COASTAL MUNICIPALITIES IMPERVIOUS SURFACE COVERAGE TOOLKIT

DECEMBER 31, 2019

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DCMP
DELAWARE COASTAL MANAGEMENT PROGRAM

KCI TECHNOLOGIES
ENGINEERS | PLANNERS | SCIENTISTS | CONSTRUCTION MANAGERS

"This Coastal Municipalities Impervious Surface Coverage Toolkit presentation was prepared by KCI Technologies Inc. using Federal funds under award NA17NOS4190151 from the Delaware Coastal Management Program (DCMP) and the Office for Coastal Management (OCM), National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of the OCM NOAA or the U.S. Department of Commerce."

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Resilient Community Partnership

- City of Lewes
- City of Rehoboth Beach
- Town of Bethany Beach
- Town of Dewey Beach
- Town of Fenwick Island
- Town of Henlopen Acres
- Town of South Bethany

Additional Stakeholders

- Save Our Lakes Alliance
- Delaware Center for Inland Bays

State of Delaware

Department of Natural Resource and Environmental Control
Division of Climate, Coastal and Energy
Delaware Coastal Management Program (DCMP)

- Kelly Valencik - Planner/Coastal Training Program Coordinator
- Robert W. Scarborough, Ph.D. - Program Manager II

University of Delaware, Department of Geography

DELAWARE COASTAL COMMUNITIES IMPERVIOUS SURFACE COVERAGE REPORT (31 AUGUST 2019)

- Dr. Tracy DeLiberty

AECOM

COASTAL DELAWARE BMP GUIDE (AUGUST 2019)

- Savannah Edwards, MPA – Planner
- Dave Athey, P.E. – Principle Water Resources Engineer

KCI Technologies Inc.

COASTAL MUNICIPALITIES IMPERVIOUS SURFACE COVERAGE TOOLKIT (DECEMBER 2019)

- Debbie Pfeil – Sr. Project Manager / Planning Manager
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CHAPTER 1 – PROJECT INTRODUCTION

In early 2018, the City of Rehoboth sought interest from other coastal communities to form a partnership to apply for assistance in conducting a study of impervious surface coverage to address its impacts on stormwater management, flooding, and water quality. The partnership includes the Cities of Lewes and Rehoboth, and the Towns of Henlopen Acres, Dewey Beach, Bethany Beach, South Bethany, and Fenwick Island.

Each of these communities face additional challenges associated with rising sea-levels, based on their proximity to the Atlantic Ocean and Delaware's Inland Bays. Rapid growth, compounded by impacts to the groundwater table and growing floodplain, led these coastal communities to seek out strategies for reducing impervious surface coverage.

The project was funded using Federal funds under award NA17NOS4190151 from the Delaware Coastal Management Program (DCMP), the Office for Coastal Management (OCM), National Oceanic and Atmospheric Administration (NOAA), and the U.S. Department of Commerce. The project includes three critical components further defined below:

1. *EVALUATION OF CURRENT STATUS OF IMPERVIOUS SURFACE COVERAGE IN EACH MUNICIPALITY'S BOUNDARIES.*

   The Delaware Coastal Programs office worked with the University of Delaware's Department of Geography to determine the current (2016) and past (2007) amounts of impervious surface in the municipalities. This report for the seven RCP Municipalities includes results for the private and municipal impervious surface areas. The *Delaware Coastal Communities Impervious Surface Coverage Report was completed* in August 2019.

2. *SUMMARY OF OPTIONS THAT WILL INCREASE STORMWATER INFILTRATION AND REDUCE FUTURE IMPERVIOUS SURFACE COVERAGE.*

   AECOM summarized current Best Management Practices (BMP) regarding stormwater infiltration across the state and region. They met with the coastal municipalities, appropriate stakeholders, and state agencies to identify current practices and codes that apply to impervious surface coverage. With this information they developed a community-based guide with tools to reduce stormwater runoff as well as their cost, feasibility, maintenance, and strategies for incentivizing BMPs. The *Coastal Municipalities Impervious Surface Coverage - Coastal Delaware BMP Guide* was completed in August 2019.

3. *DEVELOPMENT OF BEST PRACTICES FOR EACH MUNICIPALITY TO CONTROL FUTURE IMPERVIOUS SURFACE COVERAGE AND FINAL ASSESSMENT REPORT*

   KCI Technologies Inc. held seven Municipal meetings with the public to identify preferences in BMPs and to determine unique challenges. After collecting key information, KCI was able to further identify the unique coastal challenges, analyze the coastal community regulations, create implementation considerations and identify funding opportunities as stated within the Surface Coverage Municipal Toolkit. The *Coastal Municipalities Impervious Surface Coverage Toolkit* was completed in December 2019.

Municipal input and outreach were vital to the overall success of this project as it involved outreach with municipal officials and the public. Outreach was effectively executed in components 2 and 3 of this project.

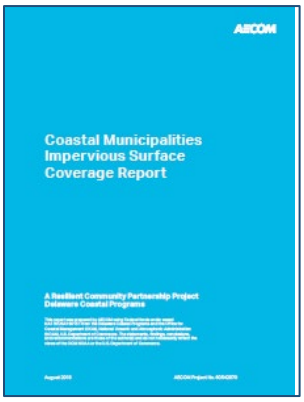
During the third project component, KCI Technologies Inc. was tasked with creating an outreach plan that involved: coordinating a public workshop for each of the seven Municipalities, creating an outreach flyer, promoting the workshops and preparing meeting presentation materials (as shown):

Each Municipality was very accommodating, welcoming and responsive to the project.

Through meetings with staff, stakeholders and Municipal Officials, localized input was obtained and provided information needed to prepare a customized approach to many options.

CHAPTER 2 - PREFERRED BEST MANAGEMENT PRACTICES (BMP'S)

As part of the second project component, AECOM prepared the *Coastal Municipalities Impervious Surface Coverage Report - Coastal Delaware BMP Guide* as a Community-based plan designed to summarize strategies for reducing existing and future impervious surface coverage and increasing stormwater infiltration in the coastal Delaware communities. This guide was intended to be used by residents, elected officials, and community members.



The guide states that a BMP is a technique or device that captures or treats stormwater runoff. Stormwater refers to the rain water that flows off different surfaces after it falls to the ground. The surfaces on which rain water falls are classified into two categories:

Pervious Surface	surfaces that *allow stormwater to seep into the earth* like gardens, forests and grass
Impervious Surface	surfaces that don't allow stormwater to seep into the earth like driveways, roads, sidewalks, and roof tops

Most of the BMPs included in the guide were chosen for their ability to reduce stormwater runoff, since frequent flooding has been an issue in coastal Delaware communities and benefits the following:

- Runoff Rate Reduction - slows down stormwater runoff or allows it to percolate into the soil to reduce flooding
- Water Quality - filters stormwater to remove pollutants
- Habitat - creates areas that are beneficial to pollinators, birds, and/or small mammals
- Aesthetics - has a high approval rating among property owners and enhances the looks of a landscape

There are three general scenarios upon which BMPs may be placed to manage runoff from:

1. existing developed areas on a voluntary basis
2. small impervious areas being proposed that would not otherwise fall under the third scenario
3. larger (greater than 5,000 sq. ft.) earth disturbance being proposed (regulated by the Delaware's Sediment and Stormwater Regulations under the Sussex Conservation District)

The guide showcased 12 BMP's and several components:

GUIDE PROVIDED BMP'S	COMPONENTS
BIORETENTION	DESCRIPTION
BIOSWALE	FACILITIES
INFILTRATION	FEASIBILITY
PERMEABLE PAVEMENT	PROPERTY TYPE
IMPERVIOUS REMOVAL	RELATIVE COST
ROOFTOP DISCONNECT	BENEFIT
GREEN ROOF	MAINTENANCE
RAINWATER HARVESTING	
TREE PLANTING	
CONSERVATION LANDSCAPING	
FILTRATION	
DRY WELL	

AECOM determined that some BMPs are more suited to regulations, while others can be better incentivized as shown below:

BMP's	Incentive	Regulatory
BIORETENTION		
Rain Garden	X	
Tree Box Filters	X	X
Streetscape Bioretention		X
Large Bioretention		X
Raised Planter Box	X	
BIOSWALE		
Bioswale		X
INFILTRATION		
Infiltration Trench		X
Infiltration Basin		X
PERMEABLE PAVEMENT		
Permeable Concrete Pavers	X	X
Grid Pavement Systems	X	X
Pervious Concrete	X	X
Porous Asphalt	X	X
IMPERVIOUS REMOVAL		
Impervious Surface Removal	X	
ROOFTOP DISCONNECT		
Rooftop Disconnect	X	X
GREEN ROOF		
Green Roof		X
RAINWATER HARVESTING		
Rain Barrels	X	
Cisterns	X	
TREE PLANTING		
Tree Planting	X	
CONSERVATION LANDSCAPING		
Conservation Landscaping	X	
FILTRATION		
Surface Sand Filter		X
Underground Sand Filter		X
Organic, Non-Structural Filter		X
Perimeter Sand Filter		X
DRY WELL		
Dry Well	X	X

The information from pages 6 and 7 was obtained from the *Coastal Delaware BMP Guide prepared by AECOM.*

KCI Technologies Inc. was tasked with presenting the BMPs to each Municipality during a regularly scheduled public meeting with elected officials. The meetings were interactive to prompt discussion with those in attendance to discuss which BMPs are more applicable to their jurisdictions and what methods already exist to reduce stormwater runoff.

