

## Initial inventory of codes and standards

### Overview

The Mayor's Office of Long-Term Planning and Sustainability (OLTPS) is working with local, state, and federal agencies and private entities to ensure that critical infrastructure is designed, built, operated, and maintained to manage climate-related risks over its useful life. The current task is aimed at identifying and evaluating the relevant design standards and codes that govern these efforts for large unique facilities in the energy, wastewater, and transit sectors (Task E.3).

This inventory comprises the first step under this Task and is designed to help identify the codes, standards, and other procedures that govern how we design, build, maintain, and operate our critical infrastructure in these sectors. It builds off of work completed by the New York City Climate Change Adaptation Task Force, a body of 40 public and private entities that operate or regulate critical infrastructure, to identify and prioritize classes of critical infrastructure and potential climate-related impacts to them. It will be used to engage designers, engineers, operators, capital planners, and eventually standards associations in the energy, wastewater, and transit sectors in a focused conversation of key vulnerabilities and relevant standards and practices.

### **Organization and Glossary of Terms**

The inventory includes a spreadsheet of relevant design standards, regulatory requirements, capital planning and maintenance, and other operational procedures for each sector (energy, wastewater, transit) by climate variable and class of infrastructure.

- **Design standards** include performance standards, specifications, and other industry-developed standards (e.g., ASTM, ASCE, "10 State" Standards for Wastewater Facilities) that determine how a specific piece of infrastructure is designed and built;
- **Regulatory requirements** include code provisions where these standards are referenced (e.g., Appendix G of the New York City Construction Codes), and permits or other regulations governing operational or technology-based requirements (e.g., Air and Water Quality permits);
- **Guidance** includes design guidelines (e.g., NYC Department of Design and Construction Guidelines for Sustainable Urban Site Design) and guidance on compliance with different standards and code requirements;
- **Capital planning and maintenance** includes capital planning and maintenance requirements or programs utilized by operating entities (e.g., asset management systems); and
- **Other policy, planning, and operating instruments** includes other miscellaneous policy instruments, programs or efforts that relate to management of climate-related risks (e.g., emergency plans, after-action storm reviews).

The inventory will provide an understanding of both the standards governing design, as well as the constraints under which different entities operate. It is an initial inventory and is not meant to be

exhaustive. It will be updated and revised based on outreach discussions with stakeholders through OLTPS' outreach efforts (see Task E.4).

