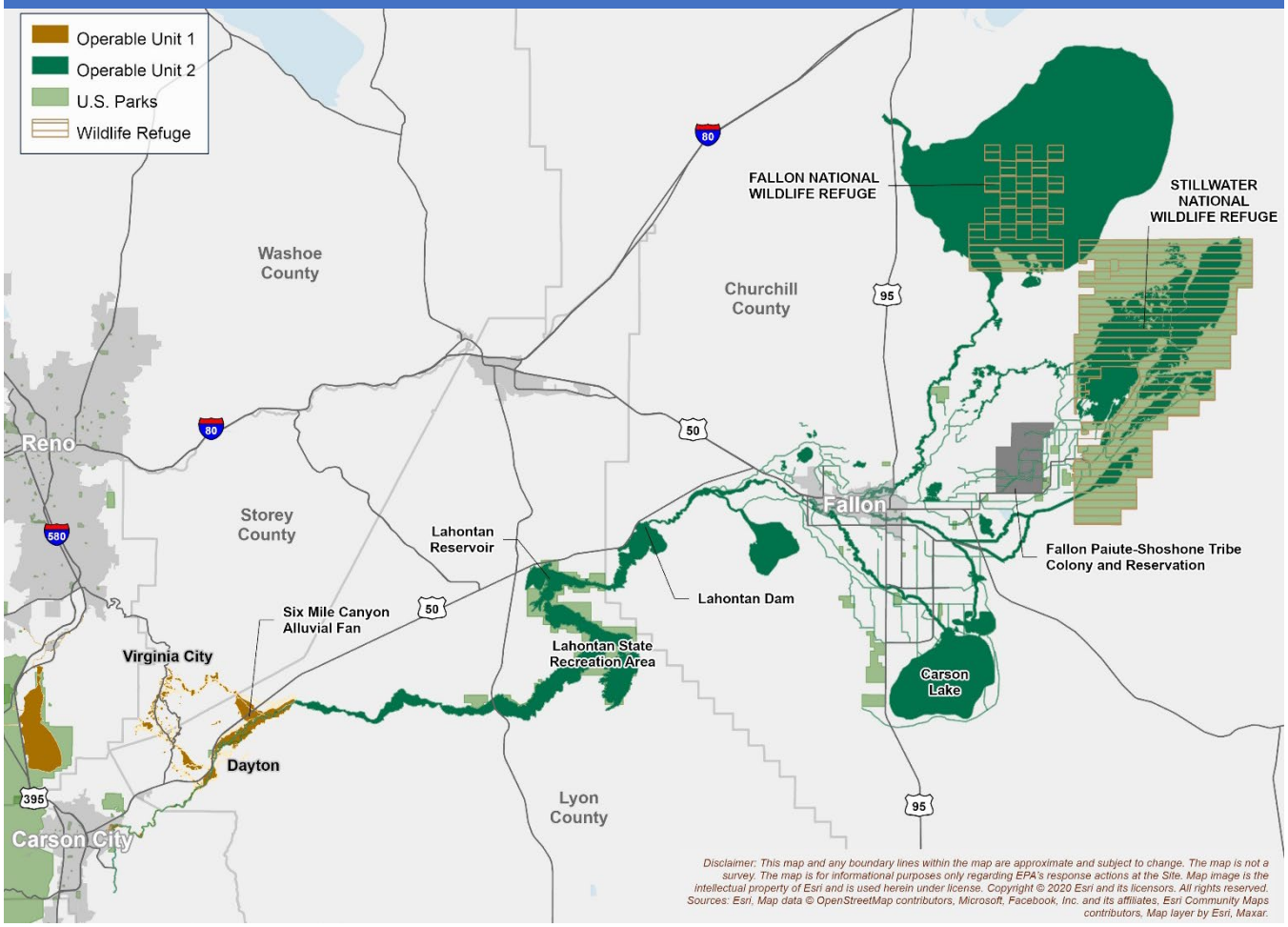
Renewable Energy Reuse Assessment

Carson River Mercury Superfund Site, Nevada



Introduction

At the request of the United States Environmental Protection Agency (EPA) Region 9, EPA's Superfund Redevelopment Program (SRP) provided technical assistance for a renewable energy assessment for the Carson River Mercury Superfund Site (CRMS or site) in Nevada. The assessment includes an evaluation of renewable energy potential, considerations shared by key stakeholders, and a sitewide screening to identify areas with potential for renewable energy development using solar photovoltaic (solar PV or solar) and/or hybrid geothermal.

CRMS covers 330 square miles, including five counties, two river basins and several watersheds in western Nevada. Past gold and silver mining activities on the eastern slope of the Sierra Nevada range led to the growth of Carson City, Virginia City and Dayton. Miners used toxic mercury to process the precious metal ore. In addition, arsenic and lead, which are naturally occurring trace metals in the region, were concentrated in the environment in some areas by these mining processes. Over many years, mining released 14 million pounds of mercury into the environment, including the Carson River and downstream water bodies. The Superfund site area generally follows the Carson River, beginning near Carson City and extending eastward (downstream) to the Lahontan Valley and the city of Fallon. The site includes the following two operable units, shown in the figure above.

- *Operable Unit 1* (OU1) covers the area of historic mines and milling activity. EPA is working with Nevada Division of Environmental Protection (NDEP) to sample soils here to better protect residents from mercury, arsenic and lead exposure.
- *Operable Unit 2* (OU2) includes the Carson River and various tributaries and other water bodies. EPA issued the Proposed Plan (Sept. 2021) and will soon issue the Record of Decision to address health risks to those who eat mercury-contaminated fish, as well as people who live in homes built in the floodplain. Arsenic and lead were found to be not significant in this area.

Purpose

Stakeholders are interested in exploring reuse and restoration options for the area, including renewable energy options. After an initial analysis of a range of renewable energy options (described on page 3) and several conversations with stakeholders regarding renewable energy development at the site, solar energy development has emerged as a shared priority for several groups. As part of the assessment, EPA convened conversations with representatives from municipalities, land conservation organizations, mining companies, state and federal agencies, and the Fallon Paiute-Shoshone Tribe regarding potential solar renewable energy opportunities at the site. Participating organizations are listed below. EPA conducted a preliminary screening to identify opportunities for solar renewable energy facilities and collaborated with local stakeholders to refine areas that may be most suitable for further evaluation. The screening also included considerations for hybrid solar and geothermal facilities. While EPA does not select or provide direct funding for future land use of properties, understanding current and anticipated future land use (or reuse) helps EPA ensure that cleanup remedies will protect human health and the environment. With this information, EPA can evaluate whether cleanup options would be compatible with reuse and ensure future uses, such as solar energy facilities, are compatible with the cleanup.

EPA Supports Reuse of Superfund Sites

EPA's Superfund Redevelopment Program helps communities reclaim and reuse thousands of acres of formerly contaminated land through an array of tools, partnerships and activities.
Visit: www.epa.gov/superfund-redevelopment

RE-Powering America's Land is an EPA initiative that encourages renewable energy development on current and formerly contaminated lands when aligned with the community's vision for the site.
Visit: www.epa.gov/re-powering

This report is a summary of the information gathered to date and is intended to be a tool for local stakeholders and prospective solar developers to continue exploring renewable energy development within the area.

Federal

- EPA Region 9 and SRP
- U.S. Bureau of Land Management (BLM)
- U.S. Bureau of Reclamation (USBR)
- U.S. Fish and Wildlife Service (USFWS)
- U.S. Navy
- Advisory Council on Historic Preservation

State

- NDEP
- Nevada State Parks
- Nevada Division of Minerals
- Nevada State Historic Preservation Office (SHPO)
- Nevada Division of State Lands

Tribes

- Fallon Paiute Shoshone Tribe
- Washoe Tribe

Local Government

- Carson City
- Churchill County
- Storey County
- Lyon County
- Truckee Carson and Irrigation District

Non-Governmental Organizations

- The Nature Conservancy (TNC)

Private Owners

- Comstock Mining

Future Use Considerations

CRMS is a large, complex site spanning over five counties. The cleanup response for such a large site includes a long-term remedial response to prevent exposure to mercury and other contaminants as land uses change. There are many public and private landowners within the 330-square-mile site, and land use change will evolve over time, informed by local land use policies and various authorities with land holdings.

EPA needs to consider land use changes to protect human health and the environment. Solar is one of the future land use opportunities at CRMS that could provide beneficial reuse of contaminated, previously disturbed areas or areas that may not be available for residential, agriculture or other economic development opportunities. This assessment provides information about potential considerations for solar development within and around the site and the coordination anticipated across the various state and federal agencies and local governments that are involved.

Renewable Energy Opportunities

Renewable energy opportunities are abundant in Nevada, particularly in the Carson Sink, where the site is located. This assessment focuses on solar, geothermal and hybrid geothermal-solar.

Solar – The site's lower latitude and desert-like climate are ideal for solar energy generation, with an annual average global horizontal irradiance (GHI) of over 5 kwH/m2/day across the entire site boundary.[1] In 2021, Nevada ranked sixth in the nation in total electricity generation from solar energy.[2]

Geothermal – Within the Carson Sink, geothermal is also abundant in areas where crystalline basement rock maintains high temperatures, 350 and above, between 5,000 to 7,500 feet below ground surface and, at some points, closer to the surface.[3]

Hybrid geothermal-solar – Nevada has a first-of-its-kind hybrid geothermal-solar power plant that combines geothermal power with solar PV. The plant, located near Fallon, uses solar thermal energy to increase plant efficiency by raising the temperature of the geothermal fluids.

Wind – While portions of Nevada are suitable for wind energy, CRMS is located primarily in a floodplain and at lower elevations that are not suitable areas for siting wind turbines. Therefore, wind energy was not a focus of this assessment.

This section provides a summary of potential solar and hybrid geothermal-solar opportunities within CRMS.

Solar PV

Nevada has excellent solar resource for any ground-mounted system. With many sunny days and strong irradiance, there are few limitations to power production. However, standard siting criteria still apply. Its varied and sometimes mountainous topography, as well as low-lying floodways, create some of the key challenges to siting solar at CRMS. Distance to transmission can also be a limiting factor. EPA's sitewide solar screening considered these key factors to identify potential areas suitable for solar PV systems. Floating PV was considered but ruled out due to limited consistent water levels in local waterways and water bodies. More information about floating PV is available in Appendix A.

[1] EPA's Re-Powering America's Lands Mapping Tool https://geopub.epa.gov/repoweringApp
[2] https://www.eia.gov/state/?sid=NV#tabs-1
[3] *New data yield new geologic insights at the Fallon FORGE site, Carson Sink Region, Nevada* https://pubs.er.usgs.gov/publication/70201800

Solar PV Opportunities

Solar reuse within CRMS provides a range of opportunities, including:

- Utilize high-value solar resources to create clean energy and offset local energy use from non-renewable energy sources.
- Redevelop already disturbed lands for solar arrays to preserve other pristine areas from development and retain areas intended for residential and commercial use.
- Support local goals for energy independence and increased stability through a diversified energy portfolio.
- Meet new opportunities to increase solar generation with the installation of new high-voltage transmission lines via Greenlink Nevada. More information is available here: https://www.nvenergy.com/cleanenergy/greenlink.
- Leverage available public land suitable for solar use and for transmission connection corridors.

Solar Screening

CRMS sitewide solar screening included evaluating areas within or adjacent to the site that could support small-scale or utility-scale solar development. Key factors that informed solar potential at this initial high-level screening are summarized below. A full list of suitability criteria and considerations for solar PV projects are summarized in Appendix B.

Table 1. Primary Criteria for Solar Screening

Primary Criteria	Small- to Mid-Scale	Utility-Scale
Solar Resource	Nevada has excellent solar resources, as compared to other parts of the U.S.	
Transmission Access	Areas ≤5 miles away from large transmission line -OR- ≤1 mile from a three-phase distribution line – 7-13 kV (if installation is to be ≤10 MW)	Areas ≤5 miles away from a transmission line High voltage lines (69 kV+) are of interest to utility-scale development
Substation Proximity	Areas ≤10 miles away from a substation	
Slope	Areas with ≤10% slope	
Road Access	Areas accessible via maintained paved or hard-pack gravel roads	Areas accessible via major public road
Size[4]	Contiguous area 8-160 acres	Contiguous area ≥160 acres
Environmental	Exclude sensitive habitat areas (i.e. desert tortoises, greater sage grouse); surface water, wetland areas and floodways; and state parks, municipal parks, national refuges and other protected areas.	

[4] In general, properties less than 160 acres may be more suitable for onsite use or net metering. Properties greater than 160 acres may be more suitable for a utility-scale project. Typically need six to eight acres for 1 MW, and utility-scale starts at 20 MW.

Solar Installation Considerations

This section provides an overview of some key considerations for moving forward with a solar project.

Remedial

Residential development in or near the OU1 area of the site must be conducted following the Long-Term Sampling and Response Plan (LTSRP). The LTSRP is a soil management plan to characterize, manage and control impacted soils on new residential property developments within OU1. While specific to residential development, the LTSRP may be a helpful resource for developers to better understand working with impacted soils. Additional information about the site is available on EPA's Site Profile web page, and specific information about activity and use is available here.

Mercury contamination is a concern throughout the entire site, in both OU1 and OU2. Elevated levels of arsenic and lead may also be present. To prevent exposure to or transport of contaminants, property owners and solar developers should work with EPA and NDEP during the design phase to better understand what may be needed to prevent exposure and help inform system design (see Solar Foundation Options section). Property owners can notify EPA and NDEP prior to construction to determine if there are area-specific sampling or soil handling protocols that need to be followed. Developers can continue to work with EPA and NDEP during construction and installation, especially before digging, to determine whether additional sampling or specific soil handling practices are needed. EPA and NDEP contact information is provided at the end of this report and on EPA's Site Profile web page.