In addition, discussion was held regarding providing incentives and/or regulatory options as well as consideration for the BMP options on private and/or public lands. During discussions at previous RCP and public meetings, it was clearly determined that each Municipality wanted more information and educational opportunities before making future decisions regarding the options for the type of BMP's, incentives versus regulations and private versus public.

KCI asked each Municipality to review and complete the provided worksheet (example shown below) to ensure the project could determine individual and collective responses for consideration in the future.

Town of South Bethany Date: _____

Point of Contact: _____

Email Address: _____

Resilient Community Partnership Project Input

Listed below you will find the Best Management Practices (BMP's) for improving water quality and reducing runoff in your Community. This exercise will help determine options to offer incentives and/or regulate as well as if they should be applicable to private and/or public lands.

BMP's	Incentive	Regulatory	Private	Public
BIORETENTION				
Rain Garden				
Tree Box Filters				
Streetscape Bioretention				
Large Bioretention				
Raised Planter Box				
BIOSWALE				
Bioswale				
INFILTRATION				
Infiltration Trench				
Infiltration Basin				
PERMEABLE PAVEMENT				
Permeable Concrete Pavers				
Grid Pavement Systems				
Pervious Concrete				
Porous Asphalt				
IMPERVIOUS REMOVAL				
Impervious Surface Removal				
ROOFTOP DISCONNECT				
Rooftop Disconnect				
GREEN ROOF				
Green Roof				
RAINWATER HARVESTING				
Rain Barrels				
Cisterns				
TREE PLANTING				
Tree Planting				
CONSEVATION LANDSCAPING				
Conservation Landscaping				
FILTRATION				
Surface Sand Filter				
Underground Sand Filter				
Organic, Non-Structural Filter				
Perimeter Sand Filter				
DRY WELL				
Dry Well				

Responses were received from all seven Municipalities for this exercise and incorporated into this document. Again, the Municipalities reiterated the need to obtain additional information and provide local educational opportunities prior to any public policy consideration. The responses from each jurisdiction vary and are shown on the next page.

BEST MANAGEMENT PRACTICE OPTIONS FOR MUNICIPAL CONSIDERATION	Bethany Beach	Dewey Beach	Fenwick Island	Henlopen Acres	Lewes	Rehoboth Beach	South Bethany
BIORETENTION							
Rain Garden	I,P,PU	I,P	I,P,PU		I,R,P,PU	I,R,P,PU	I,P
Tree Box Filters	I,P,PU	I,P	I,R,P,PU		I,P,PU	I,P,PU	
Streetscape Bioretention	I,P,PU	R,PU	R,PU	PU	I,PU	I,P,PU	R,PU
Large Bioretention	I,PU	R,PU	R,PU		R,P	I,P,PU	R,PU
Raised Planter Box	I,PU	I,P	I,P		I,P,PU	I,P,PU	I,P
BIOSWALE							
Bioswale	R,PU	I,P	R,PU	I,P	R,P	I,P,PU	R,PU
INFILTRATION							
Infiltration Trench	I,R,PU	R,PU	R,PU	P	R,P,PU	I,P,PU	R,PU
Infiltration Basin	I,R,PU	R,PU	R,PU		R,P	I,P,PU	R,PU
PERMEABLE PAVEMENT							
Permeable Concrete Pavers	I,P,PU	I,P	I,P,PU	I,P	I,P,PU	I,P,PU	R,P
Grid Pavement Systems	I,P,PU	I,P	I,P,PU	I,P,PU	I,P,PU	I,P,PU	
Pervious Concrete	R,P,PU	I,P	I,P,PU	I,P	I,P,PU	I,P,PU	R,P
Porous Asphalt	R,P,PU	I,P	I,P,PU	PU	R,P,PU	I,P,PU	R,P
IMPERVIOUS REMOVAL							
Impervious Surface Removal	I,P,PU	I,P	I,P	I,P,PU	I,P	I,R,P,PU	I,P
ROOFTOP DISCONNECT							
Rooftop Disconnect	R,P,PU	R,P,PU	R,P,PU	R,P	I,P,PU	I,P	R,P
GREEN ROOF							
Green Roof			I,P			I,P	I,P
RAINWATER HARVESTING							
Rain Barrels	I,P,PU	I,P	I,P,PU		I,P	I,P	I,P
Cisterns	I,P,PU	I,P	I,P,PU		I,P	I,P	I
TREE PLANTING							
Tree Planting	I,P,PU	I,P,PU	I,R,P,PU	I,R,P,PU	I,P,PU	I,R,P,PU	I,P
CONSERVATION LANDSCAPING							
Conservation Landscaping	I,P,PU	I,P	I,P			I,P,PU	I,P
FILTRATION							
Surface Sand Filter	I	I,P	R,PU		I,P,PU	I,P,PU	R,PU
Underground Sand Filter	I	I,P	R,PU		I,R,P	I,PU	
Organic, Non-Structural Filter	I	I,P	R,PU			I,PU	
Perimeter Sand Filter	I	I,P	R,PU		I,P	I,PU	
DRY WELL							
Dry Well	R,P,PU	I,P	I,P	PU		I,P	I,P

LEGEND: I= Incentive / R = Regulatory / P = Private / PU = Public

Based on the information received and shown on the table, the following observations were made:

1. BMPs of less interest:
   - Green Roof
   - Conservation Landscaping
   - Filtration

2. BMPs with favorable interest:
   - Bioretention
   - Bioswale
   - Infiltration
   - Permeable Pavement
   - Impervious Removal
   - Rooftop Disconnect
   - Rainwater Harvesting
   - Tree Planting
   - Dry Well

3. The majority of the Municipalities are seeking additional educational information prior to consideration of implementation of any BMP initiatives. Further opportunities could include workshops with the Community to encourage and obtain additional support.

4. While common issues are shared amongst the Municipalities, it is not a one size or solution fits all approach. Each jurisdiction proved to be unique with regard to available funding and resources, political willingness, existing programs and incentives, and code regulations.

CHAPTER 3 - UNIQUE COASTAL COMMUNITY CHALLENGES

During the workshop meetings, municipal feedback was given regarding each community's unique challenges. Several challenges were noted as being similar among jurisdictions, such as:

- Environmental threats and changes (Sea Level Rise, nuisance flooding, high water table, etc.)
- Existing infrastructure underdeveloped or unknown conditions
- Increased size of residential homes with redevelopment and new development
- Increased demand for additional parking based on residential home size
- State owned roadways and stormwater management ownership
- Seasonal population and increased service demands

Each jurisdiction was asked to provide their unique challenges; and the results are below:

Bethany Beach

1. Over 85% of Bethany Beach is in a special flood hazard area and flooding from the Salt Pond, the loop canal and even a heavy rain is an ongoing problem. There is simply nowhere for the water to go.
2. The zoning code has historically permitted lots to be completely covered with impervious surfaces. Any regulations enacted now would have little impact.
3. Lacking a cohesive storm sewer system.
4. Large percentage of home owners are not year-round residents and are unaware of tidal flooding issues.
5. New development maximizes out lot coverage.
6. Parking is a challenge. Larger homes need to provide more parking on the lot.

Dewey Beach

1. Aging and undersized or obsolete storm sewer system.
2. The Town of Dewey Beach is approximately one mile long and 2 blocks wide and situated between the Rehoboth Bay and the Atlantic Ocean. There is always the potential of nuisance flooding not allowing any free flow of rainwater.
3. Per the United States Census Bureau, the town has a total area of 0.3 square miles, all of it land.
4. Elevation. 7 ft (2 m).
5. Per the Weather Channel, Dewey receives on average 46.95 inches of rain yearly.
6. According to the 2010 census, the population of the town is 341. Yet, it is not uncommon for 30,000 to descend upon the town during summer weekends. Thus, who really 'feels' the burden of stormwater management unless their weekend is 'washed out'?
7. Redevelopment of older cottage properties to modern homes with larger footprints and more impervious areas/features.
8. Lack of quality infrastructure and flat terrain.
9. Lack of updated and specific code requirements.
10. Heavy tidal influence on the existing storm drain system due to elevation.
11. Private property owners maximizing space for rental income purposes.

Fenwick Island

1. Less tree canopy.
2. Lies between two bodies of water; Little Assawoman Bay on the west and Atlantic Ocean on the east.
3. The major corridor (SR1) is out of our jurisdiction and under DelDOT regulation for drainage improvements.
4. The elevation is very low, and we are threatened by sea level rise.
5. Existing stormwater drainage system is inadequate to handle the current conditions.
6. Small lots/large homes.

