VDOT Solar Energy Development Project

Summary Report of Risk Workshop #1

September 2015

Virginia Public-Private Partnerships

Table of Contents

Executive Summary 2
P3 Risk Management 3
Project Description 4
The Project 4
VDOT Site Examples 4
Key Stakeholders 6
Business Model 7
Risk Workshop 8
Purpose 8
Participants 8
Structure 9
Risk Assessment 10
Risk Register 11
Conclusion and Next Steps 13
Appendix A: Participant List 14
Appendix B: Group 1 – Facilities Risk Register 15
Appendix C: Group 2 – Primary/Secondary ROW Risk Register 18
Appendix D: Group 3 – Interstate ROW Risk Register 21

Executive Summary

The Virginia Office of Public-Private Partnerships (VAP3), in coordination with the Virginia Department of Transportation (VDOT) and the Virginia Department of Mines, Minerals and Energy (DMME), conducted a one-day, facilitated risk workshop for the Solar Energy Development Project (Project) on Wednesday, September 2, 2015. The purpose of this initial risk workshop was to gather important stakeholders and experienced professional together early within the development phase to identify and assess the potential risks to the Project throughout its entire lifecycle. The overall goals for the workshop were to:

- identify risks;
- identify probabilities;
- identify impacts; and
- identify mitigations.

To gather as much risk information as possible regarding the Project, the attendees were organized into three discrete groups that each focused on a different type of VDOT site. The three sites included:

- facilities (i.e., district headquarters, residencies);
- primary/secondary right-of-way (ROW) properties; and
- interstate ROW properties.

The risk information was organized into three discrete risk registers with a total of 66 risks identified across all three. The registers were kept separate because the different types of sites have different risk profiles. While the risk profiles differ, many of the risks were consistent across all three types of sites.

This Summary Report describes the Project, the approach taken for conducting the workshop, and the workshop results. It also identifies key next steps resulting from the workshop.

The discussions held were insightful and productive, and identified numerous key risks that should be addressed by the Project development team as the Project moves forward. This initial workshop was the beginning of formalized risk discussions and is anticipated to be followed by a more robust risk workshop and a quantitative risk analysis as the Project progresses further with a more defined scope.

P3 Risk Management

A risk is any uncertain event that, if it happens, can potentially interfere with successful delivery of a project. While all projects have exposure to risks, some may have more challenging risks than others as a result of a variety of factors (e.g., project technical complexity, the status of funding/financing, and stakeholder acceptance). Risk management is undertaken throughout the project lifecycle in order to track identified risks, assign and measure the performance of mitigation strategies, identify new risks as they arise, and capture lessons learned.

The central tool for tracking risk information is the risk register. The risk register is a management tool that encourages the project team and leadership to think proactively about what could negatively affect the Project and to strategize potential mitigations. The risk register is updated with new and/or closed out risks as the project progresses. The initial assessment of the risks identified in the risk register is usually qualitative and subsequently updated with quantified values as the project progresses and more project data becomes available.

Please see the P3 Risk Management Guidelines for more information about the VAP3's risk management framework.

Project Description

The Project

The Project presents VDOT with an opportunity to optimize the use of state-owned property and raise additional funds. These additional funds could include land lease collections, electricity savings and/or revenue sharing provisions. This Project meets public needs and provides public benefits by unlocking additional funds to keep facilities in a state of good repair and furthering the Commonwealth's current energy initiatives outlined in the Virginia Energy Plan.

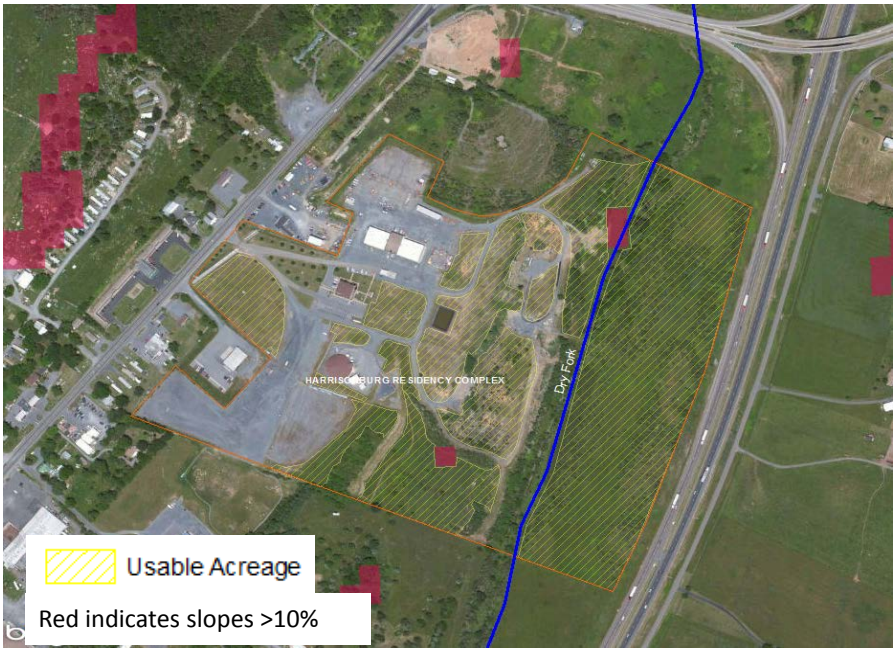
The Project could progress in a several ways: (1) smaller, distributed sites packaged together into one award for total energy capacity; (2) a large, singular site; or (3) a combination of both types of sites. The VAP3 has focused on the ground mounted solar systems because these types of systems have a low capital cost compared to other types of solar energy systems (i.e., solar canopies over parking spots). Rooftops also have a low cost; however, they have not been the priority because VDOT facility roofs are generally older than five years in age.

