SUFFOLK COUNTY COMPREHENSIVE WATER RESOURCES MANAGEMENT PLAN

2015

Steven Bellone
County Executive

Principal contributors to the development of the Suffolk County Comprehensive Water Resources Management Plan include:

SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES (SCDHS)

James L. Tomarken, MD, MPH, MBA, MSW, Commissioner
Walter Dawydiak, PE, JD, Director of Environmental Quality
Alison Branco, PhD
Douglas Feldman, PE
Patricia Floria, PE
Walter Hilbert, PE
Kenneth Hill
Ronald Huttie
Michael Jensen
Christopher Lubicich, PE
James Meyers, PE
Vito Minei, PE
Kathleen Negri
Ron Paulsen
Joette Pavelka
Nancy Pierson
Paul Ponturo, PE
Andrew Rapiejko
Sy Robbins, PG
Geralynn Rosser
John Sohngen, PE
Larry Stipp
Martin Trent
Jonathan Wanlass
Mac Waters

SUFFOLK COUNTY DEPARTMENT OF PUBLIC WORKS

Gilbert Anderson, PE, Commissioner
John Donovan, PE
Benjamin Wright, PE
Boris Rukovets, PE

SUFFOLK COUNTY DEPARTMENT OF ECONOMIC DEVELOPMENT AND PLANNING

Joanne Minieri, Deputy County Executive and Commissioner
Sarah Lansdale, Director of Planning
Dorian Dale, Director of Sustainability and Chief Recovery Officer
DeWitt Davies, PhD
Lauretta Fischer
Daniel Gulizio, AICP
Thomas Isles, AICP
Carl Lind
August Ruckdeschel
Ronald Verbarg

SUFFOLK COUNTY WATER AUTHORITY

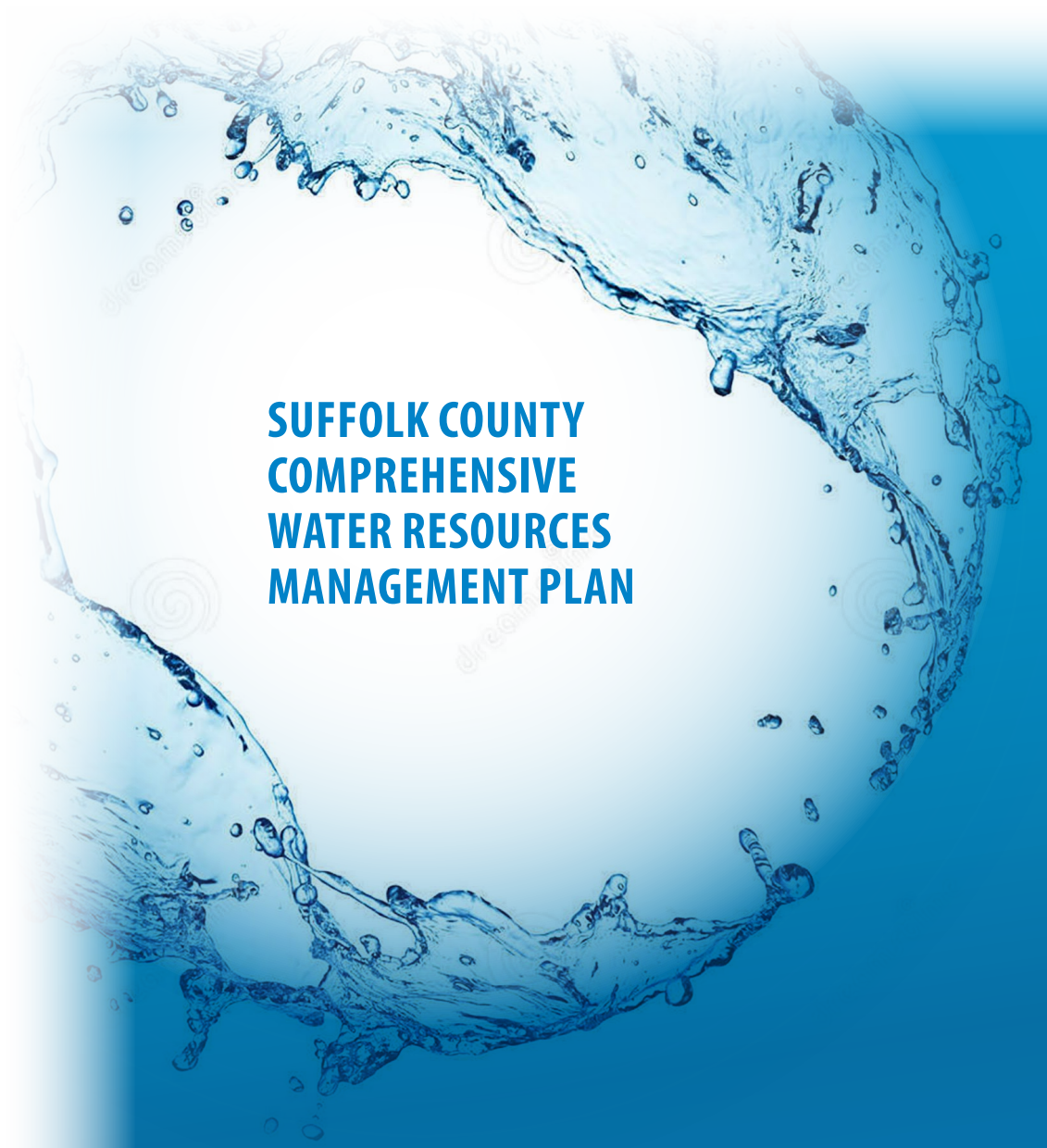
Jeffrey Szabo, Chief Executive Officer
Steven Colabufo, PG
Kevin Durk
Carrie Meek Gallagher
Stephen Jones
Paul Kuzman
James Touchet

CDM SMITH

Kati Bell, PhD, PE, BCEE
John Boyer, PE, BCEE
Matthew Gamache, PE
Michael Labiak
Mark Maimone, PE, PhD
Daniel O'Rourke, PG
Rao Sankarmanchi, PE
Mary Anne Taylor, PE

Note: Contributors to 2010 Draft are italicized

Special acknowledgement is extended to Walter Dawydiak, Director of the SCDHS Division of Environmental Quality (DEQ), and Vito Minei, former SCDHS DEQ Director for their roles in managing the initiation and completion of the Plan and to Christina Capobianco, CPA, Deputy Commissioner SCDHS and Barry Paul, Deputy Commissioner SCDHS for their support. Also, the SCDHS is grateful for the outstanding service of the draft Plan's long-time Project Managers, Sy Robbins and Martin Trent, and the final Plan's Project Managers Jason Hime and Larry Stipp. Special thanks are offered to Alison Branco, Dorian Dale, DeWitt Davies, Lauretta Fischer and John Sohngen, who contributed new chapters to this final Plan and to Doug Feldman and Andrew Rapiejko for their vital contributions throughout the program.



