

Assessing the Degree of Potential Visual Impact of Vertical Structures

ArcGIS tools used to help create Visual Impact Assessments



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Case Study

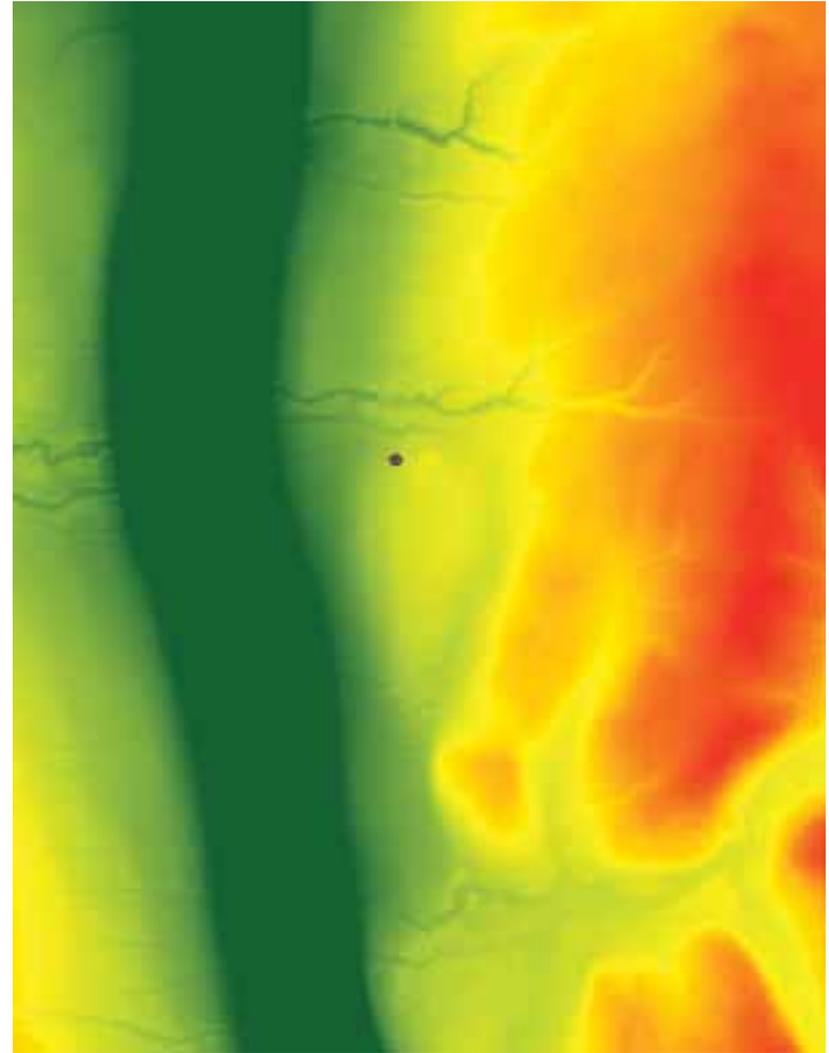
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Visual Impact Assessments and Viewshed Tool

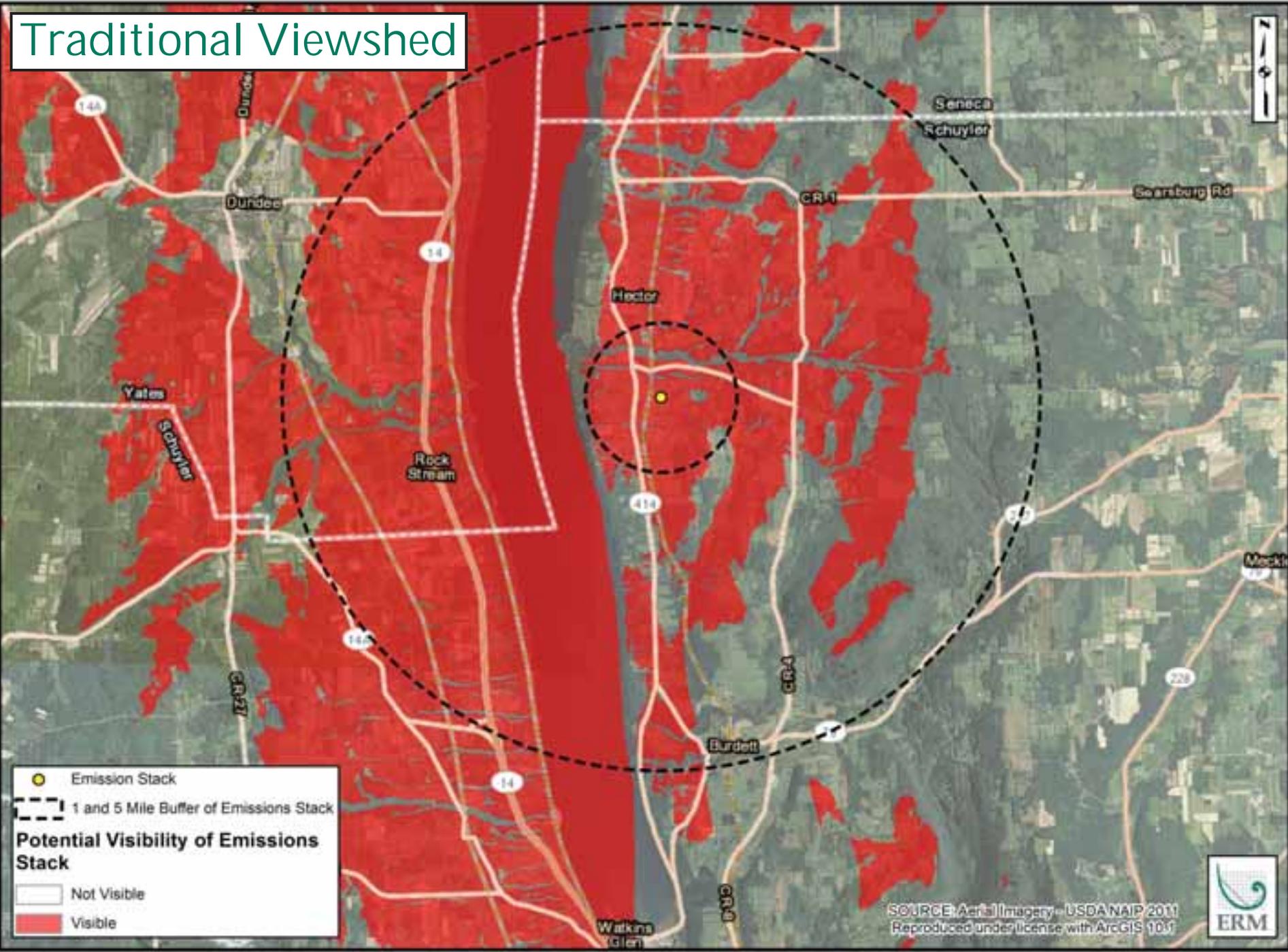
“Change in the appearance of the landscape as a result of development” (Marcaulay Institute)