When looking at ground mounted systems for VDOT sites, three types of sites are being analyzed and considered. These three types of sites include:

- facilities (i.e., district headquarters, residencies);
- primary/secondary right-of-way (ROW) properties; and
- interstate ROW properties.

VDOT Site Examples

The following figures are examples of the three different types of sites listed above. These are meant for illustration purposes only. The usable acreages, potential size of solar energy system, and potential capital cost are subject to change as all VDOT sites are further analyzed and more information is collected.



District	Staunton
Service Territory	Dominion
Usable acreage	45
Potential solar energy system output (MW)	6.5
Potential capital cost (mm)	$6.5-$12.9

Figure 1 – Facility Example: Harrisonburg Residency Site

District	Richmond
Service Territory	Dominion
Usable acreage	22
Potential solar energy system output (MW)	3.2
Potential capital cost (mm)	$3.2-$6.3

Figure 2 – Primary ROW Example: Broad Street and Route 288

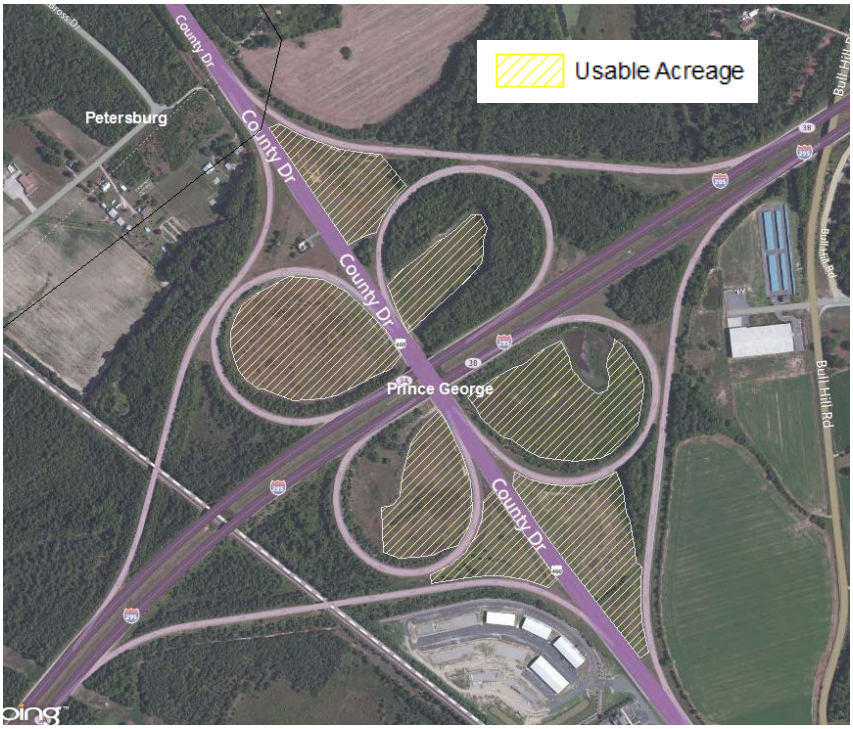


Figure 3 – Interstate ROW Example: Interstate 295 and Route 460

District	Richmond
Service Territory	Dominion
Usable acreage	43
Potential solar energy system output (MW)	6.2
Potential capital cost (mm)	$6.2-$12.3

Key Stakeholders

Key stakeholders for the Project include, but are not limited to:

- State entities:
  - VDOT
  - the Governor's administration
  - DMME
  - the Department of General Services (DGS)
  - the State Corporation Commission (SCC)
  - the Department of Environmental Quality (DEQ)
- Federal Entities:
  - the Federal Highways Administration (FHWA)
  - the Environmental Protection Agency (EPA)
- Local jurisdictions
- Electric utilities
- Ratepayers
- Renewable energy associations
- Private renewable energy developers and installers
- Environmental groups

Business Model

The large decrease in the capital cost of solar energy installations over last few years coupled with the federal Investment Tax Credits (ITCs) make this Project economically viable. The ITCs are critical to the financial viability of the Project. While the Commonwealth cannot take advantage of the ITCs, partnering with private entity could allow the Project to take advantage of the ITCs. Private financing could be used to fill the gap between the total Project cost and ITC reimbursement. To meet the ITC reduction deadline in December 2016, the industry recommended to issue a notice to award by December 2015 to ensure the Project can take advantage of the ITCs.

