The purpose of a Conceptual Location Analysis is to identify potential project/building sites in the planning phase of a project. The analysis includes review and comment on the potential sites by relevant disciplines. Site criteria encompasses DOE and NNSA requirements pertaining to real property and environmental stewardship and additionally addresses SNL site planning objectives such as sustainability and efficiency. This analysis is intended to be used as a tool to provide a comprehensive perspective on siting decisions, and is not intended to supersede previous siting decisions or agreements.

This conceptual location analysis is for the siting of PV for power production.

The goal of this Conceptual Location Analysis is to weigh different sites, and come to a consensus on preferred sites for potential solar arrays through an Energy Savings Performance Contract (ESPC) or a Utility Energy Service Contract (UESC). An RFI was released in May, 2017 to solicit information from the solar industry to assist WAPA and Sandia in structuring a future solicitation for a 5-10 MW on--site solar power purchase agreement (PPA) that WAPA would sign on behalf of Sandia. Responses were favorable, and DOE/Sandia intends to share this Conceptual Location Analysis with NNSA to discuss which sites can be included in the solicitation of an ESPC or UESC.

DOE/Sandia is considering a solar project for the following reasons*:*

1. Protection against volatile energy markets
2. Reduce costs
3. Local economic benefits
4. Education
5. Showcase renewable energy at DOE/NNSA National Laboratory
6. Increase renewable use
7. Increase resiliency
8. Clean source of energy

Sandia is considering other conservation measures under this project, but the purpose of this analysis is for onsite ground mount and covered parking photovoltaic systems.

Following is additional information regarding the potential solarproject and important considerations:

1. The solar project shall include the photovoltaic modules, inverters, electrical connections, disconnects and all other electrical components necessary to provide a fully functional system that will connect to Sandia's existing 12.47KV distribution system. The point of demarcation shall be at the primary side of the generation plant's step-up transformer. The system shall be operated and maintained, including all inverter and other equipment replacement for the life of the contract.

2. National Environmental Policy Act (NEPA) requirements will be governed by the DOE/NNSA Sandia Field Office. The NEPA process will consider cultural/archeological and biological considerations.

3. Initial ground mount solar estimates came in at 4.7 cents per KW/h, and covered parking came in at 9 cents per KW/h. Through an ESPC or UESC energy conservation measures can be bundled to include lower and higher pay back measures and energy escalation rates are also included in determining the economic viability of a project. It may be economically viable to justify covered parking. Appropriations can also be used with ESPCs and UESCs to buy down the project to make it economically viable.

4. The size of the site is an important economic consideration. More KWh can be produced on a larger site, and that lowers the cost per KWh.

This analysis is a **conceptual location study**. This study identifies proposed locations that have been selected based on long-range planning objectives, available land, and real property asset management requirements. Planning is at a conceptual level; the project has not been designed.

Proposed Sites (see maps)

Site 1 – TA-I, Parking Lot north of Building 887 (Water Tower Parking Lot)

Site 2 – TA-I, Parking lot south of Steve Schiff Auditorium, just north of Hardin

Site 3 – TA-IV, Parking Lot west of Building 960

Site 4 – Solar Tower, North of the Solar Tower

Site 5 – North of the Solar Tower

Site 6 – South of the Solar Tower

Desired Site Criteria

1. 10+ acres
2. Convenient Access for maintenance

Specific Site Analysis

The specific site analysis is a compilation of the comments that were received through subject matter expert review.

Proposed Site 1	**SNL Department/Org**	**Comment**
TA-I, Parking lot north of Building 887 (Water Tower)		
	Environmental Permitting	
	Stormwater	No issues
	Air Quality	No comments received

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	Water Quality	No issues
	NEPA & Ecology	
	Ecology	No issues
	Historic	No comments received
	NEPA	• A Planning NEPA is recommended • A construction NEPA is required • Site configuration may change due to 20th & G/Eubank Gate reconfiguration
	Archaeology	No issues
	ER Sites	No issues
	Planning	
	Site Development	• Include utility corridors for access • If there is a long-range intent to re-orient the parking lot 90 degrees, it should be done with this project • Design should include consideration of snow removal
	Landscape	No issues
	Real Estate	No issues
	Infrastructure (Civil & Electrical, Transportation)	
	Sanitary Sewer	No issues
	Natural Gas	No issues
	Storm Drainage (Civil)	• Currently, there are no storm drain lines in the area. However, with the 20th and G Project, there might be some storm drain lines at the northeast corner and perhaps along the north. Additionally, there might be some storm drain lines put in at the northwest over to the detention basin after the project, to help reduce the size of the detention basins next to 18th Street. Please keep this in mind during siting at those corners • Many years ago, a project was developed to install underground drainage piping in the parking area to reduce the depth of flow in the parking lot. I will have to look it up to see if that is still in the system waiting for funding; it was submitted two tracking systems ago and some things disappeared in the translation. There are no inlets in that large parking lot and the flows can get quite

