

Replace Obsolete Housing Unit with Multiplex Unit

Devils Tower National Monument

Floodplains Statement of Findings, PMIS 228872

National Park Service
US Department of the Interior



Introduction

Executive Order (EO) 11988, “Floodplain Management,” and EO 13690, “Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input,” require the National Park Service (NPS) and other federal agencies to evaluate the likely impacts of actions in floodplains. The objective of EO 11988 is to avoid, to the extent possible, the long-term and short-term adverse impacts associated with occupancy, modification, or destruction of floodplains and to avoid indirect support of development and new construction in such areas wherever there is a practicable alternative. EO 13690 was issued to establish a Flood Risk Management Standard for federally funded projects to improve the nation’s resilience to floods and to ensure new federal infrastructure would last as long as intended. The NPS administers floodplain policy through Director’s Order 77-2: Floodplain Management (DO 77-2) and Procedural Manual 77-2 Floodplain Management (PM 77-2).

It is NPS policy to preserve floodplain functions and values and minimize potentially hazardous conditions associated with flooding, including threats to human health/life, risk to capital (NPS) investment, and impacts on natural and beneficial floodplain values. If a proposed action is found to be in an applicable regulatory floodplain with associated impacts and relocating the action to a non-floodplain site is considered not to be a practicable alternative, then a formal floodplain “Statement of Findings” must be prepared. The “Statement of Findings” must (a) quantify flood conditions and associated hazards as a basis for management decision making, (b) describe the rationale for selection of a floodplain site, (c) disclose the resources and amount of risk associated with the chosen site, and (d) explain flood mitigation plans. The “Statement of Findings” will be available for public review and comment.

This Floodplain Statement of Findings:

- Describes the flood hazard associated with the proposed action.
- Presents the rationale for the development of proposed facilities within the estimated floodplains at the Housing area at Devils Tower National Monument.
- Documents the anticipated negative impacts of these improvements on human health/life, capital investment, and floodplain functions and values.
- Presents mitigations to these impacts.

Project Description

The availability of quality housing at affordable prices is key in attracting and retaining the workforce necessary for the operations of every park. Currently, the housing onsite is obsolete, and temporary housing for seasonal staff is difficult to find in the area. To address this problem, the NPS is proposing to upgrade the current staff living areas with new facilities.

At the Devils Tower National Monument in Devils Tower, Wyoming (figure 1), one existing obsolete Mission 66 housing unit (6-plex) may be removed and replaced with a new multiplex housing unit (figure 2). The new housing unit would be optimized with a focus on costs, space utilization, energy efficiency, and life safety. The new structure would be served by upgraded utility lines and would meet the requirements of the Architectural Barriers Act Accessibility Standards (ABAAS). Upgrades include replacement and expansion of the septic leach fields to meet current requirements. Housing Prototype Building #3 (8-plex) would be modified to a 6-plex unit with laundry facilities, shower facilities, and a Storage Unit that may also serve as protection during windstorm events. The total gross square footage of the building would be 5,368 sf. All the units on the ground level would be accessible and ABAAS compliant. Site improvements would also include a community gathering pavilion, utility upgrades, two additional RV sites, parking, and site improvements. The replacement is consistent with the park's Housing Needs Assessment.

Site Description

Devils Tower is located in northeastern Wyoming on the edge of the Black Hills. Devils Tower National Monument (DETO) is located at 44° 35' 19.126" N 104° 41' 54.764" W in Crook County, Wyoming, about 20 miles northwest of Sundance, Wyoming. The project area is located immediately west of the Belle Fourche River within the mapped floodplain (figure 1).

The existing area is segmented by the existing site development including multiple buildings/structures, a paved roadway, parking areas, and mowed maintained lawn.

Floodplain Values and Processes

The Belle Fourche River as it flows through Devils Tower National Monument has been altered significantly. In the 1930s, the river was channelized, and an oxbow was removed to facilitate the relocation of the bridge for the park road, near the park entrance. Between 1950 and 1952, the Keyhole Dam was constructed, approximately 12 miles upstream of the monument. The Keyhole Dam and Reservoir were constructed to reduce flooding along the Belle Fourche River and to provide irrigation for areas in western South Dakota. Since the construction of the Keyhole Dam, the natural frequency of flooding of the Belle Fourche River within the monument has been greatly reduced (Martin 2012). Prior to channelization and the construction of the Keyhole Dam, this area of the river flooded regularly and included an oxbow and wetlands.

