Large Array telescope in New Mexico in the 1970s.	
40-foot Telescope and control building	1962	First fully automated radio telescope in the world. Currently operates as an educational telescope for visiting students.	Individually eligible and contributing to GBO Historic District
43-meter Telescope	1958-1965	Largest telescope in the world to use an equatorial (for polar aligned) mount. Currently used as part of the Russian Radioastron project.	Individually eligible and contributing to GBO Historic District
Robert C. Byrd Green Bank Telescope (Green Bank Telescope)	1991-2000	Largest moving structure on land in the world; tilt and point design that can rotate a full 360 degrees; performs highly sensitive data collection.	Individually eligible and contributing to GBO Historic District

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The GBO is a federally-owned property that contains historic properties. Therefore the Proposed Action has the potential to affect historic properties. In compliance with 36 Code of Federal Regulations (CFR) 800.2(c)(2)(ii), NSF is initiating consultation with you on the proposed changes to GBO operations. NSF is also seeking your input on any cultural resources in the project area or any cultural resources concerns you may have related to this undertaking.

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Federal Preservation Officer
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Enclosures:
1. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 12, 2016

Dr. Brice Obermeyer
Director, Historic Preservation
Delaware Tribe of Indians
Roosevelt Hall, Rm. 212
1200 Commercial Street
Emporia, KS 66801

RE: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Dr. Obermeyer:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. The decision regarding the potential changes to GBO operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act (NHPA), NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. With this letter, NSF is formally initiating Section 106 consultation under the NHPA and transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (Enclosure 1) for your review and comment.

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as support for the observatory. As a group, the 44 contributing built environment resources are a distinct and well-preserved representation of the early years of the NRAO, complete with scientific instruments, administration/operational facilities, recreation area, and residential buildings. Additionally, the scientific instruments present on site illustrate a linear, historical narrative of the history of radio astronomy from the Jansky Replica Antenna and Reber Radio Telescope to the monumental Green Bank Telescope. Four buildings within the APE were identified as non-contributing resources. These include three barns and one cellar building, all of which pre-date the establishment of the NRAO and have been primarily left vacant or used as miscellaneous storage facilities.

Table 2 lists the properties at the GBO that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
GBO Historic District	1958-2000	Collection of administrative/operational structures, residential buildings, and radio astronomy equipment associated with the NRAO/GBO.	Eligible (Historic District); 44 contributing resources (Attachment A in Enclosure 1)
Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building	85'-1: 1958-1959 85'-2: 1963-1964 85'-3: 1965-1968 Interferometer control building: 1967-1968	The Tatel Telescope (85'-1) was the first telescope constructed by the NRAO and performed the world's first Search For Extra Terrestrial Intelligence (SETI) observations. The Interferometer Range connected two nearly identical telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the	Individually eligible and contributing to GBO Historic District

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
		construction of the Very Large Array telescope in New Mexico in the 1970s.	
40-foot Telescope and control building	1962	First fully automated radio telescope in the world. Currently operates as an educational telescope for visiting students.	Individually eligible and contributing to GBO Historic District
43-meter Telescope	1958-1965	Largest telescope in the world to use an equatorial (for polar aligned) mount. Currently used as part of the Russian Radioastron project.	Individually eligible and contributing to GBO Historic District
Robert C. Byrd Green Bank Telescope (Green Bank Telescope)	1991-2000	Largest moving structure on land in the world; tilt and point design that can rotate a full 360 degrees; performs highly sensitive data collection.	Individually eligible and contributing to GBO Historic District

Initiation of Section 106 Consultation

The GBO is a federally-owned property that contains historic properties. Therefore the Proposed Action has the potential to affect historic properties. In compliance with 36 Code of Federal Regulations (CFR) 800.2(c)(2)(ii), NSF is initiating consultation with you on the proposed changes to GBO operations. NSF is also seeking your input on any cultural resources in the project area or any cultural resources concerns you may have related to this undertaking.

We respectfully request your response within 30 days from receipt of this letter indicating your interest in participating in consultation for this undertaking. Please respond to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

NSF is also transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (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 undertaking.

Regards,

Caroline M Blanco

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

Enclosures:
1. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 12, 2016

Mr. Russ Townsend
Tribal Historic Preservation Officer
PO Box 455
Cherokee, NC 28719

RE: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Mr. Townsend:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. The decision regarding the potential changes to GBO operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act (NHPA), NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. With this letter, NSF is formally initiating Section 106 consultation under the NHPA and transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (Enclosure 1) for your review and comment.

Project Location and Background

GBO is located on federal lands adjacent to the Monongahela National Forest. This land is owned by NSF and consists of numerous parcels that were acquired/condemned by the U.S. Army Corps of Engineers in the 1950s when GBO was formed as the first (and then, only) site of the National Radio Astronomy Observatory (NRAO). The GBO is the anchor and administrative site of the 13,000-square-mile National Radio Quiet Zone (NRQZ) and is situated on approximately 2,200 acres in the NRQZ, where all radio transmissions are limited. The GBO facility has a long history of science, technology, engineering, and mathematics education, ranging from student training and mentorships through the outreach and training opportunities offered through the NRAO Center for Science Education, which is based at the GBO site. More than 40,000 visitors each year

pass through the Green Bank Science Center, including students, educators, and the general public who generally stay on site for more than one night to take advantage of the educational facilities. The GBO facility is host to multiple educational workshops and programs each year for middle school through post-graduate student training, and an average of 10 to 15 undergraduate and graduate students are mentored at the facility each year.

GBO facilities include the Green Bank Telescope; 43-meter telescope (also referred to as the 140-foot telescope); Green Bank Solar Radio Burst Spectrometer (45-foot telescope); Interferometer Range (includes three 85-foot diameter telescopes); 20-meter Geodetic Telescope; 40-foot telescope; three non-operational historical telescopes (Jansky Replica Antenna, Reber Radio Telescope, and Ewen-Purcell Horn); and other support facilities and infrastructure.

Project Description

NSF's Division of Astronomical Sciences (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 funding for the GBO has been established through a number of reviews and surveys conducted by the science community.

In 2014, CH2M conducted a Cultural Resources Evaluation for the architectural resources at the GBO. The results of the survey are included below under "Determinations of Eligibility." The associated technical report, entitled *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*, is attached for reference (Enclosure 1).

A range of preliminary proposed Alternatives is being considered for evaluation. These preliminary proposed Alternatives, which will be refined through public input, include the following:

- Continued NSF investment for science-focused operations (No-Action Alternative).
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- Collaboration with interested parties for operation as a technology and education park.

- Mothballing of facilities (suspension of operations in a manner such that operations could resume efficiently at some future date).

- Deconstruction and site restoration.

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

Proposed Area of Potential Effects

The Area of Potential Effects (APE) being proposed for the project is defined as the property boundary of GBO. The total geographic area of the Observatory was chosen as the APE to encompass all buildings and structures on the property. This inclusive APE enables a determination of whether GBO constitutes a potential historic district that could be affected by the activities associated with the proposed changes to operations at the Observatory. Figure 2-1 included in Enclosure 1 shows the boundaries of the APE.

Public Involvement

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Previously Identified Historic Properties

A literature review was conducted through the West Virginia State Historic Preservation Office (SHPO) Interactive Map on November 7, 2016. The literature review focused on the APE and included a 0.5-mile study area.

The Reber Radio Telescope is the only structure or building located within GBO that is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

One residence within the APE, the Riley House (House #15), was previously recorded in 2011. The associated survey form states that the early twentieth-century wood-frame farm house does not appear to be significant under NRHP Criterion C. The literature review did not identify any prior cultural resources surveys that have occurred within the APE. Two archaeological sites and nine architectural resources have been recorded

outside of the APE, along State Routes 28 and 92, directly adjacent to the eastern boundary of the Observatory. The two previously recorded archaeological resources were not evaluated for the NRHP. One of the architectural resources, the Liberty Presbyterian Church on State Route 92 that was constructed in 1851, is described as significant as an excellent example of Greek Revival architecture, although no formal NRHP evaluation is included with the survey form. The church was recorded on two West Virginia Historic Property Inventory Forms (PH-0002 and PH-0037-0018). Four architectural resources were evaluated as not eligible for the NRHP and three buildings were recorded, but not evaluated for the NRHP. The cultural resources that have been previously recorded within or directly adjacent to the APE are listed below in Table 1. In addition, two surveys (a bridge survey and a cultural resources survey) have occurred and 34 additional cultural resources have been identified within the 0.5-mile study area.

TABLE 1. Previously Recorded Cultural Resources Within and Directly Adjacent to the APE*

Resource Name	Description	Status	Recorded by
Reber Radio Telescope	1937 telescope located at the entrance to GBO within APE	NRHP listed 1972; National Historic Landmark 1986	National Register of Historic Places Registration Form
Riley House (House #15) PH-0331	Circa 1915 farm house within APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Liberty Presbyterian Church PH-0002 PH-0037-0018	1851 Greek Revival Church adjacent to APE	Not formally evaluated for the NRHP, but described as "significant as an excellent example of Greek Revival architecture in the area"	Michael Gioulis (Historic Preservation Consultant); 1993
George Porter Kerr House – Historic Orlan Shears House PH-0037-0040	Circa 1901 residence adjacent to APE	Not evaluated for the NRHP	Sherron Waybright; 1986
Dr. J.P. Mooumau House PH-0037-0044	1873 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986

Hamed House PH-0037-0048	1910 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986
Jack Nelson House PH-0209	Circa 1900 residence adjacent to the APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
Jerry Thortnon House PH-0210	Circa 1880-1890 vernacular residence adjacent to APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
PH-0326	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0327	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0332	1949 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Shinaberry's Fifth Grade Site 46-PH-64	Prehistoric open archaeological site adjacent to APE	Not evaluated for the NRHP	Dick Reigel; 1987
Sheets Site 46-PH-27	Prehistoric campsite adjacent to APE	Not evaluated for the NRHP	Stephen Davis; 1977

* Shaded rows indicate previously recorded resources within the APE.

Determination of Eligibility

A Secretary of the Interior-qualified architectural historian with CH2M conducted an intensive architectural survey at the GBO from October 6-9, 2014. The site visit to GBO was also used to engage GBO staff in informal interviews and to conduct archival research, including the review of historic photographs and narratives, newspaper articles, construction records, and architectural drawings.

The field survey encompassed standing structures built in or before 1969, which is 47 years from the present year. The standard NRHP age threshold is 50 years; however, using 47 years as the cutoff allowed a buffer for the execution of the proposed Alternatives. All built environment resources from 1969 or earlier within the GBO boundary were surveyed and assessed, including a determination of eligibility for listing

in the NRHP, except for the Reber Radio Telescope. Buildings and structures were evaluated individually as well as part of a potential historic district.

Using aerial photographs of GBO and information provided by GBO staff, 47 built environment resources that had been constructed in or before 1969 were identified as extant within the APE. These include: 5 telescope structures (one of which contains three large telescopes), 2 horn instruments, 1 antenna, 1 airstrip, 1 water tower, 1 recreation area, 24 residential buildings, and 12 operational and administrative buildings. As noted above, one of these telescopes, the Reber Radio Telescope, was previously evaluated. The remaining 46 built environment resources in the APE built in or before 1969 were photographed and evaluated for NRHP eligibility. Data collected through the background research and field investigations were analyzed to determine NRHP eligibility of the 46 surveyed built environment resources individually. In addition, the Green Bank Telescope, which was constructed after 1969, was evaluated individually due to its exceptional importance to radio astronomy over the last 50 years. All 47 historic-era properties (constructed in or before 1969, including the Reber Radio Telescope) and the GBT were also evaluated as a potential historic district. Properties surveyed in 2014 are listed in Attachment A of Enclosure 1. Figure 5-1, included in Enclosure 1, shows the location of each evaluated built environment resource.

NSF has determined that within the historical context of NRAO/GBO, there are four telescope instruments that are individually eligible for listing in the NRHP: the Interferometer Range, the 40-foot Telescope, the 43-meter Telescope, and the Green Bank Telescope. In addition, NSF has determined that GBO is eligible as a historic district for representing an important time in science history and for its significant contribution to the advancement of radio astronomy. There are 44 resources within the APE that are recommended as contributing to the proposed GBO historic district, the boundaries of which coincide with the site's property boundaries (and the APE). Contributing elements include 8 administrative/operational buildings, 1 airstrip, 1 water tower, 1 recreational area, 24 residential buildings, 2 horns, 1 antenna, and 6 telescopes (the Interferometer includes 3 large telescopes) (Table 2).

The scientific instruments within the APE are a collection of telescopes, horns, and antenna that are significant for their role in the development of radio astronomy and, in several instances, as remarkable feats of engineering. As a whole, the majority of the components that make up the potential district's historic character possess integrity, even though many of the buildings are individually undistinguished. The administrative and operations buildings and structures within the GBO are primarily utilitarian buildings or structures with simple designs executed using practical and standard materials. These elements create a cohesive, visual unit that emphasizes their historically linked function as support for the observatory. As a group, the 44 contributing built environment resources are a distinct and well-preserved representation of the early years of the NRAO, complete with scientific instruments, administration/operational facilities, recreation area, and residential buildings. Additionally, the scientific instruments present on site illustrate a linear, historical narrative of the history of radio astronomy from the Jansky Replica

Antenna and Reber Radio Telescope to the monumental Green Bank Telescope. Four buildings within the APE were identified as non-contributing resources. These include three barns and one cellar building, all of which pre-date the establishment of the NRAO and have been primarily left vacant or used as miscellaneous storage facilities.

Table 2 lists the properties at the GBO that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
GBO Historic District	1958-2000	Collection of administrative/operational structures, residential buildings, and radio astronomy equipment associated with the NRAO/GBO.	Eligible (Historic District); 44 contributing resources (Attachment A in Enclosure 1)
Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building	85'-1: 1958-1959 85'-2: 1963-1964 85'-3: 1965-1968 Interferometer control building: 1967-1968	The Tatel Telescope (85'-1) was the first telescope constructed by the NRAO and performed the world's first Search For Extra Terrestrial Intelligence (SETI) observations. The Interferometer Range connected two nearly identical telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the construction of the Very Large Array telescope in New Mexico in the 1970s.	Individually eligible and contributing to GBO Historic District

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
40-foot Telescope and control building	1962	First fully automated radio telescope in the world. Currently operates as an educational telescope for visiting students.	Individually eligible and contributing to GBO Historic District
43-meter Telescope	1958-1965	Largest telescope in the world to use an equatorial (for polar aligned) mount. Currently used as part of the Russian Radioastron project.	Individually eligible and contributing to GBO Historic District
Robert C. Byrd Green Bank Telescope (Green Bank Telescope)	1991-2000	Largest moving structure on land in the world; tilt and point design that can rotate a full 360 degrees; performs highly sensitive data collection.	Individually eligible and contributing to GBO Historic District

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The GBO is a federally-owned property that contains historic properties. Therefore the Proposed Action has the potential to affect historic properties. In compliance with 36 Code of Federal Regulations (CFR) 800.2(c)(2)(ii), NSF is initiating consultation with you on the proposed changes to GBO operations. NSF is also seeking your input on any cultural resources in the project area or any cultural resources concerns you may have related to this undertaking.

We respectfully request your response within 30 days from receipt of this letter indicating your interest in participating in consultation for this undertaking. Please respond to:

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NSF is also transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (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 undertaking.

Regards,

Caroline M. Blanco

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

Enclosures:
1. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 12, 2016

Ms. Sheila Bird
Tribal Historic Preservation Officer
Cherokee Nation
PO Box 948
Tahlequah, OK 74465

RE: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Ms. Bird:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. The decision regarding the potential changes to GBO operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act (NHPA), NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. With this letter, NSF is formally initiating Section 106 consultation under the NHPA and transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (Enclosure 1) for your review and comment.

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NSF has determined that within the historical context of NRAO/GBO, there are four telescope instruments that are individually eligible for listing in the NRHP: the Interferometer Range, the 40-foot Telescope, the 43-meter Telescope, and the Green Bank Telescope. In addition, NSF has determined that GBO is eligible as a historic district for representing an important time in science history and for its significant contribution to the advancement of radio astronomy. There are 44 resources within the APE that are recommended as contributing to the proposed GBO historic district, the boundaries of which coincide with the site's property boundaries (and the APE). Contributing elements include 8 administrative/operational buildings, 1 airstrip, 1 water tower, 1 recreational area, 24 residential buildings, 2 horns, 1 antenna, and 6 telescopes (the Interferometer includes 3 large telescopes) (Table 2).

