

Floodplain Assessment for the Los Alamos Canyon Sediment Reduction and Restoration Project

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Prepared for: US Department of Energy
National Nuclear Security Administration
Los Alamos Field Office

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INTRODUCTION

The Los Alamos County Department of Public Utilities (LADPU) is planning to restore and address sedimentation from post wildfire flooding impacts in Los Alamos Canyon located within the 100-year floodplain. This restoration project includes: the upper watershed area above the reservoir, the reservoir, and the area where Los Alamos Canyon Creek, water pipeline and access road run parallel to each other down the valley (Figure 1). LADPU is collaborating with Keystone Restoration Ecology and Natural Channel Design, both who specialize in bio-engineering and low impact stream restoration techniques, to reduce erosion and preserve riparian health while maintaining pipeline and access road infrastructure. This project is being done in coordination with The National Nuclear Security Administration (NNSA), a semi-autonomous agency within the U.S. Department of Energy (DOE) and the U.S. Forest Service as the land managers for the project area. (Figure 2).

This floodplain assessment was prepared in accordance with 10 Code of Federal Regulations (CFR) Part 1022 Compliance with Floodplain and Wetland Environmental Review Requirements (10 CFR Part 1022) (CFR 2003) which was promulgated to implement DOE requirements under Executive Order 11988 Floodplain Management (EO 1977). A floodplain is defined in 10 CFR 1022 as “the lowlands adjoining inland and coastal waters and relatively flat areas and flood prone areas of offshore islands,” and a base floodplain as “the 100-year floodplain, that is, a floodplain with a 1.0 percent chance of flooding in any given year (CFR 2003).” This floodplain assessment evaluates potential impacts to floodplain values and functions from implementation of the proposed action, identifies alternatives to the Proposed Action, and allows for meaningful public comment.

DOE/NNSA has published this Floodplain Assessment for a 15 day for public review and comment period. Please provide comments on this Floodplain Assessment to Kristen Dors at:

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After the close of the public comment period and prior to issuing a floodplain statement of findings DOE/NNSA will reevaluate the practicability of alternatives to the proposed floodplain action, mitigating measures and take into account all substantive comments received during the public comment period. DOE/NNSA will endeavor to allow 15 days of public review prior to implementing the proposed action.