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TRANSIT SECTOR - INITIAL INVENTORY (DRAFT)						
Climate Variable	Principal classes of at-risk infrastructure	Design standards	Rules and permits	Guidance	Capital planning and maintenance	Other policies or planning instruments
All variables	All infrastructure		<b>SAFETEA-LU:</b> On August 10, 2005, President George W. Bush signed the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) (Pub. L. 109-59), providing \$286.4 billion in guaranteed funding for federal surface transportation programs over five years through FY 2009 (and extended, currently to 2011), including \$52.6 billion for federal transit programs – a 46% increase over transit funding guaranteed in TEA-21. (49 USC Chapter 53) Under this legislation, states and metropolitan planning organizations are required to develop Long-Range Transportation Plans, which set out transportation goals over the next 25 years. Federal transportation planning requirements are included at 23 CFR Part 450.314.	<b>Federal Highway Administration (Federal Transit Authority) Clarifying Guidance on Implementation of SAFETEA-LU Planning Provisions:</b> provides guidance on state compliance with transportation planning provisions <a href="http://www.fta.dot.gov/legislation_law/legislation_law_2487.html">http://www.fta.dot.gov/legislation_law/legislation_law_2487.html</a>	<b>NYS Transportation Master Plan:</b> Comprises the state Long-Range Transportation Plan to 2030, which sets out a multi-modal plan for the state's transportation;	
All variables	All infrastructure		<b>Section 110, Clean Air Act (State Implementation Plan):</b> The State Implementation Plan (SIP) is a plan for each State which identifies how that State will attain and/or maintain the primary and secondary National Ambient Air Quality Standards (NAAQS) set forth in section 109 of the Clean Air Act. Each State is required to have a SIP which contains control measures and strategies which demonstrate how each area will attain and maintain the NAAQS. Section 110 of the Act sets out specific requirements for the State Implementation Plan, which include emission inventories and forecasts for the transportation sector. <b>Clean Air Act section 176(c) (42 U.S.C. 7506(c)) and US EPA Transportation Conformity Regulations:</b> Transportation conformity is required to ensure that federal funding and approval are given to highway and transit projects that are consistent with ("conform to") the air quality goals established by a state air quality implementation plan (SIP). Conformity, to the purpose of the SIP, means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the national ambient air quality standards. ( <a href="http://www.epa.gov/otaq/stateresources/transconf/regs/420b08001.pdf">http://www.epa.gov/otaq/stateresources/transconf/regs/420b08001.pdf</a> )	<b>US DOT Transportation Conformity Reference Guide:</b> Provides guidance on state and MPO compliance with transportation conformity regulations. <a href="http://www.fhwa.dot.gov/environment/air_quality/conformity/">http://www.fhwa.dot.gov/environment/air_quality/conformity/</a>	<b>The New York Metropolitan Transportation Council (NYMTC) Regional Transportation Plan:</b> NYMTC is the designated Metropolitan Planning Organization (MPO) for New York City, Long Island and the lower Hudson Valley. It is responsible for a continuing, coordinated, and comprehensive transportation planning process in its Region in order to receive federal transportation funding. As part of this, it develops a Regional Transportation Plan (RTP) that comprises part of the state Transportation Master Plan. Updated every four years, the RTP both forecasts future trends and provides a blueprint for long-range strategic transportation studies and investments.	
All variables	All infrastructure		<b>Draft Air Quality Conformity Determination for 2011-2015 TIP and 2010-2035 Regional Transportation Plan, as amended:</b> NYMTC has prepared a draft Air Quality Conformity Determination for the 2011-2015 Transportation Improvement Program (TIP) and the 2010-2035 Regional Transportation Plan (the Plan) to reflect updates to the Regional Transportation Plans for the Poughkeepsie-Dutchess County Transportation Council and the Orange County Transportation Council.	