Cormorants Perching on 25 kV Distribution Lines Crossing Cedar Pond, Orleans

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Aerial View- Cedar Pond, Orleans

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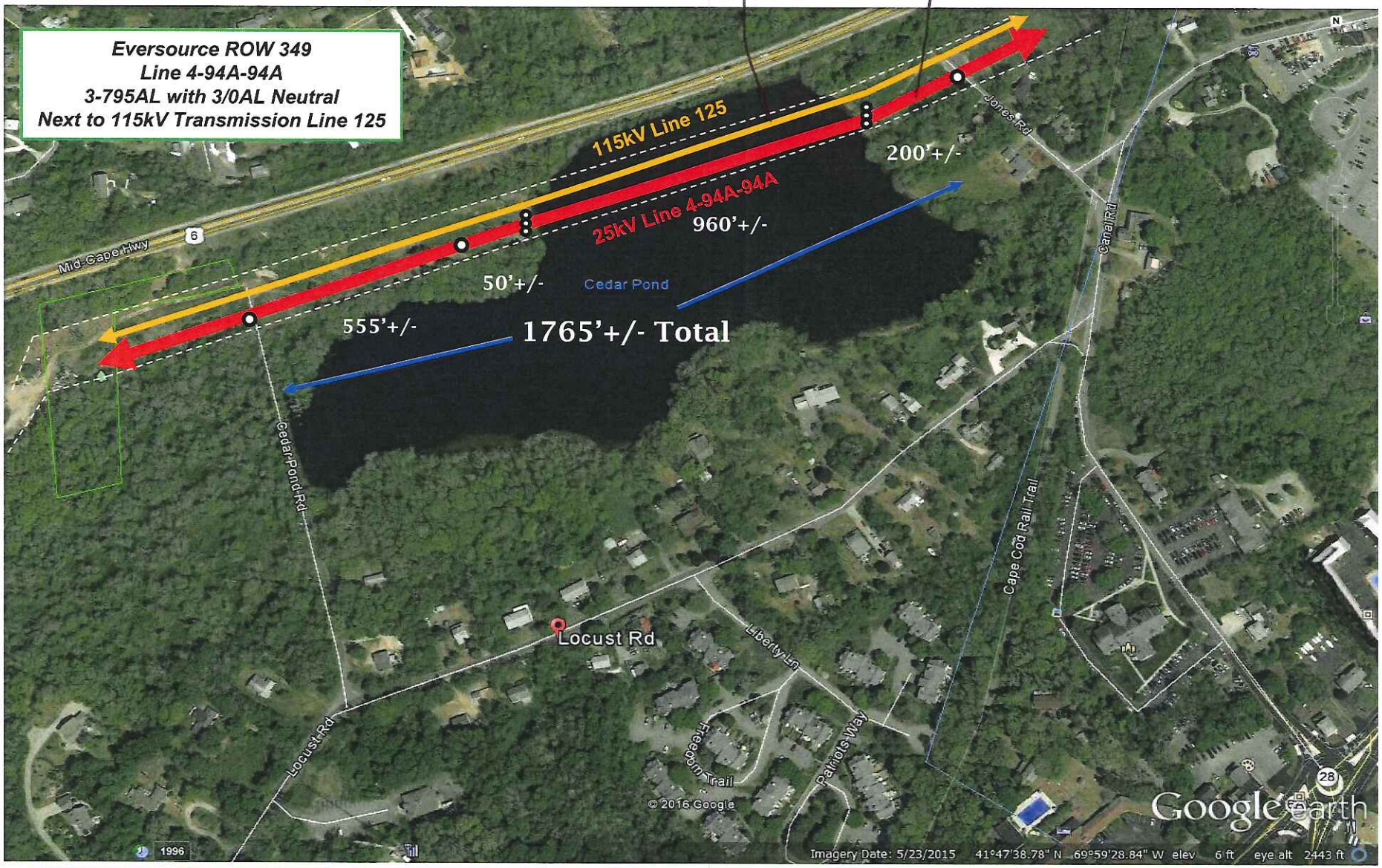