- National Environmental Policy Act (NEPA) in 1969
- Power plants, wind farms, transmission lines
- ArcGIS Viewshed Tool
 - Input data:
 - *Digital Elevation data*
 - *Infrastructure location*
 - Output:
 - *Raster (visible / not visible)*



Input data: USGS National Elevation dataset (1/3rd Arc second) and example infrastructure location

Traditional Viewshed



 Emission Stack

 1 and 5 Mile Buffer of Emissions Stack

Potential Visibility of Emissions Stack

 Not Visible

 Visible

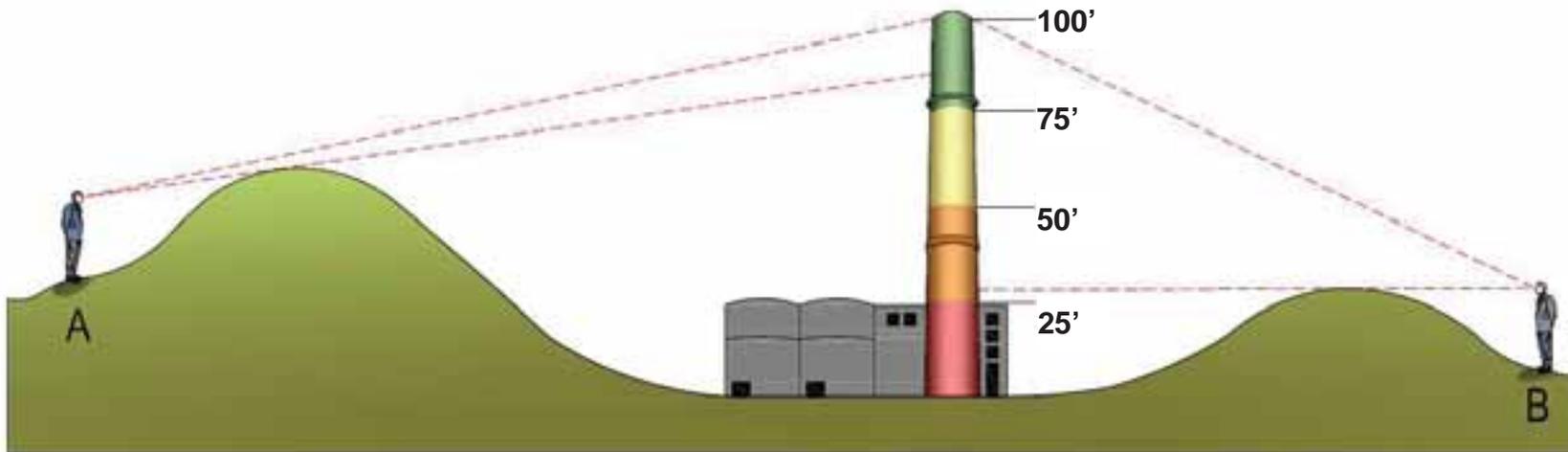
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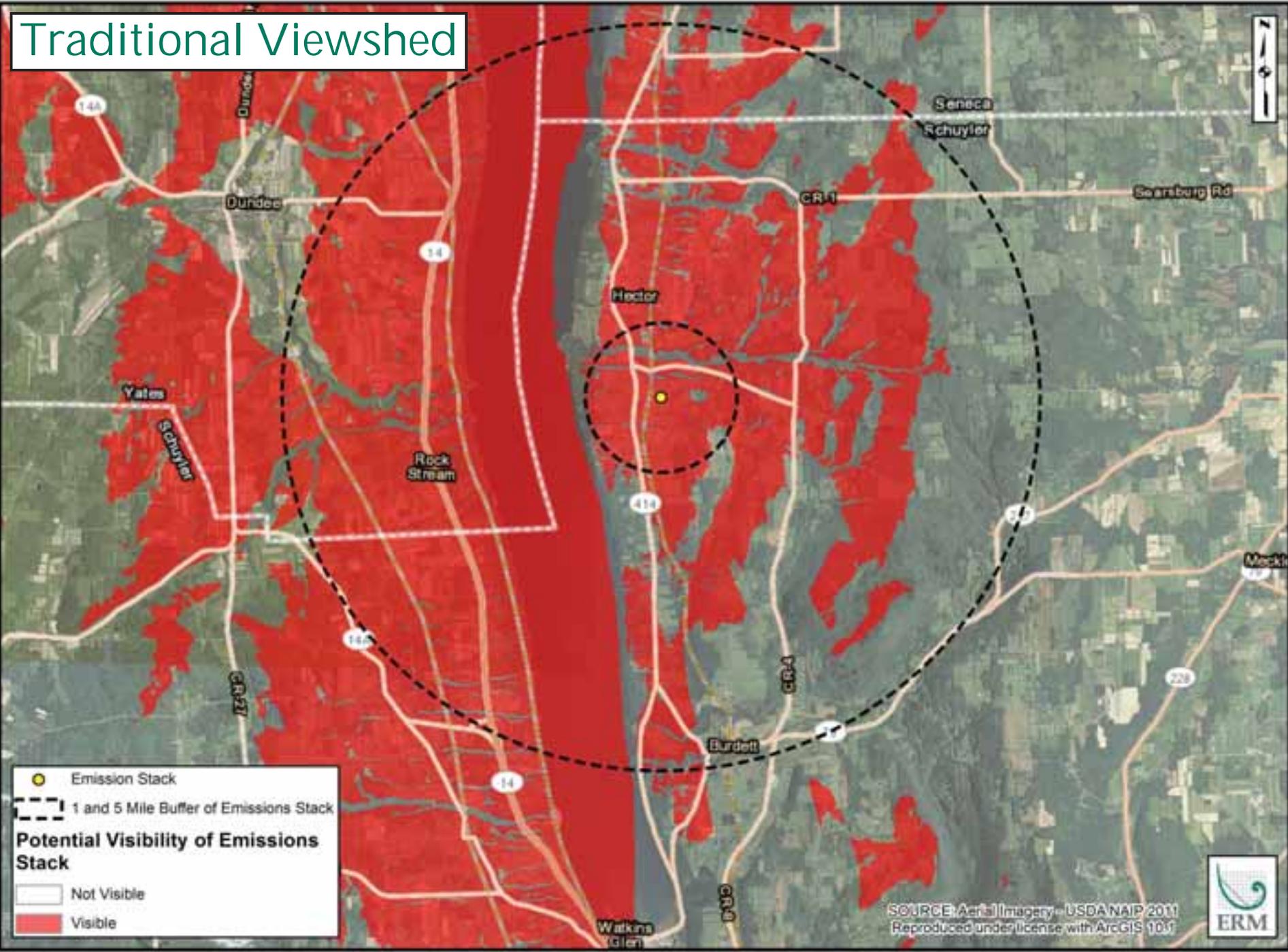
Assessing the degree of Visibility