Henlopen Acres

1. Population under 200 with 219 parcels covering 123 acres or 0.27 square miles.
2. Frequent flooding in low areas of Tidewaters, despite numerous remediation efforts.
3. Lack of sidewalk and curb exacerbates runoff and causes edges of road to deteriorate.
4. Large number of part-time, seasonal residents make public outreach more difficult.
5. Affluence of residents may make incentives ineffective

Lewes

1. Small, historical lots, low infiltration ability.
2. Many older areas of town, including areas on Lewes Beach, lack stormwater management infrastructure.
3. During high tides, stormwater pipes cannot discharge to the canal, exacerbating flooding.
4. There is significant development pressure within and surrounding Lewes. Unlike other coastal communities, the land around Lewes is not largely built out. Much of the remaining, undeveloped land in Lewes is low lying and within the 100-year floodplain.
5. The Lewes Wastewater Treatment Plant is located in a flood-prone area. While the plant itself is built above base flood elevation, American Legion Road is impassible at times, making access to the plant difficult.
6. Flooding on Cape Henlopen Drive, the west end of Cedar Avenue, and New Road at the Canary Creek bridge create an impediment to evacuation of flood-prone areas.

Rehoboth Beach

1. Lewes and Rehoboth Canal, Lake Gerar, Silver Lake, and Atlantic Ocean all are within or adjacent to municipal boundaries.
2. Municipal Parks (Stockley Street, Grove Park, Lake Gerar Park).
3. Boardwalk.
4. Redevelopment rather than new development.
5. Zoning code allows for pervious types of systems to be used for driveways, walkways, and sidewalks. Example: code currently states sidewalk is “An impervious surface parallel to a street…..” (270-4).
6. No existing stormwater utility or way to collect revenue specifically for stormwater improvements.
7. Occupying public space needs to be codified.
8. Maximum allowable building areas.
9. The City has two lakes, Lake Gerar and Silver Lake, within City limits. The lakes provide storage and treatment of stormwater; however, they require routine maintenance to ensure that they continue serving these purposes to the best of their ability.
10. Rehoboth Avenue and Bayard Avenue are state maintained roads, so any streetscape improvements (including the implementation of BMPs in these areas) would require state coordination and approval.
11. The City currently has no dedicated revenue stream used specifically for stormwater improvements.
12. Zoning Code should allow for pervious types of systems to be used for driveways, walkways, and sidewalks. For example, the City code currently states that a sidewalk is “An impervious surface parallel to a street…..” (270-4).
13. Due to the City being “built out,” redevelopment occurs more often than new development.
14. The City currently has a permit to occupy public space, however, the process and requirements to do so need to be codified.

South Bethany

1. Not unique per se but need for better public engagement for education. It might be possible to advocate for higher percentage of pervious area or take it by zone instead of sum total area as our codes allows.
2. Back bay flooding/Nuisance flooding.

3. Canals.
4. Low land elevation /wetlands/saturated soils.
5. Small land plots/ closeness of structures as close as 10’ apart.
6. Boat ramps allowed/ Not continuous bulkhead.
7. Bulkheads not allowed to be raised per code. Majority range 1.5 feet-2.0 feet NAVD/ Flood elevation 6 feet NAVD.
8. Resistance to higher regulation by ordinance.

CHAPTER 4 - COASTAL COMMUNITY REGULATIONS

The seven Municipalities were reviewed under their current regulations; and they can all be found on the General Code website, located here: https://www.generalcode.com/resources/ecode360-library/#DE This codification subscription service assists in the organization's research efforts with government regulations. The research involved searching for specific words throughout the online codes.

One area to improve the code regulations for all the Municipal partners is to update their definitions. The definitions alone will assist in updating to the most recent green infrastructure trends and materials. Each jurisdiction will need to look at what each change would do the land use, other pertinent Chapters and any effects it may cause with conflicting legislation. Two great resources for definitions are the American Planning Association (APA) and the United States Environmental Protection Agency (EPA). They are recommended based on the most up to date trends, national research resource, and case studies. The EPA is a regulatory authority that more than likely will be involved with any future permitting in your Municipality.

Each jurisdiction was asked to provide input on their current code regulations and the results are below:

Municipal Code Regulation Assessment	Bethany Beach	Dewey Beach	Fenwick Island	Henlopen Acres	Lewes	Rehoboth Beach	South Bethany
DEFINITIONS							
Lot Coverage	425-2	1-16	No	130-19	197-106	270-4	145-3B
Pervious	No	No	No	No	197-106	No	143-3
Impervious	No	No	No	No	197-106	No	145-3B
Permeable	No	No	No	No	No	No	145-3B
Porous	No	No	No	No	No	No	145-3B
MISC. REQUIREMENTS							
Trees	507	173	No	114	177	253-33	No
Driveway Surface	395-32/33	No	No	No	167-16, 170, 197	No	145-3B

Listed below is the data captured from the surveys provided during the second component of the project:

Definitions

Impervious Surface

- Fenwick Island - We do not. We do prohibit any impervious or semi-impervious pavings in setback areas in Chapter 160-5C(7) of our Zoning code area regulations for Commercial Zone and Chapter 160-8A(11) of our Zoning general regulations; exceptions for Residential Zone.

- South Bethany - No, but it does have impervious materials definition. 145-3B{44} IMPERVIOUS MATERIALS: Materials that prevent precipitation from contacting the existing soil and do not allow water to penetrate the soil.

- Lewes - 197-75(B) Impervious Cover - Surfaces providing negligible infiltration such as pavement, buildings, recreation facilities (by example, but not by limitation, tennis courts, swimming pools) and

covered driveways. 197-106(15) Surface, Impervious - A surface providing negligible infiltration such as pavement, buildings, recreational facilities (by example, but not by limitation, tennis courts, swimming pools) and covered driveways.

Impervious Surface Coverage Regulations

- Fenwick Island - In Chapter 160-2B, we have a definition of "Floor Area" and Floor Area Ratio (FAR)". We regulate allowable floor area regulations in Chapter 160-4(C)(7) of our Zoning Code for the Residential Zone. We prohibit any impervious or semi-impervious pavings in setback areas in Chapter 160-5C(7) of our Zoning code area regulations for Commercial Zone and Chapter 160-8A(11) of our Zoning general regulations; exceptions for Residential Zone.

- Rehoboth Beach - Section 270-21 Natural area, floor area ratio and lot coverage

- Henlopen Acres - Code does not reference "impervious". Lot and Building Requirements are defined in Chapter 130 Zoning, Sections 19 through 33.

- South Bethany - Pervious minimum requirements 55% and impervious max 45% see below: 145-14.3 Ground covering allowed in setback area.
    - A. In the R-1 Single-Family Dwelling District (§ 145-26) at least 55% of the sum of required building setback area, as defined in Chapter 145, Zoning, Article XI, Setback Requirements, shall be covered with pervious covering materials. The building setback area is the total of the front, rear and side setbacks expressed in square footage (i.e.: 25 feet x 50 feet + 25 feet x 50 feet + 8 feet x 50 feet + 8 feet x 50 feet = 3,300 square feet. 3,300 square feet x 55% = 1,815 square feet minimum pervious coverage). Pervious covering materials, such as, but not limited to, sand, gravel, mulch, grass, shells, natural vegetation, or, when installed per current industry standards or guidelines, permeable pavers, pervious concrete, and porous asphalt.
    - E. Impervious surfaces planned in the setback area require a building permit. The application for a permit shall include a plot or sketch, showing the location and dimensions of all existing and planned impervious surfaces, including a description of the materials to be used.

- Lewes - 197-75 water protection overlay & table of dimensional regulations.

<u>Alternative types of pavement, pavers or surface treatments (parking and driveways)</u>

- Fenwick Island - We do permit the use of permeable pavers, concrete or asphalt in setback areas.

- Bethany Beach - The Code does not specify any particular material and any surface treatment suitable for parking is acceptable.

- Henlopen Acres - Acceptable materials not specified.

- Lewes - Does not prohibit pervious pavement, but the code does not provide guidance on how this figures into lot coverage.

- South Bethany - C. Only materials, such as, but not limited to, gravel, shells, sand, and grass shall be allowed as a ground covering in any Town right-of-way. Pervious concrete and porous asphalt shall not be used in any Town right-of-way. Permeable pavers may be used within the Town right-of- way along the front of the property, no wider than 50% of the lot width and no closer than five feet to any side boundary line. If the pavers are removed for any reason, it will be the owner's responsibility and cost to replace the pavers. At the time of installing or replacing the pavers a four-inch diameter thick wall conduit (Schedule 40 minimum) shall be installed for any future use for utility purposes.

Standard Specifications in relation to driveways, curbing, sidewalk, etc.

- Bethany Beach - Typically, there is no curb or sidewalk. In Chapter 425 Zoning, Article XV specifies the requirements for off street parking and loading.

- Fenwick Island - In Chapter 160-8A(9)(b)[2], sidewalks are required for any new construction and/or substantial improvements in the Commercial Zone.

- Lewes – Chapter 167 refers to the maintenance and repairs for street and sidewalks. Chapter 170-27 refers to Improvements Specifications and design standards for major subdivisions for the stormwater management systems.