SUFFOLK COUNTY
COMPREHENSIVE
WATER RESOURCES
MANAGEMENT PLAN

Table of Contents

TABLE OF CONTENTS

Executive Summary **ES-1**

Section 1 Valuing Water **1-1**

1.1 The Value Proposition 1-1
1.2 Global Water Security & Scarcity 1-6
1.3 Public Opinion/Outreach 1-12
1.4 Messaging: Scare and/or Care 1-16
1.5 The *Value* Proposition of Home Improvement 1-19
1.6 Confluence of Ecoinfluencers? 1-20
1.7 Ecosystem Services Valuation & Externalities 1-23
1.8 Living with Water-Learning & Earning 1-28

Section 2 Ways and Means to Address Water Quality **2-1**

2. 1 Infrastructure in the Age of Scarcity 2-2
2.1.1 Conventional Financing 2-4
2.1.2 Dedicated Funding Streams 2-10
2.1.3 Niche Funding 2-15
2.2 Wastewater Management District –Extending Septic Upgrades to the Untreated 74% 2-16
2.2.1 Current Suffolk County Construction Standards 2-17
2.2.2 Use of Innovative/Alternative Systems in Massachusetts 2-17
2.2.3 Wastewater Management District 2-19
2.2.4 Responsible Management Entity (RME) 2-19
2.3 Operational Efficiencies: Synergies of Consolidation 2-27
2.4 Comprehensive Water Resources Management 2-29
2.4.1 Integration of Water Supply and Wastewater Management 2-29
2.4.2 Case in Point: Seeking Means beyond Grants… 2-34

IBM Smarter Cities Challenge Report ..... **follows 2-38**

Section 3 Groundwater Resources **3-1**

3.1 Problem Identification 3-1
3.1.1 Groundwater Quality 3-1
3.1.1.1 Background 3-1
3.1.1.2 Contaminants of Concern 3-3
3.1.1.3 Nitrate 3-4
3.1.1.4 Volatile Organic Compounds 3-45
3.1.1.5 Pesticides 3-69
3.1.1.6 Other Contaminants of Potential Concern 3-85
3.1.1.7 Summary 3-100
3.1.2 Groundwater Quantity 3-102
3.1.2.1 Water Balances 3-102
3.1.2.2 Main Body Water Balance 3-103
3.1.2.3 North Fork Water Balance 3-108
3.1.2.4 South Fork Water Balance 3-110

TABLE OF CONTENTS

3.1.2.5 Shelter Island Water Balance 3-111
3.1.2.6 Countywide Water Balances 3-116
3.1.2.7 Summary of Water Balance Results 3-118
3.1.2.8 Sea Level Rise 3-118
3.1.2.9 Sea Level Rise Summary 3-135
3.2 Groundwater Resource Management Goals and Objectives 3-135
3.3 Recommendations 3-139
3.3.1 Introduction 3-139
3.3.2 New Development 3-139
3.3.2.1 Recommendation for Open Space Preservation 3-139
3.3.2.2 Recommendations for New Developments 3-144
3.3.3 Existing Developed Areas 3-149
3.3.3.1 Recommendations to Evaluate Sanitary Wastewater Treatment and Disposal Options 3-149
3.3.3.2 Recommendations with Respect to Nitrate Loads from Fertilization 3-152
3.3.4 Recommendations to Address Volatile Organic Compound Contamination 3-155
3.3.4.1 Recommendations to Address Volatile Organic Compounds from Soil Vapor 3-157
3.3.5 Recommendations to Address Pesticides 3-158
3.3.6 Recommendations to Address Pharmaceuticals and Personal Care Products 3-160
3.4 Establishment/Enhancement of Groundwater Monitoring Programs 3-168
3.4.1 Groundwater Quality Monitoring 3-169
3.4.1.1 Drinking Water Supply Well Monitoring 3-170
3.4.1.2 Countywide Groundwater Quality Trend Monitoring 3-175
3.4.1.3 Saltwater Intrusion Monitoring 3-178
3.4.1.4 Special Studies Monitoring 3-180
3.4.1.5 Summary 3-181
3.4.2 Groundwater Quantity Monitoring 3-181
3.4.2.1 Water Levels 3-182
3.4.3 Data Management and Reporting 3-182
3.5 Public Outreach and Education 3-186
3.6 Summary of Recommendations 3-190
3.7 Implementation 3-195
3.7.1 Implementation Framework 3-195
3.7.2 Implementation Responsibilities 3-199
3.7.3 Assessment Monitoring 3-200

Section 4 Drinking Water Supply 4-1

4.1 Problem Identification 4-1
4.1.1 Resource Limitations 4-2
4.1.1.1 Groundwater Quality Limitations 4-2
4.1.1.2 Groundwater Quantity Limitations 4-3
4.1.2 Infrastructure Limitations 4-4

TABLE OF CONTENTS

4.1.2.1 Non-Community Supply Limitations 4-5
4.1.2.2 Private Well Limitations 4-5
4.1.2.3 Peak Water Supply Demands 4-6
4.2 Drinking Water Supply Goals and Objectives 4-8
4.3 Recommendations to Address Drinking Water Supply 4-10
4.3.1 Introduction 4-10
4.3.2 Extension of Community Supplies 4-10
4.3.2.1 North Fork 4-11
4.3.2.2 South Fork 4-26
4.3.3 Additional Recommendations Pertaining to Private Wells 4-33
4.3.4 County-wide Peak Pumping Demands 4-34
4.3.4.1 Rain Sensor Shut-off Devices 4-38
4.3.4.2 Conservation Program 4-38
4.3.4.3 Seasonal Rate Structure 4-40
4.3.4.4 Odd/Even Watering Restrictions 4-42
4.3.5 Supply and Pumpage Monitoring 4-42
4.4 Implementation 4-47
4.4.1 Implementation Framework 4-47
4.4.1.1 Extension of Community Water Supplies 4-47
4.4.1.2 Conservation 4-47
4.4.1.3 Monitoring, Data Management, Evaluation and Coordination 4-49
4.4.2 Implementation Responsibilities 4-52
4.4.3 Assessment Monitoring 4-53

Section 5 Surface Water Resources 5-1

5.1 Problem Identification 5-2
5.1.1 Fresh Surface Water Resources 5-2
5.1.2 Coastal and Marine Resources 5-19
5.1.2.1 Long Island Sound 5-32
5.1.2.2 Peconic Estuary 5-34
5.1.2.3 South Shore Estuary Reserve and Southern Coastal Waters 5-37
5.1.3 Contaminants of Emerging Concern 5-38
5.1.4 Summary 5-38
5.2 Goals and Objectives 5-38
5.3 Recommendations 5-42
5.3.1 Introduction 5-42
5.3.2 New Development 5-42
5.3.2.1 Recommendation for Open Space Preservation 5-42
5.3.2.2 Recommendations for New Developments 5-49
5.3.3 Existing Developed Areas 5-53
5.3.3.1 Recommendations to Evaluate Sanitary Wastewater Treatment and Disposal Options 5-53
5.3.3.2 Recommendations with Respect to Nitrate Loads from Fertilization 5-54
5.3.4 Recommendations to Address Volatile Organic Compound Contamination 5-58