- Uses Viewshed Tool iteratively at different heights
- Provides better understanding of degree of visibility

Modeled Stack Height	Visibility Map Category			
	≤ 25% Visible (≤ top 25 feet Visible)	25-50% Visible (≤ top 25-50 feet Visible)	50-75% Visible (≤ top 50-75 feet Visible)	75-100% Visible (≤ top 75 feet Visible)
100 ft	Visible	Visible	Visible	Visible
75 ft	Not Visible	Visible	Visible	Visible
50 ft	Not Visible	Not Visible	Visible	Visible
25 ft	Not Visible	Not Visible	Not Visible	Visible



Traditional Viewshed



 Emission Stack

 1 and 5 Mile Buffer of Emissions Stack

Potential Visibility of Emissions Stack

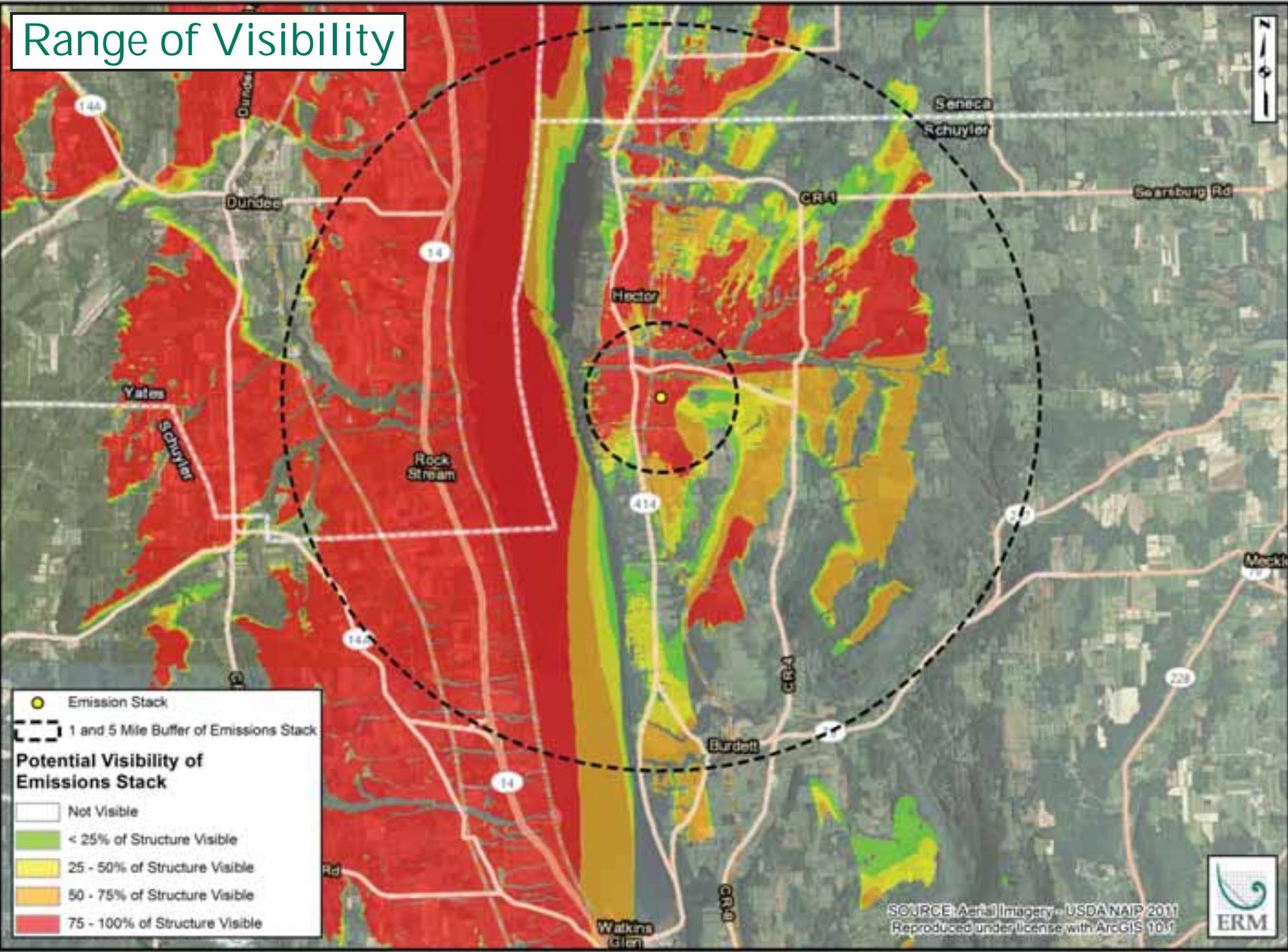
 Not Visible

 Visible

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Range of Visibility



Emission Stack

1 and 5 Mile Buffer of Emissions Stack

Potential Visibility of Emissions Stack

- Not Visible
- < 25% of Structure Visible
- 25 - 50% of Structure Visible
- 50 - 75% of Structure Visible
- 75 - 100% of Structure Visible

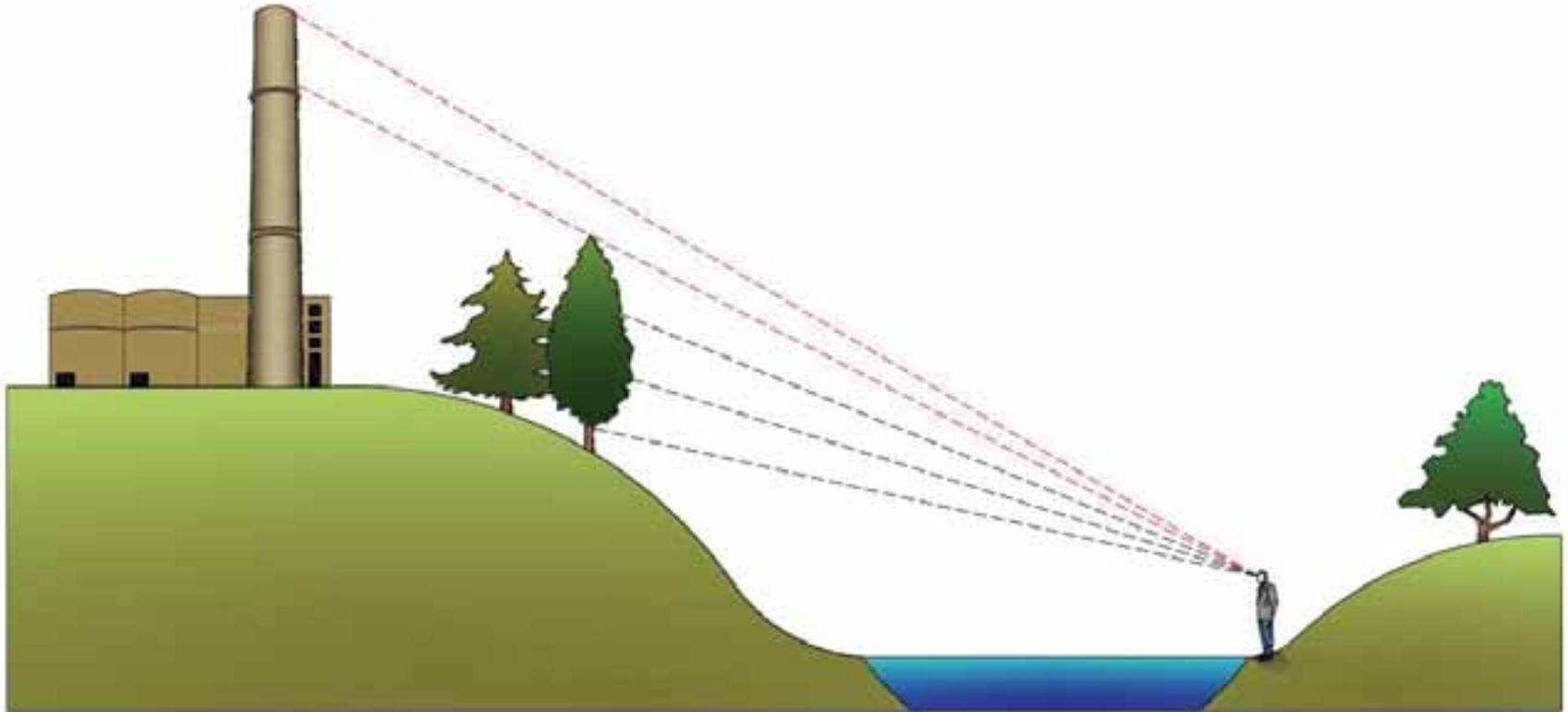
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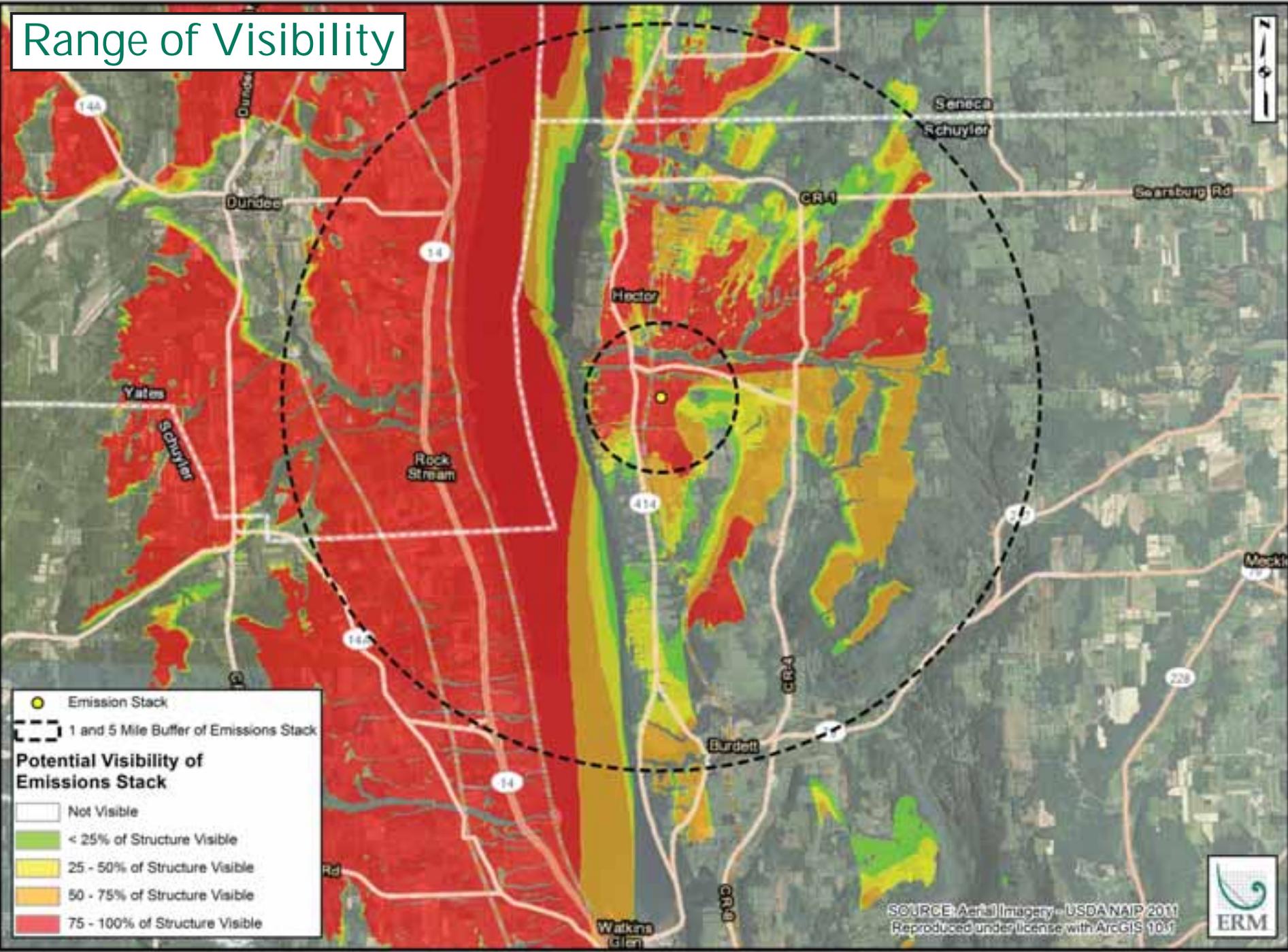
Correcting for Vegetation Screening

