TOWN OF TEWKSBURY

Stormwater Finance Analysis: Exploring the Development of a Stormwater Enterprise Fund

2019

Weston & Sampson

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EXECUTIVE SUMMARY

The Town of Tewksbury is developing a strategy to fund the Town's stormwater management needs, guarantee regulatory compliance, reduce stormwater flooding, and invest in aging infrastructure, while at the same time ensuring that any methodology adopted for assigning fees is fair and equitable to all users. After reviewing available funding mechanisms and examples of other municipalities in Massachusetts leading the way on stormwater management, the Town decided to explore the feasibility of implementing a stormwater enterprise fund. A stormwater enterprise fund collects fees to support the operation, maintenance, upgrades, and expansion of the existing stormwater system.

STORMWATER MANAGEMENT GOALS

INVEST IN THE FUTURE

The Tewksbury community will need to invest more in stormwater infrastructure to ensure an adequate level of service and regulatory compliance than what has been invested historically. By creating a stormwater enterprise fund, the Town can invest in the future without burdening other departments financed through the General Fund, like schools and highway.

REDUCE STORMWATER FLOODING

Urban stormwater runoff is directly correlated to the amount of impervious area. Impervious area keeps stormwater from seeping into the soil and recharging groundwater. In heavy downpours, the current storm drainage system can become overwhelmed. Funds generated through a stormwater enterprise fund can be used to upgrade systems and to construct green infrastructure. Green infrastructure, like bioswales and rain gardens, uses natural properties to filter pollutants and allow water to soak into the soil rather than flood our streets.

MEET REGULATORY REQUIREMENTS

The Town must comply with the extensive requirements of the 2016 Municipal Separate Storm Sewer Systems (MS4) Permit, which became effective on July 1, 2018. The Town will incur significant costs in order to meet the mandates within the permit. A reliable funding source will be necessary for the foreseeable future.

CONTROL WATER POLLUTION

Stormwater flowing from impervious surfaces, like roadways and parking lots, carries pollutants into rivers, streams, and groundwater. Water contamination is harmful to drinking water sources, wildlife and recreation. Water pollution results in both indirect and direct costs.

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PROJECTED STORMWATER BUDGET

The projected stormwater budget for FY2020 to FY2024 covers compliance with the 2016 MS4 Permit, culvert and drainage improvements, operation and maintenance, as well as equipment needs. The total budget averages approximately $1.52 million annually. The proposed enterprise fee would only cover a portion of the projected budget need.

Budget Categories	MS4 Permit Compliance	Culvert Improvements	Drainage Improvements	Operation and Maintenance	Total
Annual Range	$248,000 to $345,000	$215,000 to $485,000	$50,000 to $700,000	$606,250 to $683,929	$1,148,250 to $1,728,929

STORMWATER ENTERPRISE FUND FEASIBILITY

A stormwater enterprise fee offers a reliable and equitable funding mechanism to meet the Town's stormwater management needs compared to other funding sources. At present, there are at least thirteen communities in Massachusetts with stormwater fee systems in place. There are several other communities actively working to develop stormwater funding mechanisms or that have passed enabling legislation.

FUNDING	PROS	CONS
General Fund	Protocol is already in place. Guaranteed source of funding.	New cost burdens from the MS4 Permit would increase the amount of funding going towards stormwater from the general fund, which could limit funding for other departments. Not all properties are taxed.
Grants	Brings funding from outside of the Town.	Grants are only for specific types of projects and are not guaranteed.
Stormwater Fund	Guaranteed source of funding. A more equitable fee based on impact to stormwater system.	Initial time and effort involved in implementation and oversight going forward.

HOW WOULD A STORMWATER ENTERPRISE FUND WORK IN TEWKSBURY?

One of the fairest ways to create a stormwater enterprise fund is to calculate the fee based on a parcel's impact upon the drainage system. Parcels with greater impervious area, and without stormwater controls onsite, discharge greater amounts of stormwater into the municipal storm drain system. Therefore, the first step to calculate a stormwater enterprise fee is to measure the impervious area on parcels with different types of development. The second step is to analyze various ways to calculate stormwater user fees and corresponding billing rates. Some towns use an Equivalent Residential Unit (ERU) to compare impact to the stormwater system across different land use types and its typically

based on the average impervious area of the dominant land use type. In Tewksbury, the ERU would qual the average impervious surface on a single-family residential parcel, which equals 4,395 square feet. The Town then reviewed the three fee options (see below). The details and analysis for each of these steps are included herein.

	Residential	Commercial	
Option 1	Flat Fee	Impervious Area using ERU	**Recommended**
Option 2	Flat Fee	Based on Impervious Area Tiers	4,395 average sq. ft. of impervious area per residential sample = 1 ERU
Option 3	Based on Impervious Area Tiers	Based on Impervious Area Tiers	

Option 1 was the recommended fee structure based on equity, administrative feasibility, and the ability to meet the stormwater management needs. Option 1 would issue a flat fee for small residential customers (households with three units or less) of $30 per year. Commercial properties and larger residential properties would be charged based on the properties' ERU. For example, a property with 8,790 square feet of impervious surface would pay $60 per year (see calculation below). Fees would be administered through the existing water/sewer billing system. Abatements or corrections to the stormwater bill would be offered and a simple credit or incentive program system is being explored.

The total revenue generated from the enterprise fee structure selected would be approximately $480,900. This would cover approximately 32% of the average total projected annual budgetary needs for stormwater management.

Commercial Property A

Amount of Impervious Area	8,790 sq. ft.
Equivalent Residential Unit (ERU)	÷ 4,395 sq. ft.
	2 ERU
Rate per ERU	$30 per year
Commercial Property A	× 2 ERU
Stormwater Enterprise Fee	$60 per year

1.0 INTRODUCTION / OVERVIEW

Stormwater is runoff from rain or snow melt. Most stormwater currently flows into the Town's drainage system and ultimately ends up in groundwater, ponds, streams or wetlands. Stormwater can carry pollutants (such as bacteria, oil and grease, fertilizer, sand, and trash), which can contaminate drinking water supplies, surface waters utilized for recreational activities, fish and wildlife habitat. Impervious surfaces do not allow any stormwater to infiltrate or seep into the ground. Therefore, areas with widespread impervious surfaces can channel large amounts of stormwater to the drainage system, which can become overwhelmed during intense periods of rainfall. Thus, stormwater management programs are intended to reduce stormwater pollution and control localized flooding. The ability of the current system to meet its intended purpose can be improved by complying with regulatory requirements and investing in the future. Therefore, the goals of the stormwater program are to:

- Reduce Stormwater Flooding
- Improve Water Quality
- Meet Regulatory Requirements
- Invest in the Future

The Town analyzed historic and current stormwater activities and expenditures as well as projected stormwater activities and investments to gain a full understanding of the current stormwater program budget constraints and anticipated annual costs of meeting its goals. The Town placed special attention on efforts needed to comply with the requirements of the 2016 Municipal Separate Storm Sewer System (MS4) General Permit, which became effective on July 1, 2018, and has an overall goal of improving receiving water quality by reducing pollutant loadings to valuable water resources.

1.1 Current Stormwater Management Costs and Funding

The stormwater program currently budgets for maintenance items such as street sweeping and catch basin cleaning, capital improvement projects, and MS4 permit compliance activities. The Town's existing stormwater program is currently funded through the General Fund, which is financed through property taxes, and aid from the Commonwealth primarily through the Chapter 90 Program. By relying on the General Fund, stormwater management must compete with other budgets and is often not prioritized when compared with other highly visible or acute problems, like public safety and schools. However, when regulations necessitate funding for additional compliance, like the new MS4 permit, the Town must reallocate funds to stormwater management, which limits funding for other departments. Certain stormwater system improvements can be financed through other external finance mechanisms; however, none are specifically for stormwater management or guaranteed long-term funding sources. For example, Sutton Brook Mitigation Fund is settlement monies from the Sutton Brook Disposal Area Site Settlement and is used for stormwater projects that address impacts from the brownfield site. Chapter 90 reimbursable funds are for capital improvement projects such as highway construction, preservation and improvement projects. Stormwater projects that need to be completed in conjunction with such projects are eligible for reimbursement. However, if stormwater projects could be financed through an alternative source, more of this funding could be allocated to roadway improvements and sidewalk construction. MassDOT funding is available for transportation projects. Stormwater projects that need to be completed in conjunction with such projects are eligible for reimbursement.

1.2 Near- and Long- Term Stormwater Management Costs and Funding

Using information provided by the Town, including the Town's 5-Year Capital Improvement Plan, a five-year comprehensive stormwater management budget that captures the Town's stormwater needs was developed. This budget includes both capital projects, and non-capital items related to MS4 compliance, such as operation and maintenance of the drainage system, and associated equipment. This budget, presented in more detail in Appendix A, Five-Year Stormwater Budget Projection, and summarized in Table 1-1 reflects estimated annual planning level costs. It incorporates the costs for MS4 Permit compliance presented separately in Appendix B, MS4 Permit Compliance Cost Tables.

Table 1-1 summarizes the Town's projected stormwater expenditures for fiscal years 2020 to 2024. The Town anticipates needing approximately $1.52 million annually on average for stormwater management. The five-year projections include both ongoing and future municipal activities related to system operation and maintenance (such as street sweeping and catch basin cleaning) and planned capital improvement projects. The five-year projections for MS4 compliance were developed using annual reports, the Notice of Intent submitted by the Town to obtain coverage under the 2016 MS4 Permit, and projected costs associated with the implementation of the MS4 Permit requirements.

The new MS4 Permit will increase the Town's stormwater costs substantially going forward. To comply with the MS4 permit, the Town will need to identify and remove illicit discharges, address new regulatory updates, and create plans to reduce pollutant loads associated with chloride and phosphorus-impaired receiving waters. A large portion of the costs for MS4 permit compliance can be attributed to the Illicit Discharge Detection and Elimination (IDDE) requirements of the permit, including dry weather sampling, wet weather sampling, and IDDE investigations. Based on a review of the stormwater documents previously identified and meetings with Town staff, specific needs were identified for Tewksbury in order to comply with the 2016 MS4 Permit. These needs are summarized in the series of tables included in Appendix B, which summarize the requirements of the MS4 Permit. There is a comprehensive table that represents full compliance with the permit, as well as individual tables by permit year for Years 1 through 5. The tables provide a description of each permit requirement by item number as identified in the permit. In addition, information is presented regarding Tewksbury's specific needs and the work that the Town will need to complete over the five-year permit term and beyond. Tasks that the Town plans to complete "in-house" using existing staff, along with tasks where the Town will require assistance from an outside contractor or consultant are differentiated in the attached tables. If the Town were to implement a stormwater enterprise fund, it would allow the Town to expand their existing staffing resources in the future so that more of the work required for compliance could be accomplished in-house. However, at this time, no additional staff were considered in the five year projected costs.

A dedicated stormwater funding source, like a stormwater enterprise fund, will be invaluable in helping the Town to comply with the extensive requirements of the permit and to maintain the Town's drainage infrastructure.

Table 1-1: Estimated Annual Planning Level Non-Capital and Capital Stormwater-Related Costs by Fiscal Year

Projected Costs	FY2020	FY2021	FY2022	FY2023	FY2024
MS4 Permit Compliance	$277,000	$313,000	$248,000	$293,000	$345,000
Culvert Improvements	$215,000	$485,000	$405,000	$280,000	$0
Drainage Improvements	$50,000	$190,000	$100,000	$465,000	$700,000
Operations and Maintenance	$606,250	$624,273	$643,196	$663,066	$683,929
Total	$1,148,250	$1,612,273	$1,396,196	$1,701,066	$1,728,929

The next section reviews types of funding sources and why a stormwater enterprise fund would be an adequate finance mechanism to help meet the Town's stormwater management needs going forward.

2.0 STORMWATER FUNDING MECHANISMS

In order to finance future stormwater needs, the Town of Tewksbury will need approximately $1.52 million annually over the next 5 years. Few funding alternatives exist to meet this need. To avoid pulling funding away from other departments, such as schools and highway, a viable funding source is needed. One way to finance the stormwater operations and future investment is to increase taxes, which is limited by Proposition 2 ½. Taking advantage of available grant opportunities is another alternative. However, grant opportunities do not provide a stable source of funding and often require a town match. Chapter 90 funds from the State can also be used for stormwater management in some cases, but the funding source cannot cover everything. Using Chapter 90 funds for stormwater also reduces the amount of money that can be spent fixing roadways. The final alternative is a stormwater enterprise fund. Stormwater enterprise fund collects user fees based on a parcel's impact on the stormwater system. A stormwater enterprise fund was determined to be the best alternative for further analysis because it provides a stable funding source that is equitably distributed based on a property's impact on the stormwater system.

Stormwater enterprise funds have been successfully implemented in other Massachusetts municipalities and in many other communities across the United States. At present, there are at least thirteen communities in Massachusetts with stormwater fee systems in place. There are several other communities actively working to develop stormwater funding mechanisms or that have passed enabling legislation. However, Massachusetts lags other states in implementation of a dedicated funding source. At least 40 states and the District of Columbia have stormwater utilities and at least 6 states have over 100 stormwater utilities (Campbell, 2018). Figure 1 depicts the distribution of stormwater funding mechanisms by state.

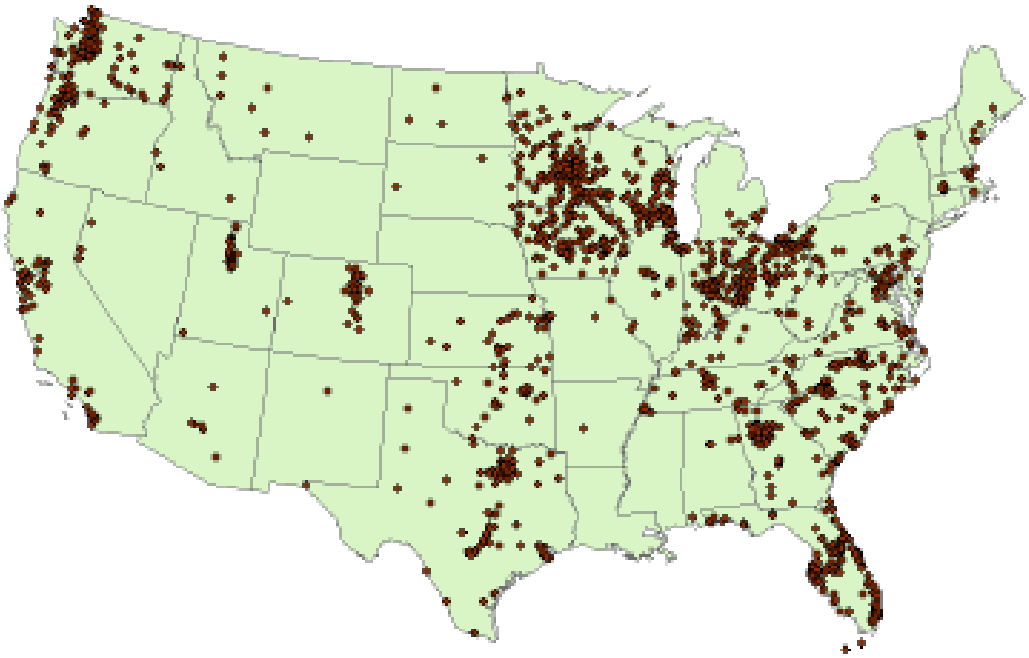

Figure 1. Stormwater Utilities, 2018

Campbell, C. Warren. (2018). Western Kentucky University Stormwater Utility Survey. Western Kentucky University, Bowling Green, KY. pp.2 https://www.wku.edu/seas/undergradprogramdescription/swusurvey2018.pdf

Table 2-1 provides an overview of stormwater fee structures currently in place in various Massachusetts communities. Although fee structures differ, they are generally based upon the amount of impervious surface on a parcel as a measure of the user's impact on the stormwater system. Some municipalities measure the amount of impervious surface on each parcel and charge a fee accordingly. Other municipalities use a metric called "equivalent residential unit." The metric equivalent residential unit can be used to compare a parcel's impact on the stormwater system across various land use types. Equivalent residential units are generally based on the average use of a single-family residential home because single-family residential parcels are usually the dominant land use type. For stormwater funding mechanisms, an equivalent resident unit (ERU) usually equals the average impervious area associated with a single-family residential parcel.

Another advantage of a stormwater enterprise fund as a funding mechanism is the ability to decrease or increase fees based on need. For example, the City of Newton reconsidered how fees were collected because the amount of revenue generated by their stormwater enterprise fund was not meeting their stormwater needs. Newton originally assigned residential properties 1 ERU and non-residential properties 6 ERUs with a rate of $25/ERU per year. The City has since increased the rate for 1.0 ERU to $75 and switched to a tiered fee system based on the amount of impervious area for non-residential properties and residential properties with more than 4 units. By implementing these changes, Newton has more than doubled the estimated $700,000 in revenue that they previously generated under their flat fee system to collect total fees closer to $2 million.

Table 2-1: Stormwater Funding Mechanisms in Massachusetts Communities

Municipality	Stormwater Fee Structure	ERU (if available)	Fees/Total Revenue Collected
Ashland	Stormwater Enterprise Fund (2018)	Map showing amount of impervious area per parcel	Tier 1: Residential: $8.75/quarter per parcel Tier 2: Commercial, Government and Other non-tax properties: $0.80/100 square feet of Impervious Area or a minimum of $20/quarter
Ayer	Stormwater Enterprise Fund Established; No Fees Collected (2011)		
Braintree	Stormwater Utility Administered through DPW Collection through water/sewer bill (2018)	2,780 SF	Residential (1-3 units) $6.25 per quarter - Flat fee Residential (4+ units) /Commercial/Industrial/Tax-Exempt $6.25 per quarter per ERU *Revenue Collected Approximately: $630,000/yr*

Table 2-1: Stormwater Funding Mechanisms in Massachusetts Communities

Municipality	Stormwater Fee Structure	ERU (if available)	Fees/Total Revenue Collected
Canton	Bylaw, no available information on implementation		
Chicopee	Stormwater Fee under Water Pollution Control Dept. (1998)		$100/year – Single Family Homes $0.45/1,000 SF (quarterly) – Up to $160/yr. – Multi-Families & Businesses FY14 – Rates were scheduled to increase by $6.66 per year FY15 – Rates for single family homes were scheduled to increase by $14.06 *Revenue Collected = Approx. $500,000/yr*
Chelmsford	Stormwater Enterprise Fund (2018)	3,990 SF	Fee Structure approved at 2018 Fall Town Meeting. Revenue raised will be $985,000 the first year. Chelmsford anticipates raising fee for single family and two-family properties gradually in subsequent years to $70/year to raise additional revenue to meet projected stormwater needs. Single Family and Two-Family - $40/year All Other Properties – Tiered System based on impervious area – fees range from $250 to $8,000/yr
Dracut	Stormwater Enterprise Fund Established; No Fees Collected (2017)		
Fall River	Sewer Commission Stormwater Fee (also funds CSO abatement) (2008)	2,800 SF	$140/yr – Residential Properties $140/yr for every 2,800 SF of impervious area – All other properties *Revenue Collected = Approx. $4.6M/yr (2012)*

Table 2-1: Stormwater Funding Mechanisms in Massachusetts Communities

Municipality	Stormwater Fee Structure	ERU (if available)	Fees/Total Revenue Collected
Gloucester	Ordinance, no available information on implementation (2009)		
Longmeadow	Stormwater Enterprise Fund – Department of Public Works (2017)	3,400 SF	Small Residential Property $2.25/month – Flat Rate Non-Residential Declining Block Rate Block ERU Range: Block Coefficient ($2.25 per ERU per month) 1-10: 1 11-50: 0.9 51-100: 0.8 101-500: 0.7
Millis	Stormwater Enterprise Fund Administered by DPW Annual Bill (2018)		Impervious Area Square Feet: Annual Fee 1-199 SF: $0 200 -1,499 SF: $33 1,500 – 2,499 SF: $66 2,500 – 3,499 SF: $99 One additional billing unit for each additional 1,000 SF greater than 3,499 SF ($2.75 per month)
Milton	Stormwater Utility Enterprise – Stormwater Management Fee – Administered by DPW (2016)		Single Family: Tier 1 (0 to 2,075 SF) - $32/yr. Tier 2 (2,076 to 2,675 SF) - $44/yr. Tier 3 (2,676 to 4,225 SF) - $61/yr. Tier 4.1 (4,226 to 8,364 SF) - $156/yr. Tier 4.2 (8,365 o 15,894 SF) – $205/yr. Tier 4.3 (15,895 SF and greater) – $468/yr. Other Residential: Condos, Multi-Family - $1.88 x 100 SF Commercial/Industrial: Office, retail, etc. - $1.88 x 100 SF Tax Exempt: Municipal, Institutional - $1.88 x 100 SF

Table 2-1: Stormwater Funding Mechanisms in Massachusetts Communities

Municipality	Stormwater Fee Structure	ERU (if available)	Fees/Total Revenue Collected
			Revenue Collected = Approx. $700,000/yr.
Newton	Stormwater Enterprise Fund under DPW (2006)	3,119 SF	Residential (1 to 4 Family Dwellings) - $75/yr. All Other Properties – Tiered System based on impervious area – fees range from $250 - $5,000/yr. *Revenue Collected = Approx. $2M/yr.*
Northampton	DPW Stormwater and Flood Control Utility (2014)	2,671 SF	Residential (1 to 3 Family Dwellings): $63.94 – impervious area less than 2,250 SF $91.05 – impervious area 2,250 – 3,056 SF $125.61 – impervious area 3,056 – 4,276 SF $259.07 – impervious area greater than 4,276 SF All other Parcels – Fee Based on Impervious Area *Revenue Collected = Approx. $2M annually*
Pepperell	Stormwater Enterprise Fee Included on Water and Sewer Billing (2018)		Every parcel will be charged $15 per quarter
Reading	Stormwater Enterprise Fund under DPW (2006)	3,210 SF	Single Family or Two-Family - $60/yr. All other properties $60/yr. for every 3,210 square feet of impervious area *Revenue Collected = Approx. $357,000 annually (2012)*

Table 2-1: Stormwater Funding Mechanisms in Massachusetts Communities

Municipality	Stormwater Fee Structure	ERU (if available)	Fees/Total Revenue Collected
Rockport	Ordinance, no available information on implementation		
Shrewsbury	Stormwater Enterprise Fund administered by DPW; Rates Set by Sewer Commission (2019)	3,200 SF	<u>Residential (1-3 Family Homes, 2-unit Condominiums/ Townhouses, and Multiple Houses)</u> $90 - Tier 1 (0 < IA ≤ 5,000) $200 - Tier 2 (5,000 < IA ≤ 10,000) $325 – Tier 3 (IA > 10,000) <u>Undeveloped Vacant Parcels</u> $45 Flat Fee <u>Other Residential / Non-Residential</u> All Other Properties – Tiered System based on impervious area – fees range from $90 to $7,500/yr
Westfield	Stormwater Enterprise Fund under DPW (2010)		Residential - $20/yr Non-Residential - $0.045 per square foot of impervious area with a maximum fee of $640 and a minimum fee of $100/yr. *Revenue Collected = Approx. $560,000 annually (2012)*

Stormwater funding mechanisms have been implemented in towns similar to Tewksbury. Chelmsford, Northampton, and Shrewsbury have a similar population size, land area, and miles of paved roadway that are municipally owned and maintained as Tewksbury. All three are also regulated under the MS4 Permit. Chelmsford expects to collect approximately $985,000 in fees the first year with plans to raise fees in subsequent years to raise $2 million annually, which is the estimated amount needed to meet their stormwater needs. Northampton currently collects approximately $2 million annually. Shrewsbury expects to collect approximately $1.75 million annually. Table 2-2 provides demographics, as well as an estimate of the revenue collected per mile of roadway maintained, for these municipalities. The estimated annual revenue collected per mile of roadway maintained is consistent among these municipalities. If the Tewksbury were to raise $480,900 annually, the estimated annual revenue collected per mile of roadway maintained would be $3,467 which again is consistent with the similarly sized municipalities highlighted in Table 2-2.

