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Stormwater Considerations for Solar Development in New York State: Where Are We Headed?

Black River Watershed Conference
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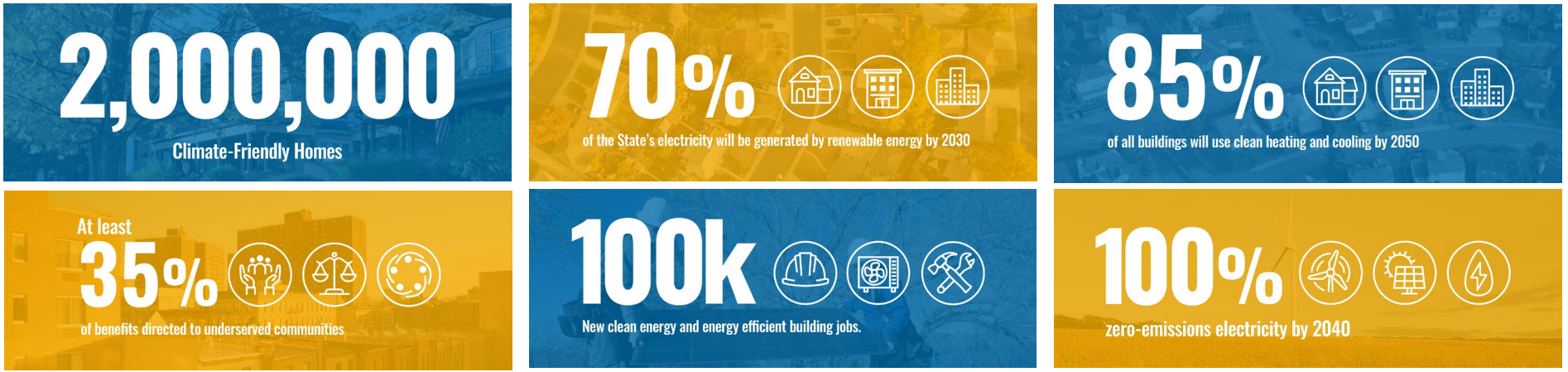
NYSDEC

Presentation Outline

- How We Got Here
  - Initiatives
    - GEMS
    - Approval Processes
  - Technical Guidance
    - Construction General Permit
    - SWPPP Preparation for Solar Sites
- Lessons Learned
- Path Forward

What is the Green Energy Management Section (GEMS)?



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Why do we need GEMS?

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How does GEMS progress large-scale renewable energy projects?

- Revise renewable energy program guidance
- Develop standard operating procedures
- Establish project tracking mechanisms
- Coordinate across the Regions
- Follow siting and permitting processes

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What processes progress renewable energy projects?

- State Environmental Quality Review Act (SEQR)
- Article 7: Major transmission facility siting
- Article 10: New and repowered or modified major electric generating facilities
- 94-c: Major renewable energy facilities
- Article 8: TBD

RAPID Act (Renewable Action through Project Interconnection and Deployment Act)

What is the RAPID Act?

- In order to meet Climate Leadership and Community Protection Act (CLCPA) goals, maintain the reliability of NY's electric transmission system and expedite review of major renewable energy facilities, bulk and local transmission facilities need to be upgraded to deliver renewable energy.
- Office of Renewable Energy Siting (ORES) oversees approvals

Takeaway

- There are various processes through which renewable energy facilities can be sited and permitted.
- GEMS helps facilitate reviews and approvals for the Division of Water
- GEMS helps their partners understand the process and provide technical resources to help

SWPPP Preparation Guidance

NYSDEC April 5, 2018 Memorandum:

Solar Panel Construction Stormwater Permitting/ SWPPP Guidance

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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MEMORANDUM

TO: Regional Water Engineers

FROM: Robert Wither, Chief, South Permit Section

SUBJECT: Solar Panel Construction Stormwater Permitting/SWPPP Guidance

DATE: April 5, 2018

Issue

The Department is seeing an increase in the number of solar panel construction projects across New York State. This has resulted in an increase in the number of questions on Construction General Permit (CGP) and Stormwater Pollution Prevention Plan (SWPPP) requirements from design professionals because the current CGP (GP-0-15-002) does not include a specific reference to the SWPPP requirements for solar panel projects in Tables 1 and 2 of Appendix B. To address this issue, the Division of Water (DOW) has developed the following guidance on CGP/SWPPP requirements for the different types of solar panel projects.