TABLE OF CONTENTS

5.3.5 Recommendations to Address Pesticides 5-59
5.3.6 Recommendations to Address Pharmaceuticals and Personal Care Products 5-61
5.3.7 Wastewater Treatment Recommendations 5-64
5.3.8 Stormwater Management Recommendations 5-67
5.4 Establishment/Enhancement of Surface Water Monitoring Programs 5-69
5.4.1 Beach Monitoring 5-69
5.4.2 Estuary Program Monitoring 5-72
5.4.3 Stream and Pond Monitoring 5-72
5.4.4 Special Studies 5-85
5.4.5 Data Management and Reporting 5-86
5.5 Public Outreach and Education 5-90
5.6 Summary of Recommendations 5-94
5.7 Implementation 5-98
5.7.1 Implementation Framework 5-98
5.7.2 Implementation Responsibilities 5-99
5.7.3 Assessment Monitoring 5-100

Section 6 Estuary Programs 6-1

6.1 Introduction 6-1
6.2 The Peconic Estuary 6-5
6.2.1 Introduction 6-5
6.2.2 Problem Identification 6-7
6.2.3 Goals and Objectives 6-8
6.2.3.1 Existing Metrics 6-11
6.2.4 Recommendations 6-12
6.2.4.1 Nitrogen: "Public Enemy Number One" 6-12
6.2.4.2 Nutrients 6-13
6.2.4.3 Harmful Algal Blooms (HABs) 6-16
6.2.4.4 Habitat and Living Resources 6-16
6.2.4.5 Pathogens 6-18
6.2.5 Implementation 6-20
6.2.5.1 Programmatic Mechanisms 6-20
6.2.5.2 Funding Mechanisms 6-21
6.2.6 Education and Outreach 6-23
6.3 Long Island Sound 6-24
6.3.1 Introduction 6-24
6.3.2 Background and Problem Identification 6-26
6.3.3 Themes, Goals, Targets, Outcomes, Objectives and Strategies 6-30
6.3.3.1 Existing Metrics 6-31
6.3.4 Recommendations 6-33
6.3.5 Implementation 6-34
6.3.6 Education and Outreach 6-35
6.4 South Shore Estuary 6-35

TABLE OF CONTENTS

6.4.1 Introduction 6-35
6.4.1.1 Overview of the Long Island SSER 6-36
6.4.2 Problem Identification 6-36
6.4.3 Goals and Objectives 6-38
6.4.4 Recommendations 6-41
6.4.4.1 Recommendations to Reduce and Control Nonpoint Source Pollution 6-41
6.4.4.2 Recommendations to Enhance Point Source Controls 6-46
6.4.4. 3 Recommendations to Implement EPA's Storm Water Phase II Final Rule 6-48
6.4.4.4 Recommendations to Address Information Needs 6-49
6.4.5 Implementation 6-50
6.5 Summary 6-63

Section 7 Coastal Resiliency 7-1

7.1 Coastal Facts 7-2
7.2 Coastal Vulnerability/Sea Level Rise 7-3
7.3 Coastal Resiliency & Risk Management 7-8
7.3.1 Strategic Retreat/ Staying Put 7-9
7.3.2 Fire Island to Montauk Point (FIMP) 7-13
7.3.3 Rebuild by Design 7-19
7.3.4 New York Rising Community Reconstruction Program 7-22
7.4 Wetland Stewardship Strategy 7-25
7.5 Drainage Strategies in Chronically Flooded Areas 7-30
7.6 Hard Defenses 7-31

Section 8 Wastewater Management 8-1

8.1 Problem Identification 8-1
8.1.1 The History of Wastewater Management in Suffolk County 8-3
8.1.1.1 Population Growth and Construction Trends 8-3
8.1.1.2 Current Methods of Reducing/Limiting Wastewater Effluent Nitrogen Loading 8-6
8.1.1.3 On-site Sewage Disposal Systems 8-11
8.1.1.4 Sewage Treatment Plants and Sewering 8-17
8.1.2 Environmental Impacts due to Wastewater Effluent 8-24
8.1.2.1 Status and Trends of Nitrogen in Suffolk County Groundwater 8-24
8.1.2.2 Status and Trends of Wastewater Impacts to Suffolk County Surface Waters 8-27
8.1.2.3 Impacts and Trends of Other Wastewater Effluent Constituents 8-29
8.1.3 Contaminants of Emerging Concern (CEC) Treatability Considerations 8-35
8.1.3.1 On-site Wastewater Treatment Systems 8-36
8.1.3.2 Conventional Wastewater Treatment Plants 8-48
8.1.3.3 Sequencing Batch Reactors & Membrane Bioreactors 8-59
8.1.3.4 Advanced Treatment Options 8-62
8.1.4 Recommendations for Suffolk County: Planning for the Future 8-64
8.1.4.1 Design Parameters for OWTSs 8-65

TABLE OF CONTENTS

8.1.4.2 Monitoring Indicators for CECs Treatment Performance 8-67
8.1.4.3 Research on Emerging Monitoring Tools 8-69
8.1.5 Impacts of Rising Sea Level on Wastewater Treatment 8-75
8.1.5.1 Groundwater and Sea Level Trends 8-76
8.1.5.2 Groundwater Model Simulation Results 8-76
8.1.5.3 Summary 8-83
8.1.6 Section Summary 8-85
8.2 Goals and Objectives 8-87
8.2.1 Goals to Meet Water Quality Initiatives 8-87
8.2.1.1 Direct Wastewater Effluent Discharge Goals 8-87
8.2.1.2 Indirect Goals Attributed to Direct Wastewater Effluent Discharge Goals 8-87
8.2.2 Objectives to Meet Water Quality Initiatives 8-88
8.2.2.1 Wastewater Management Plan Implementation Timeline to Meet Goals .. 8-88
8.2.2.2 Sewering Objectives to Meet Wastewater Goals 8-88
8.2.2.3 On-Site Wastewater Treatment System Objectives to Meet Wastewater Goals 8-90
8.2.3 Section Summary 8-91
8.3 Recommendations 8-92
8.3.1 Establish Wastewater Nitrogen Load Targets for Sub-Watersheds and Public Water Supply Well to Maintain and Improve Water Quality 8-92
8.3.1.1 Create a GIS Based Wastewater Treatment Map Defining Wastewater Treatment Options for Suffolk County Based On Established Nitrogen Load Targets 8-93
8.3.2 Implement an On-Site Sanitary System Upgrade Program and Sewage Treatment Plant Upgrade Program 8-94
8.3.3 Onsite Wastewater Treatment System Technologies 8-99
8.3.3.1 Develop an Innovative/Alternative Onsite Wastewater Treatment System Program 8-99
8.3.4 Expanding and/or Creating New Sewer districts (Centralized or Decentralized) 8-116
8.3.4.1 Bellport Feasibility Study 8-118
8.3.4.2 Flanders Riverside Sewering Feasibility Study 8-119
8.3.4.3 Mastic/Shirley Sewering Feasibility Study 8-120
8.3.4.4 Sayville Feasibility Study 8-120
8.3.4.5 Southampton Village Feasibility Study 8-121
8.3.4.6 Deer Park, North Babylon, West Babylon, Wyandanch, Wheatley Heights, and West Islip Feasibility Study 8-121
8.3.5 Improvements to Sewage Treatment Plant Technologies 8-122
8.3.6 Section Summary 8-136
8.4 Implementation 8-137
8.4.1 Responsibilities of Suffolk County 8-137
8.4.1.1 Study to Identify Priority Areas and Classify Wastewater Treatment Requirements for Each Area 8-137