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Summary

- Cedar Pond in Orleans is confronted with water quality issues likely due to various environmental contributing factors
  - Reference 1: "A Study of Cedar Pond and the Rock Harbor Estuary" Submitted to Orleans Pond Coalition. Submitted by: Amy Costa, PhD. Center for Coastal Studies, Hiebert Marine Laboratory, Provincetown, MA 02657. January 2014
  - Reference 2: "Cedar Pond Water Quality Management Plan FINAL REPORT", for the Town of Orleans. Prepared by: Coastal Systems Group, School for Marine Science and Technology, University of Massachusetts Dartmouth, New Bedford, MA 02744. July 2013
- Nutrient loading from seasonal roosting of cormorants on the 25 kV distribution lines may contribute to the water quality issues
- Eversource currently has two existing 25 kV (distribution) and 115 kV (transmission) circuits that cross over the Pond

Deterring Double Crested Cormorants

- Eversource has consulted with various wildlife experts and investigated numerous methods to deter the cormorants:
  - Mid – 1990s – meetings/consultations with US Department of Agriculture, MA State Ornithologist, Wellfleet Bay Wildlife Sanctuary, MA Audubon Society
  - 1995 – experimental "rope" suspended above the conductors
  - Early 2015 – consultations with the following organizations:
    - US Department of Agriculture Animal and Plant Health Inspection Services
    - EDM International (Certified Wildlife Biologists)
    - National Wildlife Research Center Mississippi Field Station
    - Edison Electric Institute's Avian Power Line Interaction Committee (an organization of almost 60 electric utilities, regulatory agencies and wildlife consultants from North America)
    - MA DEP
    - All sources agreed the best way to deter the cormorants would be through a USDA hazing program
  - August 2015 - US Dept. of Agriculture implemented a cormorant dispersal program combining pyrotechnics, lasers and physical harassment (USDA stated that the 72% reduction in the number of birds seen on the lines through the month of August was a success and that continued periodic hazing during the Fall migration, and again when the birds return next year, would lead to greater success)
  - 2015-2016 - Eversource has investigated possible design alternatives or modifications to the existing construction, with no certainty that any will completely resolve the cormorant issue

Plan View- Cedar Pond, Orleans

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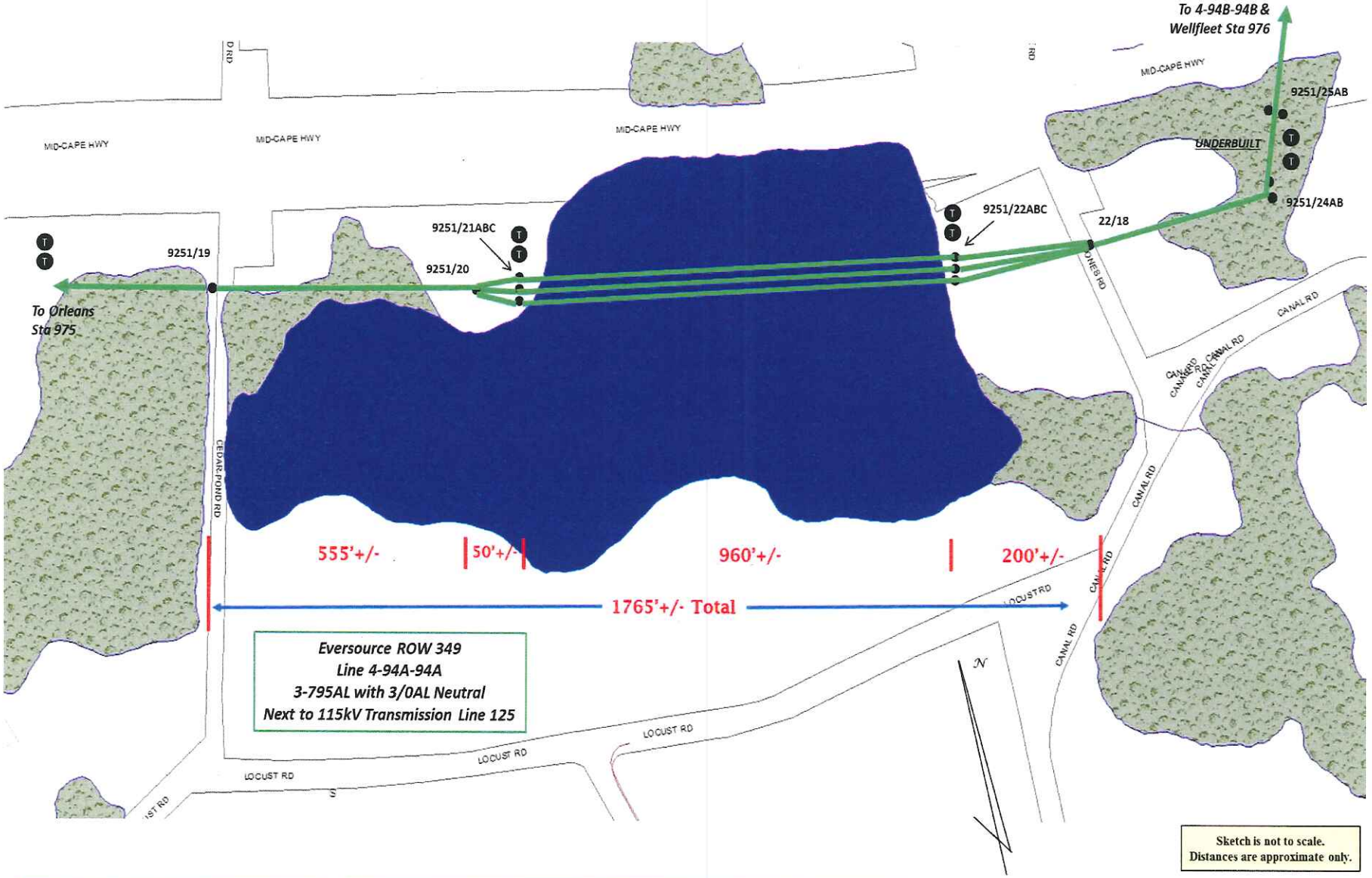