Table 2-2: Stormwater Fee Revenue Collected Per Mile of Roadway Maintained for Communities Similar to Tewksbury

Municipality	Population (Based on 2010 Census)	Land Area (sq.mi.)	Miles of Paved Roadway Maintained*	Estimated Annual Revenue Collected	Estimated Annual Revenue Collected Per Mile of Roadway Maintained
Chelmsford	33,802	22.37	170.08	$2,000,000	$11,759
Northampton	28,549	34.24	152.13	$2,000,000	$13,147
Shrewsbury	35,608	20.7	148.42	$1,750,000	$11,791
Tewksbury	28,961	20.7	138.71	$480,900**	$3,467

*MassDOT Road Inventory, City/Town Accepted Jurisdiction
**See Section 3.6

3.0 FEE STRUCTURE AND BILLING

3.1 Fee Structures

The Town has chosen to investigate implementation of a stormwater enterprise fund. Projected costs are available in Table 1-1 and a detailed analysis is available in Appendix A. Stormwater fees are generally structured as flat fees based on land use type or as user fees based on impervious area. Municipalities in Massachusetts with stormwater funding mechanisms have used each type. Note, the term rate is not interchangeable with fee, rather it is the dollar amount associated with the fee. For example, a flat fee could have a rate of $100 per year.

A flat fee refers to a universal rate or charge (e.g., $100 per user) and is often tied to a particular land use classification. Flat fees are typically used when there is limited data available on individual use, when use is difficult to quantify, or when there is little variance from one user to the next. Sometimes flat fees are used for certain categories of land use. In Massachusetts, flat fees are most often applied to smaller residential parcels. In fact, 10 out of the 13 stormwater utilities charge a flat fee to residential parcels. Flat fees in Massachusetts range from $20 per year or $1.67 dollars per month to $140 per year or $11.67 per month.

Converse to the flat fee is when a customer is charged based on their use of or impact to the storm drain system. User fees can be structured to charge by exact use or to charge through a tiered system. Stormwater user fees are generally calculated based on the amount of impervious surface area on a parcel. The metric “equivalent residential unit” can be used to compare use of the storm drain system across different land use types. Equivalent residential units are generally based on the average use of a single-family residential parcel because single-family properties are usually the dominant land use type. To calculate the user fee, each property would be assigned an ERU based on the amount of impervious surface on the parcel. For example, if the ERU is set to 1,000 square feet and the parcel has 10,000 square feet of impervious surface, the property would be charged for 10 ERUs. The Town of Reading utilizes an ERU structure for non-residential properties and charges $60 per year for each ERU (3,210 square feet of impervious area).

A tiered user fee involves a stepped rate (e.g., $50, $75, and $100 per year) assigned to groups with specific impervious area amounts. Tiered fees can be used for several reasons, including when the precise quantity of service (impervious area) is impracticable to calculate for each individual user. In addition, tiered user fees are helpful when there is significant variance in impervious area that can be reasonably approximated and then clustered into groups where a small change in impervious area would result in a change in tier and fee. In some respects, a tiered fee system can also be easier to implement and maintain. Instead of all paying different user fees, users pay according to a set number of tiers with established rates, which simplifies the billing process. Also, with a tiered system, changes in impervious area would not automatically equate to a change in fee making the billing system easier to maintain over time. Shrewsbury uses a tiered fee for both residential and nonresidential properties.

The non-residential properties tiers in Shrewsbury are (IA=Square Feet of Impervious Area) as shown below:

- $90 – Tier 1 ($0 < IA \leq 5,000$)
- $200 – Tier 2 ($5,000 < IA \leq 10,000$)
- $325 – Tier 3 ($10,000 < IA \leq 15,000$)
- $500 – Tier 4 ($15,000 < IA \leq 25,000$)
- $1,000 – Tier 5 ($25,000 < IA \leq 50,000$)
- $1,500 – Tier 6 ($50,000 < IA \leq 75,000$)
- $2,250 – Tier 7 ($75,000 < IA \leq 100,000$)
- $3,750 – Tier 8 ($100,000 < IA \leq 200,000$)
- $6,250 – Tier 9 ($200,000 < IA \leq 300,000$)
- $7,500 – Tier 10 ($IA > 300,000$)

Some communities simplify rollout by applying less complex fee structures (e.g., flat fees) initially and then following a trial period move to more granular fee structures (e.g., tiered and individualized fees) once more precise data can be obtained to apply these fees appropriately.

3.2 Fee Structure and Rate Analysis

In examining the development of a stormwater enterprise fund, the Town analyzed three fee structures (Table 3.1). The fee structures were chosen and then evaluated based upon the following: the revenue each might generate compared to need, the feasibility of administering the fee, and the Town's overall stormwater management goals. Under the first two options, residential parcels with three units or less and all townhouses/condominiums with individual sewer accounts were assigned a flat fee. The Town examined the feasibility of implementing a tiered fee structure for residential properties in Option 3. The impervious area associated with non-residential properties and residential properties with more than three units tends to vary widely. Therefore, charging a flat fee to these types of properties was an unfair and unequitable method because of their varying impact on the storm drain system. Option 1 analyzed applying a straight ERU methodology, while Option 2 and 3 used a tiered methodology, which still had some basis in the calculated ERU.

Table 3-1. Stormwater Rate Structure Options for Smaller Residential Properties and Non-Residential/Larger Residential Properties

	Rate Structure for Smaller Residential Properties	Rate Structure for Non-Residential/Large Residential Properties
Option 1	Flat Fee	Fee based on ERU Rate
Option 2	Flat Fee	Tiered Fee based on Impervious Area
Option 3	Fee based on Lot Size and Impervious Area Tiers	Tiered Fee based on Impervious Area

As part of the evaluation, rates needed to be applied to calculate the projected revenue generated, which is further described in the following sections. In order to calculate potential rates for the stormwater enterprise fund, the Town collected information about the types of development and associated amounts of impervious surface. Parcel-specific information was available from the Bureau of Geographic Information (MassGIS) and the Town's Assessor's Office, such as town land use, zoning, aerial imagery, and tax assessor's information. Using May 2016 aerial imagery, the impervious surface was delineated on 1,003 residential and non-residential parcels located throughout Tewksbury. This includes a sample size of smaller residential parcels, and all larger residential (with more than 3 units)

and non-residential parcels with impervious area. Parcels with contiguous areas of impervious surfaces greater than ten square feet were categorized by type of impervious surface, such as carport, deck, porch, building footprint (offset roof print), attached garage, detached garage, shed, driveway/paved area, patio, sidewalks/walkways and parking lots.

Residential parcels with three units or less are the dominant land use type in Tewksbury (Table 3-2). Therefore, for this analysis, a single equivalent resident unit (ERU) equals the average impervious area for residential parcels with three units or less. A sample size of 362 single-family residential parcels was selected at random to calculate the representative impervious surface area associated with a single-family home. A sample size reduces the cost of the analysis and still provides adequate representation of the entire town. The sample size was large enough to ensure with a 95% confidence level that the average impervious area of the sample size is representative of the larger population. Collectively, the parcels included in the sample size had an average impervious area of 4,359 SF. Since the average impervious area of the sample size was 4,359 SF, the equivalent residential unit or 1.0 ERU was set to 4,359 SF.

Table 3-2. Number of Parcels by Land Use Classification

Land Use Classification	Number of Parcels (Units)
Small Residential	
• Single- Family[1]	7,433
• Two-Unit (Single Family with In-Law Unit)	397 (794)
• Three-Family	16 (48)
• Multiple Houses[2]	9 (18)
Larger Residential[3]/Commercial/Industrial/Tax-Exempt Parcels[4]	641

[1] Includes 10 units owned by the Housing Authority
[2] Multiple Houses include those properties that have more than one residential building on each parcel.
[3] "Larger Residential" includes parcels identified as apartments, childcare facilities, nursing homes, and garden style condominium complexes or other condominium complexes that are billed for sewer as part of a larger entity (building or complex) and not under separate individual sewer accounts.
[4] Municipal parcels were removed from the analysis as the Town does not anticipate collecting a fee from Town-owned parcels at this time.

3.3 Option 1. Flat Fee for Residential and Non-Residential Parcels Based on ERU

Four variations of Option 1 were analyzed (Table 3-3). Each variation assigns small residential properties a flat rate. Non-residential properties and larger residential properties would be assigned a fee based on the number of equivalent residential units (ERU), which is calculated by dividing the impervious area for each property by 4,359 square feet (1 ERU). There is a total of 8,175 ERUs associated with non-residential and large residential properties. Table 3.3 examines the amount of revenue that could be collected by assigning ERU rates of $30, $75, $100, and $150 as outlined in Iteration Numbers 1A, 1B, 1C, 1D, and 1E. Under Iteration Number 1D, the use of a split ERU is proposed where all smaller residential properties with three units or less pay a flat fee of $75, and all other parcels pay a fee based on an ERU rate of $100.

Table 3-3. Option #1 Rate Iterations and Projected Revenue

Option #1 Iteration	Residential Flat Rate per Year	ERU Rate	Revenue from Small Residential	Revenue from Large Residential/Non-Residential	Annual Revenue
#1A	$75	$75	$589,125	$613,125	$1,202,250
#1B	$100	$100	$785,500	$817,500	$1,603,000
#1C	$150	$150	$1,178,250	$1,226,250	$2,404,500
#1D	$75	$100	$589,125	$817,500	$1,406,625
#1E	$30	$30	$235,650	$245,262	$480,900

Table 3.4 provides a detailed breakdown of revenue collected by parcel type as an example of how the fees would be calculated for Option #1 using Iteration #1A. If Option #1A were selected, larger residential properties with more than three units and non-residential properties would pay $957 per year on average. Residential properties would be charged $75 per year or $25 on each water/sewer bill.

Table 3-4. Option #1A Revenue by Parcel Type

Parcel Type	No. of Parcels	Total Impervious Area (SF)	ERUs	ERU Rate	Flat Rate	Annual Fees Collected
Small Residential						
• Single Family	7,433	-	-	-	$75	$557,475
• Single Family with In-law Unit (Two-Family)	397	-	-	-	$75	$29,775
• Three-Family	16	-	-	-	$75	$1,200
• Multiple Houses on One Parcel	9	-	-	-	$75	$675
Large Residential/ Commercial/Industrial/Tax-Exempt Parcels	641	35,636,521	8,175	$75	-	$613,125
					Total Revenue Collected per year:	$1,202,250

3.4 Option 2. Residential Flat Fees and Non-Residential Fee based on Tiered Impervious Surface

Under Options 2, 2A, and 2B, residential parcels (1, 2 & 3-Families, Multiple Houses) would be charged a flat fee and all other parcels would be charged by tier based upon their actual impervious area. To ensure that fees were equitable and to tie them back to the ERU, fees were assigned by taking the mid-point of each tier and dividing it by the ERU. Table 3-5 provides an overview of the different rate iterations for Option 2 and the projected revenue generation. Table 3.6 provides an example of how the rates would differ between tiers, using Option #2A as an example. All of the rate structure options and iterations are included in Appendix C.

Table 3-5. Option #2 Rate Structure Iterations and Annual Revenue

Option #2 Iteration	Residential Flat Fee	Non-Residential Range	Revenue from Small Residential	Revenue from Large Residential/Non-Residential	Annual Revenue
#2A	$100	$125-7,500	$785,500	$752,200	$1,537,700
#2B	$100	$250-15,000	$785,500	$1,502,400	$2,287,900
#2C	$75	$125-7,500	$589,125	$752,200	$1,341,325

3.5 Option 3. Tiered System for Smaller Residential Parcels

Communities in Massachusetts that have established a tiered fee structure for smaller residential properties (i.e. one-, two-, three-families and parcels with two houses) include Millis, Milton, Northampton and Shrewsbury. Small residential tiered systems generally have less tiers than those for commercial and large residential properties. Milton initially established four residential tiers in FY17. In FY18, they further divided Tier 4 into 3 separate sub-tiers. In structuring their residential tier system, Northampton's tiers for one-, two- and three-family residential properties were set up so that each tier contained approximately 25% of the total one, two- and three-family residential properties town-wide.

If the Town were to move forward with Option 3, the total impervious area would need to be delineated on every residential parcel. Currently, there are an estimated 7,855 small residential parcels and the impervious surface has been delineated on approximately 362 parcels. The impervious area on the remaining 7,493 parcels would need to be delineated to develop the tiered fee structure and determine relative rates per tier.

The time and effort required for the Town to manage and track changes in impervious area will be dependent upon:

1. the number of tiers that are created,
2. the types of systems currently in place to record changes to existing residential properties that would impact impervious cover, and
3. the capacity of the existing billing system to generate an additional automated bill or incorporate the fee within existing billing.

Keeping the number of tiers low is recommended because it makes the billing process relatively straightforward. For example, Tier 1 would encompass "typical single-family homes," while the second tier could be reserved for residential properties that deviate significantly from the average impervious area. Again, this would require additional up-front analysis and long-term tracking by town personnel. The impervious area could be tracked and updated when a homeowner obtains a building or zoning permit. Changes in impervious cover that would not require a building or zoning permit would need to be tracked separately.

3.6 Recommended Fee Option

Of those options presented in this section, Option 1E was selected as the proposed methodology for assigning stormwater fees in Tewksbury. Ultimately, the Town decided not to pursue a tiered fee for small residential properties after examining the following: (1) the cost and effort required to delineate impervious surfaces on single-family residential properties and to create a tiered fee structure for these properties; (2) the effort required for the Town to manage and track changes in impervious area; and (3) upon review of how other Massachusetts communities have structured residential fees this way and

how those fee structures were established. Small residential properties would have an enterprise fee of $30 per year, which equals $2.50 per month.

All other parcels (commercial, industrial, tax exempt and large residential properties/properties with four or more residential units) would be charged varying fees based on their actual impervious area and associated ERU. The ERU for each parcel will be multiplied by the ERU rate of $30 to determine the fee for each parcel. This was preferred over the tiered approach because it was considered to be the most fair and equitable as each parcel will be billed based on their exact impervious area.

The total revenue generated from Option 1E would be approximately $480,900. This would cover approximately 32% of the average total projected annual budgetary needs for stormwater management.

Table 3-6. Option #1E Revenue by Parcel Type

Parcel Type	No. of Parcels	Total Impervious Area (SF)	ERUs	ERU Rate	Flat Rate	Annual Fees Collected
Small Residential						
• Single Family	7,433	-	-	-	$30	$222,990
• Single Family with In-law Unit (Two-Family)	397	-	-	-	$30	$11,910
• Three-Family	16	-	-	-	$30	$480
• Multiple Houses on One Parcel	9	-	-	-	$30	$270
Large Residential/ Commercial/Industrial/Tax-Exempt Parcels	641	35,636,521	8,175	$30	-	$245,250
					Total Revenue Collected per year:	**$480,900**

3.7 Revenue Collection Systems

Municipal governments have several options for collecting stormwater fees. Fees can be collected through a current water or sewer system billing system to reduce costs if the option is available; the fee can be added to a property tax billing; or a bill can be sent as a standalone mailing. The table below lists general benefits and limitations of each approach.

Table 3-7. Bill Delivery Approach, Benefits, and Limitations

Bill Delivery Approach	Benefits	Limitations
Add fee onto property tax billing	• Reduces cost of implementation • Simplifies implementation • Improves likelihood of fee collection	• Nonprofits will need special billing • Makes the fee appear to be a tax

Table 3-7. Bill Delivery Approach, Benefits, and Limitations

Bill Delivery Approach	Benefits	Limitations
Add fee onto an existing utility billing (e.g., water and sewer)	• Reduces cost of implementation • Simplifies implementation • Improves likelihood of fee collection	• A separate bill may still need to be sent for properties not on Town water or sewer
Create a stand-alone billing process	• Clarifies the purpose of the fee	• Increases cost of implementation • Complexity of developing a new billing/collection system • A new bill may be off-putting to ratepayers

Most communities opt to conduct billing using in-house staff and to add the fee to an existing billing platform (e.g., tax bills or utility bills). By using existing staff and procedures, this billing approach is much less expensive and generally easier to implement than other approaches. Additionally, since ratepayers are already accustomed to paying existing utility bills, the payment is also easier for customers.

To reduce costs, the Town of Tewksbury intends to include the stormwater fee associated with a particular parcel on that property owner's water/sewer bill. However, there are some properties that remain on septic systems, and a separate bill would need to be generated for those parcels, as well as any other properties that have impervious area, but do not receive a water/sewer bill. Attached and detached townhouses and condominium complexes that have individual sewer accounts will each be billed individually, similar to a single-family home. The Town does not currently bill municipal properties for sewer use and does not plan to assign a stormwater fee to municipal properties based on this precedence.

4.0 ABATEMENTS AND CREDITS

Abatements lower a property's utility bill when their account has been charged incorrectly. Credits or incentives lower a property's utility bill if the customer takes a specific action. The Town currently offers abatements for water and sewer fees, but credits are not currently offered. For consistency, the stormwater enterprise could initially adopt the same structure, but the Town is considering implementation of a simplified credit system.

Abatements would be available upon an applicant's request for a reduction on their stormwater bill because the impervious surface of their property has significantly changed or was calculated incorrectly. Therefore, abatements are available to properties whose fees are calculated based on impervious surface. If the recommended fee structure presented in Section 3 is adopted, abatements would be available for non-residential and residential parcels with four units or more.

In the future, if Tewksbury decides to pursue setting up a credit system, there are regional examples to use as a reference. Some communities offer credits to reduce the stormwater fee paid if the property owner takes specific measures focused on decreasing the amount of stormwater runoff leaving their property and entering the municipal storm drain system. In Massachusetts, fee reductions usually max out at a certain percentage, ranging from 10 to 50%, even if a property owner infiltrates all stormwater runoff generated on site. The reduction percentage awarded can vary based on the type of infiltration/treatment system implemented or the amount of impervious area treated. Everyone ultimately pays at least a portion of the stormwater fee because all property owners use public roadways, which drain to the public stormwater system. Credit systems incentivize the implementation of stormwater best management practices, which help to improve overall water quality.

Some communities have opted out of providing stormwater credits. Credits systems can increase the cost of the administration of the enterprise fund and may decrease revenue generated by up to an estimated 10%. Therefore, credit systems may ultimately lead to higher stormwater fees as communities look to generate additional revenue to offset the amount paid back in credits. Credits systems can also provide negligible payback to property owners because the cost of treating stormwater onsite often outweighs the fee reduction.

If Tewksbury decides to pursue a credit system, property owners should be required to apply for the credit on an annual basis and provide the following:

- A detailed site plan clearly depicting the amount of impervious area on the property.
- A drainage plan depicting all best management practices (BMPs) on site, including the amount of impervious area that each system will infiltrate and/or treat.
- An operation and maintenance plan outlining how BMPs on site will be maintained, including maintenance frequency.
- A certified inspection form from the DPW or another certified engineer.

For BMPs that are constructed after implementation of the stormwater fee, photos should be provided before, during and after construction; and the completed system should be inspected by the Town. In addition to credits for the on-site infiltration and/or treatment of stormwater runoff, some communities also offer fee reductions for elderly and low-income property owners.