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Antenna and Reber Radio Telescope to the monumental Green Bank Telescope. Four buildings within the APE were identified as non-contributing resources. These include three barns and one cellar building, all of which pre-date the establishment of the NRAO and have been primarily left vacant or used as miscellaneous storage facilities.

Table 2 lists the properties at the GBO that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
GBO Historic District	1958-2000	Collection of administrative/operational structures, residential buildings, and radio astronomy equipment associated with the NRAO/GBO.	Eligible (Historic District); 44 contributing resources (Attachment A in Enclosure 1)
Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building	85'-1: 1958-1959 85'-2: 1963-1964 85'-3: 1965-1968 Interferometer control building: 1967-1968	The Tatel Telescope (85'-1) was the first telescope constructed by the NRAO and performed the world's first Search For Extra Terrestrial Intelligence (SETI) observations. The Interferometer Range connected two nearly identical telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the construction of the Very Large Array telescope in New Mexico in the 1970s.	Individually eligible and contributing to GBO Historic District

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
40-foot Telescope and control building	1962	First fully automated radio telescope in the world. Currently operates as an educational telescope for visiting students.	Individually eligible and contributing to GBO Historic District
43-meter Telescope	1958-1965	Largest telescope in the world to use an equatorial (for polar aligned) mount. Currently used as part of the Russian Radioastron project.	Individually eligible and contributing to GBO Historic District
Robert C. Byrd Green Bank Telescope (Green Bank Telescope)	1991-2000	Largest moving structure on land in the world; tilt and point design that can rotate a full 360 degrees; performs highly sensitive data collection.	Individually eligible and contributing to GBO Historic District

Initiation of Section 106 Consultation

The GBO is a federally-owned property that contains historic properties. Therefore the Proposed Action has the potential to affect historic properties. In compliance with 36 Code of Federal Regulations (CFR) 800.2(c)(2)(ii), NSF is initiating consultation with you on the proposed changes to GBO operations. NSF is also seeking your input on any cultural resources in the project area or any cultural resources concerns you may have related to this undertaking.

We respectfully request your response within 30 days from receipt of this letter indicating your interest in participating in consultation for this undertaking. Please respond to:

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National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

NSF is also transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (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 undertaking.

Regards,

Caroline M. Blanco

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

Enclosures:
1. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 12, 2016

Mr. Clint Halftown
Cayuga Nation
PO Box 803, 2540 NY-89
Seneca Falls, NY 13148

RE: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Mr. Halftown:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. The decision regarding the potential changes to GBO operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act (NHPA), NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. With this letter, NSF is formally initiating Section 106 consultation under the NHPA and transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (Enclosure 1) for your review and comment.

Project Location and Background

GBO is located on federal lands adjacent to the Monongahela National Forest. This land is owned by NSF and consists of numerous parcels that were acquired/condemned by the U.S. Army Corps of Engineers in the 1950s when GBO was formed as the first (and then, only) site of the National Radio Astronomy Observatory (NRAO). The GBO is the anchor and administrative site of the 13,000-square-mile National Radio Quiet Zone (NRQZ) and is situated on approximately 2,200 acres in the NRQZ, where all radio transmissions are limited. The GBO facility has a long history of science, technology, engineering, and mathematics education, ranging from student training and mentorships through the outreach and training opportunities offered through the NRAO Center for Science Education, which is based at the GBO site. More than 40,000 visitors each year

pass through the Green Bank Science Center, including students, educators, and the general public who generally stay on site for more than one night to take advantage of the educational facilities. The GBO facility is host to multiple educational workshops and programs each year for middle school through post-graduate student training, and an average of 10 to 15 undergraduate and graduate students are mentored at the facility each year.

GBO facilities include the Green Bank Telescope; 43-meter telescope (also referred to as the 140-foot telescope); Green Bank Solar Radio Burst Spectrometer (45-foot telescope); Interferometer Range (includes three 85-foot diameter telescopes); 20-meter Geodetic Telescope; 40-foot telescope; three non-operational historical telescopes (Jansky Replica Antenna, Reber Radio Telescope, and Ewen-Purcell Horn); and other support facilities and infrastructure.

Project Description

NSF's Division of Astronomical Sciences (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 funding for the GBO has been established through a number of reviews and surveys conducted by the science community.

In 2014, CH2M conducted a Cultural Resources Evaluation for the architectural resources at the GBO. The results of the survey are included below under "Determinations of Eligibility." The associated technical report, entitled *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*, is attached for reference (Enclosure 1).

A range of preliminary proposed Alternatives is being considered for evaluation. These preliminary proposed Alternatives, which will be refined through public input, include the following:

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

Proposed Area of Potential Effects

The Area of Potential Effects (APE) being proposed for the project is defined as the property boundary of GBO. The total geographic area of the Observatory was chosen as the APE to encompass all buildings and structures on the property. This inclusive APE enables a determination of whether GBO constitutes a potential historic district that could be affected by the activities associated with the proposed changes to operations at the Observatory. Figure 2-1 included in Enclosure 1 shows the boundaries of the APE.

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One residence within the APE, the Riley House (House #15), was previously recorded in 2011. The associated survey form states that the early twentieth-century wood-frame farm house does not appear to be significant under NRHP Criterion C. The literature review did not identify any prior cultural resources surveys that have occurred within the APE. Two archaeological sites and nine architectural resources have been recorded

outside of the APE, along State Routes 28 and 92, directly adjacent to the eastern boundary of the Observatory. The two previously recorded archaeological resources were not evaluated for the NRHP. One of the architectural resources, the Liberty Presbyterian Church on State Route 92 that was constructed in 1851, is described as significant as an excellent example of Greek Revival architecture, although no formal NRHP evaluation is included with the survey form. The church was recorded on two West Virginia Historic Property Inventory Forms (PH-0002 and PH-0037-0018). Four architectural resources were evaluated as not eligible for the NRHP and three buildings were recorded, but not evaluated for the NRHP. The cultural resources that have been previously recorded within or directly adjacent to the APE are listed below in Table 1. In addition, two surveys (a bridge survey and a cultural resources survey) have occurred and 34 additional cultural resources have been identified within the 0.5-mile study area.

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Jack Nelson House PH-0209	Circa 1900 residence adjacent to the APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
Jerry Thortnon House PH-0210	Circa 1880-1890 vernacular residence adjacent to APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
PH-0326	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0327	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0332	1949 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Shinaberry's Fifth Grade Site 46-PH-64	Prehistoric open archaeological site adjacent to APE	Not evaluated for the NRHP	Dick Reigel; 1987
Sheets Site 46-PH-27	Prehistoric campsite adjacent to APE	Not evaluated for the NRHP	Stephen Davis; 1977

* Shaded rows indicate previously recorded resources within the APE.

Determination of Eligibility

A Secretary of the Interior-qualified architectural historian with CH2M conducted an intensive architectural survey at the GBO from October 6-9, 2014. The site visit to GBO was also used to engage GBO staff in informal interviews and to conduct archival research, including the review of historic photographs and narratives, newspaper articles, construction records, and architectural drawings.

The field survey encompassed standing structures built in or before 1969, which is 47 years from the present year. The standard NRHP age threshold is 50 years; however, using 47 years as the cutoff allowed a buffer for the execution of the proposed Alternatives. All built environment resources from 1969 or earlier within the GBO boundary were surveyed and assessed, including a determination of eligibility for listing

in the NRHP, except for the Reber Radio Telescope. Buildings and structures were evaluated individually as well as part of a potential historic district.

Using aerial photographs of GBO and information provided by GBO staff, 47 built environment resources that had been constructed in or before 1969 were identified as extant within the APE. These include: 5 telescope structures (one of which contains three large telescopes), 2 horn instruments, 1 antenna, 1 airstrip, 1 water tower, 1 recreation area, 24 residential buildings, and 12 operational and administrative buildings. As noted above, one of these telescopes, the Reber Radio Telescope, was previously evaluated. The remaining 46 built environment resources in the APE built in or before 1969 were photographed and evaluated for NRHP eligibility. Data collected through the background research and field investigations were analyzed to determine NRHP eligibility of the 46 surveyed built environment resources individually. In addition, the Green Bank Telescope, which was constructed after 1969, was evaluated individually due to its exceptional importance to radio astronomy over the last 50 years. All 47 historic-era properties (constructed in or before 1969, including the Reber Radio Telescope) and the GBT were also evaluated as a potential historic district. Properties surveyed in 2014 are listed in Attachment A of Enclosure 1. Figure 5-1, included in Enclosure 1, shows the location of each evaluated built environment resource.

NSF has determined that within the historical context of NRAO/GBO, there are four telescope instruments that are individually eligible for listing in the NRHP: the Interferometer Range, the 40-foot Telescope, the 43-meter Telescope, and the Green Bank Telescope. In addition, NSF has determined that GBO is eligible as a historic district for representing an important time in science history and for its significant contribution to the advancement of radio astronomy. There are 44 resources within the APE that are recommended as contributing to the proposed GBO historic district, the boundaries of which coincide with the site's property boundaries (and the APE). Contributing elements include 8 administrative/operational buildings, 1 airstrip, 1 water tower, 1 recreational area, 24 residential buildings, 2 horns, 1 antenna, and 6 telescopes (the Interferometer includes 3 large telescopes) (Table 2).

The scientific instruments within the APE are a collection of telescopes, horns, and antenna that are significant for their role in the development of radio astronomy and, in several instances, as remarkable feats of engineering. As a whole, the majority of the components that make up the potential district's historic character possess integrity, even though many of the buildings are individually undistinguished. The administrative and operations buildings and structures within the GBO are primarily utilitarian buildings or structures with simple designs executed using practical and standard materials. These elements create a cohesive, visual unit that emphasizes their historically linked function as support for the observatory. As a group, the 44 contributing built environment resources are a distinct and well-preserved representation of the early years of the NRAO, complete with scientific instruments, administration/operational facilities, recreation area, and residential buildings. Additionally, the scientific instruments present on site illustrate a linear, historical narrative of the history of radio astronomy from the Jansky Replica

Antenna and Reber Radio Telescope to the monumental Green Bank Telescope. Four buildings within the APE were identified as non-contributing resources. These include three barns and one cellar building, all of which pre-date the establishment of the NRAO and have been primarily left vacant or used as miscellaneous storage facilities.

Table 2 lists the properties at the GBO that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
GBO Historic District	1958-2000	Collection of administrative/operational structures, residential buildings, and radio astronomy equipment associated with the NRAO/GBO.	Eligible (Historic District); 44 contributing resources (Attachment A in Enclosure 1)
Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building	85'-1: 1958-1959 85'-2: 1963-1964 85'-3: 1965-1968 Interferometer control building: 1967-1968	The Tatel Telescope (85'-1) was the first telescope constructed by the NRAO and performed the world's first Search For Extra Terrestrial Intelligence (SETI) observations. The Interferometer Range connected two nearly identical telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the construction of the Very Large Array telescope in New Mexico in the 1970s.	Individually eligible and contributing to GBO Historic District

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Enclosures:
1. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 12, 2016

Mr. Leonard Longhorn
Tribal Historic Preservation Officer
Absentee Shawnee Tribe of Oklahoma
2025 S Gordon Cooper Drive
Shawnee, OK 74801

RE: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Mr. Longhorn:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. The decision regarding the potential changes to GBO operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act (NHPA), NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. With this letter, NSF is formally initiating Section 106 consultation under the NHPA and transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (Enclosure 1) for your review and comment.

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The scientific instruments within the APE are a collection of telescopes, horns, and antenna that are significant for their role in the development of radio astronomy and, in several instances, as remarkable feats of engineering. As a whole, the majority of the components that make up the potential district's historic character possess integrity, even though many of the buildings are individually undistinguished. The administrative and operations buildings and structures within the GBO are primarily utilitarian buildings or structures with simple designs executed using practical and standard materials. These elements create a cohesive, visual unit that emphasizes their historically linked function as support for the observatory. As a group, the 44 contributing built environment resources are a distinct and well-preserved representation of the early years of the NRAO, complete with scientific instruments, administration/operational facilities, recreation area, and residential buildings. Additionally, the scientific instruments present on site illustrate a linear, historical narrative of the history of radio astronomy from the Jansky Replica

Antenna and Reber Radio Telescope to the monumental Green Bank Telescope. Four buildings within the APE were identified as non-contributing resources. These include three barns and one cellar building, all of which pre-date the establishment of the NRAO and have been primarily left vacant or used as miscellaneous storage facilities.

Table 2 lists the properties at the GBO that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
GBO Historic District	1958-2000	Collection of administrative/operational structures, residential buildings, and radio astronomy equipment associated with the NRAO/GBO.	Eligible (Historic District); 44 contributing resources (Attachment A in Enclosure 1)
Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building	85'-1: 1958-1959 85'-2: 1963-1964 85'-3: 1965-1968 Interferometer control building: 1967-1968	The Tatel Telescope (85'-1) was the first telescope constructed by the NRAO and performed the world's first Search For Extra Terrestrial Intelligence (SETI) observations. The Interferometer Range connected two nearly identical telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the construction of the Very Large Array telescope in New Mexico in the 1970s.	Individually eligible and contributing to GBO Historic District

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
40-foot Telescope and control building	1962	First fully automated radio telescope in the world. Currently operates as an educational telescope for visiting students.	Individually eligible and contributing to GBO Historic District
43-meter Telescope	1958-1965	Largest telescope in the world to use an equatorial (for polar aligned) mount. Currently used as part of the Russian Radioastron project.	Individually eligible and contributing to GBO Historic District
Robert C. Byrd Green Bank Telescope (Green Bank Telescope)	1991-2000	Largest moving structure on land in the world; tilt and point design that can rotate a full 360 degrees; performs highly sensitive data collection.	Individually eligible and contributing to GBO Historic District

Initiation of Section 106 Consultation

The GBO is a federally-owned property that contains historic properties. Therefore the Proposed Action has the potential to affect historic properties. In compliance with 36 Code of Federal Regulations (CFR) 800.2(c)(2)(ii), NSF is initiating consultation with you on the proposed changes to GBO operations. NSF is also seeking your input on any cultural resources in the project area or any cultural resources concerns you may have related to this undertaking.

We respectfully request your response within 30 days from receipt of this letter indicating your interest in participating in consultation for this undertaking. Please respond to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

NSF is also transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (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 undertaking.

Regards,

Caroline M. Blanco

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

Enclosures:
1. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*

From: Grayg Ralphsnyder (US)
To: Pentecost, Elizabeth A.
Cc: Grayg Ralphsnyder (US)
Subject: RE: EIS for Green Bank Observatory - Identification of Consulting Parties
Date: Wednesday, December 14, 2016 7:23:36 PM

Elizabeth,

I would like to be involved with this project.

thank you ,
grayg

Grayg Ralphsnyder - KC8SVT
Electrical Engineer
DRA Global
Phone 304 220 6306
Mobile 304 860 7459
grayg.ralphsnyder@draglobal.com
4996 Elk River Road South
Elkview, West Virginia 25071

- be safe man -

From: Pentecost, Elizabeth A. [mailto:epenteco@nsf.gov]
Sent: Thursday, December 08, 2016 5:07 PM
To: Grayg Ralphsnyder (US)
Subject: EIS for Green Bank Observatory - Identification of Consulting Parties

December 8, 2016

Subject: Identification of Consulting Parties for Section106 Compliance for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Mr. Ralphsnyder:

Please disregard the earlier email. There was a cut/paste error. At this time NSF has not identified a preferred alternative.

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. NSF has initiated consultation under Section 106 of the National Historic Preservation Act (NHPA).

The Reber Radio Telescope located within GBO is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

NSF will be conducting an Environmental Impact Statement (EIS) 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 science- and education-focused operations with reduced NSF-funded scope.

- Collaboration with interested parties for operation as a technology and education park.

- 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 CFR Part 800.2[5]). You indicated an interest in participating as a consulting party at the NEPA scoping meeting on November 9, 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 potential 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 January 5, 2017 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 time frame, you may request consulting party status in the future; however, the project may advance without your input and you won't have an opportunity to comment on the previous steps. If you are requesting consulting party status as part of an organization, 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 epenteco@nsf.gov.