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Picture Facing West Across Cedar Pond

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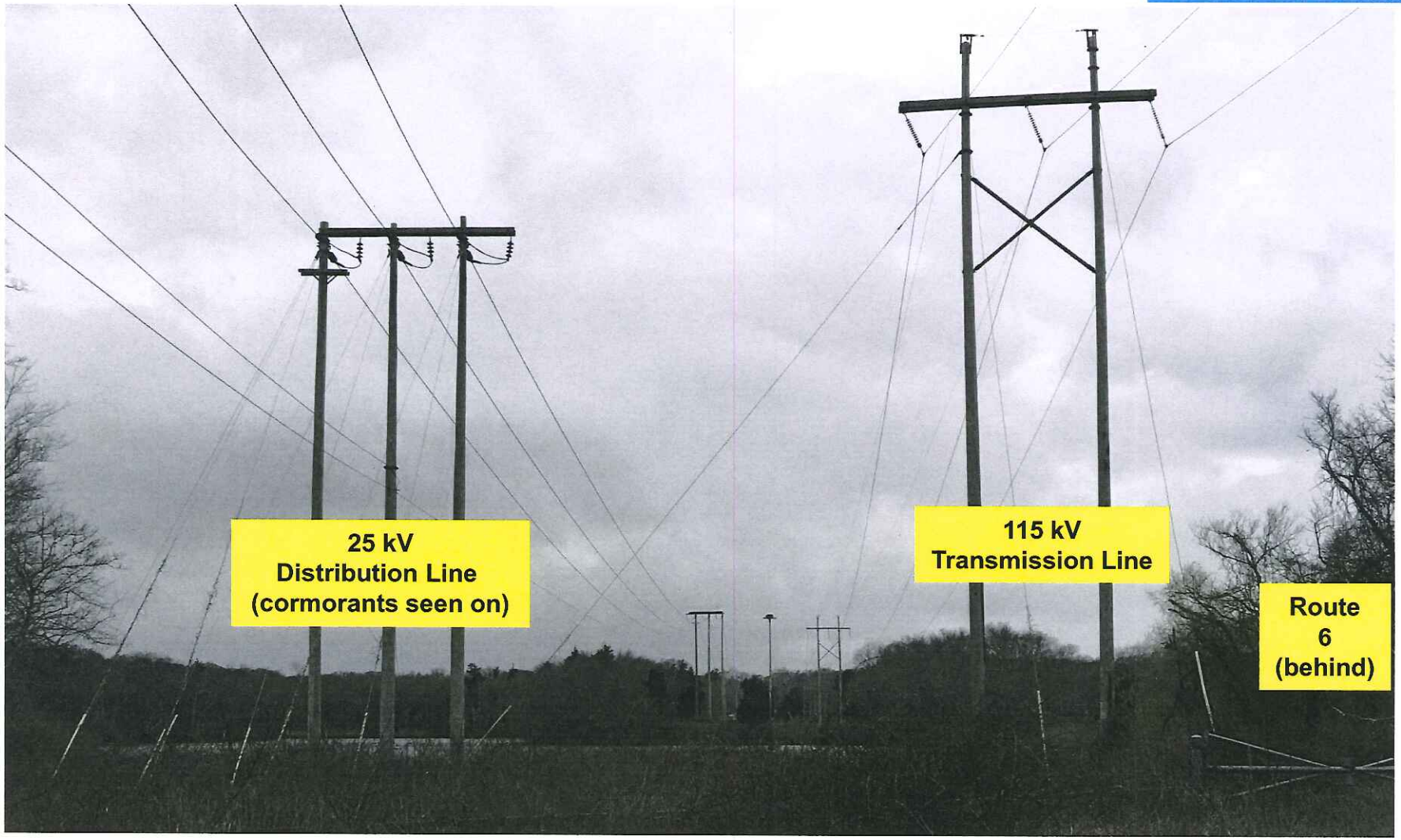