- Rehoboth Beach - See Chapter 232, Streets and Sidewalks refers to sidewalk and curbing construction standards as well as excavations, utility poles and cables, use of streets, grates, connection to Boardwalk and brick sidewalks.

- South Bethany - 145-3B{70} PAVED DRIVEWAY=A path or parking area for vehicles, constructed of impervious materials (concrete, asphalt, etc.), leading from the property line abutting the street right-of-way. § 145-42=R-1 and C-1 District parking spaces. For R-1, a parking space shall have a minimum width (parallel to the street) of 10 feet and a minimum length (perpendicular to the street) of 20 feet. Paved driveways shall not encroach into the street right-of- way. For C-1 Commercial, a parking space shall have a minimum width of 10 feet and depth of 20 feet.

CHAPTER 5 – CURRENT INITIATIVES

During some the workshop meetings, discussions were held at length regarding the Municipal initiatives. Some Municipalities were unable to engage in discussions due to length of the meeting agenda, priorities of the audience attending and time constraints. KCI researched initiatives that could be found on each Municipality's website in advance of the meetings. The intent of this Chapter is to share the knowledge and lessons learned from the Municipalities for their initiatives on the related topic.

When discussing these with your neighboring partners, ask about lessons learned, financial contributions, public outreach, political willingness, resources, and any opportunity to share documents and additional information.

Each jurisdiction was asked to provide their current initiatives and the results are below:

Bethany Beach

- Use of dry wells and French drains for guttered systems
- 10 blocks of pervious pavement system & drainage improvements (South Atlantic Avenue and Cedarwood Street)
- Continues maintenance of the Town's drainage swales/ditches
- Continue implementing a pervious paving system and drainage improvements on Town streets (future work in planning stages)
- Recent purchase of 12.3 acres of wetlands to maintain as undeveloped.

Dewey Beach

- Implementing a Stormwater Master Plan for Nutrient Reduction dated September 2013 (developed by Cotton Engineering, LLC). Currently in Phase II of implementing quality improvements.
- Regulatory: Enacted code §185-51 (effective 03/14/09 Ordinance 654) not allowing covered, paved or impervious materials on building lot areas.
- Regulatory: Enacted code §185-51 (added 08/24/18 Ordinance 744) not allowing impervious covered or paved driveway entrances.
- Regulatory: Enacted code §173-2 the Removal of Trees only by specific criteria and permit.
- Regulatory: Enacted code §185-55 requiring natural or planting areas.
- Regulatory: Enacted within the code TABLE 2 BULK ZONING STANDARDS IN ALL DISTRICTS (Amended 5-9-2015 by Ord. No. 718) requiring planting and open space requirements with in the gross lot area.
- Voluntary: Discussion(s) with property owner(s) requiring alternatives to paving on their property.
- Voluntary: Discussion with HOA president encouraging their involvement with a civil engineer to help with the HOA rain water / parking lot flooding. The engineering company is to provide a topography survey of their property and evaluate the ground water table elevation. If necessary, test pits evaluating infiltration rates would be available. They will evaluate possible location(s) for dry wells.
- GIS Mapping and Inventory of all storm water features (Pilot project underway)
- Read Avenue Shoreline Stabilization Project
- Potential redevelopment of Sunset Park and the associated shoreline.
- Replacement of various storm drain features based on the Stormwater Master Plan
- Consideration of reducing the pavement mat width when repaving certain streets.

Fenwick Island

- Stormwater Infrastructure Inventory (2013)
- Dagsboro Street Drainage Improvements Phase 1 (2014)
- Dagsboro Street Drainage Improvements Phase 2 (2015)
- Multiple Street Drainage Improvements (2016)

- Bayard Street & Bayard Street Extended Drainage Improvements (2017)
- Maryland Avenue Drainage Improvements (2018)
- Tree Community USA Designation
- Tree Triage Program
- Sustainable Community Plan (Goals, Strategies & Implementation Section) (September 2019)
- Fenwick Island established a Floor area ratio (FAR) (Town Code §160-2 which is defined as the percentage obtained by dividing the floor area of a single-family dwelling by the lot area on which it is located. For a detached single-family dwelling, the maximum floor area ratio shall be 70% and the maximum floor area shall be 7,500 square feet. Town Code §160-4 C(7).
- Adopted a Community Sustainability Plan on October 25, 2019.
- Requires the use of pervious surface material outside of the buildable lot area to aid in reducing surface water and stormwater runoff in order to maintain proper drainage. Fenwick Island Town Code § 120-2 F

Henlopen Acres

- Three underground retention areas on Pine Reach
- Infiltration trenching on Rolling Road (AECOM Report page 19)
- Minimum tree density ordinance (passed in October 2019)
- Storm drain medallions ("Drains to Bay")
- Dog waste disposal stations
- Sediment and erosion control requirements for construction
- Municipal disposal of homeowner leaf and grass debris
- Increased tree protection on Town property during construction ordinance (7/12/2019)
- Tree planting program with arborist (ocean block of Rolling Road, lot by lot approach) 2019

Lewes

- Lewes has an active Mitigation Planning Team which meets quarterly to address issues of emergency preparedness and flood risk mitigation. In 2016, the City and the Lewes Board of Public Works completed an "Evacuation Route and Critical Infrastructure Vulnerability Study", which identified vulnerable infrastructure and included recommendations to improve our planning to mitigate these vulnerabilities.
- Lewes currently requires 18 inches of freeboard when building within the 100-year floodplain.
- The Lewes Planning Commission has held two water workshops in the last year and is actively developing ordinances to protect wetlands and floodplains and to improve development standards to mitigate future risk.
- With funding from FEMA, Lewes is initiating a study to determine how to mitigate the flooding that happens on west Cedar Avenue.
- Lewes completed a flood study in 2019 that looked at how development could affect future flooding and provided recommendations to mitigate the risk of future flooding.

Rehoboth Beach

- New ordinance requiring the use of stormwater protection measures during construction that disturbs more than 1,000 square feet of land (11/15/2019).
- Chapter 253 of the Rehoboth Beach Code addresses Trees (Tree City).
- The City has installed pervious pavement in the City Hall & Convention Parking Lots in addition to bioswales.
- Adjusting user fees to pay for necessary infrastructure enhancements, repairs, and maintenance.
- Permit to occupy public space in a manner that the City agrees.
- Save Our Lakes Alliance (SOLA) provides grant incentives.

- The Board of Commissioners recently passed an ordinance requiring the use of stormwater protection measures during construction that disturbs more than 1,000 square feet of land. The City now has the ability to issue fines for violators.
- The City is in the process of performing stormwater sampling and analysis in the commercial area to better understand what can be done to improve the quality of stormwater discharging into the ocean. Additionally, the City is working towards implementing a FOG/Grease Trap Ordinance.
- The Zoning Code currently requires, in residential zoning districts, a minimum of 50% of the gross lot area and 50% of the front yard setback area of every building to remain as natural area.
- The City Hall project included the installation of pervious pavement in the employee and convention center public parking lots. Additionally, bioswales were installed.
- The City has a dedicated Chapter (253) in the Code that regulates trees in the City. Additionally, the City has a Parks and Shade Tree Commission with the responsibility to study, investigate, counsel and develop and/or update annually, and administer a written plan for the care, preservation, pruning, planting, replanting, removal or disposition of trees and shrubs in parks, along streets and in other public areas.
- The City has recently formed an Environment Committee, which may be a strong advocate for implementing some of the recommendations to reduce impervious surface coverage. The Committee will also provide a platform to solicit public input and feedback.

South Bethany

- Rain Gardens
- Pervious Pavers
- Rain Barrels

CHAPTER 6 – INCENTIVES AND PROGRAMS

Incentives and programs are a great approach to getting private property owners and partners involved in addressing local stormwater issues. If the majority of private property owners and businesses took part in such programs, it would assist with the volume of drainage during inclement weather and nuisance flooding. This would help the Municipality focus on the maintenance and management of the public stormwater systems.

Many of the incentives and programs found were driven by jurisdictions that are currently regulated by the United States Environmental Protection Agency (EPA) and the State under a National Pollutant Discharge Elimination System (NPDES) permit for the Municipal Separate Storm Sewer System (MS4) permit; however, many government agencies and organizations are taking proactive approaches to address water quantity and quality. The last Chapter in this toolkit provides a list of references that provide a step-by-step approach to incentives and programs. Some of the potential approaches and methods are summarized below.

INCENTIVES

Incentives can be offered primarily with four methods: Financial, Development, Recognition and Technical assistance. Each of the incentives are dependent upon political willingness, available resources for program management and available funding.

Financial – A cost-share program covering some of the costs of installing certain BMPs while, in most cases, the beneficiary property owner is responsible for the remaining costs. This incentive can be offered by a percentage, specific amount, price per square foot treated, providing materials and/or a combination thereof. One approach to consider is setting aside a small amount of funding, as well as submitting for grant funds to assist with the implementation of these programs on a first come-first serve basis. If a jurisdiction has an established stormwater utility fee system, financial incentives can be considered by providing rebates, credits, and fee discounts.