The private entity would be responsible for designing, building, financing, operating and maintaining (DBFOM) the Project. Two fundamental business models have been identified. Both business models include a rental amount for access to land (or space) to DBFOM the Project. The difference between these models is which party offtakes the solar power produced by the Project. In the first model, the solar power goes into the electricity grid. In the second model, the solar power is consumed onsite by the land owner. The risk workshop focused on the first model.

Risk Workshop

VAP3, in coordination with VDOT and DMME, conducted a one-day, facilitated risk workshop for the Project on Wednesday, September 2, 2015. The workshop was held at Main Street Centre (600 E. Main Street) in Richmond, Virginia. James Loftus (Project Manager, VAP3) facilitated the workshop, which was attended by nineteen individuals from VAP3, VDOT, DMME, the Commonwealth's Office of the Attorney General, and Project consultants.

Purpose

The purpose of this initial risk workshop was to gather important stakeholders and experienced professional together early within the development phase to enable them to better understand the status of the Project, as well as to identify and assess the potential risks to the Project throughout its entire lifecycle. The overall goals for the workshop were to:

- identify risks;
- identify probabilities;
- identify impacts; and
- identify mitigations.

Participants

Nineteen (19) individuals participated in the risk workshop, each of whom has a large breadth of project experience and brought a valuable and unique perspective to the risk discussions. The makeup of the participants included: VDOT Central Office employees, representing the Environmental Division, ROW Division and Financial Division; VAP3 program managers, representing experience in real estate, cell towers and facility projects; a representative from the Commonwealth's Office of Attorney General; members from DMME focused on renewable energy; and Project's consultants, including KPMG and James Madison University Center for Wind Energy. The participant list is attached as Appendix A.

Participants were divided into three groups of six to seven people, with one member assigned to be the group leader. The three groups were each assigned one of the three types of sites for the Project, which are:

- facilities (i.e., district headquarters, residencies);
- primary/secondary right-of-way (ROW) properties; and
- interstate ROW properties.

The composition of each group was mixed so that each had a range of different perspectives and expertise, as well as familiarity with the type of site. Each group recorded and captured key discussion points.

Structure

The agenda for the workshop was:

9:00 – 9:30am	Introduction
9:30 – 10:45am	Identification of project risks
10:45 – 11:00am	Break
11:00 – 12:15pm	Identification of probability and impacts
12:15 – 1:00pm	Lunch
1:00 – 2:00pm	Identification of potential mitigation strategies
2:00 – 3:00pm	Identification of top 5 risks and workshop wrap up

Following this agenda, the risk workshop opened with introductory remarks from the facilitator and an introductory presentation on the Project by the VAP3 project manager for the Project, Alexandra Lauzon. Because the Project is still in the early phases of project development, the presentation was meant to: (1) provide the participants with important information to get the participants on the same page and enable more robust risk discussions; and (2) explain the different types of sites each group would focus discussion and provide examples.

The information covered in the presentation included:

- background information on key events and electricity in The Commonwealth;
- site feasibility details;
- different types of sites for groups to focus risk discussions;
- key stakeholders;
- business models; and
- project risk areas.

The day was divided into four sessions with first three of these sessions conducted in the three breakout groups and the last session bringing the three groups together. First, each group identified the key risks to Project according to the type of site the group was assigned. After identifying the key project risks, each group assigned probability and impact to the identified risks based on certain qualitative risk assessment guidelines (see Risk Assessment for more

information on the guidelines). In the third session, each group was asked to identify potential mitigation strategies for the identified risks and pick the top five most significant and impactful risks. For the last session, the facilitator brought all the groups together for a large group discussion. Each group shared their top five risks, including probability and impact assignment, and engaged in a discussion with the large group regarding potential mitigation strategies. Finally, the facilitator wrapped up the workshop and thanked the participants for their attention throughout the day.

Risk Assessment

These guidelines are qualitative and meant to be a rough order of magnitude. This high-level order of magnitude was used because of the early stage of the Project and different site types that were being considered.

Attendees were given the following framework to assign probability and impact:

Table 1: Risk Assessment Guidelines

		Low	Medium	High
Probability		< 25%	25% < 75%	> 75%
Impact	Cost	< $100,000	$100,000 < $1 mm	> $1 mm
	Schedule	< 1 month	1 month < 6 months	> 6 months

This initial assessment will subsequently be updated with quantified values as the Project progresses and more defined Project scope is identified.

Risk Register

The risk register (Appendix B, C and D) documents the risks identified by all three groups, which were documented over the course of the workshop. The risk information was organized into three discrete risk registers with a total of 66 risks identified across all three.

The registers were kept separate because the different types of sites have different risk profiles. Examples of these risks which differed depending on the type of site include:

- limited access highway risks for interstate ROW;
- municipal/county ROW interaction for primary ROW; and
- the lease term limit for facilities.

While the risk profiles differ, many of the risks were consistent across all three types of sites. Examples of these risks which were consistent across the different types of sites include:

- political support risk;
- federal Investment Tax Credit reduction risk;
- interconnection risk; and
- offtake risk.

All three groups had different risk categories associated with the identified risks. These risk categories were compared against each other. Since many overlapped, each risk register was compiled into the following four categories for consistency:

- stakeholder/political;
- commercial;
- design/construction; and
- operating.