Despite the changes to the river and the associated floodplains, the Belle Fourche River and its floodplains still offer important natural processes and values. Floodplain functions include floodwater conveyance during high flow events, groundwater storage and recharge, sediment and nutrient filtration, and wetlands habitat. The river has incised since the channelization in the 1930s (Martin 2012). The removal of the oxbow and the reduction of out-of-bank flooding has reduced the ability of the river to meander naturally, increasing the potential for continued incision.

Class II Features (Check if part of the project)

- ☒ Schools, hospitals, clinics, or other facilities occupied by people with physical or medical limitations;
- ☐ Emergency services;
- ☐ Fuel storage facilities, 40,000 gallons per day or larger sewage treatment plants, and storage of toxic or water-reactive materials, including hazardous materials; and
- ☐ Irreplaceable records, museums, and storage of archeological artifacts.

Class III Features (Check if part of the project)

- ☐ High Hazard Area
- ☐ Coastal High Hazard Area
- ☐ Areas subject to flash flooding
- ☐ Extreme floodplain

Exceptions (Check if applicable)

- ☐ Historic or Archaeological Structures, sites, or artifacts whose location is integral to their significance.
- ☐ Park functions located near water for the enjoyment of visitors but require little physical development and do not involve overnight occupation
 - ☐ Picnic facilities, scenic overlooks, foot trails, and small associated daytime parking facilities in non-high hazard areas provided that the impacts of these facilities on floodplain values are minimized.
 - ☐ Isolated backcountry sites, natural or undeveloped sites along trails or roads, survey and study sites, or other similar activities.
 - ☐ Emergency actions essential to protecting property and public health, provided that emergency actions are limited to the minimum required and that all possible steps are taken to mitigate the short- and long-term adverse impacts of these actions on floodplain values.
 - ☐ Other: Describe

Class of Action:

<input type="checkbox"/> Class I	<input checked="" type="checkbox"/> Class II	<input type="checkbox"/> Class III
<p>Includes location or construction of administrative, residential, warehouse, and maintenance buildings; non-excepted parking lots; or other man-made features which by their nature entice or require individuals to occupy the site, are prone to flood damage, or result in impacts to natural floodplain values.</p> <p>Class I Actions are subject to the floodplain policies and procedures if they lie within the 100-year floodplain (the Base Floodplain)</p>	<p>Any activity for which even a slight chance of flooding is too great. Class II Actions are subject to the floodplain policies and procedures if they lie within the 500-year floodplain. Examples of Class II Actions are the location or construction of:</p> <ul style="list-style-type: none"> • Schools, hospitals, clinics, or other facilities occupied by people with physical or medical limitations; • Emergency services; • Fuel storage facilities, 40,000 gallons per day or larger sewage treatment plants, and storage of toxic or water-reactive materials, including hazardous materials; and • Irreplaceable records, museums, and storage of archeological artifacts. 	<p>Class I or Class II Actions in high-hazard areas, which include coastal high-hazard areas and areas subject to flash flooding. In high-hazard areas, picnic facilities, scenic overlooks, foot trails, and associated day-time parking facilities may be placed within the 100-year floodplain, but these facilities must contain signs informing visitors of flood risk and suggested actions in the event of flooding. Consideration should be given to providing additional levels of flood protection. For other activities, Class III Actions are subject to the floodplain policies and procedures if they lie within the extreme floodplain.</p>

Floodplain Description

Flood Elevation (100- and 500-year Elevations)

Using an overlay of the floodplain boundaries on the recent topographic map, the 100-year floodplain was estimated to be elevation 3,865; the 500-year floodplain is estimated to be elevation 3,869. To estimate the elevation of the 100 and 500-year floodplains, the 2014 floodplain boundaries were transferred to a recent topographic survey (2020) of the project area that includes the locations of the proposed project features (figure 3). The estimated floodplain boundaries do not align with specific topographic lines, unfortunate but not unexpected given the uncertainties noted in the development of the original 100-year floodplain boundary and the fact that areas surveyed for that effort were all one mile downstream of our project area.