Environmental Liability Protections

EPA also works with prospective purchasers, local government entities involved in property acquisition, lessees, and interested developers to ensure interested parties are aware of the steps needed to manage environmental liability issues. Property acquisition and future development should be coordinated with EPA Region 9 and NDEP. The 2002 Brownfield Amendments to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) provide important protections that could apply to prospective purchasers and lessees of parcels within the site. Prospective purchasers who meet certain statutory criteria and comply with ongoing obligations can qualify for liability protections. EPA can provide additional information to interested parties. EPA's Prospective Purchase Inquiry (PPI) service presents interested parties with current and accurate information about the site's cleanup status and timelines, current and potential property restrictions, available liability protections, and any EPA lien status.


Prospective Purchaser Inquiry Service EPA

Using the Superfund Redevelopment Program's Prospective Purchaser Inquiry Service to Support Superfund Site Reuse

EPA's Superfund Redevelopment Program works in partnership with EPA staff and communities to support the beneficial reuse of Superfund sites across the country. The Prospective Purchaser Inquiry (PPI) Service is an effective best practice that EPA regional site teams can use when they respond to inquiries from stakeholders interested in purchasing, reusing or facilitating the reuse of Superfund site properties. At the same time, the PPI Service can provide tribal, state and local governments, communities, developers and other stakeholders with valuable information on how EPA can support their reuse efforts.

EPA's Prospective Purchaser Inquiry (PPI) Service

EPA Regions use a variety of tools to support reuse at Superfund sites. EPA's PPI Service brings these tools together to provide accurate, comprehensive information about both removal and remedial Superfund sites. The information provided by EPA helps prospective purchasers make informed and timely decisions. The service is free of charge.

Through this service, EPA ensures that people have current and accurate information about a site's Superfund cleanup status and timelines, current and potential property restrictions, available liability protections, and any EPA lien status. When EPA site teams and Regional Superfund Redevelopment Coordinators offer the PPI Service, they help ensure that purchasers are informed, engage in redevelopment activities consistent with a site's cleanup, and coordinate with EPA to ensure the long-term protection of human health and the environment.

PPI Meeting Agenda and Discussion Topics

1. What is the current status of EPA's cleanup? What are the future anticipated actions?
2. Is the proposed reuse compatible with EPA's cleanup and the site's current or potential site restrictions?
3. Does the prospective purchaser understand applicable federal landowner liability protections?
4. How will EPA settle or resolve any Section 107(l) Superfund liens or Section 107(r) Windfall liens?
5. What EPA tools and support may be helpful?

More information about tools and resources for property owners, developers and prospective purchasers is available here. EPA's PPI service is described in more detail here.

Solar Foundation Options

Various foundation options are used for solar PV projects. A ground-mounted solar PV system can either be directly anchored into the ground (via piers or concrete footers) or ballasted on the surface without ground penetration. A direct ground-anchored system, such as pilings or piers may be best suited for areas where ground penetration or digging is not a major consideration. Ballast-weighted mounting methods rely on the weight of the modules, mounting racks and extra ballasts, if necessary, to meet required performance and design considerations with minimal soil disturbance. In areas where digging is prohibited or discouraged, a ballast-weighted, ground-mounted system could be the best-suited option.

Figure 1. Solar PV Array Anchoring Systems. Steel piles driven into the ground (left) and ballasted anchoring system (right)[5]

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Interconnection

Interconnection is the process for connecting solar arrays to the utility grid. This process can be a critical consideration in determining the economic feasibility of a solar project and is typically managed by the solar developer. Connecting to transmission lines is often the most expensive and time-consuming part of developing a solar project.

More information about solar interconnection standards and policies is available here: https://www.epa.gov/greenpower/solar-interconnection-standards-policies.

NV Energy is the utility company servicing most of CRMS (see map to the right), and more information about NV Energy's renewable energy portfolio, interconnection and net metering options are available here: https://www.nvenergy.com/cleanenergy.

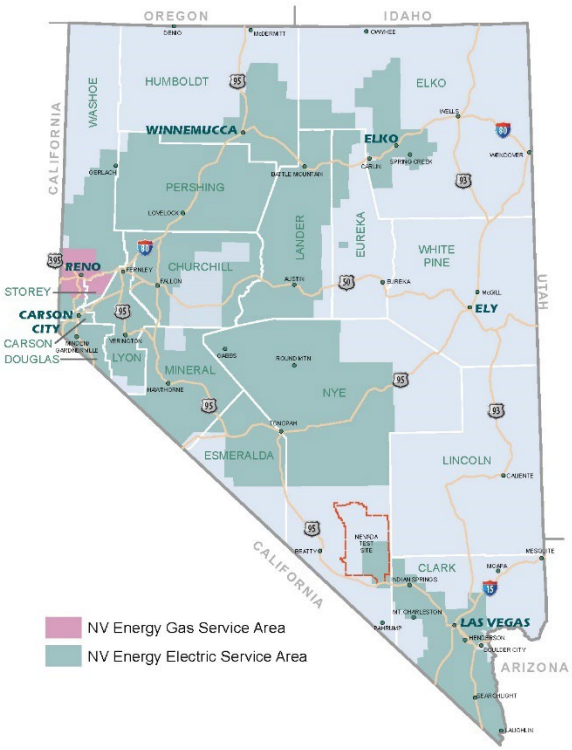
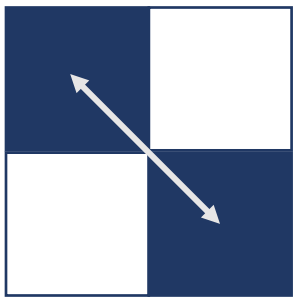


Figure 2. NV Energy service area[6]

Easement Options

In the western U.S., particularly Nevada, there are large swaths of federal land, often in a checkerboard-like configuration of 160-acre square parcels. Within the checkerboard, land alternates between federal and private ownership. Solar companies utilize what is often called "butterfly easements" to cross tie-in or connect transmission lines across large areas of checkerboard land. The butterfly easement runs through the corner connections of the federal land (see conceptual example to the right), allowing developers to limit the number of involved entities required to run a line that connects a solar PV system to the grid.



[6] https://www.nvenergy.com/about-nvenergy/our-company/territory

Sensitive Habitat

EPA's Remedial Investigation and Feasibility Study (RI/FS) for OU2 provides a summary of rare and threatened species that is provided below as a reference for solar developers considering a project in this area.

The following six species designated by the state as threatened, endangered or critically endangered birds, mammals or plants have been documented within the three primary Nevada counties in which OU2 is located (Carson City, Churchill and Lyon Counties) (Nevada Natural Heritage Program (NNHP), 2016):

- Bald eagle (endangered)
- Peregrine falcon (endangered)
- Spotted bat (threatened)
- Tahoe yellowcress (endangered)
- Churchill Narrows buckwheat (endangered)
- Williams combleaf plant (endangered)

Based on the OU2 SLERA provided in the OU2 RI Report, the three counties have no documented sightings of threatened or endangered fish or reptiles, per the NNHP and according to the USFWS*.

The following five federally threatened or endangered bird, mammal, fish, amphibian, and insect species have been documented within the three primary Nevada counties associated with OU2 (Carson City, Churchill, and Lyon Counties) (USFWS, 2016a):

- Yellow-billed Cuckoo (threatened)
- Cui-ui fish (endangered)
- Lahontan cutthroat trout (threatened)
- Sierra Nevada Yellow-legged frog (endangered)
- Carson wandering skipper (butterfly) (endangered)

The three counties have no documented sightings of threatened or endangered mammals, reptiles or plants, according to the USFWS.

Summary of Areas with Solar PV Potential

The screening analysis identified a dozen areas with potential for solar PV that may be suitable for additional evaluation. The following maps and tables classify these areas as either utility-scale or small- to mid-scale candidate sites. Areas with the best potential for solar development are listed first and are described in more detail on the following pages.

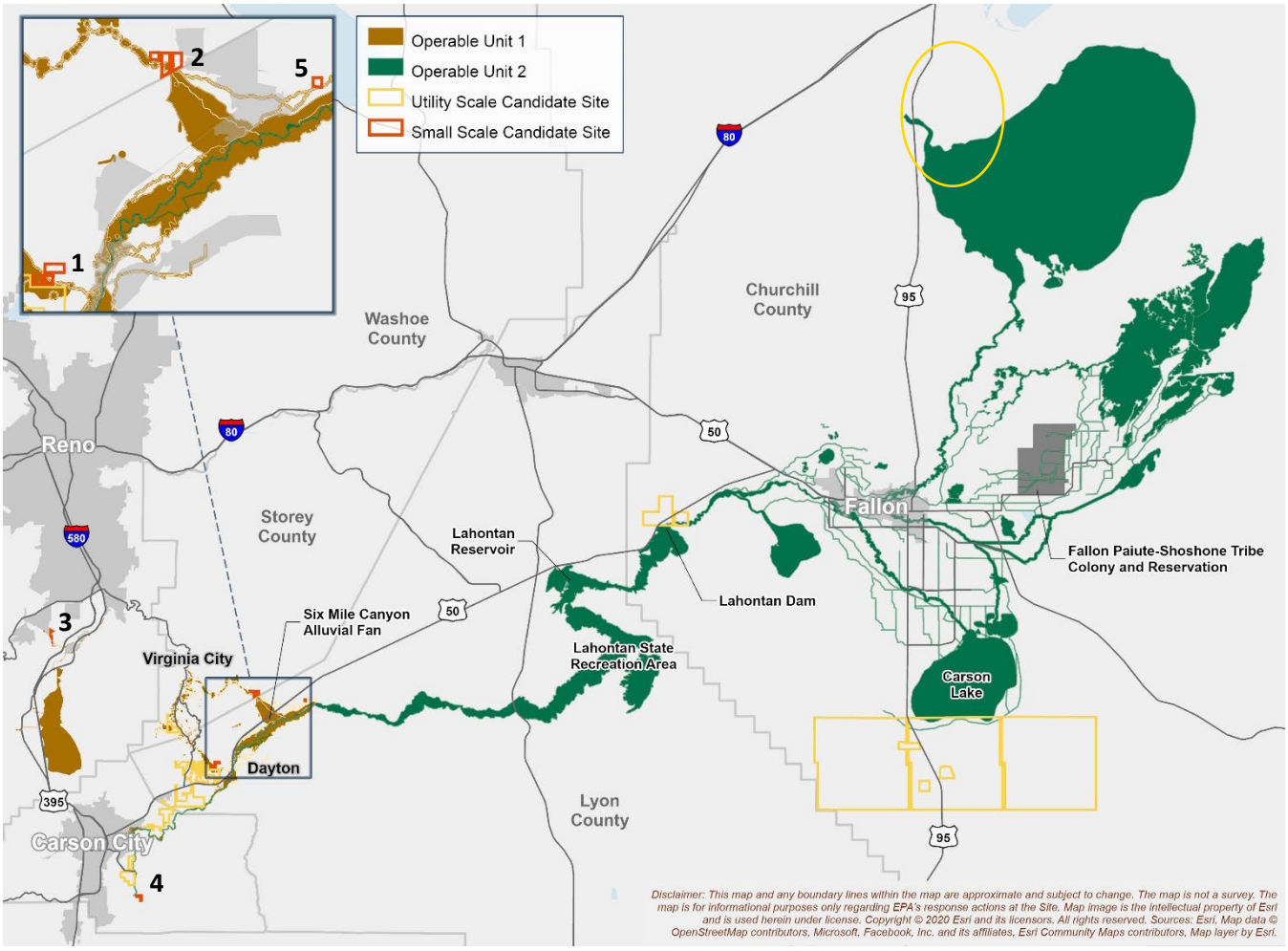


Figure 3. Map of Potential Solar PV Areas (small- to mid-scale sites shown in red)

Table 2. Summary of Potential Small- to Mid-Scale Solar Areas

Solar Area	Location	Ownership Type	Total Size*
Small- to Mid-Scale			
1. South Comstock Dump	Dayton City	Mixed (BLM and Private)	160 acres
2. Six Mile Canyon Road	Storey County	Private	180 acres
3. Montreux	Washoe County	Private	132 acres
4. Bureau of Indian Affairs	Carson City	Public	119 acres
5. Fort Churchill Road	Lyon County	Private	40 acres

