Executive Summary (Updated May 2013)
Stormwater Master Plan

Background and Purpose

During large rainfall events many areas of the Town of Fort Myers Beach, including the only evacuation route along Estero Boulevard, suffer from severe stormwater flooding. Many residential properties on the island are subject to repeated flooding, including over 50 repetitive loss properties identified by the Federal Emergency Management Association (FEMA) as part of the flood insurance they provide. In addition, water quality is an important stormwater issue for the Town as stormwater runoff can be related to beach closings due to high bacteria levels and can also impact wildlife and aquatic species. Therefore, the State Total Maximum Daily Load (TMDL) requirements and the Lee County stormwater permit (of which the Town is a co-permittee with Lee County) require minimum levels of action that the Town must take to reduce stormwater pollutant loadings.

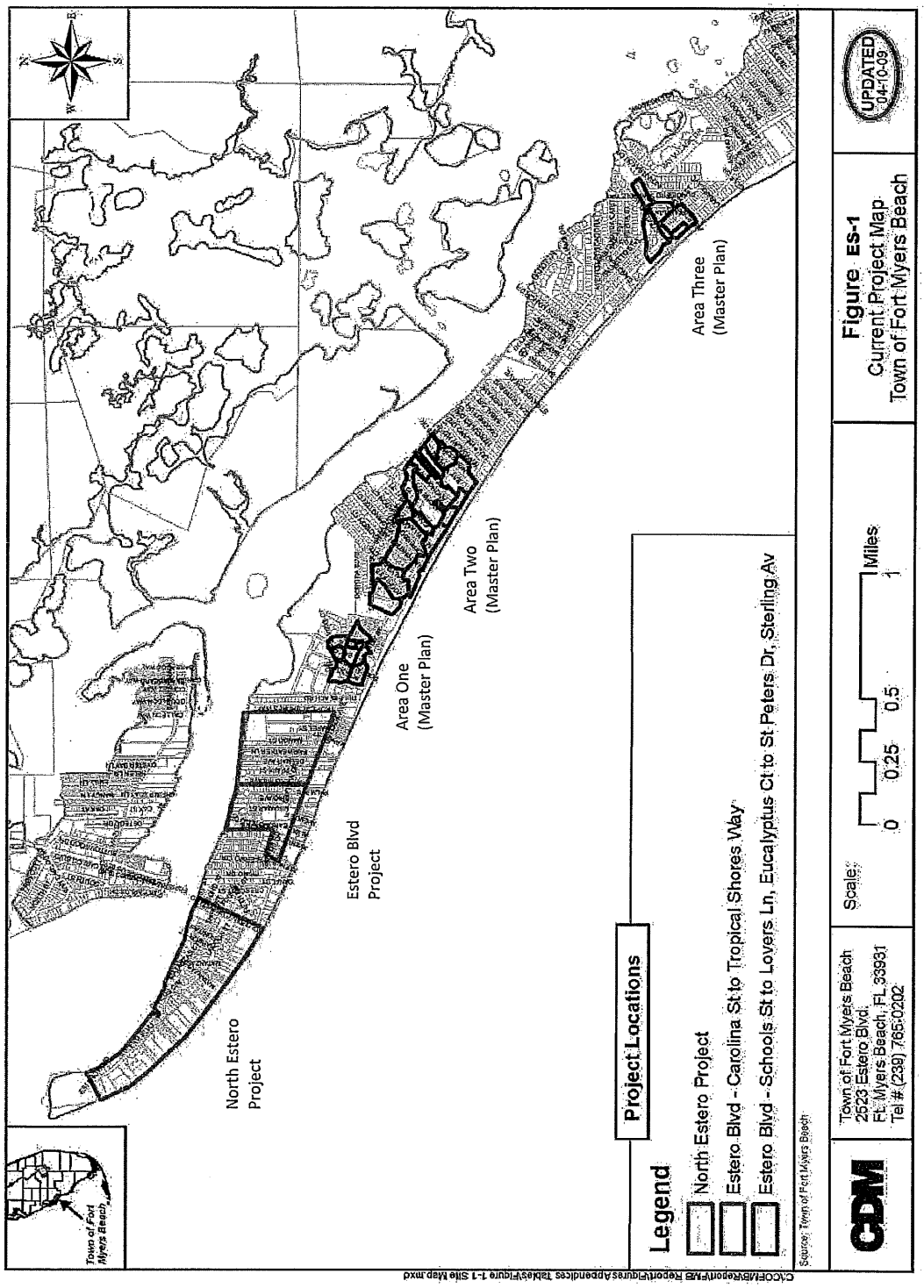
In response to these flooding and water quality issues, **Figure ES-1** shows existing and planned stormwater project areas for the Town. As part of ongoing efforts to address stormwater related flooding and water quality issues, the Town has developed a Stormwater Master Plan. The basis of the master plan comes from the Town of Fort Myers Beach Comprehensive Plan developed in 1999 which includes Goal Number 9 as:

> ***"To provide optimal flood protection and improved stormwater quality within the constraints imposed by location and existing land-use patterns."***

To reach this goal, the comprehensive plan developed six objectives that the Town has started to implement. Development of a Stormwater Master Plan and a review of options to fund it (including the potential to create a stormwater utility) fulfill this sixth objective.

This Executive Summary provides a summary of the detailed analysis and findings provided in the main report. References to the main report sections are provided for additional details as needed.

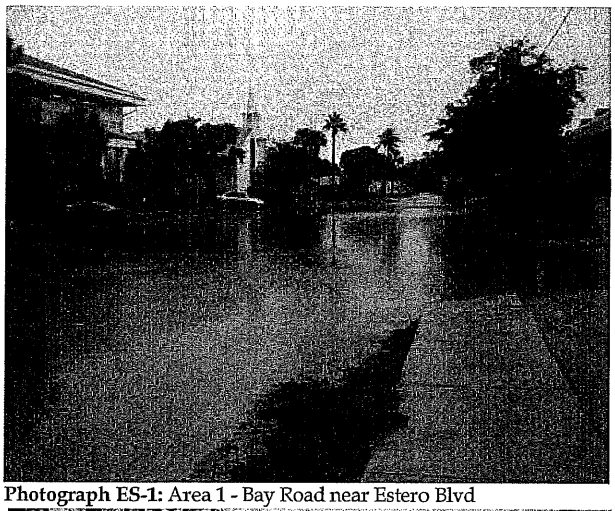
In addition, the final section of the Executive Summary provides the Town-wide Implementation Plan which was developed after the main report was finalized in 2010. As the Executive Summary was updated in May 2013, the project costs provided in the Executive Summary are about 10% higher than those given in the main report. The cost adjustment is based on the increase of the ENR construction cost index from 2009 to 2013.


North Estero Project
Estero Blvd Project
Area One (Master Plan)
Area Two (Master Plan)
Area Three (Master Plan)
Legend
Project Locations
North Estero Project
Estero Blvd - Carolina St to Tropical Shores Way
Estero Blvd - Schools St to Lovers Ln, Eucalyptus Ct to St Peters Dr, Sterling Av
Source: Town of Fort Myers Beach
Town of Fort Myers Beach
CDM
Town of Fort Myers Beach
2523 Estero Blvd.
Ft. Myers Beach, FL 33931
Tel # (239) 765-0202
Scale:
0 0.25 0.5 1 Miles
Figure ES-1
Current Project Map
Town of Fort Myers Beach
UPDATED 04-10-09
C:\JOE\FMBReport\FMB Report\Figures Appendices Tables\Figure 1-1 Site Map.mxd