Scenario 1

The DOW considers solar panel projects designed and constructed in accordance with the following criteria to be a "*Land clearing and grading for the purposes of creating vegetated open space (i.e. recreational parks, lawns, meadows, fields)*" type project as listed in Table 1, Appendix B of the CGP. Therefore, the SWPPP for this type of project will typically just need to address erosion and sediment controls.

1. Solar panels are constructed on post or rack systems and elevated off the ground surface,
2. The panels are spaced apart so that rain water can flow off the down gradient side of the panel and continue as sheet flow across the ground surface*,
3. For solar panels constructed on slopes, the individual rows of solar panels are generally installed along the contour so rain water sheet flows down slope*,
4. The ground surface below the panels consist of a well-established vegetative cover (see "Final Stabilization" definition in Appendix A of the CGP),
5. The project does not include the construction of any traditional impervious areas (i.e. buildings, substation pads, gravel access roads or parking areas, etc.),
6. Construction of the solar panels will not alter the hydrology from pre-to post development conditions (see Appendix A of the CGP, for definition of "Alter the hydrology…"). Note: The design professional shall perform the necessary site assessment/hydrology analysis to make this determination.

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Scenario 1

- Project must meet ALL six criteria
- Considered a “Land clearing and grading for the purposes of creating vegetated open space.”
- SWPPP only needs to address erosion and sediment controls.

Scenario 1 Criteria

1. Panels elevated off the ground
2. Panels are spaced apart to ensure sheet flow
3. Panel rows along the contour
4. Well-established vegetative cover
5. No new impervious area (i.e. buildings, substation pads, gravel access roads or parking areas, etc.)
6. No change in hydrology from pre-to post-development conditions

Maryland Department of the Environment Stormwater Design Guidance – Solar Panel Installations

MDE Maryland Department of the Environment

Stormwater Design Guidance – Solar Panel Installations

Revisions to Maryland's stormwater management regulations in 2010 require that environmental site design (ESD) be used to the maximum extent practicable (MEP) to mimic natural hydrology, reduce runoff to reflect forested wooded conditions, and minimize the impact of land development on water resources. This applies to any residential, commercial, industrial, or institutional development where more than 5,000 square feet of land area is disturbed. Consequently, stormwater management must be addressed even when permeable features like solar panel installations exceed 5,000 square feet of land disturbance.

Depending on local soil conditions and proposed imperviousness, the amount of rainfall that stormwater requirements are based on varies from 1.0 to 2.6 inches. However, addressing stormwater management does not mean that structural or micro-scale practices must be constructed to capture and treat large volumes of runoff. Using nonstructural techniques like disconnecting impervious cover reduces runoff by promoting overland filtering and infiltration. Commonly used with smaller or narrower impervious areas like driveways or open roads, the Disconnection of Non-Rooftop Runoff technique (see pp. 5.61 to 5.65 of the **2000 Maryland Stormwater Design Manual**[1]) is a low cost alternative for treating runoff in situations like rows of solar panels.

When non-rooftop disconnection is used to treat runoff, the following factors should be considered:

- The vegetated area receiving runoff must be equal to or greater in length than the disconnected surface (e.g., width of the row of solar panels)
- Runoff must sheet flow onto and across vegetated areas to maintain the disconnection
- Disconnections should be located on gradual slopes (≤ 5%) to maintain sheetflow. Level spreaders, terraces, or berms may be used to maintain sheetflow conditions if the average slope is steeper than 5%. However, installations on slopes greater than 10% will require an engineered plan that ensures adequate treatment and the safe and non-erosive conveyance of runoff to the property line or downstream stormwater management practice.
- Disconnecting impervious surfaces works best in undisturbed soils. To minimize disturbance and compaction, construction vehicles and equipment should avoid areas used for disconnection during installation of the solar panels.
- Groundcover vegetation must be maintained in good condition in those areas receiving disconnected runoff. Typically this maintenance is no different than other lawn or landscaped areas. However, areas receiving runoff should be protected (e.g., planting shrubs or trees along the perimeter) from future compaction.

Depending on the layout and number of panels installed, the disconnection of non-rooftop runoff technique may address some or all of the stormwater management requirements for an individual project. Where the imperviousness is high or there is other infrastructure (e.g., access roads, transformers), additional runoff may need to be treated. In these situations, other ESD techniques or micro-scale practices may be needed to provide stormwater management for these features.