■ Process:

1. USDA 2010 Cropland Data Layer (CDL)
2. Reclassify DEM based on assumed forest cover height
3. Run Viewshed Model
4. Reclassify model output for zero visibility in forest

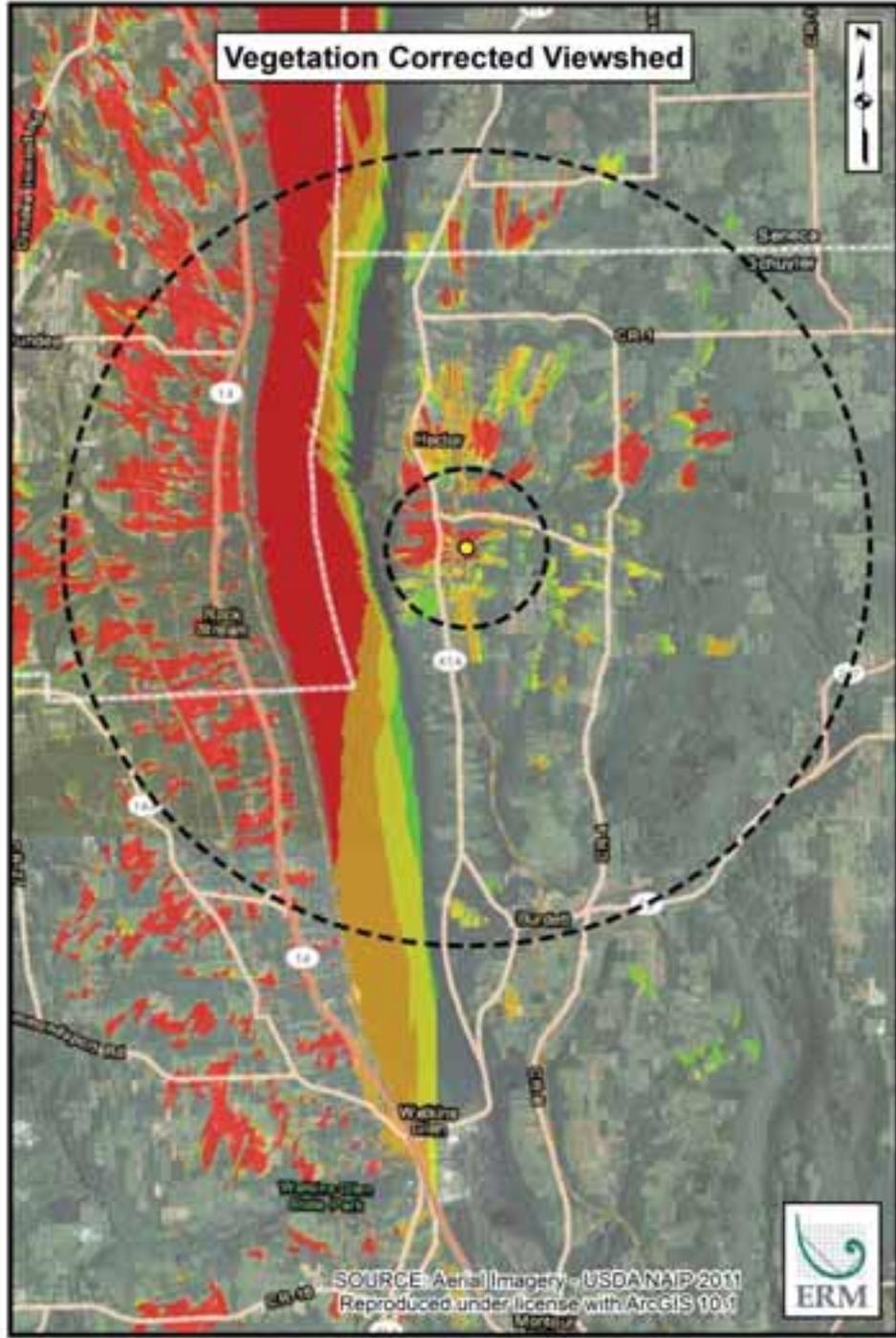
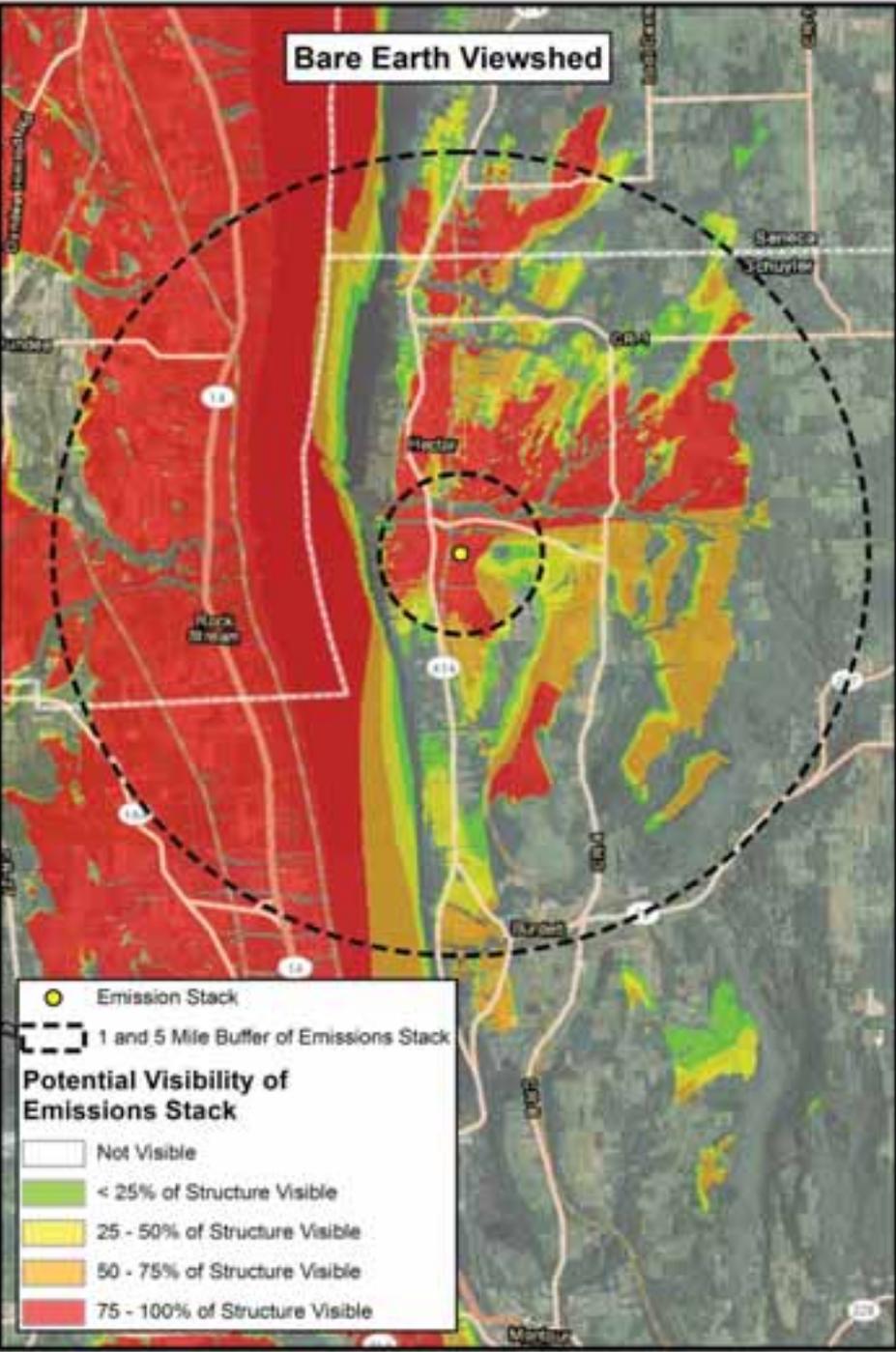