Sincerely,

Elizabeth Pentecost
Project Management Administrator
Division of Astronomical Sciences

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

WEST VIRGINIA
Division of Culture and History

The Culture Center
1900 Kanawha Blvd., E.
Charleston, WV 25305-0300
Randall Reid-Smith, Commissioner
Phone 304.558.0220 • www.wvculture.org
Fax 304.558.2779 • TDD 304.558.3562
EEO/AA Employer

December 22, 2016

Mr. James Ulvestad
Division Director, Division of Astronomical Sciences
National Science Foundation
4201 Wilson Boulevard
Arlington, Virginia 22230

RE: NEPA Analysis for Changes to Green Bank Observatory Operations
FR#: 17-49-PH-1

Dear Mr. Ulvestad:

We have reviewed the above-mentioned project to determine its effects to cultural resources. As required by Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR § 800: "Protection of Historic Properties," we submit our comments.

According to submitted information from this and previous submissions, the National Science Foundation (NSF) plans to complete an Environmental Impact Statement (EIS) to evaluate potential effects of proposed operational changes at the Green Bank Observatory (GBO) in Pocahontas County, West Virginia. According to the submitted information, five (5) case alternatives are being considered by the EIS. These include:

- Continued NSF investment for science-focused operations (No-Action Alternative)
- Collaboration with interested parties for science- and education-focused operations with reduced NSF-funded scope
- Collaboration with interested parties for operation as a technology and education park
- Mothballing of facilities (suspension of operations in a manner such that operations could resume efficiently at some future date)
- Deconstruction and site restoration

Also included in this submission is a Cultural Resources Evaluation, which includes a survey, documentation, and evaluation for National Register of Historic Places eligibility of the built resources at the Green Bank Observatory. We concur with the recommendation that the area of potential effects (APE) should be defined as the property boundary for GBO because this will encompass all of the buildings and structures associated with the observatory. We find that the Reber Radio Telescope (NR# 72001291), which was listed in the National Register of Historic Places in 1972 and was named a National Historic Landmark in 1986, remains historically significant. In addition, we concur with the recommendations that four (4) additional telescopes are individually eligible for the National Register. These include:

1) the Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'1-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer control building (eligible under Criterion A);

2) 40-foot Telescope and control building (eligible under Criterion A);

3) 43-meter Telescope (eligible under Criteria A and C);

4) Robert C. Byrd Green Bank Telescope (GBT) (eligible under Criteria A and C and Criterion Consideration G because it is less than 50 years of age);

However, while it appears likely that the GBO is eligible for the National Register of Historic Places as a historic district because the collection of buildings, structures, and scientific instrumentation represents the early history of radio astronomy while illustrating the continued development of the field, we will require more details before we can officially concur with this recommendation. The Cultural Resources Evaluation identified 44 resources within the APE as being recommended as contributing to the GBO historic district, but it provides no evidence or documentation to support this assessment.

At this time, we request the completion of a Historic Property Inventory (HPI) form for each resource at least forty-five (45) years of age located at the GBO, as well as any resource less than forty-five (45) years of age that may contribute to the potential historic district. If additional guidance regarding which resources warrant this level of documentation, a representative from our office will be glad to attend a site visit to assist in determining which resources should be documented with HPI forms. The HPI form is available, along with instructions to fill it out, at www.wvculture.org/shpo/forms.html. Please be sure to indicate the original date of construction as well as details about any changes, additions, and/or alterations each facility has experienced. Each HPI form should include two (2) color photographs of each of the documented resources. Your photographs need to be keyed to a USGS topographic or aerial map and should accurately depict from various angles any architectural resources, building or structural details, and outbuildings. Please contact Historian, Michael Burdette (Michael.A.Burdette@wv.gov), to obtain an HPI Site numbers for the newly-documented resources. We will provide further comments after the submission of the HPI forms and as the NEPA analysis and EIS for the GBO progresses. We look forward to participating in the continuation of the Section 106 process of identifying historic resources with the NSF, which will be supported by the completion of these HPI forms.

Public Comments:
Federal regulations in 36 CFR §§ 800.2(c–d), 800.3(e–f), and 800.6(a)(4) all stress the importance of involving the general public, local government representatives, and organizations that have a demonstrated interest in historic preservation or the undertaking in the Section 106 review process. If you have already completed this aspect of the requirements under Section 106, please provide written documentation along with any comments you have received, or any that you receive in the future, to this office. If you have not already done so, please consider forwarding a copy of the submitted information for the above-mentioned project to the Pocahontas County Historical Society and the Preservation Alliance of West Virginia to request their comments or opinions on the matter. Please forward any comments that you receive to this office. If you receive no comments within thirty (30) days, please indicate that *in writing* to this office. Also according to an earlier submittal, an all-day scoping meeting was planned for November 9, 2016, and we request that any correspondence or comments generated during this meeting be included with the next submittal regarding the GBO to assist with our continuation of the Section 106 process.

We appreciate the opportunity to be of service. *If you have questions regarding our comments or the Section 106 process, please contact Benjamin M. Riggle, Structural Historian, at (304) 558-0240.*

Sincerely,

Susan M. Pierce
Deputy State Historic Preservation Officer

SMP/BMR

From: Robert Sheets
To: epenteco@nsf.gov
Subject: Pocahontas County Historical Landmarks Commission
Date: Friday, December 30, 2016 6:09:43 PM

Dear Ms. Pentecost,

My name is Robert A. Sheets. I am a member of the Pocahontas County Landmarks Commission and I have been designated by the Commission to serve as the representative on behalf of PCLC as a consulting party in the Section 106 process. Mr. Jason Bauserman, our president, will be the alternate representative.

My contact information is:

Robert A. Sheets
450 Fort Warwick Passage
Green Bank, WV 24944
304-456-4815 (H)
email: fortwarwick@gmail.com

Mr. Bauserman's contact information is:

Jason Bauserman
106 Bauserman Loop
Bartow, WV 24920
304-456-4915
jbauserman@frontiernet.net

Sincerely,

Robert A. Sheets
Dec. 30, 2016

From: DARYL WHITE
To: Pentecost, Elizabeth A.
Subject: Re: EIS for Green Bank Observatory - Identification of Consulting Parties
Date: Monday, January 02, 2017 6:08:19 PM

Hello! Thank you for sending this email. I did sign up as an interested party at the Green Bank Observatory Public Hearing on November 9th. I would like to participate as a consulting party or have my wife, Deana White, participate on my behalf, however, we were uncertain if we qualify. We are concerned citizens - and are advocates for the GBO in all respects - the science community, the STEM education community, the Green Bank and surrounding communities, as well as for the historical significance this site represents. As it is the original NRAO site, it houses the Grote Reber radio telescope, and has a long and rich history contributing to radio astronomy and scientific discovery as we have been lucky enough to learn about and hear from renowned astronomer Dr. Frank Drake. Please let us know if we are eligible to participate.

Thank you,

Daryl And Deana White
Home phone 304 733 5781

Sent from my iPhone

On Dec 6, 2016, at 9:17 AM, Pentecost, Elizabeth A. <epenteco@nsf.gov> wrote:

> December 6, 2016
>
> Subject: Identification of Consulting Parties for Section106 Compliance for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia
>
> Dear Mr. White:
>
> The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. NSF has initiated consultation under Section 106 of the National Historic Preservation Act (NHPA).
>
> The Reber Radio Telescope located within GBO is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.
>
> NSF will be conducting an Environmental Impact Statement (EIS) 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 science- and education-focused operations with

reduced NSF-funded scope (Agency-Preferred Alternative).

• Collaboration with interested parties for operation as a technology and education park.

• 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 CFR Part 800.2[5]). You indicated an interest in participating as a consulting party at the NEPA scoping meeting on November 9, 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 potential 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 January 5, 2017 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 time frame, you may request consulting party status in the future; however, the project may advance without your input and you won't have an opportunity to comment on the previous steps. If you are requesting consulting party status as part of an organization, 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 epenteco@nsf.gov.

Sincerely,

Elizabeth Pentecost
Project Management Administrator
Division of Astronomical Sciences

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

Subject: RE: Follow-up Regarding National Science Foundation Letter Concerning Green Bank Observatory...

Date: Thursday, January 5, 2017 at 9:39:46 AM Eastern Standard Time

From: Holly Austin

To: Hamilton, Kristen

Ms. Hamilton,

This project falls outside of the traditional aboriginal territory of the Cherokee. As such, we wish to defer this project to the Shawnee. If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

--
Holly Austin
Tribal Historic Preservation Office
Eastern Band of the Cherokee Indians
hollymaustin94@gmail.com
Ph: (828) 359-6852

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

DIVISION OF ASTRONOMICAL SCIENCES

January 12, 2017

Ms. B. J. Sharp-Gudmundsson
Historic Preservation Officer
Pocahontas Historical Society
PO Box 453
Marlinton, WV 24954

Subject: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Ms. Gudmundsson:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. NSF has initiated consultation under Section 106 of the National Historic Preservation Act (NHPA).

Ms. Susan Pierce, Deputy State Historic Preservation Officer, requested that NSF provide your organization the information that was sent to her office on December 2 for your comments (Enclosures 1-3).

If you would like to comment, please respond 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.

We look forward to your response to this request. Should you have any questions, or wish to discuss the project or our agency's responsibilities in more detail, please contact me at epenteco@nsf.gov.

Sincerely,

Elizabeth Pentecost

Elizabeth Pentecost
Project Management Administrator
Alternate Contracting Officer's Representative

Enclosures:

1. Letter to Mr. Randall Reid-Smith, Commissioner, West Virginia Division of Culture and History, dated December 2, 12016
2. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*, May 2016
3. Email from SHPO's office with list of tribes with potential interest in West Virginia projects

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

DIVISION OF ASTRONOMICAL SCIENCES

January 12, 2017

Ms. Danielle La Presta Parker
The Preservation Alliance of West Virginia
421 Davis Avenue, #4
Elkins, WV 26241

Subject: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Ms. Parker:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. NSF has initiated consultation under Section 106 of the National Historic Preservation Act (NHPA).

Ms. Susan Pierce, Deputy State Historic Preservation Officer, requested that NSF provide your organization the information that was sent to her office on December 2 for your comments (Enclosures 1-3).

If you would like to comment, please respond 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.

We look forward to your response to this request. Should you have any questions, or wish to discuss the project or our agency's responsibilities in more detail, please contact me at epenteco@nsf.gov.

Sincerely,

Elizabeth Pentecost

Elizabeth Pentecost
Project Management Administrator
Alternate Contracting Officer's Representative

Enclosures:

1. Letter to Mr. Randall Reid-Smith, Commissioner, West Virginia Division of Culture and History, dated December 2, 12016
2. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*, May 2016
3. Email from SHPO's office with list of tribes with potential interest in West Virginia projects

Preservation Alliance of West Virginia
421 Davis Avenue
Elkins, WV 26241
304-345-6005
www.pawv.org

February 3, 2017

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

Re: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Ms. Pentecost,

Thank you for your letter dated January 12, 2017, regarding the Green Bank Observatory Operations. I am writing to submit comments regarding this project.

The Preservation Alliance of West Virginia (PAWV) would like to continue to be a consulting party during the Section 106 review of this National Historic Landmark and appreciate your initial outreach regarding this matter. PAWV recognizes the cultural importance of the Green Bank Observatory and also values its significance as an economic engine for West Virginia and Pocahontas County.

PAWV has received the packet sent by your office, and we have reviewed the preliminary proposed Alternatives. We support the following alternatives in this order (1 being most appealing and 3 being least appealing):

1. Continued NSF investment for science-focused operations;
2. Collaboration with interested parties for science- and education-focused operations with reduced NSF-funded scope; or
3. Collaboration with interested parties for operation as a technology and education park.

PAWV does not recommend mothballing the facilities and does not support the deconstruction of the Green Bank Observatory. Closing this facility would be a great detriment to the surrounding economy, and mothballing the property leaves the future of this important cultural

resource uncertain. It would be unfortunate for the property to be left vacant as it is a vital historic asset for West Virginia. There are financial incentives available to preserve the historic structure including historic preservation grants and historic rehabilitation tax credits. These grants and tax credits may help to alleviate any financial commitments related to maintaining this property.

These are all of the comments that PAWV has at this time. We look forward to working with you on this project.

Thank you for your consideration,

Danielle LaPresta Parker

Danielle LaPresta Parker
Executive Director

CC: Susan Pierce, West Virginia State Historic Preservation Office

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

May 18, 2017

Mr. Randall Reid-Smith, State Historic Preservation Officer
West Virginia Division of Culture and History
Historic Preservation Office
1900 Kanawha Boulevard East
Charleston, West Virginia 25305

RE: Transmittal of 48 Historic Property Inventory Forms for Section 106 Compliance for the Proposed Changes to Green Bank Observatory Operations, Green Bank, Pocahontas County, West Virginia

FR#: 17-49-PH-1

Dear Mr. Reid-Smith:

The National Science Foundation (NSF) initiated Section 106 consultation with the West Virginia Division of Culture and History, Historic Preservation Office (SHPO) on December 2, 2016, regarding the undertaking of Proposed Changes to Green Bank Observatory (GBO) Operations in Pocahontas County, West Virginia. Along with the Section 106 consultation letter, NSF transmitted a report to SHPO entitled *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia,* which included a historical context for the Observatory and determinations of eligibility. NSF requested input on the proposed area of potential effects (APE) and concurrence on the determination that there are four telescopes at GBO that are individually eligible for listing in the National Register of Historic Places (NRHP) and that the GBO is eligible for listing in the NRHP as a historic district.

On December 22, 2016, NSF received a response letter from the West Virginia SHPO that provided concurrence on the APE, which was defined as the property boundary for GBO. SHPO agreed that the Reber Radio Telescope (NR# 72001291), which was listed in the NRHP in 1972 and was named a National Historic Landmark (NHL) in 1986, remains historically significant. In addition, SHPO concurred that there are four additional GBO telescopes that are individually eligible for the NRHP, including:

1. Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer Control building (eligible under Criterion A);
2. 40-foot Telescope and control building (eligible under Criterion A);

Telephone (703) 292-8060 FAX (703) 292-9242

3. 43-meter (140-foot) Telescope (eligible under Criteria A and C); and
4. Robert C. Byrd Green Bank Telescope (GBT) (eligible under Criteria A and C and Criterion Consideration G).

NSF determined that GBO is eligible as a historic district for representing an important time in science history and for its significant contribution to the advancement of radio astronomy. The boundaries of the proposed GBO Historic District coincide with the site's property boundaries (and the APE). The December 22, 2016 response letter from SHPO noted that while it appears likely that the GBO is eligible for the NRHP as a historic district, additional documentation would be required for SHPO to concur with this assessment. SHPO requested that Historic Property Inventory (HPI) forms be completed for each resource at least 45 years old located at the GBO, as well as any resource less than 45 years old that may contribute to the potential historic district.

HPI forms were completed for a total of 48 resources, 44 of which NSF determined contribute to the GBO Historic District. Contributing elements include 8 administrative/operational buildings, 1 airstrip, 1 water tower, 1 recreational area, 24 residential (or formerly residential) buildings, 2 horns, 1 antenna, and 6 telescopes (the Interferometer includes 3 large telescopes). One contributing residence within the APE, the Riley House (PH-0331), was previously recorded in 2011; an updated HPI form was completed for this property. As a group, the 44 contributing resources are a distinct and well-preserved representation of the early years of the National Radio Astronomy Observatory (NRAO), complete with scientific instruments, administration/operational facilities, recreation area, and residential buildings. Additionally, the scientific instruments present on site illustrate a linear, historical narrative of the history of radio astronomy from the Jansky Replica Antenna and Reber Radio Telescope to the monumental GBT. With this letter, NSF is transmitting the 48 HPI forms for review and requesting concurrence on the determination that the GBO is an NRHP-eligible historic district containing 44 contributing resources.