No mapping by the Federal Emergency Management Agency exists for the Belle Fourche River at Devils Tower National Monument, Wyoming. In 2000, NPS hydrologists visited the monument to collect floodplain and channel survey data of a proposed Primitive Campground area for floodplain analysis, their study area was located to the east and approximately one mile downstream of the current project site (Johnson and Martin 2002). The following paragraph from their report explains how the 100-year flood flow was estimated, given the lack of data at the site (Johnson and Martin 2002):

“Commonly, flood magnitudes in ungaged basins may be estimated using USGS-derived regional flood frequency equations. However, due to the flow regulation provided by Keyhole Reservoir, these equations are not appropriate for the Belle Fourche in DETO.

To address this circumstance, the United States Army Corps of Engineers (ACOE) prepared a Special Flood Hazard Report for Devil's Tower National Monument in 1985. This report provided a flood frequency curve accounting for both flow regulation above Keyhole Reservoir and unregulated flow from the 640 square miles of intervening watershed. The magnitude of the 100-year flood derived from this curve is 13,000 cubic feet per second (cfs) (ACOE, 1985). This value is more conservative than values derived from other methods of estimation, however it is not unreasonable in its magnitude and, consequently, was chosen as the 100-year design flood for this drainage.”

Johnson and Martin surveyed three cross-sections downstream of the park road bridge over the Belle Fourche to estimate the 100-year floodplain elevation, the text below from their report documents how the 100-year floodplain was mapped, and the uncertainties associated with the mapping effort (Johnson and Martin 2002):

“Monument staff provided WRD with a landscape architects planning map of the study area titled "Visitor Staging Area Site Analysis." This map portrays approximate locations of some infrastructure and geomorphic features, however it is not drawn to scale. WRD delineated the 100-year floodplain as accurately as possible on this base map. Locations of the floodplain boundary were determined using specific distances surveyed between objects located on the map (i.e. historical building, roadway, bridge, park boundary). Some of the surveyed distances do not match those portrayed on the map, and therefore the depiction should be considered a schematic location of the cross-sections and 100-year floodplain. For added detail, refer to the graphs of the cross-sections included with this report. The original map is on file with WRD. Copies were forwarded to Monument staff and the Denver Service Center.”

A map depicting the estimated 100- and 500-year floodplains (figure 1) is believed to be derived from the Johnson and Martin (2002) report, but it should be noted that the report does not include this map, and this map has a date of 2014, there is no 2014 report that aligns with the map provided by NPS, hence the exact source of the data are uncertain. Finally, Johnson and Martin (2002) did not provide an elevation for the estimated 100-year floodplain. It remains the best information regarding the floodplains in this area and serves as the basis for this analysis.

Floodplain Description

Johnson and Martin (2002) described the floodplain in this area as “a series of moderately to well-defined alluvial terraces ranging from about two to 15 feet above the river, noting that the left bank of the river is primarily a steep cliff cut into the sedimentary bedrock.” As Martin (2012) noted, “the current riparian system of the Belle Fourche River where it passes through the park bears the effects of channel manipulations from the last century. Specifically, a 2,750-foot natural meander was removed through excavation to provide a more favorable alignment for the entrance road bridge. Downcutting of the main channel sometime after the redirection

has resulted in the current bed of the Belle Fourche to be about 10 feet below the surrounding area. The natural frequency of flooding has been greatly reduced by flow regulation at Keyhole Reservoir about 12 miles upstream.”

Recent Flood History (2013 – 2022)

To understand flood potential in the project area, data from the US Geological Survey (USGS) station 06427850 on the Belle Fourche River at Devils Towers were reviewed. The station was established in 2013. The gage is located at the park road bridge, approximately one mile downstream of the project site. The USGS website indicates no elevation data are available for this site. The data since 2013 indicated a maximum gage height of approximately 7 feet and it only reached this height on a few occasions for the period of record. As noted, this section of the Belle Fourche River is controlled by the Keyhole Dam, approximately 12 miles upstream of the project.

Alternatives

Options for Removing Project from Floodplain and Rationale for Dismissal

Relocating the proposed apartment building and leach fields outside of the floodplain would cause new impacts on natural and cultural resources, would create new costs for the project to reroute waste drains for other buildings in the Administrative Area to a new leach field location and to pump waste upgradient to the new site and would disrupt the connectedness of the area, impeding interaction and requiring duplication of facilities.

