



Title: Land Acquisition and Regulatory Compliance Scope and Requirements	Owner: Bolyard	Date: 2019-09-06
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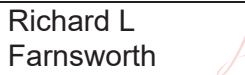




Land Acquisition and Regulatory Compliance Scope and Requirements

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Status: **RELEASED**

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Change Record

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2	2019-01-19	J. Bolyard	All	Updated from pre-decadal review RIDs
3	2019-05-31	R. Selina	2.2, 5	Minor edits; updated requirement numbering
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A.01	2019-08-29	J. Bolyard	4.1.6	Addition of building code information
A.02	2019-08-29	R. Selina	2, 5, 6.1	Minor corrections to AD/RD table, capture of building code requirements in Section 5 and associated acronyms in Section 6
B	2019-09-03	A. Lear	All	Prepared PDF for signatures & release (v.B)



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I Introduction

1.1 Purpose

This document identifies and captures the requirements for the Land Acquisition and Regulatory Compliance IPT and associated Work Packages through the entire lifecycle of the ngVLA effort. The requirements are intended to address the ngVLA efforts through design including reviews and prototyping, construction, commissioning, operation, and ultimate decommissioning.

This LA/RC requirements document will assist to ensure compliance with federal, state, and local environmental permitting requirements. This plan will contribute to the successful design, construction, characterization, operation, and ultimate decommissioning of the ngVLA site.

1.2 Scope

The ngVLA project funding source is targeted for the NSF Major Research Equipment and Facility Construction (MREFC) account or the Research and Related Activities (R&RA) account and requires National Science Board (NSB) approval. R&RA funds are typically used for smaller-scale construction up to tens of millions of dollars. In either case, the project requires compliance with the NSF policies for planning and management of large facilities. This project will be a “major federal action” subject to full National Environmental Policy Act (NEPA) compliance.

This document, designed for the LA/RC project effort, follows the NSF defined lifecycle stages:

- Development and Design,
- Construction,
- Operation, and
- Termination.

This document discusses the efforts leading through construction, although operational considerations for lease renewal are not to be overlooked. The project may progress to the Design Phase once the NSF Astronomy (AST) Division prepares a proposal to the NSF Director and an internal NSF review supports the effort. After this proposal approval, the project may progress to the Design Phase. The Design Phase commences with the Conceptual Design effort. Overall project schedule is beyond the scope of this document.

The Conceptual Design Phase (after Development) signals the initiation of budget estimates, prioritization of science goals, and other forecasts including risks. The potential environmental and safety impacts must be considered in the site selection, resulting in a clearly articulated project element for the Conceptual Design Review (CoDR). The preliminary parametric budgetary estimates for land acquisition, including schedule estimates, must also be prepared at this time. Importantly, the Project Execution Plan (PEP) must be drafted and updated by the CoDR. The CoDR progresses to the Preliminary Design Phase.

The scope of this document extends to all Integrated Product Teams, all project reviews, work practices in labs and worksites, and all subcontractors that provide documentation, procedures, or work at any ngVLA site.

Implementation of successful Land Acquisition and Regulatory Compliance efforts is complex and critical to the success of the project. Many of the actions needed to acquire access to a property can be directly addressed. However, the identification, investigation, and ultimate acquisition of each parcel of land must remain a priority effort throughout the project or the project itself may be at risk.



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After the project is approved and funded, ngVLA must execute land use permits or agreements with the site host or owners. The completion of these agreements will allow site access to complete the remaining actions. As access is authorized, additional studies may be required to identify environmental constraints. After site location and characterization is complete and the final site locations are selected, construction permits must be addressed. Finally, once the site is under construction, operational permits may be necessary.

LA/RC actions including any termination requirements for the VLA site are not contemplated in this document. Any extension of the ngVLA effort and site selection to foreign, non-United States locations or sites may introduce additional regulatory compliance, permitting, and environmental studies beyond the scope of this document.

1.3 Project Background

The Next Generation Very Large Array (ngVLA) is a project of the National Radio Astronomy Observatory (NRAO) to design and build an astronomical observatory that will operate at centimeter wavelengths (25 to 0.26 centimeters, corresponding to a frequency range extending from 1.2 GHz to 116 GHz). The observatory will be a synthesis radio telescope constituted of approximately 244 reflector antennas each of 18 meters diameter and 19 antennas of 6 meters diameter, operating in a phased or interferometric mode. The antenna count includes Long Baseline Array antennas.

Construction and integration will be distributed across several existing NRAO and partner sites and in new facilities for this purpose. Operations will be conducted from both the VLA site and an Array Operations Center.

2 Related Documents and Drawings

2.1 Applicable Documents

The following documents are applicable to this document to the extent specified. In the event of conflict between the documents referenced herein and the content of this specification, the content of this document shall be considered as a superseding requirement.

Reference No.	Document Title	Rev / Doc. No.
AD01	NRAO Environment, Safety, and Security Policy and Program Manual	Version D, October 2016

2.2 Reference Documents

The following documents are referenced within this text.