<b>Public Transportation Safety Board:</b> provides oversight and inspection of bus and rail safety in New York State; <b>System Safety Program Plan Guidelines:</b> The guidelines for a rail system safety program plan are intended to furnish a rail transportation system with the basic criteria for developing a comprehensive safety program plan. These guidelines identify all the elements that should be considered in a system-wide approach to safety. They stress operational safety rather than industrial safety. Operational safety implies a broader perspective in providing a safety service to the fare paying public since the bulk of the accidents occur in the operational aspect of the transportation system. System Safety Program Plan (SSPP) Guidelines, developed by the American Public Transit Association for the Urban Mass Transportation Administration (now Federal Transit Administration), were used as a resource material and are incorporated into the New York guidelines.	<b>NYMTC Transportation Improvement Plan (TIP):</b> The TIP is a five year program that identifies all proposed federally-funded transportation improvement projects in the NYMTC region. These improvements cover various transportation modes and facilities, including roadways and bridges, bicycle and pedestrian facilities, transit equipment and services, safety improvements and demand management programs. Projects funded through other sources are also identified to provide a more comprehensive picture of proposed transportation improvements in the region. The 2008-2012 TIP was adopted by the Council on October 29, 2007 and approved by the federal agencies. On December 10, 2007. This 5-year program runs from October 1, 2007 through September 30, 2012. Currently, NYMTC is operating from the 4th year of this program (FFY 2011) and the first year of the current NYS Statewide Transportation Improvement Program (STIP).	
All variables	All infrastructure		<b>National Environmental Policy Act (NEPA)/ SEQRA/ CEQR Review:</b> Projects that receive federal and state funding and meet certain thresholds are required to develop an Environmental Impact Statement (EIS) to consider the environmental impacts of the project. Under CEQA draft guidance, some federally-funded projects are beginning to consider the impacts of climate change e.g., sea level rise. Projects located in the floodplain are required to consider impacts on the floodplain (i.e. flood risks). This does not apply to rehabilitation of existing infrastructure.	<b>SAFETEA-LU Environmental Review Process Final Guidance:</b> provides guidance for projects receiving SAFETEA-LU funding on requirements and procedures for conducting federal environmental reviews ( <a href="http://www.fta.dot.gov/legislation_law/13720.html">http://www.fta.dot.gov/legislation_law/13720.html</a> ), Department of Transportation Disability Law Guidance: provides guidance on complying with ADA requirements at station platforms <a href="http://www.fra.dot.gov/downloads/research/commuterplatform.pdf">www.fra.dot.gov/downloads/research/commuterplatform.pdf</a>	<b>Transit asset management system:</b> System for inventorying assets, evaluating risks to those assets, and prioritizing capital improvements. [Note: TFL has incorporated climate change considerations into its asset and risk management system]	<b>EMS - ISO 14001:</b> An EMS is an organizational plan that considers an agency's activities, products, and services and provides a structured framework (system) for reducing environmental impacts. [Note: Los Angeles Metro is utilizing its EMS as a climate change management tool.]
Increased precipitation	Air intakes	<b>Specifications for elevated ventilation grates</b> (developed through MTA design competition);				
Increased precipitation	Air intakes	<b>ASHRAE 62 indoor ventilation requirements:</b> govern requirements for indoor environmental air quality				<b>Emergency response procedures:</b> Cover air intakes temporarily with plywood during storms; experimenting with closeable grates once water reaches a certain level.
Increased precipitation	Passenger Stations	Floodgates at station entrances raised to account for sea level rise. All gates below the 100-yr floodplain base flood elevation are sealed.				
Increased precipitation	Passenger Stations		<b>Americans with Disabilities Act (ADA) statutory requirements</b> found at 42 USC § 12162(e) and the U.S. Department of Transportation's regulations found at 49 CFR Parts 37 and 38: provide standards for accessibility at passenger stations;			
Increased precipitation	Passenger Stations	<b>ASCE 24/ ASCE 7 for Category 3 &amp; 4 buildings:</b> Applies to new construction and substantial modification of passenger stations & transit facilities post-1983 that are located in the 100-yr floodplain	<b>Appendix G of the New York City Construction Code:</b> establishes elevation, materials, utilities placement, and floodproofing requirements for passenger stations and transit facilities constructed or substantially modified after 1983.			
Increased precipitation	Power Equipment					