We respectfully request a response within 30 days from receipt of this letter to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

The December 22, 2016, SHPO response letter also requested that NSF forward any comments received as a result of the Section 106 consultation process to the SHPO. The West Virginia SHPO provided NSF with a list of Native American tribes with historical ties to West Virginia. The Oneida Nation of Wisconsin notified NSF by email on November 9, 2016, that it is not interested in participating as a Consulting Party in the Section 106 process. NSF initiated

Section 106 consultation with the other identified Native American tribes by sending letters on December 12, 2016, to the following tribes:

- United Keetoowah Band of Cherokee Indians;
- Tuscarora Nation;
- Shawnee Tribe;
- Seneca-Cayuga Tribe of Oklahoma;
- Seneca Nation of Indians;
- Tonawanda Band of Seneca;
- St. Regis Mohawk Tribe;
- United Keetoowah Band of Cherokee Indians;
- Eastern Shawnee Tribe of Oklahoma;
- Delaware Tribe of Indians;
- Onondaga Nation;
- Eastern Band of Cherokee Indians;
- Cherokee Nation;
- Cayuga Nation; and
- Absentee Shawnee Tribe of Oklahoma.

No responses were received from the Native American tribes.

During the NEPA public scoping meetings held at the GBO on November 9, 2016, Section 106 public outreach was also addressed, and participants were invited to identify whether they would like to participate in Section 106 as a Consulting Party. The following individuals confirmed that they would like to participate as Consulting Parties:

- Daryl and Deana White
- Grayg Ralphsnyder

In response to the scoping meeting, 14 public comments were received that included references to cultural resources. These generally cited the historic significance of the GBO and its contributions to astronomy and the sciences in general.

Additional local organizations were contacted to verify whether they wished to participate as Consulting Parties in the Section 106 process. Letters were sent to the following organizations:

- Pocahontas County Historical Landmarks Commission
- Pocahontas County Historical Society
- Preservation Alliance of West Virginia

On December 30, 2016, Robert A. Sheets responded via email as the individual designated by the Pocahontas County Historical Landmarks Commission to serve as the Consulting Party representative. At SHPO's request, NSF provided the Pocahontas County Historical Society and

the Preservation Alliance of West Virginia with copies of the Section 106 initiation letter and attachments that were sent to SHPO on December 2, 2016. The Preservation Alliance of West Virginia sent a letter to NSF on February 3, 2017, indicating that it would like to continue as a Consulting Party during the Section 106 process. No other responses have been received to date.

A list of all evaluated resources, including each resource's HPI site number (provided by the staff historian at SHPO) and respective NRHP status, is included in Enclosure 1. An aerial map showing the GBO Historic District boundaries and locations of evaluated resources is included in Enclosure 2. Hard-copies of the 48 completed HPI forms are included in Enclosure 3. In addition, two CDs are included with this package: the first CD includes electronic copies of all the HPI forms and the second CD includes GIS data. A spreadsheet with the public scoping meeting comments relating to cultural resources, as well as Section 106 responses and comments received to date, are included in Enclosure 4. 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 your comments and further consultation on this proposed undertaking.

Regards,

Caroline M. Blanco

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

Cc: E. Pentecost
K. Hamilton
M. Rau, CH2M

Enclosures:

1. List of All Evaluated Properties at GBO
2. GBO Historic District Boundary
3. 48 HPI Forms (and 2 CDs)
4. Section 106 Correspondence

Enclosure 1

List of All Evaluated Properties at GBO

HPI Site Number	Resource Type	Resource Name	NRHP Status
PH-0907	Administrative/ operational	Karl Guthe Jansky Laboratory	Eligible as a contributing resource to the GBO Historic District
PH-0908	Administrative/ operational	Cafeteria Building and Residence	Eligible as a contributing resource to the GBO Historic District
PH-0909	Administrative/ operational	Warehouse	Eligible as a contributing resource to the GBO Historic District
PH-0910	Other	Water Tower	Eligible as a contributing resource to the GBO Historic District
PH-0911	Administrative/ operational	Works Area Building	Eligible as a contributing resource to the GBO Historic District
PH-0912	Administrative/ operational	Telescope Mechanics Office (formerly Cable Storage Warehouse)	Eligible as a contributing resource to the GBO Historic District
PH-0913	Administrative/ operational	Millimeter Array Experiment Building	Eligible as a contributing resource to the GBO Historic District
PH-0914	Administrative/ operational	Outdoor Test Building	Eligible as a contributing resource to the GBO Historic District
PH-0915	Administrative/ operational	Laser Lab (formerly 300' Telescope Control Building)	Eligible as a contributing resource to the GBO Historic District
PH-0916	Other	Airstrip	Eligible as a contributing resource to the GBO Historic District
PH-0917	Other	Recreation Area	Eligible as a contributing resource to the GBO Historic District
PH-0918	Other/storage	Barn	Not eligible/non-contributing
PH-0919	Other/storage	Barn	Not eligible/non-contributing
PH-0920	Other/storage	Barn	Not eligible/non-contributing
PH-0921	Vacant	Slaven Hollow Orchard Cellar Building	Not eligible/non-contributing
PH-0922	Residential	Redwood House; Director's House (House #1)	Eligible as a contributing resource to the GBO Historic District
PH-0923	Residential	House #2 (Rabbit Patch) - 2 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0924	Residential	House #3 (Rabbit Patch) - 3 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0925	Residential	House #4 (Rabbit Patch) - 4 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0926	Residential	House #5 (Rabbit Patch) - 5 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0927	Residential	House #6 (Rabbit Patch) - 6 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0928	Residential	House #7 (Rabbit Patch) - 7 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0929	Residential	House #8 (Rabbit Patch) - 8 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0930	Residential	House #9 (Rabbit Patch) - 9 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0931	Residential	House #10 (Rabbit Patch) - 10 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0932	Residential	House #11 (Rabbit Patch) - 11 Rabbit Patch	Eligible as a contributing resource to the GBO Historic District
PH-0933	Residential	House #14 - 14 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District
PH-0934	Residential	House #16 - 16 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District
PH-0935	Residential	House #19 - 19 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District

PH-0936	Residential	House #21 - 21 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District
PH-0937	Residential	House #23 - 23 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District
PH-0938	Residential	House #24 - 24 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District
PH-0939	Residential	Shinnaberry House - 20 Route 28	Eligible as a contributing resource to the GBO Historic District
PH-0940	Residential	Nut Bin	Eligible as a contributing resource to the GBO Historic District
PH-0331 Updated	Residential	Riley House (#15) - 15 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District
PH-0941	Residential	Hill House (#17) - 17 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District
PH-0942	Residential	Tracy House (#18) - 18 Hannah Run Road	Eligible as a contributing resource to the GBO Historic District
PH-0943	Vacant	Beard House	Eligible as a contributing resource to the GBO Historic District
PH-0944	Residential	Hannah House	Eligible as a contributing resource to the GBO Historic District
PH-0945	Telescope/ instrument (no longer in active use)	Calibration Horn	Eligible as a contributing resource to the GBO Historic District
PH-0946	Telescope/ instrument (display)	Karl Guthe Jansky Replica Antenna	Eligible as a contributing resource to the GBO Historic District
PH-0947	Telescope/ instrument (display)	Ewen-Purcell Horn	Eligible as a contributing resource to the GBO Historic District
PH-0948	Telescope/ instrument (no longer in active use)	Interferometer Range: Includes Howard E. Tatel (85'-1) Telescope and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer Control Building	Individually eligible under Criterion A (SHPO concurrence 2016); contributes to the GBO Historic District
PH-0949	Telescope/ instrument	40' Telescope & 40' Telescope Control Building	Individually eligible under Criterion A (SHPO concurrence 2016); contributes to the GBO Historic District
PH-0950	Telescope/ instrument	140' Telescope (43m Telescope)	Individually eligible under Criteria A and C (SHPO concurrence 2016); contributes to the GBO Historic District
PH-0951	Telescope/ instrument	45' Telescope	Eligible as a contributing resource to the GBO Historic District
PH-0952	Telescope/ instrument	Robert C. Byrd Green Bank Telescope (GBT)	Individually eligible under Criteria A and C and Criterion Consideration G; contributes to the GBO Historic District
PH-0953	Telescope/ instrument (display)	Reber Radio Telescope	Listed in the NRHP in 1972; named a NHL in 1986; contributes to the GBO Historic District

Enclosure 2

GBO Historic District Boundary

Building / Structure Name

Administrative / Operational

1. Karl Guthe Jansky Laboratory
2. Cafeteria Building and Residence
3. Warehouse
4. Water Tower
5. Works Area Building
6. Telescope Mechanics Office (formerly Cable Storage Warehouse)
7. Millimeter Array Experiment Building
8. Outdoor Test Building
9. Laser Lab (formerly 300' Telescope Control Building)
10. Airstrip
11. Recreation Area
12. Barn
13. Barn
14. Barn
15. Slaven Hollow Orchard Cellar Building

Residential Buildings

16. Redwood House (House #1; Director's House)
17. House #2 (Rabbit Patch)
18. House #3 (Rabbit Patch)
19. House #4 (Rabbit Patch)
20. House #5 (Rabbit Patch)
21. House #6 (Rabbit Patch)
22. House #7 (Rabbit Patch)
23. House #8 (Rabbit Patch)
24. House #9 (Rabbit Patch)
25. House #10 (Rabbit Patch)
26. House #11 (Rabbit Patch)
27. House #16
28. House #14
29. House #19
30. House #21
31. House #23
32. House #24
33. Shinnaberry House
34. Nut Bin
35. Riley House (#15)
36. Hill House (#17)
37. Tracy House (#18)
38. Beard House
39. Hannah House

Structures / Telescopes

40. Calibration Horn
41. Karl Guthe Jansky Replica Antenna
42. Ewen-Purcell Horn
43. Green Bank Interferometer: Includes Howard E. Tatel (85'-1) Telescope & 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope; and the Interferometer Control Building
44. 40' Telescope & 40' Telescope Control Building
45. 140' Telescope (43m Telescope) & maintenance structure
46. 45' Telescope
47. Robert C. Byrd Green Bank Telescope (GBT)
48. Reber Radio Telescope

Aerial photo source: Google ©2014, modified by CH2M HILL

LEGEND

- NRHP Contributing
- NRHP Non-Contributing
- NRHP Individually Eligible
- NRHP Individually Listed
- Surveyed Property
- Historic District Boundary

North

0 1,000

Approximate scale in feet

GBO Historic District
Green Bank Observatory
Pocahontas County, West Virginia

CH2MHILL

Enclosure 3

48 HPI Forms (and 2 CDs)

Enclosure 4

Section 106 Correspondence

Comment Number	Segment Number	First Name	Last Name	Affilation	Comment	Date Comment Received
49	b	Adam	Taylor	Community Member/Small Business Owner	I also feel that the historic value of the numerous telescopes is significant to mankind. Many break throughs in modern science were derived right here in Greenbank, West Virginia and with options 3-5 that history could be lost and/or forgotten.	11/9/2016
54	d	Erica	Engquist	Community Member	Handwritten notes on letter: - Deer Creek Valley = Fort Warwick 1774 site	11/9/2016
116	a	Michael	Holstine		Please accept this email as comment to the EIS statement being prepared by the NSF with regards to the Green Bank Observatory. As I am certain that you have been inundated with emails concerning the socio-economic impact of the Observatory to the local community, County and State, it is important to also note the historic factors existing at the site. The Observatory houses a replica and display of the original Jansky antenna used to first detect and quantify radio waves coming from the Milky Way galaxy. Across the road from the Jansky antenna exists the actual and original Reber Telescope, donated to the site by Grote Reber and registered on the National Registry of Historic Places. Both of these antennae have been utilized to recreate their original discoveries. Remember, these represent the birth of radio astronomy. Further down the site exist telescopes used for original interferomtery and corelator experiments, the 40' telescope (the first fully computer-controlled radio telescope in the world, and now refitted as a fully manually-controlled telescope for education purposes), the 40m telescope (a polar-mount telescope with the largest spherical bearing ever produced at its tolerances), and the GBT (the largest fully steerable telescope in the world). It is amazing that all of these telescopes, varied and precisely built, all exist in one unique location - Green Bank. It is inestimable the value that can be placed on such a unique suite of instruments all in one place.	11/24/2016
148		Eric	Briggs		The past week in November is auspicious for several NRAO anniversaries: the foundation of the agency in 1956 and the collapse of the 300-foot transit in 1988 to name a few. Over the past 10 years I have gained good experience in studying historic observatories. I have watched the original film about the difficult completion of the 140 foot equatorial dish at Green Bank, and from that I can tell how often we should have to replace the previous generation's largest telescopes: Not Often. I have visited the GBT just this last month for the first time and I hope to return for many more visits. Please, everyone work together on this one.	11/26/2016
193	f	Joe	Swiggum	Postdoctoral Research Associate Center for Gravitation, Cosmology, and Astrophysics	In addition, the elimination of this scientific institution will remove a technology center in a region with few skilled positions. Even conversion to an education and technology center would still likely result in the export of a number of good-paying jobs to higher tech areas of the country. The people of Pocahontas County are proud of the observatory. At the November 2016 public comment meeting regarding the future of the GBO, not a single person complained about living in the National Radio Quiet Zone, and the public was clearly supportive of continued public funding of the GBO. As you can see, the scientific, socioeconomic, and cultural impacts of reducing NSF funding for GBO are numerous and severe. Such action would be a huge loss for my career, the careers of my colleagues, the NANOGrav collaboration, the US astronomical community, and the people of Pocahontas County, West Virginia. I urge NSF to adopt the no-action alternative in the strongest possible terms. Thank you for your consideration. If you have any questions or need further information, please contact me at the address above.	11/25/2016
260	e	J. Bruce	McKean		The historical telescopes on this site must remain as a museum/ tourist attraction forever. Just as the Civil War battlefields in the area continue to draw visitors to this area, so do the historical telescopes. Local people gave up their farms and homes for this site to become a world center for radio astronomy, and the NSF should give back to their offspring.	11/22/2016
261	a	John	Saunders		I have close family that are lifelong residents of Pocahontas County, and a few of those are in Green Bank. While the GBO is in fact an absolute critical employer in that area of the country it's sooo much more than that! It's an institution, with historical significance akin to any memorial of the Civil War, or the home Wilma Lee Cooper!	11/22/2016
379		Lawrence	Matson		Unfortunately, I just received notification of a comment period now. My abbreviated comment is simply that the historical, educational, and scientific benefit of this site exceeds the costs as well as benefits of other expenditures currently being made. Deconstruction would be a very poor option.	11/19/2016
453	a	Daniel	Keeney		I ask that, beyond questions raised as to compliance with the intent and purpose of the public scoping process, you reconsider any thoughts to close the Green Bank Observatory, which is and has been of such importance to all. Beyond the direct benefit to science, the greater concern for society should be the inspiration of our children: Have considered the GBO's impact upon them? As to the unimaginable possibility that the National Science Foundation might actually erase this treasure from our world? The impact upon places of historical importance are obvious: Green Bank Observatory IS one, in and of itself. The NSF may choose to close Green Bank, or even dismantle it and perform site restoration, effectively erasing much more than a treasured monument of historical significance. After all … it is still being useful and productive, even as I type today.	11/17/2016

468	a	Terry and Dodi	Shore		We do not need to remind you of the cultural and historical significance of the Green Bank Observatory. That heritage is well established and forever will be a part of the scientific community's group memory. And while we understand that the reasons for soliciting public input on the fate of the observatory are budgetary and concern the ability of the NSF to adequately fund future science, that history must be a consideration in any determination of the value of Green Bank.	11/16/2016
470		Catherine	Lally	Jet Propulsion Laboratory Earth Science and Technology Directorate Sentinel-6 | SWOT Jet Propulsion Laboratory	My name is Cathy Lally and I am a native West Virginian currently working at the Jet Propulsion Laboratory in Pasadena, California. During my previous work experience at the NASA West Virginia Space Grant Consortium, I became very familiar with the Green Bank Observatory and had the opportunity to spend a weekend there during a board of director's meeting in 2012 (see attached photo). Recently, I became aware that the National Science Foundation will be evaluating the environmental impact of the GBO which will result in operational changes at the facility. Obviously, I am concerned about the "deconstruction and site restoration" option and here is why: 1. The Observatory is crucial for maintaining STEM (Science, Technology, Engineering, Mathematics) outreach and opportunities in the state of West Virginia. 2. The Green Bank Telescope is a historical landmark. 3. The Observatory is a source of pride for the state of West Virginia. The people of West Virginia are in dire need of support from the science community. Organizations like the NASA WV Space Grant have spent countless hours on cultivating STEM opportunities for children and adults in our state. To consider deconstruction of a facility that significantly aids in that effort would be a devastating blow to the state. The sense of pride that is associated with the GBO, as well as the historical importance, is undeniable and so obvious that it does not require explanation. I understand that operational changes at the facility are inevitable. However, I implore the NSF to not pursue the route of deconstruction. Thank you for your time and consideration regarding this matter.	11/16/2016
639	b	Mike	Hedrick		3. A facility for the scientific community, in this rural area, on the east coast, and so close to so many collages, in the "National Quite Zone, that if it is ever lost, will not ever be regained " a place that can be used to prototype, try new ideas, new one of the kind receivers, or a whole new line of thought, with the infrastructure already here, the lab, the Machine shop, the Electrical shop, Carpenter shop, Plumbers shop, Mechanic shop, and with people with the ability to help and show how to learn, build and complete any project.	11/10/2016