**Indicates total property acres. Solar development potential is described in the next section.*

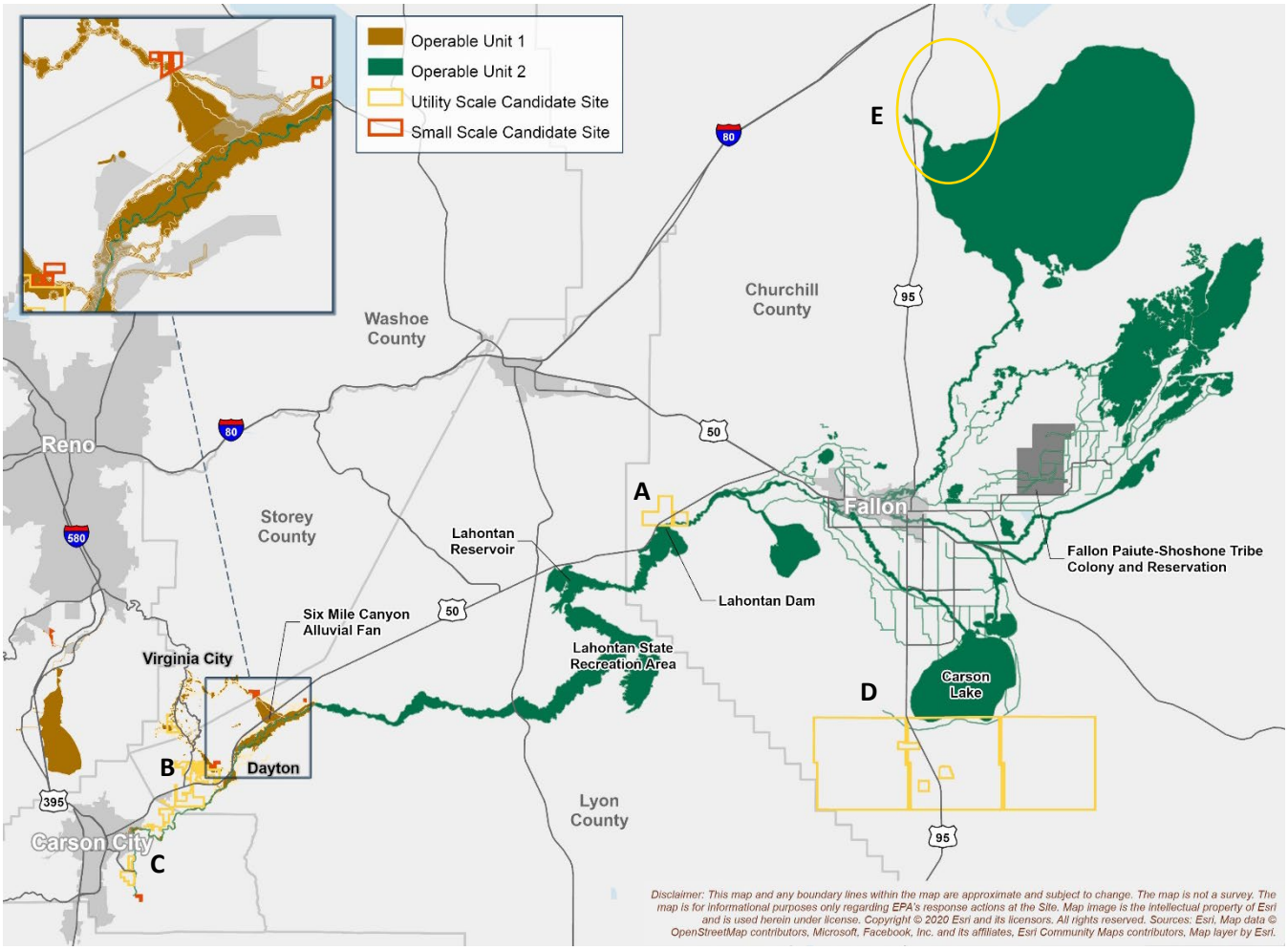


Figure 4. Map of Potential Solar Areas (utility scale sites shown in yellow)

Table 3. Summary of Potential Utility-Scale Solar Areas

Solar Area	Location	Ownership Type	Total Size*
Utility-Scale			
A. Lahontan Dam	Churchill County	Public (BLM, USBR, State of Nevada)	2,584 acres
B. Greater Comstock Dump Area	Lyon County and Dayton City	Mixed (BLM and Comstock Mining)	3,754 acres
C. Carson City	Carson City	Public	1,595 acres
D. Carson Lake	Churchill County	Private (BLM and USBR)	69,177 acres
E. Fallon Refuge Area	Churchill County	Mixed (Private and Public)	29,066 acres

**Indicates total property acres. Solar development potential is described in the next section.*

Stakeholder discussions identified the following additional areas for solar PV:

- **Fallon Paiute Shoshone Tribe**
  - Community solar PV project to offset energy demand of existing subdivision(s) on Tribal land.
  - Solar PV project to produce energy for the Tribe's reverse osmosis water treatment plant.

- **Churchill County** (these areas are outside the current CRMS boundary)
  - Co-location of solar with geothermal to offset energy demands of producing geothermal, particularly in the western area of the county.
  - Potential solar area on the bluffs southeast of Lahontan Dam, which does not conflict with the county's goal of preserving high value agriculture lands.
  - Solar PV project located at the county's wastewater treatment plant to offset energy used by the facility.

Figure 5. View of bluffs near Lahontan Dam

Solar Development on BLM Lands

In addition to the solar candidate areas identified by the screening analysis, there are also significant portions of BLM public lands with excellent renewable energy potential in and near CRMS. BLM works to identify appropriate sites for environmentally sound development of renewable energy on public lands. CRMS is located within an area that includes BLM public lands with solar development potential. Solar developers may also be interested in BLM lands for connecting to transmission lines across large areas of checkerboard land (referred to as "butterfly easements"). The Solar Energy Environmental Mapper is a web-based application that displays environmental data for the Southwest U.S. in the context of utility-scale solar energy development. However, some of this data may be out of date or additional local information may be available. Therefore, coordinating with the BLM Field Office is an important first step in the solar development process to better understand if any ecological, cultural, historical, and archeological resources exist in the area. Please see contacts at the end of this report for more information.

The map below illustrates the distribution of BLM public lands within and near CRMS and the solar candidate area identified by this assessment. See the next section, *Areas with Solar PV Potential Summary,* for more information about the solar candidate areas.

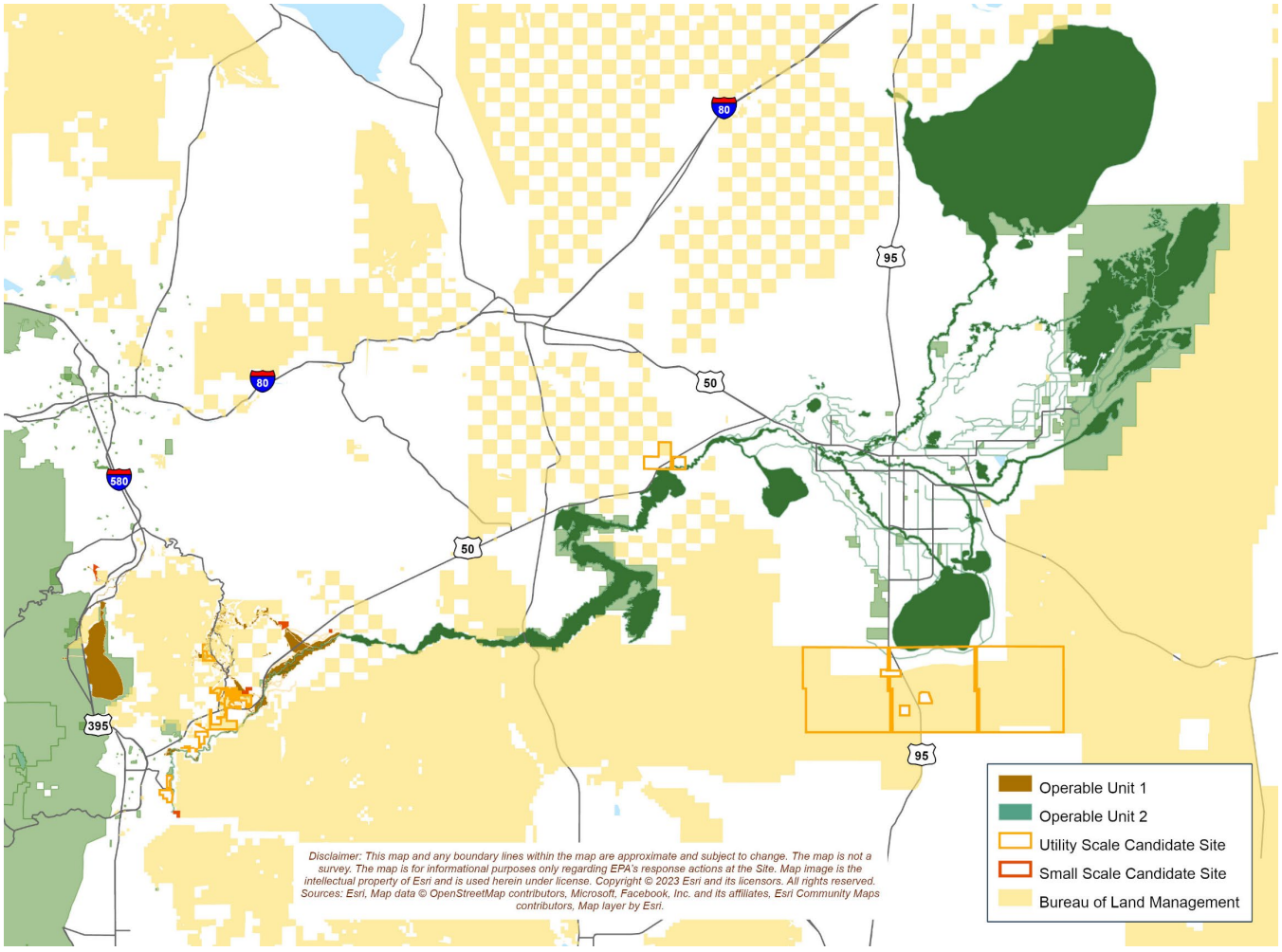
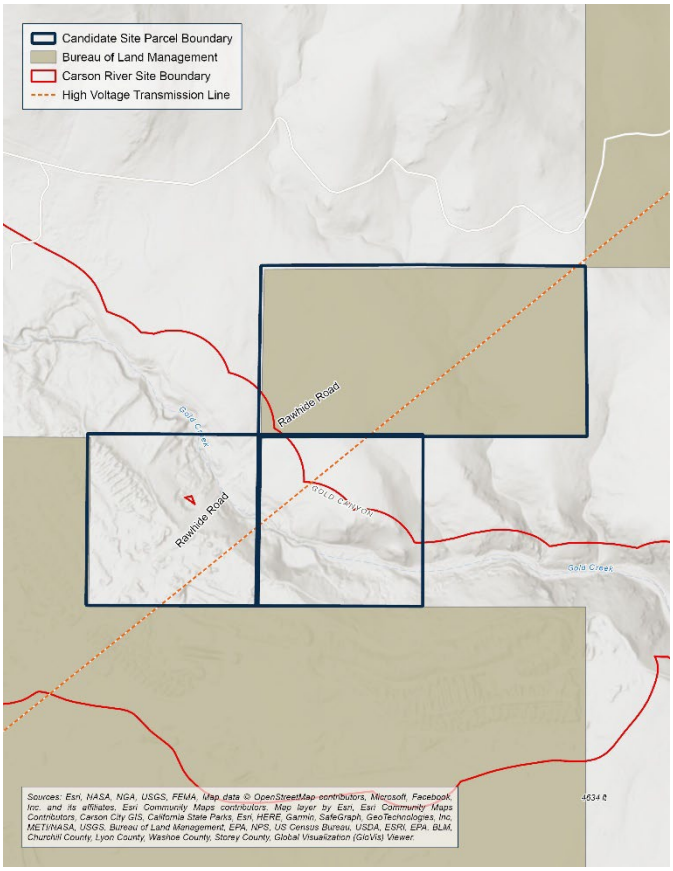


Figure 6. BLM Public Lands near CRMS

Areas with Solar PV Potential – Small- to Mid-Scale

1. South Comstock Dump

DAYTON CITY



Part of the South Comstock Dump, this area includes a former dump that received dredge tailings from 1920 to 1923. The area likely has been reworked over time, which could impact the historic significance of the area.

Ownership: Two parcels are privately owned, and one parcel is owned by BLM (as shown in the map).

Size: total acreage is 160 acres.

Potential Solar Acreage: Almost the entire area is less than 10% slope and undeveloped and could offer a solar development opportunity with road and transmission access.

Areas identified for small to mid scale solar potential include those with less than 10% slope and that range in size from 8-160 acres.

Access: The area is accessible on a poorly graded, uneven access road from Highway 50. The gravel access road may need improvements for construction and operations and maintenance. Additional access roads may be needed to access the full area and could be installed as part of the solar development.

Transmission Access: Electric transmission lines bisect the area and continue through BLM owned lands. The nearest substation is less than ten miles away.

Key Considerations:

- There is mixed private and public ownership and uncertainty about mining claims.
- Initial coordination is needed with BLM to identify any cultural, historical and archeological resources in the area. A Class 2 inventory through a remote desktop study could be an initial step to determine whether a more detailed study is needed by an archeologist and built environment historian.
- Coordination with SHPO and the Advisory Council on Historic Preservation (section 106 consultation) is required if a solar project is identified for the area.
- Viewshed analysis or visual impact assessment may be needed for areas within the Virginia City National Register of Historic Places or Comstock Historical District.

The Nevada chapter of TNC is interested in conducting a pilot for a renewable energy candidate site through the oversight agency process. TNC is considering using this area as an opportunity to better understand the steps needed to move forward with a solar development project under these unique circumstances and can provide that information to future solar developers as part of their “Mining the Sun” program. For more information, visit: https://www.nature.org/en-us/about-us/where-we-work/united-states/nevada/stories-in-nevada/solar-energy-at-former-mines/.

2. Six Mile Canyon Road

STOREY COUNTY

Undeveloped land located north of Dayton along Six Mile Canyon Road.

Ownership: Three privately owned properties.

Size: Total acreage is 180 acres.