Each group was asked to identify the top five risks with the highest probability of occurring and associated impact to the Project. These risks are highlighted in blue on each register and are listed below according to group number.

Group 1 focusing on VDOT facilities identified the following top five risks:

- state government support for renewable energy;
- federal government support for renewable energy;
- federal ITC;
- lease term limit; and
- offtake agreement.

Group 2 focusing on VDOT primary/secondary ROW identified the following top five risks:

- change in state policy;
- rush to implement a Project;
- scope definition;
- state legislation on renewable energy; and
- program risk.

Group 3 focusing on VDOT interstate ROW identified the following top five risks:

- project approvals;
- land use regulations;
- environmental considerations;
- limited access highway; and
- access and security of the site.

Please see the risk registers in the appendices for a detailed description and risk assessment.

Conclusion and Next Steps

The discussions held were insightful and productive, and identified numerous key risks that should be addressed by the Project development team as the Project moves forward. This initial workshop was the beginning of formalized risk discussions and is anticipated to be followed by a more robust risk workshop and a quantitative risk analysis as the Project progresses further with a more defined scope.

Appendix A: Participant List

VDOT Solar Energy Development Project Risk Workshop

Sign-In Sheet

September 2, 2015 9:00 am - 3:00 pm

Last	First	Signature
Beydoun	Sam	
Christopher	Al	
Cruz	Ivan	
Farmer	Laura	
Framme	Hayes	
Greenwood	Nick	
Holcombe	Dusty	
Hord	Neil	
Lynch	Ryan	
Jordan	Liz	
Jurman	Ken	
Land	Ed	
Lauzon	Alexandra	
Loftus	Jay	
Mangiaracina	Deborah	
McGarry	Ben	
Miles	Jon	
Myers	Valerie	
Nolan	Mike	
Reynolds	Matt	
Thompson	Tommy	
Townsend	Spencer	
Walker	Gabe	
Warren	John	

Appendix B: Group 1 – Facilities Risk Register

Group 1 - Facilities Risk Register							
Risk Information				Risk Analysis			Risk Response
#	Category	Topic	Description	Impact	Prob.	Impact	Mitigation
1.1	Stakeholder/Political	State government support for renewable energy	The Governor's administration has implemented measures that support renewable energy, including recommendations in the 2014 Virginia Energy Plan. The administration could change its priorities away from solar to a different type of energy or initiative.	The Governor's administration support is a key driver for this Project. If the support stopped or changed, then the Project could slow down and maybe even stop.	Low	High	Stakeholder management and accelerated development process.
1.2	Stakeholder/Political	Federal government support for renewable energy	The Federal government has implemented measures that support renewable energy, including Clean Power Plan. The administration could change its priorities away from solar to a different type of energy or initiative.	A change in federal government support could slow down and maybe even stop the Project.	Medium	High	Stakeholder management and accelerated development process.
1.3	Stakeholder/Political	Flow of revenue collected from the lease	Multiple parties could claim a share of the revenues collected from the lease. This could lead to internal disagreement.	The revenues could be diverted from VDOT. The resolution could add time to the schedule.	Low	Low	Clear decision from executives on where to program revenue.
1.4	Stakeholder/Political	Virginia's Renewable Energy Portfolio Standard (RPS)	Virginia has a voluntary RPS, which means utilities are not obligated to buy renewable electricity that goes into the grid.	If the electricity from this Project goes into the grid and the utility does not agree to buy it, then the Project would be unfeasible.	Medium	High	Early coordination with utilities and proper site selection.
1.5	Stakeholder/Political	Federal Investment Tax Credit	The Federal Business ITC amounts to a tax credit worth 30% of the capital cost for a solar energy facility. To take advantage of this ITC, facilities need to be built and commissioned by December 31, 2016. After this date, the ITC reduces from 30% to 10%.	If the Project cannot take advantage of the ITC, the economic feasibility may be in jeopardy and would need an additional source of funding.	Medium	High	Potential for the ITC to be extended. Accelerate development schedule to give more construction time.
1.6	Stakeholder/Political	Other constraints to getting the deal done	Other constraints to getting the deal done could be what service territory the Project is located, changes the state's renewable energy legislation, etc.	These constraints could make the Project unfeasible.	Low	Low	Early coordination with utilities and proper site selection.
1.7	Stakeholder/Political	Federal Clean Power Plan	This plan sets certain standards for reducing carbon emissions. One way to do this is by developing more renewable energy facilitates. This is a supportive effort to the Project.	If the plan fails, then the support for the Project could potentially decline.	Low	Low	Accelerate development schedule.
1.8	Stakeholder/Political	Virginia Climate Change Commission	This commission has recommended the government set certain goals for renewable energy. This shows support for the Project.	If the commission changes it's recommendation this could show a lack of support for the Project.	Low	Low	Accelerate development schedule.
2.1	Commercial	The state electricity contract	The state has electricity contracts with the two largest investor-owned utilities in Virginia. This contract governors how VDOT buys electricity in these two service territories.	Depending on who the private partner for this Project (meaning a private developer versus utility), this contract could have impacts on how the electricity from the Project is sold or purchased.	Low	Low	Early coordination with utilities and proper site selection.

Notes: Top five risks are highlighted in **blue**.