Flooding Evaluations

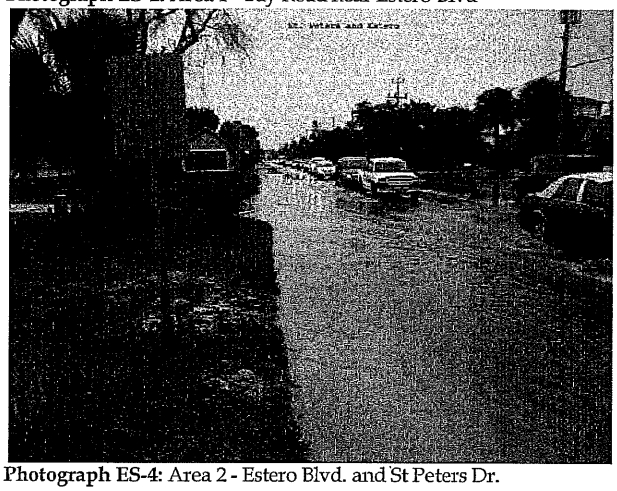
The master plan development included detailed evaluations of three problem areas identified by Town staff as being representative of other flooding and water quality issues island-wide. These areas are shown on Figure ES-1. Based on the development characteristics and reasons for flooding, findings for the three areas are used to provide general master planning recommendations island-wide. The majority of flooding in these areas occurs in roads at intersections with Estero Boulevard. In some of the problem areas, road flooding ponds until it overflows into adjacent private properties. Some residents have reported that at times, they need to wade through water to get to/from their house and in some cases there has been reported flooding into homes.

Using existing and newly collected field data, a stormwater hydraulic model of the three areas was developed to evaluate flooding and level of service as described in Section 2 of this Master Plan. Photographs of flooding, like the examples shown in **Photographs ES-1** through **ES-4,** were used to delineate the flooding. Additional photos are provided in Section 2 and Appendix C.

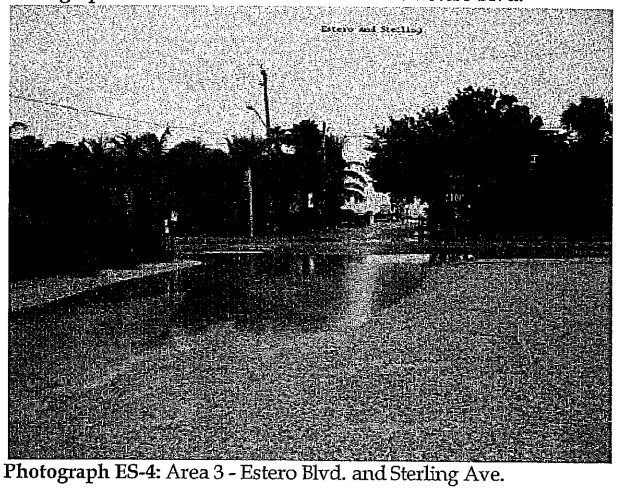


Photograph ES-1: Area 1 - Bay Road near Estero Blvd

Photograph ES-2: Area 2 - Andre Mar Dr. and Estero Blvd.

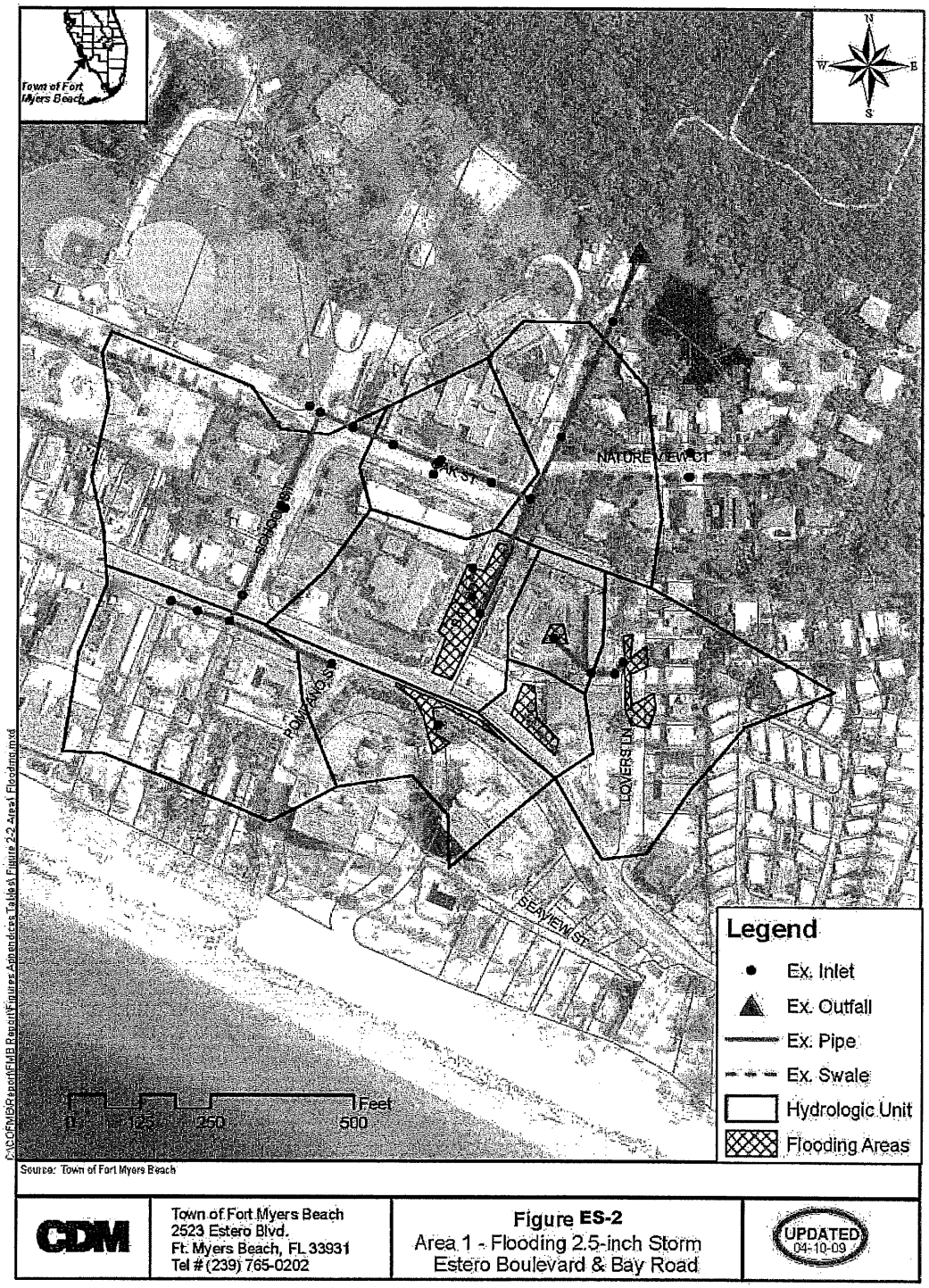


Photograph ES-4: Area 2 - Estero Blvd. and St Peters Dr.



Photograph ES-4: Area 3 - Estero Blvd. and Sterling Ave.

Figure ES-2 shows the existing stormwater infrastructure modeled and delineation of flooding for problem area one. Similar figures are provided in Section 2 for areas two and three.



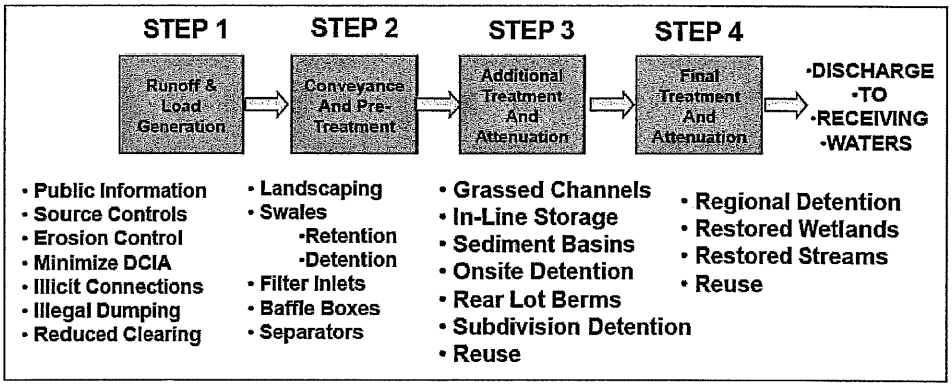
Water Quality Evaluations

A water quality model of the three problem areas was developed to estimate the annual and seasonal pollution loads from non-point sources due to stormwater runoff. The model was used to evaluate current and future conditions in order to assist in identifying best management practices (BMP) that can be included as part of the alternatives being evaluated. In addition, as the three problem areas are representative of water quality issues island-wide, the results were used to make island-wide master planning recommendations.

