STATE OF NEW YORK
SUPREME COURT COUNTY OF MONROE

TOWN OF PITTSFORD, TOWN OF BRIGHTON, and TOWN OF PERINTON,

Petitioners,

vs.

POWER AUTHORITY OF THE STATE OF NEW YORK and NEW YORK STATE CANAL CORPORATION,

Respondents.

AFFIDAVIT

Index No. 2018-945

Assigned to:
Hon.

STATE OF NEW YORK) ss
COUNTY OF MONROE)

DONALD H. GRAY, PhD, being duly sworn, depose and says as follows:

1. I am Professor Emeritus at the University of Michigan Department of Civil & Environmental Engineering.

2. I joined the faculty of the University of Michigan in 1966 as an Assistant Professor. In 1969 I was promoted to Associate Professor and was promoted to full Professor in 1975. I retired from active teaching at the University of Michigan in May, 2000.

3. My areas of specialization are geo-technical engineering, slope stability and bio-stabilization

4. I have served as a consultant on numerous occasions for private and government agencies. Organizations that have employed me in that capacity include British Petroleum Exploration Ltd., US Army Corps of Engineers, USDA Forest Service, US National Park Service, Oregon Dept. of Transportation, Ford Motor Co., EBASCO Engineering Corp and the Sacramento Area Flood Control Agency.

5. I was selected to receive the 2015 Ralph B. Peck Award from ASCE and to present the Peck Lecture at the 2015 Geo-Congress. The topic of my lecture presentation was "Bio-Stabilization of Slopes and Stream Banks." The Ralph Peck Award recognizes an individual's outstanding contributions to the geotechnical engineering profession. The award is one of the two highest honors that the ASCE Geo-Institute bestows upon a geotechnical engineer.

6. I am the principal investigator of a study commissioned by the US Army Corps of Engineers to determine the influence of woody vegetation on the stability of earthen levees. The results of this study were published in a report titled The Effects of Vegetation on the Structural Integrity of Sandy Levees, Technical Report REMR-EI-5, US Army Corps of Engineers, August 1991.

7. I am also the principal author of two books on bio-technical slope stabilization and the co-author of another on landform grading. I have authored and/or co-authored over one hundred papers and technical articles published in journals or produced as part of other proceedings.

8. In August 2007 I attended and presented a paper titled "Factors Affecting the Stability of Levees" at the Levee Vegetation Symposium in Sacramento, California. The Symposium was organized and sponsored by the Sacramento Flood Control Agency, the California Department of Water Resources, and the US Army Corps of Engineers. Scientific evidence and findings were presented at the Symposium documenting the positive benefits of woody vegetation on levee stability and refuting largely anecdotal evidence about negative effects dealing with root distribution/architecture, habitat for burrowing animals, inspection difficulties, etc.

9. As part of the preparation for my presentation at the Levee Vegetation Symposium I read and studied two reports about the performance of levees in the New Orleans area during Hurricane Katrina. The two reports in questions are the Interagency Performance Evaluation Team (IPET) and Independent Levee Evaluation Team (ILIT) reports. Some 50 failures or breaches occurred in the New Orleans levee system during the hurricane. The IPET

report made no mention of trees as a cause of failure in the findings and conclusions. The ILIT report described multiple levee damage or failure mechanisms... most of which had little or nothing to do with the either the presence or absence of trees.

10. I have read the project overview prepared by respondent New York State Canal Corporation ("Canal Corporation") for the removal of trees along elevated sections of the Erie Canal in Orleans and Monroe counties. I have also reviewed the affidavits of Howard M. Goebel, P.E. and James Candiloro, P.E. submitted on behalf of the Canal Corporation in the captioned proceeding. Many of the claimed benefits of this canal embankment clear-cut project are asserted without proof or evidence. The following claims are either incorrect or misleading and are not supported by findings in the technical literature:

a) Trees weaken embankments through root structure growth.

b) This type of (woody) vegetation can provide pathways for seepage which can weaken embankments.

c) Heavy vegetation (of this type) prevents Canal Corporation employees and other inspectors from being able to thoroughly monitor the integrity of the Canal's embankments.

11. In September 2007, the Bridgeton Neighborhood Association, Portland, Oregon, retained me to evaluate local government plans to remove a large number of trees growing on both the landward and riverward side of an earthen levee along Bridgeton Road.