Development – These apply to private developers that take the initiative to use more sustainable and green building practices. The incentives available for consideration with development can include:

- Reduction or removal of fees
- Reduction of review time (permit and land development applications)
- Floor area ratio increase/bonus
- Reduction of annual taxes

Recognition – Providing recognition for property owners who voluntarily implement a BMP is another great incentive method. Establishment of a recognition program involving a committee or individual that would design the program criteria and goals, create a simple application and develop a predetermined schedule for the award recognition cycle (such as monthly, quarterly or annually) could be a method to encourage community involvement and pride. For example, the recognition might involve one of or a combination of any of the following, depending on the program design and available budget:

- Yard flags or signs
- Website, newsletter and/or local newspaper recognition
- Customized plaque of certification
- Community plaque (list of those awarded by name)
- Gift cards or certificates to local nurseries or businesses

Technical Assistance – Some property owners may be interested and have the financial resource to implement one or more BMPs. However, they may need assistance to better understand the BMP alternatives and which might be the most beneficial to their needs. Assistance in understanding costs, short-

and long-term maintenance, estimated design and construction costs, obtaining a list of potential local vendors and potential grant funding avenues available to aide property owners with selected BMPs are ways to provide technical assistance to individual participants. Some of these can be achieved by hosting a stormwater BMP property owner workshop with interested vendors and partners. This may qualify for program outreach and education funding assistance from specific organizations or agencies.

PROGRAMS

Developing educational and outreach programs assist in meeting goals to reduce the pollution in the waters as well as reduce stormwater runoff. Some programs include one or more incentives listed above.

Listed below are a few unique programs and resources for consideration:

River Hero Home Month – This program was developed for homeowners living in the James River basin to bring awareness to stormwater runoff and promote ways to stop pollution. They hosted a series of workshops, events and rain barrel sales during the month of March. https://thejamesriver.org/river-hero-home-month/

Lynnhaven River Now

This organization serves the residents of Virginia Beach and has developed several successful programs with property owners, residents, schools, businesses, and faith-based organizations. Listed below are the specific programs-

- *Pearl Homes Program* –This program showcases the great work the residents are doing to change their practices and adopt more sustainable behaviors. To qualify for a Pearl Home, the residents must check at least 15 actions on the online application form as things you can do in your home, outside of the home, on the water and in the Community. Each awarded Pearl Home receives a yard flag with a stand or magnet. They further offer a "P*earl Neighborhood Program*" with block captains that can encourage and support all their neighbors to become a Pearl Home. To become a Pearl Neighborhood, they must complete these three items: offer Lynnhaven River NOW education opportunity for the neighbors, at least 30% of the neighbors must be Pearl Homes, and they must have one environmentally focused community project (rain garden, pollinator garden, kitchen garden, etc.). This programs success currently has 4,000 Pearl Homes and four Pearl Neighborhoods. https://www.lynnhavenrivernow.org/pearl-homes/

- *Pearl Home Sustainable Yard Program* – This unique program provides specific stormwater BMPs at a significantly reduced cost. Applicants can provide one of the following practices to qualify: Pearl Yard Program (stormwater-friendly urban nutrient management plan), rain barrel, rain garden or infiltration trench. This program offers a small homeowner co-pay of $100 per BMP and the remaining costs are paid by the program. http://www.lynnhavenrivernow.org/pearl-home-sustainable-yard-program/

- *The Lynnhaven Trashion Show* – This program developed a unique partnership with the local schools and student. The show was created as a way for local students to show off their fashion sense while demonstrating an understanding of the value and importance of reusing items whenever possible. Using only materials destined for garbage cans or recycling bins, student designers and models partner to present original creations in a runway fashion show competition. Designers have made use of such unusual materials as a broken umbrella, torn screens, and bright pink and silver padded mailing envelopes. https://www.lynnhavenrivernow.org/trashion/

- *Pearl Businesses* – This program was developed to recognize active engagement and leadership in the private sector for sustainability and cleaner water initiatives. Some are increasing their energy efficiency, using resources more strategically, reducing waste and pollution, and becoming more sustainable. Each business completes an application survey and pays a $75 membership fee. https://www.lynnhavenrivernow.org/pearl-businesses/

- *Pearl Faith Community* – This program goals are to help people of faith recognize and fulfill their responsibility for the stewardship of these gifts. All faiths are welcome and are requested to perform the following within a year:
  - Make a difference inside your buildings. Examples include installing occupancy sensors, programmable thermostats, sealing ductwork, recycling at events, greening your coffee hour by purchasing reusable or biodegradable products.
  - Make a difference outside your grounds. Examples include replacing turf grass with mulched beds and native plants, reducing pesticides and fertilizer, resurfacing parking lot areas with permeable pavers, installing rain barrels and rain gardens to reduce storm water runoff.
  - Make a difference with an educational activity. Examples include inviting Lynnhaven River NOW to give a presentation before or after services, host a Day of Service for the community and include area environmental organizations, host a lecture or film series on relevant topics, host educational activities for day school or Sunday school students.

  The successful Pearl Faith Community program includes thirteen faith-based organizations. https://www.lynnhavenrivernow.org/pearl-faith/

Elizabeth River Project

This Virginia organization services the citizens, businesses, schools and government within the Elizabeth River, a tributary of the Chesapeake Bay and offers several customized programs. Listed below are the specific programs-

- *River Star Homes Program* –This program is free and requires a property owner to do seven simple things:
  - Scoop the Dog Poop
  - Reduce Lawn Fertilizers
  - Only Rain in the Stormdrain
  - No Grease in the Sink
  - Help Geese Migrate – Don't Feed Them
  - Avoid Single-Use Plastics
  - Don't Flush Medicines

  Each awarded Pearl Home receives a yard flag, welcome packet and information of special events and opportunities. This programs currently has 5,000 River Star Homes. https://elizabethriver.org/river-star-homes

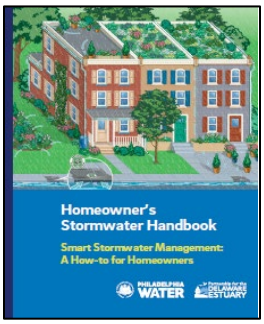
- *River Star Businesses Program* – The organization helps businesses carry out wildlife habitat projects and pursue alternatives to pollution. Customized recommendations are provided for the facility and operational needs as well as assistance to find resources, such as: grants, sources for native plants, research of pollution prevention technologies or volunteers for a planting day. This program has several tools, such as: River Star Business starter kit, criteria for recognition, online application, annual report, hall of fame winners and an annual recognition luncheon. https://elizabethriver.org/river-star-businesses

- *River Star Schools Program* – Schools and youth organizations are becoming larger stewards by providing education and initiative implementation. Currently, this program hosts 173 River Star Schools that spent the year implementing conversation, restoration and/or habitat enhancement projects. An online application is available for schools with an environmental project with a positive impact on the river. In 2019, 13 schools were recognized for implementing projects that addressed how to capture and reuse rainwater, flooding on school properties, how to encourage resilient action and how schools can reduce their carbon footprint. https://elizabethriver.org/river-star-schools

- *Super-Size Rain Barrel Program* – This program allows a reduced cost to just $125 per barrel including delivery and installation. The retail cost is $350 per barrel. Savings can be up to $200 a year on the water bills per barrel. The rain barrels are designed with double filter screens on top and within the overflow to keep leaves and mosquitoes out. An online application is completed for this program. https://elizabethriver.org/super-size-rain-barrels

- *Rain Garden Application* – The Elizabeth River Project funds up to 50% of the cost (up to $2,000) of a rain garden project. Their experts will determine if the site is suitable for a rain garden project and the design cost if $100 is applied to the total cost share. https://elizabethriver.org/rain-garden

- *Organic Lawn Care & Makeover* – This program promotes the following benefits: create a beautiful lawn while helping to restore the river and reduce pollution and help prevent algae blooms. It provides free advice on how to sustain a healthy lawn without chemicals and provides an analysis of the soil sample for only $10. Property owners may qualify for funding to help with aeration and top-dressing with organic compost. https://elizabethriver.org/organic-lawn-care-makeovers



Homeowner's Stormwater Handbook

This Smart Stormwater Management: A How-to for Homeowners handbook created by the Philadelphia Water Department and Partnership for the Delaware Estuary is designed to help reduce stormwater pollution right from your home. This handbook provides and easy to understand introduction followed by homeowner maintenance, greening your property with rain check then taking it up a notch with additional recommendations. The handbook can be located at this website link: http://s3.amazonaws.com/delawareestuary/pdf/stormwater-guide.pdf

Stormwater Utility Fee Program

The City of Newark, Delaware approved a stormwater utility in 2017 and a fee-based system was enacted in 2018. Chapter 25A-Stormwater of the Newark City code was established and can be found here: https://library.municode.com/de/newark/codes/code_of_ordinances?nodeId=CH25AST.
This Chapter includes the stormwater charges for the various stormwater classes, definitions, credits and appeals. The City created an interactive stormwater charge mapping tool for the public and provided several resources and presentations on their dedicated website. One of the presentations includes the Stormwater Utility Rate Study Update-July 24, 2017 by Black and Veatch. https://newarkde.gov/877/Stormwater-Utility