Best Management Practices

BMPs are measures used to reduce the amount of stormwater runoff and/or reduce the pollutant loading for the protection of natural resources and to comply with established water quality regulations. BMPs can be "mixed and matched" to develop a "treatment train." In order to maximize flood control, pollutant load reduction, aquifer recharge, and wetlands benefits, the treatment train concept maximizes the use of available site conditions from the point of where stormwater runoff begins to the point of where the runoff discharges to a receiving water (canals and Estero Bay in the case of the Town). **Figure ES-3** shows a schematic flowchart of the treatment train concept.

Figure ES-3. Best Management Practices Treatment Train Approach



Non-Structural BMPs. Non-structural BMPs are control measures that can be implemented to improve water quality without the need to construct new physical stormwater facilities. The Town has been implementing many of these types of controls as described in Section 3 of the report and the recommendations are provided later in this section. The non-structural BMPs are listed as Step 1 in Figure ES-3 and include the following.

- Public information programs like the Town's PRISM program to educate residents on what they can do to help.
- Source controls of pollutants and erosion control through ordinances and street sweeping.

- Minimizing directly connected impervious areas (DCIA) and reduced clearing through ordinances and land use planning.
- Identifying and eliminating illicit connections and illegal dumping.

Structural Stormwater BMPs. Structural BMPs require construction of new stormwater facilities. Structural BMPs are listed in steps 2-4 of Figure ES-3 and include the following that are most applicable to the Town.

- Shallow grassed swales and exfiltration trenches that induce infiltration and provide conveyance.
- Water quality inlets and baffle boxes to remove pollutants.
- Basins or ponds to detain (temporarily hold) or retain stormwater.
- Porous pavement that reduces runoff.

Water Quality Model

Pollutant loads to the canals and bay due to stormwater runoff were modeled for the problem areas based on rainfall, pervious and impervious runoff coefficients, event mean concentrations for each pollutant type, and loading rates typical for each land use type. The analysis is consistent with recent similar work by the Florida Department of Environmental Protection (FDEP) for Total Maximum Daily Loads (TMDL) for Estero Bay.

Similar to the FDEP TMDL studies in southwest Florida, the most critical pollutants of concern for the Town are Total Nitrogen (TN) and Total Phosphorous (TP) from the use of fertilizers, plant matter, and road runoff in both residential and commercial areas. BMPs such as swales, dry retention, dry detention, and wet detention have removal efficiencies of these constituents as high as 40 percent, 90 percent, 30 percent and 50 percent, respectively.

Alternatives and Level of Service

Three sets of alternatives were evaluated for the three problem areas as follows.

1. Clean and maintain existing stormwater system. This alternative is an operation and maintenance option that involves no capital improvements within the study area. This alternative is described in Section 4.2.

2. Fully connect existing stormwater system. This alternative is based on extending the existing system to achieve a higher level of service. This alternative is described in Section 4.3.

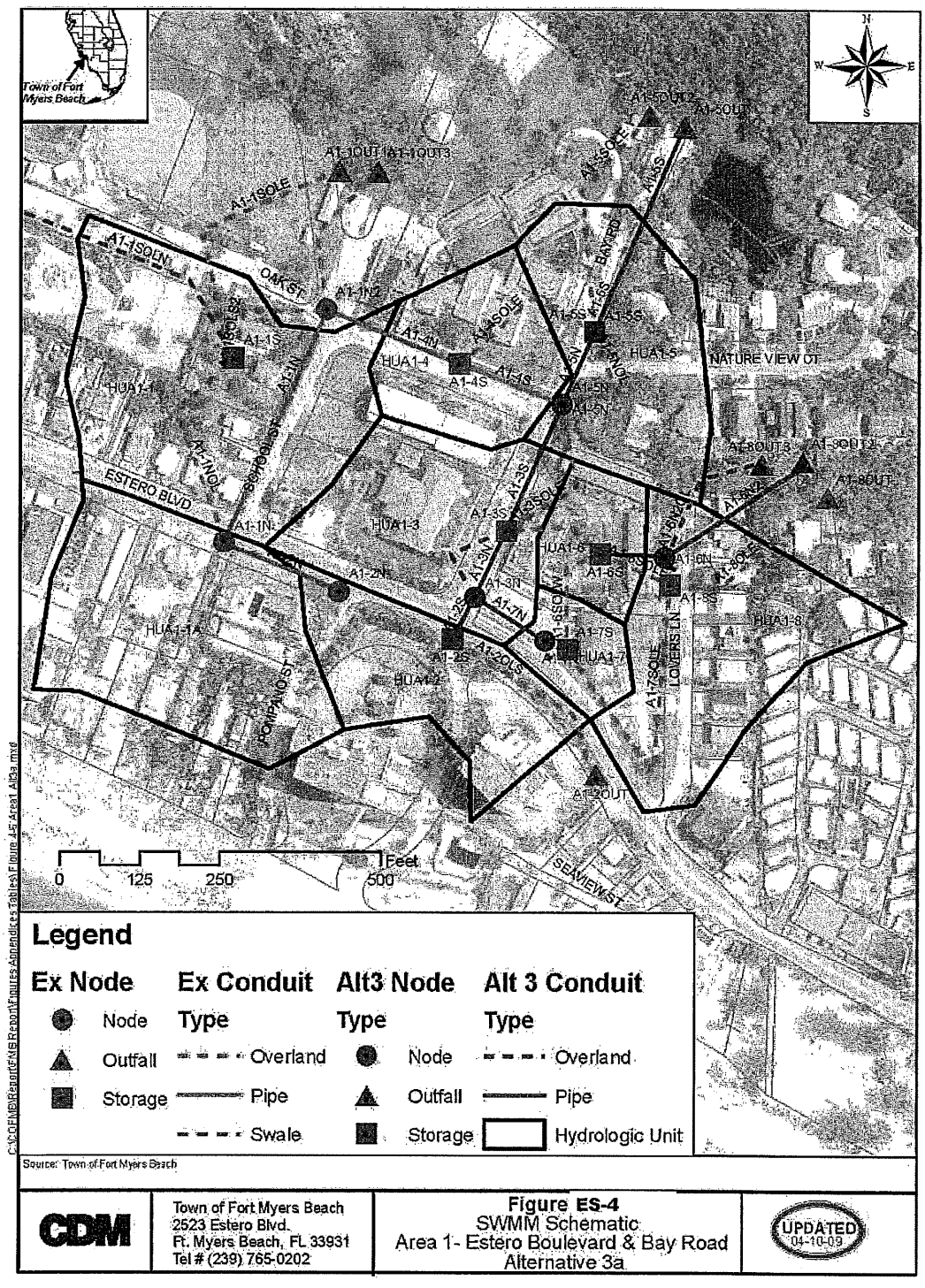
3. Fully connect and upgrade existing stormwater system. This alternative is based on achieving a higher level of service than alternative two by upsizing / replacing existing infrastructure. It can be implemented in a phased approach with alternative 2. This alternative is described in Section 4.4.