640		Diane	Schou		Below are comments for the NSF for support of the Green Bank Observatory from another perspective of people harmed by electromagnetic radiation (EMR) and their exposure to environments with higher levels of EMR: • Air quality considerations: Studies to detect changes of EMR in the radio quiet zone are valuable. o Why do several people detect unusual EMR at the same time, yet they live a distance apart? What are thei emissions that injure some people? o Funding is requested to measure, log, and document emissions, and correlate resulting effects. o To help the observatory, 1) some persons are better than meters. 2) these people choose to live without EMR and hence are good neighbors in the environment near the Green Bank Observatory.• Safety, health, and long-term biological effects are important to study in this unique environment here.o EMR levels are increasing, injure biological systems, and there may be nowhere else that is as protected as the unique environment around Green Bank, West Virginia.o Before coming to this extra protected area many of us became injured from EMR emissions and escaped to live elsewhere in a car, tent, shed or cave. We lived without easy access to food, water, and without protection from weather. We also lived without contact to other people because of the wireless communication devices they carried (not commonly done in Green Bank).▪ Cities have many, many emissions, and rural areas often have stronger emissions (likely vecause EMR have to travel farther for communication systems). Then we found Green Bank, in the National Radio Quiet Zone and our health has improved here. • We feel we are an endangered species, harmed by EMR as well as are animals, plants, and other systems on earth. It would be of value to use this area as a control in tests. o Needs for EMR people include a life without injury and pain from unnatural EMR exposures. • Social economics o Before discovering Green Bank, many of us left family, friends, careers, and homes (at great financial loss) and escaped to and lived in almost primitive environments such as in cars, tents, sheds, and caves. Many of us are college educated and could contribute, but at this stage the first focus is on survival. The urgent question is will this happen to many more people soon?o Without the Green Bank Observatory, there would not be security or a support system for us to contribute to in a manner to better prepare for others to understand coping with EMR. • National Historical Preservation: Green Bank's radio observatory's protected National Radio Quiet Zone is rare both in the United States of America and in the world.o People move to Green Bank for 1) safety (much electromagnetic radiation is unnatural and man- made), 2) security because people injured by EMR find no other protected quiet zone and 3) social connections with people as this is a humane place to live (versus in a remote cave or in a car). • Recommend expanding research at the Green Bank Observatory with goals to study physical needs.o Why do many people detect EMR? Additional funding is needed to measure, log and report EMR, especially the EMR that is artificial. Perhaps the NSF would fund this as a different entity, (i.e. in addition to or other than astronomy)? o There is also a facility for sale that could become a humane refuge at Sugar Grove, WV. Could the NSF purchase this facility, and/or work with other government groups there? People harmed by EMR would be good neighbors, not needing cell phones, wi-fi, or other wireless devices. And vice versa, we need the Green Bank Observatory National Radio Quiet Zone's survival and protection.	11/10/2016
641		Jeffrey	Mears	Environmental Area Manager Oneida Nation Environmental Health & Safety Division	The Oneida Nation, located in Wisconsin, is not interested in participating as a consulting party at this time. I can serve as the Point of Contact for any questions. Please see my contact information listed below.	11/9/2016

From:	Jeffrey M. Mears
To:	"epenteco@nsf.gov"
Cc:	Patrick J. Pelky
Subject:	Notice of Intent To Prepare an Environmental Impact Statement and Initiate Consultation for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia
Date:	Wednesday, November 9, 2016 9:06:17 AM
Attachments:	image001.png image002.png

Hi Elizabeth,

The Oneida Nation, located in Wisconsin, is not interested in participating as a consulting party at this time.

I can serve as the Point of Contact for any questions. Please see my contact information listed below.

From: Pentecost, Elizabeth A. [mailto:epenteco@nsf.gov]
Sent: Monday, November 07, 2016 12:00 PM
To: Communications_Department
Subject: Notice of Intent To Prepare an Environmental Impact Statement and Initiate Consultation for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia; Notice of Public Scoping Meetings and Comment Period

To Whom It May Concern,

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 operational changes due to funding constraints for Green Bank Observatory, in Green Bank, West Virginia. On October 19, 2016, NSF announced the beginning of the scoping process to solicit public comments and identify issues to be analyzed in the EIS. At this juncture, NSF welcomes public comments on the preliminary proposed alternatives and resource areas identified for analysis. NSF also intends to initiate consultation under Section 106 of the National Historic Preservation Act to evaluate potential effects, if any, on historic properties as a result of the Proposed Action.

NSF invites the Oneida Tribe of Wisconsin to participate in this EIS process. We would appreciate a Point of Contact and email address so that we can provide the Oneida Tribe with additional information and ask if they would like participate as a Consulting Party in the EIS process.

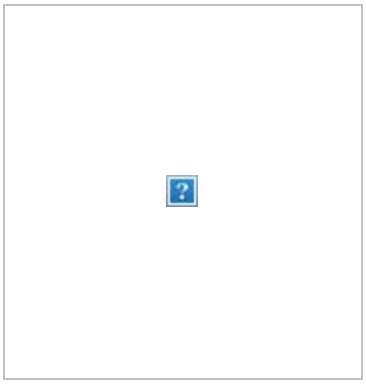
Sincerely,

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

Yaw^ko (Thank you),

Jeffrey M. Mears, MPA
Environmental Area Manager
Oneida Nation
Environmental Health & Safety Division
P.O. Box 365
Oneida, WI 54155
Office 920/869-4555
Cell 920/639-7457
jmears@oneidanation.org



From: Grayg Ralphsnyder (US)
To: Pentecost, Elizabeth A.
Cc: Grayg Ralphsnyder (US)
Subject: RE: EIS for Green Bank Observatory - Identification of Consulting Parties
Date: Wednesday, December 14, 2016 9:23:36 PM

Elizabeth,

I would like to be involved with this project.

thank you ,
grayg

Grayg Ralphsnyder - KC8SVT
Electrical Engineer
DRA Global
Phone 304 220 6306
Mobile 304 860 7459
grayg.ralphsnyder@draglobal.com
4996 Elk River Road South
Elkview, West Virginia 25071

- be safe man -

From: Pentecost, Elizabeth A. [mailto:epenteco@nsf.gov]
Sent: Thursday, December 08, 2016 5:07 PM
To: Grayg Ralphsnyder (US)
Subject: EIS for Green Bank Observatory - Identification of Consulting Parties

December 8, 2016

Subject: Identification of Consulting Parties for Section106 Compliance for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Mr. Ralphsnyder:

Please disregard the earlier email. There was a cut/paste error. At this time NSF has not identified a preferred alternative.

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. NSF has initiated consultation under Section 106 of the National Historic Preservation Act (NHPA).

The Reber Radio Telescope located within GBO is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

NSF will be conducting an Environmental Impact Statement (EIS) 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 science- and education-focused operations with reduced NSF-funded scope.

- Collaboration with interested parties for operation as a technology and education park.

- 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 CFR Part 800.2[5]). You indicated an interest in participating as a consulting party at the NEPA scoping meeting on November 9, 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 potential 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 January 5, 2017 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 time frame, you may request consulting party status in the future; however, the project may advance without your input and you won't have an opportunity to comment on the previous steps. If you are requesting consulting party status as part of an organization, 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 epenteco@nsf.gov.

Sincerely,

Elizabeth Pentecost
Project Management Administrator
Division of Astronomical Sciences

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

From: Robert Sheets
To: epenteco@nsf.gov
Subject: Pocahontas County Historical Landmarks Commission
Date: Friday, December 30, 2016 8:09:43 PM

Dear Ms. Pentecost,

My name is Robert A. Sheets. I am a member of the Pocahontas County Landmarks Commission and I have been designated by the Commission to serve as the representative on behalf of PCLC as a consulting party in the Section 106 process. Mr. Jason Bauserman, our president, will be the alternate representative.

My contact information is:

Robert A. Sheets
450 Fort Warwick Passage
Green Bank, WV 24944
304-456-4815 (H)
email: fortwarwick@gmail.com

Mr. Bauserman's contact information is:

Jason Bauserman
106 Bauserman Loop
Bartow, WV 24920
304-456-4915
jbauserman@frontiernet.net

Sincerely,

Robert A. Sheets
Dec. 30, 2016

From: DARYL WHITE
To: Pentecost, Elizabeth A.
Subject: Re: EIS for Green Bank Observatory - Identification of Consulting Parties
Date: Monday, January 2, 2017 8:08:19 PM

Hello! Thank you for sending this email. I did sign up as an interested party at the Green Bank Observatory Public Hearing on November 9th. I would like to participate as a consulting party or have my wife, Deana White, participate on my behalf, however, we were uncertain if we qualify. We are concerned citizens - and are advocates for the GBO in all respects - the science community, the STEM education community, the Green Bank and surrounding communities, as well as for the historical significance this site represents. As it is the original NRAO site, it houses the Grote Reber radio telescope, and has a long and rich history contributing to radio astronomy and scientific discovery as we have been lucky enough to learn about and hear from renowned astronomer Dr. Frank Drake. Please let us know if we are eligible to participate.

Thank you,

Daryl And Deana White
Home phone 304 733 5781

Sent from my iPhone

On Dec 6, 2016, at 9:17 AM, Pentecost, Elizabeth A. <epenteco@nsf.gov> wrote:

> December 6, 2016
>
> Subject: Identification of Consulting Parties for Section106 Compliance for Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia
>
> Dear Mr. White:
>
> The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. NSF has initiated consultation under Section 106 of the National Historic Preservation Act (NHPA).
>
> The Reber Radio Telescope located within GBO is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.
>
> NSF will be conducting an Environmental Impact Statement (EIS) 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 science- and education-focused operations with

reduced NSF-funded scope (Agency-Preferred Alternative).

• Collaboration with interested parties for operation as a technology and education park.

• 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 CFR Part 800.2[5]). You indicated an interest in participating as a consulting party at the NEPA scoping meeting on November 9, 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 potential 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 January 5, 2017 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 time frame, you may request consulting party status in the future; however, the project may advance without your input and you won't have an opportunity to comment on the previous steps. If you are requesting consulting party status as part of an organization, 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 epenteco@nsf.gov.

Sincerely,

Elizabeth Pentecost
Project Management Administrator
Division of Astronomical Sciences

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

Preservation Alliance of West Virginia
421 Davis Avenue
Elkins, WV 26241
304-345-6005
www.pawv.org

February 3, 2017

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

Re: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Ms. Pentecost,

Thank you for your letter dated January 12, 2017, regarding the Green Bank Observatory Operations. I am writing to submit comments regarding this project.

The Preservation Alliance of West Virginia (PAWV) would like to continue to be a consulting party during the Section 106 review of this National Historic Landmark and appreciate your initial outreach regarding this matter. PAWV recognizes the cultural importance of the Green Bank Observatory and also values its significance as an economic engine for West Virginia and Pocahontas County.

PAWV has received the packet sent by your office, and we have reviewed the preliminary proposed Alternatives. We support the following alternatives in this order (1 being most appealing and 3 being least appealing):

1. Continued NSF investment for science-focused operations;
2. Collaboration with interested parties for science- and education-focused operations with reduced NSF-funded scope; or
3. Collaboration with interested parties for operation as a technology and education park.

PAWV does not recommend mothballing the facilities and does not support the deconstruction of the Green Bank Observatory. Closing this facility would be a great detriment to the surrounding economy, and mothballing the property leaves the future of this important cultural

resource uncertain. It would be unfortunate for the property to be left vacant as it is a vital historic asset for West Virginia. There are financial incentives available to preserve the historic structure including historic preservation grants and historic rehabilitation tax credits. These grants and tax credits may help to alleviate any financial commitments related to maintaining this property.

These are all of the comments that PAWV has at this time. We look forward to working with you on this project.

Thank you for your consideration,

Danielle LaPresta Parker

Danielle LaPresta Parker
Executive Director

CC: Susan Pierce, West Virginia State Historic Preservation Office

WEST VIRGINIA
Division of Culture and History

The Culture Center
1900 Kanawha Blvd., E.
Charleston, WV 25305-0300
Randall Reid-Smith, Commissioner
Phone 304.558.0220 • www.wvculture.org
Fax 304.558.2779 • TDD 304.558.3562
EEO/AA Employer

June 12, 2017

Mr. James Ulvestad
Division Director, Division of Astronomical Sciences
National Science Foundation
4201 Wilson Boulevard
Arlington, Virginia 22230

RE: NEPA Analysis for Changes to Green Bank Observatory Operations
FR#: 17-49-PH-2

Dear Mr. Ulvestad:

We have reviewed the additional information submitted for the above-mentioned project to determine its effects to cultural resources. As required by Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties," we submit our comments.

According to submitted information, the National Science Foundation (NSF) plans to complete an Environmental Impact Statement (EIS) to evaluate potential effects of proposed operational changes at the Green Bank Observatory (GBO) in Pocahontas County, West Virginia. This additional information was prepared in response to our request in a letter dated December 22, 2016,

Architectural Resources:
As stated in our December 22, 2016 letter, our office agreed that the area of potential (APE) for this project was defined as the property boundary of the GBO. We also concurred that four (4) of the telescopes at GBO were individually eligible for the National Register of Historic Places, and the Reber Radio Telescope (NR# 72001291), which was listed in the National Register in 1972 and as a National Historic Landmark in 1986, retained its historical significance. While we felt that the GBO, as a whole, may represent a National Register-eligible historic district, we requested additional documentation and evaluation of all resources older than 45 years of age within the property boundary of the GBO to confirm this conclusion.

Thank you for the submission of the Historic Property Inventory forms. We have reviewed the submitted documentation and concur with the NSF that the GBO is eligible as a historic district under Criteria A for its significant contribution to radio astronomy and under Criteria C for its various unique instruments engineered to study the universe, as well as an excellent example of a scientific campus. Of the 48 documented resources over 45 years of age on the GBO, we agree that four resources, barns (PH-0918–PH-920) and the orchard cellar building (PH-0921) do not contribute to the National Register-eligible GBO historic district and are not individually eligible for the National Register because they were never used for anything beyond random storage for the GBO and lack individual significance. However, because these resources are associated with agriculture, it is possible that additional survey, outside the scope of this project, could reveal that these resources contribute to an agricultural historic district within the region.

We concur that the remaining 44 resources contribute to the National Register-eligible GBO historic district. This includes the four telescopes previously determined to be individually eligible for the National Register (PH-0948–PH-0950 and PH-0952), as well as the Reber Radio Telescope (NR# 72001291; PH-0953). The remaining

contributing resources (PH-0331; PH-0907–PH-0917; PH-0922–PH-0947; and PH-0952) include 24 residential buildings, eight administrative/operational buildings, two horn antennas, one telescope, a replica antenna, an airstrip, a water tower, and a recreational area. We agree that none of these remaining contributing resources are individually eligible for the National Register.

Because a preferred alternative for the GBO project has not yet been chosen, an assessment of potential effects resulting from the proposed project cannot be completed at this point. As the EIS process continues and a preferred alternative is developed, please provide our office an assessment of the potential effects to the National Register-eligible GBO, as well as any of the individually eligible or listed resources, resulting from the preferred alternative. We look forward to continuing our participation in the Section 106 process and will provide additional comments once we receive the details regarding the NSF's preferred alternative and the assessment of effects.

Public Comments:
We note that the NSF received an email from the Oneida Nation of Wisconsin on November 9, 2016 indicating that they are not interested in becoming a consulting party. Also, we note that your office sent letters on December 12, 2016 about the proposed project to the 15 Native American tribes identified by our office with historical ties to West Virginia. No response has been received from these tribes. During the November 9, 2016 NEPA public scoping meeting, three individuals (Daryl and Deana White and Grayg Ralphsnyder) confirmed their desire to be included as consulting parties.

