Contaminants that would be unearthed, suspended and redistributed in the Raritan Bay exceed "acceptable" levels. Exceedances were found by the NYSDEC for heavy metals (copper & mercury) in New York waters, too. Thus, construction of the Raritan Bay Loop of the NESE Project would (a) negatively impact surface water quality, and (b) harm threatened and endangered species and their habitat.

Additionally, the shortening of the in-water construction schedule raises serious concerns about impacts from increased vessel traffic and noise as well as adhering to time-of-year restrictions to protect threatened and endangered species if the schedule needs to be altered due to unforeseen circumstances.

Furthermore, the unique tidal flows in the Raritan Bay do not seem to have been given appropriate consideration.

Thus, the Waterfront Development permit and Water Quality Certificate requests should be denied by NJDEP.

To receive Water Quality Certification, Williams/Transco must provide reasonable assurance to the state that construction and operation of the NESE Project will not violate all applicable water quality standards. Williams/Transco has not met the burden of proof here since their modeling does not ensure that New Jersey's Surface Water Quality Standards will not be exceeded.

According to NJDEP, Williams/Transco did not adequately show how it would avoid adverse impact to surface water quality from dredging for the proposed Raritan Bay Loop. Williams/Transco submitted additional modeling data to the NJDEP and, at this time, it is not known what conclusions about this were drawn by NJDEP.

According to sampling analysis of sediment to determine if proposed upland placement facility was acceptable, completed in the fall/winter of 2018, exceedances of the *Ecological Sediment Saline Water Sediment Effects Range Medium* (ER-M) criteria values were found at the following sample locations for the following chemicals of concern, indicating that **the proposed dredging could affect surface water quality and exceed surface water criteria for toxic substances according to N.J.A.C. 7:9B (SWQS).** Additionally, Williams/Transco "did not provide modeling to show that turbidity concentrations and water quality parameters for the identified chemicals of concern downstream and upstream of the dredging site will meet the SWQS". (NJDEP denial 6/5/19)

Toxic Substance of Concern		Sample Locations IDs	ER-M Screening Criteria	Sampling Results from Williams/Transco's borings
Bis(2-Ethylhexyl)phthalate	Semi-Volatile Organic Compounds	VC-214	2.64651	4.98
Phenanthrene	Semi-Volatile Organic Compounds	VC-214	1.5	2.21
Arsenic	Inorganic Compounds	VC-201	70 (Non-res 19)	63.8
		VC-214	70	70.1
Manganese	Inorganic Compounds	VC-304	260	366
		DEP-3	260	379
		DEP-4	260	353
		DEP-5	260	371
Mercury	Inorganic Compounds	VC-208	0.71	1.56
		VC-214	0.71	2.17
PCBs	Aroclors Sum	VC-208	0.18	0.821
		VC-214	0.18	0.86
4,4'-DDE	Pesticides	VC-208	0.027	0.289
		VC-214	0.027	0.0366

To assess the spread of toxins from construction of the Raritan Bay Loop, tides and currents in the Raritan Bay need to be carefully considered due to their unique patterns.

The Raritan Bay is shallow and has a number of different unique current patterns that interact to create a dynamic such that it takes the waters 16 to 21 days to fully flush out. Since the tidal and current patterns of the Raritan Bay are a bit unique, is the modeling done for Williams/Transco adequate for determining how far the suspended sediments might travel and for how long they might remain in the water column?

To get a better understanding of the impact this trenching and laying of a pipeline across the Raritan Bay may have on sediment dispersal, see the text from page 21 to the top of page 23 of Harry P. Jeffries' classic 1962 study on the "Environmental Characteristics of Raritan Bay, A Polluted Estuary."
(https://aslopubs.onlinelibrary.wiley.com/doi/epdf/10.4319/lo.1962.7.1.0021)

Diagram # 2 on page 22 illustrates the complicated currents and tidal activity in Raritan Bay.

Jeffries characterizes the currents as sluggish but moving in a prevailing counterclockwise direction. However, in a number of areas of the Raritan, there are additional gyres with clockwise currents. These can allow for a further settling and dispersal of sediment and pollutants and bring them to the Bayshore of Middlesex and Monmouth County - even if the activity that stirred them up is not close.

The tides bring water in from the ocean but as the water nears the mouth of the Raritan River the current turns and follows the Bayshore toward the east. Pollutants may also get further concentrated along the Bayshore in NJ in a slow moving, clockwise (cyclonic) circulation pattern (an eddy or gyre) which you can see along the muddy flats between Keansburg and the Naval Weapons Station Earle Pier in Leonardo.

Short-term investigations Jeffries cited "demonstrated that the flushing of Raritan and Lower Bays was dependent primarily on the resultant of localized inequalities in duration and strength of ebb and flood tides. In relation to volume of the embayment, little water escapes with each cycle." "Flushing times calculated by Ketchum (1951b) for Raritan Bay ranged from 32 to 42 tides for maximum and minimum river flows. Sixty tides were required to flush river water through the entire estuary during the December, 1948 survey."
(Page 22 https://aslopubs.onlinelibrary.wiley.com/doi/epdf/10.4319/lo.1962.7.1.0021)

At Rutgers, hydrographic studies have found that the mixing of fresh water from Raritan River and saltwater from lower New York Bay creates a large, slow moving counter-clockwise circulation pattern with much back-and-forth movement within Raritan Bay. Fresh water entering the bay from the Raritan River has a net movement toward the ocean of about 500 yards a day. They concluded that it takes 16 to 21 days for the Bay to flush itself (Bennett, 1983). Tidal action represents a major influence in the distribution of pollutants in the estuary, with a mean tidal range of 1.5 meters (5 feet). Tidal current and flow velocity charts for the New York Harbor area, including Raritan and Sandy Hook Bays, are depicted in the following figures published by the U.S. Department of Commerce (NOAA, 1956).
(Page 41 http://raritan.rutgers.edu/wp-content/uploads/2015/10/Zimmer-2004-Raritan-and-sandyhook-bays-sanitary-survey-report-1997-2000.pdf)

Therefore, it would appear that the toxics and heavy metals that get re-suspended may not so readily settle down in the same locale, and the estimations made for times for turbidity to go back to ambient conditions and their estimates for the likely distances for sediment to drift seem not to have been based on the specific conditions within the Raritan Bay.