5.0 REFERENCES

Campbell, C. Warren. (2018). Western Kentucky University Stormwater Utility Survey. Western Kentucky University, Bowling Green, KY. pp.2
https://www.wku.edu/seas/undergradprogramdescription/swusurvey2018.pdf

APPENDIX A

Five-Year Stormwater Budget Projection FY2020-2024

Stormwater Budget - 5-Year Projection
Tewksbury, MA

Project Type	Project	Project Scope	Estimated Project Cost	Funding Source
		FY2020		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 2 of Permit - FY20**	Includes dry weather outfall screening & sampling, IDDE investigations, removal of illicit discharges, regulatory updates, etc.	$ 277,000	
Culvert	**Vernon at Water Street Drain Design**	Engineering Services	$ 20,000	General Fund
Culvert	**Pringle Street Culvert Design**	Engineering Services	$ 20,000	Sutton Brook Mitigation Fund
Culvert	**Pinnacle Street (Upper) Headwall Replacement Design**	Design of Pinnacle Street culvert replacement	$ 45,000	Sutton Brook Mitigation Fund
Culvert	**Bayberry Lane Culvert Replacement Design**	Engineering Design of replacement for the Bayberry Lane Culverts	$ 130,000	DER Culvert Replacement Grant
Drainage System	**Forest Ave Drainage Improvements - Construction**	Construct improvements to drainage infrastructure	$ 50,000	Chapter 90
Operation & Maintenance	**Catch Basin Cleaning**	Clean catch basins as needed to ensure that no sump is more than 50% full at any given time.	$ 120,000	
Operation & Maintenance	**Street Sweeping**	Sweep all public streets and municipal parking lots annually in the spring. Sweep some streets and parking lots a second time in the fall to meet the impaired waters requirements of the MS4 Permit.	$ 30,000	
Operation & Maintenance	**Inspect & Maintain Municipally-Owned Detention Basins**	Inspect and maintain all detention basins	$ 100,000	General Fund
Operation & Maintenance	**Cleaning & Inspection of Storm Drains & Manholes**	Clean and inspect 15% of storm drains per year (324,000 LF x 0.15 = 48,600 LF) - only assumes light cleaning	$ 145,800	
Operation & Maintenance	**Staffing Needs**	Superintendent Salary - 10% = $9,770 Working Foreman salary - 20% = $15,773.60 Crew Leader salary - 60% = $44,715 SHMEO salary - 60% = $42,412 HMEO salary - 60% = $37,776	$ 150,450	
Operation & Maintenance	**Annual Equipment Allocation**	Purchase of Equipment As Needed for Stormwater Management Operations	$ 60,000	
		FY20 Total Non-Capital Project Costs =	**$ 883,250**	
		FY20 Total Capital Project Costs =	**$ 265,000**	
		FY20 Total All Project Costs =	**$ 1,148,250**	
		FY2021		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 3 of Permit = FY21**	Includes wet weather outfall sampling, IDDE investigations, removal of illicit discharges, regulatory updates, chloride reduction plan development, etc.	$ 313,000	
Drainage System	**Town-Wide Catch Basin and Manhole Adjustment and Repair**	Catch Basins/Drain Manholes to be adjusted and repaired in conjunction with roadway improvements	$ 20,000	Chapter 90

Stormwater Budget - 5-Year Projection
Tewksbury, MA

Project Type	Project	Project Scope	Estimated Project Cost	Funding Source
Drainage System	**Vernon at Water Street Drain Installation**	Construction of storm drain at Vernon at Water Street	$ 150,000	Chapter 90
Culvert	**Bayberry Lane Culvert Replacement Construction**	Construction of replacement for the Bayberry Lane Culverts	$ 450,000	Chapter 90
Drainage System	**Cayuga Street Drainage System Improvements Design**	Design of storm drain system on Cayuga Street	$ 20,000	General Fund
Culvert	**Andover Street at Hood Road Culvert Improvements - Design**	Design culvert improvements	$ 35,000	General Fund
Operation & Maintenance	**Catch Basin Cleaning**	Clean catch basins as needed to ensure that no sump is more than 50% full at any given time.	$ 126,000	
Operation & Maintenance	**Street Sweeping**	Sweep all public streets and municipal parking lots annually in the spring. Sweep some streets and parking lots a second time in the fall to meet the impaired waters requirements of the MS4 Permit.	$ 31,500	
Operation & Maintenance	**Inspect & Maintain Municipally-Owned Detention Basins**	Inspect and maintain all detention basins	$ 100,000	General Fund
Operation & Maintenance	**Cleaning & Inspection of Storm Drains & Manholes**	Clean and inspect 15% of storm drains per year (324,000 LF x 0.15 = 48,600 LF) - only assumes light cleaning	$ 145,800	
Operation & Maintenance	**Staffing Needs**	Superintendent Salary - 10% Working Foreman salary - 20% Crew Leader salary - 60% SHMEO salary - 60% HMEO salary - 60%	$ 157,973	
Operation & Maintenance	**Annual Equipment Allocation**	Purchase of Equipment As Needed for Stormwater Management Operations	$ 63,000	
		FY21 Total Non-Capital Project Costs =	**$ 937,273**	
		FY21 Total Capital Project Costs =	**$ 675,000**	
		FY21 Total All Project Costs =	**$ 1,612,273**	
		FY2022		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 4 of Permit = FY22**	Includes IDDE investigations, removal of illicit discharges, regulatory updates, phosphorus source identification report development, etc.	$ 248,000	
Drainage System	**Town-Wide Catch Basin and Manhole Adjustment and Repair**	Catch Basins/Drain Manholes to be adjusted and repaired in conjunction with roadway improvements	$ 30,000	
Culvert	**Pinnacle Street (Upper) Headwall Replacement Construction**	Construction of Pinnacle Street culvert replacement	$ 405,000	Sutton Brook Mitigation Fund
Drainage System	**Old Boston Road/Main Street Catch Basin Installation**	Install Catch Basins to connect Old Boston Road and Main Street Drainage System	$ 35,000	Chapter 90
Drainage System	**Woburn/Felker Neighborhood Drainage Design**	Design of improvements to Storm Drain System	$ 35,000	General Fund
Operation & Maintenance	**Catch Basin Cleaning**	Clean catch basins as needed to ensure that no sump is more than 50% full at any given time.	$ 132,300	General Fund
Operation & Maintenance	**Street Sweeping**	Sweep all public streets and municipal parking lots annually in the spring. Sweep some streets and parking lots a second time in the fall to meet the impaired waters requirements of the MS4 Permit.	$ 33,075	
Operation & Maintenance	**Inspect & Maintain Municipally-Owned Detention Basins**	Inspect and maintain all detention basins	$ 100,000	General Fund

Stormwater Budget - 5-Year Projection
Tewksbury, MA

Project Type	Project	Project Scope	Estimated Project Cost	Funding Source
Operation & Maintenance	**Cleaning & Inspection of Storm Drains & Manholes**	Clean and inspect 15% of storm drains per year (324,000 LF x 0.15 = 48,600 LF) - only assumes light cleaning	$ 145,800	
Operation & Maintenance	**Staffing Needs**	Superintendent Salary - 10% Working Foreman salary - 20% Crew Leader salary - 60% SHMEO salary - 60% HMEO salary - 60%	$ 165,871	
Operation & Maintenance	**Annual Equipment Allocation**	Purchase of Equipment As Needed for Stormwater Management Operations	$ 66,150	
		FY22 Total Non-Capital Project Costs =	**$ 921,196**	
		FY22 Total Capital Project Costs =	**$ 475,000**	
		FY22 Total All Project Costs =	**$ 1,396,196**	
		FY2023		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 5 of Permit = FY23**	Includes IDDE investigations, removal of illicit discharges, BMP retrofit evaluations, etc.	$ 293,000	
Drainage System	**Town-Wide Catch Basin and Manhole Adjustment and Repair**	Catch Basins/Drain Manholes to be adjusted and repaired in conjunction with roadway improvements	$ 30,000	
Culvert	**Pringle Street Culvert Replacement**	Replacement of culvert at Pringle Street	$ 280,000	Sutton Brook Mitigation Fund
Drainage System	**Cayuga Street Drainage System Improvements - Construction**	Construction of pipe and structure repair to storm drain system on Cayuga Street	$ 400,000	General Fund
Drainage System	**Tewmack Terrace Drainage Design**	Drainage design from Wolcott Street to Arkansas	$ 35,000	General Fund
Operation & Maintenance	**Catch Basin Cleaning**	Clean catch basins as needed to ensure that no sump is more than 50% full at any given time.	$ 138,915	
Operation & Maintenance	**Street Sweeping**	Sweep all public streets and municipal parking lots annually in the spring. Sweep some streets and parking lots a second time in the fall to meet the impaired waters requirements of the MS4 Permit.	$ 34,729	
Operation & Maintenance	**Inspect & Maintain Municipally-Owned Detention Basins**	Inspect and maintain all detention basins	$ 100,000	General Fund
Operation & Maintenance	**Cleaning & Inspection of Storm Drains & Manholes**	Clean and inspect 15% of storm drains per year (324,000 LF x 0.15 = 48,600 LF) - only assumes light cleaning	$ 145,800	
Operation & Maintenance	**Staffing Needs**	Superintendent Salary - 10% Working Foreman salary - 20% Crew Leader salary - 60% SHMEO salary - 60% HMEO salary - 60%	$ 174,165	
Operation & Maintenance	**Annual Equipment Allocation**	Purchase of Equipment As Needed for Stormwater Management Operations	$ 69,458	
		FY23 Total Non-Capital Project Costs =	**$ 986,066**	
		FY23 Total Capital Project Costs =	**$ 715,000**	
		FY23 Total All Project Costs =	**$ 1,701,066**	
		FY2024		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 5 of Permit = FY23**	Includes IDDE investigations, removal of illicit discharges, BMP retrofit evaluations, etc.	$ 345,000	
Drainage System	**Install / Rebuild Woburn Street/Felker Neighborhood Drain**	Drainage system reconstruction	$ 400,000	Chapter 90

Stormwater Budget - 5-Year Projection
Tewksbury, MA

Project Type	Project	Project Scope	Estimated Project Cost	Funding Source
Drainage System	**Tewmack Terrace Drainage Construction**	Drainage construction from Wolcott Street to Arkansas	$ 250,000	Chapter 90
Drainage System	**Marston/Van Buren Drainage Design**	Design improvements at intersection of Marston Street and Van Buren Road	$ 50,000	General Fund
Operation & Maintenance	**Catch Basin Cleaning**	Clean catch basins as needed to ensure that no sump is more than 50% full at any given time.	$ 145,861	
Operation & Maintenance	**Street Sweeping**	Sweep all public streets and municipal parking lots annually in the spring. Sweep some streets and parking lots a second time in the fall to meet the impaired waters requirements of the MS4 Permit.	$ 36,465	
Operation & Maintenance	**Inspect & Maintain Municipally-Owned Detention Basins**	Inspect and maintain 50 detention basins	$ 100,000	General Fund
Operation & Maintenance	**Cleaning & Inspection of Storm Drains & Manholes**	Clean and inspect 15% of storm drains per year (324,000 LF x 0.15 = 48,600 LF) - only assumes light cleaning	$ 145,800	
Operation & Maintenance	**Staffing Needs**	Superintendent Salary - 10% Working Foreman salary - 20% Crew Leader salary - 60% SHMEO salary - 60% HMEO salary - 60%	$ 182,873	
Operation & Maintenance	**Annual Equipment Allocation**	Purchase of Equipment As Needed for Stormwater Management Operations	$ 72,930	
		FY24 Total Non-Capital Project Costs =	**$ 1,028,929**	
		FY24 Total Capital Project Costs =	**$ 700,000**	
		FY24 Total All Project Costs =	**$ 1,728,929**	

Total Funding	**$**	**7,586,714**
Approximate Annual Funding Need	**$**	**1,517,343**

APPENDIX B

MS4 Permit Compliance Cost Tables

MS4 Permit Compliance Cost Table for Full Permit Term

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - ENTIRE PERMIT
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
SECTION 1 - INTRODUCTION				
1.10	Develop written Stormwater Management Plan (SWMP)	1 year from effective date	Develop written plan outlining activities and measures to be implemented to meet the conditions of the permit. The SWMP will be developed in Year 1 and then will need to be updated on an ongoing basis throughout the permit term. Required contents of the SWMP are outlined in Section 1.10.2 of the 2016 Final MA MS4 General Permit.	$10,000 to $15,000
1.10.1	Maintain copy of SWMP, make available to public	1 year from effective date	Make SWMP available to the public at Town Hall and/or on Town website.	-
1.10.2	Update written SWMP	2 years from effective date	Update the SWMP to include those items that are required to be included in the SWMP within two years of the permit effective date as identified in Section 1.10.2.	Selected requirements to be completed as part of initial SWMP preparation under Item 1.10, and costs have already been accounted for under Item 1.10. Costs for other specific items included under Items 2.3.4.5 and 2.3.6.a.ii.
1.10.2	Update written SWMP	4 years from effective date	Update the SWMP to include those items that are required to be included in the SWMP within four years of the permit effective date as identified in Section 1.10.2.	Costs for specific items included under 2.3.6.b.
1.10.2	Update written SWMP	As Necessary	Update the SWMP as needed on an annual basis.	Assume updates to the SWMP after Year 1 will be made in conjunction with preparation of the Town's Annual Report.
SECTION 2 - NON-NUMERIC EFFLUENT LIMITATIONS				
2.1 - Water Quality Based Effluent Limitations				
2.1.1.b	For MS4 discharges to a water body with an approved TMDL identified in Part 2.2.1, comply with Part 2.2.1 and Appendix F of the Permit	see Appendix F of the 2016 Final MA MS4 General Permit	The Bacteria TMDL for the Shawsheen River Basin is applicable to Tewksbury and it includes Strong Water Brook (MA83-07 - fecal coliform), an unnamed tributary to the Shawsheen River/Meadow Brook (MA83-15 - fecal coliform), and the Shawsheen River (MA83-18 - fecal coliform).	Costs included under 1.10 and F.A.III.
2.1.1.c	For MS4 discharges to a water body that is water quality limited and not subject to an approved TMDL or for municipalities located within Part 2.2.2a.-b., comply with Part 2.2.2 and Appendix H of the Permit	see Appendix H of the 2016 Final MA MS4 General Permit	Per Part 2.2.2.b, Tewksbury has been identified as a municipality that discharges to water bodies or is tributary to water bodies that are impaired due to phosphorus, and is therefore subject to the requirements of Appendix H. This includes the Merrimack River (MA84A-03), the Concord River (MA82A-08), and Long Pond (MA83010). Tewksbury also has water bodies that are impaired for bacteria/pathogens (Trull Brook (MA84A-14) and the Merrimack River (MA84A-03)) and chloride (Pinnacle Brook (MA83-15) and an unnamed tributary to the Shawsheen River (MA83-20)) without an approved TMDL.	Costs included under 1.10, H.II, H.III and H.IV.
2.1.1.d	For all other discharges (not subject to the requirements of Part 2.1.1.b and Part 2.1.1.c of the Permit) contributing to a violation of applicable receiving water quality standards, eliminate condition causing or contributing to exceedance of water quality standards	within 60 days of becoming aware of the situation	If a discharge is identified that contributes to an exceedance of applicable water quality standards, eliminate the conditions contributing to or causing the exceedance within 60 days.	Cost included under IDDE under Item 2.3.4.2.a.
2.1.2	Written notification to MADEP & EPA as needed & documentation in the Town's SWMP regarding new or increased stormwater discharges	as needed	Any new or increased stormwater discharges must satisfy MA antidegradation regulations.	-

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - ENTIRE PERMIT
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
2.2 - Discharges to Certain Impaired Waters				
2.2	Identify all outfalls/interconnections that discharge to waters with an approved TMDL or discharge to certain waters identified as "water quality limited water bodies"	SWMP (1 yr) & annual MS4 stormwater reports	Identify all outfalls or interconnections that discharge to water quality limited water bodies.	Cost included under Items 1.10 and 4.4.
IMPAIRED - BACTERIA OR PATHOGENS				
F.A.III.1.a.i.1	Distribute residential message on pet waste management (over/above 2.3.2).	Annually	Develop and disseminate required public education information.	Allocate $10,000 per year to meet all MS4 public education requirements.
F.A.III.1.a.i.1	Disseminate required public education information to dog owners.	At license renewal (or similar)		
F.A.III.1.a.i.1	Send public education materials to septic system owners.	Not specified; assume annually		
F.A.III.1.a.i.2	2.3.4.7 IDDE - Catchments to Bacteria/Pathogen Impaired Waters to be ranked Problem or High	With 2.3.4.7; 1 year from effective date	Rank catchments to bacteria/pathogen impaired waters as Problem or High in catchment ranking to be completed under Item 2.3.4.7.a.ii.	Cost included under 2.3.4.7.a.ii.
IMPAIRED - PHOSPHORUS (INCLUDES TRIBUTARIES)				
H.II.1.a.i.1	Distribute clippings/fertilizer message to required audiences	Annually in March/April	Develop and disseminate required public education information.	Cost included under F.A.III.1.a.i.1.
H.II.1.a.i.1	Distribute pet waste management message to Residential	Annually in June/July		
H.II.1.a.i.1	Distribute leaf litter disposal message to Residential/Business/Commercial	Annually August-October		
H.II.1.a.i.2	2.3.6 Ordinance to require BMPs optimized for Phosphorus removal	With 2.3.6; 2 years from effective date	Include in Town's Stormwater Management Bylaw a requirement that new development and redevelopment stormwater BMPs be optimized for phosphorus removal.	Cost included under 2.3.6.d.
H.II.1.a.i.2	2.3.6.d to include consideration of BMPs that Infiltrate stormwater	With 2.3.6.d; 4 years from effective date	Inventory and priority ranking of Town property and infrastructure that could be retrofitted with BMPs to include consideration of BMPs that infiltrate stormwater.	Cost included under 2.3.6.d.
H.II.1.a.i.3	2.3.7 Grass-clippings procedures & blowing prohibited for MS4 property	With 2.3.7; 2 years from effective date	Develop program to manage grass clippings and leaf litter on permittee owned property.	Cost included under 2.3.7.a.i.
H.II.1.a.i.3	2.3.7 Sweep streets/lots $\geq$2/yr spring & fall	Sweep at least twice/year	Increase frequency of sweeping of public streets and municipal parking lots to a minimum of two times per year in drainage areas tributary to the Merrimack River, the Concord River and Long Pond.	Cost included under 2.3.7.a.iii.3 & 4.
H.II.1.b	Complete Phosphorus Source Identification Report	4 years from effective date; With Year 4 Annual Report	Develop Phosphorus Source Identification Report to include: (1) calculation of total MS4 area draining to the the impaired water or its tributaries (Merrimack River, Concord River and Long Pond), incorporating updated mapping of the MS4 and catchment delineations produced pursuant to Part 2.3.4.6, (2) All screening and monitoring results pursuant to Part 2.3.4.7.d., targeting the receiving water segment(s); (3) Impervious area and DCIA for the target catchment; (4) Identification, delineation and prioritization of potential catchments with high phosphorus loading; and (5) identification of potential retrofit opportunities or opportunities for the installation of structural BMPs during redevelopment, including the removal of impervious area of permittee-owned properties.	$25,000 to $35,000

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H.II.1.c	Complete Retrofit Evaluation, including implementation plan & schedule	5 years from effective date; With Year 5 Annual Report	Evaluate all permittee-owned properties identified as presenting retrofit opportunities or areas for structural BMP installation under Part 2.3.6.d.ii. or identified in the Phosphorus Source Identification Report that are within the drainage area of the impaired waters or their tributaries.	$60,000 to $100,000 for 4 retrofits - Assume that 4 retrofit opportunities are identified - $15,000 to $20,000 per retrofit to perform required field investigations to evaluate suitability for retrofit and to develop preliminary design (cost will vary however depending on the number of properties identified)
H.II.1.c	Plan/install at least one structural BMP demonstration project	6 years from effective date	Plan/install one structural BMP demonstration project.	$100,000 to $200,000 (includes engineering design & construction)
H.II.1.c	Install remaining BMPs	As per plan/schedule in Year 5 Annual Report	Install remaining BMPs in accordance with implementation plan and schedule.	$300,000 to $600,000 Depends on number of permittee owned properties for retrofit opportunity within the drainage area. Assume 3 additional locations. Budget $100,000 to $200,000 per location for design & construction.
H.II.1.c	Track/report BMP installations & estimated Phosphorus removal	Annual Report after installation; not later than Year 6	Document in Annual Report: type of BMP installed, total area treated by BMP, design storage volume of the BMP and estimated amount of phosphorus removed.	Cost included under Item 4.4.
IMPAIRED - BACTERIA OR PATHOGENS				
H.III.2.a.i	Distribute residential message on pet waste management (over/above 2.3.2).	Annually	Develop and disseminate required public education information.	Cost included under H.II.1.a.i.1.
H.III.2.a.i	Disseminate required public education information to dog owners.	At license renewal (or similar)		
H.III.2.a.i	Send public education materials to septic system owners.	Not specified; assume annually		
H.III.2.a.ii	2.3.4.7 IDDE - Catchments to Bacteria/Pathogen Impaired Waters to be ranked Problem or High	With 2.3.4.7; 1 year from effective date	Rank catchments to bacteria/pathogen impaired waters as Problem or High in catchment ranking to be completed under Item 2.3.4.7.a.ii.	Cost included under 2.3.4.7.a.ii.
IMPAIRED - CHLORIDE				
H.IV.3	If discharge found to be to Chloride Impaired Water; update Salt Reduction Plan (SRP)	60 days from awareness	Develop and implement Salt Reduction Plan in catchment areas draining to Pinnacle Brook (MA83-15) and the unnamed tributary to the Shawsheen River (MA83-20) in accordance with the requirements of Appendix H.	Allocate $5,000 to $10,000 per year towards development and implementation of Salt Reduction Plan.
H.IV.3	If discharge to Chloride Impaired Water & no SRP; prepare SRP	3 years from awareness		
H.IV.3	If discharge to Chloride Impaired Water & no SRP; implement SRP	5 years from awareness		
H.IV.4.a.i	Track/report type/amount of salt applied to MS4-owned surfaces	Annual Reports beginning year SRP completed		
H.IV.4.a.ii	Implement required Salt Reduction activities	Not specified; assume ED		
H.IV.4.b.i	Establish regulatory mechanism to prevent runoff from private salt piles	Not specified	Establish ordinance requiring measures to prevent exposure of any salt stockpiles to precipitation and runoff at all commercial and industrial properties.	Cost included under Item 2.3.6.a.ii.
H.IV.4.b.ii	Distribute message to Commercial/Industrial & private applicators on storage/application of deicing materials (over/above 2.3.3)	Annually in Nov/Dec	Supplement commercial/industrial education program with an annual message to private road salt applicators, and commercial and industrial site owners on the proper storage and application rates of winter deicing material.	Cost included under H.II.1.a.i.1.
H.IV.4.b.iii	2.3.6 Establish procedures/requirements to minimize salt usage/require salt alternatives with new- & re-development	With 2.3.6; 2 years from ED	Establish procedures and requirements to minimize salt usage and require the use of salt alternatives.	Cost included under Item 2.3.6.a.ii.
H.IV.4.c	Submit SRP to EPA	Annual Report after completion	Include Salt Reduction Plan in Annual Report	Cost included under Item 4.4.