Stormwater Management Utility Program

The Town of North East, Maryland approved a stormwater utility in May of 2019. In August 2018, the Town contracted with Soltesz, LLC of Lanham Maryland to undertake a Storm Water Management Study to determine the amount of storm water the Town is required to mitigate under the terms of the permit. The report was completed in April of 2019 and can be found here: http://northeastmd.org/wp-content/uploads/2019/05/report-ms4_20190524121556.pdf. The Town's website link is located here for more information: http://northeastmd.org/stormwater-management-utility/

Comprehensive Vegetation Management Plan

The City of Dover's Comprehensive Vegetation Management Plan was updated in September 11, 2019 and the intent of the Plan is to provide a comprehensive management strategy for the City owned areas along scenic routes, such as: Mirror Lake, St. Jones River (along Park Drive and Silver Lake), State Street Bridge, and Silver Lake Dam. The Plan can found here:
https://www.cityofdover.com/media/Public%20Works/Vegetation%20Management%20Plan/Vegetation%20Management%20Plan.pdf

Livable Delaware Series

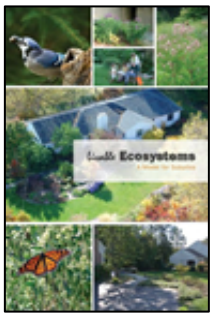
The Delaware Nursery & Landscape Association, DNLA, is non-profit trade organization that serves Delaware's horticultural related businesses and the companies that supply them. The Association also works in cooperation with the Delaware Department of Agriculture and Delaware Cooperative Extension to shape legislative and administrative policies and procedures on matters which are of interest to Delaware's green industry. The Livable Delaware series was developed to educate Delawareans about the problems of invasive plants in the landscape and ways to create more environmentally friendly gardens. The series initiatives are listed below:

- *Livable Lawns* - This program provides a detailed seven step plan to a Livable Lawn and an online application system which requires a commitment to completing eight requirements. The Delaware Livable Lawns Program Advisory Group includes several government agencies, higher education institutions, conservation district, organizations and associations. The website states that EPA considers stormwater runoff from yards, streets, parking lots and other areas to be one of the most significant sources of contamination in our country's water and DNLA aims to: certify lawn care companies that follow environmentally-friendly practices in fertilizer application and provide homeowners with the necessary information to make small changes in your lawn care practices so we can all be better stewards of our environment.

- *Plants for a Livable Delaware* – This is a campaign to identify and promote superior plants that thrive without becoming invasive. A Livable Delaware plant must: possess adaptable characteristics to landscape situations (i.e. drought resistant, tolerant of poor soils, etc.), pose no potential threat as an invasive plant, have no serious disease or insect problems and be hardy to Delaware. This guide provides problematic and invasive plants that are still bought and sold in nurseries and garden centers and see great alternatives to these plants that you can use in your home landscape.

- *Livable Landscapes* – This brochure suggests an attractive supplement to ecological preserves: redesigning our home gardens to accommodate biodiversity. Your home landscape might be comprised of a variety of ecological niches, each with unique cultural requirements that shape the design and selection of appropriate plant combinations. The following sections are intended to offer suggested planting combinations based on ten culturally distinct landscape niches: meadow, wet area, dry shade, rain garden, forest edge, pond/stream edge, sunny slope, salt and sand, small garden and container.

- *Controlling Backyard Invaders* – Invasive plants can be divided into two categories— (1) plants that were introduced either intentionally or accidentally but are no longer sold (i.e. multiflora rose, stilt grass) and (2) ornamental plants still grown and sold. This brochure focuses primarily on invasive plants no longer sold. The goal is to guide home and property owners in the identification and control of aggressive invasive plants. Not only will control improve the diversity of native and non-invasive plants, but it will also improve habitat and help prevent the spread of invasive plants to neighboring areas.



- *Livable Ecosystems* - A suburban livable ecosystem is a landscape that takes advantage of natural processes while providing tangible benefits to its owner. The can create an opportunity to produce ecosystem services right in our yards; services such as cleaning water, increasing plant and animal diversity, cooling the environment, saving energy, sequestering carbon, and enjoying landscapes for the pleasure they can provide. This brochure assists with learning about planting more shade trees, reducing lawn, recycling grass clippings, using leaves as mulch, planting dense groundcovers, and incorporating native plants into your landscape.

The Livable Delaware series, membership information and additional resources can be found at this website link: https://www.dnlaonline.org/resources/livable-delaware

Green Infrastructure Primer for Delaware

The Green Infrastructure Primer – A Guide to Using Natural Systems in Urban, Rural and Coastal Settings was developed by the Delaware Department of Natural Resources and Environmental Control (DNREC) in partnership with the Executive Order 41 Flood Avoidance Workgroup. Under the order, state agencies are directed to "incorporate measures to improve resiliency to flood heights, erosion, and sea level rise using natural systems or green infrastructure to improve resiliency wherever practical and effective." The purpose of this document is to promote the use of green infrastructure as an adaptation strategy for climate change. The document can be found here:
http://www.dnrec.delaware.gov/GI/Documents/Green%20Infrastructure/Green_Infra_Primer2016_FINAL%20web%20version.pdf

CHAPTER 7 - IMPLEMENTATION CONSIDERATIONS

The implementation chart shown below can assist Municipalities with items for consideration regarding impervious surface coverage initiatives, please note these are not in any particular order nor are they prioritized. These are general recommendations and are not applicable to all jurisdictions due to existing conditions and infrastructure, ongoing programs, project initiatives, funding, ownership, political will and existing resources.

No.	Recommendation
1	Consider a sediment and stormwater review for projects under 4,999 square feet of disturbance; projects greater than 5,000 square feet require review by the Sussex Conservation District. The following options could be considered separately or jointly: A) Create more stringent regulations and review locally B) Analyze and create a fee that would cover these review expenses C) Work with the SCD on potential partnership opportunities to provide this service
2	Prepare/Update a Tree Ordinance that would protect the existing inventory and require new trees to be planted to a predetermined specification. Ensure maintenance measures are clear and can be enforced.
3	Create an existing tree inventory to assess existing conditions, determined location with private and public ownership, ensure the right of way and/or easements are determined, research grants and incentives for a successful program.
4	Research and determine the local qualifications to obtain a Tree City USA certification. If existing, ensure the Municipality remains active and in good standing.
5	Review the Capital Budget annually for upcoming proposed infrastructure improvements and ensure consideration is given to stormwater and drainage improvements.
6	Update Municipal code definitions (recommend following EPA or State definitions) to include potential future regulatory permit requirements.
7	Research and develop incentive programs.
8	Research and develop awards and recognition programs for BMPs.
9	Provide educational community workshops with partners recognized, such as: A) Vendors B) Private, local business providers such as: greenhouse, landscaping, etc. C) Industry leading speakers / presenters D) Community Organizations
10	Research and determine applicable funding opportunities and timelines for application submittals.
11	Inventory all public lands and assess the ability to develop applicable BMPs.
12	Inventory, and identify areas of improvement for the existing stormwater infrastructure.
13	Further research and determine local applicable BMPs (biggest bang for the buck approach)
14	Identify potential areas for Living Shoreline (i.e. protected, stabilized coastal edge).
15	Research and Identify an approach and/or a feasibility study to a Stormwater Utility program.
16	Review the existing regulations to reduce the allowable lot and structure coverage.
17	Continue intergovernmental coordination regarding multi-jurisdictional stormwater infrastructures.
18	Work with local vendors on alternate surface materials and/or BMP materials.
19	Create outreach and educational materials that can be updated with success stories and lessons learned for future use.