12. The main purpose of my evaluation was to determine if tree removal, that was planned by the Multnomah County Drainage District of Oregon, would serve the purpose of increasing levee stability and public safety.

13. I visited the site and conducted an investigation of the Bridgeton Levee and neighboring levees during the period September 16 to 19, 2007. As part of this investigation I walked the length of and took photographs of an adjacent Cross Levee where numerous trees had recently been clear-cut (completely removed) from the levee by the Drainage District. Literally

hundreds of severed and dying roots were exposed along a mid-slope access road on the water-ward side of the levee. These roots will eventually rot and become potential seepage conduits during high water or flood stage events. I also observed surface cavities in the levees where trees had been removed.

14. This type of large-scale tree removal makes little sense and is inimical to levee or canal embankment stability and public safety. Indiscriminate clear-cutting leads to conversion of live roots, which act as tensile reinforcements, into severed, dying roots that are left behind in the ground. These dying roots will eventually rot or decay and be converted from tensile reinforcements to zones of weakness or holes that will act as potential seepage conduits during high water or flood stage events. Healthy, trees are precisely the trees that should be left in place and/or managed to improve their positive benefits and to mitigate any potential liabilities.

15. Large scale removal of trees introduces serious problems and hazards that cannot be easily avoided nor mitigated. Stump grinding only removes the bottom portion of the tree trunks and attached roots in relatively small diameter "root ball" zone. Accordingly, if tree cutting and removal proceeds as planned, literally thousands of severed and dying roots will be left behind in critical cross sections of the subgrade below the embankment-tow-path. Many of these roots are attached to large, mature trees that have long, large diameter roots.

16. A canal embankment tow path with underlying, severed, dead and decaying roots is the least stable condition with regard to mass stability; even less than a bare or grass covered embankment. The only certain way to repair this faulty condition is to excavate and rebuild the embankment.

17. A concern with regard to the presence of trees growing on or near earthen levees and embankments is possible wind-throwing and overturning. This concern mainly applies to tall, rigid trees whose crowns act like sails that catch the wind and produce large overturning moments. This problem, however, can be greatly reduced and mitigated by pruning techniques that lower the crown and reduce the sail area of the tree. Pruning techniques such as thinning, coppicing, pollarding, and stub-cutting accomplish this goal while maintaining the benefits of a tree's intact root system and preserving other amenities.

18. Inspection and access, another concern that has been raised about the presence of nearby trees, does not appear to be a problem in the case of trees growing near the canal, embankment-tow-path. Trees that are reasonably spaced provide access and inspection opportunities. Brush removal and pruning of lower tree branches can be employed to remove any vegetation that hinders inspection or access.

19. A consideration that has not been addressed (reported) in the Canal Corporation tree removal plan is the effect on burrowing animals. Tree removal and conversion to grass can promote the incursion burrowing animals and construction of their underground tunnels. Evidence in the technical literature indicates that these underground tunnels can pose a much greater danger to embankment stability than any possible threat from tree roots. Tree removal can also eliminate or compromise the control that raptors have on burrowing animal (e.g., muskrat) populations.

20. As part of my review of Mr. Goebel's affidavit, I have noticed that he declared an emergency with respect to the removal of trees from sites within the three petitioning Towns. The declaration was based solely on an inspection report at one site within respondent Town of Perinton on August 30, 2017, noting "Wet areas," "Cattails," "A minor inboard slope failure," "Toe of the embankment not visible…", and "Existing seep/leak." Goebel Aff. Exh. H. None of these conditions were alleged to have been caused or contributed to by the presence of woody vegetation on the embankment. More peculiarly, the declaration of emergency was made on February 19, 2018, almost 6 months after the inspection report was done. Needless to say, the declaration of emergency is unfounded on the evidence presented.

21. In summary, trees growing adjacent the canal, embankment tow-path provide multiple benefits, not only environmental and visual, but also to embankment structural stability and public safety. Healthy, trees are precisely the type of woody vegetation that should be left in place and/or managed to improve their positive benefits and to mitigate any potential liabilities. Conversely, wide-scale removal, as presently planned and already partially undertaken, will incur additional expenses and have adverse consequences on embankment stability and integrity.

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

Donald H. Gray, PhD

Sworn to before me this 21
day of February, 2018

Notary Public