EXECUTIVE SUMMARY

In 2011, the Town of Cary commissioned the development of a Town Stormwater Master Plan (master plan). The purpose of the master plan is to explore the history of the Stormwater Management Program for the Town of Cary, assess the Programs' current condition in light of the state of the practice, its peers and the regulatory environment and to propose a framework for Stormwater Management for the next 10 to 20 years. The sections below summarize the key elements and options identified within this Stormwater Master Plan.

Program History & Successes

A review was conducted of the current stormwater program from a historical and comparative perspective highlighting where the program has been proactive and competitive amongst its peers. Examples are:

- The Town's Flood Damage Prevention Ordinances exceed FEMA requirements.
- The Town sediment and erosion control standards exceed the State and Federal requirements. Cary was awarded the Best Local Erosion and Sediment Control Program in 1998, 2001, and 2008.
- The Urban Transition Buffer Ordinance exceeds (and predates for the Cape Fear river basin) the buffer requirements for both the Cape Fear and Neuse River basins.
- The Town exceeds requirements set forth under its NPDES Phase II Permit with the State.
- The Town was compared to ten other municipalities deemed to be leaders in stormwater and/or similar in size to Cary. The comparison indicated that the Town of Cary is meeting or exceeding its regulatory requirements with less staff and funding than many other municipalities in a high quality and efficient manner.

Maintenance Policies, Extent of Service (EOS), and Level of Service (LOS) Improvements

Currently the Engineering Department/Stormwater Services Division works closely with the Public Works and Utilities Department (PWUT) to maintain and improve the public stormwater infrastructure as summarized by the following guidelines:

- The Town of Cary maintains the stormwater infrastructure within the Town owned Right of Way (ROW) and on Town owned property. This is the current extent of service (EOS) for the Town.
- Inspection and cleaning of the existing storm drainage system is currently response based on problem areas as identified by Town staff or citizens. PWUT does provide routine clearing of pipes/culverts/bridges over 72" in diameter prior to significant expected rain events. This is the current level of service (LOS) for storm drainage maintenance.
- The Town has two mechanisms to assist private citizens with drainage improvements. These are Policy Statement 35 Storm Drainage Improvement Requests and Policy 146 Stormwater Capital

Improvement Requests. Policy 35 provides a cost sharing opportunity with the Town on private property, whereas Policy 146 establishes capital projects for stormwater drainage systems within the ROW.

The following are potential program enhancement opportunities related to maintenance policies identified within the master plan. A summary of all of the presented enhancement options is located in Table 3 of this executive summary.

- *Option Public Assistance 1* - This master plan provides a new methodology to assist property owners with the cost of broken storm drainage pipes on their property and to assist the Town with its approach for determining cost share under Policy 35. Projects that are typically addressed by Policy 35 in cooperation with private property owners are problems related to structural flooding and structural damage due to severe erosion. The potential enhancement to Policy 35 is to address broken storm drainage pipes on private property with a cost share based on determining the percent of public water that passes through the stormwater infrastructure at the point of concern and applying the cost share accordingly. Adding this calculation method in determining how the cost share is applied is expected to have an annual cost of approximately $40k. *Benefit – Expands the existing program to cover broken storm drainage pipes; Provides a method for determining cost share of the repair; Gives the Town better information for decision-making to address a stormwater concern; and sets a standard by which the Town can partner with private owners for maintenance of storm systems off the Town-maintained ROW.*
- *Option Inspection/Assessment 1* - Based on assessments within the master plan the Town has an opportunity to enhance the maintenance level of service to be more preventative. Enhancing the EOS/LOS will require a dedicated maintenance crew including a new vacuum truck and crew cab. The first year cost for purchase of initial equipment is $365k with an annual cost of $180k for crew and equipment maintenance. *Benefit – The addition of a dedicated vacuum truck and crew to addressing stormwater concerns will increase the LOS to the public and allow for more preventative maintenance, reducing the cost of future repairs to infrastructure. It will also allow the current vacuum truck and crew to be solely dedicated to sanitary sewer tasking and not have to split its use.*
- *Options Inspection/Assessment 2 and 3 – Clean, Inspect and Assess Storm Drain Networks by a Subcontractor* – Due to the aging Town infrastructure and the potential for failure of the storm drainage networks over time, it is in the interest of the Town to clean, inspect, and assess the condition of the storm drainage networks. This should be considered for both networks within the Town ROW and outside the ROW. The cost to clean, inspect and assess the networks by a subcontractor at a rate of 12 miles per year is $320,000. *Benefit - Cleaning and inspection of storm systems will remove debris allowing the system to operate as designed; it will reduce nuisance flooding, and allow Public Works to identify and address problem areas before concerns are registered by the public. This allows for a planned maintenance schedule that would improve overall efficiency and responsiveness of the maintenance program.*