CHAPTER 8 - FUNDING OPPORTUNITIES

Loans are available for an array of projects; however, the Municipalities must be aware of their borrowing capacity and prioritize projects accordingly. The majority of loans are spent on water, sewer and streets. Grants are the preferred method to fund government projects; however, they are getting increasingly harder to obtain based on some of these areas:

- more competitive
- frequently requiring a financial match component
- increasing program accountability and administration responsibilities
- requiring additional strategies and supportive application research

When researching funding opportunities, it is best to start with what the Municipality is proposing in the upcoming budget year to determine if any of the projects can offset or share the associated costs. Some programs or grants can qualify for a cash match, if required. Not all funding opportunities fit the needs for each Municipality; however, if planned properly with the budget and application schedule it could stretch the local funds to meet all the needs in the project area. Listed below are some potential funding opportunities for consideration:

SURFACE WATER MATCHING PLANNING GRANTS - established by the Delaware Water Infrastructure Advisory Council and intended to help plan for projects to manage water pollution that comes from specific sources and/or multiple sources (non-point source pollution). The grants support planning, preliminary engineering, and feasibility analysis of surface water improvement projects and activities that focus on the developed landscape to improve water quality within impaired watersheds in Delaware. The grant can be used for a variety of projects, such as:

- Retrofitting stormwater systems
- Establishing green technology practices
- Restoring streams and wetlands
- Small watershed studies
- Developing master surface water and drainage plans

Funding for projects receiving a grant award will be capped at $50,000 with a 1:1 cash match requirement. There is also a $100,000 cap per fiscal year.
https://dnrec.alpha.delaware.gov/environmental-finance/surface-water-planning-grants/

COMMUNITY WATER QUALITY IMPROVEMENT GRANT - is an annually-determined set-aside in the Delaware Clean Water State Revolving Fund (CWSRF) Non-Federal Administrative Account. It requires a 25% cash match and must meet state insurance requirements. This grant is intended for projects to improve water quality as part of specific watershed improvement plans. It is meant for programs and projects that demonstrate innovative and sustainable methods, techniques, and/or practices for water quality improvements with cost effective and measurable results. Preference is given to projects involving cooperative partnerships and sponsors without a dedicated source of funds for repayment of Clean Water State Revolving Fund loans and the eligible sectors include: Delaware non-profit organizations, local conservation districts, educational institutions, community organizations, and/or homeowner's associations. All proposals should address one or more of the following goals:

- Providing benefits to water quality within an impaired watershed
- Implementation of non-regulatory projects listed in a watershed management plan. Examples of plans include voluntary elements of Pollution Control Strategies, watershed-based restoration plans, a Whole Basin Management Preliminary Assessment, or community-based stormwater permits
- Installation of community stormwater management improvements in existing developments and municipalities
- Restoration for water quality benefits

https://dnrec.alpha.delaware.gov/environmental-finance/community-water-quality-improvement/

DELAWARE WATER POLLUTION CONTROL REVOLVING FUND - provides loans for stormwater infrastructure projects as part of a 20% set-aside designed to provide funds for green infrastructure, water or energy efficiency improvements, or other environmentally innovative activities. Stormwater infrastructure project loans are made at below market interest rates. Interest rate subsidies and/or principal forgiveness may be provided based on the affordability of the project. Eligible projects will be able to show a water quality benefit. Projects greater than $250,000 must follow the Project Priority List (PPL) process and Stormwater projects can be eligible as municipal (212) projects, non-point source (319), and /or green infrastructure projects. Low-cost, non-point source projects may be eligible under the expanded uses programs.
https://dnrec.alpha.delaware.gov/environmental-finance/stormwater-infrastructure/

WATER QUALITY IMPROVEMENT LOAN PROGRAM - provides loans to cities and towns to fund water quality improvement projects to complement municipal wastewater treatment projects. The program funds projects designed to improve water quality, such as green street initiatives, removal of stormwater from wastewater systems, urban forestry programs and other water quality improvement efforts, by local governments receiving wastewater treatment funding through the Water Pollution Control Revolving Fund (WPCRF). Municipalities that have wastewater projects on the fundable portion of the Fund's Project Priority List can enter into contractual agreements with the Division of Watershed Stewardship for water quality improvement projects. Funded water quality improvement projects must have demonstrated water quality improvement benefits and be managed for the life of the improvement. Eligible projects are those that can demonstrate a water quality benefit and eligible applicants are limited to municipalities with wastewater projects on the fundable portion of the WPCRF project priority list.
https://dnrec.alpha.delaware.gov/environmental-finance/water-quality-improvement/

COMMUNITY ENVIRONMENTAL PROJECT FUND – provides money to support the restoration of the environment in communities that were damaged by environmental pollution. It was established by legislation in 2004 that authorizes Department of Natural Resources and Environmental Control (DNREC) to establish a grant fund by withholding 25% of funds collected as penalties for violations of environmental regulations. These funds are returned to the communities where the violations occurred as competitive grants to nonprofit organizations to support community environmental projects. Eligible community environmental projects must mitigate pollution, enhance the environment, or create recreational opportunities. Eligible Project Activities include: habitat restoration, infrastructure upgrades, planning, species protection, stormwater management, wetland protection. The grant requires a 25% match and up to $20,000 in funds. Grants can only be given to communities where there was a violation of environmental regulations and penalty assessed by DNREC.
https://dnrec.alpha.delaware.gov/community-service

WATER HAZARDOUS MITIGATION GRANT PROGRAM – The Federal Emergency Management Agency (FEMA) eligible project activities include: property acquisition/easement, disaster preparedness, disaster recovery, vulnerability assessment, planning, stormwater management, storm-proofing retrofits. The grant requires a 25% non-federal match. Small impoverished communities may receive a federal cost share of up to 90% of approved project costs. Funding is determined based on the total damages incurred by the community after a disaster. Contact the areas Hazard Mitigation Officer for more specific amounts. The key purpose of the Hazard Mitigation Grant Program (HMGP) awards grants to fund hazard mitigation initiatives that aim to reduce the risk of loss of life and property from future disasters after a Presidential Major Disaster Declaration has been issued in an area. Hazard mitigation includes long-term efforts to reduce the impact of future events. In order to be considered for funding, a project must conform with the approved state and local mitigation plan, benefit the disaster area, conform with environmental regulations, solve a problem and be technically feasible, meet all applicable state and local codes and standards, and be cost effective. If the proposed community is located in the Special Flood Hazard Area (SFHA) they must be a compliant member of the National Flood Insurance Program (NFIP) to apply.
https://www.fema.gov/hazard-mitigation-grant-program

FIVE STAR AND URBAN WATERS RESTORATION GRANT PROGRAM – The program is administered by the National Fish and Wildlife Foundation (NFWF) and it is designed to assist communities in sustaining local natural resources for future generations by providing financial assistance to diverse local partnerships. The focus is on improving water quality, watersheds and the species and habitats they support, and priority will be given to projects that advance water quality goals in underserved communities. Although 'urban' is in the title of this program, any size community may apply. Funds may be used for community tree canopy enhancement, water quality monitoring, community outreach, and stewardship, among other activities. Funds may not be used for political advocacy, fundraising, lobbying, or litigation. The eligible project activities include: habitat restoration, stormwater management, education, clean water initiatives, wetland protection, species protection, infrastructure updates and the grants requiring a 50% non-federal match for technical assistance. The typical funding amount is from $20,000 to $50,000. Eligible Applicants include: Native American tribes, educational institutions, state government agencies, non-profit organizations, local governments, municipal governments.
http://www.nfwf.org/fivestar/Pages/home.aspx

RESILIENT COMMUNITIES PROGRAM - The program is administered by the National Fish and Wildlife Foundation (NFWF) and designed to prepare communities for future environmental challenges by enhancing community capacity to plan and implement resiliency projects and improve the protections afforded by natural ecosystems by investing in green infrastructure and other measures. The program focuses on water quality and quantity declines, forest health concerns, and sea level rise. The program emphasizes community inclusion and assistance to traditionally underserved populations in vulnerable areas. There are two categories of grants. Category 1 Grants ($200,000 to $500,000) will fund dune habitat restoration, wetland restoration, bird and wildlife habitat restoration, living shorelines, aquatic migration connection. Category 2 Grants ($100,000 to $250,000) will support highly-impactful and visible projects that help communities understand, organize and take action to address risks and opportunities through improved resilience brought about by enhanced natural features. This can include resilience solutions benefiting multi-family affordable housing through green infrastructure such as tree canopies/pocket parks/community green spaces, and/or stormwater retention projects. Category 2 grants can also support organizations that build capacity to help cities plan for enhanced resilience through green infrastructure or other improvements. The grant requires 1:1 match and can be between $100,000 and $500,000 depending on the category. The eligible applicants include: Non-profit 501(c) organizations, local governments, Indian tribes.
http://www.nfwf.org/resilientcommunities/Pages/home.aspx

DELAWARE DATABASE FOR FUNDING RESILIENT COMMUNITIES - The Institute for Public Administration (IPA) at the University of Delaware, with support from Delaware Coastal Programs (DCP), conducted an extensive search of financial assistance programs that support the implementation of resiliency-building plans and projects in Delaware and compiled the findings into an accessible and intuitive online searchable database. While planning and technical assistance programs were identified and included, IPA's search prioritized financial assistance programs that support the implementation of high-cost activities such as infrastructure improvements, facility retrofitting, construction, and land acquisition. Use the sorting feature to quickly and easily filter programs by four categories:

- Type of assistance offered (grant, loan, etc.)
- Project scope (land acquisition, energy efficiency retrofits, etc.)
- Amount of financial assistance available
- Whether or not matching funds are required

https://www.completecommunitiesde.org/planning/ddfrc/

CHAPTER 9 – RESOURCES AND REFERENCES

Listed below are several resources and references for additional information. They are all valuable and can assist with outreach and education, programs, community information, policy maker data for decisions and case studies, potential partners, and methods for funding such initiatives.