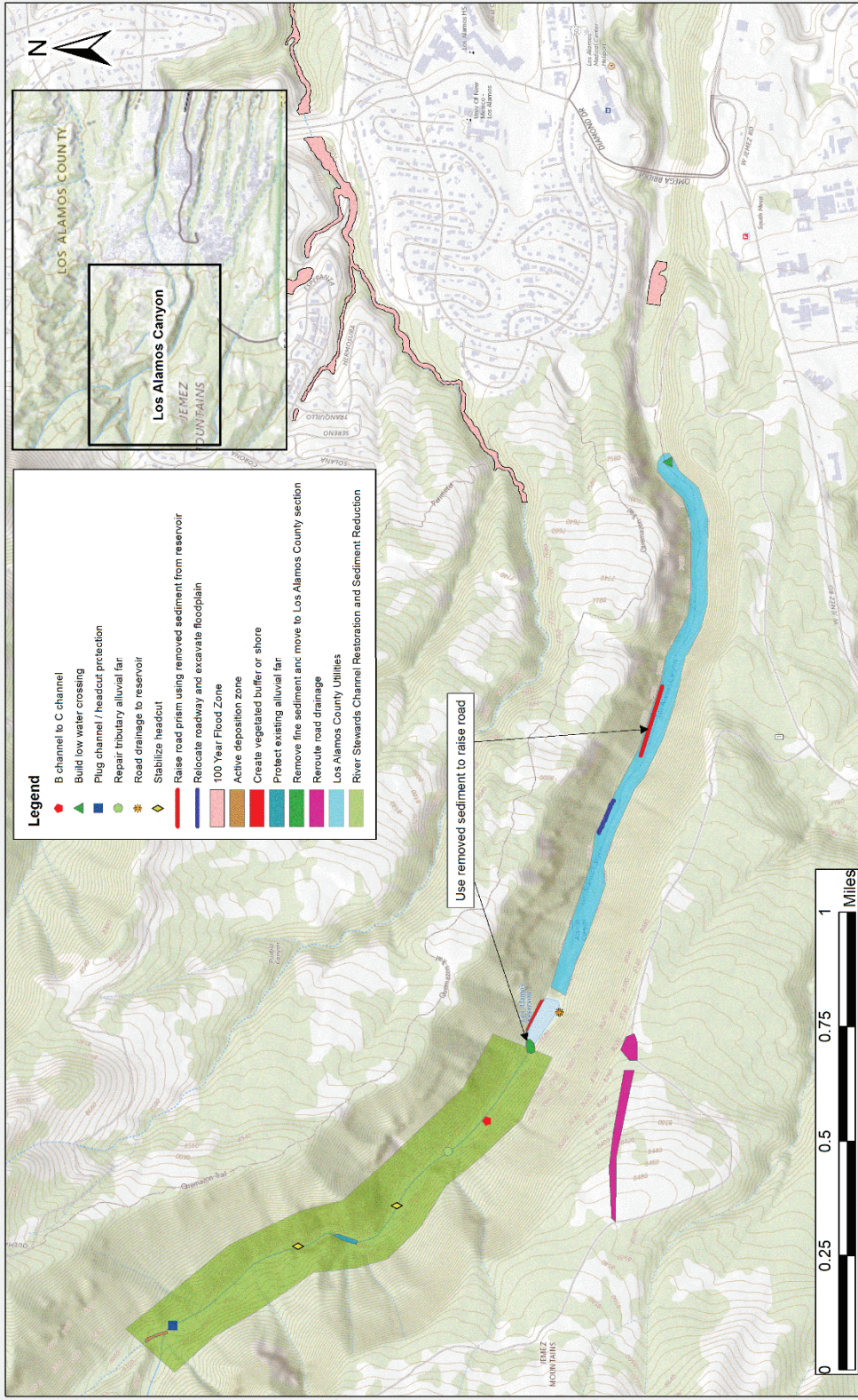


Figure 1. Location of Primary Restoration Project Area on USFS Lands

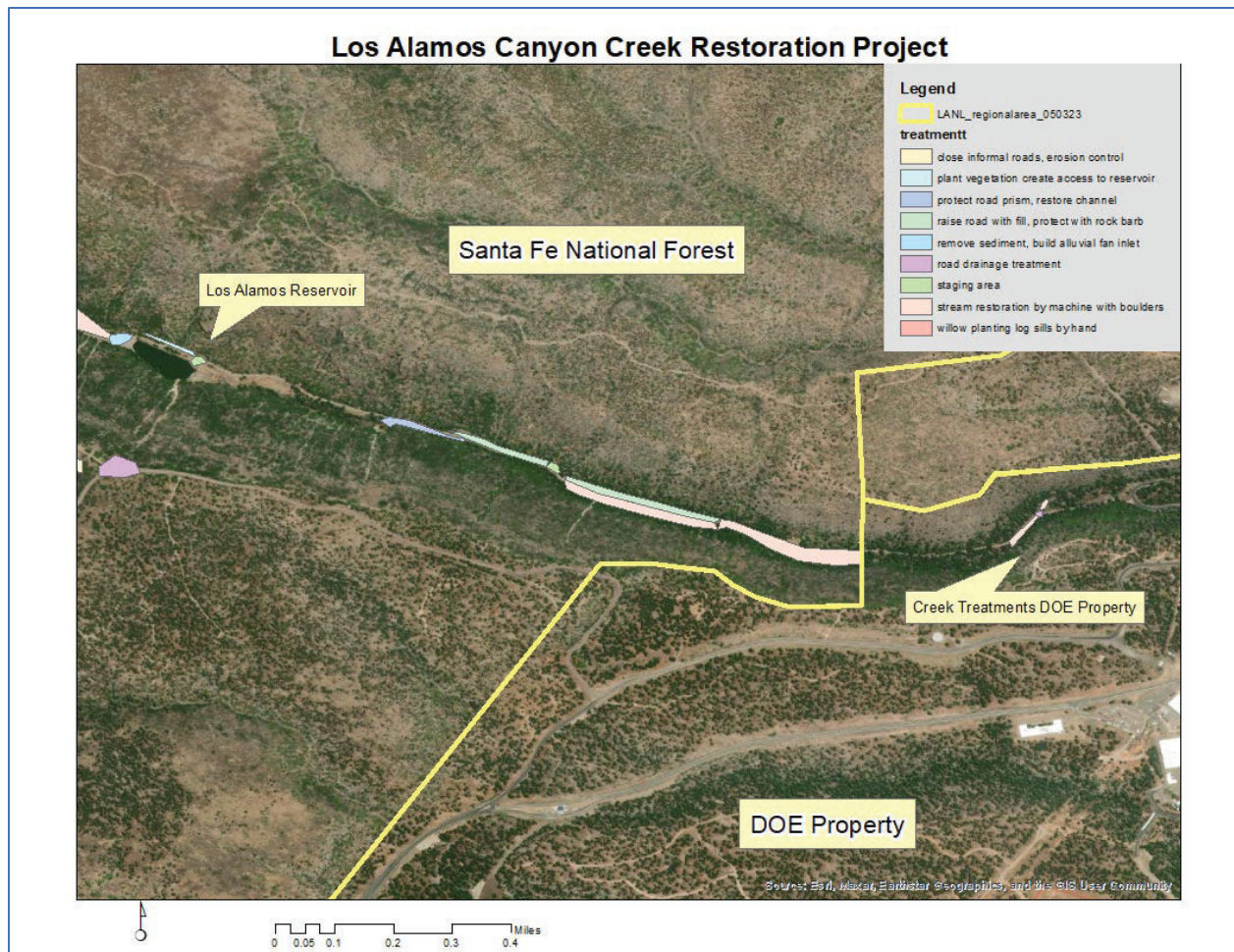


Figure 2. Property Boundaries and Creek Treatments on DOE Lands

BACKGROUND

Los Alamos Canyon Creek severely burned by two fires, the Cerro Grande Fire in 2000 and the Las Conchas Fire in 2011. The almost complete elimination of the forest canopy and ground cover has increased runoff rates in the watershed. Consequently, increased runoff creates an enormous amount of erosion in Los Alamos Canyon, which filled the Los Alamos Reservoir several times with rock and debris. Initial observations indicate that the source of sediment is from the destabilization of the channel of Los Alamos Creek in the upper watershed. This sediment has filled Los Alamos Reservoir several times, and is beginning to encroach on the reservoir again. Until the upstream watershed and Los Alamos Creek are stabilized and revegetated, this process is likely to continue for many years.

Downstream from the reservoir, the Los Alamos County water pipeline, conduit, and road have been destabilized and washed out by several extreme flood events. These events threaten access to the reservoir and the safety of the pipeline and associated infrastructure. This issue is exacerbated by the original realignment of the channel to accommodate the roadway and pipeline. The channel of Los Alamos Canyon Creek in one location is at a higher elevation than the road and pipeline,

overbank flows are forced towards the road embankment, leading to a continuing problem with flooding and erosion of the road base.

Los Alamos County Utilities has contracted with Keystone Restoration Ecology and Natural Channel Design Engineering to create a bio-engineering and geomorphic restoration design to mitigate this continuing erosion and channel instability. LADPU has received a River Stewardship Grant from the State of New Mexico's Surface Water Quality Bureau to work on channel instability and restoration of channel form and function. In addition, LADPU and Los Alamos County have contributed a large amount of funding to design and construct the phases of the project that require an engineering and construction approach, such as dredging the reservoir, re-building the access road to the Los Alamos Canyon Reservoir, and protecting the road and water pipeline from future flooding events.

PROJECT DESCRIPTION

The channel of Los Alamos Canyon Creek has been modified by the reservoir upstream. The capture of floodwaters in the reservoir has removed the 2-year Bankfull flood events that maintain the channel and floodplain in a stable form. Due to this, the channel has been clogged by sediment from the burned hillslopes above. This sediment is then colonized by the vigorous riparian vegetation and the channel has almost been eliminated in many locations. The channel will be carefully excavated to a stable form so that it can carry flood events in the channel rather than spilling on the floodplain.