Reference No.	Document Title	Rev / Doc. No.
RD01	System Environmental Specifications	020.10.15.10.00-0001-SPE



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3 Regulatory Compliance

The Regulatory Compliance work package includes critical permitting and environmental project impact completion. The initial impacts are evaluated and land acquisition efforts begin in earnest in the Preliminary Design Phase. The project-wide Environmental Assessment, including the NSF NEPA action described herein, must be fully completed with the exception of additional landowner-required assessments. Any owner-required assessments are completed during the construction phase of the project.

3.1 Design Phase

3.1.1 NSF-Led NEPA Antecedents

To commence with efficient use of resources and meet project scheduling, the LA/RC effort relies on a stable project concept. The following identifies some early issues the ngVLA project must address in preparation for the LA/RC effort.

3.1.2 Site Quantity/Location

This step establishes the optimal observation configuration through modeling to begin identifying potential site locations. The configuration must identify how many sites are anticipated on existing land in use by NRAO, i.e. VLA, and how many sites are required to complete the project. It also provides an acceptable error range for fine location adjustments, or micro-siting, of sites. The project must identify the process to adjust configuration should a location be unavailable for siting. If candidate sites are already identified, these must be communicated to LA/RC to begin tracking the locations and establishing early contacts.

3.1.3 Potential Site Size

It is essential to identify the required land area for siting the telescopes. Some candidate sites may be available at a <1 acre size requirement, but the land acquisition effort will be more difficult and locations limited if the required plot exceeds 5–10 acres. Additionally, the intent to construct identical facilities needs to be known. Should the telescope sites differ materially, the locations must be identified where the differences occur. This is required for later environmental evaluation efforts.

3.1.4 Land Ownership

Sites located outside the US will require additional effort and coordination with foreign authorities. These locations will require significant effort and time and must be coordinated with both the local authorities as well as the NSF. For US-based sites, the land acquisition strategy may include a mix of approaches. There are several impacts to the project effort resulting from the final approach selected. For example, leasing land from private landowners is generally quicker to execute, but potentially brings increased potential cost implications for annual lease fees. Federal land availability varies depending on the agency. Some agencies have the local authority to enter into land use agreement, whereas for other agencies, such as National Park Service, navigating the land use requirements process is complex. Once the strategy is developed, LA/RC should be able to develop a schedule for the project based on the anticipated availability of the selected sites. Additional strategies are discussed later in this document.

3.1.5 Utilities

The project must identify the largest anticipated demand for utilities. Such issues as water and sewer needs will drive later environmental and construction permitting efforts. Maximum anticipated electrical power demands and any requirements for alternative power generation will affect permitting. Identification for fiber needs must be addressed as well. Even if land acquisition is successful, power delivery may require identification of power easements and thus affect the construction schedule as well as project cost.



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3.1.6 Lifecycle

The required lifecycle affects the land use agreement. Owners must understand the implications of a 20–50 year agreement. In addition, the agreement must address restoration requirements upon completion of the operational life of the site. As the NSF may not own the land, this component must not be overlooked. The site restoration plan may be a factor for some landowners, and there are potential cost implications to the funding agency.

3.1.7 Operations Model

The operations model does not need to be complete early in the project; however, a conceptual operational model must be available. This will assist in determining onsite/offsite storage capacity, parts inventorying, site staffing plans, and similar issues. This is important as the site storage and staffing affects site size and potentially affects the NEPA environmental evaluation.

3.2 National Environmental Policy Act (NEPA)

The significance and complexity of the ngVLA effort will require NRAO to work with the NSF Program Officer for full compliance with National Environmental Policy Act of 1969 (NEPA) requirements for the project. This may require consultation and coordination with the NSF Environmental Compliance Team in the NSF Office of General Counsel to ensure compliance with this aspect of the program.

3.2.1 NEPA Scope

The initial NEPA effort (outlined in Figure 1, next page) can take over a year to complete and may include compliance with the National Historic Preservation Act and the Endangered Species Act, as described below. Sites considered for construction on Native American land, or with the potential to affect Native Americans, require consultations with the appropriate Native American authorities. Any issues related to compliance can introduce significant schedule and cost risks to the effort. NSF is responsible for these consultations. The consultation for these efforts must be initiated early in the Conceptual Design Phase.

The NSF is required under NEPA to evaluate the potential environmental effects of actions they propose to fund. The NSF commissioned assessment will be conducted in accordance with NEPA requirements, the Council on Environmental Quality (CEQ) regulations of 1978, and 45 Code of Federal Regulations (CFR) Part 640. This evaluation requires an analysis of the proposed actions and various alternatives depending on the significance of a proposed project’s effects on the environment. The most detailed and expensive is the completion of an Environmental Impact Statements (EIS) to the less comprehensive Environmental Assessments (EA) and Categorical Exclusions (CATEX or CE).

If, prior to or during development of an EA, the NSF determines the project may cause significant environmental impacts, an EIS would be considered at significant cost and delay. However, if the NSF determines there are no significant impacts from the proposed project, then a Finding of No Significant Impact (FONSI) is issued. If the proposed project fits within a category of activities that the NSF has already determined normally has no potential for significant environmental impacts (CATEX), there is no need to complete an EA or EIS. For example, the Bureau of Land Management (BLM) within the Department of the Interior has CATEX in place for certain activities, such as snow fences for safety.