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2.3 - Requirements to Reduce Pollutants to the Maximum Extent Practicable (MEP)				
PUBLIC EDUCATION & OUTREACH				
2.3.2.a-d	Distribute at least 2 educational messages to each of 4 targeted audiences (residents, businesses/commercial/institutional, developers and industrial). Different messages to the same targeted audience shall be distributed at least one year apart.	begin year 1; continue throughout permit term	Develop/distribute a minumum of 8 messages over the permit term. Educational messages can include brochures, newsletters, information posted to the Town's website, newspaper articles, public service announcements, displays in municipal buildings, etc.	Cost included under F.A.III.1.a.i.1.
2.3.2.e	Identify method to evaluate effectiveness of message; implement	not stated	Determine method to evaluate message effectiveness; implement method.	
2.3.2.f	Modify ineffective messages/methods	before next message distribution	Modify message or distribution methods if applicable.	
2.3.2.g	Report on messages as per permit	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
PUBLIC INVOLVEMENT & PARTICIPATION				
2.3.3.a	Meet Public Notice requirements	continuous	Ensure that all public involvement activities comply with state public notice requirements.	-
2.3.3.a	Make Stormwater Management Plan & Annual MS4 Stormwater Report available to public	continuous	Make SWMP and annual MS4 stormwater reports available to public at Town Hall and/or on the Town's website.	-
2.3.3.b	Public opportunity to participate in the review/implementation of the Stormwater Management Program	annually	May be implemented through the use of Town website, Town hotline, clean-up teams, monitoring teams, or a stormwater advisory committee.	Town to satisfy public participation requirements using Town Forces.
2.3.3.c	Report on public participation opportunities	annually	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
ILLICIT DISCHARGE DETECTION & ELIMINATON				
2.3.4.a	Adopt regulatory mechanism providing legal authority to prohibit/investigate/eliminate illicit discharges	Should have been completed under 2003 permit.	Chapter 20 of the Town's General Bylaws regulates discharges to the municipal storm drain system.	-
2.3.4.2.a	Eliminate illicit discharges	60 days from detection or as expeditiously as possible	Eliminate illicit discharges as they are identified or establish a schedule for elimination for discharges that cannot be removed within 60 days.	Budget $10,000 to $15,000 per year starting in Year 2 and going through Year 10 (time period over which IDDE investigations will occur) as an allowance for removal of illicit connections.
2.3.4.2.a	Report dates of illicit identification and schedules for removal	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.4.a	Mitigate SSOs	Expeditiously as possible	Eliminate SSOs as expeditiously as possible and take interim mitigation measures to minimize the discharge of pollutants to and from the Town until elimination is completed.	-
2.3.4.4.b	Complete Inventory of Sanitary Sewer Overflows (SSOs)	1 year from effective date	Identify all known locations where SSOs have discharged within the previous five years.	Town Forces
2.3.4.4.c	Report SSOs	24 hours of awareness	Provide verbal notice to EPA within 24 hours, and written notice to EPA and MADEP within 5 days.	Town Forces
2.3.4.4.d	Update SSO inventory	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.5.a	Map the MS4 features required in 2.3.4.5.a under Phase 1 including outfalls and receiving waters, open channel conveyances, interconnections, municipally-owned stormwater treatment structures, water bodies and use impairments, and initial catchment delineations.	1 & 2 years from effective date	The Town has an existing drainage GIS. The Town has mapped all their outfalls (unique identifiers have been added to all outfalls in GIS) and receiving waters, as well as a majority of their pipes, catch basins, and manholes. Anticipated mapping additions include: additional infrastructure where drainage is missing, interconnections with other MS4s, municipally-owned stormwater treatment structures, drainage channels, updated/new drainage from new developments and re-developments, and use impairments for water bodies on the 303(d) list.	$5,000 - $10,000

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2.3.4.5.b	Map the MS4 features required in 2.3.4.6.b under Phase 2 including outfall spatial location, pipes, manholes, catch basins, refined catchment delineations, and the municipal sanitary system (if available) and the municipal combined sewer system (if applicable).	Annually during catchment investigation procedures; Within 10 years from permit effective date	The Town has mapped a majority of their drainage system. Anticipated mapping additions include: refined catchment delineations, updated/new drainage from new developments and re-developments, and drainage updates based on IDDE investigations. The municipal sanitary sewer system has also already been mapped and will be added.	Assume $5,000 per year for additional mapping beginning in Year 2 and going through to Year 10.
2.3.4.5.e	Report on mapping progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.6	Develop written IDDE program (include responsibility statement, written procedure for outfall/interconnection screening and sampling per Item 2.3.4.7.b.i., written procedure for IDDE investigation)	1 year from effective date	Develop a written IDDE Program to meet the conditions of the permit.	$5,000 - $7,500
2.3.4.7.a.i	Develop outfall & interconnection inventory based on existing information	1 year from effective date	This requirement includes identifying each outfall and interconnection, recording its location and condition, and providing a framework for tracking inspections, screenings and other activities. The Town has approximately 637 outfalls and interconnections, which have all been located.	Assume any additional effort would be completed in conjunction with the illicit discharge potential assessment and priority ranking included under Item 2.3.4.7.a.ii & iii.
2.3.4.7.a.ii. & iii.	Complete initial illicit discharge potential assessment and priority ranking based on existing information	1 year from effective date	Assess and rank all catchments for the potential to have illicit discharges and/or SSOs. Develop matrix to rank each outfall catchment area. Priority rank catchments based on where certain risk factors may be present as provided in the permit under Item 2.3.4.7.a.iii. The Town has approximately 637 outfalls. However, not all outfalls are regulated under the permit. It is estimated that approximately 400 outfalls and interconnections would be regulated under the permit because they discharge to a water of the US.	$10,000 - $15,000
2.3.4.7.a	Report on list of catchments and results of rankings & update annually	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.7.b	Dry-weather outfall/interconnection screening & sampling (except Excluded & Problem Catchments)	3 years from effective date	Complete dry weather screening & sampling of every MS4 outfall and interconnection. Dry weather sampling parameters shall include, at a minimum, ammonia, chlorine, conductivity, E.coli, surfactants and temperature. Phosphorus and chloride will also need to be included at some outfalls to meet the requirements for impaired waters. All can be performed with test kits with the exception of chloride, bacteria and phosphorus; however, the cost provided assumes lab analysis for ammonia, E.coli, surfactants and phosphorus, and test kits for temperature and chlorine. The Town has approximately 400 regulated outfalls and interconnections. For budgeting purposes, it is assumed that all outfalls/interconnections would be visited once and 10% of all outfalls + interconnections will have dry weather flow in need of sampling (40 outfalls/interconnections). Outfalls/interconnections with evidence of contamination, but without active dry weather flow would need to be revisited. Assume that 5% of all outfalls + interconnections (20 outfalls/interconnections) would need to be revisited and that 50% (10 outfalls/interconnections) would have dry weather flow. The Town also may be able to receive credit for dry weather screening completed under the 2003 permit as long as it meets the conditions of Part 2.3.4.7.b of the permit. The Town completed dry weather screening of all outfalls in 2010, and found that 51 had dry weather flow, which was sampled.	$50,000 to $60,000 (The Town also may be able to receive credit for dry weather screening and sampling completed under the 2003 permit as long as it meets the conditions of Part 2.3.4.7 of the permit, which would reduce costs.)

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2.3.4.7.c.iii	Follow-up ranking of outfalls and interconnections	3 years from effective date	Update ranking as dry weather screening information becomes available	Allocate $2,500 to $5,000 to complete updated ranking in Year 3 based on dry weather sampling results.
2.3.4.8.a-b	Develop a written catchment investigation procedure per 2.3.4.8.	18 months from effective date	Develop written catchment investigation procedures in accordance with requirements of 2.3.4.8.b and incorporate into written IDDE Plan.	Cost included under 2.3.4.6 as part of IDDE Program development.
2.3.4.8.a	Begin investigation of catchments associated with Problem Outfalls	no later than 2 years from effective date	Implement Illicit Discharge Detection and Elimination Investigations as required by the conditions of the permit. For budgeting purposes, it is assumed that an Illicit Discharge Detection and Elimination Investigation Program will need to be implemented in all catchments. Catchments with no potential for illicit discharges (based on the catchment ranking exercise completed under Task 2.3.4.7.c.) can be excluded from the IDDE Program.	Budget $100,000 to $125,000/yr allowance in Years 2 to 10 for IDDE investigation, sampling & reporting. Budget includes $25,000/yr allowance in Years 2 to 10 for CCTV inspection and dye testing to investigate illicit connections. Budget allowance for removal of illicit connections included under 2.3.4.2.a.
2.3.4.8.a	Begin investigation of catchments associated with High and Low Priority Outfalls	After completion of outfall ranking - latest allowable timeframe is 3 years from effective date		
2.3.4.8.a	Complete Investigation of catchments associated with Problem Outfalls	7 years from effective date		
2.3.4.8.a	Complete Investigations of catchments where info on outfall/interconnection identifies sewer input	7 years from effective date		
2.3.4.8.a	Complete Investigations of catchments associated with all Problem, High- and Low-Priority outfalls	10 years from effective date		
2.3.4.8.c.i	Document the presence or absence of system vulnerability factors	Annual Report	Document the presence or absence of system vulnerability factors for each catchment.	To be completed as part of Item 2.3.4.7.a.ii. and iii, and reported in Annual Report (4).
2.3.4.8.c.ii.2	Wet weather sampling	Upon completion of any dry weather investigation	Wet weather sampling must be completed at all outfalls where the catchment has a minimum of one (1) System Vulnerability Factor. Assume that 100% of all regulated outfalls/interconnections have at least one System Vulnerability Factor in its catchment, which triggers the requirement for wet-weather sampling. For this reason, the budget estimate assumes that 100% of the approximately 400 regulated outfalls/interconnections will require wet-weather sampling. Wet weather sampling parameters shall include, at a minimum, ammonia, chlorine, conductivity, salinity, E.coli, surfactants and temperature. For outfalls that discharge to receiving waters with impairments for phosphorus and chloride, samples collected will have to be analyzed for these parameters as well. (Budget assumes lab analysis for most sampling parameters.)	Budget $100,000 - $125,000 for wet weather sampling.
2.3.4.8.c.iii	Report on all data collected as part of the catchment investigations	annual MS4 stormwater reports	Report data in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.8.e.i	Report on each illicit discharge identified and date of removal	annual MS4 stormwater reports	For each confirmed source, the following information shall be included: location of discharge and source; description of discharge; method of discovery; date of discovery; date of elimination, mitigation or enforcement action or planned corrective measures; and estimate of the volume of flow removed.	Cost included under Item 4.4.
2.3.4.8.e.ii	Conduct confirmatory outfall or interconnection screening	1 year from removal of discharges	If confirmatory screening indicates evidence of illicit discharge, the catchment shall be scheduled for additional investigation.	Cost is dependent on the number of illicit discharges identified.
2.3.4.9	Evaluate & report IDDE program progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.10	Reprioritize catchments and schedule ongoing dry weather and wet weather (where system vulnerability factors are present) screening and sampling once all catchments have been investigated and all illicit discharges have been removed	Once every 5 years	Ongoing dry weather and wet weather (where system vulnerability factors are present) screening and sampling shall be completed every 5 years once all catchments have been investigated and all illicit discharges have been removed.	Catchment investigation work will not be complete until Year 10 so this work will not occur until at least Year 15.
2.3.4.11	Conduct IDDE employee training	at least annually	Train employees about the IDDE Program including how to recognize illicit discharges and SSOs.	Budget $25,000 to $30,000 to prepare training materials and complete required training.

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2.3.4.11	Report on IDDE employee training	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
CONSTRUCTION SITE STORMWATER RUNOFF CONTROL				
2.3.5	Implement & enforce Construction Site Stormwater Runoff Control (CSSRC) Program	not stated	Continue to implement and enforce a program to reduce pollutants in stormwater runoff from construction activities per the 2003 Permit.	-
2.3.5.c.i	Adopt regulatory mechanism requiring use of sediment/erosion control at construction sites	Should have been completed under 2003 permit.	Chapter 19 of the Town's General Bylaws governs stormwater management and erosion control during construction.	-
2.3.5.c.ii	Develop written procedures for site inspections and enforcement of sediment and erosion control measures. The procedures shall clearly define who is responsible for site inspections as well as who has authority to implement enforcement procedures. The program shall provide that the permittee may, to the extent authorized by law, impose sanctions to ensure compliance with the local program.	1 year from effective date	Sections 19.100 and 19.110 of the Town's General Bylaws outline construction site inspection procedures, and enforcement. Town to review existing site inspection and enforcement procedures to ensure full compliance with the permit conditions, and update as needed.	Budget $5,000 to $7,500 to review construction site stormwater runoff control regulatory mechanisms, modify the regulations for compliance & develop/update written procedures as needed.
2.3.5.c.iii	Require developers to implement a sediment and erosion control program that includes BMPs appropriate for the conditions at the construction site.	not stated	Continue to require construction operators to implement a sediment and erosion control plan as defined in Section 19.120 of the the Town's General Bylaws governing Stormwater Management and Erosion Control. Review existing erosion and sediment control requirements to ensure BMPs are appropriate for site conditions. Update existing bylaw as needed to meet permit requirements.	Cost included under Item 2.3.5.c.ii.
2.3.5.c.iv	Include requirements for waste control, including but not limited to, discarded building materials, concrete truck wash out, chemicals, litter, and sanitary wastes, in the CSSRC ordinance.	not stated	Amend Chapter 19 of the Town's General Bylaws to include specific requirements related to the control of wastes at construction sites including discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste.	Cost included under Item 2.3.5.c.ii.
2.3.5.c.v	Develop written site plan review procedures. Site plan review shall include a review by the permittee of the site design, the planned operations at the construction site, planned BMPs during the construction phase, and the planned BMPs to be used to manage runoff created after development. The review procedure shall incorporate procedures for the consideration of potential water quality impacts; procedures for pre-construction review; and procedures for receipt and consideration of information submitted by the public. Site plan review procedure shall include evaluation of opportunities for use of low impact design and green infrastructure. When the opportunity exists, the permittee shall encourage project proponents to incorporate these practices into the site design. The permittee shall track the number of site reviews, inspections, and enforcement actions.	1 year from effective date	Develop and implement written site plan review procedures.	Cost included under Item 2.3.5.c.ii.
POST-CONSTRUCTION STORMWATER MANAGEMENT				
2.3.6.a	Implement & enforce SW management for New Development/Redevelopment	not stated	Continue to implement and enforce a program to address post-construction stormwater runoff from new development and redevelopment projects per the 2003 Permit.	-
2.3.6.a	Adopt regulatory mechanism that regulates runoff from new development/redevelopment	Should have been completed under 2003 permit.	Chapter 19 of the Town's General Bylaws governs post-construction stormwater management.	-
2.3.6.a.ii	Amend existing regulatory mechanism to contain provisions at least as stringent as those outlined under Part 2.3.6.a.ii.	2 years from effective date	Section 19.120 of the Town's General Bylaws currently requires compliance with the Massachusetts Stormwater Management Standards, and include retention and treatment requirements for post-construction stormwater controls. Review existing regulatory requirements and update as needed to ensure full compliance with permit conditions.	Budget $5,000 to $7,500 to review post-construction stormwater management regulatory mechanisms, modify the regulations for compliance & develop/update written procedures as needed.

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2.3.6.a.iii	Develop procedures for Post Construction Stormwater Management to ensure submission of as-built plans within two (2) years from completed construction, and long-term O&M of BMPs; include in written SWMP.	2 years from effective date	Section 19.030 of the Town's General Bylaws currently requires the submission of a post-construction O&M Plan. Review existing requirements and update as need to meet permit requirements. Update Section 19.050 Part L of the Town's general bylaws to require submission of as-builts within two years of completion of construction.	Cost included under Item 2.3.6.a.ii.
2.3.6.a.iii	Report on measures to comply with 2.3.6.a.iii in annual MS4 stormwater report	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.6.b	Develop a report assessing street/parking design related to creation of impervious cover	Report progress annually; complete 4 years from effective date	Develop a report assessing current street design and parking lot guidelines and other local requirements impacting the creation of impervious cover. Determine whether design standards can be modified to support low impact design. If modifications can be made, outline recommendations and proposed schedule for modifying applicable standards.	$5,000 - $10,000
2.3.6.c	Develop a report assessing local regulations to allow the listed green practices	Report progress annually; complete 4 years from effective date	Develop a report assessing existing local regulations to determine the feasibility of making green infrastructure practices (green roofs, infiltration practices, water harvesting devices) allowable when appropriate site conditions exist.	$5,000 - $10,000
2.3.6.d	Identify a minimum of 5 permittee-owned properties for BMP retrofits & priority rank based on factors listed in 2.3.6.d	4 years from effective date	Complete an inventory and priority ranking of Town property and infrastructure that could be retrofitted with BMPs to reduce frequency, volume and pollutant loads associated with stormwater discharges.	$2,500 to $5,000
2.3.6.d	Identify additional sites and infrastructure that could be retrofitted to maintain a minimun of 5 sites in the inventory; Report progress on implementation of BMP retrofits in Annual Report	annual MS4 stormwater reports beginning Year 5	Report progress in Annual MS4 Stormwater Report.	$2,500 to $5,000
GOOD HOUSEKEEPING & POLLUTION PREVENTION FOR PERMITEE-OWNED OPERATIONS				
2.3.7.a.i & ii	Develop written operation & maintenance procedures for municipal activities.	2 years from effective date	Update existing written operation & maintenance procedures for parks and open space, buildings and facilities where pollutants are exposed to stormwater runoff, as well as vehicles and equipment.	$2,500 - $3,500
2.3.7.a.ii	Complete inventory of listed municipal facilities	2 years from effective date; review/update annually	Develop inventory of all municipal facilities; Review inventory annually and update as necessary.	Town Forces
2.3.7.a.ii.2	Provide training on use, storage, & disposal of petroleum products to applicable staff as necessary	not stated	Provide training on use, storage, & disposal of petroleum products to applicable municipal staff as necessary.	Cost included under Item 2.3.4.11
2.3.7.a.iii.1	Written program detailing activities/procedures the MS4 will implement to ensure infrastructure is maintained in timely manner	2 years from effective date	Update existing and create new written O&M procedures as needed to include all requirements contained in 2.3.7.a.ii for parks and open spaces, buildings and facilities, and vehicles and equipment.	Cost included under 2.3.7.a.i. (Since the Town already has written procedures in place, it is assumed that only minimal updates will be needed to meet the conditions of the permit.)
2.3.7.a.iii.2	Develop & implement a plan to optimize catch basin cleaning & include in written SWMP	2 years from effective date	Develop and implement a plan to optimize inspection, cleaning, and maintenance of catch basins to ensure that permit conditions are met.	$2,500 to $5,000

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2.3.7.a.iii.2	Implement routine inspection/cleaning/maintenance of catch basins to ensure sumps <50% full; report on activities as specified; investigate excessive sediment; log/report CB cleaning	continuous; annual MS4 stormwater reports	Clean catch basins as needed to ensure that no sump is more than 50% full at any given time. The Town has approximately 3,300 catch basins town-wide. In PY15, only 15% of catch basins were cleaned due to budget constraints. The Town anticipates that 50% of catch basins will need to be cleaned each year to meet permit requirements.	The Town anticipates spending $50,000 to $60,000 annually for catch basin cleaning to meet MS4 Permit requirements. These costs are not included in the MS4 Budget, and instead are included as part of separate O&M cost under the stormwater budget. Once the catch basin optimization plan is complete, additional funding may need to be allocated to increase catch basin cleaning frequency to meet permit requirements. The Town has been collecting data over the last 3 years to build their optimization plan.
2.3.7.a.iii.3 & 4.	Sweep streets/parking lots 1x/year in spring; report on efforts	annually; annual MS4 stormwater reports	The Town currently sweeps all public streets and municipal parking lots annually in the spring. Some streets and parking lots must be swept twice per year to meet the impaired waters requirements included under Appendix H. Part II.1.a.i.3.	The Town currently contracts out some of their street sweeping and does remaining sweeping in-house. They currently spend $12,000 per year. These costs are not included in the MS4 Budget, and instead are included as part of separate O&M cost under the stormwater budget. The Town will need to adjust street sweeping frequency so that streets located within catchments of phosphorous impaired waters are swept twice per year.
2.3.7.a.iii.4	Ensure proper storage of CB cleanings & street sweeping to prevent runoff	NA	Examine storage of CB cleanings & street sweepings	Cost included under 2.3.7.a.i.
2.3.7.a.iii.5	Establish procedures for winter road maintenance	not stated	Look at storage and usage of salt and sand; evaluate opportunities for use of alternative deicers.	Cost included under 2.3.7.a.i.
2.3.7.a.iii.6	Establish/implement procedures to inspect/maintain storm drains & structural BMPs; and for annual inspection of treatment structures	not stated	Establish/implement procedures to inspect/maintain storm drains & structural BMPs; inspect treatment structures annually at a minimum.	Cost to develop procedures included under 2.3.7.a.i.; Costs for maintenance calculated as part of separate O&M cost under stormwater budget.
2.3.7.a.iv	Report on all Good Housekeeping/Pollution Prevention requirements	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.7.a.v	Keep written record of all Good Housekeeping/Pollution Prevention activities under 2.3.7.a	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
2.3.7.b	Develop/implement written Stormwater Pollution Prevention Plans for required facilities as per permit to include the items under 2.3.7.b.ii	2 years from effective date	Update, as needed, and implement SWPPPs developed for the DPW Facility at 999 Whipple Road, and the Water Treatment Plant at 71 Merrimac Drive, as well as any other municipal waste handling facilities.	Budget $2,500 to $3,500 to revisit and update SWPPPs as needed.
2.3.7.b.ii & iii	Perform SWPPP required actions/inspections/training	frequencies as per permit	Perform quarterly inspections at the DPW Facility and the Water Treatment Plant, and conduct annual employee training on SWPPPs developed for each facility.	Assume Town staff will perform quarterly inspections. Costs for employee training included under Item 2.3.4.11.
2.3.7.b.iii	Report on Stormwater Pollution Prevention Plan inspections	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.7.b.iv	Maintain written records for all SWPPP related items under 2.3.7.b	continuous	Keep written record of all maintenance activities, inspections and training completed.	-