The Pocahontas County Historical Landmarks Commission (PCHLC), the Pocahontas County Historical Society (PCHS), and the Preservation Alliance of West Virginia (PAWV) were also notified about the project. On December 30, 2016, Robert A. Sheets, designated representative of the PCHLC, notified NSF via email of his organization's interest in being included as a consulting party. On February 3, 2017, the PAWV sent a letter to the NSF to indicate that the PAWV would like to continue as a consulting party for this project. In addition, several public comments regarding the cultural and historical significance of the GBO were received during the public comment period, which NSF included with this submittal. No other responses had been received by the NSF at the time of submittal. We understand that any further correspondence or comments will be sent to our office.

We appreciate the opportunity to be of service. *If you have questions regarding our comments or the Section 106 process, please contact Benjamin M. Riggle, Structural Historian, at (304) 558-0240.*

Sincerely,

Susan M. Pierce
Deputy State Historic Preservation Officer

SMP/BMR

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

August 7, 2017

Ms. Kim Penrod
Director of Cultural Resources
Delaware Nation
P.O. Box 825
Anadarko, OK 73005

RE: Section 106 Consultation for the Proposed Changes to Green Bank Observatory Operations, Green Bank, West Virginia

Dear Ms. Penrod:

The National Science Foundation (NSF) 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. Green Bank Observatory (GBO) in Green Bank, Pocahontas County, West Virginia, is one of the facilities identified for potential divestment. The decision regarding the potential changes to GBO operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act (NHPA), NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. With this letter, NSF is formally initiating Section 106 consultation under the NHPA and transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (Enclosure 1) for your review and comment.

Project Location and Background

GBO is located on federal lands adjacent to the Monongahela National Forest. This land is owned by NSF and consists of numerous parcels that were acquired/condemned by the U.S. Army Corps of Engineers in the 1950s when GBO was formed as the first (and then, only) site of the National Radio Astronomy Observatory (NRAO). The GBO is the anchor and administrative site of the 13,000-square-mile National Radio Quiet Zone (NRQZ) and is situated on approximately 2,200 acres in the NRQZ, where all radio transmissions are limited. The GBO facility has a long history of science, technology, engineering, and mathematics education, ranging from student training and mentorships through the outreach and training opportunities offered through the NRAO Center for

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Science Education, which is based at the GBO site. More than 40,000 visitors each year pass through the Green Bank Science Center, including students, educators, and the general public who generally stay on site for more than one night to take advantage of the educational facilities. The GBO facility is host to multiple educational workshops and programs each year for middle school through post-graduate student training, and an average of 10 to 15 undergraduate and graduate students are mentored at the facility each year.

GBO facilities include the Green Bank Telescope; 43-meter telescope (also referred to as the 140-foot telescope); Green Bank Solar Radio Burst Spectrometer (45-foot telescope); Interferometer Range (includes three 85-foot diameter telescopes); 20-meter Geodetic Telescope; 40-foot telescope; three non-operational historical telescopes (Jansky Replica Antenna, Reber Radio Telescope, and Ewen-Purcell Horn); and other support facilities and infrastructure.

Project Description

NSF's Division of Astronomical Sciences (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 funding for the GBO has been established through a number of reviews and surveys conducted by the science community.

In 2014, CH2M conducted a Cultural Resources Evaluation for the architectural resources at the GBO. The results of the survey are included below under "Determinations of Eligibility." The associated technical report, entitled *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*, is attached for reference (Enclosure 1).

A range of preliminary proposed Alternatives is being considered for evaluation. These preliminary proposed Alternatives, which will be refined through public input, include the following:

- Continued NSF investment for science-focused operations (No-Action Alternative).

- Collaboration with interested parties for science- and education-focused operations with reduced NSF-funded scope.

- Collaboration with interested parties for operation as a technology and education park.

- Mothballing of facilities (suspension of operations in a manner such that operations could resume efficiently at some future date).

- Deconstruction and site restoration.

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

Proposed Area of Potential Effects

The Area of Potential Effects (APE) proposed for the project is defined as the property boundary of GBO. The total geographic area of the Observatory was chosen as the APE to encompass all buildings and structures on the property. This inclusive APE enables a determination of whether GBO constitutes a potential historic district that could be affected by the activities associated with the proposed changes to operations at the Observatory. Figure 2-1 included in Enclosure 1 shows the boundaries of the APE. The West Virginia State Historic Preservation Office (SHPO) concurred with the APE in a letter dated December 22, 2016.

Public Involvement

A Notice of Intent (NOI) was published in the Federal Register on October 19, 2016 to initiate the public scoping process for the EIS. A revised NOI was published on November 1, 2016. Two Public Scoping Meetings were conducted on November 9, 2016, at GBO. Section 106 public outreach was addressed as part of the public meeting, and participants were invited to identify whether they would like to participate in Section 106 as a consulting party. NSF followed up with these potential consulting parties to confirm their interest. A separate Section 106 consulting party meeting will be scheduled following the release of the Draft EIS this fall. Follow-up discussions with consulting parties will occur as needed.

Previously Identified Historic Properties

A literature review was conducted through the West Virginia SHPO Interactive Map on November 7, 2016. The literature review focused on the APE and included a 0.5-mile study area.

The Reber Radio Telescope is the only structure or building located within GBO that is listed in the NRHP. It was listed in the NRHP in 1972 and designated a National Historic Landmark in 1986. The telescope was listed under Criteria A and B for its nationally significant association with the origins of radio astronomy and for its association with Grote Reber.

One residence within the APE, the Riley House (House #15), was previously recorded in 2011. The associated survey form states that the early twentieth-century wood-frame

farm house does not appear to be significant under NRHP Criterion C. The literature review did not identify any prior cultural resources surveys that have occurred within the APE. Two archaeological sites and nine architectural resources have been recorded outside of the APE, along State Routes 28 and 92, directly adjacent to the eastern boundary of the Observatory. The two previously recorded archaeological resources were not evaluated for the NRHP. One of the architectural resources, the Liberty Presbyterian Church on State Route 92 that was constructed in 1851, is described as significant as an excellent example of Greek Revival architecture, although no formal NRHP evaluation is included with the survey form. The church was recorded on two West Virginia Historic Property Inventory Forms (PH-0002 and PH-0037-0018). Four architectural resources were evaluated as not eligible for the NRHP and three buildings were recorded, but not evaluated for the NRHP. The cultural resources that have been previously recorded within or directly adjacent to the APE are listed below in Table 1. In addition, two surveys (a bridge survey and a cultural resources survey) have occurred and 34 additional cultural resources have been identified within the 0.5-mile study area.

TABLE 1. Previously Recorded Cultural Resources Within and Directly Adjacent to the APE*

Resource Name	Description	Status	Recorded by
Reber Radio Telescope	1937 telescope located at the entrance to GBO within APE	NRHP listed 1972; National Historic Landmark 1986	National Register of Historic Places Registration Form
Riley House (House #15) PH-0331	Circa 1915 farm house within APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Liberty Presbyterian Church PH-0002 PH-0037-0018	1851 Greek Revival Church adjacent to APE	Not formally evaluated for the NRHP, but described as "significant as an excellent example of Greek Revival architecture in the area"	Michael Gioulis (Historic Preservation Consultant); 1993
George Porter Kerr House – Historic Orlan Shears House PH-0037-0040	Circa 1901 residence adjacent to APE	Not evaluated for the NRHP	Sherron Waybright; 1986

Dr. J.P. Mooumau House PH-0037-0044	1873 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986
Hamed House PH-0037-0048	1910 residence adjacent to APE	Not evaluated for the NRHP	Jessie B. Powell; 1986
Jack Nelson House PH-0209	Circa 1900 residence adjacent to the APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
Jerry Thortnon House PH-0210	Circa 1880-1890 vernacular residence adjacent to APE	Not eligible for the NRHP	Jeff Drobney (Skelly and Loy, Inc.); 1996
PH-0326	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0327	Circa 1920 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
PH-0332	1949 bungalow residence adjacent to APE	Not eligible for the NRHP	Justin Greenawalt and Mary Stack (Skelly and Loy, Inc.); 2011
Shinaberry's Fifth Grade Site 46-PH-64	Prehistoric open archaeological site adjacent to APE	Not evaluated for the NRHP	Dick Reigel; 1987
Sheets Site 46-PH-27	Prehistoric campsite adjacent to APE	Not evaluated for the NRHP	Stephen Davis; 1977

* Shaded rows indicate previously recorded resources within the APE.

Determination of Eligibility

A Secretary of the Interior-qualified architectural historian with CH2M conducted an intensive architectural survey at the GBO from October 6-9, 2014. The site visit to GBO was also used to engage GBO staff in informal interviews and to conduct archival research, including the review of historic photographs and narratives, newspaper articles, construction records, and architectural drawings.

The field survey encompassed standing structures built in or before 1969, which is 47 years from the present year. The standard NRHP age threshold is 50 years; however, using 47 years as the cutoff allowed a buffer for the execution of the proposed Alternatives. All built environment resources from 1969 or earlier within the GBO boundary were surveyed and assessed, including a determination of eligibility for listing in the NRHP, except for the Reber Radio Telescope. Buildings and structures were evaluated individually as well as part of a potential historic district.

Using aerial photographs of GBO and information provided by GBO staff, 47 built environment resources that had been constructed in or before 1969 were identified as extant within the APE. These include: 5 telescope structures (one of which contains three large telescopes), 2 horn instruments, 1 antenna, 1 airstrip, 1 water tower, 1 recreation area, 24 residential buildings, and 12 operational and administrative buildings. As noted above, one of these telescopes, the Reber Radio Telescope, was previously evaluated. The remaining 46 built environment resources in the APE built in or before 1969 were photographed and evaluated for NRHP eligibility. Data collected through the background research and field investigations were analyzed to determine NRHP eligibility of the 46 surveyed built environment resources individually. In addition, the Green Bank Telescope, which was constructed after 1969, was evaluated individually due to its exceptional importance to radio astronomy over the last 50 years. All 47 historic-era properties (constructed in or before 1969, including the Reber Radio Telescope) and the GBT were also evaluated as a potential historic district. Properties surveyed in 2014 are listed in Attachment A of Enclosure 1. Figure 5-1, included in Enclosure 1, shows the location of each evaluated built environment resource.

NSF has determined that within the historical context of NRAO/GBO, there are four telescope instruments that are individually eligible for listing in the NRHP: the Interferometer Range, the 40-foot Telescope, the 43-meter Telescope, and the Green Bank Telescope. In addition, NSF has determined that GBO is eligible as a historic district for representing an important time in science history and for its significant contribution to the advancement of radio astronomy. There are 44 resources within the APE that are recommended as contributing to the proposed GBO historic district, the boundaries of which coincide with the site's property boundaries (and the APE). Contributing elements include 8 administrative/operational buildings, 1 airstrip, 1 water tower, 1 recreational area, 24 residential buildings, 2 horns, 1 antenna, and 6 telescopes (the Interferometer includes 3 large telescopes) (Table 2).

The scientific instruments within the APE are a collection of telescopes, horns, and antenna that are significant for their role in the development of radio astronomy and, in several instances, as remarkable feats of engineering. As a whole, the majority of the components that make up the potential district's historic character possess integrity, even though many of the buildings are individually undistinguished. The administrative and operations buildings and structures within the GBO are primarily utilitarian buildings or structures with simple designs executed using practical and standard materials. These elements create a cohesive, visual unit that emphasizes their historically linked function

as support for the observatory. As a group, the 44 contributing built environment resources are a distinct and well-preserved representation of the early years of the NRAO, complete with scientific instruments, administration/operational facilities, recreation area, and residential buildings. Additionally, the scientific instruments present on site illustrate a linear, historical narrative of the history of radio astronomy from the Jansky Replica Antenna and Reber Radio Telescope to the monumental Green Bank Telescope. Four buildings within the APE were identified as non-contributing resources. These include three barns and one cellar building, all of which pre-date the establishment of the NRAO and have been primarily left vacant or used as miscellaneous storage facilities.

Table 2 lists the properties at the GBO that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

In its letter dated December 22, 2016, the West Virginia SHPO concurred that four of the telescopes are individually eligible for listing on the National Register. In order to evaluate NSF's determination regarding historic district eligibility, the SHPO requested that NSF complete Historic Property Inventory Forms on all resources within the APE that are older than 45 years of age. Following submission of this additional documentation, the SHPO concurred, on June 12, 2017, that GBO is eligible as a historic district with 44 contributing resources.

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
GBO Historic District	1958-2000	Collection of administrative/operational structures, residential buildings, and radio astronomy equipment associated with the NRAO/GBO.	Eligible (Historic District); 44 contributing resources (Attachment A in Enclosure 1)
Interferometer Range: Howard E. Tatel Telescope (85'-1) and 85'-1 control building; 85'-2 Telescope; 85'-3 Telescope;	85'-1: 1958-1959 85'-2: 1963-1964 85'-3: 1965-1968 Interferometer control	The Tatel Telescope (85'-1) was the first telescope constructed by the NRAO and performed the world's first Search For Extra Terrestrial Intelligence (SETI) observations. The Interferometer Range connected two nearly identical	Individually eligible and contributing to GBO Historic District

TABLE 2. NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Recommendation
and the Interferometer control building	building: 1967-1968	telescopes to the Tatel Telescope in a linear formation. The three telescopes operated in unison and proved that dishes could be combined to form very large telescopes. This information spurred the construction of the Very Large Array telescope in New Mexico in the 1970s.	
40-foot Telescope and control building	1962	First fully automated radio telescope in the world. Currently operates as an educational telescope for visiting students.	Individually eligible and contributing to GBO Historic District
43-meter Telescope	1958-1965	Largest telescope in the world to use an equatorial (for polar aligned) mount. Currently used as part of the Russian Radioastron project.	Individually eligible and contributing to GBO Historic District
Robert C. Byrd Green Bank Telescope (Green Bank Telescope)	1991-2000	Largest moving structure on land in the world; tilt and point design that can rotate a full 360 degrees; performs highly sensitive data collection.	Individually eligible and contributing to GBO Historic District

Initiation of Section 106 Consultation

The GBO is a federally-owned property that contains historic properties. Therefore the Proposed Action has the potential to affect historic properties. In compliance with 36 Code of Federal Regulations (CFR) 800.2(c)(2)(ii), NSF is initiating consultation with you on the proposed changes to GBO operations. NSF is also seeking your input on any cultural resources in the project area or any cultural resources concerns you may have related to this undertaking.

We respectfully request your response within 30 days from receipt of this letter indicating your interest in participating in consultation for this undertaking. Please respond to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

NSF is also transmitting the *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia* (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 undertaking.

Regards,

Kristen Hamilton

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

Enclosures:
1. *Cultural Resources Evaluation, Green Bank Observatory, Green Bank, West Virginia*

From: Kimberly Penrod <kpenrod@delawarenation.com>
Date: Thursday, August 24, 2017 at 10:36 AM
To: Elizabeth Pentecost <epenteco@nsf.gov>
Cc: Kimberly Penrod <kpenrod@delawarenation.com>
Subject: RE: Cultural Resources Evaluation/ Green Bank Observatory, Green Bank, West Virginia

Elizabeth,
The protection of our tribal cultural resources and tribal trust resources will take all of us working together.
We look forward to working with you and your agency.
With the information you have submitted we can concur at present with this proposed plan and request to be a consulting party on this project.

As with any new project, we never know what may come to light until work begins.
The Delaware Nation asks that you keep us up to date on the progress of this project and
if any discoveries arise please contact us immediately.

Our department is trying to go as paper free as possible. If it is at all feasible for your office to send email correspondence we would greatly appreciate.

If you need anything additional from me please do not hesitate to contact me.