		deep by the west end, sometimes creating hazards for those venturing out in a large rainfall event. It would be a good idea to look at those proposals, to provide corridors for the drainage piping and inlets so that this could still be done in the future • If we are just putting in covered parking with solar panels on top, I don't think we would trigger EISA Section 438 requirements because we are not actively regrading the parking lot. However, if the parking lot gets regraded at the same time, then Section 438 would apply • Recommend repaving the parking lot with this project, or at least providing a design sufficient to allow for safe repaving in the future • The panels would not increase the amount of runoff or its speed. However, it would concentrate it in ways it had not before as now the water would run directly to the aisles. This would need to be considered during the design and might actually be a good reason for some of the storm drainage improvements mentioned in item 2 above
	Communications (Civil)	There are no communication lines in the site, but there are lines at the perimeter that should be considered during design
	Communications Service	• Comments assume that a network connection for metering/monitoring is required • There are 4 telecom maintenance holes location on H Avenue that could be accessed. Fiber connection point would be in Building 880. If copper is required, the nearest copper splice case would be accessed
	Building & Fire Safety	No issues
	Traffic/ Transportation	If this site is selected, it should be designed so that there is no loss of parking spaces
	Electrical	Site is acceptable but existing parking lot lighting should be taken into consideration

		Site 1 (North Parking Lot) 
	Existing Water Lines/ Underground Chilled Water	No issues
	Physical Security	No issues
	Conceptual ALARA Review	No ALARA review is required
	Development Cost & Project Schedule	Covered parking will increase cost

Proposed Site 2	**SNL Department/Org**	**Comment**
TA-I, Parking lot south of Steve Schiff		
	Environmental Permitting	
	Stormwater	No issues
	Air Quality	No comments received
	Water Quality	No issues
	NEPA & Ecology	
	Ecology	No issues
	Historic	No comments received
	NEPA	• A Planning NEPA is recommended • Construction NEPA is required • Area is scheduled for an increase in available parking to the south (north side of Hardin Blvd)—probably not a conflict but could add additional parking area available for PV
	Archaeology	No issues
	ER Sites	This site has two groundwater monitoring wells located within the proposed PV production site boundaries (see attached map). These monitoring wells must not be disturbed during PV construction activities. Groundwater samples are collected from

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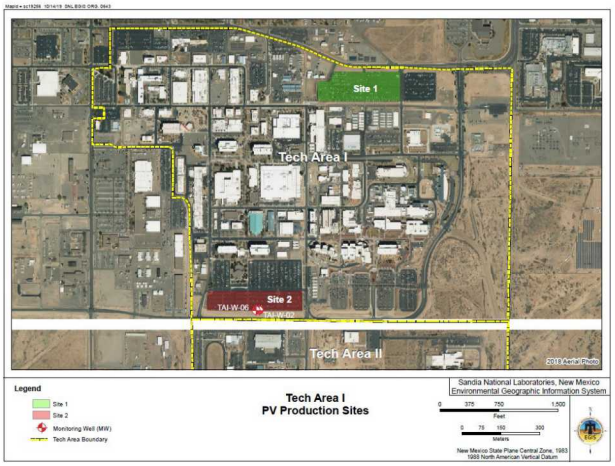
		these wells twice a year and our groundwater sample team will require unimpeded access to the monitoring well locations. The wells are constructed flush to the ground surface and may be difficult to notice 
	Planning	
	Site Development	• Include utility corridors for access • Design should include consideration of snow removal • If there is a long-range intent to re-orient the parking 90 degrees, do it with this project • There is a planned project to add additional parking south of this lot with Section 438 retention at the southwest corner – consider this in design
	Landscape	No issues
	Real Estate	N/A (site is on DOE property)
	Infrastructure (Civil & Electrical, Transportation)	
	Sanitary Sewer	There is a major sewer line along the east end of this parking area. The east end parking spaces would most likely not be able to be covered
	Natural Gas	There are major feeds to the south on the west and east side of Site 2. No construction should be done over these lines
	Storm Drainage (Civil)	• Currently, there is a storm drain on a diagonal at the northwest corner. Space would have to be provided so that the pipe could be removed without removing the panels