TRANSIT SECTOR - INITIAL INVENTORY (DRAFT)						
Climate Variable	Principal classes of at-risk infrastructure	Design standards	Rules and permits	Guidance	Capital planning and maintenance	Other policies or planning instruments
Increased precipitation	Pumping Facilities	Pumping facilities and drainage at subway stations are designed to handle 1.75" of rainfall per hour.				Subway uses portable pumps during intense rains. However, once stormwater management system is overwhelmed there is nowhere to pump additional water.
Increased precipitation	Rolling Stock & Bus Fleet	<b>American Public Transportation Association (APTA) manual for rail passenger equipment:</b> provides standards for rolling stock and rail passenger equipment; <b>American Society of Mechanical Engineers (ASME), Rail Transit Vehicle Standards Committee:</b> covers safety, functional, performance and operability requirements for rail transit vehicles, mechanical systems and components and structural requirements. Rail transit includes conventional subway (rapid) railcars and light rail cars, and excludes freight, commuter, high speed or any other rail vehicles under the jurisdiction of the Federal Railroad Administration as of March 18, 1998. <a href="http://cstools.asme.org/csconnect/CommitteePages.cfm?Committee=L02800000">http://cstools.asme.org/csconnect/CommitteePages.cfm?Committee=L02800000</a>				<b>Emergency Plan, Bus/rail parking and deployment strategies:</b> specify procedures for moving rolling stock and bus fleet out of harm's way during storms.
Increased precipitation	Tracks & Switches (includes culverts)	<b>APTA Manual of Best Practices for Rail Transit Systems:</b> provides cross sections and standard dimensions, including slope of paved surfaces for managing stormwater runoff and vertical clearances over waterways for transit bridges <a href="http://aptastandards.com/Documents/PublishedStandards/Rail/tabid/327/language/en-US/Default.aspx">http://aptastandards.com/Documents/PublishedStandards/Rail/tabid/327/language/en-US/Default.aspx</a> ;				
Increased precipitation	Tunnels - transit only	<b>ASTM, FHWA, NYSDOT:</b> materials specs for pavement for stations and lots, bridges, tunnels, tracks, track beds	<b>Phase II SPDES permit for Stormwater Management:</b> Roads, bridges, and tunnels under the jurisdiction of the MTA must comply with MS4 requirements	<b>Department of Design and Construction (DDC) Sustainable Urban Site Design Manual:</b> sustainable site design guidelines for public projects (Chapter 5 deals with water management) ( <a href="http://www.nyc.gov/html/ddc/html/pubs/publications.shtml#sustainableguides">http://www.nyc.gov/html/ddc/html/pubs/publications.shtml#sustainableguides</a> ); <b>DDC High Performance Infrastructure Guidelines:</b> performance guidelines for projects in the public right-of-way ( <a href="http://www.nyc.gov/html/ddc/html/pubs/publications.shtml#sustainableguides">http://www.nyc.gov/html/ddc/html/pubs/publications.shtml#sustainableguides</a> ); <b>Department of Transportation (DOT) Street Design Manual:</b> Provides guidelines for use of stormwater source controls on streets and sidewalks. ( <a href="http://www.nyc.gov/html/dot/html/about/streetdesignmanual.shtml#download">http://www.nyc.gov/html/dot/html/about/streetdesignmanual.shtml#download</a> )		
Other extreme events	Signal Equipment			<b>APTA Manual of Best Practices for Rail Transit Systems:</b> provides standards for maintenance and inspection of signals and communications (Volume 6). <a href="http://www.aptastandards.com/Documents/PublishedStandards/Rail/tabid/327/language/en-US/Default.aspx">http://www.aptastandards.com/Documents/PublishedStandards/Rail/tabid/327/language/en-US/Default.aspx</a>		<b>After-action storm reviews:</b> agencies review performance of emergency plans and procedures after major storm events
Other extreme events	Substations		<b>NYC Zoning Resolution:</b> Substations are categorized as Use Group 17C and allowed as-of-right in M districts. Special permits are typically required to locate in Commercial or Residential Zones.			<b>Continuity of operations plans:</b> designates alternate facilities to be used in an emergency event for the continuation of critical agency functions.
Rising temperatures/heat waves	Electrical & Communications Equipment			<b>PANYNJ Sustainable Design Project Manual:</b> Provides guidelines for sustainable project design, including for stormwater, materials, and energy ( <a href="http://www.panynj.gov/about/pdf/Sustainable-Design-Project-Manual.pdf">www.panynj.gov/about/pdf/Sustainable-Design-Project-Manual.pdf</a> ).	<b>Back-up power:</b> Back-up electrical generators acquired and installed to at a minimum power the fuel system, radio communications, a minimum of lights, electrical outlets, and shop equipment.	<b>Participation in demand response programs:</b> operator utilizes back-up power during periods of high demand to help prevent outages.