TABLE OF CONTENTS

8.4.1.2 SCDHS Sanitary Code and Construction Standards 8-139
8.4.1.3 Creation and Functions of a Responsible Management Entity to Oversee Funding, Operation, and Maintenance of an I/A OWTS Program 8-144
8.4.1.4 Permitting and Evaluation of Innovative/Alternative Onsite Wastewater Treatment Systems for Use in Suffolk County 8-146
8.4.1.5 Funding of Innovative/Alternative Onsite Wastewater Treatment Systems (I/A OWTS) 8-148
8.4.1.6 Decentralized Sewage Treatment Plant Systems 8-152
8.4.1.7 Public Sewer District Expansions and/or Creation in Identified Priority Areas (Centralized/Municipal) 8-153
8.4.2 Responsible Management Entity 8-158
8.4.3 Property Owners 8-160
8.4.4 Contractors and Design Professionals 8-161
8.4.5 Summary 8-161
8.5 Section References 8-163

Section 9 Recommendations and Implementation 8-1

9.1 Recommendations 8-1
9.2 Implementation 8-19
9.2.1 Assessment Monitoring 8-20

Section 10 References 8-1

TABLE OF CONTENTS

List of Figures

Figure 1-1 L.A. Aqueduct Dynamited in Response to Being SOLD Out in the Owens Valley 1-2
Figure 1-2 Government Says It Needs Money for Infrastructure, But Some Citizens Say They Are Willing to Go to Prison for Refusing to Pay 1-4
Figure 1-3 Water Required to Produce Clothing and Food 1-12
Figure 1-4 Reclaim Our Waters Initiatives Completed in 2014 1-15
Figure 2-1 Financing Methods for Water and Wastewater Facilities in the United States 2-7
Figure 2-2 Special Purpose Entity 2-8
Figure 2-3 Aquifer Protection Fee 2-11
Figure 2-4 Overview of Clean Water State Revolving Funding 2-23
Figure 2-5 The New Sunrise Corridor as Proposed by the Rebuild by Design/Interboro Team 2-34
Figure 3-1 Community Supply Well Susceptibility Ratings for Nitrates 3-6
Figure 3-2 Relationship between Susceptibility Ratings and Nitrate Concentrations in Community Supply Wells 3-7
Figure 3-3a Average Nitrate Concentrations in the Upper Glacial Aquifer in 2013 3-9
Figure 3-3b Average Nitrate Concentrations in the Magothy Aquifer in 2013 3-9
Figure 3-3c Average Nitrate Concentrations in the Lloyd Aquifer in 2013 3-9
Figure 3-4 Groundwater Management Zones 3-10
Figure 3-5a Nitrate Concentrations in Private Wells, 1997-2006 3-11
Figure 3-5b Nitrate Concentrations in Private Wells 2007-2013 3-12
Figure 3-6a Nitrate Trends in Public Supply Wells Screened in the Upper Glacial Aquifer 1987-2013 3-15
Figure 3-6b Nitrate Trends in Public Supply Wells Screened in the Magothy Aquifer 1987-2013. 3-15
Figure 3-7 Density & Nitrogen Concentrations in Groundwater 3-17
Figure 3-8 Nitrate Concentrations and Changes in Land Use over Time within the Recharge Area to the Woodchuck Hollow Road Wellfield 3-18
Figure 3-9 Nitrate Concentrations and Changes in Land Use over Time within the Recharge Area to the Bicycle Path Road Wellfield 3-22
Figure 3-10 Residential Parcels Less than or Equal to ½ Acre 3-32
Figure 3-11 Residential Parcels Less than or Equal to ¼ Acre 3-33
Figure 3-12 Nitrogen Loading Simulation – ¼ Acre Density 3-40
Figure 3-13 Nitrogen Loading Simulation – 1/2 Acre Density 3-41
Figure 3-14 Nitrogen Loading Simulation 1 Acre Density 3-42
Figure 3-15 Nitrogen Loading Simulation – 2 Acre Density 3-43
Figure 3-16 Simulated Hypothetical Nitrogen Concentrations at SCWA Country Club Drive Wellfield 3-44
Figure 3-17 Community Supply Well Susceptibility Ratings for VOCs 3-46
Figure 3-18a Average PCE Concentrations in the Upper Glacial Aquifer in 2013 3-48
Figure 3-18b Average PCE Concentrations in the Magothy Aquifer in 2013 3-48
Figure 3-18c Average PCE Concentrations in the Lloyd Aquifer in 2013 3-48
Figure 3-19a Average TCE Concentrations in the Upper Glacial Aquifer in 2013 3-52
Figure 3-19b Average TCE Concentrations in the Magothy Aquifer in 2013 3-52
Figure 3-19c Average TCE Concentrations in the Lloyd Aquifer in 2013 3-52