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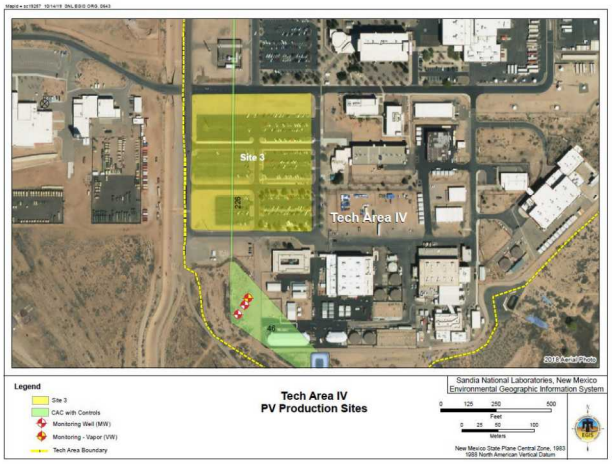
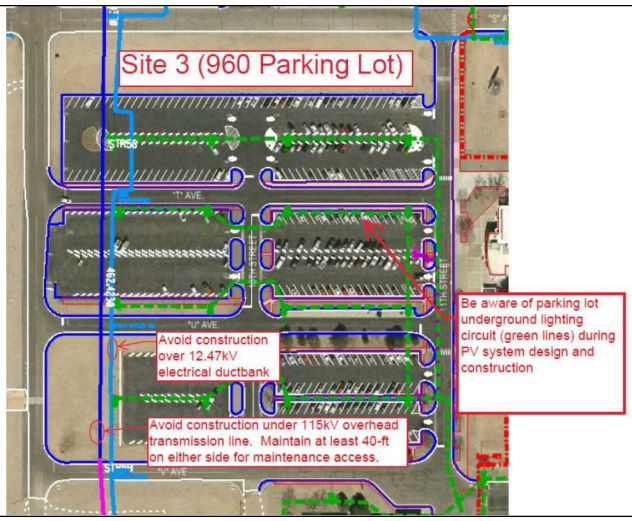
		• Many years ago, a project was developed to install underground drainage piping in the parking area to reduce the depth of flow in the parking lot. I will have to look it up to see if that is still in the system waiting for funding; it was submitted two tracking systems ago and some things disappeared in the translation. There are no inlets in that large parking lot and the flows can get quite deep by the west end, sometimes creating hazards for those venturing out in a large rainfall event. It would be a good idea to look at those proposals, to provide corridors for the drainage piping and inlets so that this could still be done in the future • If we are just putting in covered parking with solar panels on top, I don't think we would trigger EISA Section 438 requirements because we are not actively regrading the parking lot. However, if the parking lot gets regraded at the same time, then Section 438 would apply • Recommend repaving the parking lot with this project, or at least providing a design sufficient to allow for safe repaving in the future • The panels would not increase the amount of runoff or its speed. However, it would concentrate it in ways it had not before as now the water would run directly to the aisles. This would need to be considered during the design and might actually be a good reason for some of the storm drainage improvements mentioned in item above
	Communications (Civil)	No issues
	Communications Service	• Comments assume that a network connection for metering/monitoring would be required • There are 3 telecom maintenance holes located on the south side of Hardin Blvd. or 1 maintenance hole located to the west of the site on 9th St. that could be accessed. Fiber connection point would Building 821.

		If copper is required the nearest copper splice would be accessed
	Building & Fire Safety	No issues
	Traffic/ Transportation	If this site is selected, it should be designed so that there is no loss of parking spaces
	Electrical	Site is acceptable but existing parking lot lighting should be taken into consideration. Also, there is an electrical ductbank at the far west end of the proposed site, but it shouldn't be an issue Site 2 (South Parking Lot) 
	Existing Water Lines/ Underground Chilled Water	No issues
	Physical Security	No issues
	Conceptual ALARA Review	No ALARA review is required
	Development Cost & Project Schedule	Covered parking will add cost, there are some utility and water monitoring well avoidance issues that might reduce usable site size

Proposed Site 3	**SNL Department/Org**	**Comment**
TA-IV, Parking Lot west of Building 960		
	Environmental Permitting	
	Stormwater	No issues
	Air Quality	No comments received
	Water Quality	No issues
	NEPA & Ecology	
	Ecology	No issues
	Historic	No comments received
	ER Sites	The Tech Area IV PV Production Site 3 has one former ER drain line (ER Site 226) that runs north to south through PV Site 3. ER Site 226 has completed the regulatory process with a determination of Corrective Action Complete with Controls. However, as long as you don't anticipate

		excavating deeper than 4 to 8 feet below grade I don't believe this would restrict the use of this site for your project 
	NEPA	• Western half of this area currently contains the 600 MVA Transformer and is slated for a temporary tent structure adjacent to the transformer. Eventual transformer removal could be problematic if PV mounted on overhead structures • No issues with covered parking PV on eastern side of the area. Recommend planning NEPA • Construction NEPA required
	Archaeology	No issues
	Planning	
	Site Development	• Recommend providing utility corridors for access • Design should include consideration of snow removal
	Landscape	No issues
	Real Estate	N/A (site is on DOE property)
	Infrastructure (Civil & Electrical, Transportation)	
	Sanitary Sewer	• There is a major sewer line along the west end of this parking area. The west end parking spaces would not be able to have the covered parking • There is an abandoned sewer line in this area at the west. It can be removed and