Respectfully,

Kim Penrod
Delaware Nation
Director, Cultural Resources/106
Archives, Library and Museum
31064 State Highway 281
PO Box 825
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NATIONAL SCIENCE FOUNDATION
2415 Eisenhower Avenue
Alexandria, Virginia 22314

Mr. Randall Reid-Smith, State Historic Preservation Officer
West Virginia Division of Culture and History
Historic Preservation Office
1900 Kanawha Boulevard East
Charleston, West Virginia 25305

October 31, 2017

RE: Transmittal of *Proposed Changes to Green Bank Observatory Operations: Historic Properties Assessment of Effect* Technical Report, Green Bank, Pocahontas County, West Virginia

FR#: 17-49-PH-1

Dear Mr. Reid-Smith,

The National Science Foundation (NSF) initiated Section 106 consultation with the West Virginia Division of Culture and History, Historic Preservation Office (SHPO) on December 2, 2016, regarding the undertaking of Proposed Changes to Green Bank Observatory (GBO) Operations in Pocahontas County, West Virginia. On December 22, 2016, NSF received a response letter from the West Virginia SHPO that provided concurrence on the APE, defined as the property boundary for GBO. In addition, SHPO agreed that the Reber Radio Telescope (NR# 72001291) remains historically significant and concurred that there are four additional GBO telescopes that are individually eligible for the NRHP: the Interferometer Range; 40-foot Telescope; 43-meter (140-foot) Telescope; and the Robert C. Byrd Green Bank Telescope (GBT).

Also in the December 22, 2016, letter, the West Virginia SHPO noted that while it appears likely that the GBO is eligible for the NRHP as a historic district, additional documentation would be required to provide concurrence with this assessment. SHPO requested that Historic Property Inventory (HPI) forms be completed for each resource that might contribute to a potentially NRHP-eligible GBO Historic District. West Virginia HPI forms were completed for 48 architectural resources and were submitted to the SHPO on May 19, 2017, for review and concurrence. NSF determined that 44 buildings and structures contribute to the GBO Historic District. SHPO concurred with the determinations of eligibility for the GBO Historic District on June 12, 2017.

With this letter, NSF is transmitting the *Proposed Changes to Green Bank Observatory Operations: Historic Properties Assessment of Effect* technical report for review and comment (Enclosure 1). The report describes the proposed undertaking and provides an assessment of effects associated with it. In the concurrence letter dated June 12, 2017, the West Virginia SHPO stated that an assessment of

potential effects resulting from the proposed project should not be completed until NSF chose a preferred alternative for the undertaking. NSF anticipates identifying a preferred alternative in its upcoming Draft EIS. However, NSF seeks to coordinate the Section 106 and NEPA processes, as recommended by the Council on Environmental Quality and the Advisory Council on Historic Preservation. As part of this coordination, NSF has developed effects findings for all alternatives. This is needed because of the unique circumstances of this divestment effort and the wide range of alternatives under consideration; if, for example, NSF determines further along in the process that its preferred alternative is not viable, then another alternative would have to be used. To avoid costly delays and duplicative efforts to apply the criteria of adverse effect to another alternative later in the process, NSF has chosen to evaluate the effects of all the alternatives equally and simultaneously. This also helps to inform the NEPA process and selection of the preferred alternative. If the preferred alternative is ultimately not feasible, NSF would resume Section 106 consultation for the other alternatives. Ultimately, the Memorandum of Agreement or Programmatic Agreement that results from the Section 106 consultation process would likely address potential adverse effects only from the preferred alternative.

We respectfully request a response within 30 days from receipt of this letter to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

The West Virginia SHPO previously requested that NSF forward any comments received as a result of the Section 106 consultation process to the SHPO. A spreadsheet with the public scoping meeting comments related to cultural resources, as well as Section 106 responses and comments received to date were submitted to the West Virginia SHPO on May 18, 2017. Since that time, the Delaware Nation has requested to become a consulting party on the undertaking. Their correspondence is included in Enclosure 2. We will also provide an electronic copy of this report to the consulting parties that have been identified for this undertaking (see cc list). 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 your comments and further consultation on this proposed undertaking.

Regards,

Caroline M. Blanco

Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
National Science Foundation

cc to consulting parties (by email): Danielle LaPresta Parker, Preservation Alliance of West Virginia
Daryl White, citizen
Grayg Ralphsnyder, DRA Global
Kimberly Penrod, Delaware Nation
Robert Sheets, Pocahontas County Historical Landmark Commission

Enclosures:

1. *Proposed Changes to Green Bank Observatory Operations: Historic Properties Assessment of Effect*
2. Delaware Nation Correspondence

From:	Pentecost, Elizabeth A.
To:	Rau, Michelle/COS; McDonough, Christina/COS
Subject:	FW: Assessment of Effects Report for Green Bank Observatory [EXTERNAL]
Date:	Thursday, November 02, 2017 9:18:40 AM
Attachments:	GBO_Assessment of Effects_Tech Report_FINAL.pdf Response from Delaware Nation to 8-17-17 Letter_8-24-17.pdf GBO.NSF assess of effects to SHPO.10.31.17.pdf

---

These are the Consulting Parties:

Danielle LaPresta, info@pawv.org
Kimberly Penrod, kpenrod@delawarenation.com
Gray Ralphsnyder, grayg.ralphsnyder@draglobal.com
Daryl White, darylwhite1@icloud.com
Robert Sheets, fortwarwick@gmail.com

National Science Foundation
Division of Astronomical Sciences
Room W9152
2415 Eisenhower Avenue
Alexandria, VA 22314
Tel: 703-292-4907
Fax: 703-292-9452

From: Elizabeth Pentecost <epenteco@nsf.gov> on behalf of NSF/AST Compliance Mailbox - Green Bank <Envcomp-AST-greenbank@nsf.gov>
Date: Wednesday, November 1, 2017 at 8:22 AM
To: Elizabeth Pentecost <epenteco@nsf.gov>
Subject: Assessment of Effects Report for Green Bank Observatory

Dear Interested Parties,

You have previously confirmed your interest in participating in consultation under Section 106 of the National Historic Preservation Act for the National Science Foundation's proposed changes to operations at Green Bank Observatory. We are on the third step of the Section 106 process, which is to assess effects. Please see the attached report, and our recent letter to the West Virginia State Historic Preservation Officer regarding our effects findings. We will be in touch in the near future to schedule a consulting parties meeting to discuss ways to avoid, minimize, and mitigate adverse effects. Your comments are always welcome- you may respond using this email address or call me at 703-292-4907.

Sincerely,

Elizabeth Pentecost

NATIONAL SCIENCE FOUNDATION
2415 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22314

DIVISION OF ASTRONOMICAL SCIENCES

November 20, 2017

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

Subject: Availability of Draft Environmental Impact Statement for Green Bank Observatory for review and comment

Dear Dr. Fowler:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences is preparing an Environmental Impact Statement (EIS) to assess potential future use of the Green Bank Observatory in West Virginia under the condition of reduced funding of the Observatory by NSF. The Draft EIS has been released for public review with a Notice of Availability published in the *Federal Register* on November 8, 2017.

The proposed Alternatives under consideration in the Draft EIS include the following:

- Collaboration with interested parties for continued science- and education- focused operations with reduced NSF funding (Agency Preferred Alternative)
- Collaboration with interested parties for operation as a technology and education park
- Mothballing of facilities (suspension of operations in a manner such that operations could resume efficiently at some future date)
- Demolition and site restoration
- Continued NSF investment for science-focused operations (No-Action Alternative)

This letter is to apprise your agency of the availability of this document and request that you provide relevant comments on the analysis by January 8, 2018. A public meeting will be held in Green Bank during the review period at the following location and time:

November 30, 2017
5:00 pm to 8:30 pm
Green Bank Science Center
155 Observatory Road
Green Bank, WV 24915
304-456-2011

The NSF point of contact for the National Environmental Policy Act of 1969 analysis is Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite W9152, 2415 Eisenhower Avenue, Alexandria, VA 22314; telephone: (703) 292-4907; email: epenteco@nsf.gov.

The DEIS and materials relating to the meeting will be posted at www.nsf.gov/AST (see "AST Facilities - Environmental Reviews").

We appreciate review and comment on the Draft EIS by your agency. If you require any additional information or documentation, please contact Ms. Pentecost.

Sincerely,

For Joseph Rosse

Richard F. Green
Division Director
Division of Astronomical Sciences

Cc: C. Blanco, NSF/OGC
K. Hamilton, NSF/AST
E. Pentecost, NSF/AST
M. Rau, CH2M

NATIONAL SCIENCE FOUNDATION
2415 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22314

DIVISION OF ASTRONOMICAL SCIENCES

November 20, 2017

Dr. Susan Pierce
Director and Deputy State Historic Preservation Officer
West Virginia State Historic Preservation Office
1900 Kanawha Blvd. E.
Charleston, WV 25305

Subject: Availability of Draft Environmental Impact Statement for Green Bank Observatory for review and comment

Dear Dr. Pierce:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences is preparing an Environmental Impact Statement (EIS) to assess potential future use of the Green Bank Observatory in West Virginia under the condition of reduced funding of the Observatory by NSF. The Draft EIS has been released for public review with a Notice of Availability published in the *Federal Register* on November 8, 2017.

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We appreciate review and comment on the Draft EIS by your agency. If you require any additional information or documentation, please contact Ms. Pentecost.

Sincerely,

For/ Joseph E. Pepe

Richard F. Green
Division Director
Division of Astronomical Sciences

Cc: C. Blanco, NSF/OGC
K. Hamilton, NSF/AST
E. Pentecost, NSF/AST
M. Rau, CH2M

NATIONAL SCIENCE FOUNDATION
2415 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22314

DIVISION OF ASTRONOMICAL SCIENCES

November 20, 2017

Mr. Clyde Thompson, Supervisor
Monongahela National Forest
200 Sycamore Street
Elkins, WV 26741

Subject: Availability of Draft Environmental Impact Statement for Green Bank Observatory for review and comment

Dear Mr. Thompson:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences is preparing an Environmental Impact Statement (EIS) to assess potential future use of the Green Bank Observatory in West Virginia under the condition of reduced funding of the Observatory by NSF. The Draft EIS has been released for public review with a Notice of Availability published in the *Federal Register* on November 8, 2017.

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We appreciate review and comment on the Draft EIS by your agency. If you require any additional information or documentation, please contact Ms. Pentecost.

Sincerely,

for Joseph E. Pepe

Richard F. Green
Division Director
Division of Astronomical Sciences

Cc: C. Blanco, NSF/OGC
K. Hamilton, NSF/AST
E. Pentecost, NSF/AST
M. Rau, CH2M

NATIONAL SCIENCE FOUNDATION
2415 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22314

DIVISION OF ASTRONOMICAL SCIENCES

November 20, 2017

Mr. David Thorne
Coldwater Fisheries and Stream Habitat Restoration Biologist
Division of Natural Resources
PO Box 67
Elkins, WV 26241

Subject: Availability of Draft Environmental Impact Statement for Green Bank Observatory for review and comment

Dear Dr. Thorne:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences is preparing an Environmental Impact Statement (EIS) to assess potential future use of the Green Bank Observatory in West Virginia under the condition of reduced funding of the Observatory by NSF. The Draft EIS has been released for public review with a Notice of Availability published in the *Federal Register* on November 8, 2017.

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The DEIS and materials relating to the meeting will be posted at www.nsf.gov/AST (see "AST Facilities - Environmental Reviews").

We appreciate review and comment on the Draft EIS by your agency. If you require any additional information or documentation, please contact Ms. Pentecost.

Sincerely,

For/ Richard F. Green
Division Director
Division of Astronomical Sciences

Cc: C. Blanco, NSF/OGC
K. Hamilton, NSF/AST
E. Pentecost, NSF/AST
M. Rau, CH2M

NATIONAL SCIENCE FOUNDATION
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ALEXANDRIA, VIRGINIA 22314

DIVISION OF ASTRONOMICAL SCIENCES

November 20, 2017

Ms. Barbara Rudnick, NEPA Team Leader
USEPA Region 3
1650 Arch Street
Philadelphia, PA 19103-2029

Subject: Availability of Draft Environmental Impact Statement for Green Bank Observatory for review and comment

Dear Ms. Rudnick:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences is preparing an Environmental Impact Statement (EIS) to assess potential future use of the Green Bank Observatory in West Virginia under the condition of reduced funding of the Observatory by NSF. The Draft EIS has been released for public review with a Notice of Availability published in the *Federal Register* on November 8, 2017.

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We appreciate review and comment on the Draft EIS by your agency. If you require any additional information or documentation, please contact Ms. Pentecost.

Sincerely,

for

Richard F. Green
Division Director
Division of Astronomical Sciences

Cc: C. Blanco, NSF/OGC
K. Hamilton, NSF/AST
E. Pentecost, NSF/AST
M. Rau, CH2M

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ALEXANDRIA, VIRGINIA 22314

DIVISION OF ASTRONOMICAL SCIENCES

November 20, 2017

Ms. Danielle La Presta Parker
The Preservation Alliance of West Virginia
421 Davis Avenue, #4
Elkins, WV 26241

Subject: Availability of Draft Environmental Impact Statement for Green Bank Observatory for review and comment

Dear Ms. Parker:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences is preparing an Environmental Impact Statement (EIS) to assess potential future use of the Green Bank Observatory in West Virginia under the condition of reduced funding of the Observatory by NSF. The Draft EIS has been released for public review with a Notice of Availability published in the *Federal Register* on November 8, 2017.

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We appreciate review and comment on the Draft EIS by your agency. If you require any additional information or documentation, please contact Ms. Pentecost.

Sincerely,

For/ Joseph Dehne

Richard F. Green
Division Director
Division of Astronomical Sciences

Cc: C. Blanco, NSF/OGC
K. Hamilton, NSF/AST
E. Pentecost, NSF/AST
M. Rau, CH2M

NATIONAL SCIENCE FOUNDATION
2415 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22314

DIVISION OF ASTRONOMICAL SCIENCES

November 20, 2017

Mr. John Schmidt, Project Leader
WV Ecological Services Field Office
U.S. Fish and Wildlife Service
694 Beverly Pike
Elkins, WV 26241

Subject: Availability of Draft Environmental Impact Statement for Green Bank Observatory for review and comment

Dear Mr. Schmidt:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences is preparing an Environmental Impact Statement (EIS) to assess potential future use of the Green Bank Observatory in West Virginia under the condition of reduced funding of the Observatory by NSF. The Draft EIS has been released for public review with a Notice of Availability published in the *Federal Register* on November 8, 2017.

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The NSF point of contact for the National Environmental Policy Act of 1969 analysis is Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite W9152, 2415 Eisenhower Avenue, Alexandria, VA 22314; telephone: (703) 292-4907; email: epenteco@nsf.gov.

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We appreciate review and comment on the Draft EIS by your agency. If you require any additional information or documentation, please contact Ms. Pentecost.

Sincerely,

For

Richard F. Green
Division Director
Division of Astronomical Sciences

Cc: C. Blanco, NSF/OGC
K. Hamilton, NSF/AST
E. Pentecost, NSF/AST
M. Rau, CH2M

McDonough, Christina/COS

Subject: FW: [EXTERNAL] Section 106 Compliance for Proposed Changes to Green Bank Observatory Operations - Draft Programmatic Agreement
Attachments: Green Bank Observatory.Draft Programmatic Agreement.6.14.18[2].pdf

---

From: Pentecost, Elizabeth A. <epenteco@nsf.gov>
Sent: Thursday, June 14, 2018 2:57:02 PM
To: grayg.ralphsnyder; Robert Sheets; Kimberly Penrod; DARYL WHITE; Karen O'Neil; bjgudmundsson@yahoo.com; jbauserman@frontiernet.net
Cc: Pierce, Susan M; Riggle, Benjamin M; Halda, Bonnie; Charlene Vaughn
Subject: [EXTERNAL] Section 106 Compliance for Proposed Changes to Green Bank Observatory Operations - Draft Programmatic Agreement

Dear All,

Attached please find the Draft Programmatic Agreement (PA) written to address potential adverse effects associated with the National Science Foundation's undertaking: proposed changes to operations at Green Bank Observatory. The PA provides stipulations to address any adverse effects on historic properties associated with the proposed changes to operations at Green Bank Observatory. With this transmission, the National Science Foundation (NSF) is initiating a review and comment period on the Draft PA as part of its Section 106 consultation process. The review and comment period begins today, **Thursday, June 14**, and will end **Saturday, July 14**. Comments on the Draft PA may be submitted to NSF during the review and comment period via email addressed to: (envcomp-AST-greenbank@nsf.gov) , or via mail to Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite W9152, 2415 Eisenhower Avenue, Alexandria, VA 22314.