Water Quantity Improvement Options

Currently the Town of Cary manages issues related to Water Quantity through administration and enforcement of the Town's Land Development Ordinance (LDO). The Engineering Services/Stormwater Division is responsible for ensuring development projects meet or exceed LDO requirements through the development review process. They also address water quantity issues through meeting with and addressing citizen concerns and administering Town initiated stormwater improvement projects.

One goal of the water quantity analysis within this master plan was to assess the stormwater conveyance systems for their continued effectiveness to handle current and future runoff. The infrastructure assessment looked at several main components; the age of the infrastructure, pipe condition, and the LOS (its ability to pass the design storm event). This assessment produced the following water quantity focused enhancement options:

Option Stormdrain Upgrade 1 - Pipe Conflict Areas - This option represents four project areas identified to be concerns due to known issues and being supported by citizen reports in the area. The conflicts are related to situations where a larger pipe flows downstream into a smaller pipe and the problem was confirmed with citizen complaints of storm drain blockage. The cost for pipe replacements in these 4 areas covering 1466 linear feet of pipe is $300,000+/-. ***Benefit – Fix known problem areas, reduce nuisance flooding, and reduce cost of future maintenance.***

Option Culvert Upgrade 1 - TCAP Crossings – This option represents 15 project areas previously identified under the 2006 TCAP Drainage System Analysis and reviewed within this study. These are areas where the current storm drainage pipe or culvert does not meet current Town standards for passing the 25-year storm event. Areas impacted are along Coles Branch, Walnut Creek, Walnut Creek Tributary and the Swift Creek Tributary. The estimated cost for implementation of this option - $7.61 million. ***Benefit - These improvements would reduce potential flooding in the TCAP area and ensure crossings meet Town standards.***

Option Culvert Upgrade 2 - FEMA Roadway LOS Improvements – In addition to the TCAP crossings, 33 FEMA crossings were identified that did not meet Town design standards for passing the 100-year storm event. Of the 33 crossings identified, 18 are Town-maintained crossings, 14 are NCDOT-maintained, and one is private. The cost to upgrade these 18 crossings to Town standards is estimated at $5.34 million. ***Benefit – Increased LOS, reduction in flooding, reduction in future maintenance.***

Options Pipe 1 and Pipe 2 - Improvements to Damaged and Older Town-Owned Pipes – Based on the age and condition of the pipes as determined by the Stormwater Inventory and GIS analysis, a method of prioritization for repair or replacement was developed for stormwater systems inside and outside the Town ROW. The results are shown below in the Table 1 and reflect several options to repair and replace pipes that are currently rated in fair or poor condition. ***Benefit - Systematic repair of the affected systems will reduce flooding concerns and reduce potential damage to public and private property.***

Table 1. Summary of Storm System Repair Cost Estimates

Storm System Repair	In Town ROW (High, Medium Priority) Option Pipe (1A, 1B)	Outside Town ROW (High & Medium Priority) Option Pipe (2A, 2B)
Slipline Repair Option (over 5 years)	$180,000 (1A)	$73,000 (2A)
Replace Option (over 5 years)	$250,000 (1B)	$103,000 (2B)

Water Quality Opportunities and Options

The US Environmental Protection Agency (USEPA) and the North Carolina Division of Water Quality (DWQ) are expected to increase water quality related requirements mostly through the NPDES Phase II Stormwater Permits and the further development of TMDLs. The Town is already well positioned to address potential future regulatory requirements. This plan identifies locations for the potential implementation of Best Management Practices (BMP) retrofits. These are areas where modifications can be made to the existing landscape or different management practices can be implemented resulting in reduced peak runoff volume and/or reduced pollutants downstream of the BMP. These retrofits also help satisfy Neuse River Basin regulatory requirements to identify four retrofit locations annually. The following is a summary of the BMP retrofits opportunities identified within the master plan. In addition, the master plan includes a summary of BMP's, BMP toolbox, which may be used on development projects in the Town.