The NSF does not currently have an extensive listing of CATEX for proposed actions. However, the magnitude of the proposed ngVLA effort will require an EA as a minimum and a CATEX is unlikely. This initial environmental effort is submitted at the completion of the NSF’s Institution/Organization Environmental Impacts Checklist. This checklist identifies at an early stage the potential impacts of the project. NRAO is able to complete this checklist internally. However, the authority and responsibility for environmental determination for the ngVLA effort, as with all projects, lies with the NSF.



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The required Environmental Assessment in compliance with NEPA is intended to address the proposed action with the ultimate objective to identify whether the NSF should establish and support the ngVLA proposal. This assessment is designed to identify the effects of establishing the project as detailed in the conceptual design, at the locations described. Under NEPA, this is the Preferred Alternative.

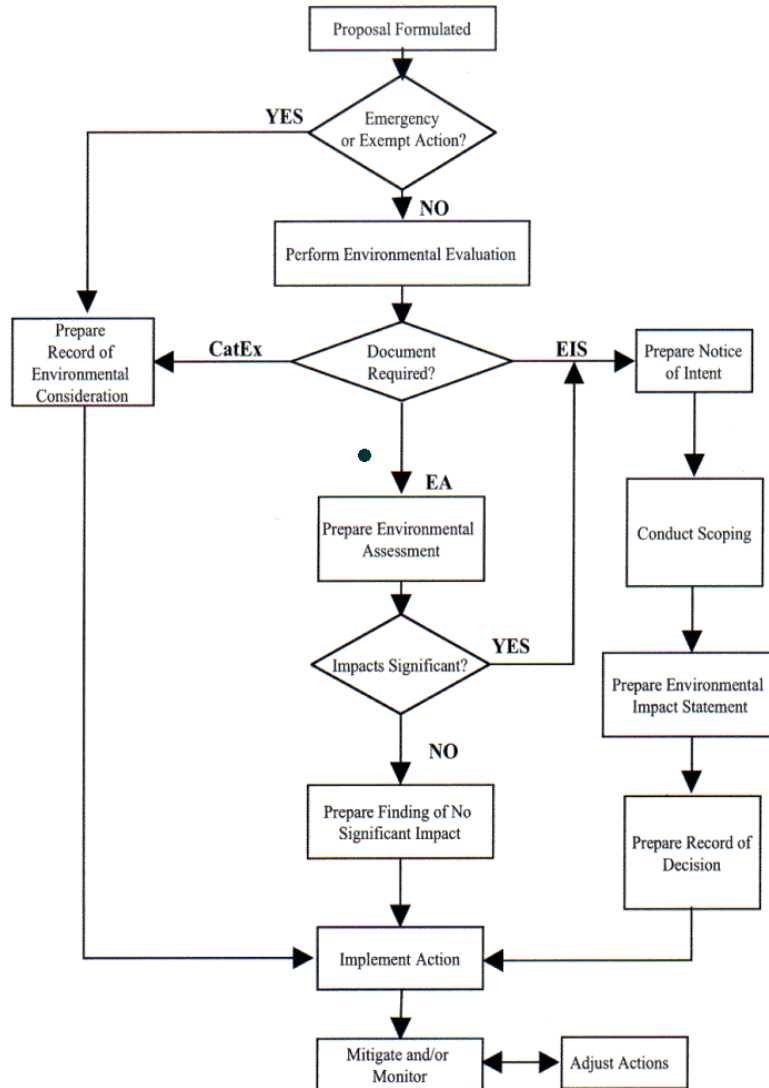


Figure 1 - The NEPA process (source: NASA).

3.2.2 Potential Areas of Impact Evaluated

As the NEPA EA continues, it includes agency and public participation including public meetings to review and discuss the impacts from the individual locations selected. Select areas of analysis include the following:

- Land Use: Impacts to existing or planned land use
- Topography: Alterations to the gross topography
- Hydrogeology and Groundwater: Use of and impact to groundwater
- Demographics: Change in community demographics during construction and operations
- Community Resources: Level of service provided by the community



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- Hydrology: Potential for hydrologic impacts from water runoff
- Socioeconomic Impacts on Local Economy: benefits to local economy spending
- Air Quality: Potential emissions and generation of fugitive dusts from the proposed project
- Noise: Impacts to human and wildlife receptors
- Water Quality: Impacts to water quality from sedimentation or erosion
- Common Vegetation and Plant Communities: Whether vegetation would be altered or removed
- Common Fauna: Whether common fauna would be displaced or killed as a result of project activities
- Sensitive Ecological Communities: Looks for habitat types that are rare in the general area and that may be at risk by the development
- Sensitive Species: Examines the presence of protected species and the impact to their ecosystems
- Cultural resources: Addresses archaeological sites and sites of cultural importance
- Utilities: Considers existing utility system and whether the impact to other resources could occur
- Environmental Justice: Evaluates fair treatment and meaningful involvement of all people
- Aesthetics and Visual Resources: Relates to the existing views and landscape character

As the NEPA statute requires federal agencies to evaluate the potential environmental effects of proposed projects on the human environment, the NSF has historically funded and conducted this effort separate from the project funding. LA/RC would be expected to provide significant support for the environmental contractor selected to perform this effort. This effort may progress in parallel with conceptual design and development activities as long as the development effort is funded and there is no significant alteration in impacts to the above areas because of project changes.