Maryland Guidance

Disconnection of Non-Rooftop Runoff technique

Disconnection of Non-Rooftop Runoff

- Disconnection length ≥ solar panel row width
- Runoff must sheet flow onto and across vegetated areas
- Minimize disturbance to undisturbed soils
- Maintain groundcover vegetation

Scenario 2

- Project meets all criteria except #6

Table 2 (Continued)

CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT INCLUDES POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- Parking lot construction or reconstruction, including parking lots constructed as part of the construction activities listed in Table 1
- Athletic fields (natural grass) that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Athletic fields with artificial turf
- Permanent access roads, parking areas, substations, compressor stations and well drilling pads, surfaced with *impervious cover,* and constructed as part of an over-head electric transmission line project, wind-power project, cell tower project, oil or gas well drilling project, sewer or water main project or other linear utility project
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a residential, commercial or institutional development
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a highway construction or reconstruction project
- All other construction activities that include the construction or reconstruction of *impervious area* or *alter the hydrology from pre to post development* conditions, and are not listed in Table 1

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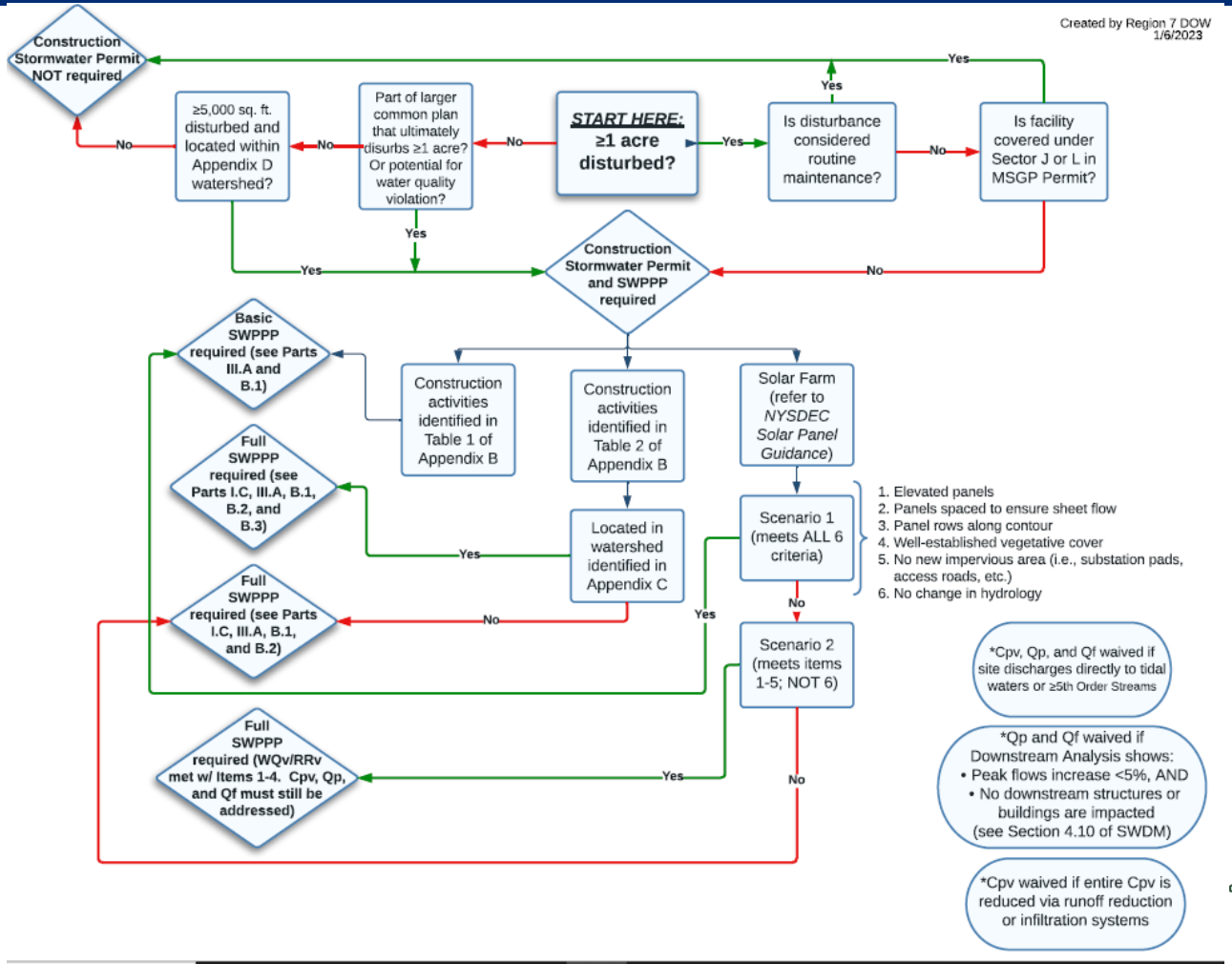