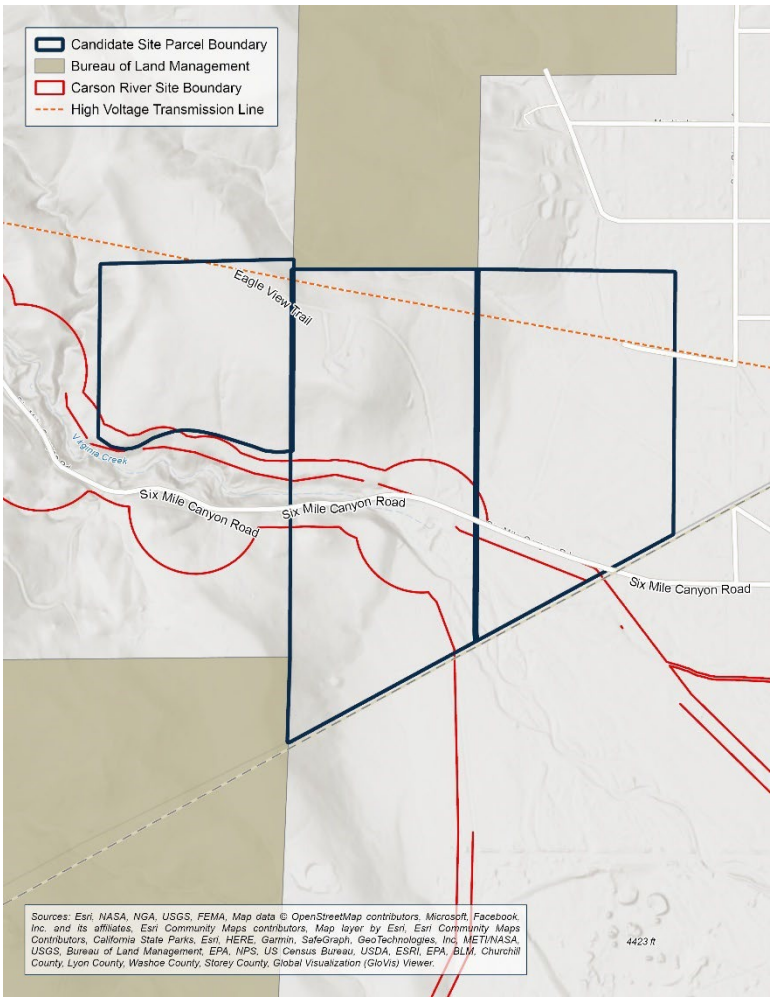
Potential Solar Acreage: Approximately two-thirds of the total acreage may have suitable slope for solar.

Areas identified for small to mid scale solar potential include those with less than 10% slope and that range in size from 8-160 acres.

Access: The area is accessible from Six Mile Canyon Road. Two of the parcels span across the road.

Transmission Access: Electric transmission lines intersect all three properties.

The nearest substation is less than 10 miles away.



Key Considerations:

- A larger solar facility would require agreement and coordination among three different landowners.
- There is potential for higher levels of soil contamination, especially near sources around former tailings and mill operations, which may make solar a more appealing future land use than residential, depending on landowner goals.
- Must determine whether solar arrays are consistent with current local zoning and ordinances.
- Solar development would need to be coordinated with EPA and NDEP to ensure any soil with elevated levels of contaminants is managed properly.

3. Montreux

MONTREUX, WASHOE COUNTY

Located along Galena Creek and adjacent to an existing residential community.

Ownership: Three privately owned properties.

Size: Total acreage is 132 acres.

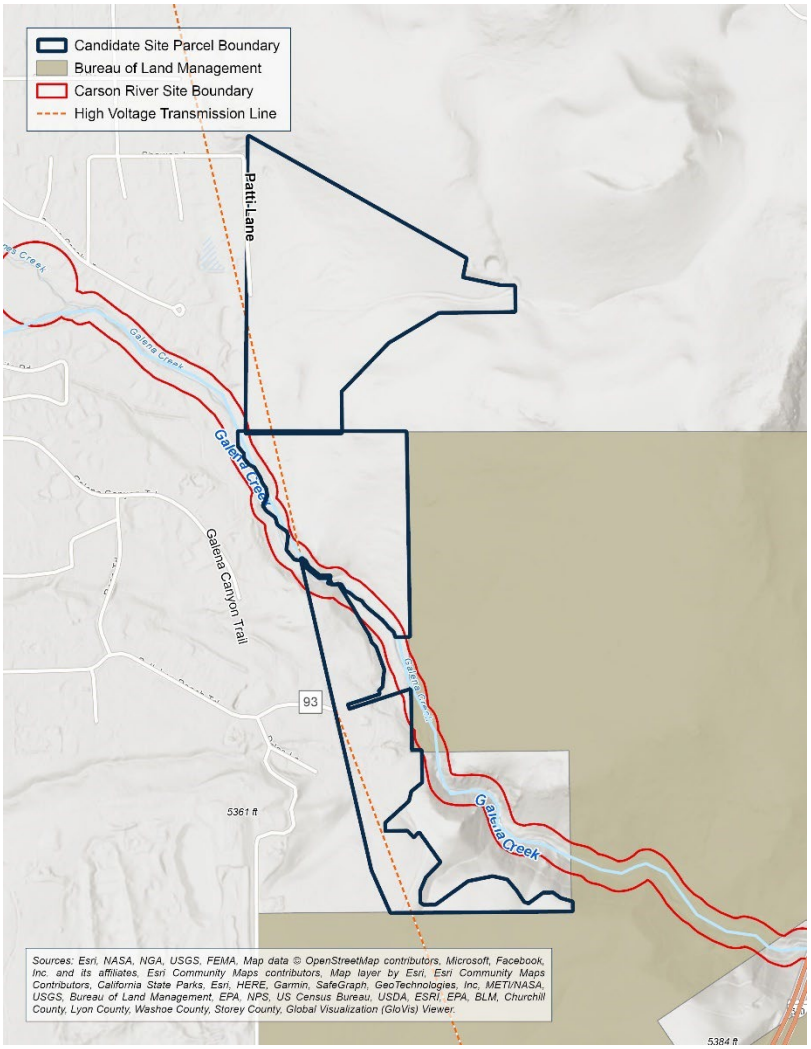
Potential Solar Acreage: Approximately two-thirds of the total acreage may have suitable slope for solar.

Areas identified for small to mid scale solar potential include those with less than 10% slope and that range in size from 8-160 acres.

Access: The area is accessible from existing residential streets.

Transmission Access: Electric transmission lines intersect all three properties.

The nearest substation is less than 10 miles away.



Key Considerations:

- A larger solar facility would require agreement and coordination among three different landowners.
- Proximity to an existing residential community and interest in preserving future residential growth may limit support for solar in this area.
- BLM owned land surrounds the area to the east and south.

4. Bureau of Indian Affairs

CARSON CITY

This property is located southeast of Carson City.

Ownership: Bureau of Indian Affairs

Size: Total acreage is 119 acres.

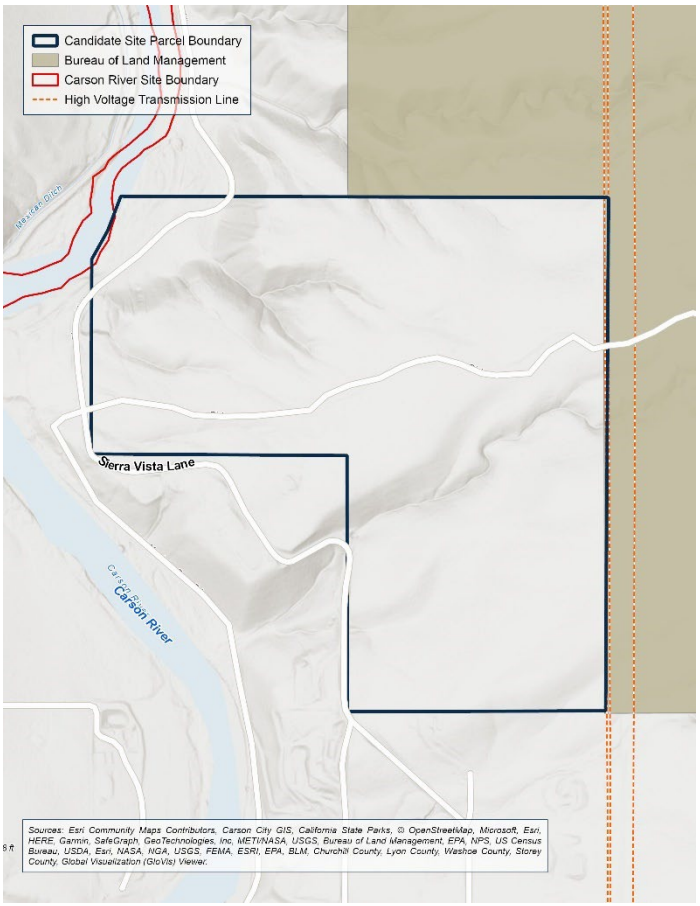
Potential Solar Acreage: Approximately two-thirds of the total acreage may have suitable slope for solar.

Areas identified for small to mid scale solar potential include those with less than 10% slope and that range in size from 8-160 acres.

Access: The area is accessible from existing, maintained roads (Sierra Vista Lane), and a road bisects the property.

Transmission Access: The property abuts electric transmission lines.

The nearest substation is less than 10 miles away.



Key Considerations:

- Lack of contiguous level areas may be a limiting factor for larger solar array.
- Long-term goals and property ownership are unknown.
- Renewable energy development may conflict with existing recreational and agriculture zoning in the Carson Valley.

5. Fort Churchill Road

LYON COUNTY

This property is located adjacent to a residential area in Lyon County.

Ownership: Privately owned parcel.

Size: Approximately 42 acres.

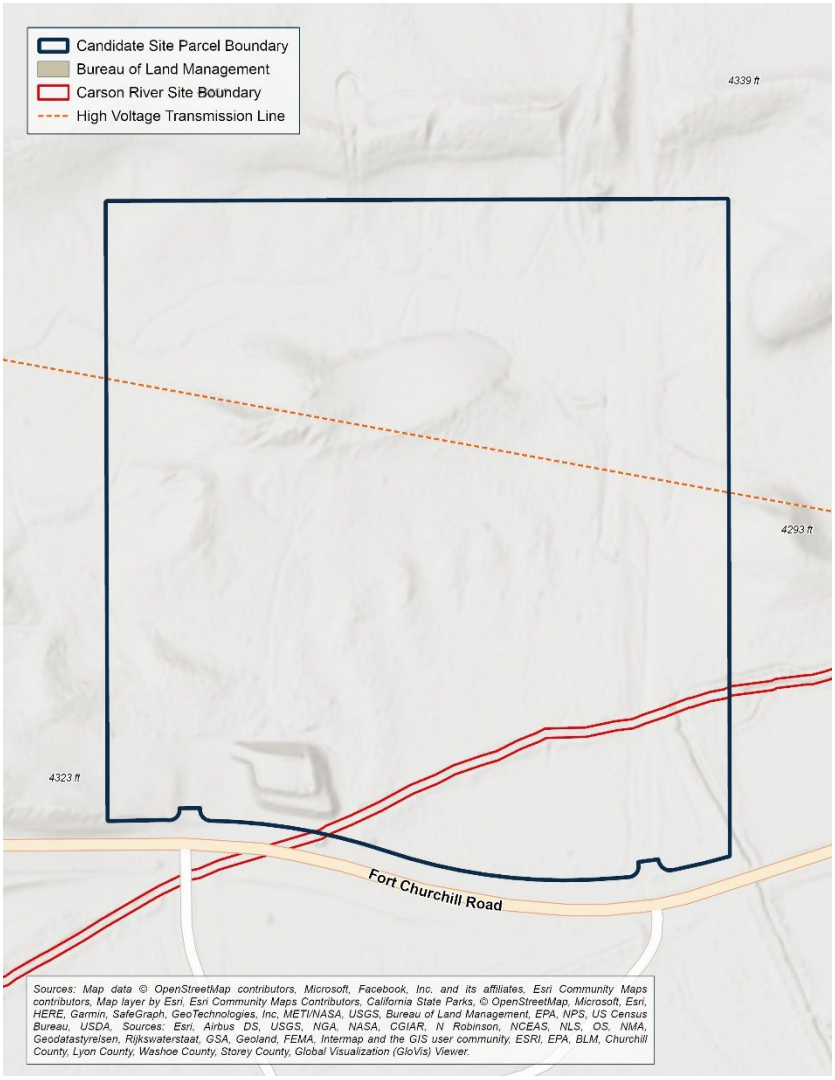
Potential Solar Acreage: Most of the property may have suitable slope for solar.

Areas identified for small to mid scale solar potential include those with less than 10% slope and that range in size from 8-160 acres.

Access: The property has road frontage and is accessible from Fort Churchill Road.

Transmission Access: Electric transmission lines cross the property.

The nearest substation is less than 10 miles away.



Key Considerations:

- Interest in future residential development and local zoning may preclude solar development at this time.

Areas with Solar PV Potential – Utility-Scale

A. Lahontan Dam

CHURCHILL COUNTY

This area is north of Lahontan Dam.

Ownership: Publicly owned by BLM, USBR and Nevada State Parks.

Size: Total acreage is 2,584 acres.