3.2.3 NSF Cooperating Agency Options

It is possible to identify large federal landowners such as BLM or US Forest Service (USFS) for multiple proposed ngVLA sites. In such cases, it may benefit the project to encourage the NSF Program Officer to pursue an agreement with the federal landowner to become a cooperating agency for the EA. The cooperating agency role derives from NEPA, which called on federal, state, and local governments to cooperate with the goal of achieving “productive harmony” between humans and their environment. The CEQ’s regulations implementing NEPA allow federal agencies (as lead agencies) to invite other federal agencies to serve as cooperating agencies in preparing environmental impact statements.

3.3 Other Environmental Aspects

In addition to the programmatic Environmental Assessment described below, sites may require additional environmental studies to assure that the identified environmental constraints are avoided, or where not possible to avoid an identified environmental constraint, mitigation measures are taken to reduce the impact of the ngVLA project to the environment.

Other studies that may be reasonably anticipated include the following:

- Additional focused EA effort
- Wetlands delineations
- Archaeological or cultural resources studies (NHPA/SHPO)
- Viewshed analysis
- Sensitive species studies
- Biological assessment studies

Not all possible actions are listed in this document but must be included in the Project Execution Plan. The LA/RC IPT is responsible to identify all required site-specific studies. Costs for the studies must be included in the project costing.



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3.3.1 National Historic Preservation Act (NHPA)

While NEPA efforts include consideration of historical facilities, the project will need to address site-specific impacts considered in the construction activities, including routing for any infrastructure. Under NHPA, Section 106, any federal project requires the NSF to take into account the effects of the project on historic properties. NSF is also required to consult on the Section 106 process with State Historic Preservation Offices (SHPO), Tribal Historic Preservation Offices (THPO), and Native American Tribes.

Historic properties are any prehistoric or historic districts, sites, buildings, structures, or objects that are eligible for or already listed in the National Register of Historic Places. Also included are any artifacts, records, and remains (surface or subsurface) in any properties of traditional religious and cultural importance to Tribes. This requirement applies regardless of the location of the historic property.

Even if an historic property is not listed in the National Register or has not previously been determined eligible, it will need evaluated to determine if it meets NHPA eligibility. This effort may be contracted to consultants and included in the project costs separately from the NEPA effort for site-specific clearances.

3.4 Owner Required Environmental Studies

The Project Execution Plan (PEP) requires inclusion of the detailed Site Selection Criteria as well as a description of the selected sites. The PEP must identify the need for any environmental studies, permitting requirements, and specific site assessments.

A FONSI determination from the NEPA analysis does not exempt the project from additional studies required by the site host or local regulations. Initially, by use of the completed NEPA/EA, the project should identify sites/locations where additional studies are known to be required. The project must consult with local authorities to identify locations requiring additional studies on environmental impacts or other permit restrictions that may be in place to protect the most threatened habitats. Construction activities including power delivery and communication efforts may require separate environmental studies along the planned power route where no existing infrastructure exists.

The project must work with ngVLA contracts and procurement to select a qualified consultant(s) to complete the studies as needed. It is likely that a consultant(s) with regional or national capabilities will be needed. The most effective means to complete additional studies is to develop a Basic Ordering Agreement with the selected consultant(s). This agreement will allow work to be completed as additional environmental study requirements are identified.

Monitoring the effort is essential to track progress and allow construction scheduling to occur efficiently. Each site will require tracking and progress monitoring on a weekly basis. Sites that are encountering difficulties in permitting and environmental mitigation efforts must be flagged and mitigation managed.

Costing and schedule implications are to be tracked with the project’s controls. Environmental studies are a construction-related cost and must be tracked accordingly. Progress metrics must be developed and reported by the LA/RC team.



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4 Land Acquisition

4.1 Design and Development Phase

4.1.1 Scope

The Land Acquisition work package requires development of initial budgetary estimates for developing land acquisition agreements. The scope encompasses requirements for any partnership agreements, risks facing the project, and termination liabilities. Upon successful completion of the NEPA process and the NSF filing of the Record of Decision for the project, the NSF will consider the project construction funding levels. Typically, this requires finalized project designs and successful design reviews. While preliminary agreements may be initiated, only after receipt of construction funding may the project enter into the final Land Use Agreements. It is preferable from the project schedule perspective to initiate preliminary land use agreements prior to construction funding, but agreements must contain termination clauses in case project funding is not achieved.

4.1.2 Land Use Agreement Forms

During NEPA efforts, LA/RC together with the ngVLA Program Management team should develop a standard NSF approved MOU/MOA to utilize for land use agreements. Standardized agreements allow for prompt approval with minimal NSF review and reduce the number of iterations needed between the signatories. Where use of federal land is anticipated, the NSF should be encouraged to enter into agreements with identified federal agencies to facilitate land use acquisition. For example, where an ngVLA construction site is proposed on BLM land, an existing cooperative agreement between the NSF and the BLM will identify and facilitate completion of any Special Use Permits required for project execution.

The agreements between NRAO and the site host can include Memoranda of Agreement, Special Use Permits, revocable agreements, and non-recorded easements. This also includes MOUs and Lease Agreements. Generally, the ngVLA will use primarily the standard NSF-approved MOU/MOA described above to define the relationship between ngVLA and the host site, owner, or organization. However, in some cases a Special Use Permit or client-preferred agreement may be utilized to authorize use on some federal lands. The exact vehicle used will depend on the site ownership and management.