WASTEWATER SECTOR - INITIAL INVENTORY (DRAFT)						
Climate Variable	Principal classes of at-risk infrastructure	Design standards	Rules and permits	Guidance	Capital planning and maintenance	Other policies or planning instruments
All impacts	All infrastructure	<b>Intensity-duration-frequency (IDF) curves:</b> Used to determine the amount of surface stormwater runoff that the City's storm and combined sewers are designed to convey. Currently "the standard design criterion in New York City is to use the intensity-duration values based on a storm with a 5-year return period (e.g., 1.75 inches/hour for a one hour storm). The sewer design flow is then determined by application of an equation using a runoff coefficient, a rainfall intensity determined from an equation derived from the IDF analysis, and the contributory drainage area (NYCEPA, 1973). The design of combined sewers includes allowance for the sanitary flows." (DEP Adaptation Strategy at 39).				
All impacts	All infrastructure	<b>Typical rainfall year:</b> Used to determine runoff coefficient and is included in the InfoWorks model to determine the combination of grey & green infrastructure improvements that the city must implement to comply with CSO requirements under its consent order.				
All impacts	All infrastructure	<b>10 State Standards for Wastewater Facilities (2004 Edition):</b> Provide recommended standards for wastewater facilities that are followed by DEP. These include policies for the design, review, and approval of plans and specifications for wastewater collection and treatment facilities (sewers, pumping stations, wastewater treatment facilities, treatment processes, etc. ( <a href="http://10statesstandards.com/wastewaterstandards.html">http://10statesstandards.com/wastewaterstandards.html</a> ). For example, these standards specify that plants should be protected from physical damage by the 100-yr flood and should remain operational during the 25-yr flood. Similarly, the standards provide for emergency pumping capability to prevent overflow and that plant outfalls shall be constructed and protected against the effects of tides, flooding, and other hazards.				
Increased precipitation	all plants and pump stations	<b>Green infrastructure application rate:</b> 2011 Consent Order Modification establishes 10% application rate of green infrastructure citywide (across all combined sewersheds, except East River and Open Waters)	<b>SPDES CSO permit:</b> governs discharge requirements for each WWCP		<b>Procurement arrangements:</b> Job order contracts are in place to allow for quick replacement and repair of wastewater treatment facilities based on pre-approved prices	<b>Use Attainability Analysis:</b> Required to determine whether water quality standards for a given water body are attainable. Note: there is a presumption against downgrading.
Increased precipitation	all plants and pump stations		<b>Long-term control plans:</b> will be developed for each WWCP and combined sewershed. Each plan will identify the specific capital improvements (both grey and green) necessary for meeting CSO volume reduction requirements as spelled out in the 2011 Consent Order Modification. (e.g., Alley Creek LTCP is scheduled to be completed June 2013). [Currently, each WWTP has a waterbody/ watershed plan, which is seen as a pre-cursor to the LTCPs.]	<b>Guidance For Long-Term Control Plan,</b> EPA, September, 1995. (See also: <a href="http://www.dec.ny.gov/chemical/48985.html">http://www.dec.ny.gov/chemical/48985.html</a> )	<b>Asset management and scoring system:</b> Inspect and score each piece of equipment every two years. Assets are scored based on physical condition, criticality to wastewater compliance, and maintenance history. Assets with a given score are included in the capital plan for replacement/ upgrade.	<b>2011 Consent Order Modification:</b> identifies the mix of grey and green infrastructure improvements the City must implement to comply with CSO control requirements. (Note: CSO White Paper for the 2011 modification of the Consent Order explains how current and projected rainfall conditions are being re-evaluated and new IDF curves are being developed to determine DEP's CSO control requirements (using InfoWorks) over the next 20 years. <a href="http://www.dec.ny.gov/chemical/77733.html">http://www.dec.ny.gov/chemical/77733.html</a> )
Increased precipitation	Stormwater management system (sewer pipes, basins, green infrastructure/ source controls)	<b>DEP stormwater performance standard:</b> Sets a performance standard for new and redevelopment on large and medium-sized lots in combined sewer areas. Sites must demonstrate that stormwater is released from the site at a rate of no more than .25 cfs or 10% of the Allowable Flow. The runoff flow for a site is calculated using the design flow calculation (which relies in part on the IDF curve). Compliance is required to receive a certificate of occupancy and a sewer connection permit. [Note: this rule is still in draft and has not been finalized]	<b>Title 15, Chapter 31, Rules of the City of NY:</b> Establishes requirements for stormwater management for new and redevelopment, including DEP's proposed stormwater performance standard <a href="http://www.nyc.gov/html/nycrules/downloads/rules/P_DEP_10_31_11_A.PDF">http://www.nyc.gov/html/nycrules/downloads/rules/P_DEP_10_31_11_A.PDF</a> .	<b>DEP's Draft Guidelines for the Design and Construction of Stormwater Management Systems:</b> Provides guidance for how to comply with the proposed rule, including the design of source controls (e.g. blue and green roofs) <a href="http://www.nyc.gov/html/dep/pdf/green_infrastructure/stormwater_guidelines_2011_draft.pdf">http://www.nyc.gov/html/dep/pdf/green_infrastructure/stormwater_guidelines_2011_draft.pdf</a> .		Supports implementation of the City's requirements under 2011 Consent Order for CSO control to attain a 10% application rate for green infrastructure citywide (across all combined sewersheds, except East River and Open Waters)