Low ǁ Medium ǁ High : Probability: < 25% ǁ 25% < 75% ǁ > 75%
Impact - Cost: < $100,000 ǁ $100,000 < $1 mm ǁ > $1mm
Impact - Schedule: < 1 month ǁ 1 month < 6 months ǁ > 6 months

Group 1 - Facilities Risk Register

Risk Information				Risk Analysis			Risk Response
#	Category	Topic	Description	Impact	Prob.	Impact	Mitigation
2.2	Commercial	Future use of land	If a site is selected for the Project, then the site would be leased for 15-30 years. A site would need to be chosen that does not have any future plans for use.	If the land is leased for the Project and a future use is identified, then the future use will have to wait until the lease is done.	Medium	High	Good site selection and planning process. Contract terms that address this situation.
2.3	Commercial	Lease term limit	One option for the lease agreement has a term limit of 15 years. This term limit may not be long enough for payback of the Project.	If the Project payback is not possible, then the economic feasibility may be in jeopardy and would need an additional source of funding.	High	High	Use an alternative lease or contract option. Change legislation to increase the number of years.
2.4	Commercial	Offtaker default	The offtaker of the electricity may default and not be able to make payments for the electricity.	The lack of a stable offtaker for the electricity would make payback not possible and jeopardize the economic feasibility of the Project.	Low	High	Contractual remedies.
2.5	Commercial	Developer default	The developer of the Project may default and not be able to make rent payments for the lease.	The developer default would stop the construction and/or operations of the Project and result in lack of rent payments to the VDOT.	Low	High	Contractual remedies (step-in rights).
2.6	Commercial	Interconnection agreement	The interconnection agreement is the contract that governs connecting the Project to the grid. The site needs to be located close to an interconnection point that has available capacity to offtake the electricity. The Project would have to go through the process of applying for interconnection and obtaining the completed agreement. This process can be somewhat lengthy and resource intensive.	If the interconnection agreement is not secured, then the Project cannot put electricity into the grid and sell it. This would put the Project in jeopardy.	Medium	High	Good site selection and planning process. Contract terms that address this situation. Interconnection studies can be performed.
2.7	Commercial	Offtake agreement	The offtake agreement is the agreement to buy the electricity produced from the Project. This agreement must be legal and set at a price that makes the Project valuable to both parties.	If the offtake agreement is not secured, then the Project does not have a purchaser. This would put the Project in jeopardy.	High	High	Good due diligence in development. VDOT could decide to be the offtaker.
2.8	Commercial	Lack of agreement on contract terms	Lack of agreement between VDOT and the developer could kill the contract.	This would stop the Project.	Medium	High	Good site selection and development process.
2.9	Commercial	Handback condition	The handback condition is the condition of the Project when the contract is complete. The condition should meet a certain criteria detailed in the contract. This condition could be very poor and not meet the requirements.	Poor condition of the Project at handback could result in a loss of value.	Low	Low	Contract terms that address this situation. Partner with a creditworthy counterparty. Potentially have a holdback tied to the condition of the Project.
3.1	Design/Construction	Local community support	People and/or businesses within the local community could oppose the Project.	Very strong opposition to the Project could add time to the schedule.	Low	Low	Early coordination with localities and proper site selection.
3.2	Design/Construction	Tree clearing	Trees onsite will need to be cleared so that the panels can be constructed. Tree clearing could be subject to certain environmental restrictions.	Tree clearing could add cost to the Project and time to the schedule.	Low	Low	Good site selection and Project planning.
3.3	Design/Construction	Glare of panels	The panels could reflect glare and cause eye sight issues.	This problem could result in changes to the Project to resolve the issue, which could be an added cost.	Low	Low	Good site selection and Project planning. Product specifications in the contract.

Notes: Top five risks are highlighted in **blue**.

Low ǁ Medium ǁ High : Probability: < 25% ǁ 25% < 75% ǁ > 75%
Impact - Cost: < $100,000 ǁ $100,000 < $1 mm ǁ > $1mm
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Group 1 - Facilities Risk Register

Risk Information				Risk Analysis			Risk Response
#	Category	Topic	Description	Impact	Prob.	Impact	Mitigation
3.4	Design/Construction	Spoiling view	The Project could be perceived to spoil the view shed and face opposition from parties wanting to preserve the view shed.	This problem could result in changes to the Project to resolve the issue, which could be an added cost.	Low	Low	Good site selection and Project planning.
3.5	Design/Construction	Health hazards	The Project could be perceived as having negative health effects, which has not been proven.	This perception could cause opposition to the Project.	Low	Low	Proper education.
3.6	Design/Construction	Surrounding property valuations	The surrounding property valuations could decrease in value because of the Project.	This problem could result in changes to the Project to resolve the issue, which could be an added cost.	Low	Low	Good site selection and Project planning.
3.7	Design/Construction	Not in my backyard (NIMBY)	NIMBY could be opposed to the Project.	Very strong opposition to the Project could add time to the schedule.	Low	Low	Good site selection and Project planning.
3.8	Design/Construction	Zoning/Planning	VDOT must coordinate and inform the localities of the Project. The locality could oppose the Project.	Very strong opposition to the Project could add time to the schedule.	Low	Low	Good site selection and Project planning.
4.1	Operating	Inadequate output	Insolation low, shading, poor specifications of components, degradation, soiling, defects, curtailment (grid/power quality)	Inadequate output could lead to a less economical Project and potentially cause developer default.	Low	Medium	Good site/product selection and Project planning.
4.2	Operating	Vandalism	Vandals could damage the panels and the panels would need replacement.	This could add cost to the Project.	Low	Medium	Insurance and security.
4.3	Operating	Solar workers safety	During construction and operations, the safety of the workers would be a concern.	A safety incident could result in changes to the Project to resolve the issue, which could be an added cost.	Low	Low	Good Project planning, Insurance and security.
4.4	Operating	VDOT worker safety	During construction and operations, the safety of the workers would be a concern.	A safety incident could result in changes to the Project to resolve the issue, which could be an added cost.	Low	Low	Good Project planning, Insurance and security.