Options BMP Retrofit (1-5) - Potential BMP Retrofits – As part of addressing current and future State and Federal requirements, the master plan has identified a number of potential stormwater BMP retrofit sites to improve water quality in runoff from existing developed areas. Most of these are on Town property. Nineteen sites are listed as potential projects with approximate total estimated cost of $19.7 million. A breakdown of the projects and costs by potential is shown in Table 2 below:

Table 2. Summary of BMP Retrofit Cost Estimates

Potential	Estimated Cost
Top 4 Projects (Retrofit 1)	$300,000
Very High (Retrofit 2)	$8,000,000
High (Retrofit 3)	$2,560,000
Medium (Retrofit 4)	$995,000
Low (Retrofit 5)	$8,175,000

Benefit – Improved water quality/quantity and benefit to the public through improvement to Town-owned natural areas.

BMP Toolbox - The BMP Tool Box is designed to be a resource for other Town Departments and the development community to select appropriate BMP's based on regulatory site requirements or desire for environmental benefit. The BMP Tool Box not only assists the user in identifying appropriate BMPs from a regulatory perspective, but also identifies a BMP's relative construction, land-use, and maintenance costs.

Flood Risk Assessment - TCAP

Due to flooding concerns originally identified in the 2006 TCAP Study, a detailed flood risk assessment was undertaken for buildings within mapped boundaries of Coles Branch, Swift Creek Tributary, and Walnut Creek in the TCAP area. 178 buildings were identified as being within a mapped floodplain area (non-FEMA study conducted in 2006). Using the flood models from the study and the results of Mobile LiDAR surveying to determine the finished floor elevations of buildings, a risk model for analysis was established based on depth of flooding. In addition, a scoring system was developed to assign a relative level of risk to each building independent of property value. Of the 178 buildings evaluated, 11 were considered to be at high risk, 84 buildings were moderate risk, and 83 were considered low risk. The following are program enhancement opportunities related to flood risk assessment identified within the master plan.

Option Flood Risk 1 – Based on the Risk Assessment results, the Town can provide outreach to the high and moderate risk property owners to discuss risk awareness and their flood mitigation options. One-time cost to provide Outreach - $50,000. ***Benefit – Increased public awareness to flooding and potential for property damage.***

Option Flood Risk 2 – Quick Buy Option – The quick buy option is a property acquisition technique where a flood prone property is purchased and converted to open/natural space. This option is exercised shortly after flooding has occurred on the subject properties. Acquisition would cover the damaged value of the property. The property owner would cover the remaining value through their insurance company. Funding to cover the at-risk properties would be allocated by the Town Council as needed after an event. Based on the risk assessment properties analyzed and expanding them to all flood prone properties within the Town, the potential funding that would need to be allocated to cover potential at risk properties within the existing 100-year floodplain would be up to $10.8 million. Town Council could appropriate money as needed, but this option would establish a mechanism to bring these properties to Council for consideration. ***Benefit – Method for swift action post disaster, removing structures in floodplain through this program will remove future costs to rebuild or repair these properties and reduce potential for loss of life.***

Stormwater Management Program Opportunities

This master plan also investigates overall stormwater program management. A variety of management strategies were investigated including a redevelopment flexibility approach, watershed based stormwater studies and a variety of program funding methods. Below is a synopsis of those opportunities.

Redevelopment Flexibility for the TCAP Area – The proposed density for redevelopment of the TCAP presents challenges for stormwater management and permitting. This master plan supports the planning goals for the TCAP and recommends the following for stormwater master planning in the TCAP:

- Utilize a density transfer program to compensate for the higher density development
- Work with DWQ to garner approval of regional BMPs for the TCAP as opposed to site-by-site BMPs. A comprehensive stormwater hydraulic model (SWMM or equivalent) can be used to support this effort.

- Consider incentive-based program for developers to implement green and sustainable stormwater solutions above standard requirements, thus allowing more flexibility throughout the TCAP.