WASTEWATER SECTOR - INITIAL INVENTORY (DRAFT)						
Climate Variable	Principal classes of at-risk infrastructure	Design standards	Rules and permits	Guidance	Capital planning and maintenance	Other policies or planning instruments
Increased precipitation	Stormwater management system (sewer pipes, basins, green infrastructure/ source controls)		<b>Article IV, Chapter 4, NYC Zoning Resolution:</b> Mandates landscape areas with stormwater BMPs for commercial and community facility off-street parking lots	<b>Department of Design and Construction (DDC) Sustainable Urban Site Design Manual:</b> sustainable site design guidelines for public projects (Chapter 5 deals with water management) ( <a href="http://www.nyc.gov/html/ddc/html/pubs/publications.shtml#sustainableguides">http://www.nyc.gov/html/ddc/html/pubs/publications.shtml#sustainableguides</a> ); <b>DDC High Performance Infrastructure Guidelines:</b> performance guidelines for projects in the public right-of-way ( <a href="http://www.nyc.gov/html/ddc/html/pubs/publications.shtml#sustainableguides">http://www.nyc.gov/html/ddc/html/pubs/publications.shtml#sustainableguides</a> ); <b>Department of Transportation (DOT) Street Design Manual:</b> Provides guidelines for use of stormwater source controls on streets and sidewalks. ( <a href="http://www.nyc.gov/html/dot/html/about/streetdesignmanual.shtml#download">http://www.nyc.gov/html/dot/html/about/streetdesignmanual.shtml#download</a> ). <b>Department of Parks and Recreation High Performance Design Guidelines:</b> a comprehensive manual for the design and construction of sustainable parks and open space, including improved stormwater management and increased resiliency of plantings. <a href="http://www.nycgovparks.org/sub_about/sustainable_parks/design_guidelines.pdf">http://www.nycgovparks.org/sub_about/sustainable_parks/design_guidelines.pdf</a>		
Increased precipitation	Stormwater management system (sewer pipes, basins, green infrastructure/ source controls)	<b>American Society for Testing and Materials (ASTM) standards:</b> Specify the materials, minimum sizing, and installation for sewers. ASTM standards relevant for a particular situation are specified in the 10 state standards discussed below.	<b>SPDES General Permit for Stormwater Discharges from Construction Activities:</b> New construction on sites larger than 1 acre must meet state stormwater/ MS4 requirements in separately sewered areas ( <a href="http://www.dec.ny.gov/chemical/43133.html">http://www.dec.ny.gov/chemical/43133.html</a> ). <b>NYC DEP East of Hudson, Phase II MS4 SPDES permit:</b> Requires DEP to comply with Phase II stormwater management plan, which includes six minimum measures: 1. Public education and outreach 2. Public involvement and participation 3. Illicit discharge detection and elimination 4. Construction site stormwater runoff control 5. Post construction stormwater management practices 6. Pollution prevention and good housekeeping	<b>NYS Standards for Erosion and Sedimentation Control:</b> Sets standards and provide specifications for erosion and sedimentation control for construction activities; guides compliance with MS4 activities ( <a href="http://www.dec.ny.gov/chemical/29066.html">http://www.dec.ny.gov/chemical/29066.html</a> ); <b>New York State Stormwater Management Design Manual:</b> provides guidance for compliance with MS4 requirements for construction activities, Chapter 9 on redevelopment is most relevant for City projects ( <a href="http://www.dec.ny.gov/chemical/29072.html">http://www.dec.ny.gov/chemical/29072.html</a> )		
Sea level rise	all plants and pump stations		<b>Zoning Resolution:</b> Use, height, setback and other requirements for M-3 districts apply to WWCPs.			
Sea level rise	all plants and pump stations	<b>ASCE 24/ ASCE 7 for Category 3 &amp; 4 buildings:</b> Applies to new construction and substantial modification of wastewater treatment plants post-1983 that are located in the 100-yr floodplain	<b>Appendix G of the New York City Construction Code:</b> establishes elevation, materials, utilities placement, and floodproofing requirements for wastewater treatment facilities constructed or substantially modified after 1983			
Sea level rise	all plants and pump stations	<b>National electrical code &amp; National Electrical Manufacturers Association:</b> Set standards for electrical equipment for submersible pumps (included in 10 state standards described above).	<b>USACE Section 404 (Clean Water Act) permit:</b> Required for discharge of fill or dredged material in federal navigable waters; <b>USACE Section 10 Rivers and Harbors Act permit:</b> Required for construction of or disposal into a sewer outfall; <b>DEC Tidal Wetlands permit:</b> Required for construction of or disposal into a sewer outfall and/or for activities in or adjacent to a tidal wetland(150 landward);Bathing beaches in New York City are regulated, monitored and permitted by the City and State under Article 167 of the New York City Health Code and Section 6-2.19 of the New York City Sanitary Code. <b>NEPA and SEQRA/ CEQR Review:</b> Environmental impact review is required for federal and state discretionary actions which may have a significant impact on the environment (e.g., siting or permitting of new treatment facilities)	<b>Waterfront Revitalization Program:</b> applies to major upgrades of WWTPs within the coastal zone boundary. Provides guidance for consistency determinations for discretionary actions of local, state, and federal agencies, such as rezonings or issuance of section 404 dredge and fill permits.		
Sea level rise	stormwater management (sewer pipes, basins, green infrastructure)		<b>Long-term control plans (see above)</b>		<b>Asset management and scoring system (see above)</b>	<b>Emergency action plan:</b> each WWTP has an emergency action plan that provides practices and operating procedures in the event of an emergency.
Rising temperatures/heat waves	all plants and pump stations	<b>10 state standards (see above):</b> require that facilities have back-up generators.	<b>DEC air pollution control permits:</b> Specify the emissions limits for each WWCP required for compliance with air quality standards.			<b>Protocol for Operation of Emergency Generators at New York City Department of Environmental Protection (DEP) Wastewater Treatment Plants (WWTPs) during Electrical System Emergency Conditions:</b> Outlines narrow and specific emergency conditions under which DEP can operate certain emergency generators at its WWTPs.