		built over but might have some ER site complications
	Natural Gas	There is a major feed to TA-IV that runs along the north side of Site 4. No construction should be done over this line
	Storm Drainage (Civil)	• Currently, there is some storm drain along the edges of the parking areas. Don't build over them, and space would have to be provided so that the pipe could be removed without removing the panels • If we are just putting in covered parking with solar panels on top, I don't think we would trigger EISA Section 438 requirements because we are not actively regrading the parking lot. However, if the parking lot gets regraded at the same time, then Section 438 would apply. • Recommend repaving the parking lot with this project, or at least providing a design sufficient to allow for safe repaving in the future • The panels would not increase the amount of runoff or its speed. However, it would concentrate it in ways it had not before as now the water would run directly to the aisles. This would need to be considered during the design
	Communications (Civil)	No issues
	Communications Service	There is very limited access to telecom maintenance holes on the west side of Building 960. The duct bank infrastructure requires abandon cabling to be removed and there is limited access into Building 960. Fiber connection point would be Building 960. If copper is required the nearest copper slice case would be accessed
	Building & Fire Safety	No issues
	Traffic/ Transportation	If this site is selected, it should be designed so that there is no loss of parking spaces
	Electrical	There is a 115kV transmission line and an electrical ductbank at the west end of the site that would reduce usable site size

		
	Existing Water Lines/ Underground Chilled Water	No issues
	Physical Security	No issues
	Conceptual ALARA Review	No ALARA review is required
	Development Cost & Project Schedule	Covered parking will add cost and there are some utility avoidance issues that might reduce usable site size

Proposed Site 4	SNL Department/Org	Comment
North of Solar Tower		
	Environmental Permitting	
	Stormwater	No issues
	Air Quality	No comments received
	Water Quality	No issues
	NEPA & Ecology	
	Ecology	No issues
	Historic	No comments received
	NEPA	• Proposed locations are located on land permitted to DOE. AF approval would be required, including Siting, NEPA approval (AF813) and Real Estate interaction (332). Any work (i.e. buried transmission lines, utilities, etc.) that goes beyond the permit boundaries would require a new land use permit from the AF

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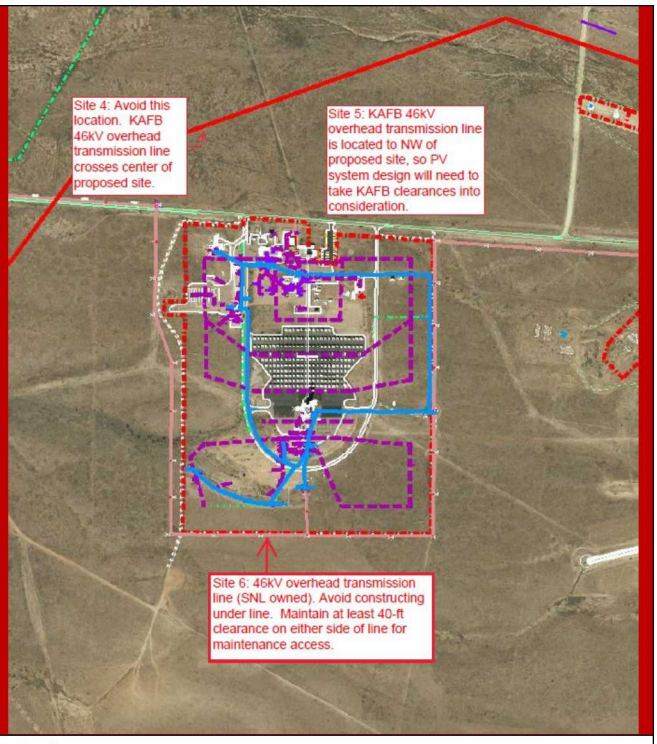
		• Could be a visual impact/cultural issue (Archaeology would address) • Recommend Planning NEPA • Construction NEPA required
	Archaeology	An archaeological survey will be required
	ER Sites	There are no LTS/ER issues. Any ER/LTS sites within the potential PV sites have completed remedial action with a determination of corrective action complete without controls
	Planning	
	Site Development	Recommend leaving utility corridors for access
	Landscape	No issues
	Real Estate	Site is located on a KAFB permit and will require coordination through Real Estate and NEPA
	Infrastructure (Civil & Electrical, Transportation)	
	Sanitary Sewer	No issues – there is a line to the south
	Natural Gas	No issues
	Storm Drainage (Civil)	• There are no storm drain lines in the area • There are some drainage paths through this area which would need to be considered during design. I do not see a major channel, but you will need to plan on corridors for water to pass through the site as part of the overall drainage plan • I fully expect that we would trigger EISA Section 438 requirements for retention
	Communications (Civil)	No issues – there is a line to the east of the site
	Communications Service	The fiber connection point would be Building 9981. There is no underground infrastructure in place that could be utilized. Trenching would be required. There is limited space in the 1 equipment cabinet in Building 9981 for termination. Copper cabling is not available at this site
	Building & Fire Safety	No issues
	Traffic/ Transportation	No issues
	Electrical	Recommend avoiding this site. A KAFB owned 46kV overhead transmission line crosses the center of the proposed site