4.1.3 Land Use Agreement Content

The ngVLA project team and the LA/RC IPT will seek a standard agreement for NSF approval that details the terms of the relationship with the site. This agreement will address shared costs, any buffer zone requirements, access, in-kind contributions, etc. As some of the agreements are prepared prior to the commitment of construction funds, the details will describe contingencies if there is a funding failure. Site-specific land use agreements will be prepared for locations where the required agreement form differs from the pre-approved agreement. Such individual site agreements require NSF Program Office review. Upon NSF approval, the landowner or representative will iterate with LA/RC for final contractual execution. Each agreement must detail the following at a minimum:

- Contact information
- Legal details of the agreement
- Effective period and any limitations on the planned use
- Any specific requirements for protected species, historical features, or additional studies required
- Preliminary design contents, if available
- The planned location(s) of the ngVLA project infrastructure
- Renewal period information and remuneration details
- Where required, prepare site-specific land use agreements (e.g., Special Use Permits)

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If the agreements are prepared prior to the commitment of construction funds, the details will describe contingency if there is funding failure.

4.1.4 GIS Support of LA/RC Efforts

GIS tools and models will be used to geo-locate the parameters of the environmental studies, site locations, and utility routing in support of LA/RC efforts and applications. Under such a system, permits and new applications will be incorporated into a geodatabase to provide accurate and site-specific data needed to make permitting decisions. Permits must determine proposed easements for access routes, surveyed land boundaries, construction limits, and any identified protected features located on a site-specific basis.

Permit applications with potential environmental impacts will require engineering drawings or plans with precise location information and identified environmental constraints. Applications that have no potential for impact will consist of county maps, topographic maps, or other digital elevation model (DEM) maps with point shape(s) entered on a data layer to identify the site and project boundaries. Application maps will be created for each permit application, as needed, with geographic information. The application maps will define the limits of acceptable site boundaries and include images of approximately 5 km around the estimated site on a high-resolution, geo-rectified, color aerial image.

With locations adequately identified, environmental studies, construction plans, and site characterization sampling will identify appropriate restriction areas. In locations where constraints are identified, such as threatened and endangered species, influence areas will be mapped based on existing data or, where needed, additional environmental studies. If a critical area is impacted by construction activities, ngVLA will investigate an alternate location. After construction, all the site facilities and infrastructure should be surveyed and mapped to allow for future permitting and decommissioning activities. Figure 2 shows an early example of the need for and use of GIS mapping.

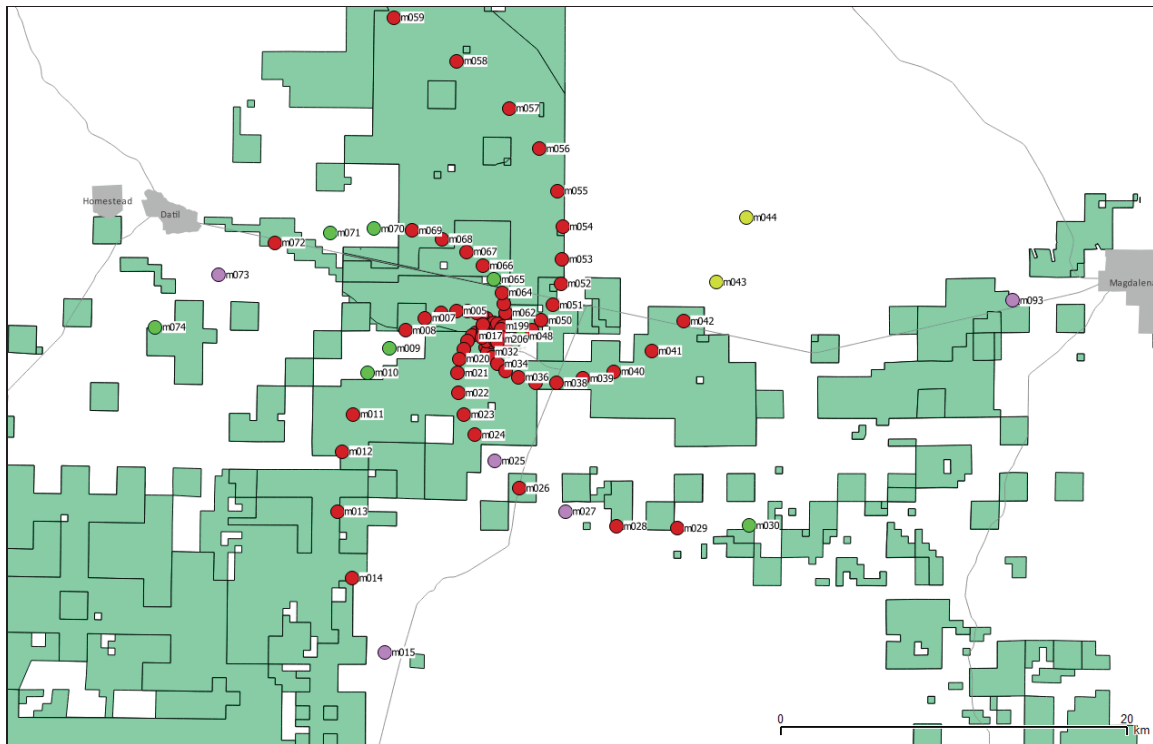


Figure 2 - Preliminary state land ownership mapped for construction phase.