Figure ES-4 (on page 8) provides an example of how Alternative 3 for area one is laid-out. Maps for the additional areas are provided in Figures 4-1 through 4-10 in Section 4. As these alternatives will increase stormwater discharges to existing outfalls, the South Florida Water Management District (SFWMD) will require BMPs as a retrofit to the existing system. As the Town is retro-fitting in areas previously developed, the number and types of BMPs the SFWMD ultimately require will likely not be as stringent as those required for new development, but will need to be negotiated based on a site specific cost-effective analysis. Potential BMPs were identified for each area based on physical space constraints, permitting constraints, level of benefit achieved and financial costs. **Figure ES-5** (on page 9) provides an example of potential BMPs for problem area one. Potential BMPS for all three areas are provided in Figures 4-11 through 4-14 in Section 4.6.

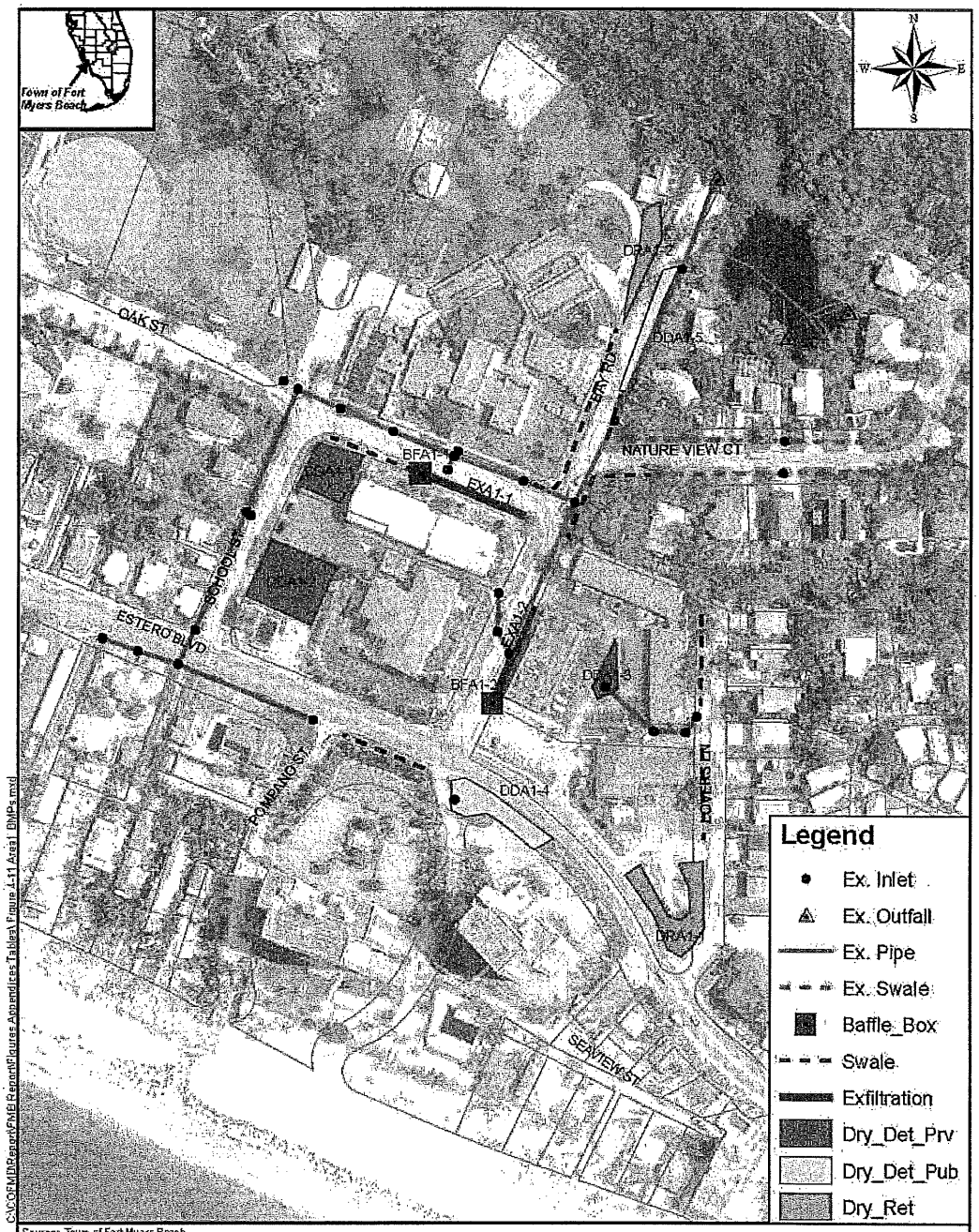
Level of Service

As part of the master planning process, a level of service (LOS) criteria was established to protect public safety and property, and provide direction for the Town Capital Improvement Program (CIP). The LOS goals for the Town were based on experience in the Town of Fort Myers Beach and similar programs such as Collier County (Gordon River) and the cities of Jacksonville, Atlantic Beach, Daytona Beach, Miami, and Ormond Beach. In addition, an evaluation for a range of alternatives was used to evaluate what LOS goals are reasonable for the Town to achieve.

The LOS criteria are based on an acceptable level of flooding (inches) over a range of rainfall events. The SFWMD design storms used for an Environmental Resource Permit (ERP) basis of review were used as the rainfall events and are provided in **Table ES- 1** (on page 10). Additionally, the Florida Department of Transportation (FDOT) 4-hour storm was used to analyze the effects of a shorter duration rain event.



CDM	Town of Fort Myers Beach 2523 Estero Blvd. Ft. Myers Beach, FL 33931 Tel # (239) 765-0202	**Figure ES-4** SWMM Schematic Area 1- Estero Boulevard & Bay Road Alternative 3a	UPDATED 04-10-09



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Source: Town of Fort Myers Beach

CDM	Town of Fort Myers Beach 2523 Estero Blvd. Ft. Myers Beach, FL 33931 Tel # (239) 765-0202	**Figure ES-5** Proposed BMPs Area 1 Estero Boulevard & Bay Road	UPDATED 04-10-09

Table ES-1. SFWMD Rainfall Events

Storms	Volume (inches)
1-year, 4-hour*	2.5
2-year, 24-hour	5.0
5-year, 24-hour	5.7
10-year, 72-hour	9.5
25-year, 72-hour	11.5
100-year, 72-hour	15.0

* Used the FDOT 4-hour rainfall distribution

The LOS criteria include four classes of acceptable levels of flooding as defined in **Table ES-2.** In general Class A has no flooding on any streets, while Class B, C, and D allow up to three, six, and nine inches of flooding on streets, respectively. For all classes, no flooding of first floor building elevations is acceptable. As shown in Table ES-2, the 1-year and 2-year LOS for all roads is Class B (no flooding greater than 3 inches). Similarly the 5-year LOS for evacuation routes is Class B, but Class C for other roads (up to 6 inches of flooding).

Table ES-2. Level of Service Goals for Town of Fort Myers Beach

Rain Event	1-Year (2.5-inches)#		2-Year (5-inches)*		5-Year (5.7-inches)*		10-Year (9.5-inches)*		25-Year (11.5-inches)*		100-Year (15-inches)*	
Structure/Facility	**Depth**	**Class**	**Depth**	**Class**	**Depth**	**Class**	**Depth**	**Class**	**Depth**	**Class**	**Depth**	**Class**
Houses/Buildings	<FFE (1)	D	<FFE	D	<FFE	D	<FFE	D	<FFE	D	<FFE	D
Evacuation Route (2)	1/2 W (3)	B	1/2 W	B	1/2 W	B	1/2 W	C	1/2 W	D	1/2 W	D
Other Roads (4)	< 3 in.	B	< 3 in.	B	< 6 in.	C	< 9 in.	D	> 9 in.	NA	> 9 in.	NA
Critical Elevation (5)	< 3 in.	B	< 3 in.	B	< 6 in.	C	< 9 in.	D	> 9 in.	NA	> 9 in.	NA

Class A: Full conveyance of storm runoff and maintains full width of evacuation route clear of flooding.
Class B: Manages erosion and maintains half of width of evacuation route clear of flooding and other roads to less than 3 inches.
Class C: Provides control of flood waters to less than 6 inches over evacuation routes and other roads.
Class D: Provides flood protection of first-floor elevations (FFE) and control of flood waters to less than 9 inches over evacuation routes.
Class NA: There is no level of service class that applies to this flood depth.