Option Study 1 - Watershed Planning – To build on the findings in this master plan, the Town has the option to proceed with watershed based planning studies over the next several years. These plans will allow for developing comprehensive stormwater models (SWMM or equivalent) that will aid in identifying and prioritizing specific projects to reduce flooding, improve infrastructure and reduce water quality impacts. These will also provide specific supporting data to the planning recommendations within this report. It is estimated that all the Cary watersheds could be analyzed for $250,000 per watershed with a watershed being analyzed each year for five years. ***Benefit** – Watershed plans allow for more in-depth review of watersheds resulting in specific prioritized solutions. Watershed based models will allow for enhanced regional stormwater planning and assessing impact of future build-out conditions.*

Funding Approaches – To account for the costs associated with these various options, it may be necessary to look at several funding approaches. The master plan centers on the following:

- *Funding 1 - Existing Approach*– Maintain the current funding methods through the Ad Valorem tax structure. As identified within this master plan, the Town of Cary currently provides a robust amount of funding for stormwater efforts. The Town may opt to maintain the current funding stream and program projects to fit within these budgets with consideration given by Town council and staff to increase as deemed necessary.
- *Funding 2 – Enhanced Grant Approach* – Explore alternative funding sources such as grants. As described within the master plan, there are multiple sources for grants to fund the types of projects identified within the master plan. Grant programs such as the Section 319 grant program, Clean Water Management Trust Fund, and the Pre-Disaster Mitigation Program could provide funding for projects. Securing these grants would require a dedicated staff member and an aggressive approach.
- *Funding 3 - Stormwater Utility Option* – The master plan discusses the concept of a stormwater utility at a planning level and does not provide a comprehensive feasibility study for implementation of a stormwater utility to fund stormwater programs. Stormwater Utilities are used by many municipalities as a funding mechanism for stormwater programs. The programs vary significantly so it is difficult to quantify the potential implications to the Town of Cary with regard to items such as administrative costs, customer service expectations, technical resources and staffing needs at this time. Further investigation would be needed to determine the feasibility and the specific impacts of this option.

Table 3 – Complete List of Enhancement Options

Option Name	Description	Maintenance	Water Quantity	Flood Risk	Water Quality	Management	Estimated Annual Cost	Cost in Cents/$100 Tax Value
Public Assistance 1	Modify Policy Statement 35 to include broken storm drain pipe repair on private property at a cost share percentage	☑					$40,000	0.02
Inspection/Assessment 1	Enhanced SW Inspection Program - Purchase of Jet-Vac Truck and dedicated Town Crew	☑					$545,000	0.26
Inspection/Assessment 2	Enhanced SW Inspection Program - Subcontracted in ROW	☑	☑				$320,000	0.15
Inspection/Assessment 3	Enhanced SW Inspection Program - Subcontracted outside ROW	☑	☑				$320,000	0.15
Storm Drain Upgrade 1	Storm Drain Replacement of Areas known to have Pipe Reductions	☑	☑				$300,000	0.14
Culvert Upgrade 1	Upgrade TCAP crossings (cost spread out over five years)		☑	☑			$1,600,000	0.76
Culvert Upgrade 2	Upgrade FEMA crossings (cost spread out over twenty years)		☑	☑			$270,000	0.13
Pipe 1A	Proactive repair in ROW - slip line (cost spread out over five years)	☑	☑		☑		$180,000	0.09
Pipe 1B	Proactive repair in ROW - remove/replace (cost spread out over five years)	☑	☑		☑		$250,000	0.12
Pipe 2A	Proactive repair outside ROW - slip line (cost spread out over five years)	☑	☑		☑		$73,000	0.03
Pipe 2B	Proactive repair outside ROW - remove/replace (cost spread out over five years)	☑	☑		☑		$103,000	0.05
BMP Retrofit 1	Top 4 BMP Retrofits		☑	☑	☑		$300,000	0.14
BMP Retrofit 2	Very High Rated BMP Retrofits (spread out over twenty years)		☑	☑	☑		$400,000	0.19
BMP Retrofit 3	High Rated BMP Retrofits (spread out over five years)		☑	☑	☑		$512,000	0.24
BMP Retrofit 4	Medium Rated BMP Retrofits (spread out over twenty years)		☑	☑	☑		$199,000	0.09
BMP Retrofit 5	Low Rated BMP Retrofits (spread out over twenty years)		☑	☑	☑		$409,000	0.19
Flood Risk 1	Outreach and Education to High Risk Properties within the TCAP			☑		☑	$50,000	0.02
Flood Risk 2	Quick Buy Program (money allocated as needed, post impact)			☑		☑	$0	0.00
Study 1	Watershed Plans (one per year for five years)					☑	$250,000	0.12
Current Base Budget	*$2,660,000 or $0.0127 per $100 in tax value*							