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4.1.5 Land Acquisition Actions

Upon award of construction funds, the LA/RC IPT is responsible to initiate formal negotiations with property owners and legal representatives. Land Use Agreements allow for all future access, site characterization, construction, operations, and maintenance. The ngVLA LA/RC IPT is responsible for land acquisition, easements for access and utilities, land rights, licenses, leases, permits, and other documents necessary for the construction, operation, and maintenance of facilities. Specific responsibilities include the following:

- Conduct diverse and complex negotiations with landowners
- Work on the settlement of damage claims with land owners relative to property damage caused or created during the construction
- Advise and assist in establishing market values used in the acquisition of land and land rights
- Prepare documents for rights of entry, contracts, easements, licenses, leases, permits, options to purchase, and other documents as necessary to acquire adequate rights for the project
- Explain the purpose of the project and development to individual landowners, to consortium groups, and/or at public meetings
- Make independent decisions within established parameters on approach of landowners and conduct lease negotiation
- Explain project to landowners including expectations, procedures, timing, and financial arrangements
- Provide reports to Project Management and NSF on the status of negotiations and details of executed lease agreements
- Prepare lease agreements and other necessary documents related to the transaction

4.1.6 Construction Permits

This document does not attempt to describe design details of the facilities, the infrastructure, or other aspects of the project design. In general, any facility and telescope design will be prepared by a consultant and will meet all relevant building codes. A construction or building permit may be required in some jurisdictions for the construction of the ngVLA project. Generally, this requires inspections during and after construction activities are completed to assure compliance with national, regional, and local building and life safety codes.

For example, an electrical permit may be required in some jurisdictions. This permit may require rough-in inspections, service inspections, and final inspections prior to connecting electrical systems to the main service. Generally, the construction contract will require the contractor to obtain these permits. In ngVLA locations where construction permits are not required, the ngVLA project will be built according to plans and specifications that comply with national building codes.

Where construction permits are required, LA/RC must work with the construction team to identify which permits will be obtained by the contractor. The permit records for all construction activities must be maintained on a site-by-site basis and provided to Permitting for final recordkeeping. This may include water discharge permits (NPDES), air quality permits, and fuel tank permits. While not responsible to obtain the permits, LA/RC will support general contractor efforts in obtaining county/local permits.

The following building codes are included and must be considered in the development of the facility buildings, infrastructure, and antenna design as appropriate.

International Building Code (IBC): Applies to most types of new buildings. The IBC Model code has requirements for accessibility. It is found in Chapter 11 and references the ANSI A117.1 Guidelines. ANSI on its own does not have any scoping requirements and does not indicate how many elements must be



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accessible for accessible building design. It mainly provides technical guidelines on how to make elements accessible to people with disabilities.

International Existing Building Code (IEBC): Applies to the alteration, repair, addition or change in occupancy of existing structures.

Some provisions in the IBC and IEBC are intended to ensure that structures can adequately resist seismic forces during earthquakes. These seismic provisions represent the best available guidance on how structures should be designed and constructed to limit seismic risk. Seismic and environmental requirements are addressed in the System Environmental Specifications [RD01].

2010 ADA Standards for Accessible Design: These standards, from the Department of Justice (DOJ) were published in 2010, and took effect in 2012. The 2010 Standards are the most current ADA standards from the federal government. ADA is a civil rights law that is not tied to a building code. Title III of the ADA requires that certain elements within facilities be accessible to the disabled community. Whether or not there is construction in a facility, the ADA still applies.

Adoption of the model codes is uneven across and within states, even in areas with high levels of seismic hazard. Some states and local jurisdictions have adopted the codes but have made amendments or exclusions relating to the seismic provisions.

For the facilities in New Mexico, the New Mexico Administrative Code (NMAC) is the official compilation of current rules filed by state agencies. In addition to the full code, the NMAC Title 14 governs construction activities and chapters 5–10 are applicable.

The State of New Mexico has adopted the following:

- 2015 New Mexico Commercial Building Code (adopted from 2015 International Building Code, IBC),
- 2015 New Mexico Residential Building Code (adopted from 2015 International Residential Code, IRC),
- 2003 International Fire Code (2003 IFC), 2015 New Mexico Mechanical Code (adopted from 2015 Uniform Mechanical Code, UMC),
- 2015 New Mexico Plumbing Code (adopted from the 2015 Uniform Plumbing Code, UPC),
- 2017 New Mexico Electrical Code (adopted from the 2017 National Electrical Code, NEC),
- 2009 International Energy Conservation Code (2009 IECC),
- 2015 International Existing Building Code (IEBC)

Design codes for electronic products often follow Underwriters Laboratory, UL, private safety testing requirements. Additionally, the Conformite Europeenne, CE, indicates conformity with European law for products to be sold in the European market. The FCC letters indicate the product meets the standards of the Federal Communications Commission.

The CE and UL approval is not a legal requirement; however, if the product is produced for sale to consumers, regulators in the United States require that electrical products be tested by a nationally recognized testing laboratory before they're used. Similarly, any electronics sold in the U.S. must be tested by an FCC-approved lab to make sure they won't interfere with radio signals. As there is no intention for sale of the ngVLA products, these testing requirements are not mandatory. The safety design requirements specify that all facility and infrastructure designs are safe for use.