TABLE OF CONTENTS

Figure 3-20a Average TCA Concentrations in the Upper Glacial Aquifer in 2013 3-55
Figure 3-20b Average TCA Concentrations in the Magothy Aquifer in 2013 3-55
Figure 3-20c Average TCA Concentrations in the Lloyd Aquifer in 2013 3-55
Figure 3-21a Average MTBE Concentrations in the Upper Glacial Aquifer in 2013 3-59
Figure 3-21b Average MTBE Concentrations in the Magothy Aquifer in 2013 3-59
Figure 3-21c Average MTBE Concentrations in the Lloyd Aquifer in 2013 3-59
Figure 3-22 MTBE Detections in Private Wells from 1997 through 2007 (Source: SCDHS) 3-61
Figure 3-22a MTBE Detections in Private Wells through 2013 (Source: SCDHS) 3-63
Figure 3-23 VOC Detections in Private Wells from 1997 through 2013 (Source: SCDHS) 3-64
Figure 3-24 Facilities Storing or Using Hazardous Materials 3-68
Figure 3-25 Community Supply Well Susceptibility Ratings for Pesticides 3-75
Figure 3-26 Community Public Water Supply Well Pesticide Samples 3-76
Figure 3-26a Detections of Metalaxyl between 1997 and 2010 (from SCDHS, 2011) 3-78
Figure 3-27 Trends in Maximum Aldicarb, Metolachlor and TCPA Concentrations Detected by SCDHS 3-79
Figure 3-28 Trends in Median Aldicarb, Metolachlor and TCPA Concentrations Detected by SCDHS 3-79
Figure 3-29 Average Perchlorate Concentration in the Upper Glacial, Magothy and Lloyd Aquifers – Community and Non-Community Supply Wells - 2005 3-87
Figure 3-30 1,4 Dioxane Detections in Community Supply Wells 2013-2014 3-99
Figure 3-31 Main Body Flow Model 3-104
Figure 3-32 North Fork Flow Model 3-109
Figure 3-33 South Fork Flow Model 3-113
Figure 3-34 Shelter Island Flow Model 3-114
Figure 3-35 Carmans River Runoff and Baseflow 3-119
Figure 3-36 Carlls River Runoff and Baseflow 3-119
Figure 3-37a Simulated Increase in Water Table Elevation Due to a Sea Level Rise of 34 Inches by 2100 3-122
Figure 3-37b Simulated Increase in Heads in the Magothy Aquifer Due to a Sea Level Rise of 34 Inches by 2100 3-123
Figure 3-37c Simulated Increase in Heads in the Lloyd Aquifer Due to a Sea Level Rise of 34 Inches by 2100 3-124
Figure 3-38 Simulated Increase in the Water Table on the North Fork Due to a Sea Level Rise of 34 Inches by 2100 3-126
Figure 3-39 North Fork Cross-Section – Simulated Impact of a 34-inch Rise in Mean Sea Level in 2100 3-127
Figure 3-40 Simulated Increase in the Water Table on the South Fork Due to a Sea Level Rise of 34 Inches by 2100 3-128
Figure 3-41 South Fork Cross-Section – Simulated Impact of a 34-inch Rise in Mean Sea Level in 2100 3-129
Figure 3-42 Simulated Increase in the Water Table on Shelter Island due to a Sea Level Rise of 34 Inches by 2100 3-131
Figure 3-43 Shelter Island Cross-Section – Simulated Impact of a 34-inch Rise in Mean Sea Level in 2100 3-132

TABLE OF CONTENTS

Figure 3-44 Shelter Island Cross Section – Simulated Impact of a 34-inch Rise in Mean Sea Level in 2100 3-133
Figure 3-45 On-shore Discharge Nodes in Shelter Island Groundwater Model - Baseline and after a 34-inch Sea Level Rise 3-134
Figure 3-46 Vacant Land within the 50 Year Contributing Areas to Community Supply Wells 3-143
Figure 3-47 Areas Contributing to Community Supply Wells and Surface Waters 3-148
Figure 3-48 Area Contributing Recharge to Community Supply Wells within 50 Years 3-150
Figure 3-49 Land Use and Monitoring Wells 3-177
Figure 3-50 Sample Powerpoint Lesson: Potential Groundwater Pathways to Supply Wells and Surface Waters 3-189
Figure 4-1 – Summer Water Supply Pumping Associated with Increased Outdoor Water Use and Automated Irrigation Systems has Significantly Increased in Recent Years 4-7
Figure 4-2- Peak SCWA Demand in 2008 4-7
Figure 4-3 – Potential New Supply Wells in Southold for 2030 Water Demand with No Conservation 4-17
Figure 4- 4 Change in Saltwater Interface Elevation in 2030 with No Conservation 4-18
Figure 4-5 Simulated Water Table Drawdown in Southold and Riverhead in 2030 with No Conservation 4-19
Figure 4-6 Potential New Supply Wells in Southold in 2030, with No Conservation 4-20
Figure 4-7 Simulated Position of the Saltwater Interface in Southold at 2030 under Existing Pumping Conditions (blue) and 2030 Pumping Conditions (red). 4-21
Figure 4-8 Simulated Water Table Drawdown (from Existing Pumping Conditions) in Southold in 2030 with No Conservation 4-22
Figure 4-9 Simulated Drawdown from Southold Water Demand from Baseline (Existing) with Conservation 4-23
Figure 4-10 Western Residential Areas in East Hampton Not Served by Public Supply 4-28
Figure 4-11 Eastern Areas in Southampton Not Served by Public Supply 4-29
Figure 4-12 Properties with Suffolk County Water Authority Easements (Source: SCWA, 2010) 4-30
Figure 4-13 Average Monthly Pumping from SCWA Distribution Area 1 4-36
Figure 5-1 Map of the 12 Selected Streams 5-12
Figure 5-2 Average Nitrate Concentrations in Streams (2000 -2005 and 2013-2014, SCDHS) 5-15
Figure 5-3 Nitrate Concentrations in Sampawams Creek 5-15
Figure 5-4 Land Use Classifications within the Groundwater Contributing Areas to Carlls River and Sampawams Creek 5-17
Figure 5-5 Groundwater Contributing Areas to Carlls River and Sampawams Creek 5-18
Figure 5-6 Suffolk County Coastal Waters Sampling Stations 5-20
Figure 5-7 Average Annual TN Concentrations (mg/L) by Year at Select Sampling Locations within North Shore Embayments 5-33
Figure 5-8 Average Annual TN Concentrations (mg/L) by Year at Selectd Sampling Locations within Peconic Bay 5-35
Figure 5-9 Areas Contributing Groundwater Baseflow to Surface Waters 5-47
Figure 5-10 Vacant Land within the 25 Year Baseflow Contributing Area to Surface Waters 5-48