		
	Existing Water Lines/ Underground Chilled Water	No issues
	Physical Security	No issues
	Conceptual ALARA Review	No ALARA review is required
	Development Cost & Project Schedule	Comments from electrical recommend not pursuing this site due to the KAFB owned 46kV overhead transmission line that crosses the site

Proposed Site 5	**SNL Department/Org**	**Comment**
North of Solar Tower		
	Environmental Permitting	
	Stormwater	No issues
	Air Quality	No comments received
	Water Quality	No issues
	NEPA & Ecology	
	Ecology	No issues
	Historic	No comments received
	NEPA	• Proposed locations are located on land permitted to DOE. AF approval would be required, including Siting, NEPA approval

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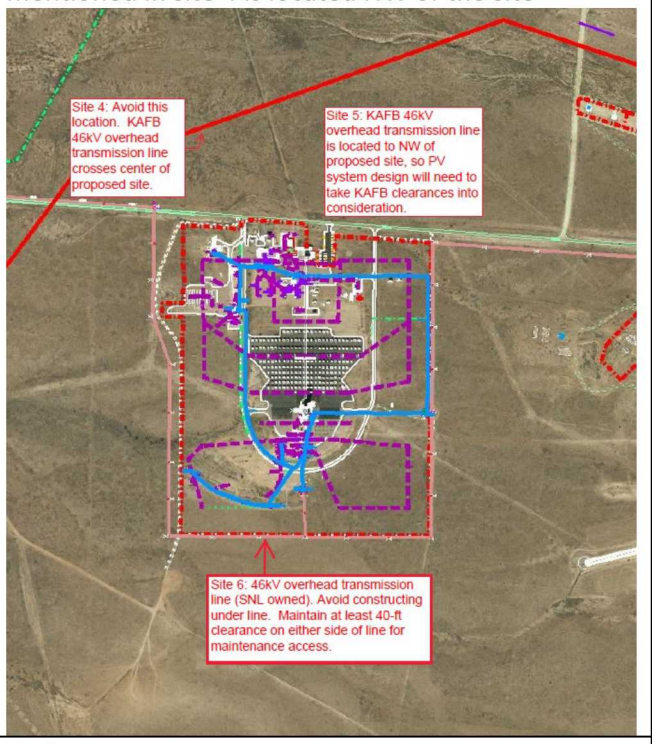
		(AF813) and Real Estate interaction (332). Any work (i.e. buried transmission lines, utilities, etc.) that goes beyond the permit boundaries would require a new land use permit from the AF • Could be a visual impact/cultural issue (Archaeology would address) • Recommend Planning NEPA • Construction NEPA required
	Archaeology	An archaeological survey will be required
	ER Sites	There are no LTS/ER issues. Any ER/LTS sites within the potential PV sites have completed remedial action with a determination of corrective action complete without controls
	Planning	
	Site Development	Recommend leaving utility corridors for access
	Landscape	No issues
	Real Estate	Site is located on a KAFB permit and will require coordination through Real Estate and NEPA
	Infrastructure (Civil & Electrical, Transportation)	
	Sanitary Sewer	No issues – there is a line south of the site
	Natural Gas	No issues
	Storm Drainage (Civil)	• There is no storm drain lines in the area • There are some drainage paths through this area which would need to be considered during design. I do not see a major channel, but you will need to plan on corridors for water to pass through the site as part of the overall drainage plan • I fully expect that we would trigger EISA Section 438 requirements for retention.
	Communications (Civil)	No issues – there is a line west of the site
	Communications Service	The fiber connection point would be Building 9981. There is no underground infrastructure in place that could be utilized. Trenching would be required. There is limited space in the 1 equipment cabinet in Building 9981 for termination. Copper cabling is not available at this site
	Building & Fire Safety	No issues
	Traffic/ Transportation	No issues

	Electrical	This site is possible, but the KAFB transmission line mentioned in site 4 is located NW of the site 
	Existing Water Lines/ Underground Chilled Water	No issues
	Physical Security	No issues
	Conceptual ALARA Review	No ALARA review is required
	Development Cost & Project Schedule	There are some utility (electrical transmission line) avoidance issues that might reduce usable site size

Proposed Site 6	**SNL Department/Org**	**Comment**
South of Solar Tower		
	Environmental Permitting	
	Stormwater	No issues
	Air Quality	No comments received
	Water Quality	No issues
	NEPA & Ecology	
	Ecology	No issues
	Historic	No comments received