4.1.7 Permit and Land Use Renewals

Each permit and land use agreement generated will be logged into a LA/RC database to ensure that any renewals are addressed on a timely basis for continuity of site operations. The information tracked will include the following:



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- Permit name
- Permit number
- Permit type
- Issuing agency, with contact information
- Cost of the permit
- Supporting documentation
- Length of permit acquisition
- Renewal information, including details of any required reports
- Expiration date and estimate of time needed for renewal
- Copy/original of the permit

4.1.8 Possible Delays to LA/RC Processes

In addition to the above-described items, it should be noted that land use agreements and associated permits are processed by a variety of agencies across a variety of jurisdictions. This results in a complex permitting approach, and delays will occur due to legal review, the level of backlogged applications that exist at a given permit approver, local resistance to the construction, environmental mitigation issues, or any number of unanticipated issues. Permitting efforts may be required to address multiple property owners in the identification of easements, property boundaries, setbacks, etc. Clearly the more complex any given agreement or assessment, the more time the permit will require.

To address these concerns, procedures will be established to maintain communication between LA/RC and Project Management in ngVLA. It is highly recommended that permitting status and progress be reported at every management meeting with particular emphasis on schedule and cost. When acquisition of any particular site is recognized as a potential risk, a mitigation effort should be implemented and criteria established for potential alternative site selection.

4.1.9 Alternative Site Selection Criteria

The following considerations and guidelines are useful for determining if a candidate site is feasible for use and construction. Note that this list includes guidance on factors other than permitting and acquisition capability. When any of the following factors exceed project triggers, the project team must evaluate and decide if the project must mitigate the concerns or eliminate the site from consideration. This will assist in the review of a site’s status and guide a determination of when an alternate site should be considered. Note this schedule is not comprehensive and must be established during project planning.

Review Area	Considerations
Scientific Requirements	Unable to meet established science requirements. Factors may include RFI mitigation or other established science goals and criteria.
Geotechnical Requirements	Slope too severe, or foundation unstable. Includes construction feasibility limits established by the project.
Geotechnical Requirements	Foundation construction would cause significant impact to the environment. Consideration with the NEPA and any other environmental studies required.
Power Requirements	Unable to obtain grid power within project limits, for example, approximately 3 miles from candidate site, or power delivery cost exceeds \$1,000,000. Cannot obtain authorization for overhead power.



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Review Area	Considerations
Land Use Agreement	Unable to develop acceptable terms with landowner. Unable to obtain NSF approval on land terms. Unable to obtain landowner approval. Agreements cannot cover the entire project life.
Environmental Findings	Sensitive species identified that requires site relocation. Archaeological or cultural sites discovered that require a new site. Wetland mitigation is required.
Environmental Assessments	Environmental Impact Studies are required. Studies do not result in a FONSI. Public comments are received during public comment period that cannot be resolved.
Permitting	Site cannot be permitted. Site permitting duration exceeds one year. Loss of permit. Public or special interest resistance to permit issuance.

4.1.10 Potential Site Location Sources

The land management agencies and owners of potential site locations for ngVLA antennas will determine the preferred Land Acquisition approach. The degree of process formality varies depending on the management agency. The acquisition process has a direct impact on the project schedule and introduces risk to the project planning. Naturally, the preferred approach is to minimize the overall cost of acquisitions and reduce the uncertainty introduced to the project construction schedule.

The following introduces several options and the potential benefits and concerns of each type of land agent.

Land Holder	Potential Benefits	Potential Issues
Private	<ul style="list-style-type: none"> Reduced mandatory environmental studies Possible timely closing, possession, and acquisition Reduction in need for legal environmental consultation 	<ul style="list-style-type: none"> If purchased, inflated costs for land If leased, negotiations for access of landowner and ongoing lease renewal Impact of shared use with owner Site specific conditions from negotiations
Federal Agency, Bureau of Land Management	<ul style="list-style-type: none"> Generally amenable to projects Lease agreements are not typically onerous Moderate in terms of time needed to execute agreements Typically limited or no fee for land use Significant land holdings are present in the southwest areas of proposed antenna sites Readily extended lease agreements 	<ul style="list-style-type: none"> Not likely to be able to purchase land Requirements for additional archaeological studies If archaeological sites are detected, antenna location may require relocation Distance from power and fiber likely May not be able to direct final antenna location; BLM may direct available sites Land may already be leased for cattle grazing; introduces requirement for additional stakeholder



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Land Holder	Potential Benefits	Potential Issues
Federal Agency, United States Forest Service	<ul style="list-style-type: none"> Generally amenable to projects Lease agreements are not typically onerous Typically limited or no fee for land use; may require Special Use Permit Significant land holdings are present in the southwest areas of proposed antenna sites 	<ul style="list-style-type: none"> Not likely to be able to purchase land Requirements for additional biological, site-specific environmental studies, and archaeological studies If sensitive sites are detected, antenna location may require relocation Distance from power and fiber likely May not be able to direct final antenna location; USFS may direct available sites Agreements typically take additional time to execute through USFS review process
State Agency	Currently, land acquisition and use process is not sufficiently understood to determine benefits and issues	Currently, land acquisition and use process is not sufficiently understood to determine benefits and issues
Education Organizations or Universities	<ul style="list-style-type: none"> Typically willing to share land use Enthusiastic support of scientific efforts 	<ul style="list-style-type: none"> Legal and administration review are time consuming Site specific requirements for the agency benefits included in agreement Potential costs of land lease is an ongoing issue