This project will maintain a stable and functioning stream channel that will provide habitat for wildlife and have the capacity to move sediment and water downstream. This naturally stable channel will be maintained by the installation of cross vanes (see Photo 1 for example), rock riffle features and log vanes. These natural channel design structures are constructed using natural materials and work to create natural channel features such as pools and riffles that provide habitat to aquatic organisms.



Photo 1. Cross Vane in Valles Caldera, Looking Upstream at Structure

The road will be restored to a functioning and stable condition by using the sediment removed from the reservoir as a resource to re-build the road base. Natural materials such as ponderosa logs and boulders will be used to construct log and rock vanes (barbs) to protect the road from floodwater.

Proposed Design by Location

Upper Watershed

The primary source of flooding and sediment is the upper watershed of Los Alamos Canyon, including Quemazon canyon. The channel in the upper watershed is extremely destabilized, with areas of deep gullying, headcutting and erosion (see Photo 2). The sediment produced by erosion moves downstream in flood events and is deposited in wide, flat locations in the channel. This leads to additional destabilization and can begin more gullying and incision.

A conceptual design for Los Alamos Canyon channel restoration has been prepared and would involve careful implementation of restoration techniques using rubber-tracked machines such as excavators and skidsteers to move native materials such as boulders and logs to create a stable channel and floodplain. Revegetation using native riparian plants such as Coyote willow, Bluestem willow and Narrow-leaf Cottonwood will be done by machine and possibly hand planting with volunteers.



Photo 2. Cut Banks in Upper Watershed Contributing Sediment to Reservoir

Reservoir

The LA Canyon reservoir has the distinction of being the only “swimming hole” in the County and is widely used for recreation by families. However, years of filling with sediment and sediment removal have left it with steep, eroding banks, little shade, and poor water quality (see Photo 3). The winter snowmelt of 2019 began to fill the reservoir with sediment again, and this sediment is reducing water storage capacity and introducing nutrients such as phosphorus. The reservoir will be dredged and sediments used to raise elevation of the access road base.



Photo 3. Sediment from the Watershed Filling the Reservoir, this sediment will be removed to increase reservoir capacity and this material will be moved downstream to create road base.

Below the Reservoir

The section begins where Los Alamos Canyon Creek approaches the road at a narrow point in the canyon with cliffs on both sides of the valley (see Photo 4). Parker Construction, an approved LA County on-call construction company will move dredged sediment to build up road base elevation in this area where creek and road are side by side.

Where the valley is wider and can contain both a Bankfull channel and a flood-prone area (25-year floodplain), the road will be filled in with dredged material and protected with Rock Vanes. Rock Vanes or barbs are placed at a 20° upstream angle to the road and dip downward into the floodplain at about 15°. Water rolls off of the vane and returns into the floodplain, leaving sediment behind the vane which gets colonized by riparian vegetation for additional bank stability.

Vanes are more effective than riprap alone as they reduce scour at the road embankment by directing the flow of the water away from the road to the tip of the vane arm. Willows and cottonwoods will be planted between the vanes to add additional root stability and roughness to the road embankment.



Photo 4. Road Washout and Temporary Pipeline Stabilization (orange line). This location will be filled with dredged material from the reservoir to raise the road up 3-4 feet above current elevation.

The channel in this reach has been filled in due to the large flood events that impinged upon and washed away the road base. During the flood, the Creek flowed into the road and the remaining channel was left as a backwater. Sediment carried in the flood filled the channel in and riparian vegetation colonized this vegetation. Careful clearing of the channel of vegetation and removal of flood debris from the floodplain will maintain channel capacity for the next large flood event. Throughout this section of the project the Bankfull area, approximately 10 feet wide, will have large vegetation over 2 inches in diameter clipped.

DOE/NNSA Property

The DOE/NNSA portion of the project is located at the far bottom end of the project area near the intersection of the Creek with West Road, and starts about 500 feet above the intersection. The project area is about 1000 feet long, and is centered around a concrete stream crossing on the road that is presently covered with sediment from the erosion upstream in the burned watershed (see Photo 5). All of the project boundary that is within DOE/NNSA portion falls within Core and Buffer habitat for the Jemez Mountains salamander (JMS). The JMS is endemic to the Jemez Mountains.