View from Jones Rd. facing West to Cedar Pond Rd.

Option 1: Relocate 25 kV Lines Away from Pond

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- Install new poles & overhead line South along Cedar Pond Rd; and upgrade existing wire along Locust St, Canal Rd, & Jones Rd and eliminates existing crossing
  - Relocating line North of the Pond along Route 6 Eastbound lane is not likely feasible because wires will still be very close to Pond
- Relocate only 25 kV wires that birds perch on
- Tree pruning and clearing as needed to reestablish Cedar Pond Rd. as a traveled way, road improvements to access poles are required, permitting and grants of location are required
- Not certain where Cormorants may migrate to after wires are relocated
- Preliminary cost estimate: $915,000

Option 2: Relocate 25 kV Lines Under Pond

- Horizontal Directional Drilling (HDD) – Bore under Pond with heavy machinery and install two sets of conduit for new cable
  - Requires significant construction area with large environmental impact at both ends
  - Two sets of cable required to maintain line capacity
  - New manholes & riser poles required at each end
- Substantial environmental permitting, impact, and limitations based on wetland construction area (Federal, State, Cape Cod Commission, Town Requirements)
- Preliminary minimum cost estimate: $1,100,000

Option 3: Lay 25 kV Cables on Bottom of Pond

- Submarine Cable Laying Method
  - Lay two armored cables directly on the bottom of the Pond- not bored under Pond
  - Two sets of cable required to maintain line capacity
  - New transition manholes & riser poles required at each end
- Substantial environmental permitting, impact, and limitations based on Wetland construction area (Federal, State, Cape Cod Commission, Town Requirements)
- Preliminary cost estimate: $2,600,000 - due to expense of cables

Option 4: Install 2 Sets of Smaller Wires Over Pond in Place of Existing 1" Diameter Wires

- This approach is based on potential that smaller wires will be more difficult for cormorants to perch on
- Unknown if option will deter perching – cormorants may adapt
- Poles and guying will be upgraded at both ends at existing locations
- Environmental permitting required to build in wetland areas near existing structures
- Preliminary cost estimate: $1,020,000

Option 5: Install Deterrents Directly on Existing 25 kV Lines

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- No product currently on the market for this application
- Unknown if option will deter cormorant perching
- Overhead lines would still be crossing over Pond
- Design concerns from added ice/wind loading on wire & deterrent assemblies requires heavier guying or pole braces due to higher design forces
- Installation and maintenance difficult due to no access over Pond
- Environmental permitting required to build in wetland areas to reinforce structures
- Cost can not yet be estimated