ENERGY SECTOR - INITIAL INVENTORY (DRAFT)						
Climate Variable	Principal classes of at-risk infrastructure	Design standards	Rules and permits	Guidance	Capital planning and maintenance	Other policies or planning instruments
All impacts	All infrastructure		Utility rate increases required for capital improvements and additional maintenance must be approved by the PSC (16 NYCRR 61): PSC sets rates for distribution services, typically at a certain percentage of ROE. Sets out rules for utility rate proceedings.			
Increased precipitation	Distribution cables	Underground cables limit exposure to precipitation; design specifications differ by utility but comply with standard industry practice.	NYCDOT street opening and emergency work permits: required for cable construction, installation and repair under normal and emergency circumstances; NYS DOT Title 17: governs requirements for underground utilities in the state highway right-of-way;	DDC High Performance Infrastructure Guidelines: performance guidelines for projects in the public right-of-way (including utilities) ( <a href="http://www.nyc.gov/html/ddc/html/pubs/publications.shtml#sustainableguides">http://www.nyc.gov/html/ddc/html/pubs/publications.shtml#sustainableguides</a> );	Utility cable replacement programs	
Increased precipitation	Flood pumps	Flood pumps and drainage typically designed to manage precipitation from 100-yr and 25-yr storm events	DEC SPDES stormwater permits: governs stormwater management requirements for industrial activities		Utility capital planning and asset management systems: Planning and procurement or rental of flood pumps	
Increased precipitation	Gas mains, pipes, etc. (natural gas distribution)	Underground pipes limit exposure to precipitation; design specifications comply with standard industry practice.	NYCDOT street opening and emergency work permits: required for gas main construction, installation and repair under normal and emergency circumstances; NYS DOT Title 17: governs requirements for underground utilities in the state highway right-of-way;	DDC High Performance Infrastructure Guidelines: performance guidelines for projects in the public right-of-way (including utilities) ( <a href="http://www.nyc.gov/html/ddc/html/pubs/publications.shtml#sustainableguides">http://www.nyc.gov/html/ddc/html/pubs/publications.shtml#sustainableguides</a> );	Utility capital planning and asset management systems: identify and replace pipes at risk of leaking	
Other extreme events	LNG Plant	Design standards for LNG facilities, including standards and criteria for wind forces. (Federal requirements incorporated by reference at 49 CFR 193)	Compliance included as part of facility licensing process		Generation capital planning and asset management systems	Emergency plans: includes standard operating procedures for plant shut down.
Other extreme events	Electric transmission lines	Design limits on transmission & materials requirements governed by design criteria of different transmission operators (and NYSRC Reliability Guidelines).	PSC requires maintenance of transmission Right-of-Way (16 NYCRR 84): Sets transmission Right-of-way maintenance requirements; US Energy Policy Act 2005: governs vegetation management in ROW, and electric lines over 200kv.	Smart Grid Policy Guidelines (PSC, CASE 10-E-0285): PSC-adopted guidelines for smart grid improvements to be made by regulated entities in electricity sector	Utility tree trimming programs, advanced weather modeling	Emergency Plans (16 NYCRR part 105): Requires utilities to develop and submit Emergency Plans to the PSC and conduct after-storm reviews.
Rising temperatures/heat waves	Distribution cables	See design guidelines for distribution cables above			Utility tree trimming programs, advanced weather modeling	
Rising temperatures/heat waves	LNG Plant	Design standards for LNG facilities, including standards and criteria for wind forces. (Federal requirements incorporated by reference at 49 CFR 193)	Natural Gas Act (15 USC 717b(e) (1)): provides FERC with authority over siting, construction, expansion, and operation of facilities located onshore or in State waters for the import or export of LNG. DEC Section 401 Water Quality Certification: Required where construction of generation facilities may discharge into navigable waters. Section 404 Dredge & Fill and Section 10 permits: Permits issued by the US Army Corps of Engineers (USACE) for dredge and fill in navigable waters. Dept. of State Coastal Zone Management Act Consistency Determination (Article 42, EL): Activities within the coastal zone boundary must be consistent with federal and state coastal zone management policies. DEC Air pollution control permit: governs emissions requirements for industrial facilities.			NYISO Comprehensive Reliability Planning and Reliability Needs Assessment: NYISO conducts long-term reliability assessment of both resource adequacy and transmission security of the New York bulk power system (process approved by FERC). Identifies additional generation needs based on assumptions for demand, supply, and efficiency at which the system operates.
Rising temperatures/heat waves	Power plants	Specific design requirements differ by generator, but comply with standard industry practice and rely on developed industry standards by associations such as ASTM, ASME, IEEE	DEC SPDES permits under section 316(b) of the Clean Water Act and NYS Environmental Conservation Law: govern requirements for thermal discharges to regulated waterbodies and best technology available (BTA) standards for cooling water intake structures ( <a href="http://www.dec.ny.gov/regs/4589.html#16147">http://www.dec.ny.gov/regs/4589.html#16147</a> ); DEC Air Pollution Control permits for major stationary sources (Title V, Clean Air Act and Environmental Conservation Law, Article 19): set limits on plant emissions, including ability to run on back-up fuel oil at dual generation facilities	Final Policy on BTA for cooling water intake structures: provides guidance on making BTA determinations for different types of power plants ( <a href="http://www.dec.ny.gov/docs/fish_marine_pdf/btapolicyfinal.pdf">http://www.dec.ny.gov/docs/fish_marine_pdf/btapolicyfinal.pdf</a> )	Internal maintenance protocols: determine maintenance procedures	National Environmental Policy Act (NEPA) and State Environmental Quality Review Act/ CEQR (ECL, Article 8 and 6 NYCRR Part 617 and 16 NYCRR Part 7): Environmental impact review is required for federal and state discretionary actions which may have a significant impact on the environment (e.g., siting or permitting of new generation facilities).
Rising temperatures/heat waves	Power plants		Article X, Public Service Law (PL 388 of 2011): governs one-stop shop siting through the PSC for new and repowered coal, gas, oil and onshore renewable facilities greater than 25 MW. Atomic Energy Act (10 CFR part 52): Nuclear Regulatory Commission is responsible for licensing and regulating the design, construction, operation, and decommissioning of commercial nuclear power plants. The licensing process includes approving initial license, subsequent license modifications, and license renewals. For new reactor facilities, NRC reviews applications submitted by prospective licensees, and (when appropriate) issues standard design certifications, early site permits, limited work authorizations, construction permits, operating licenses, and combined licenses. Federal Power Act and Integrated Licensing Process (section 241 of EPAct of 2005): FERC has licensing authority over hydroelectric generation. Additional approvals: See DEC Section 401 Water Quality Certification, Section 404 Dredge & Fill and Section 10 permits, and Coastal Zone Management Act Consistency Determination (Article 42, EL) above. NYISO Interconnection Process defined in the NYISO Open Access Transmission Tariff (OATT): governs requirements for new generation to connect to the transmission system. NYSRC Reliability Guidelines: Rules for reliability that NYISO and Market Participants are required to comply with. NYSRC monitors compliance with the Rules, which are mandated by FERC and PSC.	Waterfront Revitalization Program: provides the basis for consistency determinations within New York City. Provides guidance for consistency determinations for discretionary actions of local, state, and federal agencies, such as rezonings or issuance of section 404 dredge and fill permits.		NYISO Comprehensive Reliability Planning and Reliability Needs Assessment: NYISO conducts long-term reliability assessment of both resource adequacy and transmission security of the New York bulk power system (process approved by FERC). Identifies additional generation needs based on assumptions for demand, supply, and efficiency at which the system operates. Demand response programs: Programs designed to reduce energy demand, including during periods at which the system is operating near peak load (operated by NYISO and others)