TABLE OF CONTENTS

Figure 5-11 Total Nitrogen Concentration and Trends in South Shore Estuary Sampling Stations, 1976-2013 5-50
Figure 5-12 Average Annual Total Nitrogen Concentrations (mg/L) by Year at Select Sampling Locations within the South Shore Estuary 5-51
Figure 5-13 Beaches Monitored by Suffolk County Department of Health Services 5-71
Figure 5-14 Suffolk County Department of Health Services Sampling Locations Huntington-Northport Harbor 5-73
Figure 5-15 Suffolk County Department of Health Services Sampling Locations Nissequogue and Stony Brook Harbor 5-74
Figure 5-16 Suffolk County Department of Health Services Sampling Locations Port Jefferson Harbor 5-75
Figure 5-17 Suffolk County Department of Health Services Sampling Locations Mount Sinai Harbor 5-76
Figure 5-18 Suffolk County Department of Health Services Sampling Locations Mattituck Creek 5-77
Figure 5-19a Suffolk County Department of Health Services Marine Monitoring Locations Peconic Estuary 5-78
Figure 5-19b Suffolk County Department of Health Services Sampling Locations Stream Monitoring Locations Peconic Estuary 5-79
Figure 5-20 Suffolk County Department of Health Services Monitoring Locations South Shore Estuary Reserve (SSER) 5-80
Figure 5-21 Suffolk County Department of Health Services Monitoring Locations Great South Bay 5-81
Figure 5-22 Suffolk County Department of Health Services Monitoring Locations Moriches Bay 5-82
Figure 5-23 Suffolk County Department of Health Services Monitoring Locations Shinnecock Bay 5-83
Figure 5-24 Recommended Stream Sampling Stations 5-84
Figure 5-25 Potential Groundwater Pathways to Supply Wells and Surface Waters 5-92
Figure 6-1 Estuary Management Program Boundaries 6-3
Figure 6-2 Commercial Landings and Value of Bay Scallops from the Peconic Estuary 6-6
Figure 7-1 Distressed Dolphin – Gilgo Beach, Long Island 7-1
Figure 7-2 Exposed Sub-foundation of Old Gilgo Coast Guard Station after Sandy Swept Away 8 Foot Depth of Sand 7-1
Figure 7-3 In Advance of Sandy, NASA Satellite Images of Unprecedented Greenland Ice Sheet Melt from July 8-12, 2012, Melt Area Going from 40% of the Ice Sheet to 97% (Previous Maximum 55%) NASA; CNES; Center for Remote Sensing of Ice Sheets, U Kansas . 7-2
Figure 7-4 Predicted Future Storm Surge Risk Resulting from Sea Level Rise 7-3
Figure 7-5 Increase in Average Global Temperature 7-4
Figure 7-6 Water Floods the Brooklyn Battery Tunnel in Lower Manhattan as Hurricane Sandy Pounds 10/29/12 7-5
Figure 7-7 Intergovernmental Panel on Climate Change Summary for Policymakers 7-7
Figure 7-8 Sea Level Rise Projections 7-9
Figure 7-9 Tornado-related Loss is on Par with Hurricanes for Inland Areas that are Far Less Densely Populated than Coasts 7-11
Figure 7-10 Long Beach, Long Island Elevation 7-12

TABLE OF CONTENTS

Figure 7-11 Fire Island to Montauk Point Reformulation Study Area 7-14
Figure 7-12 Stratigraphy of the Shallow Seabed Using Ultra-high Resolution Seismic Reflection Systems (CHIRP) 7-16
Figure 7-13 Proposed Restoration Areas 7-18
Figure 7-14 Drivers and Processes that Influence Vertical Wetlands Development 7-26
Figure 7-15 Portland Street with Pavers in Parking Lanes and Lindenhurst Library with Porous Parking Lot 7-31
Figure 8-1 Map of Areas for Advanced Treatment 8-3
Figure 8-2 Suffolk County Population Growth 8-4
Figure 8-3 Suffolk County Housing Units 8-5
Figure 8-4 Abandoned United Artist Movie Theater Located in Coram (Left) and Renderings of Proposed Residential-Commercial Buildings to be Constructed on the Site (Right) 8-6
Figure 8-5 Suffolk County Sanitary Code Article 6 Groundwater Management Zone Map 8-7
Figure 8-6 Aerial Photo of Bergen Point STP (Courtesy of Newsday) 8-10
Figure 8-7 Suffolk County Great South Bay Coastal Resiliency Projects 8-12
Figure 8-8 Block Leaching Pool Detail -SCDHS Residential Standards Prior to 1972 8-13
Figure 8-9 Precast Leaching Rings (Left) & Typical System layout (Right) 8-14
Figure 8-10 Kings Park State Hospital Sewage Disposal Facilities Circa 1935[10] 8-19
Figure 8-11 Aerial photo of Kings Park STP in 1978 (Left) and 2013 (Right) 8-19
Figure 8-12 CromaFlow (Left) and BESST (Right) Treatment Tanks 8-23
Figure 8-13 E/One Low-Pressure Pump Station (Model DH-152) 8-24
Figure 8-14 Average Nitrate Concentration of Same Wells Tested In 1987, 2005, and 2013 8-26
Figure 8-15 Average Nitrate Concentration of All Wells Tested In 1987, 2005, and 2013 8-27
Figure 8-16 Plot of Absorption Coefficients of Pharmaceuticals over a Range of Wavelengths (reproduced from Pereira et al., 2007) 8-55
Figure 8-17 Output Wavelengths for UV lamps Shown with the Effective Germicidal Region for UV Disinfection; from http://www.americanairandwater.com/images/uv-lamp-output.gif 8-55
Figure 8-18 Example of a 3D EEM Map Obtained in a Recent Study Tracking Effluent Organic Matter in an Environmental Sample 8-71
Figure 8-19 Monthly Sea Level Height over Time (Relative to the Revised Local Reference (RLR); from Zhang et al, 2014) 75
Figure 8-20 Simulated Depth to the Water Table 8-77
Figure 8-21 Simulated Discharge Nodes at Surface 8-79
Figure 8-22 Impact of Rising Sea Level on Select Parcels on the North Fork 8-80
Figure 8-23 Impact of Rising Sea Level on Select Parcels on the North Fork 8-81
Figure 8-24 Simulated Depth to Groundwater on the South Fork 8-82
Figure 8-25 Simulated Depth to Groundwater on Shelter Island 8-84
Figure 8-26 Diagram of Timeline and Interconnections between Program Phases 8-89
Figure 8-27 Wastewater Management Timeline 8-90
Figure 8-28 Picture of a Collapsed Cesspool 8-95
Figure 8-29 SCDHS Leaching Pool Detail with Requirement to Maintain 1 ft above Groundwater Prior to 1972 8-95