Notes: Top five risks are highlighted in **blue**.

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Appendix C: Group 2 – Primary/Secondary ROW Risk Register

Group 2 - Primary/Secondary ROW Risk Register							
Risk Information				Risk Analysis			Risk Response
#	Category	Topic	Description	Impact	Prob.	Impact	Mitigation
1.1	Stakeholder/Political	Change in state policy	The Governor's administration has implemented policies that support renewable energy, including recommendations in the 2014 Virginia Energy Plan. The policies could changed to place priority away from solar to a different type of energy or initiative.	The Governor's administration's policies are a key driver for this Project. If they are changed, then the Project could slow down and maybe even stop.	High	High	Stakeholder management and accelerated project development schedule.
1.2	Stakeholder/Political	Rush to implement a Project	The Federal Business ITC amounts to a tax credit worth 30% of the capital cost for a solar energy facility. To take advantage of this ITC, facilities need to be built and commissioned by December 31, 2016. After this date, the ITC reduces from 30% to 10%. The looming ITC reduction has rushed project development to implement a Project.	Rushing to implement a Project could result in a lower quality Project or less value captured by the Commonwealth.	High	High	Define clear scope for the Project and due diligence in the site selection process. Financial analyses.
1.3	Stakeholder/Political	VDOT ROW stakeholder	VDOT ROW is a key stakeholder for the Project and will need to go through the necessary ROW procedures and coordinate with municipal/county ROW.	ROW may not have the resources to allot to the additional workload as a result of this Project. This could add cost to VDOT and time to the schedule.	Medium	Low	Early coordination with VDOT ROW to select sites and create a development plan.
1.4	Stakeholder/Political	Municipal/county ROW interaction	Depending on the site chosen, the municipality or county may be involved in the approvals and development. This interaction is an added layer of interaction to the Project.	The municipality or county could oppose the Project and add time to the schedule.	High	High	Early municipality/county coordination and good site selection.
1.5	Stakeholder/Political	VDOT approvals	Project approvals needed to bring this Project to completion include approvals needed by VDOT requirement to review and approve sites, access.	Because of the nature of the ROW, taking into consideration additional access and security issues in the design could add cost to the Project.	Medium	Low	Early coordination.
2.1	Commercial	Scope definition	The scope of the Project is not clearly defined yet. A range of potential projects are contemplated each with an associated complexity, including the number of effected stakeholders.	The schedule could be delayed a great deal if these approvals cannot be obtained in a timely manner.	High	High	Define clear scope for the Project.
2.2	Commercial	State legislation on renewable energy	Current state legislation imposes certain constraints on renewable electricity. These constraints could limit the available business models for the Project.	These constraints could make the Project unfeasible.	High	High	Clear understanding of the current legislation. Potentially a legislative change.
2.3	Commercial	Program risk	Since the Project is still in the early stages of development, there is risk that the best Project is not chosen and the Commonwealth does not capture the most potential value from the Project.	The Commonwealth could fail to optimize the opportunity.	High	Low	Financial analysis and consideration of value.
2.4	Commercial	Offtaker	The offtake agreement is the agreement to buy the electricity produced from the Project. This agreement must be legal and set at a price that makes the Project valuable to both parties.	If the offtake agreement is not secured, then the Project does not have a purchaser. This would put the Project in jeopardy.	High	Low	Good due diligence in development. VDOT could decide to be the offtaker.
2.5	Commercial	Interconnection	The interconnection agreement is the contract that governs connecting the Project to the grid. The site needs to be located close to an interconnection point that could absorb the electricity. The Project would have to go through the process of applying for interconnection and obtaining the completed agreement. This process can be somewhat lengthy and resource intensive.	If the interconnection agreement is not secured, then the Project cannot put electricity into the grid and sell it. This would put the Project in jeopardy.	High	High	Good site selection and planning process. Contract terms that address this situation. Interconnection studies can be performed.

Notes: Top five risks are highlighted in **blue**.