The proposed project is to replace an existing apartment housing building and associated facilities (parking, recreational vehicle (RV) parking, and utilities including the existing septic system). The current facilities are located within the floodplain. The existing septic field and tank(s) are located in the 100-year floodplain (figure 4). The apartment housing building and associated facilities are located in the 500-year floodplain (figure 4). Other buildings and facilities associated with the DETO Administrative Area are also located within the 500-year floodplain. These include the administrative building, office, pump house and maintenance building, recreational fields, and single-family residences (figure 4).

Impact on Natural Resources

The primary option for relocating the apartment housing building and leach fields is an area west of the existing facilities (western area). This was considered but ultimately dismissed as an option for several reasons. The western area is currently undeveloped, primarily prairie grasses with some forested areas. The current area is already developed and primarily mowed lawn. Relocating to the western area would have new impacts on natural resources that can be avoided by constructing in the proposed area. The western area is outside of the 500-year floodplain, so relocation here would avoid impacts to floodplains.

Impacts on Cultural Resources

The western area is known to have historic resources and a high potential for archeological resources. Proposed development in this area would require investigation and likely mitigation of impacts to cultural resources. The current site is a historic district; demolition of the apartment building would have an adverse effect on the building itself and the historic district because this impact is related to the demolition of the existing building and not the construction of the new building, the impact would be the same regardless of the location of the new facilities.

Logistical Challenges

Relocating the leach fields west of the existing facilities would complicate the function of these systems and increase the cost of construction. Currently, the leach field is down gradient of the developed area and can take advantage of gravity to convey material from the developed area to the leach field. Relocating the new leach fields to the west would require significantly more infrastructure, increasing the costs and complexity of the construction project. Because these leach fields serve the entire administrative area, additional work to reroute other facilities would be needed.

Different Location and Rationale for Dismissal

In summary, there is no suitable alternate location that would meet the purpose and need of the proposed project. Moving facilities out of the current area would increase the adverse effect on the Mission 66 Administrative and Residential Area and could cause adverse impacts on areas of archeological concern. It would also create new adverse effects on natural resources in an area that is currently undeveloped. Moving the apartment building away from the remaining facilities within the Administrative and Residential Area would disrupt the connectedness of the area, impeding interaction and requiring duplication of facilities.

Mitigations

Structural actions taken to minimize impacts to natural resources in floodplains

- No structures have been proposed within the 100-year floodplain. While the leach fields would be located within the 100-year floodplain, the leach fields would be located completely below ground and thus would not impact the functions or values of the 100-year floodplain.
- The proposed apartment building and parking areas are located within the 500-year floodplain. These features have been designed to minimize the footprint and are located mostly within the area already impacted by previous construction efforts. Impacts on new areas of the floodplain have been avoided.

Structural actions taken to minimize impacts on human life and property in floodplains

- Elevate the apartment building so that the lowest finished floor for living space would be above the estimated 100-year floodplain. While the building would include a basement that would be below the 100-year floodplain, the basement is for storage only. Living space would all be above the estimated 100-year floodplain.

Flood resiliency measures incorporated into the design

- All surface access points to the sewer and leach field located within the floodplain would be made water-tight, including one manhole, two distribution boxes, and eight leach field observation pipes.
- Features would be water-tight, including water-tight joints for the manholes, water-tight manhole covers for the manhole and distribution boxes, a water-tight caps for the leach field observation pipes.

Non-structural measures incorporated to reduce hazards to human life and property

- A flood evacuation plan is needed for the park. The existing Administrative Area and the existing Campground Area are located within the 500-year floodplain (Administrative Area) and 100-year floodplain (Campground Area). As such, these existing facilities require a flood evacuation plan that would also apply to the new facilities proposed to be constructed within the existing Administrative Area. Signs would be placed in the new housing building for residents and visitors, depicting the higher safe ground areas and outlining the flood emergency plans.
- Septic system operation during flood events:
 - During flood events, defined as a 100-year flood event or greater, park maintenance staff would monitor water levels within the leach field using the leach field observation pipes.
 - If leach field saturation warrants, maintenance staff would notify staff in the Administrative Area of the need to implement water use restrictions.

