

# ENGINEERING REPORT TEMPLATE

## *Overview of REDI Implementation Baseline Data*

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### FIGURES

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### APPENDICES

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Appendix A.....	Supporting Design Basis Information (Capacity data, hydraulic modeling results, critical design element and features, etc.)
Appendix B.....	Supporting Cost Estimate Information
Appendix C.....	Public and Stakeholder Involvement Summary
Appendix D.....	Smart Growth Assessment Form
Appendix E.....	Other Supporting Information (Resiliency Design Best Practices, Energy Efficiency Best Practices, Special Considerations, etc.)

### 1. EXECUTIVE SUMMARY

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Provide a brief description of the purpose of the report, need for the project, evaluations conducted, recommended alternatives, and proposed course of action.

## **2. PROJECT BACKGROUND AND HISTORY**

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### **2.1 Location**

Describe the area(s) under consideration including the following:

- Maps with appropriate scale, topographical features, and property boundaries
- Site photographs

### **2.2 Geological Conditions**

- Soil type
- Depth to bedrock
- Depth to groundwater
- Slope (if significant)
- Near shore bathymetry/morphology, littoral sediment sources, transport and depositional characteristics

### **2.3 Environmental Conditions**

- Surface water features
- Environmental resources
  - » Natural protective features such as dunes, beaches, sandbars, spits, shoals, barrier islands, bay barriers, bluffs and wetlands
- Floodplain considerations (100-yr flood elevation and highest flood of record, if known)

### **2.4 Ownership and Service Area**

Describe the ownership of the land (including underwater lands), facilities and area(s) being served. Include details of the following:

- Publicly or Privately-owned
  - » Municipal, State, Federal, Water Authority, Water Works Corporation, Homeowners Association, Water Works Transportation Corporation, Native American Reservation, Commercial, Industrial, School, Joint Public/Private Ownership or Usage Agreements or Relationships, State Legislation, Other
- Facility/System Management
  - » Group structure, operators (name and certification level)
- Site and District (if applicable) boundaries (existing and proposed)
  - » Describe existing zoning and other relevant local development controls
  - » Projects financed through New York State need to comply with the State's Smart Growth Act and therefore care should be taken when setting the boundaries if creating new or expanding existing districts.
  - » If applicable, identify/demonstrate ownership of lands underwater
- Outside users, if applicable
  - » Discuss any existing/required contracts, and/or inter-municipal/private/industrial agreements, and/or joint public/private ownership or usage agreements or relationships, and/or any existing/required parkland alienation or other legislation related to the land, facilities, or area being served
- Nearby agricultural or industrial land-use activities
  - » Site context:
    - Nearby agricultural or industrial land-use activities
    - Upland properties and facilities also protected by any resiliency treatments at site

- Adjacent coastal properties potentially affected by resiliency treatment at site
- Existing coastal processes and habitats that may be impacted by projects
- Population trends and growth
  - » U.S. Census or other data (include references) for the service area for at least the past two decades if available
  - » Describe any socially vulnerable populations that are serviced by the facility/asset/resiliency project
  - » Discuss any planned or anticipated development
  - » Projected population over next 20 years in five-year intervals
- Historical usage and/or flood inundation data
- Projected usage and/or flood inundation data
- For sewer and water projects, identify nearest public systems
- Community involvement (support/opposition)- Please describe how the community was engaged in the development and/or vetting of the project and the result of such engagement

## **2.5 Existing Facilities and Present Conditions**

Provide overview of major system components of the asset and include the following:

- Location and layout
  - » Map, site plan, and schematic layout for existing facilities
  - » Photographs of existing facilities
- General description and history
  - » Purpose of system component
  - » Dates when component was constructed, renovated, expanded, or removed from service
  - » Failure history and component limitations
  - » History of damage due to storm or flood impacts
- Current Site Conditions:
  - » Topography, hydrology, soils and streambank conditions
  - » Existence of infrastructure (water supply, sewage disposal, electric supply, solid waste disposal)
  - » Environmental issues (hazardous waste sites, solid waste, etc.)
  - » Natural resources (wetlands, steep slopes, mature trees, etc.) Natural resources (wetlands, steep slopes, mature trees, etc.)
  - » Significant fish and wildlife habitats
  - » Native biodiversity and presence of invasive species
- Present condition of infrastructure
  - » Adequacy of current facilities (flood protection, conveyance, treatment, storage, security, etc.)
  - » Risks to current facilities
  - » Existing design basis and limitations
  - » Ability of the current infrastructure to meet performance expectations
  - » Energy consumption (include energy audit results if available)

- » Suitability for continued use
- Permit conditions

## **2.6 Definition of the Problem**

Describe the need for the project. Include maps, photographs, or schematics as it relates to:

- Flood protection, health, sanitation, and/or security
  - » Quality and/or quantity consideration
  - » Regulations
- Aging infrastructure
  - » Inefficient design
  - » Safety concerns
- Reasonable growth
  - » Future growth needs (provide supporting calculations)
  - » Adequacy of revenue to meet future growth needs
- Sustainability, water/energy efficiency considerations (include audits, if available)
- Suitability for continued use- please describe potential consequences for continued use if the resiliency project does not get implemented.
- Hazard
  - » Wind/storm-driven wave and surge
  - » Potential for flooding impacts
  - » Low water
  - » Icing
  - » Erosion
- Compliance with local, state and federal requirements. Discuss and provide copies of the following:
  - » Notices of violation
  - » Consent orders
  - » Judicial orders
  - » EPA orders
  - » Sanitary survey
- Compliance with current engineering design standards and best practice

## **2.7 Financial Status**

Briefly provide information regarding sources of income, current rate schedules, other capital improvement programs, and status of existing debts and required reserve accounts.