Low ǁ Medium ǁ High : Probability: < 25% ǁ 25% < 75% ǁ > 75%
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Group 2 - Primary/Secondary ROW Risk Register

Risk Information				Risk Analysis			Risk Response
#	Category	Topic	Description	Impact	Prob.	Impact	Mitigation
2.6	Commercial	Protest	The local community could be opposed to the Project and protest its development.	Very strong opposition to the Project could add time to the schedule.	Low	Low	Early coordination with localities and proper site selection.
2.7	Commercial	Opportunity cos/future use	If a site is selected for the Project, then the site would be leased for 15-30 years. A site would need to be chosen that does not have any future plans for use (e.g., road widening).	If the land is leased for the Project and a future use is identified, then the future use will have to wait until the lease is done.	Medium	Low	Good site selection and planning process. Contract terms that address this situation.
2.8	Commercial	Handback terms	The handback condition is the condition of the Project when the contract is complete. The condition should meet a certain criteria detailed in the contract. This condition could be very poor and not meet the requirements.	Poor condition of the Project at handback could result in a loss of value.	Low	Low	Contract terms that address this situation. Partner with a creditworthy counterparty. Potentially have a holdback tied to the condition of the Project.
2.9	Commercial	Performance bonds/guarantees	The developer must meet VDOT's performance bond and guarantee requirements.	Project may not normally need to meet these requirements, so they could add extra cost.	Low	Low	Due diligence on the appropriate amounts.
3.1	Design/Construction	CTB limited access breaks	When the Project is located on ROW (limited access breaks) certain operations and maintenance issues of the Project will need to be considered and safety of the workers and drivers in the road ensured.	Because of the nature of the ROW, taking into consideration additional safety issues in the design could add cost to the Project.	Medium	Low	Good site selection and planning process.
3.2	Design/Construction	Environmental permits	Generally, non-federal but potentially USACE (water), bats… Environmental considerations can include cultural resources, threatened and endangered species (e.g., Hampton Roads ospreys) and water sources. The site could have issues with one or all of these types of environmental considerations for permits.	If the site has issues with any of these types of environmental considerations, then studies and permit approval could add time to the schedule.	Low	Low	Good site selection and planning process. Environmental studies can be performed.
3.3	Design/Construction	Developer cost of interaction with VDOT	VDOT being a state agency may require additional assurances from the developer. These assurances could be in the form of financial guarantees and direct costs.	These direct costs would add to the overall Project cost and hurt the economic feasibility.	High	Low	Contractual provisions.
3.4	Design/Construction	Restrictions/ conditions	Different regulations govern activities within the ROW depending on site and roadway. These restrictions may be related to zoning or time of day restrictions.	These restrictions could add cost and time to the Project.	High	Low	Good site selection and planning process.
3.5	Design/Construction	Approvals outside of VDOT	Project approvals needed to bring this Project to completion include approvals needed by the Federal Highways Administration (FHWA), environmental entities (e.g.., Department of Environmental Quality), and the localities.	The schedule could be delayed a great deal if these approvals cannot be obtained in a timely manner.	High	Low	Early coordination with utilities and proper site selection.
3.6	Design/Construction	Construction	The risk of construction is on the developer.	Construction could take longer than planned due to unforeseen issues.	High	High	Detailed and realistic construction plan.
4.1	Operating	Operations of facility	The developer must meet the obligations for maintenance and performance of the facility.	The facility could have major maintenance requirements which could add additional cost to the Project.	High	High	Detailed and realistic operations plan.

Notes: Top five risks are highlighted in **blue**.

Low ǁ Medium ǁ High : Probability: < 25% ǁ 25% < 75% ǁ > 75%
Impact - Cost: < $100,000 ǁ $100,000 < $1 mm ǁ > $1mm
Impact - Schedule: < 1 month ǁ 1 month < 6 months ǁ > 6 months

Group 2 - Primary/Secondary ROW Risk Register

Risk Information				Risk Analysis			Risk Response
#	Category	Topic	Description	Impact	Prob.	Impact	Mitigation
4.2	Operating	Maintenance of site	When the Project is located on ROW certain operations and maintenance roadway issues of the site will need to be considered as regular maintenance of the Project. The developer must meet the obligations.	These restrictions could add cost and time to the Project.	Low	Low	Good site selection and planning process.
4.3	Operating	VDOT maintenance responsibilities	If a site in the ROW is selected for the Project, then it will have an impact on VDOT's current operations for the roadway (e.g., road barriers).	If this have a negative impact on current operations, the VDOT could have an added cost.	Low	Low	Early coordination with VDOT maintenance division.
4.4	Operating	Glare/safety	The panels could reflect glare and cause eye sight issues.	This problem could result in changes to the Project to resolve the issue, which could be an added cost.	Low	Low	Good site selection and Project planning.
4.5	Operating	Work zone conditions/standards	During construction and operations, the safety of the workers would be a concern.	A safety incident could result in changes to the Project to resolve the issue, which could be an added cost.	Low	Low	Good Project planning, Insurance and security.
4.6	Operating	Approval of changes/terms	The Project may have change orders or unforeseen issues. VDOT needs to have someone identified who will approve the changes/terms. This would be an oversight responsibility.	Oversight is not identified and the Project is not tracked correctly.	Medium	Medium	Early identification of who will oversee the Project. Clear lines of responsibility.
4.7	Operating	Site Security	Vandals could damage the panels and the panels would need replacement.	This could add cost to the Project.	Low	Low	Insurance and security.