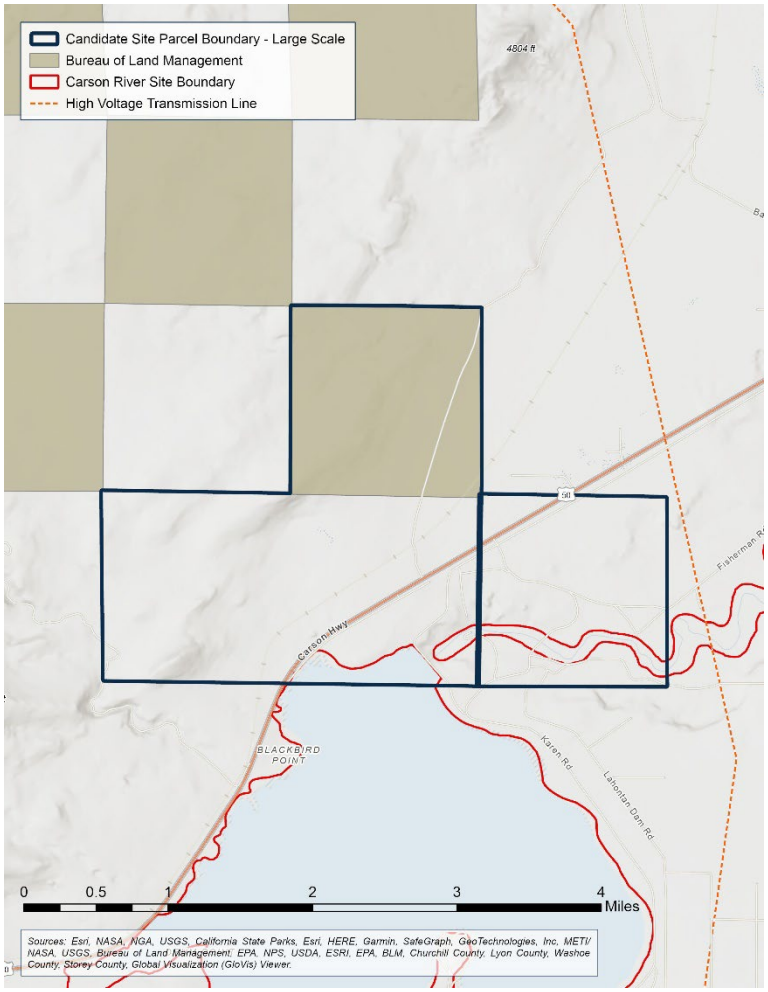
Potential Solar Acreage: Majority of the areas are less than 10% slope.

Areas identified for utility scale solar potential include those with less than 10% slope and that are 160 acres and larger.

Access: The area is intersected by Highway 50.

Transmission Access: The area is adjacent to electric transmission lines.

The nearest substation is less than 10 miles away (located at Lahontan Dam).



Key Considerations:

- Coordination is needed between federal and state agencies to determine ownership and next steps for solar development.
- Only a small portion of the area is within CRMS.
- The Truckee Carson Irrigation District is a key stakeholder and interested in solar development. A solar project is under development nearby.
- There is precedent for solar projects on USBR land. More information about the San Luis Reservoir solar project in California is available here: www.usbr.gov/mp/nepa/includes/documentShow.php?Doc_ID=33221

Figure 7. Views of the area north of Lahontan Dam

B. Greater Comstock Dump Area

LYON COUNTY / DAYTON COUNTY

This area expands beyond the South Comstock Dump area described in the small- to mid-scale solar projects and includes additional land to the south and west.

Ownership: Ownership is mixed between Comstock Mining and BLM.

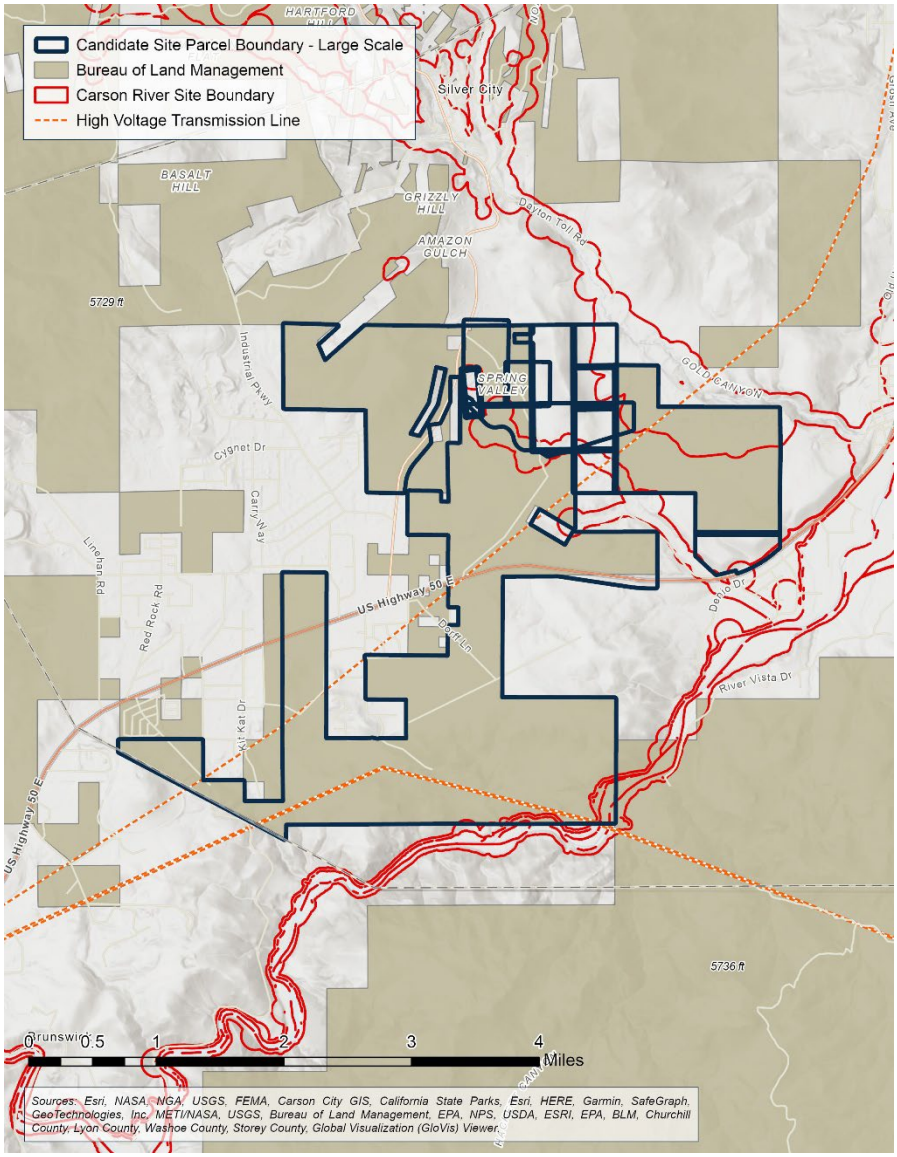
Size: Total acreage is 3,754 acres.

Potential Solar Acreage: Varies.

Areas identified for utility-scale solar potential include those with less than 10% slope and that are 160 acres and larger.

Access: The area is accessible by Dayton Toll Road from the north and Highway 50 from the south.

Transmission Access: Electric transmission lines intersect the area.



The nearest substation is less than 10 miles away.

Key Considerations:

- Comstock Mining may be interested in solar on some of their holdings to the north. There is also interest in geothermal.
- Early coordination is needed to determine if there are any historic district viewshed considerations that may limit or inform the type of development or materials selection. Coordination with SHPO and the Advisory Council on Historic Preservation (section 106 consultation) may be needed.

C. Carson City

CARSON CITY

To the east of the city, there are several Carson City owned parcels that are adjacent to CRMS.

Ownership: Publicly owned by Carson City.

Size: Total acreage is 1,595 acres.

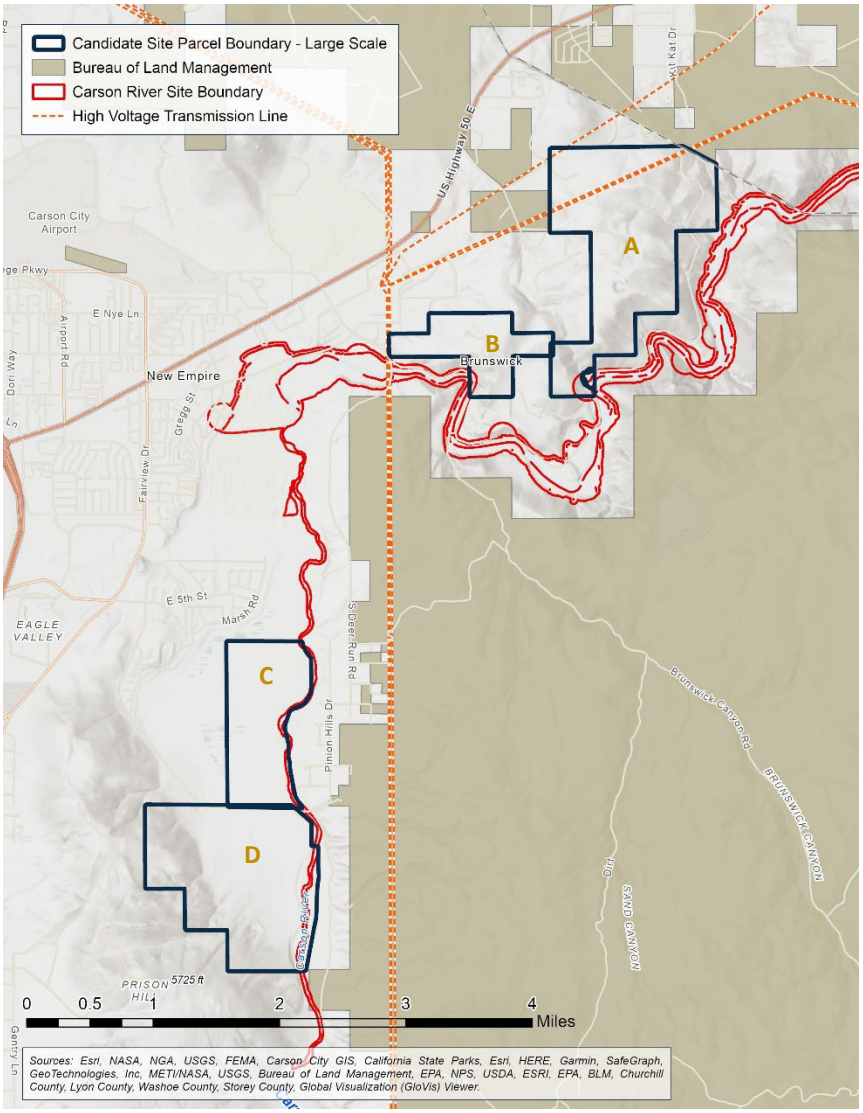
Potential Solar Acreage: Varies.

Areas identified for utility-scale solar potential include those with less than 10% slope and that are 160 acres and larger.

Access: The area is accessible from existing major roads.

Transmission Access: Electric transmission lines are nearby.

The nearest substation is less than 10 miles away.



Key Considerations:

- Installing a solar PV system at the existing landfill may be an opportunity to explore further. System size and siting would be informed by future landfill expansion plans, if any.
- Existing onsite uses, adjacent land uses, use agreements for land transfer and municipal laws may limit solar development in this area.
- The city acquired the northern two properties (A and B) as part of a BLM land exchange. The programmatic agreement between Carson City, BLM, SHPO and the Washoe Tribe focuses on cultural resources, and compliance would involve Section 106 clearance.
- The southern two parcels (C and D) are preserved for open space to support the historic use of ranching in this area. The city's open space code may not allow solar development. Under the BLM land transfer agreement, the city is restricted from generating revenue on these lands.

D. Carson Lake

Churchill County

This is a large area south of Carson Lake.

Ownership: Primarily publicly owned by BLM and USBR. Nevada State Parks and USFWS lands are adjacent to the area.

Size: Total acreage is 69,177 acres.

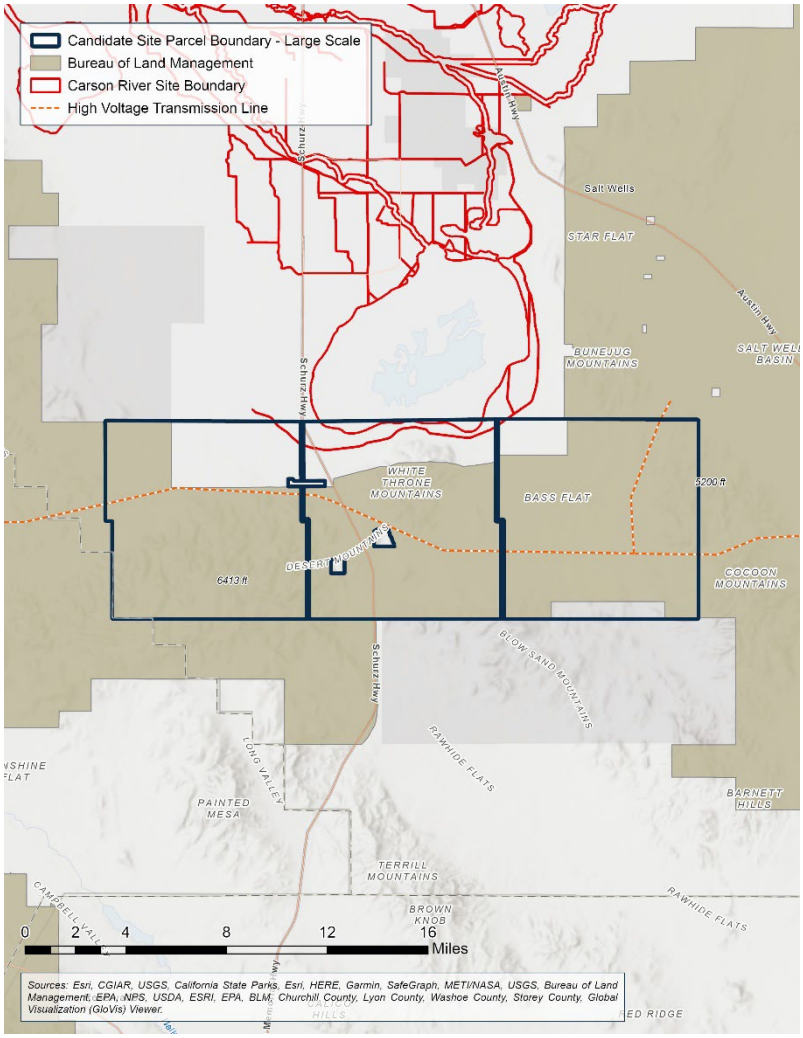
Potential Solar Acreage: Approximately 80% of the area is 10% slope or below.