4.1.11 Communicating and Identification of Site Risks

Any group or individual is expected to identify and communicate potential risks to a site selection. When a site is identified to have potential development issues or concerns, it must be reported to Project Management and LA/RC for mitigation plan development and tracking. LA/RC is responsible to track the concern and provide regular updates in the project status meeting. Part of the mitigation may include initiation of accelerated permitting efforts to mitigate potential delays.

Once a site has been declared “at-risk,” the ngVLA science team(s) are responsible to identify potential alternative sites upon direction from ngVLA project management. The ngVLA science team(s) are responsible to report progress on alternative site selection to allow characterization activities, design work, and permitting to commence in a timely manner.

4.1.12 Operations Activities

LA/RC operational activities are anticipated to include permit renewals, lease monitoring and renewal, processing of lease fees, and GIS mapping activities. Staff ramp-down is anticipated. Other activities are not addressed in this document and shall follow the NRAO administrative policies.



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5 LA/RC Requirements

The following requirements shall be fulfilled *as a minimum* to achieve the needed demands of the LA/RC scope of work across the ngVLA Project.

Requirement ID	Requirement Name	Requirements
LRC0018	Identify LA/RC Constraints	The ngVLA Project Office shall establish land acquisition constraints, including costs limits, technical constraints that may jeopardize site acquisition, and schedule constraints.
LRC0019	Address Environmental Issues in Change Requests	All project Change Requests shall be considered relative to impact on site selection and potential environmental impacts.
LRC0020	Report and Record Site Metadata	All site selection data (with metadata) regarding site boundaries, easement locations, etc., shall be reported to LA/RC and recorded in the GIS database.
LRC0021	Ensure Site Permits Are In Place	Site construction and development contractors shall obtain necessary permits for their contracted work, including required site inspections by authorities having jurisdiction.
LRC0022	Use Approved Land Use Agreements	Land Use Agreements shall conform to NSF pre-approved formats and content.
LRC0023	Review Exceptions to Land Use Agreements	Any exceptions to pre-approved Land Use Agreements shall be reviewed and approved by the LA/RC and Project Office.
LRC0024	Ensure All Agreements Are Executed by LA/RC	Only authorized LA/RC representatives may execute Land Use Agreements and commitments.
LRC0025	Review Proposed Site Shifts	After baseline locations are fixed, i.e. post-CoDR, any potential site or facility may be relocated or shifted only upon review of the Project Office and LA/RC.
LRC0026	Report LA/RC Discussions	Any land use or environmental discussion with land representatives must be reported and recorded with LA/RC.
LRC0027	Control Changes to Project for Environmental Integrity	The ngVLA project shall ensure stable project design to ensure integrity of Finding of No Significant Impact (FONSI).
LRC0028	Implement Mitigation as Directed	The ngVLA project shall implement mitigating actions required in completed NEPA.
LRC0029	Building Code Compliance	Construction deliverables shall be designed and delivered in conformance with the International Building Code and all applicable local codes.
LRC0030	ADA Compliance	All occupied buildings shall be designed and constructed to comply with the ADA Standards for Accessible Design.



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6 Appendix

6.1 Abbreviations and Acronyms

Acronym	Description
AD	Applicable Document
ADA	Americans with Disabilities Act
ANSI	American National Standards Institute
BLM	Bureau of Land Management
CATEX	Categorical Exclusions
CDR	Critical Design Review
CE	Conformité Européenne
CEQ	Council on Environmental Quality, regulations of 1978
CFR	Code of Federal Regulations
CoDR	Conceptual Design Review
DEM	Digital Elevation Model
DOJ	Department of Justice
EA	Environmental Assessment
EIS	Environmental Impact Statement
FONSI	Finding of No Significant Impact
GIS	Geographical Information System
IBC	International Building Code
ICD	Interface Control Document
IEBC	International Existing Building Code
IECC	International Energy Conservation Code
IFC	International Fire Code
IPT	Integrated Product Team
IRC	International Residential Code
LA/RC	Land Acquisition and Regulatory Compliance
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MREFC	(NSF) Major Research Equipment and Facility Construction
NEC	National Electric Code
NEPA	National Environmental Policy Act of 1969
NHPA	National Historical Preservation Act
ngVLA	Next-Generation VLA
NMAC	New Mexico Administrative Code
NPDES	National Pollutant Discharge Elimination System
NRAO	National Radio Astronomy Observatory
NSB	National Science Board
NSF	National Science Foundation
PEP	Project Execution Plan
R&RA	Research and Related Activities
RD	Reference Document
RFI	Radio Frequency Interference
SHPO	State Historic Preservation Offices
TBD	To Be Determined



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Acronym	Description
THPO	Tribal Historic Preservation Offices
UL	Underwriters Laboratory
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
USFS	US Forest Service
VLA	Jansky Very Large Array