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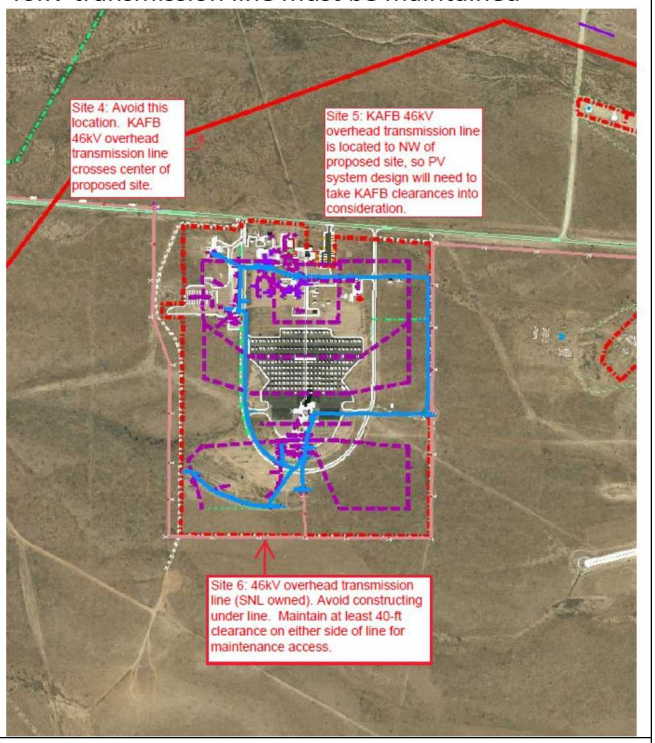
	NEPA	• Proposed locations are located on land permitted to DOE. AF approval would be required, including Siting, NEPA approval (AF813) and Real Estate interaction (332). Any work (i.e. buried transmission lines, utilities, etc.) that goes beyond the permit boundaries would require a new land use permit from the AF • Could be a visual impact/cultural issue (Archaeology would address) • Recommend Planning NEPA • Construction NEPA required
	Archaeology	An archaeological survey will be required
	ER Sites	There are no LTS/ER issues. Any ER/LTS sites within the potential PV sites have completed remedial action with a determination of corrective action complete without controls
	Planning	
	Site Development	Recommend leaving utility corridors for access
	Landscape	No issues
	Real Estate	Site is located on a KAFB permit and will require coordination through Real Estate and NEPA
	Infrastructure (Civil & Electrical, Transportation)	
	Sanitary Sewer	No issues
	Natural Gas	No issues
	Storm Drainage (Civil)	• There are no storm drain lines in the area • There are some drainage paths through this area which would need to be considered during design. There are some minor ones but there is one along the south edge that does appear to be major. You will need to design to protect the site from erosion from that major channel and you will need to plan on corridors for water to pass through the site as part of the overall drainage plan • I fully expect that we would trigger EISA Section 438 requirements for retention
	Communications (Civil)	No issues
	Communications Service	The fiber connection point would be Building 9981. Trenching would be required from site to tunnel between Building 9980 & 9981. Fiber would need to be installed through ¼ mile tunnel to equipment

		rack in 9981. There is limited space in the 1 equipment cabinet in Building 9981 for termination. Copper cabling is not available at this site
	Building & Fire Safety	No issues
	Traffic/ Transportation	No issues
	Electrical	Site is acceptable but clearances from SNL owned 46kV transmission line must be maintained 
	Existing Water Lines/ Underground Chilled Water	No issues
	Physical Security	No issues
	Conceptual ALARA Review	No ALARA review is required
	Development Cost & Project Schedule	Project schedule will be impacted by required KAFB coordination. There are potential historic and communication service issues

Proposed Location

This analysis will inform a Request for Proposal. With the exception of Site 4, all sites are viable for the project and should be included as possible sites in the RFP. A Project NEPA checklist will be submitted for this project.

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GLOSSARY

Customer Needs/Program Drivers/Mission Need – How well does the location meet the needs of the Customer, Program, and Mission?

Safety/Emergency Response – Does the site identified present any concerns regarding safety and/or emergency management access?

Gas – Is gas readily available to the site? Are there existing lines running through the site that need to be relocated?

Electricity – Is electricity readily available to the site? Are there existing lines running through the site that need to be relocated?

Water – Is water readily available to the site? Are there existing lines running through the site that need to be relocated?

Sanitary Sewer – Is sanitary sewer readily available to the site? Are there existing lines running through the site that need to be relocated?

Storm Water – Does that site present any issues for capturing pre-development storm water? Are there existing lines running through the site that need to be relocated?

Traffic – Are there any broad vehicular circulation concerns? Will additional traffic generation impact surrounding roadways?

Pedestrian Connectivity – Will pedestrians be able to safely access site facilities like the cafeteria, fitness, parking, bus stops, etc.?

Bicycle Connectivity – Will cyclists be able to safely access site facilities like the cafeteria, fitness, bus stops, etc.?

Site Organization – Is site located with easy access to either similar work being performed and/or work that has a symbiotic relationship?

Compatible Land Uses – Are the surrounding land uses compatible in terms of noise, dust, hazards, etc.?

Access to Site Amenities – Is the site within easy walking distance to site amenities such as cafeteria, fitness, health clinic, etc.?