(1) Peak flood stages less than the FFE based on available data.
(2) Emergency and Evacuation routes as defined by town. (E.g. Estero Boulevard)
(3) Flood inundation limited to each side of the road such that half of the roadway width (W) or one travel lane width is not flooded.
(4) Other roads which are not critical for evacuation, but that will be used to estimate encroachment of FFEs.
(5) Critical elevations such as parking lots, yards and other areas defined as critical by the town.
Refers to FDOT Florida Department of Transportation's 1-Year, 2.5-inch rainfall event.
* Refers to SFWMD South Florida Water Management District's rainfall events as provided in Table 2-1 on page 2-21.

As part of establishing the LOS criteria, their direct affect on the size and cost of the alternatives needed to reach them was considered. For Alternative 2, locations that lacked connectivity to the existing stormwater system were provided with new piping or swales. This resulted in some reduction of flooding but overall improvement to the LOS was limited. For Alternative 3, the existing collection system and outfalls were upsized to at least 24-inch pipes where feasible. These results were considered the best-case scenario without significant costs for options requiring pumping facilities and therefore used as the criteria for setting the LOS goals in Table ES- 2.

Cost Comparisons

A cost/benefit analysis is summarized in **Table ES-3** by alternative and problem area. Appendices F and G provide a breakdown of the cost estimates for Alternatives 2 and 3 by problem area.

Table ES- 3. Project Cost/Benefit Analysis by Alternative and Area (Updated to $2013)

Alternative	Area	Cost	LOS	Benefit
Alt 2a	1	$473,000	<2-Year	- 3 to 12-inch reduction in flooding for 2-yr storm - improved LOS to Lovers Lane
Alt 2b	1	$495,000	<2-Year	- 3 to 12-inch reduction in flooding for 2-yr storm - no easements required for Lovers Lane
Alt 2	2	$1,760,000	<2-Year	- 1 to 2-inch reduction in flooding for 2-yr storm
Alt 2	3	$616,000	<2-Year	- 0 to 6-inch reduction in flooding for 2-yr storm
Alt 3a	1	$605,000	5-Year	- 2 to 13-inch reduction in flooding for 5-yr storm - improved LOS to Lovers Lane
Alt 3b	1	$572,000	5-Year	- 2 to 13-inch reduction in flooding for 5-yr storm - no easements required for Lovers Lane
Alt 3	2	$2,200,000	5-Year	- 2 to 10-inch reduction in flooding for 5-yr storm
Alt 3	3	$803,000	5-Year	- 2 to 7-inch reduction in flooding for 5-yr storm

Notes:
1. Estimate of cost is $2013 (adjusted in this updated executive summary up from $2009 in the main report).
2. Cost are for stormwater facilities and do not include water, sewer or other utility repairs/replacements.
3. Estimate of cost does not include property acquisition or easements.
4. Does not include potential hazardous material remediation or wetlands mitigation.

Table ES-4 summarizes the total project cost estimates by alternative.

Table ES- 4. Project Cost by Alternative (Updated to $2013)

Alternative	Cost	LOS
Alt 2	$2.9 M	<2-Year
Alt 3	$3.6 M	5-Year

Notes:
1. Estimate of cost is $2013 (adjusted in this updated executive summary up from $2009 in the main report).
2. Cost are for stormwater facilities and do not include water, sewer or other utility repairs/replacements.
3. Estimate of cost does not include property acquisition or easements.
4. Does not include potential hazardous material remediation or wetlands mitigation.

Alternative 1 should be considered a necessary step before implementing Alternatives 2 and 3. Alternative 2 will provide some improvement to LOS, but nuisance flooding will continue to be an issue in some of the problem areas. Alternative 3 provides an improvement in LOS and flood duration that Alternative 2 cannot achieve. Some combination of Alternatives 2 and 3 might be the most cost-effective solution for the long term.

Recommendations for the Three Problem Areas

The three problems areas were selected as they are representative of stormwater management issues and needs Town-wide. Specifically, stormwater management improvements for the three problem areas, as well as Town-wide, are constrained by limited topographic relief, limited available land for stormwater storage and infiltration, and influence of tides due to proximity to Estero Bay and the Gulf of Mexico. Directing gravity flow of stormwater runoff to the Gulf of Mexico side of the problem areas is prohibitive based on water quality concerns for beaches. Gravity flow of runoff to the Estero Bay side also has water quality concerns but contains a much greater area of terrain in which to detain/infiltrate runoff via swales or other BMPs. However, terrain from the three problems areas to the existing outfalls on the Estero Bay side of the island has a slight uphill grade that prevents natural overland flow in this direction.

These constraints present greater challenges to convey runoff and provide surface water quality treatment before the flow is received by existing pipes. The existing stormwater system of pipes and swales is fragmented, has significant build-up of sand, and lacks connectivity. Many of the problem areas are disconnected from the existing stormwater systems and have no primary outfall. In these low areas, stormwater runoff collects and ponds until reaching an elevation where it slowly meanders to private residential yards and infiltrates or perhaps finds its way to the existing stormwater system.

Review Criteria

Five major factors are typically considered in the selection of capital improvements program (CIP) alternatives and recommendations to meet level of service goals. These factors include:

- Technical Feasibility and Reliability
- Environmental Consistency
- Socio-Political Acceptability
- Economic Reasonability
- Financial Ability

Technical Feasibility and Reliability

The hydraulic model was developed to evaluate solutions for chronic flooding. While increased pipe sizes are sufficient to reduce flooding for the 2-year, 24-hour storm, the results indicate solutions are expensive for storms larger than the 5-year, 24-hour event.

Three alternatives were developed with input from the Town staff. Alternative 1 consists of returning the existing system to design capacity through maintenance and replacement of damaged pipes/inlets and grading and grooming of swales. While

Town-wide Recommendations for Stormwater Capital Improvements

As described in Section 4, the three problem areas were selected for detailed analysis as they provide a reasonable representation of flooding and water quality issues Town-wide, as much of the Town has similar hydrologic/hydraulic characteristics and constraints. Therefore, the following general recommendations based on findings in the three problem areas are provided to give guidance for Town-wide stormwater capital improvements.

1. **Stormwater operation and maintenance program.** The Town should continue to expand its routine operation and maintenance of the existing and any new systems developed. This is critical as in some cases flooding is the result of plugged pipes and inlets filled with sediment and sand. This is especially critical for the Town as sand is so prevalent and easily migrates into the stormwater system. At a minimum, the Town should continue to inspect all stormwater system components annually and clean/remove sediment and sand as required in the NPDES permit. Based on experience, the Town should continue to identify portions of the stormwater system where more frequent maintenance is needed (in addition to the areas the Town is already doing this). Ultimately, this may require additional staff and equipment to provide the level of attention this work requires.

2. **Stormwater infrastructure inventory and GIS development**. While the Town has a GIS coverage and list of known stormwater infrastructure, it does not have all structures included. In addition, it does not include critical information on how the inlets, pipes, swales, outfalls, and other pieces all connect. Finally it does not include attribute information, such as the pipe sizes and invert elevations. Therefore it is recommended that the Town complete similar field surveys in the remaining areas of the Town as CDM completed in the three problem areas for this Master Plan.

3. **Use of swales for conveyance.** Where additional conveyance is needed in areas outside of the three problems areas, it is generally best for the Town to use swales where possible instead of underground pipes. Swales offer greater storage and water quality benefits through recharge/infiltration that pipes do not provide. In addition, swales generally cost much less to construct and are easier to inspect for potential clogging and cleaning. Overall, it is recommended the Town consider implementing a Town-wide swale program to rehabilitate filled in swales and require the development of swales along all streets.