### 3. PERMIT AND REGULATORY COMPLIANCE

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This sub-section should describe anticipated federal, state or local permits or regulations for infrastructure projects, such as shoreline stabilization or erosion protection measures, and the status of those permits or applications. Typically, this includes State Protection of Waters Permits, State Freshwater Wetlands Permits, Coastal Erosion Hazard Area (CEHA) Permits, Water Quality Certifications, and federal coastal consistency review pursuant to the federal Coastal Zone Management Act (CZMA), with local consistency review in municipalities that have an approved Local Waterfront Revitalization Program.

This sub-section should also highlight or summarize important code and regulatory items related to the project. This sub-section may include items from the Building Codes of New York State such as occupancy classification, type of alterations/levels, floodplain, roof fire classification, National Fire Protection Association (NFPA) E088 (including energy efficiency strategies), American Disabilities Act (ADA), State Environmental Quality Review Act (SEQR), State Historic Preservation Office (SHPO), New York State Department of Health (NYSDOH) and local municipality regulations.

If more detailed code information or review is provided, it can be included as an appendix item in the report.

### 4. ALTERNATIVES ANALYSIS

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As appropriate, the report must include a comprehensive analysis of the following alternatives:

- No-action
- “Non-structural (e.g., relocation, elevation)”
- Green infrastructure or natural/nature-based features alone or in combination with gray infrastructure or individually (required for projects involving stormwater, including stormwater inflow into sewer systems)
- Repair or replacement versus new construction
- Regional consolidation opportunities
- Centralized versus decentralized
- Any alternatives considered technically infeasible should be identified as such, and the rationale briefly discussed.

#### 4.1 Description

Describe how each alternative will resolve the defined problem. Present the following information for each technically feasible alternative, as appropriate:

- Proposed preliminary design, design standards, sizing, and supporting calculations.
- Impact on existing facility
- Potential impacts to adjacent or nearby properties within shoreline reach
- Location map and/or schematic drawing
- Land requirements
- Environmental impacts and mitigation measures
  - » Consider water quality and supply, noise levels, air quality, population growth, wetlands, floodplains, scenic resources and other sensitive areas
- Seasonal limits, challenges, and requirements
- Permit requirements (new/proposed and existing)
- Identify the water and energy efficiency measures used
  - » Efficient water use, reuse, recapture, and conservation, and energy-efficient design, and/or renewable

generation of energy

» Energy efficiency in accordance with NYSERDA Summary of Baseline Standard Practices and Energy Efficient Designs - Wastewater Sector

- Hazard resiliency:
  - » Wind/storm-driven wave and surge
  - » Potential for flooding impacts
  - » Low water
  - » Icing
  - » Erosion
- Adaptability- describe the ability of the project to be adaptable to future conditions (e.g., low and high water levels)
- Constructability and schedule

#### **4.2 Cost Estimate**

- Total project cost with construction costs, non-construction costs, and contingency separately stated
  - » Non-construction may include land/easement acquisition, legal, engineering, construction management, financial advisor, grant/loan administrator, etc.
- Annual operation and maintenance (O&M) cost considering personnel, administration, water purchase or waste treatment costs, insurance, energy cost (fuel or electric), process chemical, monitoring and testing, short-lived asset maintenance and replacement, professional services, and residuals disposal. Include any income from energy generation or outside revenue.

#### **4.3 Community Benefits and Other Impacts**

Include discussion of all relevant non-monetary factors such as increased recreational opportunities, increased local employment, aesthetics, improved habitat, reduced carbon footprint, climate resiliency, standardization, personnel impacts, permit issues, community support/objections, or wetland relocation.

### **5. SUMMARY AND COMPARISON OF RESILIENCY, NATURAL AND NATURE-BASED ALTERNATIVES**

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Provide a summary table of all technically feasible alternatives identifying any major differences, pros and cons, community benefits and other impacts, and costs.

- Provide a summary life-cycle cost analysis for all technically feasible alternatives. A comprehensive life-cycle cost analysis may be warranted for projects involving new infrastructure technologies. This analysis should convert capital, O&M, short-term assets, and salvage costs to present worth values. State the time period and the interest rate used in the evaluation.
- If one of the project objectives is energy efficiency, the payback period should be calculated and compared for each alternative. (While energy efficiency is a feature of overall resiliency, REDI standards for resiliency focus on infrastructure durability, as well as, environmental sustainability and suitability.)
- For projects involving stormwater, including stormwater inflow to sanitary or combined sewer systems, a justification and cost analysis must be provided if a green infrastructure component is not part of the recommended alternative.
- Extent to which project provides additional and immediate benefits to social (e.g., vulnerable populations), environmental (e.g., habitat), and economic systems (e.g., local businesses), particularly positive impacts on economic development
- Extent to which the project increases or decreases risk/impacts to adjacent assets/locations

## 6. RECOMMENDATIONS

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Identify the recommended alternative and include:

- Basis of selection
  - » Impact of resiliency project on coastal processes and habitats
  - » Ability of project to be adaptable to changing conditions over time.
  - » Positive/negative effects on resiliency of adjacent coastal properties and upland properties (e.g., does the project interrupt natural sediment movement along the shorelines? Does the project redirect water to other properties? Does the project provide flood risk reduction to more than one facility/asset?)
  - » Prioritization of recommendations. Consider vulnerability, failure analysis, and cost-effectiveness
  - » Justification of why certain alternatives were not selected, especially relocation, and incorporation of natural or nature-based features
- Cost estimate
- Project schedule (including submittal of plans and specifications, advertisement for bid, contract award, initiation of construction, substantial completion, final completion, startup)
- Next steps (including special studies, special coordination, planned community engagement)