References

Johnson, Kim and Mike Martin

- 2002 *Trip report for travel to Devils Tower National Monument, June 26-27, 2000.*
October 2002.

Martin, Mike

- 2012 *Trip report detailing an assessment of an abandoned meander on the Belle Fourche River.* June 2012.

US Army Corps of Engineers (USACE)

- 1985 Special Flood Hazard Report, Devils Tower National Monument, Devils Tower Wyoming. In: *Environmental Assessment, General Management Plan, Development Concept Plan, Devils Tower National Monument, 1985.* As cited in Johnson and Martin 2002.

Attachment A: Figures

Figure 1. Devils Tower National Monument Location and Floodplain Map

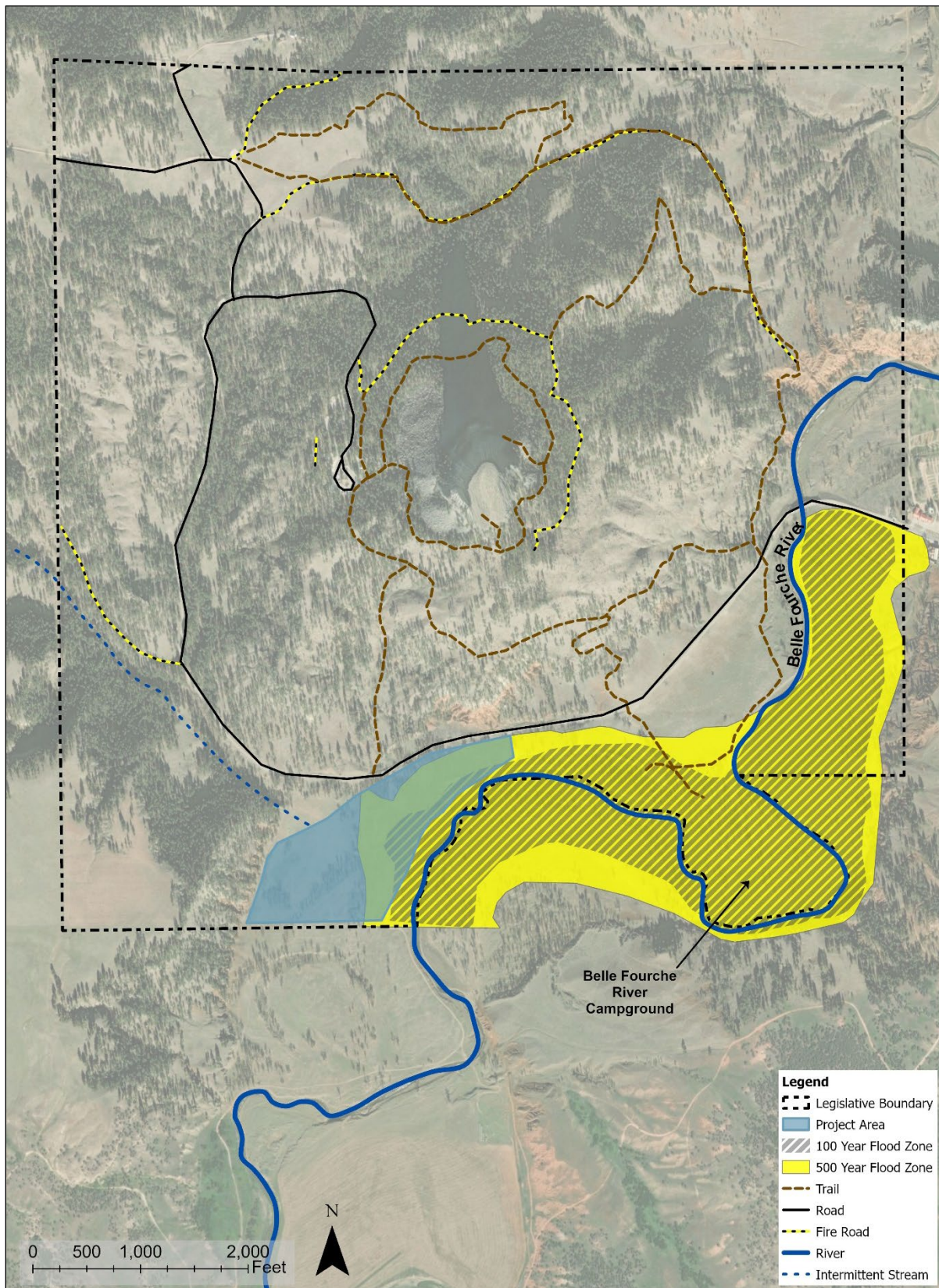


Figure 2. Proposed Project Plan

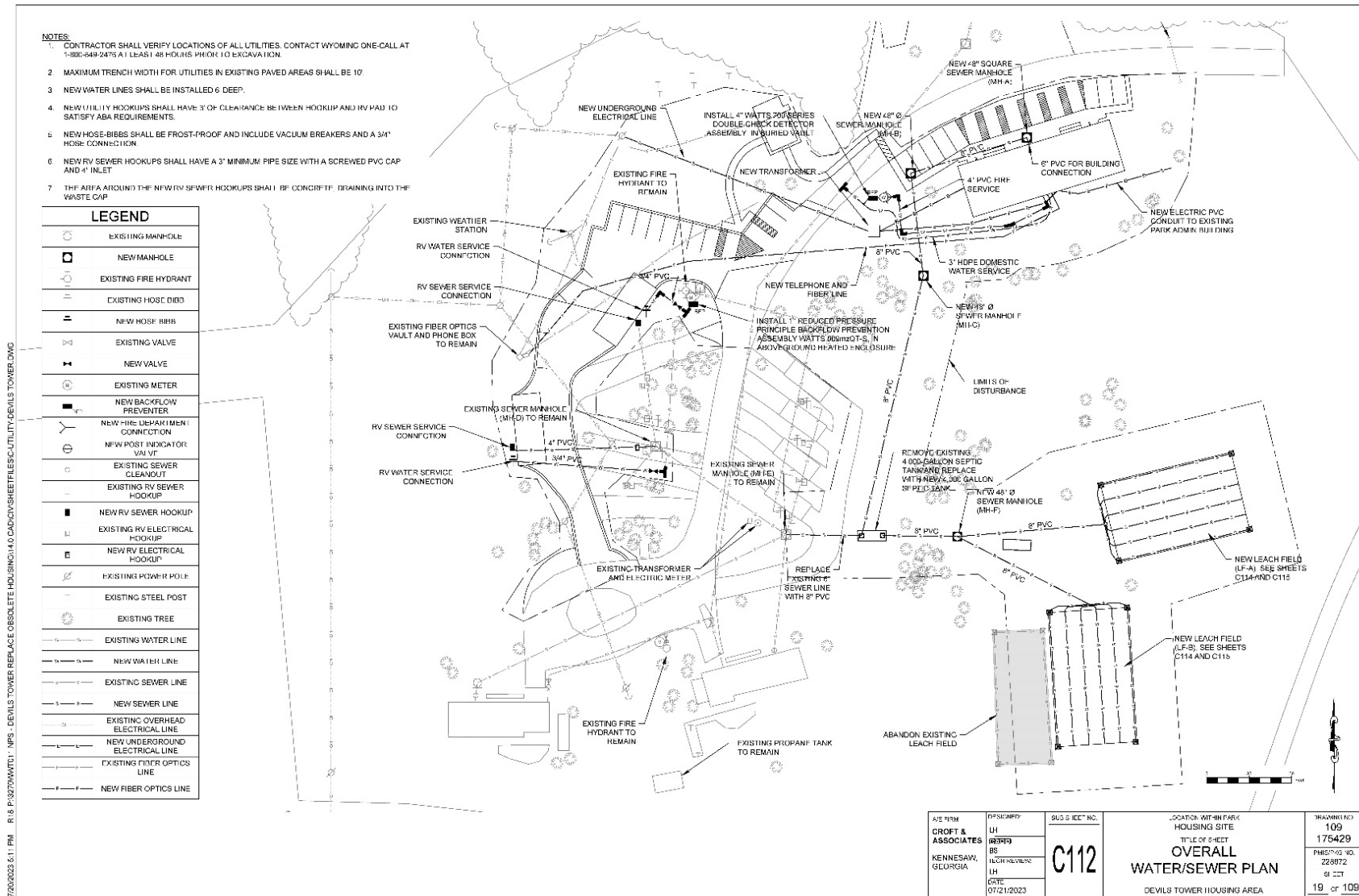


Figure 3. Approximate Locations of 100 and 500-year Floodplain Boundaries Overlaid on 2020 Topographic Mapping