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - ENTIRE PERMIT
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
SECTION 3 - ADDITIONAL REQUIREMENTS FOR DISCHARGES TO SURFACE DRINKING WATER SUPPLIES AND THEIR TRIBUTARIES				
3.0.a	Make MS4 discharges to surface drinking water supply sources & their tributaries a priority in the SWMP	continuous; report annually	The Town's MS4 discharges to the Merrimack River, which is a surface drinking water supply source in Tewksbury. The Town's MS4 also discharges to the Concord River, which is tributary to a section of the Merrimack River, which is a surface drinking water supply source. The Shawsheen River appears to discharge just downstream of the section of the Merrimiack River that is a water supply source.	As part of the IDDE Investigations, the Town will designate catchments tributary to surface drinking water supply sources as high priority.
3.0.b	Provide pretreatment/spill control for MS4 discharges to public surface drinking water supply sources & their tributaries to the extent feasible	continuous; report annually	The Town's MS4 discharges to the Merrimack River, which is a surface drinking water supply source in Tewksbury. The Town's MS4 also discharges to the Concord River, which is tributary to a section of the Merrimack River, which is a surface drinking water supply source. The Shawsheen River appears to discharge just downstream of the section of the Merrimiack River that is a water supply source.	Allocate $5,000 to $10,000 per year to investigate source protection needs and for potential implementation of BMPs. Both water bodies are impaired for phosphorus so there will be additional potential BMP retrofits installed in these areas as part of the Phosphorus Source Identification Report.
3.0.c	Avoid direct discharges to Class A waters	continuous; report annually	There are no Class A Waters located in Tewksbury.	-
SECTION 4 - PROGRAM EVALUATION, RECORDKEEPING & REPORTING				
4.1.a	Self-evaluate compliance with the permit; include documentation of evaluation in written SWMP	annually	Annually evaluate Town's compliance with permit conditions.	Cost included under Item 4.4.
4.1.b	Evaluate BMP effectiveness & change if needed under provisions of permit	not stated	Evaluate BMP effectiveness in achieving permit objectives & modify BMPs accordingly as needed.	Cost included under Item 4.4.
4.1.b	Report BMP modifications	annual MS4 stormwater reports	Include in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
4.2	MS4 must keep records for ≥5yrs; make available to public	Continuous	Maintain annual MS4 stormwater reports and make available to the public.	-
4.3	Document results of MS4 outfall screening/sampling & any other monitoring/studies	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
4.4	Submit Annual MS4 Stormwater Report	annually 90 days from effective date	Prepare Annual MS4 Stormwater Report.	$5,000 - $7,500/yr (It is anticipated that first year annual costs will be higher than subsequent years.)

Requirements specific to discharges to waters with approved TMDLs (see Appendix F)
Requirements specific to discharges to impaired waters without an approved TMDL (Appendix H)

Planning Level Estimate for Permit Compliance: **$1,885,000 to $2,752,000**

Notes
(1) The permit has a 5-year term, and most permit requirements will be implemented within that timeframe. However, there are certain requirements that the Town will have a longer period of time to implement. These include the planning and installation of structural BMPs for phosphorus removal (Item H.II.1.c). The first BMP retrofit must be constructed in Year 6. The Town is able to establish implementation timeframes for the remaining BMP retrofits. For the purpose of estimating costs, it was assumed that the Town would construct three additional retrofits in Permit Years 7, 8, and 9. The Town also has 10 years to complete IDDE investigations in catchments identified as Problem, High and Low Priority (Item 2.3.4.8.a), and those costs were allocated equally among Permit Years 2 through 10.

Planning Level Estimate for Year 1:	**$62,500 to $96,000**
Planning Level Estimate for Year 2:	**$212,500 to $277,000**
Planning Level Estimate for Year 3:	**$245,000 to $313,000**
Planning Level Estimate for Year 4:	**$182,500 to $248,000**
Planning Level Estimate for Year 5:	**$207,500 to $293,000**
Planning Level Estimate for Year 6:	**$215,000 to $345,000**
Planning Level Estimate for Year 7:	**$215,000 to $345,000**
Planning Level Estimate for Year 8:	**$215,000 to $345,000**
Planning Level Estimate for Year 9:	**$215,000 to $345,000**
Planning Level Estimate for Year 10:	**$115,000 to $145,000**

Year 2 MS4 Permit Compliance Cost Table

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 2 PERMIT REQUIREMENTS (JULY 1, 2019 to JUNE 30, 2020)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
SECTION 1 - INTRODUCTION				
1.10.2	Update written SWMP	2 years from effective date	Update the SWMP to include those items that are required to be included in the SWMP within two years of the permit effective date as identified in Section 1.10.2.	Selected requirements to be completed as part of initial SWMP preparation under Item 1.10, and costs have already been accounted for under Item 1.10. Costs for other specific items included under Items 2.3.4.5 and 2.3.6.a.ii.
SECTION 2 - NON-NUMERIC EFFLUENT LIMITATIONS				
2.1 - Water Quality Based Effluent Limitations				
2.1.1.b	For MS4 discharges to a water body with an approved TMDL identified in Part 2.2.1, comply with Part 2.2.1 and Appendix F of the Permit	see Appendix F of the 2016 Final MA MS4 General Permit	The Bacteria TMDL for the Shawsheen River Basin is applicable to Tewksbury and it includes Strong Water Brook (MA83-07 - fecal coliform), an unnamed tributary to the Shawsheen River/Meadow Brook (MA83-15 - fecal coliform), and the Shawsheen River (MA83-18 - fecal coliform).	Costs included under 1.10 and F.A.III.
2.1.1.c	For MS4 discharges to a water body that is water quality limited and not subject to an approved TMDL or for municipalities located within Part 2.2.2a.-b., comply with Part 2.2.2 and Appendix H of the Permit	see Appendix H of the 2016 Final MA MS4 General Permit	Per Part 2.2.2.b, Tewksbury has been identified as a municipality that discharges to water bodies or is tributary to water bodies that are impaired due to phosphorus, and is therefore subject to the requirements of Appendix H. This includes the Merrimack River (MA84A-03), the Concord River (MA82A-08), and Long Pond (MA83010). Tewksbury also has water bodies that are impaired for bacteria/pathogens (Trull Brook (MA84A-14) and the Merrimack River (MA84A-03)) and chloride (Pinnacle Brook (MA83-15) and an unnamed tributary to the Shawsheen River (MA83-20)) without an approved TMDL.	Costs included under 1.10, H.II, H.III and H.IV.
2.1.1.d	For all other discharges (not subject to the requirements of Part 2.1.1.b and Part 2.1.1.c of the Permit) contributing to a violation of applicable receiving water quality standards, eliminate condition causing or contributing to exceedance of water quality standards	within 60 days of becoming aware of the situation	If a discharge is identified that contributes to an exceedance of applicable water quality standards, eliminate the conditions contributing to or causing the exceedance within 60 days.	Cost included under IDDE under Item 2.3.4.2.a.
2.1.2	Written notification to MADEP & EPA as needed & documentation in the Town's SWMP regarding new or increased stormwater discharges	as needed	Any new or increased stormwater discharges must satisfy MA antidegradation regulations.	-
2.2 - Discharges to Certain Impaired Waters				
2.2	Identify all outfalls/interconnections that discharge to waters with an approved TMDL or discharge to certain waters identified as "water quality limited water bodies"	SWMP (1 yr) & annual MS4 stormwater reports	Identify all outfalls or interconnections that discharge to water quality limited water bodies.	Cost included under Items 1.10 and 4.4.
IMPAIRED - BACTERIA OR PATHOGENS				
F.A.III.1.a.i.1	Distribute residential message on pet waste management (over/above 2.3.2).	Annually	Develop and disseminate required public education information.	Allocate $10,000 per year to meet all MS4 public education requirements.
F.A.III.1.a.i.1	Disseminate required public education information to dog owners.	At license renewal (or similar)		
F.A.III.1.a.i.1	Send public education materials to septic system owners.	Not specified; assume annually		
F.A.III.1.a.i.2	2.3.4.7 IDDE - Catchments to Bacteria/Pathogen Impaired Waters to be ranked Problem or High	With 2.3.4.7; 1 year from effective date	Rank catchments to bacteria/pathogen impaired waters as Problem or High in catchment ranking to be completed under Item 2.3.4.7.a.ii.	Cost included under 2.3.4.7.a.ii.
IMPAIRED - PHOSPHORUS (INCLUDES TRIBUTARIES)				
H.II.1.a.i.1	Distribute clippings/fertilizer message to required audiences	Annually in March/April	Develop and disseminate required public education information.	Cost included under F.A.III.1.a.i.1.
H.II.1.a.i.1	Distribute pet waste management message to Residential	Annually in June/July		
H.II.1.a.i.1	Distribute leaf litter disposal message to Residential/Business/Commercial	Annually August-October		

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 2 PERMIT REQUIREMENTS (JULY 1, 2019 to JUNE 30, 2020)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
H.II.1.a.i.2	2.3.6 Ordinance to require BMPs optimized for Phosphorus removal	With 2.3.6; 2 years from effective date	Include in Town's Stormwater Management Bylaw a requirement that new development and redevelopment stormwater BMPs be optimized for phosphorus removal.	Cost included under 2.3.6.d.
H.II.1.a.i.3	2.3.7 Grass-clippings procedures & blowing prohibited for MS4 property	With 2.3.7; 2 years from effective date	Develop program to manage grass clippings and leaf litter on permittee owned property.	Cost included under 2.3.7.a.i.
H.II.1.a.i.3	2.3.7 Sweep streets/lots ≥2/yr spring & fall	Sweep at least twice/year	Increase frequency of sweeping of public streets and municipal parking lots to a minimum of two times per year in drainage areas tributary to the Merrimack River, the Concord River and Long Pond.	Cost included under 2.3.7.a.iii.3 & 4.
IMPAIRED - BACTERIA OR PATHOGENS				
H.III.2.a.i	Distribute residential message on pet waste management (over/above 2.3.2).	Annually	Develop and disseminate required public education information.	Cost included under F.A.III.1.a.i.1.
H.III.2.a.i	Disseminate required public education information to dog owners.	At license renewal (or similar)		
H.III.2.a.i	Send public education materials to septic system owners.	Not specified; assume annually		
IMPAIRED - CHLORIDE				
H.IV.3	If discharge found to be to Chloride Impaired Water; update Salt Reduction Plan (SRP)	60 days from awareness	Develop and implement Salt Reduction Plan in catchment areas draining to Pinnacle Brook (MA83-15) and the unnamed tributary to the Shawsheen River (MA83-20) in accordance with the requirements of Appendix H.	Allocate $5,000 to $10,000 per year towards development and implementation of Salt Reduction Plan.
H.IV.3	If discharge to Chloride Impaired Water & no SRP; prepare SRP	3 years from awareness		
H.IV.3	If discharge to Chloride Impaired Water & no SRP; implement SRP	5 years from awareness		
H.IV.4.a.i	Track/report type/amount of salt applied to MS4-owned surfaces	Annual Reports beginning year SRP completed		
H.IV.4.a.ii	Implement required Salt Reduction activities	Not specified; assume ED		
H.IV.4.b.i	Establish regulatory mechanism to prevent runoff from private salt piles	Not specified	Establish ordinance requiring measures to prevent exposure of any salt stockpiles to precipitation and runoff at all commercial and industrial properties.	Cost included under Item 2.3.6.a.ii.
H.IV.4.b.ii	Distribute message to Commercial/Industrial & private applicators on storage/application of deicing materials (over/above 2.3.3)	Annually in Nov/Dec	Supplement commercial/industrial education program with an annual message to private road salt applicators, and commercial and industrial site owners on the proper storage and application rates of winter deicing material.	Cost included under F.A.III.1.a.i.1.
H.IV.4.b.iii	2.3.6 Establish procedures/requirements to minimize salt usage/require salt alternatives with new- & re-development	With 2.3.6; 2 years from ED	Establish procedures and requirements to minimize salt usage and require the use of salt alternatives.	Cost included under Item 2.3.6.a.ii.
H.IV.4.c	Submit SRP to EPA	Annual Report after completion	Include Salt Reduction Plan in Annual Report	Cost included under Item 4.4.
2.3 - Requirements to Reduce Pollutants to the Maximum Extent Practicable (MEP)				
PUBLIC EDUCATION & OUTREACH				
2.3.2.a-d	Distribute at least 2 educational messages to each of 4 targeted audiences (residents, businesses/commercial/institutional, developers and industrial). Different messages to the same targeted audience shall be distributed at least one year apart.	begin year 1; continue throughout permit term	Develop/distribute a minumum of 8 messages over the permit term. Educational messages can include brochures, newsletters, information posted to the Town's website, newspaper articles, public service announcements, displays in municipal buildings, etc.	Cost included under F.A.III.1.a.i.1.
2.3.2.e	Identify method to evaluate effectiveness of message; implement	not stated	Determine method to evaluate message effectiveness; implement method.	
2.3.2.f	Modify ineffective messages/methods	before next message distribution	Modify message or distribution methods if applicable.	
2.3.2.g	Report on messages as per permit	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
PUBLIC INVOLVEMENT & PARTICIPATION				
2.3.3.a	Meet Public Notice requirements	continuous	Ensure that all public involvement activities comply with state public notice requirements.	-
2.3.3.a	Make Stormwater Management Plan & Annual MS4 Stormwater Report available to public	continuous	Make SWMP and annual MS4 stormwater reports available to public at Town Hall and/or on the Town's website.	-
2.3.3.b	Public opportunity to participate in the review/implementation of the Stormwater Management Program	annually	May be implemented through the use of Town website, Town hotline, clean-up teams, monitoring teams, or a stormwater advisory committee.	Town to satisfy public participation requirements using Town Forces.

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 2 PERMIT REQUIREMENTS (JULY 1, 2019 to JUNE 30, 2020)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
2.3.3.c	Report on public participation opportunities	annually	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
	ILLICIT DISCHARGE DETECTION & ELIMINATON			
2.3.4.2.a	Eliminate illicit discharges	60 days from detection or as expeditiously as possible	Eliminate illicit discharges as they are identified or establish a schedule for elimination for discharges that cannot be removed within 60 days.	Budget $10,000 to $15,000 per year starting in Year 2 and going through Year 10 (time period over which IDDE investigations will occur) as an allowance for removal of illicit connections.
2.3.4.2.a	Report dates of illicit identification and schedules for removal	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.4.a	Mitigate SSOs	Expeditiously as possible	Eliminate SSOs as expeditiously as possible and take interim mitigation measures to minimize the discharge of pollutants to and from the Town until elimination is completed.	-
2.3.4.4.b	Complete Inventory of Sanitary Sewer Overflows (SSOs)	1 year from effective date	Identify all known locations where SSOs have discharged within the previous five years.	Town Forces
2.3.4.4.c	Report SSOs	24 hours of awareness	Provide verbal notice to EPA within 24 hours, and written notice to EPA and MADEP within 5 days.	Town Forces
2.3.4.4.d	Update SSO inventory	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.5.b	Map the MS4 features required in 2.3.4.6.b under Phase 2 including outfall spatial location, pipes, manholes, catch basins, refined catchment delineations, and the municipal sanitary system (if available) and the municipal combined sewer system (if applicable).	Annually during catchment investigation procedures; Within 10 years from permit effective date	The Town has mapped a majority of their drainage system. Anticipated mapping additions include: refined catchment delineations, updated/new drainage from new developments and re-developments, and drainage updates based on IDDE investigations. The municipal sanitary sewer system has also already been mapped and will be added.	Assume $5,000 per year for additional mapping beginning in Year 2 and going through to Year 10.
2.3.4.5.e	Report on mapping progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.7.a	Report on list of catchments and results of rankings & update annually	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.7.b	Dry-weather outfall/interconnection screening & sampling (except Excluded & Problem Catchments)	3 years from effective date	Complete dry weather screening & sampling of every MS4 outfall and interconnection. Dry weather sampling parameters shall include, at a minimum, ammonia, chlorine, conductivity, E.coli, surfactants and temperature. Phosphorus and chloride will also need to be included at some outfalls to meet the requirements for impaired waters. All can be performed with test kits with the exception of chloride, bacteria and phosphorus; however, the cost provided assumes lab analysis for ammonia, E.coli, surfactants and phosphorus, and test kits for temperature and chlorine. The Town has approximately 400 regulated outfalls and interconnections. For budgeting purposes, it is assumed that all outfalls/interconnections would be visited once and 10% of all outfalls + interconnections will have dry weather flow in need of sampling (40 outfalls/interconnections). Outfalls/interconnections with evidence of contamination, but without active dry weather flow would need to be revisited. Assume that 5% of all outfalls + interconnections (20 outfalls/interconnections) would need to be revisited and that 50% (10 outfalls/interconnections) would have dry weather flow. The Town also may be able to receive credit for dry weather screening completed under the 2003 permit as long as it meets the conditions of Part 2.3.4.7.b of the permit. The Town completed dry weather screening of all outfalls in 2010, and found that 51 had dry weather flow, which was sampled.	$50,000 to $60,000 (The Town also may be able to receive credit for dry weather screening and sampling completed under the 2003 permit as long as it meets the conditions of Part 2.3.4.7 of the permit, which would reduce costs.)

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 2 PERMIT REQUIREMENTS (JULY 1, 2019 to JUNE 30, 2020)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
2.3.4.7.c.iii	Follow-up ranking of outfalls and interconnections	3 years from effective date	Update ranking as dry weather screening information becomes available	Allocate $2,500 to $5,000 to complete updated ranking in Year 3 based on dry weather sampling results.
2.3.4.8.a	Begin investigation of catchments associated with Problem Outfalls	no later than 2 years from effective date	Implement Illicit Discharge Detection and Elimination Investigations as required by the conditions of the permit. For budgeting purposes, it is assumed that an Illicit Discharge Detection and Elimination Investigation Program will need to be implemented in all catchments. Catchments with no potential for illicit discharges (based on the catchment ranking exercise completed under Task 2.3.4.7.c.) can be excluded from the IDDE Program.	Budget $100,000 to $125,000/yr allowance in Years 2 to 10 for IDDE investigation, sampling & reporting. Budget includes $25,000/yr allowance in Years 2 to 10 for CCTV inspection and dye testing to investigate illicit connections. Budget allowance for removal of illicit connections included under 2.3.4.2.a.
2.3.4.8.a	Begin investigation of catchments associated with High and Low Priority Outfalls	After completion of outfall ranking - latest allowable timeframe is 3 years from effective date		
2.3.4.8.a	Complete Investigation of catchments associated with Problem Outfalls	7 years from effective date		
2.3.4.8.a	Complete Investigations of catchments where info on outfall/interconnection identifies sewer input	7 years from effective date		
2.3.4.8.a	Complete Investigations of catchments associated with all Problem, High- and Low-Priority outfalls	10 years from effective date		
2.3.4.8.c.i	Document the presence or absence of system vulnerability factors	Annual Report	Document the presence or absence of system vulnerability factors for each catchment.	To be completed as part of Item 2.3.4.7.a.ii. and iii, and reported in Annual Report (4).
2.3.4.8.c.iii	Report on all data collected as part of the catchment investigations	annual MS4 stormwater reports	Report data in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.8.e.i	Report on each illicit discharge identified and date of removal	annual MS4 stormwater reports	For each confirmed source, the following information shall be included: location of discharge and source; description of discharge; method of discovery; date of discovery; date of elimination, mitigation or enforcement action or planned corrective measures; and estimate of the volume of flow removed.	Cost included under Item 4.4.
2.3.4.8.e.ii	Conduct confirmatory outfall or interconnection screening	1 year from removal of discharges	If confirmatory screening indicates evidence of illicit discharge, the catchment shall be scheduled for additional investigation.	Cost is dependent on the number of illicit discharges identified.
2.3.4.9	Evaluate & report IDDE program progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.10	Reprioritize catchments and schedule ongoing dry weather and wet weather (where system vulnerability factors are present) screening and sampling once all catchments have been investigated and all illicit discharges have been removed	Once every 5 years	Ongoing dry weather and wet weather (where system vulnerability factors are present) screening and sampling shall be completed every 5 years once all catchments have been investigated and all illicit discharges have been removed.	Catchment investigation work will not be complete until Year 10 so this work will not occur until at least Year 15.
2.3.4.11	Conduct IDDE employee training	at least annually	Train employees about the IDDE Program including how to recognize illicit discharges and SSOs.	Budget $25,000 to $30,000 to prepare training materials and complete required training.
2.3.4.11	Report on IDDE employee training	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
CONSTRUCTION SITE STORMWATER RUNOFF CONTROL				
2.3.5	Implement & enforce Construction Site Stormwater Runoff Control (CSSRC) Program	not stated	Continue to implement and enforce a program to reduce pollutants in stormwater runoff from construction activities per the 2003 Permit.	-
POST-CONSTRUCTION STORMWATER MANAGEMENT				
2.3.6.a	Implement & enforce SW management for New Development/Redevelopment	not stated	Continue to implement and enforce a program to address post-construction stormwater runoff from new development and redevelopment projects per the 2003 Permit.	-
2.3.6.a.ii	Amend existing regulatory mechanism to contain provisions at least as stringent as those outlined under Part 2.3.6.a.ii.	2 years from effective date	Section 19.120 of the Town's General Bylaws currently requires compliance with the Massachusetts Stormwater Management Standards, and include retention and treatment requirements for post-construction stormwater controls. Review existing regulatory requirements and update as needed to ensure full compliance with permit conditions.	Budget $5,000 to $7,500 to review post-construction stormwater management regulatory mechanisms, modify the regulations for compliance & develop/update written procedures as needed.