Areas identified for utility-scale solar potential include those with less than 10% slope and that are 160 acres and larger.

Access: The area is accessible from major roads.

Transmission Access: Electric transmission lines cross the area.

The nearest substation is less than 10 miles away.



Key Considerations:

- Areas that are historically prone to flooding and areas that are rich in cultural resources will need to be avoided. Coordination with SHPO and the Advisory Council on Historic Preservation (section 106 consultation) may be needed.
- Only a small portion of the area is within CRMS.
- Proximity to Fallon Naval Air Station may create additional considerations and restrictions regarding material selection (glare reduction) and height of structures.
- North of this area, especially west of Carson Lake and Fallon Naval Air Station, there may be more interest in co-locating solar with geothermal.

E. Fallon Refuge Area

CHURCHILL COUNTY

This area is located west of the Fallon Wildlife Refuge.

Ownership: Mix of public and private owners.

Size: Total acreage is 29,066 acres

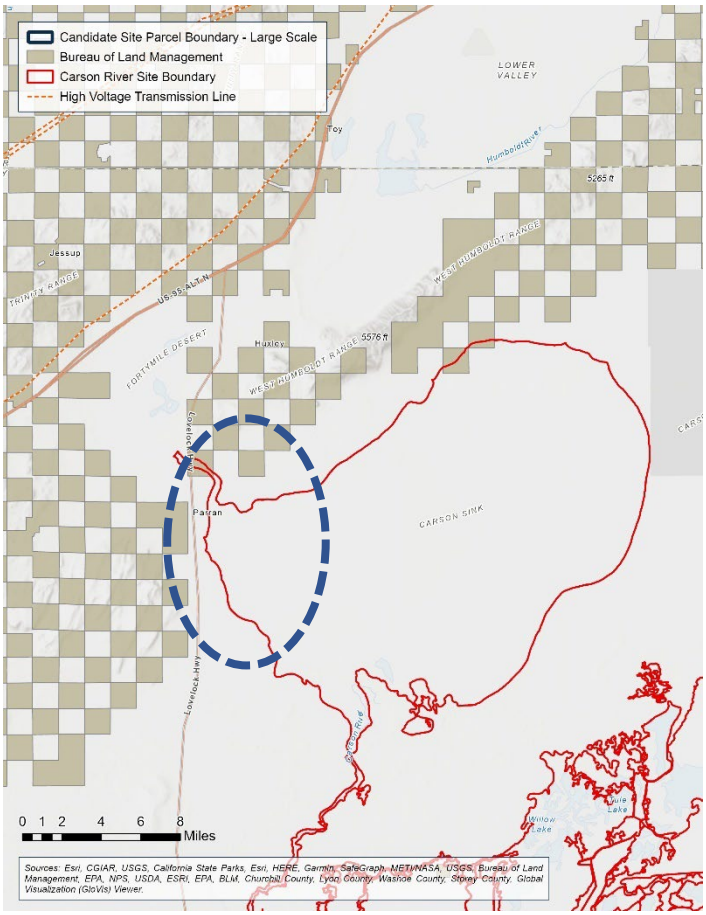
Potential Solar Acreage: A majority of the area is less than 10% slope.

Areas identified for utility-scale solar potential include those with less than 10% slope and that are 160 acres and larger.

Access: Access roads may be needed depending on solar project location.

Transmission Access: Electric transmission lines are nearby and could be connected through BLM land.

The nearest substation is less than 10 miles away.



Considerations:

- Proximity to the wildlife refuge may make this area less appealing, and additional environmental research may be needed to understand any impacts.
- The size of this area may be appealing to utility-scale solar developers for a large solar facility. The scale of the project may offset costs to run transmission lines to connect to the grid or to build a new substation.
- The grid pattern of BLM owned lands creates a “butterfly easement” opportunity to connect a solar system developed on private land across BLM land to the transmission line.

Fallon Paiute-Shoshone Tribe Solar Opportunities

During a site visit in October 2022, representatives from the Fallon Paiute-Shoshone Tribe expressed interest in a community solar PV project that could help offset energy demand of an existing Tribal subdivision, as well as a solar PV project that could offset energy used by the Tribe's arsenic water treatment plant on their reservation. Each of these solar development opportunities are explored further in the scenarios below.

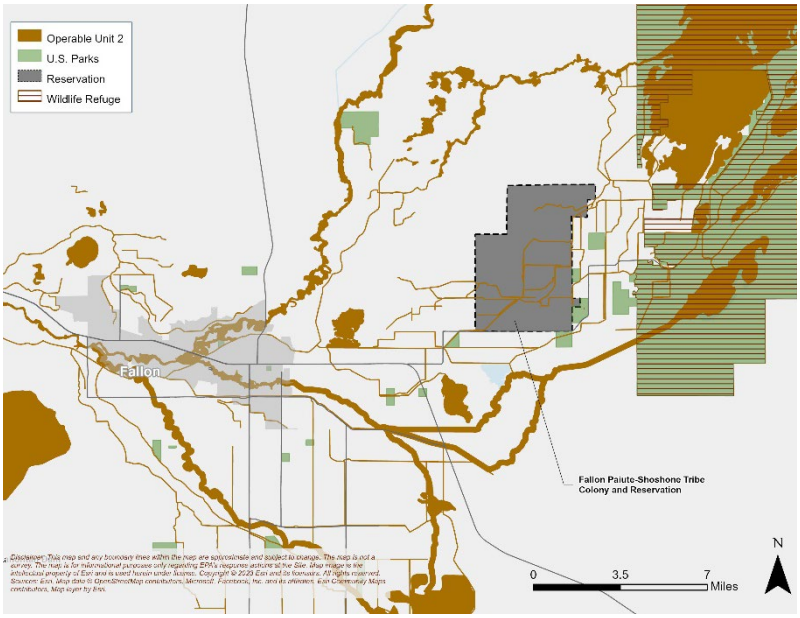


Figure 12. Map showing location of Fallon Paiute-Shoshone Tribal Lands

Community PV Solar

On average, a typical single-family home in western Nevada uses 924 kWh of electricity per month.[7] A subdivision of 30 homes would use about 330,640 kWh of power each year. A 1,000 kW solar PV array requires about six acres of land.[8] Based on these assumptions, a 1.0- to 1.5-acre site could support a community solar PV project that generates enough power for a 30-home subdivision.

In a net metering scenario, the solar energy produced is supplied to the grid, and residents or the Tribe would receive a credit for any extra energy produced that is not used. The community solar PV project would likely be located near a substation and transmission lines with the necessary capacity.

Community solar projects with storage are growing nationally. A community solar PV project with storage would position the Tribe to directly use power generated by the PV solar arrays. Storage avoids power supply disruption, and the solar PV array could be located near the subdivision to reduce loss of efficiencies with transmission over distance. If storage is an option, homes would still need to use another power supply when the solar arrays are not producing electricity (such as nighttime or cloudy days).

Alternatively, solar panels on the rooftops of homes are another option for individuals to offset their personal energy use.

Table 4. Community Solar Power Estimate

Average Monthly Household Usage (Nevada)	Annual Energy Use for Subdivision (30 homes)	Estimated Solar PV Size	Estimated Output[9]	Estimated Acreage
924 kWh	330,640 kWh	250 kW	416,853 kWh per year	1 – 1.5 acre of land

[7] https://www.electricchoice.com/blog/electricity-on-average-do-homes/
[8] www.nrel.gov/docs/fy13osti/56290.pdf
[9] https://pvwatts.nrel.gov/pvwatts.php

Water Treatment Solar Power Estimate

There are several initial steps in evaluating the potential for a solar PV system to offset some or all the energy used by the Tribe's arsenic water treatment facility.

Electric Load: The amount of energy used is a key factor that determines the optimal size for a solar PV system that will offset current costs for the water treatment facility. Utility billing information was not available to determine the electric demand for a water treatment plant. Instead, this evaluation used assumptions from a similar nearby system with well documented energy demands. Key assumptions included water treatment plant electricity usage per volume of water treated and the volume of groundwater treated in a given amount of time. Based on these assumptions, the water treatment plant's estimated energy consumption would be about 106,000 kilowatt-hours per year (kWh/year). This rough estimate should be revised with actual load and electricity costs to determine economic viability of a project. For additional details, see methodology notes below.

Water Treatment Plant Electricity Use Assumptions

- 153.7 Watt-hours of energy per cubic meter of water treated
- 500,000 gallons of groundwater treated per day
- Pumping system electricity load of (104,000 kWh/year)
- Treatment system electricity load (2.000 kWh/year)
- Estimated annual electric load: 106,000 kilowatt-hours per year (kWh/year)

PV System Sizing: The solar PV system can be sized based on the area available for the system and total energy use that would be offset with solar. This assessment used the National Renewable Energy Laboratory's (NREL) PVWatts Calculator to estimate the sizes of solar PV systems that would offset 50% and 100% of the energy used by the Tribe's water treatment plant. Energy usage, solar PV system sizes, acreage requirements and energy offset information is included in the table below. See methodology notes for further details.

Table 5. Utility Power Estimate

Estimated Energy Use for Tribe's Water Treatment Plant	Estimated Solar PV Size	Estimated Output[10]	Estimated Acreage	Energy Use Offset
106,000 kWh/year	31.8 kW	53,000 kWh/year	0.12 acres	50%
106,000 kWh/year	63.7 kW	106,000 kWh/year	0.25 acres	100%

[10] https://pvwatts.nrel.gov/pvwatts.php

Methodology Notes

Electric Demand: This assessment estimated the water treatment facility's energy consumption based on a recent analysis published in a peer reviewed academic journal (Bukhary et al. 2020).[11] Bukhary et al. studied a small drinking water treatment plant that treats arsenic-contaminated water for a community of less than 10,000 people in the U.S. Southwest. This plant treats 0.425 m^3 of groundwater per second (9.7 million gallons per day) using the processes of coagulation, filtration and disinfection. These are the same processes that are used at the Tribe's water treatment plant.[12] Bukhary et al. calculated that the plant uses 153.7 Watt-hours of energy per cubic meter of water treated; 98% of this energy is for booster pumps to convey water to the storage tanks, and the remaining 2% of the energy is for water treatment. Applying Bukhary et al.'s energy rate to the flow rate of the Tribe's water treatment plant (500,000 gallons per day) results in an estimated energy consumption of about 106,000 kilowatt-hours per year (kWh/year), which is made up of pumping (104,000 kWh/year) and water treatment (2,000 kWh/year). This rough estimate should be revised with actual load and electricity costs to determine the economic viability of a project.

Solar PV System Sizing: Using the solar energy intensity of Fallon, Nevada, along with the calculator's default parameters (e.g., fixed-tilt, ground-mounted solar panels), the PVWatts Calculator estimated that a 63.7 kW solar PV system would offset 100% of the water treatment plant's energy usage, and that a 31.8 kW solar PV system would offset 50% of the plant's energy usage. This is an average over a year. In the winter, the PV system would not produce enough energy to power the plant. In summer, it would produce extra.

[11] Bukhary S, Batista J, Ahmad S. An Analysis of Energy Consumption and the Use of Renewables for a Small Drinking Water Treatment Plant. Water. 2020; 12(1):28. https://doi.org/10.3390/w12010028

[12] 2013 Annual Drinking Water Quality Report, https://www.fpst.org/wp-content/uploads/2014/06/2013-Consumer-Confidence-Report-Electronic.pdf

Hybrid Geothermal-Solar Opportunities

Stakeholders expressed interest in co-locating solar arrays with geothermal production. There is an existing hybrid geothermal-solar plant in Stillwater, which is located in Churchill County. Geothermal energy is abundant, and there are numerous authorized geothermal claims in the area in and around Carson Lake. Newer technologies, such as directional drilling, could expand geothermal plants in this area of Nevada.

Figure 8. Location and view of Stillwater Geothermal / Solar Hybrid Plant. Map data ©2023 Google

Successful geothermal energy production is based not only on subsurface temperature (300-700° F) but also permeability and hydrothermal fluid circulation. Key factors affecting geothermal potential are subterranean temperature, permeability of the prevailing rock layers and the volume and chemical makeup of groundwater. There are two types of geothermal resources:

- *Conventional* geothermal sources use heated fluid to power steam turbines and then reinject the cooled fluid to the ground system to repeat the process. Magmatism and tectonic activity are sources of increased heat.
- *Enhanced Geothermal Systems* (EGS) are deeper geothermal resources that lack natural permeability. EGS create necessary permeability to enable circulation of the hot fluids required for electricity generation.