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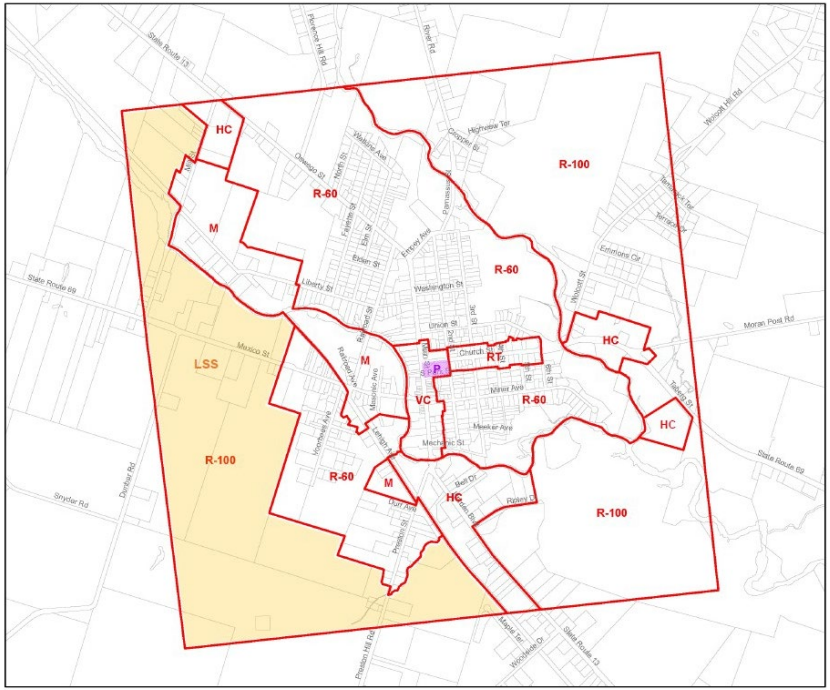
Lessons Learned

Industry Concerns

1. Panels are not truly impervious in the traditional sense
2. Panels are not generally placed along the contour
3. Slope limitations and need for “engineered plans”
4. Rotating panels not considered
5. Limitations for placement of pervious access roads and use during construction

Local Concerns

1. Number of projects proposed in the municipality
2. Siting concerns
3. Visual impacts
4. Safety
5. Decommissioning
6. Dual uses



NYSERDA Recommendations

- Place utilities underground wherever possible
- Minimize the extent of impervious area and soil compaction
- Ensure anti-reflective coatings
- Lighting considerations
- Fencing
- Screening
- Minimize tree removal larger than 6 in. diameter (DBH)

NYSERDA Recommendations

Maximum height of panels – 15/20 feet

Minimum setbacks:

Zoning District	**Front**	**Side**	**Rear**	**Non-Participating Occupied Residence**
Residential Low Density	100’	100’	100’	250’
Residential High Density	—	—	—	—
Commercial / Business	50’	50’	50’	250’
Light Industrial	50’	50’	50’	250’
Heavy Industrial	50’	50’	50’	250’
Agricultural / Residential	50’	50’	50’	250’

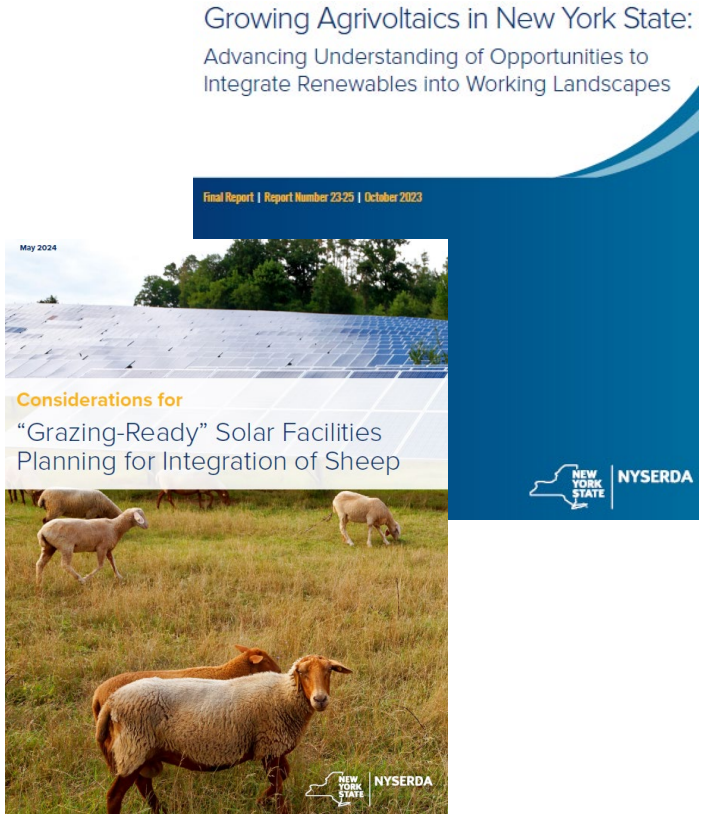
Build flexibility into the law to allow for dual use, such as agrivoltaics.