TABLE OF CONTENTS

Figure 8-30 Example of I/A OWTS Approval Timeline....8-102
Figure 8-31 Barnstable County BioMicrobics FAST Total Nitrogen Effluent Data Graph....8-105
Figure 8-32 Example Recirculating Sand Filters (RSF)....8-108
Figure 8-33 Recirculating Constructed Wetlands Systems (AKA recirculating gravel filter)....8-109
Figure 8-34 Norweco Singulair TNT....8-111
Figure 8-35 Norweco's Hydro-Kinetic System....8-112
Figure 8-36 Busse Green Technologies, Inc. BUSSE MF 400....8-112
Figure 8-37 Orenco Systems AdvanTex AX20....8-113
Figure 8-38 Orenco Systems AdvanTex AX-RT....8-114
Figure 8-39 Geomat Flat leaching system by Geomatrix....8-115
Figure 8-40 Wasteflow Dripline with Rootguard by Geoflow Example Layout....8-116
Figure 8-41 Map of Wyandanch, Deer Park, West Babylon, North Babylon, and West Islip Sewer Feasibility Study Area....8-117
Figure 8-42 Map of Yaphank, Mastic-Shirley, Sayville, Bellport, North Bellport, Flanders, Southampton Village, Lake Ronkonkoma HUB, and NY 25 Corridor Sewer Feasibility Study Areas....8-118
Figure 8-43 Conventional Extended Aeration Process....8-123
Figure 8-44 Denitrification Process with Addition of Methanol as Carbon Food Source....8-124
Figure 8-45 Denitrification Process with Incoming Effluent used as Carbon Food Source....8-125
Figure 8-46 Upflow Continuous-backwash Filter....8-126
Figure 8-47 Rotating Biological Contractors....8-127
Figure 8-48 Sequencing Batch Reactor with Pre-aeration Tank[31]....8-128
Figure 8-49 CromoFlow Process Tank....8-129
Figure 8-50 Biologically Engineered Single Sludge Treatment (BESST) Flow Diagram....8-130
Figure 8-51 Membrane Bioreactor (MBR) Flow Diagram....8-131
Figure 8-52 New and Existing STP's at Fairfield Commack (Top), Inside Existing Extended Aeration STP at Fairfield Commack (Bottom Left), and Inside New MBR STP at Fairfield Commack (Bottom Right)....8-132
Figure 8-53 Town of Riverhead STP Water Reuse Schematic....8-133
Figure 8-54 Aerials of SCDPW Port Jefferson STP in 2004 (Left) and 2010 (Right)....8-134
Figure 8-55 Aerials of SCDPW Kings Park STP in 2001 (Left) and 2013 (Right)....8-134
Figure 8-56 Aerials of SCDPW Hauppauge STP in 2004 (Left) and 2014 (Right)....8-135
Figure 8-57 Aerials of SCDPW Hauppauge STP Leaching in 2004 (Left) and 2014 (Right)....8-135
Figure 8-58 Distribution of South Shore Coastal Vegetation 1930....8-157
Figure 8-59 Distribution of South Shore Coastal Vegetation 2002....8-157
Figure 8-60 Distribution of South Shore Coastal Vegetation 2012....8-158

TABLE OF CONTENTS

List of Tables

Table 2-1 Summary of On-site Wastewater Treatment Systems Management Models 2-25
Table 2-2 IBM Smarter Cities Challenge Report Recommendation 2-30
Table 3-1 Nitrate Concentration from Community and Non-Community Supply Wells 3-14
Table 3-2 Water Quality Summary for Nitrate (as Nitrogen), Ammonia and Total Nitrogen from the 1987 Comprehensive Water Resources Management Plan (from Dvirka and Bartilucci, 1987) 3-17
Table 3-3 Summary of Calculated and Observed Nitrate Concentrations 3-20
Table 3-4 Residential Parcels Smaller than or Equal to One-Half Acre 3-31
Table 3-5 Residential Parcels Smaller than or Equal to One-Quarter Acre 3-34
Table 3-6 Summary of Residential Parcel Size for All Parcels Intersecting the Water Table Contributing Areas for the 29 Identified Wellfields 3-35
Table 3-7 Tetrachloroethene (PCE) Concentrations from Community and Non-Community Supply Wells 3-49
Table 3-8 Trichloroethene (TCE) Concentrations from Community and Non-Community Supply Wells 3-53
Table 3-9 1,1,1 Trichloroethane (TCA) Concentrations from Community and Non-Community Supply Wells 3-56
Table 3-10 Methyl Tert-Butyl Ether (MTBE) Concentrations from Community and Non-Community Supply Wells 3-60
Table 3-11 Pesticide Analytes Tested by SCDHS PEHL, 2014 3-72
Table 3-11a Pesticides Detected by SCDHS, 1997-2014 3-73
Table 3-11b Wells Sampled for Pesticides by SCDHS, 2011 through 2013 3-74
Table 3-12 Metalaxyl, Atrazine and Imidicloprid Data Trends in Community, Non-community and Private Wells 3-80
Table 3-13 Pesticide Detections in Community Supply Wells (2011 through 2013)* 3-83
Table 3-14 Pesticide Detections in Golf Course Monitoring Wells since 1999 (SCDHS, 2014) 3-84
Table 3-15 Perchlorate Concentrations from Community and Non-Community Supply Wells 3-88
Table 3-16 PPCPs Currently Analyzed by the Suffolk County PEHL and Maximum Concentrations Detected 3-94
Table 3-17 Preliminary Sample Results for PhAcs from Groundwater Collected in Suffolk County (from Benotti and Brownawell, 2005) 3-95
Table 3-18 Main Body Flow Model – Predevelopment Water Balance (All Flows in MGD) 3-105
Table 3-19 Main Body Flow Model Present Day Water Balance 3-106
Table 3-20 North Fork Flow Model Predevelopment Water Balance (All Flows in MGD) 3-108
Table 3-21 North Fork Flow Model Present Day Water Balance (All Flows in MGD) 3-110
Table 3-22 South Fork Flow Model Predevelopment Water Balance (All Flows in MGD) 3-112
Table 3-23 South Fork Flow Model Present Day Water Balance (All Flows in MGD) 3-112
Table 3-24 Shelter Island Flow Model Predevelopment Water Balance (All Flows in MGD) 3-115
Table 3-25 Shelter Island Flow Model Present Day Water Balance (All Flows in MGD) 3-115
Table 3-26 Suffolk County Predevelopment Water Balance (All Flows in MGD) 3-116
Table 3-27 Suffolk County Present Day Water Balance (All Flows in MGD) 3-117
Table 3-28 Groundwater Resource Management Goals and Objectives 3-137