EGS methods are being actively researched but are not yet commercially viable. The U.S. Department of Energy (DOE) has developed a program for accelerating EGS, called Frontier Observatory for Research in Geothermal Energy (FORGE). Fallon, Nevada is a candidate site for FORGE. Initial testing has found high geothermal temperatures in the Carson Sink region and confirmed limited permeability, which is a limiting factor to conventional geothermal development.

Geothermal Screening

CRMS was screened for conventional and enhanced geothermal potential using data compiled from NREL's Geothermal Prospector tool,[13] overlaid with the CRMS boundary. Exempt lands, specifically BLM and U.S. Forestry Service (USFS) lands are not eligible for geothermal use. CRMS does not include major BLM and USFS lands, but such lands exist adjacent to the site and throughout this region of the state. Areas of extreme slope, greater than 30%, are not viable due to infeasibility of constructing surface structures and drilling. Finally, surface water areas are also not feasible.

Conventional Geothermal Favorability in CRMS

Conventional geothermal resources depend on hydrothermal fluid circulation, permeability and temperature. The figure below shows conventional geothermal favorability ranking that was developed by the U.S. Geological Survey. Rankings from five to15 and over indicate exceptional geothermal resources. Areas of CRMS in and around Carson Lake, Fallon and Stillwater demonstrate high favorability for conventional geothermal. This is also an area with numerous geothermal claims.

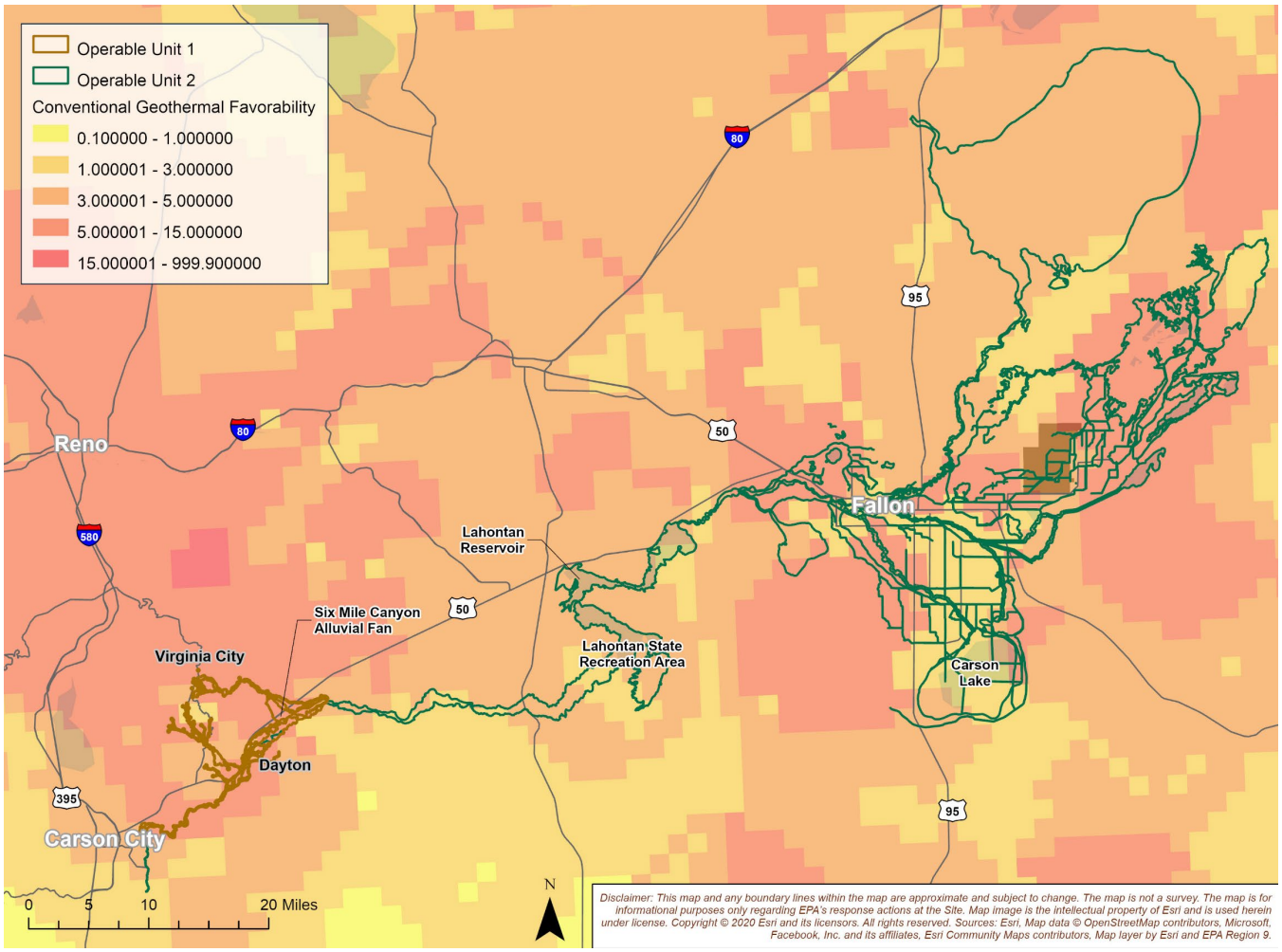


Figure 9. Conventional Geothermal Favorability in CRMS

[13] National Renewable Energy Laboratory's Geothermal Prospector tool

Enhanced Geothermal Favorability in CRMS

Enhanced favorability takes into consideration deeper resources, where permeability is at least partially engineered. Favorability is ranked from one to five, with one being most favorable. Data is based on temperature-at-depth data provided by Southern Methodist University Geothermal Laboratory, and ranking analysis was conducted by NREL in 2011. Rankings one and two have the highest viability. Areas of CRMS in and around Carson Lake demonstrate the highest favorability for enhanced geothermal.

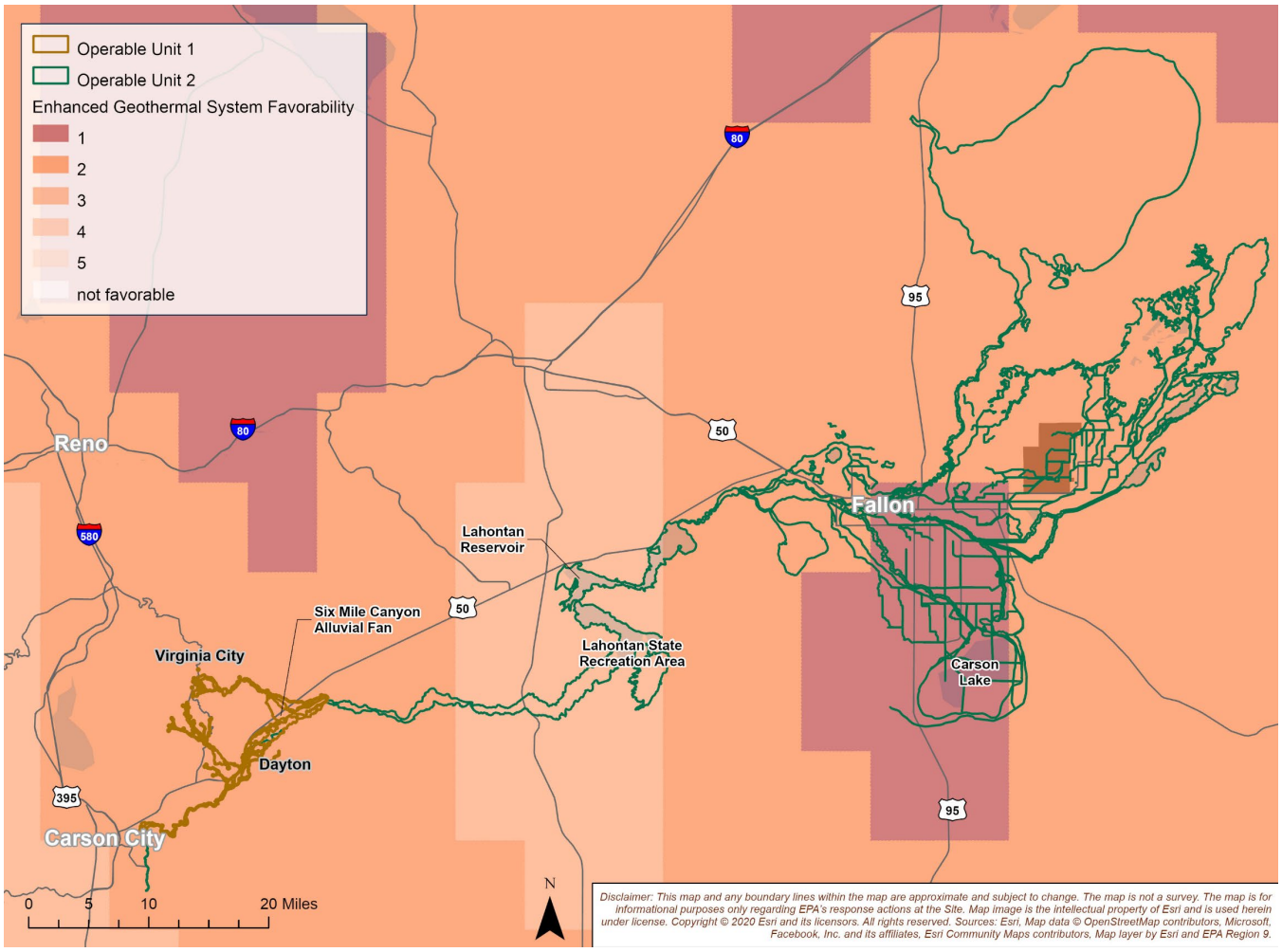


Figure 10. Enhanced Geothermal System Favorability in CRMS

Hybrid Geothermal-Solar

The figure below shows areas with the best conventional geothermal favorability throughout the site (ranked five or higher). Areas with less than 10% slope are shown to highlight areas where hybrid geothermal-solar plants may be an option for further exploration. Areas around Carson Lake and Fallon have a high degree of geothermal potential and adjacent flat land to accommodate solar.

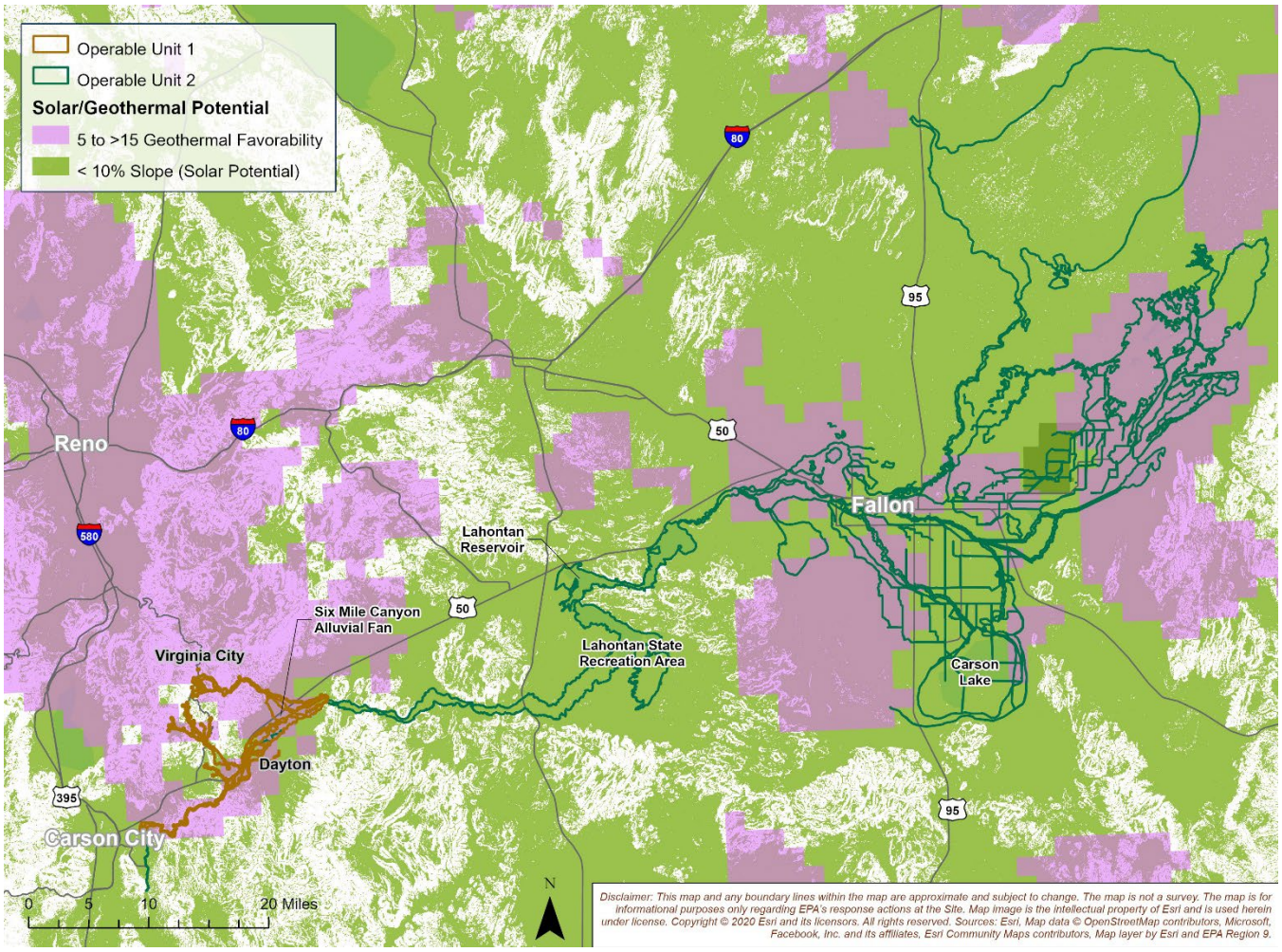


Figure 11. Hybrid geothermal potential in CRMS based on geothermal potential and areas with less than 10% slope

Key Findings and Next Steps

The CRMS sitewide solar screening evaluated areas within or adjacent to the site to support small- to mid-scale or utility-scale solar development. The process identified a dozen areas with approximately 630 acres of land potentially available for small- to mid-scale solar PV and approximately 106,000 acres of land potentially available for utility-scale solar PV. For reference, approximately six acres of land is needed to generate 1 MW of power from solar PV systems that are 1 to 20 MW in size.