NYSERDA Recommendations

- No more than 50% of the area of MSG 1-4 soils within the solar facility area
  - Caveat: Unless land can still be used as agricultural
- Construct facilities on MSG 1-4 soils in accordance with the requirements of the NYS Department of Agriculture and Markets Guidelines for Solar Energy Projects – Construction Mitigation for Agricultural Lands

Agrovoltaics

- NYSERDA's resources on agrovoltaics:
  1. Growing Agrivoltaics in NYS
  2. Grazing Ready Solar Facilities
  3. https://www.nyserda.ny.gov/PutEnergyToWork/Industry-Energy-Solutions/Agriculture/Agrivoltaics
  4. https://www.nyatwg.com/



DEC Lessons Learned

- Actual disturbed area exceeds anticipated
- Additional ESC measures required or not in conformance with Blue Book
- Lack of Winter Stabilization Plan

DEC Lessons Learned

- Maintain sheet flow with level spreading types of practices
- Phase construction & stabilization
- Properly size sediment basins (good end of line practice)
- Treat WQv at the source

DEC Lessons Learned

- Directional Drilling
  - Detailed frac-out plan
  - Adequate storage for excess drilling fluid

Path Forward

How Do We Pivot?

- Clarification of guidance
- Construction General Permit revisions
- Research
- Partnerships

Clarify Guidance

- Update to the 2018 Solar Guidance Memo

Construction General Permit Update

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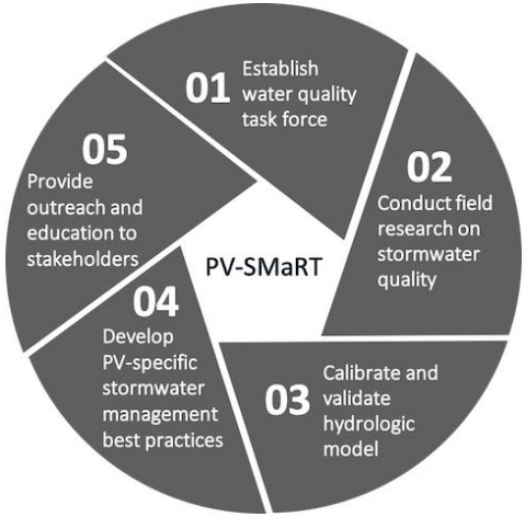
Research

- PV-SMaRT
  - https://www.nrel.gov/solar/market-research-analysis/pv-smart.html
  - Research findings
  - Runoff calculator
  - Field research sites
  - Water Quality Task Force



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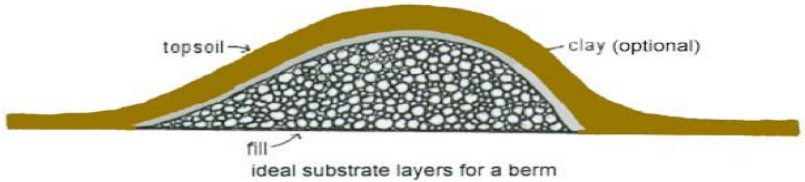
Research

- Best management practices from other states

BMP 6.4.10: Infiltration Berm & Retentive Grading



ideal substrate layers for a berm

An Infiltration Berm is a mound of compacted earth with sloping sides that is usually located along a contour on relatively gently sloping sites. Berms can also be created through excavation/removal of upslope material, effectively creating a Berm with the original grade. Berms may serve various stormwater drainage functions including: creating a barrier to flow, retaining flow and allowing infiltration for volume control, and directing flows. Grading may be designed in some cases to prevent rather than promote stormwater flows, through creation of "saucers" or "lips" in site yard areas where temporary retention of stormwater does not interfere with use.

Partnerships

- NYSERDA
- NYSEIA
- Department of Ag & Markets
- Department of Public Service (DPS)
- Office of Renewable Energy Siting (ORES)
- DEC Divisions

Thank You

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