Range of Visibility



Bare Earth Viewshed

Vegetation Corrected Viewshed



● Emission Stack

--- 1 and 5 Mile Buffer of Emissions Stack

Potential Visibility of Emissions Stack

- Not Visible
- < 25% of Structure Visible
- 25 - 50% of Structure Visible
- 50 - 75% of Structure Visible
- 75 - 100% of Structure Visible

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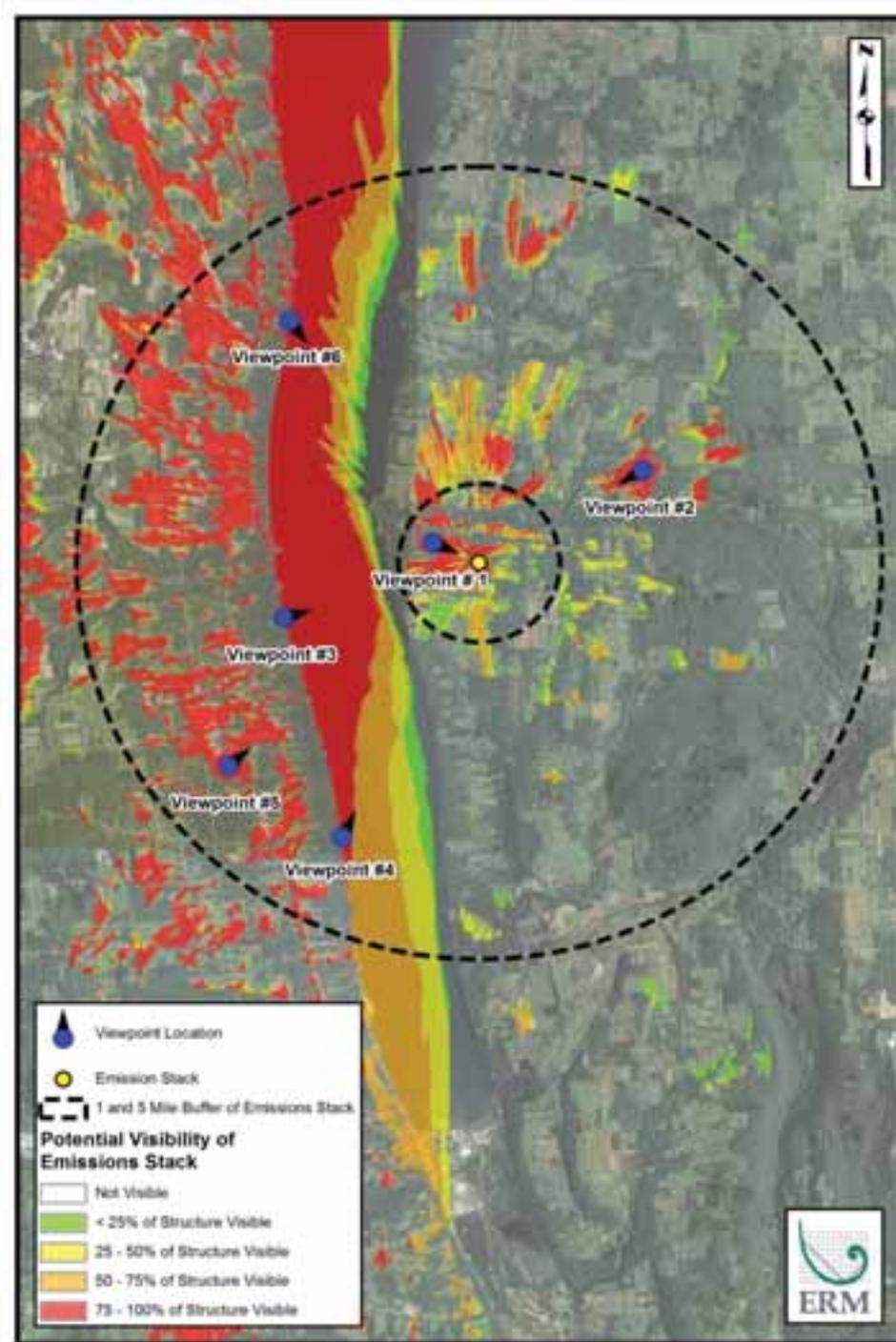
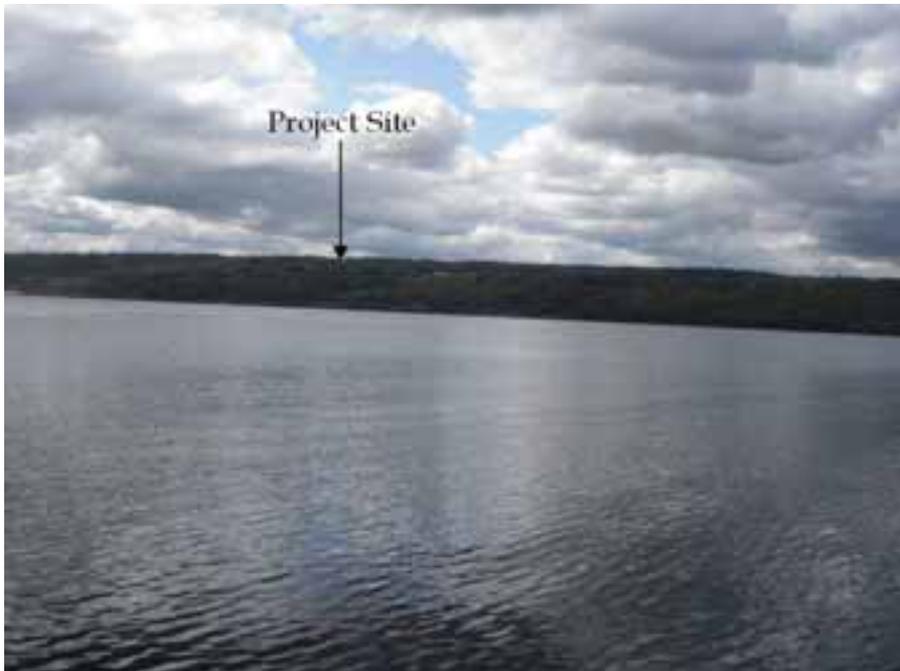
Quantitative Analysis