Table 6. Total Acreage of Combined Candidate Solar Areas in CRMS

	Total Acres[14]
Small- to Mid-Scale	631 acres
Utility-Scale	106,176 acres

The CRMS solar screening identified great potential for increasing power generation from solar PV systems in the area to help meet the region's renewable energy and resiliency goals. This document presents detailed information for each potential solar area as a guide for refining opportunities and working with property owners, solar investors and developers. Further evaluation of these areas, considering factors such as site conditions, interconnection, transmission capacity and lease and power purchase agreements, will be a key next step for interested parties.

Table 7. Candidate Solar Areas in CRMS by Scale

Solar Area	Location	Ownership Type	Total Size*
Small- to Mid-Scale			
1. South Comstock Dump	Dayton City	Mixed (BLM and Private)	160 acres
2. Six Mile Canyon Road	Storey County	Private	180 acres
3. Montreux	Washoe County	Private	132 acres
4. Bureau of Indian Affairs	Carson City	Public	119 acres
5. Fort Churchill Road	Lyon County	Private	40 acres
Solar Area	Location	Ownership Type	Total Size*
Utility-Scale			
A. Lahontan Dam	Churchill County	Public (BLM, USBR, State of Nevada)	2,584 acres
B. Greater Comstock Dump Area	Lyon County and Dayton City	Mixed (BLM and Comstock Mining)	3,754 acres
C. Carson City	Carson City	Public	1,595 acres
D. Carson Lake	Churchill County	Private (BLM and USBR)	69,177 acres
E. Fallon Refuge Area	Churchill County	Mixed (Private and Public)	29,066 acres

[14] Total acres of land identified includes the total property acreage. The solar development envelope would be less than this. The screening identified small- to mid-scale as 8 to 160 acres of land with less than 10% slope and utility-scale as greater than 160 acres with less than 10% slope.

Solar Development Procurement and Solicitation Resources:
The resources listed below offer some valuable background on factors that municipalities and tribes can consider in determining how best to approach or develop a solar development Request for Proposal (RFP), including the three general solicitation options municipalities commonly use, and additional resources.

- Solicitation Process for Solar Development
- Request for Information (preliminary)
- Request for Qualifications (short list of potential bidders)
- Request for Proposals (developer selection)

Liability Protection Resources for Landowners, Developer and Prospective Purchasers/Lessees:
Property owners can notify EPA and NDEP prior to construction to determine if there are area-specific sampling or soil handling protocols that need to be followed. Developers can continue to work with EPA and NDEP during construction and installation, especially before digging to determine whether additional sampling or specific soil handling practices are needed. EPA and NDEP contact information is provided below and on EPA's Site Profile web page.

More information about tools and resources for property owners, developers and prospective purchasers is available here. EPA's PPI service is described in more detail here.

For More Information

Solar development will need to be coordinated with the following EPA and NDEP contacts to ensure any soil handling of elevated levels of contaminants is managed properly.

EPA Region 9 Superfund Remedial Project Managers

Andy Bain
bain.andrew@epa.gov
(415) 972-3167

Patricia Bowlin
bowlin.patricia@epa.gov
(415) 972-3177

Mohamed Ibrahim
ibrahim.mohamed.n@epa.gov
(415) 972-3184

NMED Superfund Project Manager
David Friedman
901 S. Stewart Street, Suite 4001, Carson City, NV 89701
dfriedman@ndep.nv.gov

EPA's Superfund Redevelopment Program
Alexis Reyes Rourke, EPA Headquarters
Rourk.Alexis@epa.gov
(202) 564-3179

EPA's RePowering America's Land Program
Karen Irwin, EPA Region 9
Irwin.Karen@epa.gov
(415) 947-4116

Additional Agencies and Organizations
The following agencies and organizations are resources that may be able to assist with solar development.

For more information about solar development on federal lands, please contact:

BLM
Gregory L. Helseth, Branch Chief Renewable Energy
Division of Energy and Minerals
Bureau of Land Management – Nevada
(775) 861-6477
ghelseth@blm.gov

USBR
Rena Ballew
(775) 884-8342
rballew@usbr.gov

To coordinate solar development with the Truckee Carson Irrigation District, please contact:
Ben Shawcroft, General Manager
775-423-2141
ben@tcid.org

The Nevada Chapter of The Nature Conservancy
Peter Gower, Energy, Infrastructure and Land Use Strategy Director
(775) 446-5525
peter.gower@TNC.ORG

Appendix A. Floating PV

Relatively new to the renewable industry, floating photovoltaics (FPV) began use in 2016. Siting FPV on waterbodies can reduce evaporation, algae growth, operating temperatures, and provide relief on land demands. The majority of FPV is installed in Japan and Southeast Asian countries. Initial analysis of siting potential of FPV in the United States yields many potential waterbodies, but high-level siting tools do not yet exist. Like ground-mounted PV, proximity to transmission is a factor in siting, but many of the land-based leasing costs and challenges associated with ground-mounted PV do not exist in a FPV scenario.

Water depth, distance to transmission, existing use and surface area are the key suitability criteria for FPV. Existing FPV systems across the world are sited in waterbodies from 2 m (6.7 ft) to 27 m (88.5 ft) in water depth, with the majority between 2 m (6.7 ft) and 10 m (32.8 ft) in depth. While the Lahontan Dam Reservoir is within the acceptable range based on available data, local stakeholders shared that fluctuation in water levels and maintenance concerns may be limiting factors for considering floating PV at this time. There are also approximately 400 miles of agriculture canals and drains within the Truckee Carson Irrigation District; however, water level in the canals likely fluctuates too much to be viable. FPV considers the same factors as small- to mid-scale, ground-mounted solar in terms of proximity to transmission. Potential areas should be five or fewer miles away from large transmission line or one or fewer mile from a three-phase distribution line – 7-13 kV (if installation is to be ≤10 MW). Existing uses, such as active recreational uses like boating or fishing, can preclude community interest and physical security of FPV systems. Areas used for navigation or fish and wildlife areas may also not be suitable for FPV. Finally, at least one acre of surface area is required; all existing FPV installations are over one acre in surface area.

For more information about FPV, please see:

https://www.nrel.gov/state-local-tribal/blog/posts/floating-solar-photovoltaics-could-make-a-big-splash-in-the-usa

Floating Photovoltaic Systems: Assessing the Technical Potential of Photovoltaic Systems on Man-Made Water Bodies in the United States

Appendix B. Solar Suitability

The CRMS sitewide solar screening evaluated the area in and around the site to support small- to mid-scale facilities or utility-scale facilities. Siting solar facilities varies according to the size of facility, utility-scale (≥20 MW) to a small- to mid-scale threshold (<20 MW). Facility scale dictates the amount of land area and transmission access required. For other factors, such as slope, road access, existing land use and sensitive ecosystems, both facility scales have similar requirements.

The sitewide solar suitability screening was conducted in two phases for each facility scale. The primary screening phase was conducted using readily available existing land use and spatial data. This phase significantly narrowed down the scope of candidate areas based on their physical attributes. The second phase identified more detailed land use and ownership considerations that may enhance or preclude solar use.

The following sections summarize primary and secondary screening criteria and any associated thresholds used per facility size.

Primary Screening

Existing Transmission Access

Proximity to transmission lines can impact economic feasibility of solar project, as general tie-in lines, substation improvements and right-of-way agreements can be expensive and time intensive. The voltage of transmission, capacity of nearby substations and utility company ownership are secondary factors to consider when evaluating transmission access. Transmission access thresholds are as follows:

Small- to Mid-Scale

- Areas ≤5 miles away from large transmission line
  -OR-
- ≤1 mile from a three-phase distribution line – 7-13 kV (if installation is to be ≤10 MW)

Utility-Scale

- Areas ≤5 miles away from a transmission line*
- High voltage lines (69 kV+) are of interest to utility-scale development

*Large, developable areas (1,000 acres+) may be viable despite distances greater than five miles (up to 20 miles), due to the financial advantages of a large-scale development and possibility of BLM butterfly easements to run a general tie-in line.

Existing Substation Proximity

Proximity to a substation can impact the economic feasibility of solar project. In general tie-in lines, substation improvements and right-of-way agreements can be expensive and time intensive. The voltage of transmission, capacity of nearby substations and utility company ownership are secondary factors to consider when evaluating transmission access. Substation proximity thresholds are as follows:

Small- to Mid-Scale

- Areas ≤10 miles away from a substation

Utility-Scale

- Areas ≤10 miles away from a substation
  - Note: Large developable areas (1,000 acres+) may be viable despite distances greater than 10 miles (up to 20 miles) from a substation due to financial advantages of a large-scale development and possibility of BLM butterfly easements to run a general tie-in line.

Topography

Areas greater than 5% slope are typically excluded in a solar screening due to the engineering challenge of building arrays and because the aspect factor in steep areas can be financially prohibitive. The CRMS screening considered up to 10% slope as an initial screening threshold to identify potential contiguous areas for consideration. Topography thresholds are as follows:

Small- to Mid-Scale and Utility-Scale

- Areas with ≤10% slope[15]

Road Access

Areas without road access were excluded. Road access includes proximity to a major public road, paved county road, state road or interstate. Some degree of road access is required for construction and maintenance activities. Road access thresholds are as follows:

Small- to Mid-Scale

- Areas accessible via maintained paved or hard-pack gravel roads

Utility-Scale

- Areas accessible via major public road

Exclusion Zones

The CRMS screening omitted areas that are excluded from solar development by federal or state entities, which included exclusion zones through BLM and the USFS.

Environmental Features

Surface water, floodways, wetlands and endangered species habitat should be excluded. If within a 100-year flood risk zone (Federal Emergency Management Agency Zone A), solar panel edges, electrical equipment and inverters must be raised one foot above the 100-year flood elevation.[16] The following environmental features would be excluded: habitat areas for desert tortoises and greater sage grouse; surface water, wetland areas and special/regulatory floodways; and areas of high critical environmental concern.

Parks and Refuges

State and municipal parks, national refuges and other protected areas were excluded.

[15] Location Considerations for Ground-Mounted Solar Arrays. Accessed 22 February 2022. https://ag.umass.edu/clean-energy/fact-sheets/location-considerations-for-ground-mounted-solar-pv-arrays

[16] Pima County Solar Guidelines webcms.pima.gov/UserFiles/Servers/Server_6/File/Government/Flood%20Control/Permitting/guidelines-solar-array-projects.pdf

Zoning

For CRMS, county-level zoning is useful to prescreen for land use compatibility concerns and to determine whether local land use policy restricts zoning. Local parcel and zoning data can be used to rule out residentially zoned areas and densely developed areas.

Parcel Size / Ownership

Whether property is publicly or privately owned can inform stakeholder discussions and future solar project ownership or lease arrangement that might be pursued. Local parcel data can be used to determine ownership type.

Properties that are less than 160 acres may be more suitable for onsite use or net metering, whereas properties greater than 160 acres may be more suitable for utility-scale project). Typically need 6-8 acres for 1 MW[17], and utility-scale starts at 20MW. Property size thresholds are as follows:

Small- to Mid-Scale

- Contiguous area of 8 to 160 acres

Utility-Scale

- Contiguous area of ≥160 acres

Solar Resource

Nevada has excellent solar resource as compared to other parts of the U.S.

Secondary Screening

The second phase of screening refines the primary screening parameters to consider more nuanced environmental and land use issues.

Environmental Features

Further investigation into environmental features could exclude sensitive species habitat and incompatible land cover type. Consider other sensitive species and land cover type (parameters defined by regionally specific species of concern).

Remedial Features

Consider compatibility of solar with remedial components, source areas, planned clean up actions, institutional controls and/or active mining operations. Prioritize disturbed land (but not in active use), without reuse constrictions.

[17] https://www.nrel.gov/docs/fy13osti/56290.pdf

TNC Renewable Energy Hotspots / Mining the Sun Site Universe

Build upon existing efforts to identify sites to crosscheck priority areas, including sites identified by TNC.

Tribal/Landowner Interest

Identify Federally Recognized Tribal Land Areas and include tribal representatives in all possible discussions.

Viewshed Impacts

Visibility from historic districts/properties is an important consideration for community support. Virginia City is a key historical viewshed in CRMS. Solar developers can also coordinate with SHPO and BLM to identify any other historic resources within an area of interest. Consider a viewshed buffer around Virginia City historic districts and scenic rail line or conduct a viewshed analysis.

Screening Summary

The screening criteria described, along with the requirement that the parcel be directly adjacent to or intersecting the CRMS Superfund site boundary, identified 12 potential solar project sites. The potential solar projects are described in more detail in the above Carson River Mercury Site Renewable Energy Assessment. The screening criteria may be helpful reference for considering solar at other Superfund site locations.