4. **Use of the BMP train.** The BMP train provided in Figure 3-5 of Section 3 provides general guidance on the priority/order of selection of the most cost-effective BMP measures. When identifying BMPs for areas outside of the three problem areas, the Town should start with items identified in step 1 and progress to step 4 as site characteristics and costs allow. Further guidance on

the most appropriate BMPs for other areas can be obtained from the BMP selection considerations provided in Section 4.6 of this Master Plan.

5. **Water quality retro-fits for remaining outfalls.** This Master Plan deals with 11 of the approximately 90 stormwater outfalls the Town has. The Town has general concerns for water quality impacts. As such, the Town may consider starting to implement a program to retro-fit outfalls with baffle boxes and inlet and vortex separators for the outfalls. These have been successfully implemented in many similar coastal communities.

   In addition, while there are no current TMDL requirements established for Estero Bay, one important consideration is the current momentum within the FDEP to set new TMDL limits that may eventually require retro-fits for already developed areas. The TMDL limits being set for freshwater draining to Estero Bay from the Caloosahatchee River, Hendry Creek, and Imperial River are requiring communities to reduce nutrient loads by 40 percent or more. The FDEP is working to set TMDL limits for estuaries and bays. Furthermore, the US EPA is working to publish its own recommendation for nutrient limits to estuaries and bays. Based on the extremely stringent limits they published in January 2010 that exceed the State recommended TMDL limits for freshwaters, the limits set for the estuaries and bays may be even more stringent than what the State ultimately sets for estuaries. Once both the State and Federal limits are established, the Town may be required to make significant nutrient load reductions.

6. **Establish infrastructure standards and obtain as-built drawings.** Historically the Town has not required and obtained as-built drawings for stormwater systems installed as needed around the Town. It is recommended that the Town adopt or develop a set of standard specifications for all future stormwater projects to follow. In addition, the Town should require that at completion of construction, as-built drawings be submitted to the Town. In addition, the Town should provide a Town inspection of new construction during the construction process to verify connectivity and that the Town standards are being followed.

7. **Consider the creation of a Stormwater utility.** One potentially beneficial funding mechanism would be to create a stormwater utility to fund the development, operation, and maintenance of the Town's stormwater system. This will link costs directly with the service that is provided.

8. **Coordinate work with Estero Boulevard and Lee County.** As the County and Town work together on plans for repaving of Estero Boulevard, this creates opportunities to identify cost-saving opportunities to improve stormwater infrastructure at the same time.

9. **Look for cooperative and creative solutions with other public and private projects.** Overall, the Town should always be open to identify and coordinate

creative stormwater alternatives with both public and private non-stormwater projects. One potential opportunity is to discuss possible options for BMPs as part of the planned Town Library addition on the open lot at the corner of Estero Boulevard and School Street.

Town-wide Recommendations for Non-Structural Stormwater Controls

Non-structural controls aid in the control of both water quantity and water quality aspects of stormwater. Nonstructural controls are not capital projects that are constructed by the Town but rather are source controls, ordinances, and regulations that depend on participation by residents and implementation by development or re-development to minimize the water quantity and quality impacts associated with development.

The Town has already implemented a public outreach and education program that includes informational documents entitled Personal Responsibility for Island Stormwater Management (PRISM) and a Guide for Harvesting Rain Water. These documents are available at the Town Hall or through the Towns' website.

CDM recommends that nonstructural controls continue to be incorporated in the Stormwater Master Plan. The effectiveness of nonstructural controls depends largely on several factors that are not fiscal in nature. These factors include practices set forth through ordinances and public participation and awareness. A summary of recommended nonstructural controls follows:

- Fertilizer Application Control – Continue public education and enforcement of existing Town ordinance
- Pesticide and Herbicide Control – Continue public education and enforcement of existing Town ordinance
- Solid Waste Management and Control of Illegal Dumping
- Directly Connected Impervious Area (DCIA) Minimization
- Water Conservation Landscaping
- Illicit Connections - Identification and Removal
- Erosion and Sediment Control on Construction Sites
- Stormwater Management Ordinance Requirements

One example is creating an ordinance that limits the amount of impervious area that can be developed on a single lot. An ordinance would be required to control imperviousness as the current SFWMD rules require a permit only for projects that affect an area of one-acre or more, excluding most lots in the Town. To assist the Town in forming a basis for a new ordinance, CDM provided the Town's Local Planning Agency (LPA) with example ordinances from similar coastal communities and discussed them at their October 21, 2008 meeting. These examples support limits as low as 40 percent for residential areas as shown in **Table ES- 5**. The complete ordinances are provided in Appendix H of this Master Plan.

If an ordinance is not developed, the Town can expect percent imperviousness to continue to increase over time, following the ongoing trends to modify homes and buildings to be larger. If this occurs, when the current 35 percent and 40 percent impervious for medium and high density residential grows to much greater than 40 percent, it will likely lead to a need for significant stormwater infrastructure improvements, including underground piping, using large open areas to construct treatment areas, and likely require the need for stormwater pumping systems in order to meet the level of service goals. Furthermore, with the potential regulatory limitations being developed, allowing impervious development beyond 60 percent could require alternatives that would not be cost feasible in order to meet the level of service goals. On the other hand, limiting imperviousness to anything much less, such as 35 percent or less, would not be realistic, as much of the Town was originally developed at 35 to 40 percent imperviousness.

Table ES- 5. Examples of Coastal Ordinances Limiting Residential Imperviousness

Municipality	Residential Impervious Limits	Other Notes
St. Augustine Beach, FL	40% and 50% for low and medium density residential respectively	Porous paving material does not count as impervious
Siesta Key, Sarasota County, FL	50% for any residential type	None
Key West, FL	40% and 50% for low and medium density residential respectively	Porous material may be used subject to approval by city.
Neptune Beach, FL	50%; 35% for apartments complexes	Semi-pervious surfaces and water detention systems encouraged and not counted as impervious; Higher percentages allowed if runoff calculations sealed by P.E. indicate no net increase in runoff.
Atlantic Beach, FL	50% for any residential type	Does not include roof and balcony overhangs; does not include swimming pools; Pervious paving areas only count as 50% towards impervious area
Satellite Beach, FL	50% plus additional 10% for pavers	Swimming pools exempt
Kure Beach, NC	36% for all areas within 575 feet designated as shell fishing waters or critical water supply watershed	None
Surfside Beach, SC	40, 45, and 50% for low, medium and high density residential, respectively	None

Town-wide Implementation Plan

Based on the Town-wide recommendations, the detailed evaluations completed for Areas 1, 2 and 3 were used to develop the following conceptual level implementation plan. It provides a generalized budget, schedule and funding plan to implement the recommendations Town-wide.

Town-wide Implementation Budget

Figure ES-6 provides a map of the Town showing separate stormwater management areas to indicate where master planning efforts are needed outside of the three detailed study areas. The different areas use streets as the basis to differentiate between the following stormwater management areas:

- Streets with completed and planned comprehensive stormwater projects are highlighted as solid green. This includes the recently completed North Estero Project, the ongoing Basins Based FEMA funded project and the three detailed study areas evaluated as part of this stormwater master plan.

- Streets on the north end of the island that are not part of the other northern projects are highlighted in yellow.

- Streets with existing, well-connected and maintained swales and/or other best management practices (BMPs) are highlighted with a green dashed line. This includes locations with SFWMD Environmental Resource Permits (ERP) that regulate site-specific stormwater. This also includes the approximate two-mile stretch of Estero Blvd on the south end of the Island that has a continuous swale system. These locations are expected to have significantly lower stormwater improvement needs than identified for the three detailed study areas.

- Streets that are owned and maintained by someone other than the Town or County are highlighted with a light-blue dashed line. In general, efforts to manage the onsite stormwater in these locations are not the responsibility of the Town. However, as with the County owned Estero Blvd, the Town may need to manage stormwater coming from those areas into adjacent Town-owned areas and properties. In general, these locations are expected to have significantly lower stormwater needs than identified for three detailed study areas.