This Page Intentionally Left Blank

Table 4 – Estimated Enhancement Option Cost Summary

	Implement	Cost
Year	2015	Cents/$100 Tax Value
Estimated Baseline Budget		
Engineering Dept. - Stormwater Services Division Staff	$ 850,000	0.40
Public Works Department Staff	$ 240,000	0.11
Public Works Work Orders	$ 400,000	0.19
Street Sweeping	$ 70,000	0.03
Policy 35	$ 500,000	0.24
Policy 146	$ 600,000	0.29
Total Annual Budget - Stormwater Management	**$ 2,660,000**	**1.27**
Preventative Assistance - Enhanced LOS Option		
Option Public Assistance 1 - Calculating Percent of Public Water/Modify Policy Statement 35	$ 40,000	0.02
Enhanced Stormwater Inspection Options		
Option Inspection/Assessment 1 - Add Routine Maintenance Crew	$ 180,000	0.09
Option Inspection/Assessment 1 - One time Crew Equipment Costs	$ 365,000	0.17
Option Inspection/Assessment 2 - Clean, Inspect and Assess condition (12 miles per year) Subcontracted in ROW	$ 320,000	0.15
Option Inspection/Assessment 3 - Clean, Inspect and Assess condition (12 miles per year) Subcontracted outside ROW	$ 320,000	0.15
Total Enhanced Stormwater Inspection Options	**$ 1,185,000**	**0.56**
Known Infrastructure Improvement Options		
Option Stormdrain Upgrade 1 - Pipe Conflict Areas	$ 300,000	0.14
Option Culvert Upgrade 1 - TCAP Improvements (over 5 years)	$ 1,600,000	0.76
Option Culvert Upgrade 2 - FEMA Crossings (over 20 years)	$ 270,000	0.13
Subtotal with LOS Structure repairs	**$ 2,170,000**	**1.03**
Pipe Repair Options within Town ROW		
Option Pipe 1A - Slipline Repair Option (2.7 mi./year over 5 years)	$ 180,000	0.09
Option Pipe 1B - Replace Repair Option (2.7 mi./year over 5 years)	$ 250,000	0.12
Pipe Repair Options outside Town ROW		
Option Pipe 2A - Slipline Repair Option (1.25 mi,/year over 5 years)	$ 73,000	0.03
Option Pipe 2B - Replace Repair Option (1.25mi./year over 5 years)	$ 103,000	0.05

	Implement	Cost
Year	2015	Cents/$100 Tax Value
BMP Retrofit Options		
Option Retrofit 1 - Top Four Retrofits only (Stand-Alone)	**$ 300,000**	0.14
Option Retrofit 2 - Very High Potential Projects (across 20 years)	$ 400,000	0.19
Option Retrofit 3 - High Potential Projects (across 5 years)	$ 512,000	0.24
Option Retrofit 4 - Medium Potential Projects (across 5 years)	$ 199,000	0.09
Option Retrofit 5 - Low Potential Projects (across 20 years)	$ 409,000	0.19
Total with all BMP Retrofits (Retrofit 2 -Retrofit 5)	**$ 1 ,520,000**	**0.72**
Flood Risk Mitigation Options		
Option Flood Risk 1 - Conduct Outreach for at-risk properties	$ 50,000	0.02
Option Flood Risk 2 - Quick Buy Option (Cost is potential one-time allocation of Quick-Buy funds, not recurring)	$ 0	0.00
Total Cost for Flood Risk Mitigation	**$ 10,850,000**	**0.02**
Management Options		
Option Study 1 - Watershed Planning Develop Watershed Improvement Plans/Studies (each year for five years)	**$ 250,000**	0.12