Viewshed Analysis Results – 5-mile radius of Project Site

	Bare Earth Model		Vegetation Corrected Model	
	Area (sq. miles)	% of Total Area	Area (sq. miles)	% of Total Area
100 ft. Emissions Stack Visibility				
Not visible	445.27	78.90%	523.66	92.80%
<25%	8.23	1.50%	3.44	0.60%
25-50%	9.11	1.60%	4.12	0.70%
50-75%	10.1	1.80%	5.43	0.90%
75-100%	91.7	16.20%	27.62	4.90%

Viewpoint Photos

- Updated model provides better direction to field teams



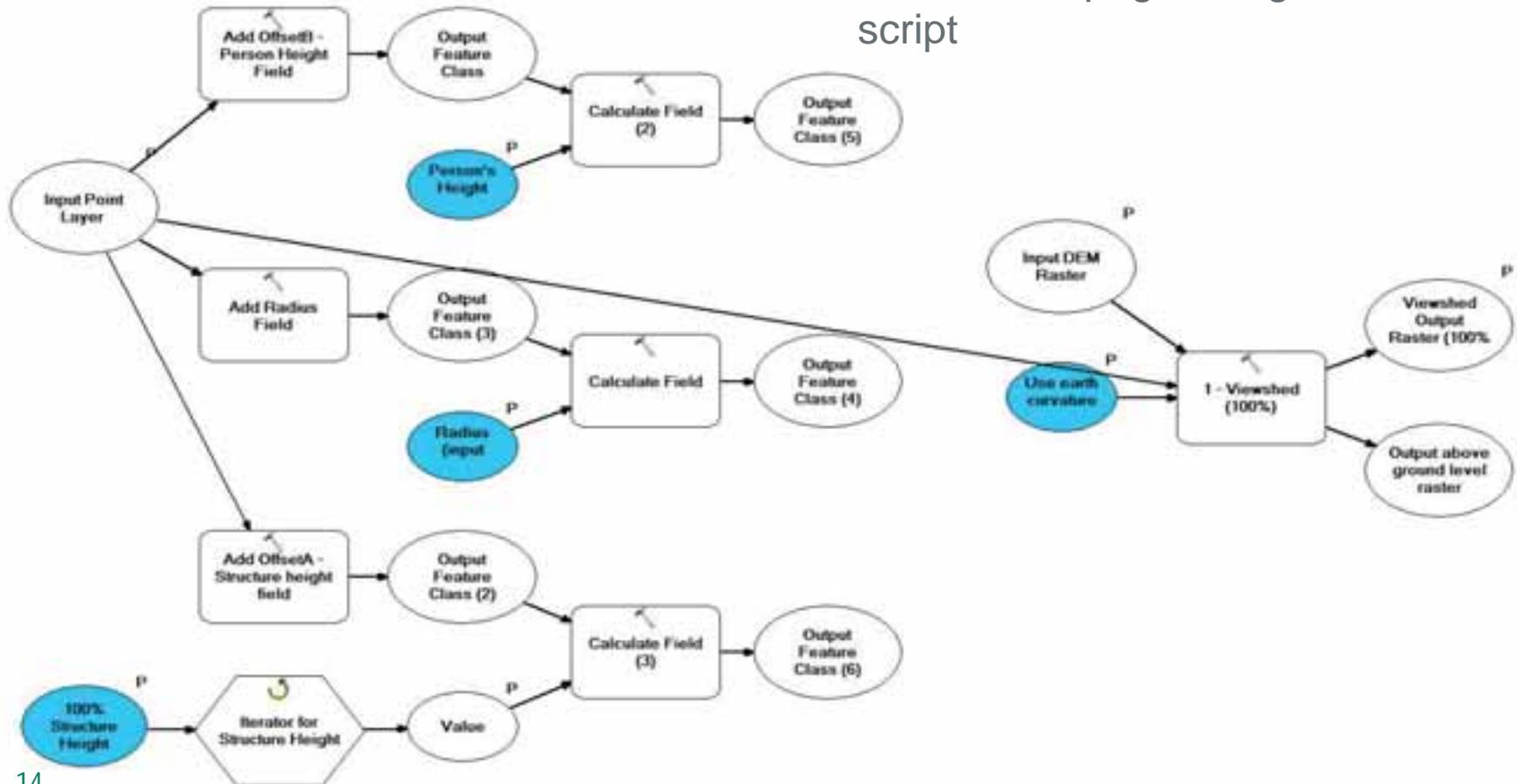
Automating Viewshed

■ PROBLEM: Multiple engineering designs and changes

■ SOLUTION: Model Builder

■ Batch output of range of visibility viewsheds

■ Data driven page using re-source data script



Conclusions

- ArcGIS Viewshed tool to assess degree of visibility
- Correcting for vegetation creates most realistic model
- Can use tools iteratively for mitigation (adjust heights / move locations)
- Next development – 3D viewshed integration

Brett Shaver
Environmental Resources Management (ERM)
Brett.Shaver@erm.com