Preferred Option 1 Route

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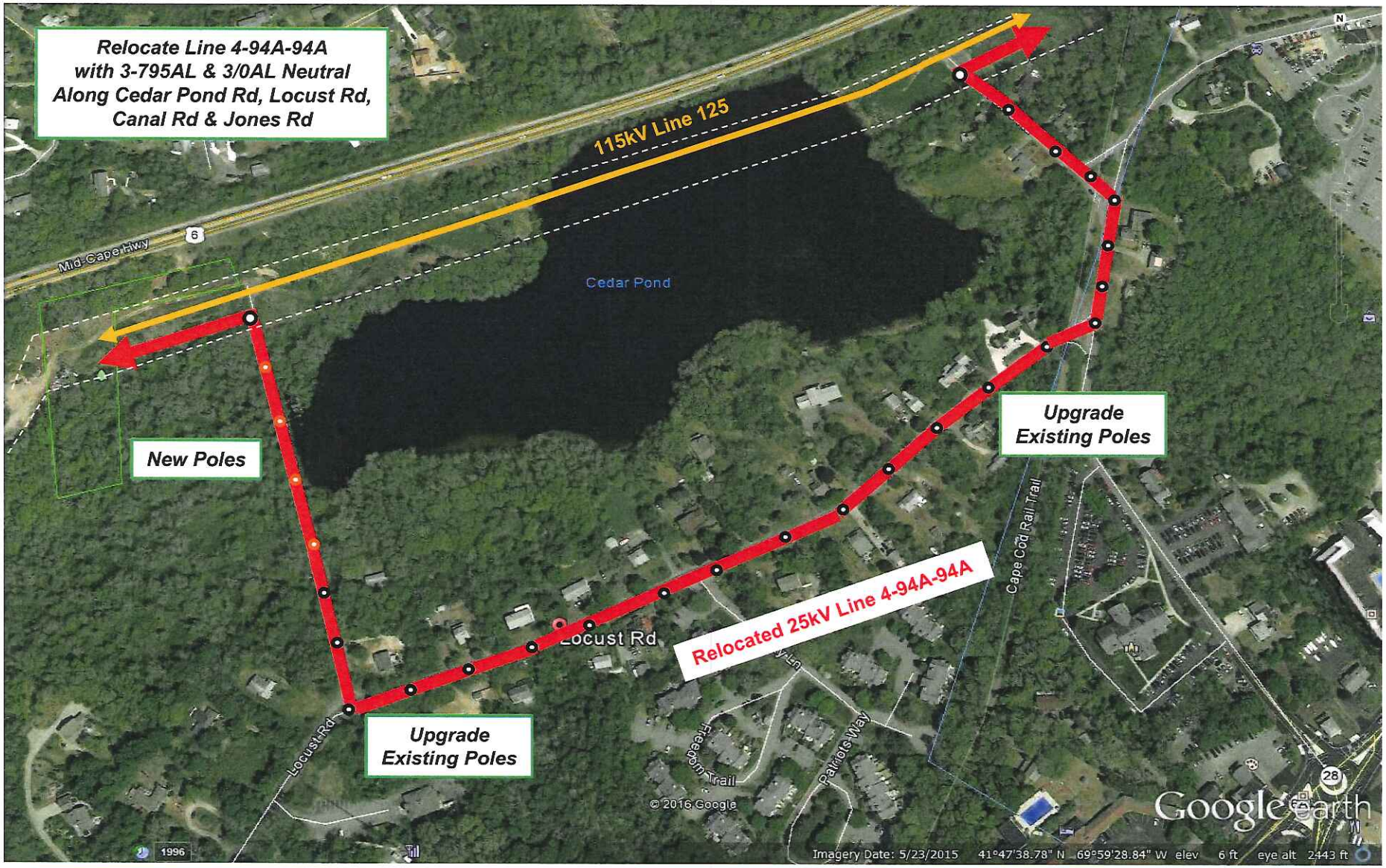

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Conclusion

- Not clear that any 25 kV construction changes will remove cormorants from the area
- Impact on water quality is uncertain even if cormorants on wires are no longer present
- Any type of construction in the Pond area will require permitting (Federal, State, Cape Cod Conservation Commission, Town permits)
  - More uncertainty with drilling or cable laying options
  - Less permitting expected for overhead options
  - Less environmental impact for overhead options