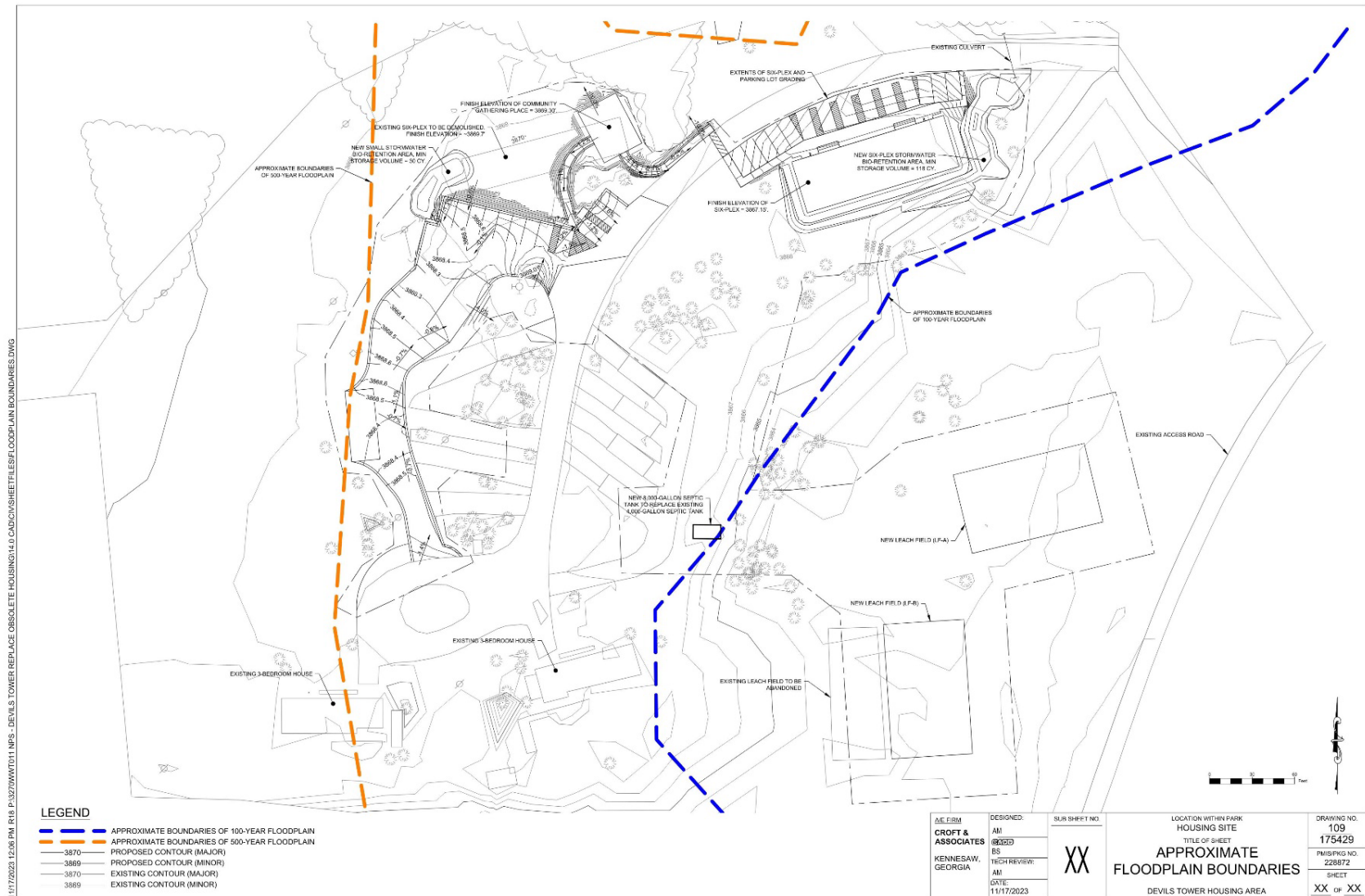


Figure 4. Approximate Locations of Proposed Project Features Relative to Floodplains