At the downstream end of the project area, the road has impinged on the floodplain and channel, and a narrow, 10-foot swath exists between the road and the hillside for Los Alamos Canyon Creek. The Creek will be cleared of excess sediment and the road embankment protected with rock vanes.

The low water crossing is designed to carry large flows across the road; however, the wide and flat surface does not maintain sediment transport across the road. Creating an armored low water crossing with a narrow active channel in the center will ensure that gravel and sand are washed

through the crossing and it remains clear of sediment. This will reduce the amount of maintenance needed at this crossing and prevent it from getting clogged and forcing the Creek to flow elsewhere.

Downstream, a cross vane (see Photo 6) weir will provide grade control to protect the road and direct the flow of the Creek into the center of the channel. Several rock vanes will protect the downstream, north, bank of the Creek.



Photo 5. Low Water Crossing in Road, narrow corridor on Right is Creek.



Photo 6. Looking Upstream at Rock Vane, Left of Picture

FLOODPLAIN IMPACTS

The proposed project would involve work within the 100-yr floodplain. The following floodplain impact assessment discusses the long- and short-term impacts (positive, negative, direct, and indirect) of the proposed project on the floodplain.

SHORT-TERM IMPACTS

The short term direct and indirect impacts of the restoration project will be from constructing the restoration structures with machinery.

During construction there will be sediment released into the Creek which will directly affect aquatic habitat and water quality. There will also be soil compaction from heavy machinery. Vegetation within the creeks inner berm will be cut back if greater than 2" diameter. This will remove some wildlife habitat and change the aesthetics but is necessary to ensure runoff events and flooding have adequate area in the stream channel balance maintaining water supply through the pipeline and the access road to the reservoir.

Indirect adverse environmental effects involve temporary impacts to the project area with regards to noise and pollution from heavy machinery. These impacts will cease following completion of construction activities.

Other short-term direct and indirect impacts from the project will be avoided or minimized through implementation of the following best management practices:

- Rubber tracked machinery will be used for all stream restoration work reducing soil compaction impact.
- All machinery will be re-fueled away from Creek and other water sources.
- The disturbance area will be minimized and pre-existing disturbed areas will be used for staging areas for machinery and materials.
- Whenever possible in-stream structures will be built from the existing access road with the machine reaching into the stream channel.
- Vegetation will be cut at grade. Roots will remain in place.
- Project will revegetate all disturbed soils using native species appropriate for this elevation and forest type.
- Compliance with the Migratory Bird Treaty Act (MBTA) requires that no vegetation removal occurs during the peak bird breeding season, May 15 through July 31, unless biological resources staff at LANL have conducted a nest check to ensure that there are no nesting birds present. If active nests are found, the nest tree or bush will be left until the nesting is complete.
- Project will remove all debris (eg. construction material) from the floodplain at completion.
- All project personnel (footwear) and all field equipment used within/or passing through the LANL Jemez Mountains salamander habitat areas will be required to follow the disinfectant protocol standards set to ensure *Batrachochytrium dendrobatidis* (Bd) is not transported between sites (i.e., all equipment must be sprayed clean of all soil and

vegetation debris, and then all equipment and footwear must be sprayed with either 3% solution of 6% concentrate of household bleach or 1% solution of Virkon S. This includes application of the disinfectant to all field tools, machinery, vehicles, and work boots before entry, between sites, and after exiting the field.

- Retention of downed logs larger than 12 in. (30 cm) in diameter are to be retained, when possible. Rocks/boulders will be left in place, when possible.
- Any “hazard trees” within DOE lands will be evaluated by a LANL biologist before final disposition.
- No earth work or ground disturbing activities may take place during active weather events (e.g., rainfall), or if standing water are present.

Potential direct effects to migratory birds and other biological resources are minimal, as little or no habitat would be disturbed. The Migratory Bird Treaty Act prohibits killing migratory birds, including nestlings and eggs in an active nest. Therefore, if vegetation removal is required, during the nesting season (May 15 through July 31), an onsite inspection for bird nests from LANL Biological Resource subject matter experts would be required. Installation activities would conform to requirements stipulated in the Migratory Bird Best Management Practices Source Document for Los Alamos National Laboratory (LANL 2020).