Notes: Top five risks are highlighted in **blue**.

Low ǁ Medium ǁ High : Probability: < 25% ǁ 25% < 75% ǁ > 75%
Impact - Cost: < $100,000 ǁ $100,000 < $1 mm ǁ > $1mm
Impact - Schedule: < 1 month ǁ 1 month < 6 months ǁ > 6 months

Appendix D: Group 3 – Interstate ROW Risk Register

Group 3 - Interstate ROW Risk Register

Risk Information				Risk Analysis			Risk Response
#	Category	Topic	Description	Impact	Prob.	Impact	Mitigation
1.1	Stakeholder/Political	Project approvals	Project approvals needed to bring this Project to completion include approvals needed by the Federal Highways Administration (FHWA), environmental entities (e.g.., Department of Environmental Quality), VDOT, and the localities.	The schedule could be delayed a great deal if these approvals cannot be obtained in a timely manner.	High	High	Early and regular coordination with stakeholders.
1.2	Stakeholder/Political	State energy regulation and electricity contract	The regulations and contract lack clarity regarding renewable energy and how state law governs energy generation versus energy generation companies. The question of whether the Commonwealth's can purchase or sell electricity is uncertain.	Lack of clarity could add time to the Project depending on how timely answers can be received and whether there is disagreement.	Medium	Medium	Due diligence.
1.3	Stakeholder/Political	Utility's perception/reception	Virginia's energy market has various investor-owned utilities, electric cooperatives and non-jurisdictional utilities. The perception and reception of the Project can vary depending on the utility. Some utilities could oppose the Project or change their view on renewable energy.	The support of the local utility is critical for this Project. Opposition by this utility could add time to the schedule.	Low	Low	Early coordination with utilities, especially ones where a Project is being considered.
2.1	Commercial	Private partner	At this point in development it is not clear who the private partner will be for the Project. The partner could be a utility or a private developer (or commercial entity).	A lack of clarity on this scope item could add more time to the development schedule.	Low	High	Clearly defined scope.
2.2	Commercial	Interconnection	The site needs to be located close to an interconnection point that has available capacity to offtake the electricity. The Project would have to go through the process of applying for interconnection and obtaining the completed agreement. This process can be somewhat lengthy and resource intensive.	If the interconnection agreement is not secured, then the Project cannot put electricity into the grid and sell it. This would put the Project in jeopardy.	Low	Low	Good site selection and planning process. Contract terms that address this situation. Interconnection studies can be performed.
3.1	Design/Construction	Land use regulations	Different regulations govern activities within the ROW depending on whether the private partner is a utility versus a commercial entity. A commercial entity may be subject to additional zoning requirements.	Following additional zoning requirements could add time to the schedule depending on what the ROW is zoned and how well the locality receives the Project.	Low	High	Due diligence on zoning regulations and good site selection process.
3.2	Design/Construction	Environmental considerations	Environmental considerations can include cultural resources, threatened and endangered species (e.g., Hampton Roads ospreys) and water sources. The site could have issues with one or all of these types of environmental considerations.	If the site has issues with any of these types of environmental considerations, then studies and resolutions could add time to the schedule.	Low	High	Good site selection and planning process. Environmental studies can be performed.
4.1	Operating	Limited access highway	When the Project is located on Interstate ROW (limited access highway) certain operations and maintenance issues of the Project will need to be considered and safety of the workers and drivers in the road ensured.	Because of the nature of the ROW, taking into consideration additional safety issues in the design could add cost to the Project.	Medium	Medium	Early coordination with FHWA and highway engineers. Good site selection and planning process.

Notes: Top five risks are highlighted in **blue**.

	Low	Medium	High
Probability:	< 25%	25% < 75%	> 75%
Impact - Cost:	< $100,000	$100,000 < $1 mm	> $1mm
Impact - Schedule:	< 1 month	1 month < 6 months	> 6 months

Group 3 - Interstate ROW Risk Register

Risk Information				Risk Analysis			Risk Response
#	Category	Topic	Description	Impact	Prob.	Impact	Mitigation
4.2	Operating	Access and security of the site	When the Project is located on Interstate ROW (limited access highway) certain access issues will need to be considered and proper security installed. This is to ensure the safety of the workers for the Project and drivers in the road.	Because of the nature of the ROW, taking into consideration additional access and security issues in the design could add cost to the Project.	High	Medium	Early coordination with FHWA and highway engineers. Good site selection and planning process.
4.3	Operating	Highway user safety	When the Project is located on Interstate ROW the panels could reflect glare into the eyesight of a driver along the highway. This could impair the safety of the Project and drivers in the road.	Impaired eyesight could lead to accidents and damage to the Project. Both these issues would add cost to the Project.	Low	Low	Good site selection and Project planning. Product specifications in the contract.

Notes: Top five risks are highlighted in **blue**.

Low ǁ Medium ǁ High : Probability: < 25% ǁ 25% < 75% ǁ > 75%
Impact - Cost: < $100,000 ǁ $100,000 < $1 mm ǁ > $1mm
Impact - Schedule: < 1 month ǁ 1 month < 6 months ǁ > 6 months