TABLE OF CONTENTS

Table 3-29 Recommended New Analytes for SCDHS PEHL....3-161
Table 3-30 Analytes for Groundwater Monitoring Program....3-172
Table 3-31 Public Supply Well Monitoring Points....3-175
Table 3-32 Monitoring Wells and Suffolk County Land Uses....3-179
Table 3-33 Groundwater Protection Recommendations....3-191
Table 4-1 Projected Average 2030 Community Water Supply Pumpage....4-4
Table 4-2 Drinking Water Supply Goals and Objectives....4-9
Table 4-3 Community Water Supplies That Could be Improved by SCWA Takeover....4-11
Table 4-4 Conceptual Capital Cost Estimates for Southold Water Demand Alternatives....4-24
Table 4-5 Per Capita Water Usage by Town....4-35
Table 4-6 Potential Outdoor Conservation Measures....4-37
Table 4-7 Drinking Water Supply Recommendations....4-44
Table 4-8 Projected New Supply Wells Required with and without Conservation....4-48
Table 5-1 Suffolk County Fresh Surface Water Classifications and Impairments....5-3
Table 5-2 VOCs Most Frequently Detected in Suffolk County Streams, 2013-2014....5-13
Table 5-3 Pesticides Detected in Suffolk County Streams, 2013-2014....5-13
Table 5-4 Nitrate Concentrations in Streams in the Southwest Sewer District....5-16
Table 5-5 Analysis of Land Use within the Carmans River Groundwater Contributing Areas....5-21
Table 5-6 Coastal Marine Water Classifications and Impairments....5-22
Table 5-7 Suffolk County Impaired Waters....5-29
Table 5-8 Changes in Water Quality Post CCMP....5-37
Table 5-9 Surface Water Management Goals and Objectives....5-40
Table 5-10 Recommended New Analytes for SCDHS PEHL....5-62
Table 5-11 Suffolk County Bathing Beach Monitoring Program Summary....5-70
Table 5-12 Streams to be Included in SCDHS Sampling Program....5-85
Table 5-13 Surface Water Protection Recommendations....5-95
Table 6-1 Physical Characteristics of Suffolk County's Three Main Estuaries....6-2
Table 6-2 Watershed-based Management Programs in Suffolk County....6-2
Table 6-3 South Shore Estuary Study Recommendations to Reduce Nonpoint and Point Source Pollution....6-52
Table 6-4 South Shore Estuary Study Recommendations to Increase Shellfish Harvest and Protect and Restore Coastal Habitat....6-53
Table 6-5 South Shore Estuary Study Recommendations to Preserve Open Space and Improve Knowledge for Ecosystem Management....6-54
Table 6-6 South Shore Estuary Study Recommendations to Increase Public Use of the Estuary, Sustain Water-Dependent Businesses and Thriving Maritime Centers....6-55
Table 6-7 South Shore Estuary Study Recommendations to Increase Public Use of the Estuary, Sustain Water-Dependent Businesses and Thriving Maritime Centers....6-56
Table 6-8 Suffolk County Projects to Improve and Maintain Great South Bay Water Quality....6-60
Table 6-9 New York State-Assisted Projects to Improve and Maintain Great South Bay Water Quality....6-61
Table 6-10 Projects to Improve and Maintain Great South Bay Water Quality with Other Cooperators....6-62
Table 7-1 Employment and GDP in Coastal Communities – Nationwide and New York State....7-3

TABLE OF CONTENTS

Table 7-2 Sea Level Projections – Montauk Point Region/"Climate Change in New York State" 7-5
Table 7-3 Impacts of Sea Level Rise and Coastal Floods on Coastal Infrastructure Source: Climate Change Impacts in the United States – The Third National Climate Assessment..... 7-8
Table 7-4 Summary of Recorded Rolling Easement Options (J Titus, EPA, 2009).....7-10
Table 7-5 FIMP Annual Cost for Non-Structural and Beach Nourishment Plans 7-15
Table 7-6 Permeable Interlocking Concrete Pavers (PICP).....7-32
Table 7-7 Shoreline Armoring Alternatives *Source: U.S. Climate Change Science Program, January 2009. Coastal Sensitivity to Sea-Level Rise: A Focus on the Mid-Atlantic Region)*.....7-33
Table 7-8 Summary of Structural and Non-Structural Measures to Reduce Storm-Related Risks..7-36
Table 8-1 Residential Parcels Less Than or Equal to ½ Acre..... 8-9
Table 8-2 Residential Parcels Less Than or Equal to ¼ Acre..... 8-9
Table 8-3 Sewered vs Unsewered Residential Lots 8-9
Table 8-4 Estimated Sanitary Systems Pre-Dating Requirements for Septic Tanks.....8-15
Table 8-5 Suffolk County Demonstration Project I/A OWTS 8-17
Table 8-6 List of Suffolk County STPs (See Table 8-7 for Additional STPs).....8-20
Table 8-7 List of Suffolk County STPs (See Table 8-6 for Additional STPs).....8-21
Table 8-8 SCDHS STP Setback Requirements 8-22
Table 8-9 PPCPs currently Analyzed by the Suffolk County PEHL and Maximum Concentrations Detected 8-31
Table 8-10 Summary of PPCPs Found in Suffolk County WWTP Effluent.....8-32
Table 8-11 CEC Classes and Examples of Compounds in These Categories 8-37
Table 8-12 General Conclusions from Literature Regarding CEC Removal and Treatment in OWTSs.... 8-44
Table 8-13 Literature Reported Removal Efficiencies of Select CECs from OWTS Discharge.....8-45
Table 8-14 Removal of Pharmaceutical Compounds with Chlorination 8-50
Table 8-15 Summary of Ozone Dose and Treatment Efficiencies for Select Pharmaceuticals.....8-52
Table 8-16 Threshold (aerobic) SRTs Required to Achieve > 80% Removal of Targeted CECs.....8-58
Table 8-17 Indicators Recommended for Assessing Biological Treatment Performance.....8-68
Table 8-18 Example of Wastewater Treatment Categories Based on Future Study to Establish Nitrogen Load Targets 8-94
Table 8-19 Predicted SCDHS I/A OWTS Applications for Additions to Existing Dwellings.....8-97
Table 8-20 Predicted SCDHS I/A OWTS Applications for Existing Dwellings at The Time of Property Transfer.....8-98
Table 8-21 Summary of I/A OWTS Available Funding for Installation.....8-104
Table 8-22 Types of Nitrogen Reducing Systems (IFAS – Integrated Fixed Film Activated Sludge Process, SBR – Sequence Batch Reactor, MBR – Membrane Bioreactor).....8-110
Table 8-23 Annual Costs for Property Owners Located in the Sayville Sewer District 8-122
Table 8-24 Example Standard I/A OWTS Approval Process.....8-147
Table 8-25 Example Demonstration Project I/A OWTS Approval Process.....8-148
Table 8-26 Average Cost of Installation of a Conventional Sewage Disposal System Consisting of 1,500 gallon septic tank with 8' diameter by 16' deep leaching pool.....8-149
Table 8-27 Average cost of Purchase, Installation and O&M for Systems Approved for Use in Maryland.....8-149

TABLE OF CONTENTS

Table 8-28 Average Cost of Purchase, Installation and O&M for Systems Approved for Use in New Jersey Pinelands....8-150
Table 8-29 Average I/A OWTS O&M Costs in Jurisdictions Outside of New York....8-150
Table 8-30 Example Monthly Financed Payments for the Installation of an I/A OWTS....8-151
Table 8-31 Suffolk County Scavenger Plant Capacities....8-156
Table 9-1 Water Resources Management Plan Implementation....9-3

Appendices

Appendix A List of Acronyms and Glossary

Appendix B Evaluation of Nitrates in Suffolk County, New York Public Water Supply Wells, April 2014

Appendix C SWAP Map

Appendix D VOC Action Plan

Appendix E Summary and Basis of Water Quality Parameters Analyzed by the Suffolk County Department of Health Services Public & Environmental Health Laboratory as Compared with Those Regulated in Drinking Water & Analyzed by Other Agencies (March 2015)

Appendix F DRAFT Monitoring Well Network Map

Appendix G Contaminant Fact Sheets

Appendix H Suffolk County Community Water Supplies

Appendix I Suffolk County Sewage Treatment Plants

Appendix J Advanced Wastewater & Transfer of Development Rights Tour Summary

Appendix K Key Performance Indicators