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 2 PERMIT REQUIREMENTS (JULY 1, 2019 to JUNE 30, 2020)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
2.3.6.a.iii	Develop procedures for Post Construction Stormwater Management to ensure submission of as-built plans within two (2) years from completed construction, and long-term O&M of BMPs; include in written SWMP.	2 years from effective date	Section 19.030 of the Town's General Bylaws currently requires the submission of a post-construction O&M Plan. Review existing requirements and update as need to meet permit requirements. Update Section 19.050 Part L of the Town's general bylaws to require submission of as-builts within two years of completion of construction.	Cost included under Item 2.3.6.a.ii.
2.3.6.a.iii	Report on measures to comply with 2.3.6.a.iii in annual MS4 stormwater report	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
GOOD HOUSEKEEPING & POLLUTION PREVENTION FOR PERMITEE-OWNED OPERATIONS				
2.3.7.a.i & ii	Develop written operation & maintenance procedures for municipal activities.	2 years from effective date	Update existing written operation & maintenance procedures for parks and open space, buildings and facilities where pollutants are exposed to stormwater runoff, as well as vehicles and equipment.	$2,500 - $3,500
2.3.7.a.ii	Complete inventory of listed municipal facilities	2 years from effective date; review/update annually	Develop inventory of all municipal facilities; Review inventory annually and update as necessary.	Town Forces
2.3.7.a.ii.2	Provide training on use, storage, & disposal of petroleum products to applicable staff as necessary	not stated	Provide training on use, storage, & disposal of petroleum products to applicable municipal staff as necessary.	Cost included under Item 2.3.4.11
2.3.7.a.iii.1	Written program detailing activities/procedures the MS4 will implement to ensure infrastructure is maintained in timely manner	2 years from effective date	Update existing and create new written O&M procedures as needed to include all requirements contained in 2.3.7.a.ii for parks and open spaces, buildings and facilities, and vehicles and equipment.	Cost included under 2.3.7.a.i. (Since the Town already has written procedures in place, it is assumed that only minimal updates will be needed to meet the conditions of the permit.)
2.3.7.a.iii.2	Develop & implement a plan to optimize catch basin cleaning & include in written SWMP	2 years from effective date	Develop and implement a plan to optimize inspection, cleaning, and maintenance of catch basins to ensure that permit conditions are met.	$2,500 to $5,000
2.3.7.a.iii.2	Implement routine inspection/cleaning/maintenance of catch basins to ensure sumps <50% full; report on activities as specified; investigate excessive sediment; log/report CB cleaning	continuous; annual MS4 stormwater reports	Clean catch basins as needed to ensure that no sump is more than 50% full at any given time. The Town has approximately 3,300 catch basins town-wide. In PY15, only 15% of catch basins were cleaned due to budget constraints. The Town anticipates that 50% of catch basins will need to be cleaned each year to meet permit requirements.	The Town anticipates spending $50,000 to $60,000 annually for catch basin cleaning to meet MS4 Permit requirements. These costs are not included in the MS4 Budget, and instead are included as part of separate O&M cost under the stormwater budget. Once the catch basin optimization plan is complete, additional funding may need to be allocated to increase catch basin cleaning frequency to meet permit requirements. The Town has been collecting data over the last 3 years to build their optimization plan.
2.3.7.a.iii.3 & 4.	Sweep streets/parking lots 1x/year in spring; report on efforts	annually; annual MS4 stormwater reports	The Town currently sweeps all public streets and municipal parking lots annually in the spring. Some streets and parking lots must be swept twice per year to meet the impaired waters requirements included under Appendix H. Part II.1.a.i.3.	The Town currently contracts out some of their street sweeping and does remaining sweeping in-house. They currently spend $12,000 per year. These costs are not included in the MS4 Budget, and instead are included as part of separate O&M cost under the stormwater budget. The Town will need to adjust street sweeping frequency so that streets located within catchments of phosphorous impaired waters are swept twice per year.

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 2 PERMIT REQUIREMENTS (JULY 1, 2019 to JUNE 30, 2020)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
2.3.7.a.iii.4	Ensure proper storage of CB cleanings & street sweeping to prevent runoff	NA	Examine storage of CB cleanings & street sweepings	Cost included under 2.3.7.a.i.
2.3.7.a.iii.5	Establish procedures for winter road maintenance	not stated	Look at storage and usage of salt and sand; evaluate opportunities for use of alternative deicers.	Cost included under 2.3.7.a.i.
2.3.7.a.iii.6	Establish/implement procedures to inspect/maintain storm drains & structural BMPs; and for annual inspection of treatment structures	not stated	Establish/implement procedures to inspect/maintain storm drains & structural BMPs; inspect treatment structures annually at a minimum.	Cost to develop procedures included under 2.3.7.a.i.; Costs for maintenance calculated as part of separate O&M cost under stormwater budget.
2.3.7.a.iv	Report on all Good Housekeeping/Pollution Prevention requirements	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.7.a.v	Keep written record of all Good Housekeeping/Pollution Prevention activities under 2.3.7.a	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
2.3.7.b	Develop/implement written Stormwater Pollution Prevention Plans for required facilities as per permit to include the items under 2.3.7.b.ii	2 years from effective date	Update, as needed, and implement SWPPPs developed for the DPW Facility at 999 Whipple Road, and the Water Treatment Plant at 71 Merrimac Drive, as well as any other municipal waste handling facilities.	Budget $2,500 to $3,500 to revisit and update SWPPPs as needed.
2.3.7.b.ii & iii	Perform SWPPP required actions/inspections/training	frequencies as per permit	Perform quarterly inspections at the DPW Facility and the Water Treatment Plant, and conduct annual employee training on SWPPPs developed for each facility.	Assume Town staff will perform quarterly inspections. Costs for employee training included under Item 2.3.4.11.
2.3.7.b.iii	Report on Stormwater Pollution Prevention Plan inspections	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.7.b.iv	Maintain written records for all SWPPP related items under 2.3.7.b	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
SECTION 3 - ADDITIONAL REQUIREMENTS FOR DISCHARGES TO SURFACE DRINKING WATER SUPPLIES AND THEIR TRIBUTARIES				
3.0.a	Make MS4 discharges to surface drinking water supply sources & their tributaries a priority in the SWMP	continuous; report annually	The Town's MS4 discharges to the Merrimack River, which is a surface drinking water supply source in Tewksbury. The Town's MS4 also discharges to the Concord River, which is tributary to a section of the Merrimack River, which is a surface drinking water supply source. The Shawsheen River appears to discharge just downstream of the section of the Merrimiack River that is a water supply source.	As part of the IDDE Investigations, the Town will designate catchments tributary to surface drinking water supply sources as high priority.
3.0.b	Provide pretreatment/spill control for MS4 discharges to public surface drinking water supply sources & their tributaries to the extent feasible	continuous; report annually	The Town's MS4 discharges to the Merrimack River, which is a surface drinking water supply source in Tewksbury. The Town's MS4 also discharges to the Concord River, which is tributary to a section of the Merrimack River, which is a surface drinking water supply source. The Shawsheen River appears to discharge just downstream of the section of the Merrimiack River that is a water supply source.	Allocate $5,000 to $10,000 per year to investigate source protection needs and for potential implementation of BMPs. Both water bodies are impaired for phosphorus so there will be additional potential BMP retrofits installed in these areas as part of the Phosphorus Source Identification Report.
3.0.c	Avoid direct discharges to Class A waters	continuous; report annually	There are no Class A Waters located in Tewksbury.	-
SECTION 4 - PROGRAM EVALUATION, RECORDKEEPING & REPORTING				
4.1.a	Self-evaluate compliance with the permit; include documentation of evaluation in written SWMP	annually	Annually evaluate Town's compliance with permit conditions.	Cost included under Item 4.4.
4.1.b	Evaluate BMP effectiveness & change if needed under provisions of permit	not stated	Evaluate BMP effectiveness in achieving permit objectives & modify BMPs accordingly as needed.	Cost included under Item 4.4.
4.1.b	Report BMP modifications	annual MS4 stormwater reports	Include in Annual MS4 Stormwater Report.	Cost included under Item 4.4.

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 2 PERMIT REQUIREMENTS (JULY 1, 2019 to JUNE 30, 2020)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
4.2	MS4 must keep records for ≥5yrs; make available to public	Continuous	Maintain annual MS4 stormwater reports and make available to the public.	-
4.3	Document results of MS4 outfall screening/sampling & any other monitoring/studies	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
4.4	Submit Annual MS4 Stormwater Report	annually 90 days from effective date	Prepare Annual MS4 Stormwater Report.	$5,000 - $7,500/yr (It is anticipated that first year annual costs will be higher than subsequent years.)

Requirements specific to discharges to waters with approved TMDLs (see Appendix F)
Requirements specific to discharges to impaired waters without an approved TMDL (Appendix H)

Planning Level Estimate for Year 2: **$222,500 to $307,000**

Notes
(1) The permit has a 5-year term, and most permit requirements will be implemented within that timeframe. However, there are certain requirements that the Town will have a longer period of time to implement. These include the planning and installation of structural BMPs for phosphorus removal (Item H.II.1.c). The first BMP retrofit must be constructed in Year 6. The Town is able to establish implementation timeframes for the remaining BMP retrofits. For the purpose of estimating costs, it was assumed that the Town would construct three additional retrofits in Permit Years 7, 8, and 9. The Town also has 10 years to complete IDDE investigations in catchments identified as Problem, High and Low Priority (Item 2.3.4.8.a), and those costs were allocated equally among Permit Years 2 through 10.

Year 3 MS4 Permit Compliance Cost Table

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 3 PERMIT REQUIREMENTS (JULY 1, 2020 to JUNE 30, 2021)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
SECTION 1 - INTRODUCTION				
1.10.2	Update written SWMP	As Necessary	Update the SWMP as needed on an annual basis.	Assume updates to the SWMP after Year 1 will be made in conjunction with preparation of the Town's Annual Report.
SECTION 2 - NON-NUMERIC EFFLUENT LIMITATIONS				
2.1 - Water Quality Based Effluent Limitations				
2.1.1.b	For MS4 discharges to a water body with an approved TMDL identified in Part 2.2.1, comply with Part 2.2.1 and Appendix F of the Permit	see Appendix F of the 2016 Final MA MS4 General Permit	The Bacteria TMDL for the Shawsheen River Basin is applicable to Tewksbury and it includes Strong Water Brook (MA83-07 - fecal coliform), an unnamed tributary to the Shawsheen River/Meadow Brook (MA83-15 - fecal coliform), and the Shawsheen River (MA83-18 - fecal coliform).	Costs included under 1.10 and F.A.III.
2.1.1.c	For MS4 discharges to a water body that is water quality limited and not subject to an approved TMDL or for municipalities located within Part 2.2.2a.-b., comply with Part 2.2.2 and Appendix H of the Permit	see Appendix H of the 2016 Final MA MS4 General Permit	Per Part 2.2.2.b, Tewksbury has been identified as a municipality that discharges to water bodies or is tributary to water bodies that are impaired due to phosphorus, and is therefore subject to the requirements of Appendix H. This includes the Merrimack River (MA84A-03), the Concord River (MA82A-08), and Long Pond (MA83010). Tewksbury also has water bodies that are impaired for bacteria/pathogens (Trull Brook (MA84A-14) and the Merrimack River (MA84A-03)) and chloride (Pinnacle Brook (MA83-15) and an unnamed tributary to the Shawsheen River (MA83-20)) without an approved TMDL.	Costs included under 1.10, H.II, H.III and H.IV.
2.1.1.d	For all other discharges (not subject to the requirements of Part 2.1.1.b and Part 2.1.1.c of the Permit) contributing to a violation of applicable receiving water quality standards, eliminate condition causing or contributing to exceedance of water quality standards	within 60 days of becoming aware of the situation	If a discharge is identified that contributes to an exceedance of applicable water quality standards, eliminate the conditions contributing to or causing the exceedance within 60 days.	Cost included under IDDE under Item 2.3.4.2.a.
2.1.2	Written notification to MADEP & EPA as needed & documentation in the Town's SWMP regarding new or increased stormwater discharges	as needed	Any new or increased stormwater discharges must satisfy MA antidegradation regulations.	-
2.2 - Discharges to Certain Impaired Waters				
2.2	Identify all outfalls/interconnections that discharge to waters with an approved TMDL or discharge to certain waters identified as "water quality limited water bodies"	SWMP (1 yr) & annual MS4 stormwater reports	Identify all outfalls or interconnections that discharge to water quality limited water bodies.	Cost included under Items 1.10 and 4.4.
IMPAIRED - BACTERIA OR PATHOGENS				
F.A.III.1.a.i.1	Distribute residential message on pet waste management (over/above 2.3.2).	Annually	Develop and disseminate required public education information.	Allocate $10,000 per year to meet all MS4 public education requirements.
F.A.III.1.a.i.1	Disseminate required public education information to dog owners.	At license renewal (or similar)		
F.A.III.1.a.i.1	Send public education materials to septic system owners.	Not specified; assume annually		
F.A.III.1.a.i.2	2.3.4.7 IDDE - Catchments to Bacteria/Pathogen Impaired Waters to be ranked Problem or High	With 2.3.4.7; 1 year from effective date	Rank catchments to bacteria/pathogen impaired waters as Problem or High in catchment ranking to be completed under Item 2.3.4.7.a.ii.	Cost included under 2.3.4.7.a.ii.
IMPAIRED - PHOSPHORUS (INCLUDES TRIBUTARIES)				
H.II.1.a.i.1	Distribute clippings/fertilizer message to required audiences	Annually in March/April	Develop and disseminate required public education information.	Cost included under F.A.III.1.a.i.1.
H.II.1.a.i.1	Distribute pet waste management message to Residential	Annually in June/July		
H.II.1.a.i.1	Distribute leaf litter disposal message to Residential/Business/Commercial	Annually August-October		
H.II.1.a.i.2	2.3.6 Ordinance to require BMPs optimized for Phosphorus removal	With 2.3.6; 2 years from effective date	Include in Town's Stormwater Management Bylaw a requirement that new development and redevelopment stormwater BMPs be optimized for phosphorus removal.	Cost included under 2.3.6.d.

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 3 PERMIT REQUIREMENTS (JULY 1, 2020 to JUNE 30, 2021)
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Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
H.II.1.a.i.2	2.3.6.d to include consideration of BMPs that Infiltrate stormwater	With 2.3.6.d; 4 years from effective date	Inventory and priority ranking of Town property and infrastructure that could be retrofitted with BMPs to include consideration of BMPs that infiltrate stormwater.	Cost included under 2.3.6.d.
H.II.1.a.i.3	2.3.7 Grass-clippings procedures & blowing prohibited for MS4 property	With 2.3.7; 2 years from effective date	Develop program to manage grass clippings and leaf litter on permittee owned property.	Cost included under 2.3.7.a.i.
H.II.1.a.i.3	2.3.7 Sweep streets/lots ≥2/yr spring & fall	Sweep at least twice/year	Increase frequency of sweeping of public streets and municipal parking lots to a minimum of two times per year in drainage areas tributary to the Merrimack River, the Concord River and Long Pond.	Cost included under 2.3.7.a.iii.3 & 4.
IMPAIRED - BACTERIA OR PATHOGENS				
H.III.2.a.i	Distribute residential message on pet waste management (over/above 2.3.2).	Annually	Develop and disseminate required public education information.	Cost included under H.II.1.a.i.1.
H.III.2.a.i	Disseminate required public education information to dog owners.	At license renewal (or similar)		
H.III.2.a.i	Send public education materials to septic system owners.	Not specified; assume annually		
IMPAIRED - CHLORIDE				
H.IV.3	If discharge found to be to Chloride Impaired Water; update Salt Reduction Plan (SRP)	60 days from awareness	Develop and implement Salt Reduction Plan in catchment areas draining to Pinnacle Brook (MA83-15) and the unnamed tributary to the Shawsheen River (MA83-20) in accordance with the requirements of Appendix H.	Allocate $5,000 to $10,000 per year towards development and implementation of Salt Reduction Plan.
H.IV.3	If discharge to Chloride Impaired Water & no SRP; prepare SRP	3 years from awareness		
H.IV.3	If discharge to Chloride Impaired Water & no SRP; implement SRP	5 years from awareness		
H.IV.4.a.i	Track/report type/amount of salt applied to MS4-owned surfaces	Annual Reports beginning year SRP completed		
H.IV.4.a.ii	Implement required Salt Reduction activities	Not specified; assume ED		
H.IV.4.b.i	Establish regulatory mechanism to prevent runoff from private salt piles	Not specified	Establish ordinance requiring measures to prevent exposure of any salt stockpiles to precipitation and runoff at all commercial and industrial properties.	Cost included under Item 2.3.6.a.ii.
H.IV.4.b.ii	Distribute message to Commercial/Industrial & private applicators on storage/application of deicing materials (over/above 2.3.3)	Annually in Nov/Dec	Supplement commercial/industrial education program with an annual message to private road salt applicators, and commercial and industrial site owners on the proper storage and application rates of winter deicing material.	Cost included under H.II.1.a.i.1.
H.IV.4.c	Submit SRP to EPA	Annual Report after completion	Include Salt Reduction Plan in Annual Report	Cost included under Item 4.4.
2.3 - Requirements to Reduce Pollutants to the Maximum Extent Practicable (MEP)				
PUBLIC EDUCATION & OUTREACH				
2.3.2.a-d	Distribute at least 2 educational messages to each of 4 targeted audiences (residents, businesses/commercial/institutional, developers and industrial). Different messages to the same targeted audience shall be distributed at least one year apart.	begin year 1; continue throughout permit term	Develop/distribute a minumum of 8 messages over the permit term. Educational messages can include brochures, newsletters, information posted to the Town's website, newspaper articles, public service announcements, displays in municipal buildings, etc.	Cost included under F.A.III.1.a.i.1.
2.3.2.e	Identify method to evaluate effectiveness of message; implement	not stated	Determine method to evaluate message effectiveness; implement method.	
2.3.2.f	Modify ineffective messages/methods	before next message distribution	Modify message or distribution methods if applicable.	
2.3.2.g	Report on messages as per permit	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 3 PERMIT REQUIREMENTS (JULY 1, 2020 to JUNE 30, 2021)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
PUBLIC INVOLVEMENT & PARTICIPATION				
2.3.3.a	Meet Public Notice requirements	continuous	Ensure that all public involvement activities comply with state public notice requirements.	-
2.3.3.a	Make Stormwater Management Plan & Annual MS4 Stormwater Report available to public	continuous	Make SWMP and annual MS4 stormwater reports available to public at Town Hall and/or on the Town's website.	-
2.3.3.b	Public opportunity to participate in the review/implementation of the Stormwater Management Program	annually	May be implemented through the use of Town website, Town hotline, clean-up teams, monitoring teams, or a stormwater advisory committee.	Town to satisfy public participation requirements using Town Forces.
2.3.3.c	Report on public participation opportunities	annually	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
ILLICIT DISCHARGE DETECTION & ELIMINATON				
2.3.4.a	Adopt regulatory mechanism providing legal authority to prohibit/investigate/eliminate illicit discharges	Should have been completed under 2003 permit.	Chapter 20 of the Town's General Bylaws regulates discharges to the municipal storm drain system.	-
2.3.4.2.a	Eliminate illicit discharges	60 days from detection or as expeditiously as possible	Eliminate illicit discharges as they are identified or establish a schedule for elimination for discharges that cannot be removed within 60 days.	Budget $10,000 to $15,000 per year starting in Year 2 and going through Year 10 (time period over which IDDE investigations will occur) as an allowance for removal of illicit connections.
2.3.4.2.a	Report dates of illicit identification and schedules for removal	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.4.a	Mitigate SSOs	Expeditiously as possible	Eliminate SSOs as expeditiously as possible and take interim mitigation measures to minimize the discharge of pollutants to and from the Town until elimination is completed.	-
2.3.4.4.b	Complete Inventory of Sanitary Sewer Overflows (SSOs)	1 year from effective date	Identify all known locations where SSOs have discharged within the previous five years.	Town Forces
2.3.4.4.c	Report SSOs	24 hours of awareness	Provide verbal notice to EPA within 24 hours, and written notice to EPA and MADEP within 5 days.	Town Forces
2.3.4.4.d	Update SSO inventory	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.5.b	Map the MS4 features required in 2.3.4.6.b under Phase 2 including outfall spatial location, pipes, manholes, catch basins, refined catchment delineations, and the municipal sanitary system (if available) and the municipal combined sewer system (if applicable).	Annually during catchment investigation procedures; Within 10 years from permit effective date	The Town has mapped a majority of their drainage system. Anticipated mapping additions include: refined catchment delineations, updated/new drainage from new developments and re-developments, and drainage updates based on IDDE investigations. The municipal sanitary sewer system has also already been mapped and will be added.	Assume $5,000 per year for additional mapping beginning in Year 2 and going through to Year 10.
2.3.4.5.e	Report on mapping progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.7.a	Report on list of catchments and results of rankings & update annually	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.8.a	Begin investigation of catchments associated with Problem Outfalls	no later than 2 years from effective date	Implement Illicit Discharge Detection and Elimination Investigations as required by the conditions of the permit. For budgeting purposes, it is assumed that an Illicit Discharge Detection and Elimination Investigation Program will need to be implemented in all catchments. Catchments with no potential for illicit discharges (based on the catchment ranking exercise completed under Task 2.3.4.7.c.) can be excluded from the IDDE Program.	Budget $100,000 to $125,000/yr allowance in Years 2 to 10 for IDDE investigation, sampling & reporting. Budget includes $25,000/yr allowance in Years 2 to 10 for CCTV inspection and dye testing to investigate illicit connections. Budget allowance for removal of illicit connections included under 2.3.4.2.a.
2.3.4.8.a	Begin investigation of catchments associated with High and Low Priority Outfalls	After completion of outfall ranking - latest allowable timeframe is 3 years from effective date		
2.3.4.8.a	Complete Investigation of catchments associated with Problem Outfalls	7 years from effective date		
2.3.4.8.a	Complete Investigations of catchments where info on outfall/interconnection identifies sewer input	7 years from effective date		
2.3.4.8.a	Complete Investigations of catchments associated with all Problem, High- and Low-Priority outfalls	10 years from effective date		
2.3.4.8.c.i	Document the presence or absence of system vulnerability factors	Annual Report	Document the presence or absence of system vulnerability factors for each catchment.	To be completed as part of Item 2.3.4.7.a.ii. and iii, and reported in Annual Report (4).