- Streets with stormwater needs similar to the three detailed study areas are highlighted in red. Small-scale stormwater improvements have sporadically been made as-needed in these locations and have not been part of an overall coordinated effort. These areas receive runoff from the County's Estero Blvd. Most residential properties on these streets do not have an adjacent canal or wetlands where stormwater might be directed by property owners. These locations are expected to have similar stormwater improvement costs as the detailed study areas.

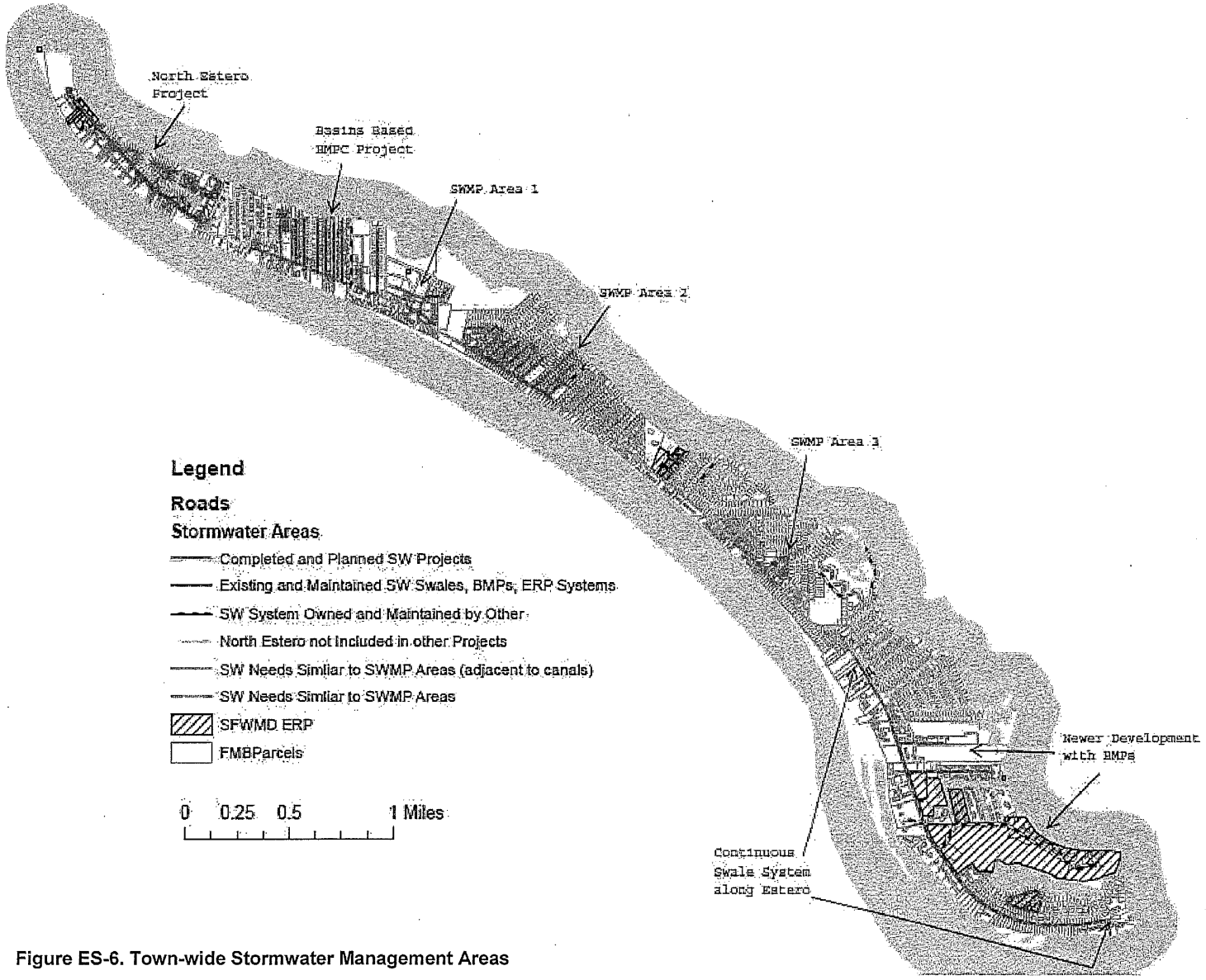

Figure ES-6. Town-wide Stormwater Management Areas

- Streets with stormwater needs similar to the three detailed study areas but also where the majority of properties have an adjacent canal or wetlands are highlighted in orange. These properties likely have reduced stormwater flooding issues as property owners may grade their property to direct runoff to adjacent canals and wetlands. However, these properties may be critical to help address water quality issues under future regulations to reduce pollutant loading to Estero Bay. These locations still have needs to manage runoff from properties graded towards streets, as well as runoff from local roads and in some cases Estero Blvd. Overall the stormwater improvement costs for these areas are expected to be less than the average for the detailed study areas, but in some cases could be similar or higher if less area is available for BMPs.

Based on the areas described for Figure ES-6, **Table ES-6** provides an estimate of the Town-wide costs to implement the stormwater master plan. The top half of the table summarizes the costs for the three detailed study areas as described in Section 4. For each of the areas, the unit cost in million dollars per mile of road (M$/mile) is calculated in column three based on the total project costs and miles of roads provided in columns four and two respectively. The unit costs for each area are fairly consistent, ranging from 0.81 to 0.91 M$/mile, with an average of 0.86 M$/mile.

Table ES-6. Estimate of Town-wide Costs to Implement the Master Plan (Updated to $2013)

Stormwater Master Plan (SWMP) Evaluation Areas	Roads (miles)	Unit Cost (M$/mile)	Area Cost (M$)	Comment
SWMP Area 1	0.7	0.81	0.60	per SWMP Section 4
SWMP Area 2	2.6	0.86	2.20	per SWMP Section 4
SWMP Area 3	0.9	0.91	0.81	per SWMP Section 4
	4.2		*3.6*	***Total for SWMP Evaluation Areas***
Other Stormwater Management Areas Without Existing Plans	**Roads (miles)**	**Unit Cost (M$/mile)**	**Area Cost (M$)**	**Comment**
North Estero Area	2.3	1.00	2.27	N. Estero / 12-Streets project unit cost
Areas Similar to SWMP Areas 1-3	8.0	0.86	6.83	SWMP average unit cost
Areas Adjacent Canals Similar to SWMP	5.9	0.81	4.79	SWMP minimum unit cost
Areas with Existing Stormwater ERPs	0.7	0.22	0.15	Minimal unit cost needs
Areas with Existing Swales and BMPs	2.9	0.22	0.64	Minimal unit cost needs
	19.7		***14.7***	***Total Projected for Other Areas***
	23.9		**18.3**	**Total Town-wide Imrpovements**
Notes:				
M$ is cost in million dollars				
Costs are in 2013 dollars (adjusted from 2009 dollars in main report)				

The bottom half of Table ES-6 provides estimates for the other areas in the Town not already under a separate stormwater project or plan. For each of these areas, the total length of roads highlighted in Figure ES-6 is listed in column two. Unit costs for the areas similar to the detailed study areas (highlighted in red on Figure ES-6) are assumed to require the study area average of 0.86 M$/mile, giving an estimated cost of $6.8M for properties along those 8-miles of roads. Unit costs for the areas similar to the detailed study areas but adjacent to canals/wetlands may be lower, therefore the low end cost of 0.81 M$/mile is used. While the costs in these areas may be even lower it is appropriate for planning purposes. For the locations with existing SFWMD ERPs and continuous well-maintained swales/BMPs, an estimate of 0.22 M$/mile is

used to provide a planning budget for the limited as-needed improvements anticipated in these areas.

Overall, the total projected capital cost for stormwater improvements to address flooding and provide retrofit BMPs where possible is estimated to be $18.3M Town-wide. This includes the $3.6M for the three detailed study areas and an additional $14.7M for other areas not already under a separate plan. These costs are based on the assumptions described for conceptual level purposes, and may ultimately be different depending on site-specific constraints, amount of flooding and water quality issues at each location.