ENERGY SECTOR - INITIAL INVENTORY (DRAFT)						
Climate Variable	Principal classes of at-risk infrastructure	Design standards	Rules and permits	Guidance	Capital planning and maintenance	Other policies or planning instruments
Rising temperatures/heat waves	Electric transmission lines and natural gas pipelines	Design limits on transmission & materials requirements governed by design criteria of different transmission operators (and NYSRC Reliability Guidelines).	<b>Article VII of the PSL</b> (§§120 et seq., implemented at 16 NYCRR Subpart 85-2 et seq.): provides the PSC with authority to issue a Certificate of Environmental Compatibility and Public Need (Article VII Certificate) to construct "major" electric and fuel gas transmission facilities, (electric lines rated 125 kV or more extending more than one mile, or more than 100 kV, but less than 125 kV, extending 10 miles or more and gas facilities extending a distance of at least 1,000 feet and operated at pressures of 125 psi or more). Provides one-stop siting for State and local approvals of electric and intrastate natural gas pipelines. <b>Additional approvals:</b> See DEC Section 401 Water Quality Certification, Section 404 Dredge & Fill and Section 10 permits, and Coastal Zone Management Act Consistency Determination (Article 42, EL) above. <b>Energy Policy Act of 2005 and 18 CFR part 50, FERC backstop authority:</b> provides DOE with authority to designate National Interest Electric Transmission Corridors (NIETCs) in areas experiencing transmission capacity constraints or congestion. FERC has backstop permitting authority for new electric transmission in these corridors and is responsible for conducting the federal environmental (NEPA) review and issuing construction permits where the state has withheld its approval for more than 1 year or conditioned approval such that the project will not address congestion concerns. <b>Natural Gas Act (15 U.S.C. §717 et seq.):</b> Provides FERC with jurisdiction over the issuance of certificates of public convenience and necessity to prospective companies providing energy services or constructing and operating interstate natural gas pipelines and storage facilities. In its review of an application, FERC ensures that the applicant has certified that it will comply with U.S. Department of Transportation safety standards. <b>NYISO Open Access Transmission Tariff (OATT):</b> FERC-approved tariff for provision of transmission services.			<b>National Environmental Policy Act (NEPA) and State Environmental Quality Review Act (ECL, Article 8 and 6 NYCRR Part 617 and 16 NYCRR Part 7):</b> Environmental impact review is required for federal and state discretionary actions which may have a significant impact on the environment (e.g., siting or permitting of new transmission facilities). <b>Waterfront Revitalization Program:</b> provides the basis for consistency determinations within New York City. Provides guidance for consistency determinations for discretionary actions of local, state, and federal agencies, such as rezonings or issuance of section 404 dredge and fill permits.
Storm surge with sea level rise	LNG Plant facilities and natural gas pipelines	Design standards for LNG facilities, including standards and criteria for wind forces. (Federal requirements incorporated by reference at 49 CFR 193)	<b>US DOT/ PHMSA Gas Transmission Integrity Management Rule:</b> provides federal and state design requirements for gas transmission integrity. Federal and state standards for water removal from LNG facilities (49 CFR 193 & standards incorporated by reference). See DEC Section 401 Water Quality Certification, Section 404 Dredge & Fill and Section 10 permits, and Coastal Zone Management Act Consistency Determination (Article 42, EL) above for additional approvals required for coastal protections.		Internal procedures for monitoring and maintaining dikes; planning and procurement of flood pumps. <b>Integrity Management Program:</b> each operator has individual integrity management program designed to comply with rules and to ensure integrity of natural gas pipelines (includes inspection and maintenance requirements).	
Storm surge with sea level rise	Flood pumps	Flood pumps and drainage typically designed to manage precipitation from 100-yr and 25-yr storm events				Procedures for procuring or renting additional moveable flood pumps in advance of storms or on an as-needed basis
Storm surge with sea level rise	Fuel tanks	Anchoring and load requirements for tanks	New York City Fire & Construction code requirements related to fuel storage tanks in the flood zone.			
Storm surge with sea level rise	Gas mains, pipes, etc. (natural gas distribution)	Underground pipes limit exposure to precipitation; design specifications comply with standard industry practice.	<b>US DOT/ PHMSA integrity management rule for distribution:</b> sets requirements for integrity management programs for distributors <a href="http://primis.phmsa.dot.gov/dimp/">http://primis.phmsa.dot.gov/dimp/</a> .		<b>Integrity Management Program:</b> Program overseen by US DOT/ PHMSA to ensure safety and integrity of gas distribution (includes inspection and maintenance requirements) <a href="http://primis.phmsa.dot.gov/dimp/">http://primis.phmsa.dot.gov/dimp/</a>	<b>Coastal storm plans:</b> operators have individual coastal storm plans that include standard operating procedures for protecting or shutting down gas mains where necessary.
Storm surge with sea level rise	Power plants	<b>ASCE 24, ASCE 7:</b> Model standards incorporated by reference into NYC Construction Codes specifying standards for Flood-Resistant Construction for Category 3 & 4 buildings (including power plants)	<b>Appendix G, NYC Construction Codes:</b> Establishes elevation, equipment placement, floodproofing, and materials requirements for Category 3 & 4 buildings (including power plants). <b>NYC Zoning Resolution:</b> Manufacturing districts provide for as-of-right development of generation facilities.		Internal design standards that enable equipment to be submerged or resistant to saltwater corrosion, or that require additional elevation of equipment	<b>Coastal storm plans:</b> operators have individual coastal storm plans that include standard operating procedures for protecting or shutting down power plants where necessary.
Storm surge with sea level rise	Power plants		See DEC Section 401 Water Quality Certification, Section 404 Dredge & Fill and Section 10 permits, and Coastal Zone Management Act Consistency Determination (Article 42, EL) above			
Storm surge with sea level rise	Substation	See ASCE 24, ASCE 7 above	See Appendix G, NYC Construction Codes and NYC Zoning Resolution above		Preventative maintenance programs	See coastal storm plan above
Storm surge with sea level rise	Transformers	See ASCE 24, ASCE 7 above	See Appendix G, NYC Construction Codes and NYC Zoning Resolution above		Operator efforts to upgrade sub-surface transformers to be submersible	See coastal storm plan above