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 3 PERMIT REQUIREMENTS (JULY 1, 2020 to JUNE 30, 2021)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
2.3.4.8.c.ii.2	Wet weather sampling	Upon completion of any dry weather investigation	Wet weather sampling must be completed at all outfalls where the catchment has a minimum of one (1) System Vulnerability Factor. Assume that 100% of all regulated outfalls/interconnections have at least one System Vulnerability Factor in its catchment, which triggers the requirement for wet-weather sampling. For this reason, the budget estimate assumes that 100% of the approximately 400 regulated outfalls/interconnections will require wet-weather sampling. Wet weather sampling parameters shall include, at a minimum, ammonia, chlorine, conductivity, salinity, E.coli, surfactants and temperature. For outfalls that discharge to receiving waters with impairments for phosphorus and chloride, samples collected will have to be analyzed for these parameters as well. (Budget assumes lab analysis for most sampling parameters.)	Budget $100,000 - $125,000 for wet weather sampling.
2.3.4.8.c.iii	Report on all data collected as part of the catchment investigations	annual MS4 stormwater reports	Report data in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.8.e.i	Report on each illicit discharge identified and date of removal	annual MS4 stormwater reports	For each confirmed source, the following information shall be included: location of discharge and source; description of discharge; method of discovery; date of discovery; date of elimination, mitigation or enforcement action or planned corrective measures; and estimate of the volume of flow removed.	Cost included under Item 4.4.
2.3.4.8.e.ii	Conduct confirmatory outfall or interconnection screening	1 year from removal of discharges	If confirmatory screening indicates evidence of illicit discharge, the catchment shall be scheduled for additional investigation.	Cost is dependent on the number of illicit discharges identified.
2.3.4.9	Evaluate & report IDDE program progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.10	Reprioritize catchments and schedule ongoing dry weather and wet weather (where system vulnerability factors are present) screening and sampling once all catchments have been investigated and all illicit discharges have been removed	Once every 5 years	Ongoing dry weather and wet weather (where system vulnerability factors are present) screening and sampling shall be completed every 5 years once all catchments have been investigated and all illicit discharges have been removed.	Catchment investigation work will not be complete until Year 10 so this work will not occur until at least Year 15.
2.3.4.11	Conduct IDDE employee training	at least annually	Train employees about the IDDE Program including how to recognize illicit discharges and SSOs.	Budget $25,000 to $30,000 to prepare training materials and complete required training.
2.3.4.11	Report on IDDE employee training	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
CONSTRUCTION SITE STORMWATER RUNOFF CONTROL				
2.3.5	Implement & enforce Construction Site Stormwater Runoff Control (CSSRC) Program	not stated	Continue to implement and enforce a program to reduce pollutants in stormwater runoff from construction activities per the 2003 Permit.	-
POST-CONSTRUCTION STORMWATER MANAGEMENT				
2.3.6.a	Implement & enforce SW management for New Development/Redevelopment	not stated	Continue to implement and enforce a program to address post-construction stormwater runoff from new development and redevelopment projects per the 2003 Permit.	-
GOOD HOUSEKEEPING & POLLUTION PREVENTION FOR PERMITEE-OWNED OPERATIONS				
2.3.7.a.ii.2	Provide training on use, storage, & disposal of petroleum products to applicable staff as necessary	not stated	Provide training on use, storage, & disposal of petroleum products to applicable municipal staff as necessary.	Cost included under Item 2.3.4.11

TEWKSBURY, MA
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Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
2.3.7.a.iii.2	Implement routine inspection/cleaning/maintenance of catch basins to ensure sumps <50% full; report on activities as specified; investigate excessive sediment; log/report CB cleaning	continuous; annual MS4 stormwater reports	Clean catch basins as needed to ensure that no sump is more than 50% full at any given time. The Town has approximately 3,300 catch basins town-wide. In PY15, only 15% of catch basins were cleaned due to budget constraints. The Town anticipates that 50% of catch basins will need to be cleaned each year to meet permit requirements.	The Town anticipates spending $50,000 to $60,000 annually for catch basin cleaning to meet MS4 Permit requirements. These costs are not included in the MS4 Budget, and instead are included as part of separate O&M cost under the stormwater budget. Once the catch basin optimization plan is complete, additional funding may need to be allocated to increase catch basin cleaning frequency to meet permit requirements. The Town has been collecting data over the last 3 years to build their optimization plan.
2.3.7.a.iii.3 & 4.	Sweep streets/parking lots 1x/year in spring; report on efforts	annually; annual MS4 stormwater reports	The Town currently sweeps all public streets and municipal parking lots annually in the spring. Some streets and parking lots must be swept twice per year to meet the impaired waters requirements included under Appendix H. Part II.1.a.i.3.	The Town currently contracts out some of their street sweeping and does remaining sweeping in-house. They currently spend $12,000 per year. These costs are not included in the MS4 Budget, and instead are included as part of separate O&M cost under the stormwater budget. The Town will need to adjust street sweeping frequency so that streets located within catchments of phosphorous impaired waters are swept twice per year.
2.3.7.a.iii.4	Ensure proper storage of CB cleanings & street sweeping to prevent runoff	NA	Examine storage of CB cleanings & street sweepings	Cost included under 2.3.7.a.i.
2.3.7.a.iii.5	Establish procedures for winter road maintenance	not stated	Look at storage and usage of salt and sand; evaluate opportunities for use of alternative deicers.	Cost included under 2.3.7.a.i.
2.3.7.a.iii.6	Establish/implement procedures to inspect/maintain storm drains & structural BMPs; and for annual inspection of treatment structures	not stated	Establish/implement procedures to inspect/maintain storm drains & structural BMPs; inspect treatment structures annually at a minimum.	Cost to develop procedures included under 2.3.7.a.i.; Costs for maintenance calculated as part of separate O&M cost under stormwater budget.
2.3.7.a.iv	Report on all Good Housekeeping/Pollution Prevention requirements	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.7.a.v	Keep written record of all Good Housekeeping/Pollution Prevention activities under 2.3.7.a	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
2.3.7.b.ii & iii	Perform SWPPP required actions/inspections/training	frequencies as per permit	Perform quarterly inspections at the DPW Facility and the Water Treatment Plant, and conduct annual employee training on SWPPPs developed for each facility.	Assume Town staff will perform quarterly inspections. Costs for employee training included under Item 2.3.4.11.
2.3.7.b.iii	Report on Stormwater Pollution Prevention Plan inspections	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.7.b.iv	Maintain written records for all SWPPP related items under 2.3.7.b	continuous	Keep written record of all maintenance activities, inspections and training completed.	-

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 3 PERMIT REQUIREMENTS (JULY 1, 2020 to JUNE 30, 2021)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
SECTION 3 - ADDITIONAL REQUIREMENTS FOR DISCHARGES TO SURFACE DRINKING WATER SUPPLIES AND THEIR TRIBUTARIES				
3.0.a	Make MS4 discharges to surface drinking water supply sources & their tributaries a priority in the SWMP	continuous; report annually	The Town's MS4 discharges to the Merrimack River, which is a surface drinking water supply source in Tewksbury. The Town's MS4 also discharges to the Concord River, which is tributary to a section of the Merrimack River, which is a surface drinking water supply source. The Shawsheen River appears to discharge just downstream of the section of the Merrimiack River that is a water supply source.	As part of the IDDE Investigations, the Town will designate catchments tributary to surface drinking water supply sources as high priority.
3.0.b	Provide pretreatment/spill control for MS4 discharges to public surface drinking water supply sources & their tributaries to the extent feasible	continuous; report annually	The Town's MS4 discharges to the Merrimack River, which is a surface drinking water supply source in Tewksbury. The Town's MS4 also discharges to the Concord River, which is tributary to a section of the Merrimack River, which is a surface drinking water supply source. The Shawsheen River appears to discharge just downstream of the section of the Merrimiack River that is a water supply source.	Allocate $5,000 to $10,000 per year to investigate source protection needs and for potential implementation of BMPs. Both water bodies are impaired for phosphorus so there will be additional potential BMP retrofits installed in these areas as part of the Phosphorus Source Identification Report.
3.0.c	Avoid direct discharges to Class A waters	continuous; report annually	There are no Class A Waters located in Tewksbury.	-
SECTION 4 - PROGRAM EVALUATION, RECORDKEEPING & REPORTING				
4.1.a	Self-evaluate compliance with the permit; include documentation of evaluation in written SWMP	annually	Annually evaluate Town's compliance with permit conditions.	Cost included under Item 4.4.
4.1.b	Evaluate BMP effectiveness & change if needed under provisions of permit	not stated	Evaluate BMP effectiveness in achieving permit objectives & modify BMPs accordingly as needed.	Cost included under Item 4.4.
4.1.b	Report BMP modifications	annual MS4 stormwater reports	Include in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
4.2	MS4 must keep records for ≥5yrs; make available to public	Continuous	Maintain annual MS4 stormwater reports and make available to the public.	-
4.3	Document results of MS4 outfall screening/sampling & any other monitoring/studies	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
4.4	Submit Annual MS4 Stormwater Report	annually 90 days from effective date	Prepare Annual MS4 Stormwater Report.	$5,000 - $7,500/yr (It is anticipated that first year annual costs will be higher than subsequent years.)

Requirements specific to discharges to waters with approved TMDLs (see Appendix F)
Requirements specific to discharges to impaired waters without an approved TMDL (Appendix H)

Planning Level Estimate for Year 3: **$255,000 to $343,000**

Notes
(1) The permit has a 5-year term, and most permit requirements will be implemented within that timeframe. However, there are certain requirements that the Town will have a longer period of time to implement. These include the planning and installation of structural BMPs for phosphorus removal (Item H.II.1.c). The first BMP retrofit must be constructed in Year 6. The Town is able to establish implementation timeframes for the remaining BMP retrofits. For the purpose of estimating costs, it was assumed that the Town would construct three additional retrofits in Permit Years 7, 8, and 9. The Town also has 10 years to complete IDDE investigations in catchments identified as Problem, High and Low Priority (Item 2.3.4.8.a), and those costs were allocated equally among Permit Years 2 through 10.

Year 4 MS4 Permit Compliance Cost Table

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 4 PERMIT REQUIREMENTS (JULY 1, 2021 to JUNE 30, 2022)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
SECTION 1 - INTRODUCTION				
1.10.2	Update written SWMP	4 years from effective date	Update the SWMP to include those items that are required to be included in the SWMP within four years of the permit effective date as identified in Section 1.10.2.	Costs for specific items included under 2.3.6.b.
SECTION 2 - NON-NUMERIC EFFLUENT LIMITATIONS				
2.1 - Water Quality Based Effluent Limitations				
2.1.1.b	For MS4 discharges to a water body with an approved TMDL identified in Part 2.2.1, comply with Part 2.2.1 and Appendix F of the Permit	see Appendix F of the 2016 Final MA MS4 General Permit	The Bacteria TMDL for the Shawsheen River Basin is applicable to Tewksbury and it includes Strong Water Brook (MA83-07 - fecal coliform), an unnamed tributary to the Shawsheen River/Meadow Brook (MA83-15 - fecal coliform), and the Shawsheen River (MA83-18 - fecal coliform).	Costs included under 1.10 and F.A.III.
2.1.1.c	For MS4 discharges to a water body that is water quality limited and not subject to an approved TMDL or for municipalities located within Part 2.2.2a.-b., comply with Part 2.2.2 and Appendix H of the Permit	see Appendix H of the 2016 Final MA MS4 General Permit	Per Part 2.2.2.b, Tewksbury has been identified as a municipality that discharges to water bodies or is tributary to water bodies that are impaired due to phosphorus, and is therefore subject to the requirements of Appendix H. This includes the Merrimack River (MA84A-03), the Concord River (MA82A-08), and Long Pond (MA83010). Tewksbury also has water bodies that are impaired for bacteria/pathogens (Trull Brook (MA84A-14) and the Merrimack River (MA84A-03)) and chloride (Pinnacle Brook (MA83-15) and an unnamed tributary to the Shawsheen River (MA83-20)) without an approved TMDL.	Costs included under 1.10, H.II, H.III and H.IV.
2.1.1.d	For all other discharges (not subject to the requirements of Part 2.1.1.b and Part 2.1.1.c of the Permit) contributing to a violation of applicable receiving water quality standards, eliminate condition causing or contributing to exceedance of water quality standards	within 60 days of becoming aware of the situation	If a discharge is identified that contributes to an exceedance of applicable water quality standards, eliminate the conditions contributing to or causing the exceedance within 60 days.	Cost included under IDDE under Item 2.3.4.2.a.
2.1.2	Written notification to MADEP & EPA as needed & documentation in the Town's SWMP regarding new or increased stormwater discharges	as needed	Any new or increased stormwater discharges must satisfy MA antidegradation regulations.	-
2.2 - Discharges to Certain Impaired Waters				
2.2	Identify all outfalls/interconnections that discharge to waters with an approved TMDL or discharge to certain waters identified as "water quality limited water bodies"	SWMP (1 yr) & annual MS4 stormwater reports	Identify all outfalls or interconnections that discharge to water quality limited water bodies.	Cost included under Items 1.10 and 4.4.
IMPAIRED - BACTERIA OR PATHOGENS				
F.A.III.1.a.i.1	Distribute residential message on pet waste management (over/above 2.3.2).	Annually	Develop and disseminate required public education information.	Allocate $10,000 per year to meet all MS4 public education requirements.
F.A.III.1.a.i.1	Disseminate required public education information to dog owners.	At license renewal (or similar)		
F.A.III.1.a.i.1	Send public education materials to septic system owners.	Not specified; assume annually		
IMPAIRED - PHOSPHORUS (INCLUDES TRIBUTARIES)				
H.II.1.a.i.1	Distribute clippings/fertilizer message to required audiences	Annually in March/April	Develop and disseminate required public education information.	Cost included under F.A.III.1.a.i.1.
H.II.1.a.i.1	Distribute pet waste management message to Residential	Annually in June/July		
H.II.1.a.i.1	Distribute leaf litter disposal message to Residential/Business/Commercial	Annually August-October		

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 4 PERMIT REQUIREMENTS (JULY 1, 2021 to JUNE 30, 2022)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
H.II.1.b	Complete Phosphorus Source Identification Report	4 years from effective date; With Year 4 Annual Report	Develop Phosphorus Source Identification Report to include: (1) calculation of total MS4 area draining to the the impaired water or its tributaries (Merrimack River, Concord River and Long Pond), incorporating updated mapping of the MS4 and catchment delineations produced pursuant to Part 2.3.4.6, (2) All screening and monitoring results pursuant to Part 2.3.4.7.d., targeting the receiving water segment(s); (3) Impervious area and DCIA for the target catchment; (4) Identification, delineation and prioritization of potential catchments with high phosphorus loading; and (5) identification of potential retrofit opportunities or opportunities for the installation of structural BMPs during redevelopment, including the removal of impervious area of permittee-owned properties.	$25,000 to $35,000
H.II.1.a.i.3	2.3.7 Sweep streets/lots >2/yr spring & fall	Sweep at least twice/year	Increase frequency of sweeping of public streets and municipal parking lots to a minimum of two times per year in drainage areas tributary to the Merrimack River, the Concord River and Long Pond.	Cost included under 2.3.7.a.iii.3 & 4.
IMPAIRED - BACTERIA OR PATHOGENS				
H.III.2.a.i	Distribute residential message on pet waste management (over/above 2.3.2).	Annually	Develop and disseminate required public education information.	Cost included under H.II.1.a.i.1.
H.III.2.a.i	Disseminate required public education information to dog owners.	At license renewal (or similar)		
H.III.2.a.i	Send public education materials to septic system owners.	Not specified; assume annually		
IMPAIRED - CHLORIDE				
H.IV.3	If discharge found to be to Chloride Impaired Water; update Salt Reduction Plan (SRP)	60 days from awareness	Develop and implement Salt Reduction Plan in catchment areas draining to Pinnacle Brook (MA83-15) and the unnamed tributary to the Shawsheen River (MA83-20) in accordance with the requirements of Appendix H.	Allocate $5,000 to $10,000 per year towards development and implementation of Salt Reduction Plan.
H.IV.3	If discharge to Chloride Impaired Water & no SRP; prepare SRP	3 years from awareness		
H.IV.3	If discharge to Chloride Impaired Water & no SRP; implement SRP	5 years from awareness		
H.IV.4.a.i	Track/report type/amount of salt applied to MS4-owned surfaces	Annual Reports beginning year SRP completed		
H.IV.4.a.ii	Implement required Salt Reduction activities	Not specified; assume ED		
H.IV.4.b.i	Establish regulatory mechanism to prevent runoff from private salt piles	Not specified	Establish ordinance requiring measures to prevent exposure of any salt stockpiles to precipitation and runoff at all commercial and industrial properties.	Cost included under Item 2.3.6.a.ii.
H.IV.4.b.ii	Distribute message to Commercial/Industrial & private applicators on storage/application of deicing materials (over/above 2.3.3)	Annually in Nov/Dec	Supplement commercial/industrial education program with an annual message to private road salt applicators, and commercial and industrial site owners on the proper storage and application rates of winter deicing material.	Cost included under H.II.1.a.i.1.
H.IV.4.c	Submit SRP to EPA	Annual Report after completion	Include Salt Reduction Plan in Annual Report	Cost included under Item 4.4.
2.3 - Requirements to Reduce Pollutants to the Maximum Extent Practicable (MEP)				
PUBLIC EDUCATION & OUTREACH				
2.3.2.a-d	Distribute at least 2 educational messages to each of 4 targeted audiences (residents, businesses/commercial/institutional, developers and industrial). Different messages to the same targeted audience shall be distributed at least one year apart.	begin year 1; continue throughout permit term	Develop/distribute a minumum of 8 messages over the permit term. Educational messages can include brochures, newsletters, information posted to the Town's website, newspaper articles, public service announcements, displays in municipal buildings, etc.	Cost included under F.A.III.1.a.i.1.
2.3.2.e	Identify method to evaluate effectiveness of message; implement	not stated	Determine method to evaluate message effectiveness; implement method.	
2.3.2.f	Modify ineffective messages/methods	before next message distribution	Modify message or distribution methods if applicable.	
2.3.2.g	Report on messages as per permit	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 4 PERMIT REQUIREMENTS (JULY 1, 2021 to JUNE 30, 2022)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
PUBLIC INVOLVEMENT & PARTICIPATION				
2.3.3.a	Meet Public Notice requirements	continuous	Ensure that all public involvement activities comply with state public notice requirements.	-
2.3.3.a	Make Stormwater Management Plan & Annual MS4 Stormwater Report available to public	continuous	Make SWMP and annual MS4 stormwater reports available to public at Town Hall and/or on the Town's website.	-
2.3.3.b	Public opportunity to participate in the review/implementation of the Stormwater Management Program	annually	May be implemented through the use of Town website, Town hotline, clean-up teams, monitoring teams, or a stormwater advisory committee.	Town to satisfy public participation requirements using Town Forces.
2.3.3.c	Report on public participation opportunities	annually	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
ILLICIT DISCHARGE DETECTION & ELIMINATON				
2.3.4.2.a	Eliminate illicit discharges	60 days from detection or as expeditiously as possible	Eliminate illicit discharges as they are identified or establish a schedule for elimination for discharges that cannot be removed within 60 days.	Budget $10,000 to $15,000 per year starting in Year 2 and going through Year 10 (time period over which IDDE investigations will occur) as an allowance for removal of illicit connections.
2.3.4.2.a	Report dates of illicit identification and schedules for removal	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.4.a	Mitigate SSOs	Expeditiously as possible	Eliminate SSOs as expeditiously as possible and take interim mitigation measures to minimize the discharge of pollutants to and from the Town until elimination is completed.	-
2.3.4.4.c	Report SSOs	24 hours of awareness	Provide verbal notice to EPA within 24 hours, and written notice to EPA and MADEP within 5 days.	Town Forces
2.3.4.4.d	Update SSO inventory	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.5.b	Map the MS4 features required in 2.3.4.6.b under Phase 2 including outfall spatial location, pipes, manholes, catch basins, refined catchment delineations, and the municipal sanitary system (if available) and the municipal combined sewer system (if applicable).	Annually during catchment investigation procedures; Within 10 years from permit effective date	The Town has mapped a majority of their drainage system. Anticipated mapping additions include: refined catchment delineations, updated/new drainage from new developments and re-developments, and drainage updates based on IDDE investigations. The municipal sanitary sewer system has also already been mapped and will be added.	Assume $5,000 per year for additional mapping beginning in Year 2 and going through to Year 10.
2.3.4.5.e	Report on mapping progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.7.a	Report on list of catchments and results of rankings & update annually	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.8.a	Begin investigation of catchments associated with Problem Outfalls	no later than 2 years from effective date	Implement Illicit Discharge Detection and Elimination Investigations as required by the conditions of the permit. For budgeting purposes, it is assumed that an Illicit Discharge Detection and Elimination Investigation Program will need to be implemented in all catchments. Catchments with no potential for illicit discharges (based on the catchment ranking exercise completed under Task 2.3.4.7.c.) can be excluded from the IDDE Program.	Budget $100,000 to $125,000/yr allowance in Years 2 to 10 for IDDE investigation, sampling & reporting. Budget includes $25,000/yr allowance in Years 2 to 10 for CCTV inspection and dye testing to investigate illicit connections. Budget allowance for removal of illicit connections included under 2.3.4.2.a.
2.3.4.8.a	Begin investigation of catchments associated with High and Low Priority Outfalls	After completion of outfall ranking - latest allowable timeframe is 3 years from effective date		
2.3.4.8.a	Complete Investigation of catchments associated with Problem Outfalls	7 years from effective date		
2.3.4.8.a	Complete Investigations of catchments where info on outfall/interconnection identifies sewer input	7 years from effective date		
2.3.4.8.a	Complete Investigations of catchments associated with all Problem, High- and Low-Priority outfalls	10 years from effective date		
2.3.4.8.c.i	Document the presence or absence of system vulnerability factors	Annual Report	Document the presence or absence of system vulnerability factors for each catchment.	To be completed as part of Item 2.3.4.7.a.ii. and iii, and reported in Annual Report (4).
2.3.4.8.c.iii	Report on all data collected as part of the catchment investigations	annual MS4 stormwater reports	Report data in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.8.e.i	Report on each illicit discharge identified and date of removal	annual MS4 stormwater reports	For each confirmed source, the following information shall be included: location of discharge and source; description of discharge; method of discovery; date of discovery; date of elimination, mitigation or enforcement action or planned corrective measures; and estimate of the volume of flow removed.	Cost included under Item 4.4.