Distance of Site to Usable Open Space – Is there any type of usable open space (patio, courtyard, balcony, trails, etc.) within easy walking distance from the site?

Parking – Is there sufficient parking within a five-minute walking distance to accommodate new building inhabitants?

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Infill Development – Is the site within an area that has been previously developed, and is there existing infrastructure in the area that can be utilized for the project?

Environmental Permitting – Issues pertaining to environmental regulatory compliance. Examples include Air Quality and Stormwater.

Environmental Sensitivity/Conservation Area (NEPA & Ecology)– Is the site located in an area of environmental sensitivity? Will development mitigation be required? Analysis of broad environmental issues determined by SNL NEPA and Ecology.

Aligns with Long-Range Planning Objectives – Does the site further long range planning objectives as defined in the Long-Range Development Framework, Sub-Area Plans, and Integrated F&I Plan?

Aligns with LEEDV4 for Campus & Sustainable Design Principles – Federally funded projects are required to meet Leadership in Energy and Environmental Design (LEED) requirements. Sandia has credits that have been certified through LEED V4 for Campus which can be applied to individual projects. Credits are based on sustainable site design elements such as walkability, infill development, design for active occupants, etc.

Aligns with Planned Investments – Does the site align with investments and projects adjacent to the site. Does the site impact any investments that are already underway? Are there any projects that could be completed simultaneously for efficiency gains (Example: planned roadway project being completed at the same time as sidewalk improvements required by project).

Demolition Required – Is demolition required to develop the site?

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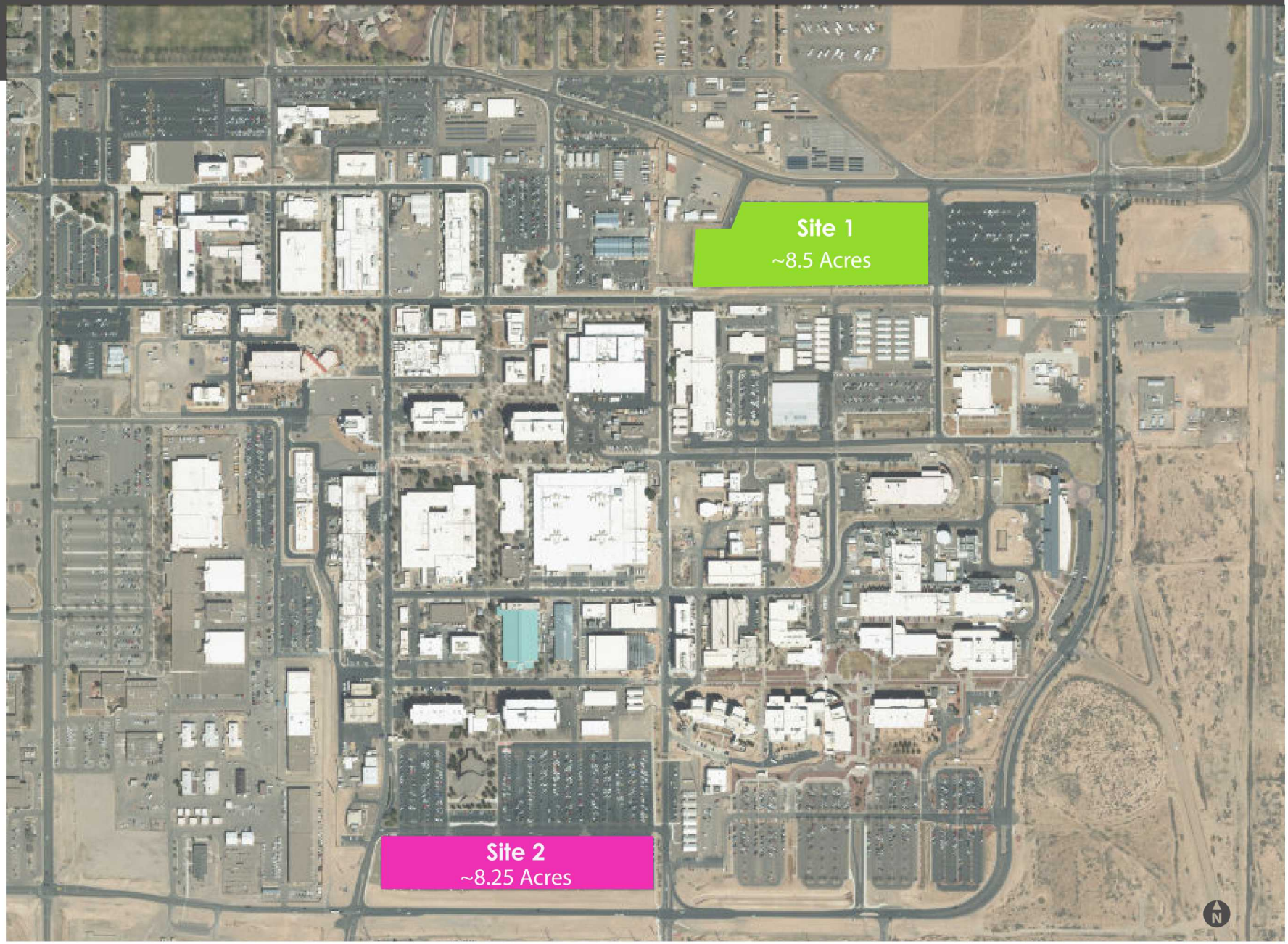
TECH AREA 1