ENVIRONMENTAL PROTECTION AGENCY (EPA)

Municipal Handbook, Incentive Mechanisms
https://www.epa.gov/sites/production/files/2015-10/documents/gi_munichandbook_incentives.pdf

Guidance for Municipal Stormwater Funding
https://www.epa.gov/sites/production/files/2015-09/documents/guidance-manual-version-2x-2_0.pdf

Identifying Greener Landscaping Choices
https://www.epa.gov/greenerproducts/identifying-greener-landscaping-choices

Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices
https://www.epa.gov/sites/production/files/2015-10/documents/2008_01_02_nps_lid_costs07uments_reducingstormwatercosts-2.pdf

WATER ENVIRONMENT RESEARCH FOUNDATION (WERF)

Using Rainwater to Grow Livable Communities - Sustainable Stormwater Best Management Practices (BMPs)
Stormwater best management practices (BMPs) are gaining recognition as effective, flexible, and environmentally sound ways for controlling the quantity and improving the quality of stormwater runoff, while also adding amenity to a wide variety of development projects. This website is designed to encourage and facilitate the integration of stormwater BMPs into development projects in your area by providing tools and resources for effective communication and implementation as well as in-depth case studies that examine BMP integration in several cities across the United States.
https://www.werf.org/liveablecommunities/index.htm

CITY OF LANCASTER, PA

Green Infrastructure Manuals (Design, Maintenance, Monitoring, & GreenIt! Lancaster Program)
The City has developed design, maintenance, and monitoring manuals, as well as an updated green infrastructure plan, pursuant to Consent Decree requirements. The documents linked below are currently under review by the Pennsylvania Department of Environmental Protection and the U.S. Environmental Protection Agency. They also have a fairly large Green Infrastructure 25-year Plan with several initiatives and implementation tasks.
https://www.cityoflancasterpa.com/services/water-sewer-stormwater/

TOWN OF BERLIN, MD

Financing Feasibility Study for Stormwater Management (October 2012)
https://berlinmd.gov/wp-content/uploads/2019/03/BerlinStormwaterFeasibilityStudyFinalReport1.pdf
Stormwater Financing Case Study
https://efc.umd.edu/assets/sw_case_studies/berlin.pdf
The Town of Berlin established a stormwater utility in 2013 and more information can be found on the Town's website, located here: https://berlinmd.gov/department/water-resources/

DISTRICT OF COLUMBIA, MD

District Department of the Environment, Stormwater Management Division
RiverSmart Rewards Program and DC Water's Clean Rivers Impervious Surface Area Charge Incentive Program
https://doee.dc.gov/riversmartrewards

ALLIANCE FOR THE CHESAPEAKE BAY, MD
Chesapeake RiverWise Communities Manual
https://allianceforthebay.org

CITY OF RICHMOND, VA
Stormwater Credit Program for Residential and Non-residential Properties
http://www.richmondgov.com/PublicUtilities/StormwaterCredits.aspx
http://www.richmondgov.com/PublicUtilities/documents/SWFAQ.pdf
http://www.richmondgov.com/PublicUtilities/documents/SWcreditmanual.pdf

CITY OF CHARLOTTESVILLE, VA
Charlottesville Conservation Assistance Program (CCAP)
Water Resources Protection Program (WRPP)
https://www.charlottesville.org/departments-and-services/departments-h-z/utilities/stormwater

CITY OF LYNCHBURG, VA
Credit Program-Reduction in Stormwater Fee
http://www.lynchburgva.gov/stormwater-credit-program

ENVIRONMENTAL FINANCE CENTER, UNIVERSITY OF MARYLAND
Local Government Stormwater Financing Manual: A Process for Program Reform
This manual provides, for local government staff, background information about a paradigm shift underway in stormwater management and a process model for being effective leaders in their jurisdictions to create policies and programs to finance that shift.
https://efc.umd.edu/assets/efc_stormwater_financing_manual_final_(1).pdf

METROPOLITAN AREA PLANNING COUNCIL (MAPC)
Stormwater Utility Funding/Utility Starter Kit
MAPC and project partners developed a Stormwater Utility/Funding Starter Kit to help municipalities take control of local water quality issues via a long-term funding source for stormwater management, which is encouraged by the U.S. Environmental Protection Agency and The Massachusetts Department of Environmental Protection.
https://www.mapc.org/resource-library/stormwater-financing-utility-starter-kit/

NATIONAL ASSOCIATION OF CLEAN WATER AGENCIES (NACWA)
Legal Considerations for Enacting, Implementing & Funding Stormwater Programs
This publication provides a brief overview of current legal issues associated with user-fee funded municipal separate storm sewer systems (MS4s) stormwater programs and a summary of selected legal decisions and pending cases.
https://www.nacwa.org/docs/default-source/default-document-library/2016-12-08stormwaterwhitepaper.pdf?sfvrsn=e2f6e961_0

CHESAPEAKE BAY TRUST
The Trust's grant-making strategies are shaped by three core objectives: environmental education, demonstration-based restoration, and community engagement. We look to these objectives as touchstones for developing our grant programs, engaging new partners, and communicating about our work.
https://cbtrust.org/

PENNFUTURE

Funding Stormwater Management in Pennsylvania Municipalities: Creating Authorities and Implementing Ordinances

Municipalities are on the front lines of stormwater management. Although not all municipalities are required to obtain stormwater permits, those that are must satisfy numerous permitting requirements that are becoming increasingly stringent. Those requirements include: keeping the public educated and involved; identifying improper discharges to the stormwater system; regulating stormwater discharges resulting from new construction; and implementing municipal "good housekeeping" practices. This guide gives recommendations for stormwater improvements, formation of an authority, implementation of fees and provides a model ordinance for consideration.

http://www.pennfuture.org/Files/Admin/PennFuture_StormwaterManual_web_3.20.17.pdf

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Funding Quick Resource Guide to the MS4 Program

This guide was written for municipalities that own and operate Municipal Separate Storm Sewer Systems (MS4s). Stormwater regulations associated with the Federal Clean Water Act (CWA) are administered under the MS4 Program by the Environmental Protection Agency (EPA). In this guide, we begin with the history and background of MS4s and regulations. Then we provide an overview of the six (6) Minimum Control Measures (MCMs) of the NPDES MS4 permit and their associated Best Management Practices (BMPs).

http://files.dep.state.pa.us/EnvironmentalEd/Environmental%20Education/EnvEdPortalFiles/MS4%20Resource%20Guide.pdf

HARVARD LAW SCHOOL

Regional and Municipal Stormwater Management: A Comprehensive Approach

This report analyzes options for addressing stormwater pollution at both the regional and municipal level.

http://eelp.law.harvard.edu/wp-content/uploads/regional-municipal-stormwater-management-comprehensive-approach.pdf

INTERLOCKING CONCRETE PAVING INSTITUTE

Fact sheets, design guidance and reference materials

http://www.icpi.org

PERVIOUS CONCRETE

Fact sheets, design guidance and reference materials

http://www.perviouspavement.org/

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL (DNREC)

A Delaware Guide to Using Natural Systems in Urban, Rural and Coastal Setting

http://www.dnrec.delaware.gov/GI/Documents/Green%20Infrastructure/Green_Infra_Primer2016_FINAL%20web%20version.pdf

Delaware Coastal Management Program

https://dnrec.alpha.delaware.gov/coastal-programs/coastal-management/

DELAWARE NURSEY & LANDSCAPE ASSOCIATION (DNLA)

The Delaware Nursery & Landscape Association, DNLA, is a leader in Delaware's $745 million Green industry. DNLA is a non-profit trade organization that serves Delaware's horticultural related businesses and the companies that supply them. The Association also works in cooperation with the Delaware Department of Agriculture and Delaware Cooperative Extension to shape legislative and administrative policies and procedures on matters which are of interest to Delaware's green industry.

https://www.dnlaonline.org/

DELAWARE NATIVE PLANT SOCIETY (DNPS)

The Delaware Native Plant Society (DNPS) is a volunteer-based, publicly supported, 501(c)(3) non-profit organization dedicated to the use, propagation, promotion, and conservation of native plants and their natural habitats through education, science, advocacy, and land stewardship.
https://delawarenativeplants.org/

DELAWARE CENTER FOR INLAND BAYS

The Delaware Center for the Inland Bays was established as a nonprofit organization and its creation was the culmination of active public participation and investigation into the decline of the Inland Bays and the remedies for the restoration and preservation of the watershed. Delaware's Inland Bays were designated an "estuary of national significance in 1988 by the U.S. Congress, and as such, the Center for the Inland Bays is one of the 28 National Estuary Programs (NEP's). The Center oversees the implementation of the Comprehensive Conservation and Management Plan for Delaware's Inland Bays (CCMP) and 2012 Addendum and promotes the wise use and enhancement of the Inland Bays watershed by conducting public outreach and education, developing and implementing restoration projects, encouraging scientific inquiry, sponsoring needed research, and establishing a long-term process for the protection and preservation of the watershed.
https://www.inlandbays.org/

NANTICOKE RIVER WATERSHED CONSERVANCY

The Nanticoke River Watershed Conservancy is a citizen-based land conservation organization dedicated to preservation of the natural qualities of the watershed. Their objective is to promote protection and balanced use of the watershed's natural resources in both Delaware and Maryland. Most of their land protection is achieved through conservation easements, or written agreements between the landowner and our agency ensuring that a property will not be developed.
http://nanticokeconservancy.org/

RCP BMP EXAMPLES