Table ES-7 provides a summary of the improvement costs with estimates for other Town-wide recommendations. This includes an additional $2.2M to retro-fit up to 80 stormwater outfalls with water quality baffle boxes. The need for these may depend on SFWMD permitting requirements on a case-by case basis as well as potential future regulations to reduce pollutant loading to Estero Bay. Also included are one-time budget estimates to establish standard stormwater design standards for future projects and complete a Town-wide inventory/survey of all stormwater structures to understand their connectivity and provide a comprehensive GIS for planning, design and O&M purposes. The total capital and other one-time costs subtotal is $20.1M.

The second half of Table ES-7 provides annual estimates for Town staff to operate and maintain the systems, coordinate public policies/outreach, complete inspections for stormwater related ordinances, and manage construction projects. The annual costs are $426,700, or $8.53M over a 20-year planning period.

Table ES-7. Estimated Town-wide 20-Year Implementation Costs (Updated to $2013)

Capital Improvements and Other One-Time Costs	Budget ($)
Total Town-wide Improvements (Design/Permit/Construction)	18,290,000
Additional Outfall Water Quality Retro-Fits (80)	2,200,000
Establish Design Standards	55,000
Infrastructure Inventory and GIS Development	220,000
Establish a Stormwater Utility	110,000
Subtotal: Capital and Other One-Time Costs	***20,875,000***
Annual Operations and Maintenance Needs	
Operation and Maintenance (1.5% of capital improvements)	307,350
Policy Coordination and Inspections (Town Staff - 0.5)	42,350
Project Management (Town Staff 1.0)	77,000
Subtotal: Annual Costs	*426,700*
Subtotal: 20-Years of Annual Costs	***8,534,000***
Master Plan 20-Year Implementation Costs	**29,409,000**

Town-wide Implementation Schedule

The master plan provides an overall framework to guide improvements that will be implemented over time on an as-needed basis to address flooding and water quality issues that currently exist as well as ones that may arise in the future as the result of

development changes, aging infrastructure and future regulatory requirements. In addition, the implementation of the plan should be coordinated with other long-term infrastructure projects. For example, this would include the water utility rehabilitation and improvement projects. Also, implementation should be coordinated with the availability of other funding sources described n Section 4, such as annual grants and the creation of a stormwater utility.

Based on these considerations, it is recommended the planning schedule be based on a 20-year implementation period. The total costs associated with the master plan using the Year-2013 costs in Table ES-7 amounts to $29.4M (or 1.47 M$/yr) and would complete on average approximately 1.2 miles of improvements per year.

Town-wide Implementation Funding

The Town currently funds its stormwater program from ad valorem taxes through the General Fund. This reflects the traditional source of funding for stormwater systems. The demands on the Town's General Fund have increased annually while the economy has continued to be under considerable stress. In addition, the Town Charter has provisions that restrict its ability to issue debt for a term longer than three years.

The total implementation cost of $29.4M suggests the need to identify other forms of funding available for consideration. Initially and simultaneously it is important to consider and aggressively access all forms of program assistance. Funding for and understanding the critical functions performed under the O&M budget is vital to the budgeting process. Many times municipalities highlight the capital cost needs without an equal understanding of O&M funding required. It is important to note there are no outside forms of assistance for O&M cost needs. There are a few Federal and State assistance programs for capital needs. All of these programs are driven by a grant application process.

All possible sources of grant funding and coordination with other projects should be evaluated as described in Section 4. The Town has been very successful at obtaining inter-governmental grants (such as FEMA and SFWMD) for the North Estero and Basins Based projects to pay for significant portions of those stormwater related project costs. It is anticipated that these and other similar sources will continue to fund a portion of the implementation costs. This may include new grant sources related to new regulations such as a potential TMDL requirement for Estero Bay. While it is very difficult to estimate how much grant funding and cost sharing from related projects (such as water utility improvements) will be obtained, for planning purposes, the Town may use a planning level goal of 25% of the costs coming from these types of sources.

Stormwater Utility

For the remaining 75% of the costs, experience has shown that a permanent, reliable, sustainable, and fair funding source is needed in order to systematically implement this type of program. A common and successful stormwater funding option utilized

by many cities and counties throughout Florida as well as throughout the country is a Stormwater Utility.

Typically, a stormwater utility program is funded by a user fee. A stormwater utility is similar to water and wastewater utilities that are based on a service provided. In a stormwater utility a fee is charged based on the services provided on a communitywide bases. While in water and wastewater utilities the fee is based on the volume, the typical stormwater utility bases its fee on the amount of impervious areas on each parcel of developed property. The billing unit is typically the equivalent residential unit (ERU).

As previously noted stormwater utilities have been in full operation throughout Florida for many years. The City of Tallahassee established a stormwater utility in 1985. Florida Statues Chapter 403 authorizes the establishment of a stormwater utility through local government ordinance adoption.

Central to the establishment of a stormwater utility is identifying the number and types of development units. Therefore, in order to develop a stormwater utility, the Town of Fort Myers Beach would need to identify the number of single family units, multi-family units, condo units, commercial units, and institutional units. These numbers could then be used to develop Equivalent Residential Units (ERU). Based on experience with the establishment and implementation of Stormwater Utilities, a user fee that is based on Equivalent Residential Units can produce roughly $100,000 /$1/ERU.

Addressing the needs of the total $29.4M implementation costs over a 20-year period and assuming that 25% of the costs come from multiple other sources (grants, Gas Tax, inter-local opportunities), the 20-year funding required is $22.1M. In keeping with the Town Charter of limiting the term of indebtedness, implementation can be achieved through a stormwater utility with a monthly user charge of $11/ERU using seven three-year cycles (based on preliminary information for number of units from the appraiser office).

Many communities that have established Stormwater Utilities have dedicated the revenue generated by the utility to capital improvements while continuing the funding of Administration and Maintenance through the General Fund. If this is done, the monthly user charge can be reduced to $8/ERU.

In addition, municipalities can bond projects or programs against the stormwater utility. Three examples of funding projects through a stormwater utility are:

- Perform work as money becomes available.
- Short or long term bonds.
- Special Assessments – bonds sold against stormwater utility revenues.

In addressing the best fit for the Town at this time it is critical that a grass roots program be initiated that involves all levels of the community, including elected officials, property owners, and interest groups. Utilizing the results of this report it is essential to conduct site specific workshops addressing issues and their solutions in order to establish a proper level of understanding of the budget needs. This level of public involvement has been shown to be vital to the success of any public works program. Once the public has understood the issues and their potential solutions (and costs), an effective discussion on funding options can occur. Establishing the public's proper understanding of specific needs before presenting funding options is critical for successful implementation.

Conclusions

As described in this report, areas within the Town of Fort Myers Beach suffer from severe stormwater flooding during large rainfall events. This includes the only evacuation route along Estero Boulevard and for many residents properties are subject to repeated flooding. Another impact of the flooding is additional wear on the roads and washing out of sand from properties and out from under sidewalks and roads.

In addition, untreated stormwater runs off to the canals and bay that surround the island. Water quality is an important stormwater issue for the Town as stormwater runoff can be related to beach closings due to high bacteria levels and can also impact wildlife and aquatic species. Existing regulatory requirements require minimum levels of action that the Town must take to reduce stormwater pollutant loadings, and potential new regulations in the future may add to those requirements.

It will take a coordinated effort by the Town to address these flooding and water quality issues. Direction for this effort is provided in the Stormwater Master Plan outlined in this report. The plan includes combining ongoing and new efforts to meet the Town's Comprehensive Plan Goal Number 9;

> ***"To provide optimal flood protection and improved stormwater quality within the constraints imposed by location and existing land-use patterns."***

By implementing this plan, the Town will reach this goal using a well organized and efficient approach.