PV Production Sites - CONCEPTUAL LOCATION ANALYSIS

Site 1

Site 2



*Sites identified would require pv to be mounted on covered parking

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TECH AREA 4

PV Production Sites - CONCEPTUAL LOCATION ANALYSIS

Site 3

*This site will require PV to be mounted on covered parking

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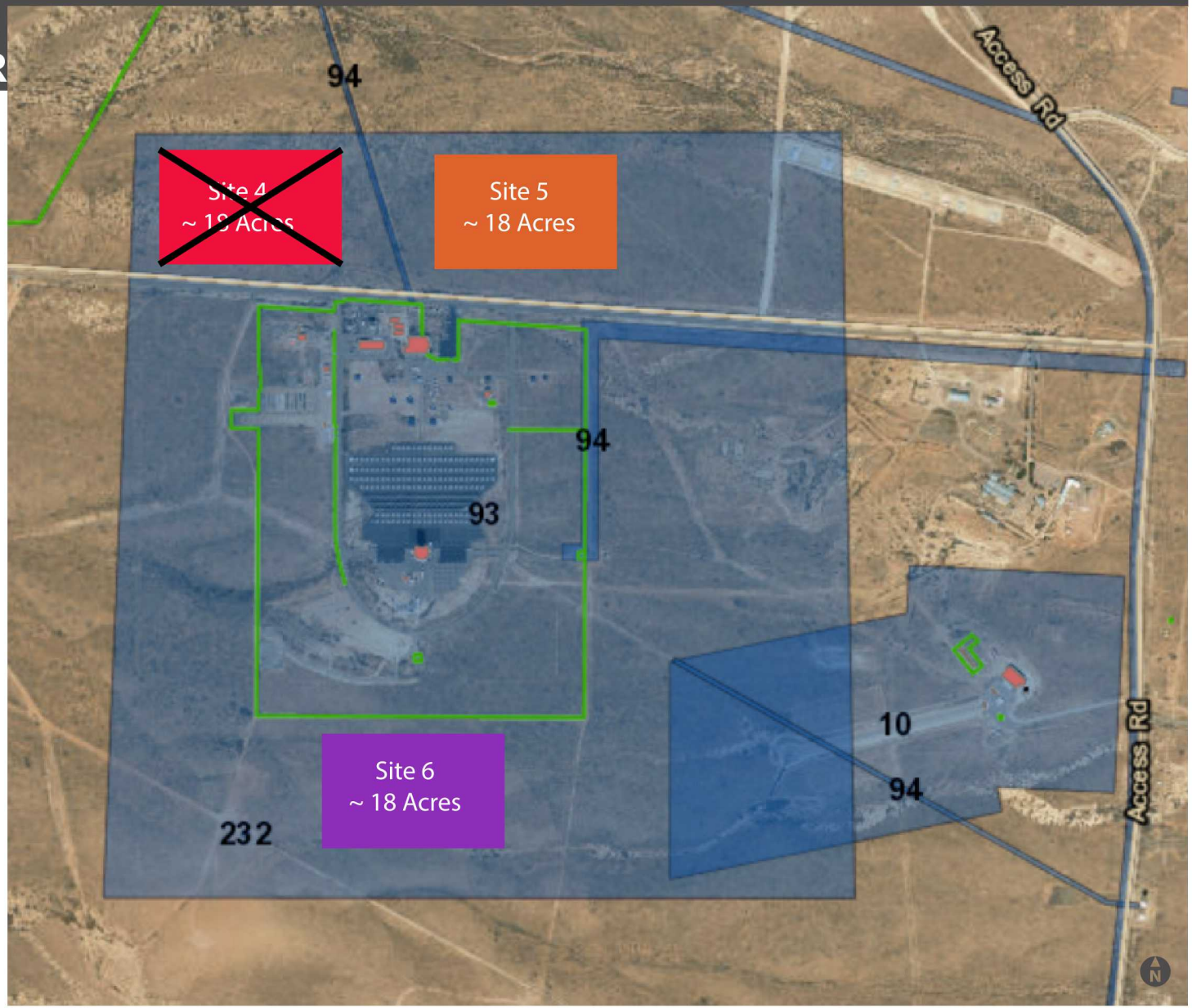
SOLAR TOWER



Site 4 - Site 4 was eliminated because there is a 46kV overhead transmission Line crosses the center of the site

Site 5

Site 6

*Sites 4-6 would be ground mounted and are all on land that is permitted from KAFB

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