In addition, on **Thursday, June 28, from 3:00pm (EDT) to 5:00pm (EDT)**, NSF will hold a Section 106 consultation meeting to discuss the PA. You are invited to participate in this consultation meeting at the:

Green Bank Observatory Science Center
155 Observatory Road
Green Bank, WV, 24915
304-456-2011

We will also have a telephonic connection set up for those who cannot attend in person. Please use the dial-in information: 1-866-692-3158; passcode: 8850902.

We value your input into this important process and hope you will be able to join us. A copy of the Draft Programmatic Agreement (PA) will also be posted at https://www.nsf.gov/mps/ast/env_impact_reviews/greenbank/greenbank_section106.jsp.

Thank you for your continued interest and participation.

Sincerely,

Elizabeth Pentecost
Project Management Administrator
National Science Foundation
Tel: 703.292.4907

Email: epenteco@nsf.gov

Appendix 4.12A

EPA EJSCREEN Results

EJSCREEN ACS Summary Report

Location: User-specified point center at 38.433060, -79.839947
Ring (buffer): 5-mile radius
Description: Green Bank Observatory

Summary of ACS Estimates	2010 - 2014
Population	992
Population Density (per sq. mile)	16
Minority Population	36
% Minority	4%
Households	370
Housing Units	1,058
Housing Units Built Before 1950	183
Per Capita Income	28,576
Land Area (sq. miles) (Source: SF1)	62.97
% Land Area	100%
Water Area (sq. miles) (Source: SF1)	0.00
% Water Area	0%

	2010 - 2014 ACS Estimates	Percent	MOE (±)
Population by Race			
Total	992	100%	210
Population Reporting One Race	992	100%	320
White	961	97%	210
Black	30	3%	66
American Indian	0	0%	11
Asian	0	0%	11
Pacific Islander	0	0%	11
Some Other Race	1	0%	11
Population Reporting Two or More Races	0	0%	11
Total Hispanic Population	6	1%	15
Total Non-Hispanic Population	986		
White Alone	956	96%	206
Black Alone	30	3%	66
American Indian Alone	0	0%	11
Non-Hispanic Asian Alone	0	0%	11
Pacific Islander Alone	0	0%	11
Other Race Alone	0	0%	11
Two or More Races Alone	0	0%	11
Population by Sex			
Male	472	48%	132
Female	520	52%	104
Population by Age			
Age 0-4	69	7%	47
Age 0-17	192	19%	80
Age 18+	800	81%	142
Age 65+	189	19%	66

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available.
Source: U.S. Census Bureau, American Community Survey (ACS) 2010 - 2014.

EJSCREEN ACS Summary Report

Location: User-specified point center at 38.433060, -79.839947
Ring (buffer): 5-mile radius
Description: Green Bank Observatory

	2010 - 2014 ACS Estimates	Percent	MOE (±)
Population 25+ by Educational Attainment			
Total	771	100%	140
Less than 9th Grade	49	6%	42
9th - 12th Grade, No Diploma	31	4%	26
High School Graduate	416	54%	102
Some College, No Degree	139	18%	61
Associate Degree	40	5%	40
Bachelor's Degree or more	136	18%	53
Population Age 5+ Years by Ability to Speak English			
Total	923	100%	189
Speak only English	916	99%	180
Non-English at Home[1+2+3+4]	7	1%	23
[1]Speak English "very well"	7	1%	23
[2]Speak English "well"	0	0%	11
[3]Speak English "not well"	0	0%	11
[4]Speak English "not at all"	0	0%	11
[3+4]Speak English "less than well"	0	0%	11
[2+3+4]Speak English "less than very well"	0	0%	19
Linguistically Isolated Households*			
Total	0	0%	11
Speak Spanish	0	0%	11
Speak Other Indo-European Languages	0	0%	11
Speak Asian-Pacific Island Languages	0	0%	11
Speak Other Languages	0	0%	11
Households by Household Income			
Household Income Base	370	100%	89
< $15,000	63	17%	50
$15,000 - $25,000	61	17%	70
$25,000 - $50,000	98	27%	59
$50,000 - $75,000	94	25%	51
$75,000 +	54	15%	46
Occupied Housing Units by Tenure			
Total	370	100%	89
Owner Occupied	309	84%	68
Renter Occupied	61	16%	80
Employed Population Age 16+ Years			
Total	818	100%	154
In Labor Force	525	64%	141
Civilian Unemployed in Labor Force	26	3%	34
Not In Labor Force	293	36%	111

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2010 - 2014.

*Households in which no one 14 and over speaks English "very well" or speaks English only.

EJSCREEN ACS Summary Report

Location: User-specified point center at 38.433060, -79.839947
Ring (buffer): 5-mile radius
Description: Green Bank Observatory

	2010 - 2014 ACS Estimates	Percent	MOE (±)
Population by Language Spoken at Home*			
Total (persons age 5 and above)	923	100%	189
English	N/A	N/A	N/A
Spanish	N/A	N/A	N/A
French	N/A	N/A	N/A
French Creole	N/A	N/A	N/A
Italian	N/A	N/A	N/A
Portuguese	N/A	N/A	N/A
German	N/A	N/A	N/A
Yiddish	N/A	N/A	N/A
Other West Germanic	N/A	N/A	N/A
Scandinavian	N/A	N/A	N/A
Greek	N/A	N/A	N/A
Russian	N/A	N/A	N/A
Polish	N/A	N/A	N/A
Serbo-Croatian	N/A	N/A	N/A
Other Slavic	N/A	N/A	N/A
Armenian	N/A	N/A	N/A
Persian	N/A	N/A	N/A
Gujarathi	N/A	N/A	N/A
Hindi	N/A	N/A	N/A
Urdu	N/A	N/A	N/A
Other Indic	N/A	N/A	N/A
Other Indo-European	N/A	N/A	N/A
Chinese	N/A	N/A	N/A
Japanese	N/A	N/A	N/A
Korean	N/A	N/A	N/A
Mon-Khmer, Cambodian	N/A	N/A	N/A
Hmong	N/A	N/A	N/A
Thai	N/A	N/A	N/A
Laotian	N/A	N/A	N/A
Vietnamese	N/A	N/A	N/A
Other Asian	N/A	N/A	N/A
Tagalog	N/A	N/A	N/A
Other Pacific Island	N/A	N/A	N/A
Navajo	N/A	N/A	N/A
Other Native American	N/A	N/A	N/A
Hungarian	N/A	N/A	N/A
Arabic	N/A	N/A	N/A
Hebrew	N/A	N/A	N/A
African	N/A	N/A	N/A
Other and non-specified	N/A	N/A	N/A
Total Non-English	N/A	N/A	N/A

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2010 - 2014.
*Population by Language Spoken at Home is available at the census tract summary level and up.

EJSCREEN Report (Version 2016)

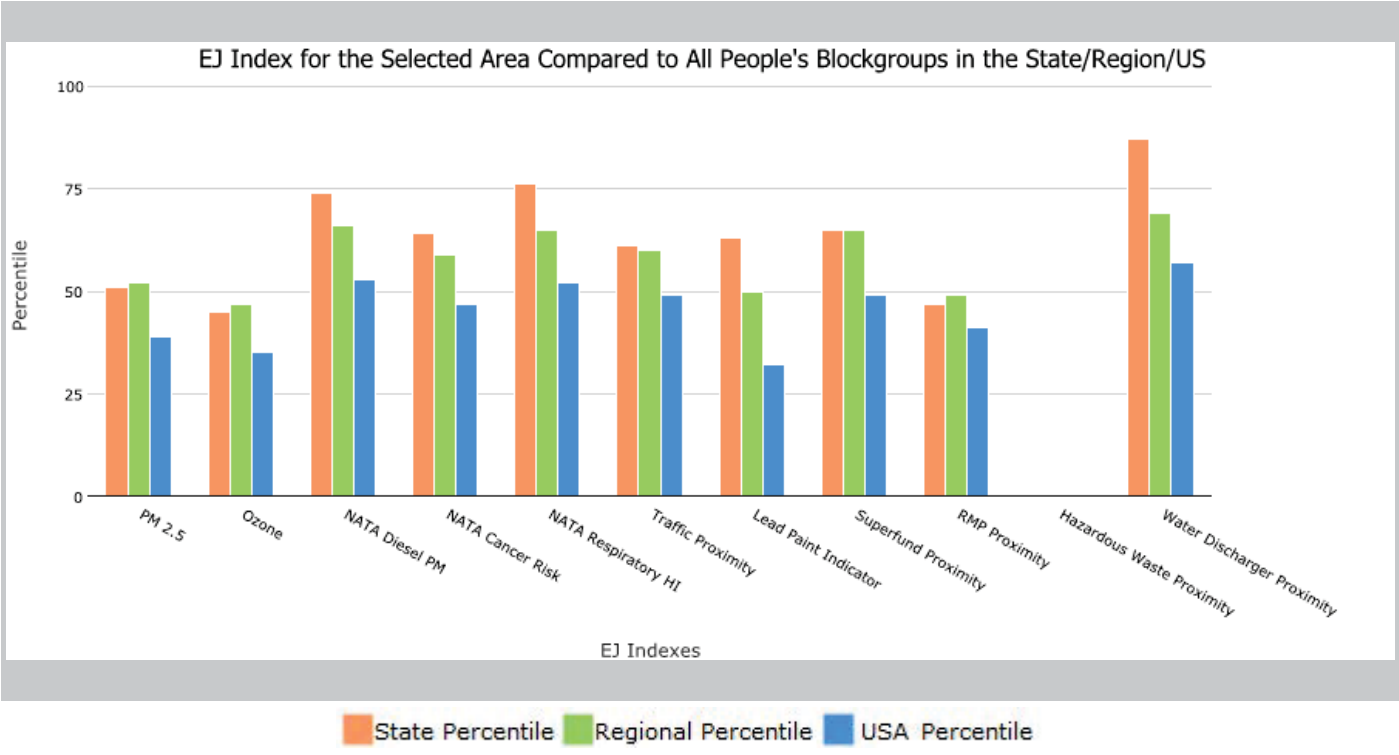
5 mile Ring Centered at 38.433060,-79.839947, WEST VIRGINIA, EPA Region 3

Approximate Population: 992

Input Area (sq. miles): 78.53

Green Bank Observatory

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	51	52	39
EJ Index for Ozone	45	47	35
EJ Index for NATA* Diesel PM	74	66	53
EJ Index for NATA* Air Toxics Cancer Risk	64	59	47
EJ Index for NATA* Respiratory Hazard Index	76	65	52
EJ Index for Traffic Proximity and Volume	61	60	49
EJ Index for Lead Paint Indicator	63	50	32
EJ Index for Superfund Proximity	65	65	49
EJ Index for RMP Proximity	47	49	41
EJ Index for Hazardous Waste Proximity+	N/A	N/A	N/A
EJ Index for Water Discharger Proximity	87	69	57



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.

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5 mile Ring Centered at 38.433060,-79.839947, WEST VIRGINIA, EPA Region 3

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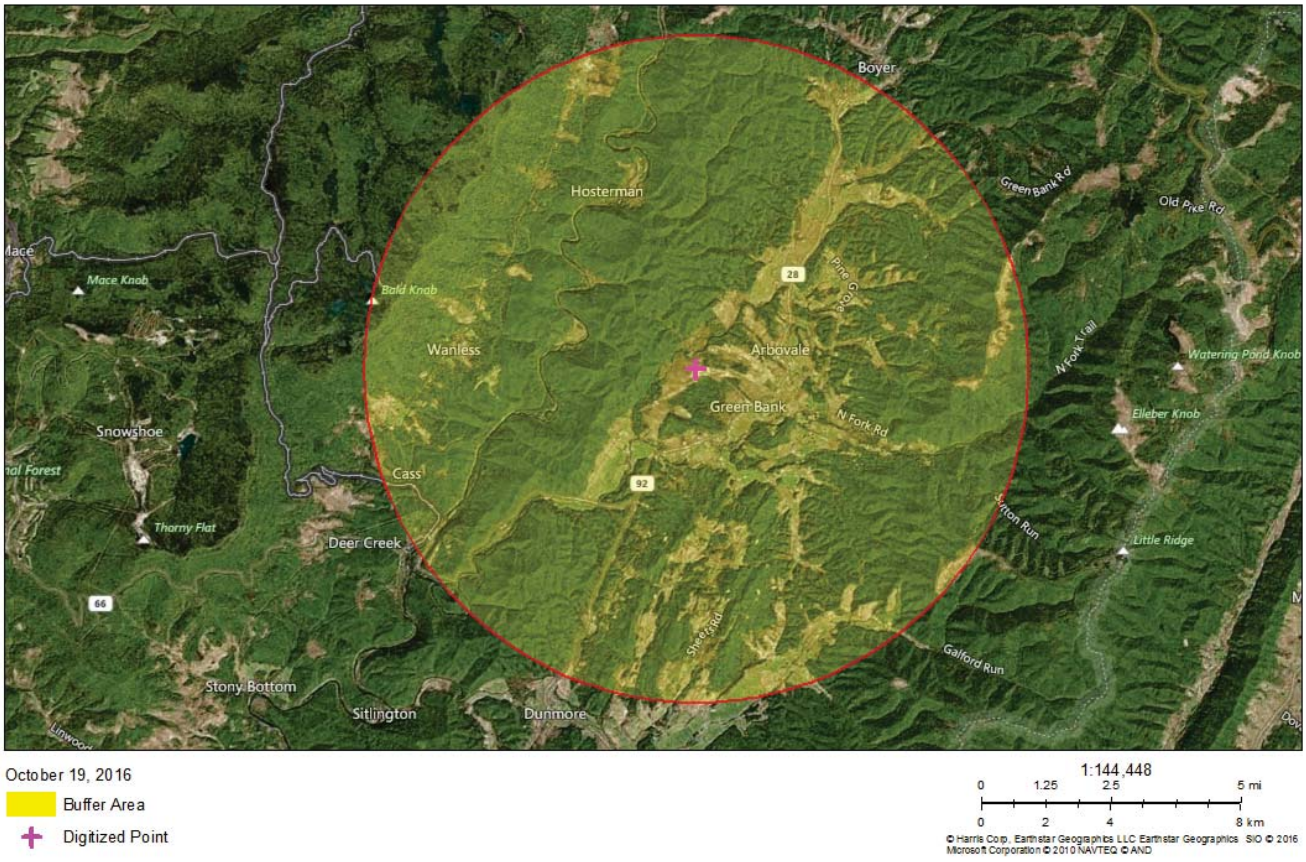

Sites reporting to EPA	
Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	0
National Pollutant Discharge Elimination System (NPDES)	0

EJSCREEN Report (Version 2016)

5 mile Ring Centered at 38.433060,-79.839947, WEST VIRGINIA, EPA Region 3

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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 µg/m^3)	7.65	9.51	0	9.84	0	9.32	16
Ozone (ppb)	47.2	50.1	4	49.8	15	47.4	43
NATA* Diesel PM (µg/m^3)	0.105	0.439	1	0.918	<50th	0.937	<50th
NATA* Cancer Risk (lifetime risk per million)	19	34	0	42	<50th	40	<50th
NATA* Respiratory Hazard Index	0.39	1.3	0	1.8	<50th	1.8	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	4	58	22	350	9	590	9
Lead Paint Indicator (% Pre-1960 Housing)	0.15	0.35	23	0.37	32	0.3	44
Superfund Proximity (site count/km distance)	0.00022	0.074	27	0.15	5	0.13	16
RMP Proximity (facility count/km distance)	0.11	0.29	46	0.35	37	0.43	31
Hazardous Waste Proximity+ (facility count/km distance)	N/A	0.12	N/A	0.12	N/A	0.11	N/A
Water Discharger Proximity (facility count/km distance)	0.0056	0.42	0	0.37	0	0.31	1
Demographic Indicators							
Demographic Index	17%	24%	23	30%	31	36%	23
Minority Population	4%	7%	48	31%	16	37%	9
Low Income Population	30%	40%	27	29%	58	35%	47
Linguistically Isolated Population	0%	0%	87	2%	55	5%	44
Population With Less Than High School Education	10%	16%	34	12%	54	14%	49
Population Under 5 years of age	7%	6%	68	6%	66	6%	60
Population over 64 years of age	19%	17%	67	15%	75	14%	79

* 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.

+ The hazardous waste environmental indicator and the corresponding EJ index will appear as N/A if there are no hazardous waste facilities within 50 km of a selected location.

For additional information, see: www.epa.gov/environmentaljustice