LONG-TERM IMPACTS

The long-term impacts of this restoration project will be a positive impact to the riparian area, wildlife habitat and public recreation.

Beneficial long- term effects from the restoration of Los Alamos Canyon Creek include a reduction of sedimentation from the creek running onto the access road. Improvements in water quality and aquatic habitat are expected. Increasing access to floodplain will result in beneficial impacts to wildlife habitat, hydrology downstream of the project and water quality. Habitat will be improved in the long term.

Although the project will impact the aesthetics of the area in the short term, overall vegetation will re-sprout and the creek will be more accessible for public use. This restoration design accommodates the communities recreational use of this area. Near the reservoir, access and shade will be enhanced with trails, beaches, cottonwood trees, and other infrastructure. The implementation and revegetation plan will restore the reservoir to a beautiful amenity for the community.

PLANNING AND PERMITTING

This project will require a 404 permit and 401 certification. As part of the Nationwide #27 permit process, the project area is surveyed to determine impacts on threatened and endangered species habitat, cultural resources and floodplains or wetlands.

The USFS has performed an environmental assessment for the Northern New Mexico Riparian, Aquatic, and Wetland Restoration Project. This project decision and National Environmental Policy Act (NEPA) determination document was signed on 7-29-2021. Restoration projects

performed under this decision are evaluated under a checklist which includes requirements for cultural surveys, tribal consultation, and Endangered Species compliance. The DOE/NNSA would consider the NEPA determination and evaluation checklist of the USFS and could apply an agency determination to the DOE/NNSA portion of the project area.

Additional cultural surveys will be needed, especially in areas below the Los Alamos Reservoir. Since the upper watershed has completely eroded and redeposited by the 2013 flood, it was determined that minimal cultural surveys will be needed in this portion of the project area.

Biological surveys for Jemez Mountains salamander (JMS) were conducted on USFS managed lands in summer 2022. One salamander was present in the upper watershed area, above the reservoir, in a tributary to LA Canyon Creek in a forested area beyond the scope of this construction area. Survey work on the DOE/NNSA lands were conducted in June 2023 and no JMS were found. In addition to the best management practices described earlier in this document, no machine work is planned within 1000 feet of the “presence” identification, and no further work upstream will be performed by heavy machinery.

ALTERNATIVES

The alternatives available to DOE/NNSA include the no action alternative. The no action alternative was not selected by DOE/NNSA because without treatment and restoration of the watershed, channel erosion will continue to occur from the access road, banks, and channel bed of Los Alamos Canyon Creek. The Creek will continue to erode and change course to flow into the road, which currently 5 feet lower than the Creek elevation. Continual maintenance of the road will cause additional destabilization of the Creek. Sediment is continually dredged from the reservoir and used for road repairs. This sediment also continues to be eroded in large flood events and deposited downstream in highly impaired and contaminated portions of Los Alamos Creek which are more complicated and a higher risk to treat and restore.

CONCLUSIONS

Although this project will have short term and direct and indirect impacts to the 100-yr floodplain while construction activities are occurring, it will not result in long term adverse impacts to the floodplain function. Once construction activities are complete, the short-term impacts will cease. Implementing this project will improve floodplain function and reduce adverse impacts to the floodplain. No effects to lives and property associated with floodplain modifications are anticipated.

In accordance with 10 CFR 1022, DOE/NNSA will publish this Floodplain Assessment for a 15 day for public review and comment period. After the close of the public comment period and prior to issuing a floodplain statement of finding DOE/NNSA will reevaluate the practicability of alternatives to the proposed floodplain action, mitigating measures and take into account all substantive comments received during the public comment period.

LITERATURE CITED

EO 1977. Executive Order 11988 *Floodplain Management*.

CFR 2003. 10 Code of Federal Regulations (CFR) Part 1022 *Compliance with Floodplain and Wetland Environmental Review Requirements*.

LANL 2020. *Migratory bird best management practices source document for Los Alamos National Laboratory revised November 2020*. Stanek, J.E., Thompson, B.E., Sanchez, A.A., Berryhill, J.T. and C.D. Hathcock, LA-UR-20-24292.