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 4 PERMIT REQUIREMENTS (JULY 1, 2021 to JUNE 30, 2022)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
2.3.4.8.e.ii	Conduct confirmatory outfall or interconnection screening	1 year from removal of discharges	If confirmatory screening indicates evidence of illicit discharge, the catchment shall be scheduled for additional investigation.	Cost is dependent on the number of illicit discharges identified.
2.3.4.9	Evaluate & report IDDE program progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.11	Conduct IDDE employee training	at least annually	Train employees about the IDDE Program including how to recognize illicit discharges and SSOs.	Budget $25,000 to $30,000 to prepare training materials and complete required training.
2.3.4.11	Report on IDDE employee training	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
CONSTRUCTION SITE STORMWATER RUNOFF CONTROL				
2.3.5	Implement & enforce Construction Site Stormwater Runoff Control (CSSRC) Program	not stated	Continue to implement and enforce a program to reduce pollutants in stormwater runoff from construction activities per the 2003 Permit.	-
POST-CONSTRUCTION STORMWATER MANAGEMENT				
2.3.6.a	Implement & enforce SW management for New Development/Redevelopment	not stated	Continue to implement and enforce a program to address post-construction stormwater runoff from new development and redevelopment projects per the 2003 Permit.	-
2.3.6.b	Develop a report assessing street/parking design related to creation of impervious cover	Report progress annually; complete 4 years from effective date	Develop a report assessing current street design and parking lot guidelines and other local requirements impacting the creation of impervious cover. Determine whether design standards can be modified to support low impact design. If modifications can be made, outline recommendations and proposed schedule for modifying applicable standards.	$5,000 - $10,000
2.3.6.c	Develop a report assessing local regulations to allow the listed green practices	Report progress annually; complete 4 years from effective date	Develop a report assessing existing local regulations to determine the feasibility of making green infrastructure practices (green roofs, infiltration practices, water harvesting devices) allowable when appropriate site conditions exist.	$5,000 - $10,000
2.3.6.d	Identify a minimum of 5 permittee-owned properties for BMP retrofits & priority rank based on factors listed in 2.3.6.d	4 years from effective date	Complete an inventory and priority ranking of Town property and infrastructure that could be retrofitted with BMPs to reduce frequency, volume and pollutant loads associated with stormwater discharges.	$2,500 to $5,000
GOOD HOUSEKEEPING & POLLUTION PREVENTION FOR PERMITEE-OWNED OPERATIONS				
2.3.7.a.ii.2	Provide training on use, storage, & disposal of petroleum products to applicable staff as necessary	not stated	Provide training on use, storage, & disposal of petroleum products to applicable municipal staff as necessary.	Cost included under Item 2.3.4.11
2.3.7.a.iii.2	Implement routine inspection/cleaning/maintenance of catch basins to ensure sumps <50% full; report on activities as specified; investigate excessive sediment; log/report CB cleaning	continuous; annual MS4 stormwater reports	Clean catch basins as needed to ensure that no sump is more than 50% full at any given time. The Town has approximately 3,300 catch basins town-wide. In PY15, only 15% of catch basins were cleaned due to budget constraints. The Town anticipates that 50% of catch basins will need to be cleaned each year to meet permit requirements.	The Town anticipates spending $50,000 to $60,000 annually for catch basin cleaning to meet MS4 Permit requirements. These costs are not included in the MS4 Budget, and instead are included as part of separate O&M cost under the stormwater budget. Once the catch basin optimization plan is complete, additional funding may need to be allocated to increase catch basin cleaning frequency to meet permit requirements. The Town has been collecting data over the last 3 years to build their optimization plan.

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 4 PERMIT REQUIREMENTS (JULY 1, 2021 to JUNE 30, 2022)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
2.3.7.a.iii.3 & 4.	Sweep streets/parking lots 1x/year in spring; report on efforts	annually; annual MS4 stormwater reports	The Town currently sweeps all public streets and municipal parking lots annually in the spring. Some streets and parking lots must be swept twice per year to meet the impaired waters requirements included under Appendix H. Part II.1.a.i.3.	The Town currently contracts out some of their street sweeping and does remaining sweeping in-house. They currently spend $12,000 per year. These costs are not included in the MS4 Budget, and instead are included as part of separate O&M cost under the stormwater budget. The Town will need to adjust street sweeping frequency so that streets located within catchments of phosphorous impaired waters are swept twice per year.
2.3.7.a.iii.4	Ensure proper storage of CB cleanings & street sweeping to prevent runoff	NA	Examine storage of CB cleanings & street sweepings	Cost included under 2.3.7.a.i.
2.3.7.a.iii.5	Establish procedures for winter road maintenance	not stated	Look at storage and usage of salt and sand; evaluate opportunities for use of alternative deicers.	Cost included under 2.3.7.a.i.
2.3.7.a.iii.6	Establish/implement procedures to inspect/maintain storm drains & structural BMPs; and for annual inspection of treatment structures	not stated	Establish/implement procedures to inspect/maintain storm drains & structural BMPs; inspect treatment structures annually at a minimum.	Cost to develop procedures included under 2.3.7.a.i.; Costs for maintenance calculated as part of separate O&M cost under stormwater budget.
2.3.7.a.iv	Report on all Good Housekeeping/Pollution Prevention requirements	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.7.a.v	Keep written record of all Good Housekeeping/Pollution Prevention activities under 2.3.7.a	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
2.3.7.b.ii & iii	Perform SWPPP required actions/inspections/training	frequencies as per permit	Perform quarterly inspections at the DPW Facility and the Water Treatment Plant, and conduct annual employee training on SWPPPs developed for each facility.	Assume Town staff will perform quarterly inspections. Costs for employee training included under Item 2.3.4.11.
2.3.7.b.iii	Report on Stormwater Pollution Prevention Plan inspections	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.7.b.iv	Maintain written records for all SWPPP related items under 2.3.7.b	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
SECTION 3 - ADDITIONAL REQUIREMENTS FOR DISCHARGES TO SURFACE DRINKING WATER SUPPLIES AND THEIR TRIBUTARIES				
3.0.a	Make MS4 discharges to surface drinking water supply sources & their tributaries a priority in the SWMP	continuous; report annually	The Town's MS4 discharges to the Merrimack River, which is a surface drinking water supply source in Tewksbury. The Town's MS4 also discharges to the Concord River, which is tributary to a section of the Merrimack River, which is a surface drinking water supply source. The Shawsheen River appears to discharge just downstream of the section of the Merrimiack River that is a water supply source.	As part of the IDDE Investigations, the Town will designate catchments tributary to surface drinking water supply sources as high priority.
3.0.b	Provide pretreatment/spill control for MS4 discharges to public surface drinking water supply sources & their tributaries to the extent feasible	continuous; report annually	The Town's MS4 discharges to the Merrimack River, which is a surface drinking water supply source in Tewksbury. The Town's MS4 also discharges to the Concord River, which is tributary to a section of the Merrimack River, which is a surface drinking water supply source. The Shawsheen River appears to discharge just downstream of the section of the Merrimiack River that is a water supply source.	Allocate $5,000 to $10,000 per year to investigate source protection needs and for potential implementation of BMPs. Both water bodies are impaired for phosphorus so there will be additional potential BMP retrofits installed in these areas as part of the Phosphorus Source Identification Report.
3.0.c	Avoid direct discharges to Class A waters	continuous; report annually	There are no Class A Waters located in Tewksbury.	-
SECTION 4 - PROGRAM EVALUATION, RECORDKEEPING & REPORTING				
4.1.a	Self-evaluate compliance with the permit; include documentation of evaluation in written SWMP	annually	Annually evaluate Town's compliance with permit conditions.	Cost included under Item 4.4.
4.1.b	Evaluate BMP effectiveness & change if needed under provisions of permit	not stated	Evaluate BMP effectiveness in achieving permit objectives & modify BMPs accordingly as needed.	Cost included under Item 4.4.
4.1.b	Report BMP modifications	annual MS4 stormwater reports	Include in Annual MS4 Stormwater Report.	Cost included under Item 4.4.

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 4 PERMIT REQUIREMENTS (JULY 1, 2021 to JUNE 30, 2022)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
4.2	MS4 must keep records for ≥5yrs; make available to public	Continuous	Maintain annual MS4 stormwater reports and make available to the public.	-
4.3	Document results of MS4 outfall screening/sampling & any other monitoring/studies	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
4.4	Submit Annual MS4 Stormwater Report	annually 90 days from effective date	Prepare Annual MS4 Stormwater Report.	$5,000 - $7,500/yr (It is anticipated that first year annual costs will be higher than subsequent years.)

Requirements specific to discharges to waters with approved TMDLs (see Appendix F)
Requirements specific to discharges to impaired waters without an approved TMDL (Appendix H)

Planning Level Estimate for Year 4: **$192,000 to $278,000**

Notes
(1) The permit has a 5-year term, and most permit requirements will be implemented within that timeframe. However, there are certain requirements that the Town will have a longer period of time to implement. These include the planning and installation of structural BMPs for phosphorus removal (Item H.II.1.c). The first BMP retrofit must be constructed in Year 6. The Town is able to establish implementation timeframes for the remaining BMP retrofits. For the purpose of estimating costs, it was assumed that the Town would construct three additional retrofits in Permit Years 7, 8, and 9. The Town also has 10 years to complete IDDE investigations in catchments identified as Problem, High and Low Priority (Item 2.3.4.8.a), and those costs were allocated equally among Permit Years 2 through 10.

STORMWATER FINANCE ANALYSIS

Year 5 MS4 Permit Compliance Cost Table

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 5 PERMIT REQUIREMENTS (JULY 1, 2022 to JUNE 30, 2023)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
SECTION 1 - INTRODUCTION				
1.10.2	Update written SWMP	As Necessary	Update the SWMP as needed on an annual basis.	Assume updates to the SWMP after Year 1 will be made in conjunction with preparation of the Town's Annual Report.
SECTION 2 - NON-NUMERIC EFFLUENT LIMITATIONS				
2.1 - Water Quality Based Effluent Limitations				
2.1.1.b	For MS4 discharges to a water body with an approved TMDL identified in Part 2.2.1, comply with Part 2.2.1 and Appendix F of the Permit	see Appendix F of the 2016 Final MA MS4 General Permit	The Bacteria TMDL for the Shawsheen River Basin is applicable to Tewksbury and it includes Strong Water Brook (MA83-07 - fecal coliform), an unnamed tributary to the Shawsheen River/Meadow Brook (MA83-15 - fecal coliform), and the Shawsheen River (MA83-18 - fecal coliform).	Costs included under 1.10 and F.A.III.
2.1.1.c	For MS4 discharges to a water body that is water quality limited and not subject to an approved TMDL or for municipalities located within Part 2.2.2a.-b., comply with Part 2.2.2 and Appendix H of the Permit	see Appendix H of the 2016 Final MA MS4 General Permit	Per Part 2.2.2.b, Tewksbury has been identified as a municipality that discharges to water bodies or is tributary to water bodies that are impaired due to phosphorus, and is therefore subject to the requirements of Appendix H. This includes the Merrimack River (MA84A-03), the Concord River (MA82A-08), and Long Pond (MA83010). Tewksbury also has water bodies that are impaired for bacteria/pathogens (Trull Brook (MA84A-14) and the Merrimack River (MA84A-03)) and chloride (Pinnacle Brook (MA83-15) and an unnamed tributary to the Shawsheen River (MA83-20)) without an approved TMDL.	Costs included under 1.10, H.II, H.III and H.IV.
2.1.1.d	For all other discharges (not subject to the requirements of Part 2.1.1.b and Part 2.1.1.c of the Permit) contributing to a violation of applicable receiving water quality standards, eliminate condition causing or contributing to exceedance of water quality standards	within 60 days of becoming aware of the situation	If a discharge is identified that contributes to an exceedance of applicable water quality standards, eliminate the conditions contributing to or causing the exceedance within 60 days.	Cost included under IDDE under Item 2.3.4.2.a.
2.1.2	Written notification to MADEP & EPA as needed & documentation in the Town's SWMP regarding new or increased stormwater discharges	as needed	Any new or increased stormwater discharges must satisfy MA antidegradation regulations.	-
2.2 - Discharges to Certain Impaired Waters				
2.2	Identify all outfalls/interconnections that discharge to waters with an approved TMDL or discharge to certain waters identified as "water quality limited water bodies"	SWMP (1 yr) & annual MS4 stormwater reports	Identify all outfalls or interconnections that discharge to water quality limited water bodies.	Cost included under Items 1.10 and 4.4.
IMPAIRED - BACTERIA OR PATHOGENS				
F.A.III.1.a.i.1	Distribute residential message on pet waste management (over/above 2.3.2).	Annually	Develop and disseminate required public education information.	Allocate $10,000 per year to meet all MS4 public education requirements.
F.A.III.1.a.i.1	Disseminate required public education information to dog owners.	At license renewal (or similar)		
F.A.III.1.a.i.1	Send public education materials to septic system owners.	Not specified; assume annually		
IMPAIRED - PHOSPHORUS (INCLUDES TRIBUTARIES)				
H.II.1.a.i.1	Distribute clippings/fertilizer message to required audiences	Annually in March/April	Develop and disseminate required public education information.	Cost included under F.A.III.1.a.i.1.
H.II.1.a.i.1	Distribute pet waste management message to Residential	Annually in June/July		
H.II.1.a.i.1	Distribute leaf litter disposal message to Residential/Business/Commercial	Annually August-October		
H.II.1.a.i.3	2.3.7 Sweep streets/lots $\geq$2/yr spring & fall	Sweep at least twice/year	Increase frequency of sweeping of public streets and municipal parking lots to a minimum of two times per year in drainage areas tributary to the Merrimack River, the Concord River and Long Pond.	Cost included under 2.3.7.a.iii.3 & 4.

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 5 PERMIT REQUIREMENTS (JULY 1, 2022 to JUNE 30, 2023)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
H.II.1.c	Complete Retrofit Evaluation, including implementation plan & schedule	5 years from effective date; With Year 5 Annual Report	Evaluate all permittee-owned properties identified as presenting retrofit opportunities or areas for structural BMP installation under Part 2.3.6.d.ii. or identified in the Phosphorus Source Identification Report that are within the drainage area of the impaired waters or their tributaries.	$60,000 to $100,000 for 4 retrofits - Assume that 4 retrofit opportunities are identified - $15,000 to $20,000 per retrofit to perform required field investigations to evaluate suitability for retrofit and to develop preliminary design (cost will vary however depending on the number of properties identified)
IMPAIRED - BACTERIA OR PATHOGENS				
H.III.2.a.i	Distribute residential message on pet waste management (over/above 2.3.2).	Annually	Develop and disseminate required public education information.	Cost included under H.II.1.a.i.1.
H.III.2.a.i	Disseminate required public education information to dog owners.	At license renewal (or similar)		
H.III.2.a.i	Send public education materials to septic system owners.	Not specified; assume annually		
H.III.2.a.ii	2.3.4.7 IDDE - Catchments to Bacteria/Pathogen Impaired Waters to be ranked Problem or High	With 2.3.4.7; 1 year from effective date	Rank catchments to bacteria/pathogen impaired waters as Problem or High in catchment ranking to be completed under Item 2.3.4.7.a.ii.	Cost included under 2.3.4.7.a.ii.
IMPAIRED - CHLORIDE				
H.IV.3	If discharge found to be to Chloride Impaired Water; update Salt Reduction Plan (SRP)	60 days from awareness	Develop and implement Salt Reduction Plan in catchment areas draining to Pinnacle Brook (MA83-15) and the unnamed tributary to the Shawsheen River (MA83-20) in accordance with the requirements of Appendix H.	Allocate $5,000 to $10,000 per year towards development and implementation of Salt Reduction Plan.
H.IV.3	If discharge to Chloride Impaired Water & no SRP; prepare SRP	3 years from awareness		
H.IV.3	If discharge to Chloride Impaired Water & no SRP; implement SRP	5 years from awareness		
H.IV.4.a.i	Track/report type/amount of salt applied to MS4-owned surfaces	Annual Reports beginning year SRP completed		
H.IV.4.a.ii	Implement required Salt Reduction activities	Not specified; assume ED		
H.IV.4.b.i	Establish regulatory mechanism to prevent runoff from private salt piles	Not specified	Establish ordinance requiring measures to prevent exposure of any salt stockpiles to precipitation and runoff at all commercial and industrial properties.	Cost included under Item 2.3.6.a.ii.
H.IV.4.b.ii	Distribute message to Commercial/Industrial & private applicators on storage/application of deicing materials (over/above 2.3.3)	Annually in Nov/Dec	Supplement commercial/industrial education program with an annual message to private road salt applicators, and commercial and industrial site owners on the proper storage and application rates of winter deicing material.	Cost included under H.II.1.a.i.1.
H.IV.4.c	Submit SRP to EPA	Annual Report after completion	Include Salt Reduction Plan in Annual Report	Cost included under Item 4.4.
2.3 - Requirements to Reduce Pollutants to the Maximum Extent Practicable (MEP)				
PUBLIC EDUCATION & OUTREACH				
2.3.2.a-d	Distribute at least 2 educational messages to each of 4 targeted audiences (residents, businesses/commercial/institutional, developers and industrial). Different messages to the same targeted audience shall be distributed at least one year apart.	begin year 1; continue throughout permit term	Develop/distribute a minumum of 8 messages over the permit term. Educational messages can include brochures, newsletters, information posted to the Town's website, newspaper articles, public service announcements, displays in municipal buildings, etc.	Cost included under F.A.III.1.a.i.1.
2.3.2.e	Identify method to evaluate effectiveness of message; implement	not stated	Determine method to evaluate message effectiveness; implement method.	
2.3.2.f	Modify ineffective messages/methods	before next message distribution	Modify message or distribution methods if applicable.	
2.3.2.g	Report on messages as per permit	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
PUBLIC INVOLVEMENT & PARTICIPATION				
2.3.3.a	Meet Public Notice requirements	continuous	Ensure that all public involvement activities comply with state public notice requirements.	-
2.3.3.a	Make Stormwater Management Plan & Annual MS4 Stormwater Report available to public	continuous	Make SWMP and annual MS4 stormwater reports available to public at Town Hall and/or on the Town's website.	-

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 5 PERMIT REQUIREMENTS (JULY 1, 2022 to JUNE 30, 2023)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
2.3.3.b	Public opportunity to participate in the review/implementation of the Stormwater Management Program	annually	May be implemented through the use of Town website, Town hotline, clean-up teams, monitoring teams, or a stormwater advisory committee.	Town to satisfy public participation requirements using Town Forces.
2.3.3.c	Report on public participation opportunities	annually	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
	ILLICIT DISCHARGE DETECTION & ELIMINATON			
2.3.4.2.a	Eliminate illicit discharges	60 days from detection or as expeditiously as possible	Eliminate illicit discharges as they are identified or establish a schedule for elimination for discharges that cannot be removed within 60 days.	Budget $10,000 to $15,000 per year starting in Year 2 and going through Year 10 (time period over which IDDE investigations will occur) as an allowance for removal of illicit connections.
2.3.4.2.a	Report dates of illicit identification and schedules for removal	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.4.a	Mitigate SSOs	Expeditiously as possible	Eliminate SSOs as expeditiously as possible and take interim mitigation measures to minimize the discharge of pollutants to and from the Town until elimination is completed.	-
2.3.4.4.c	Report SSOs	24 hours of awareness	Provide verbal notice to EPA within 24 hours, and written notice to EPA and MADEP within 5 days.	Town Forces
2.3.4.4.d	Update SSO inventory	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.5.b	Map the MS4 features required in 2.3.4.6.b under Phase 2 including outfall spatial location, pipes, manholes, catch basins, refined catchment delineations, and the municipal sanitary system (if available) and the municipal combined sewer system (if applicable).	Annually during catchment investigation procedures; Within 10 years from permit effective date	The Town has mapped a majority of their drainage system. Anticipated mapping additions include: refined catchment delineations, updated/new drainage from new developments and re-developments, and drainage updates based on IDDE investigations. The municipal sanitary sewer system has also already been mapped and will be added.	Assume $5,000 per year for additional mapping beginning in Year 2 and going through to Year 10.
2.3.4.5.e	Report on mapping progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.7.a	Report on list of catchments and results of rankings & update annually	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.8.a	Begin investigation of catchments associated with Problem Outfalls	no later than 2 years from effective date	Implement Illicit Discharge Detection and Elimination Investigations as required by the conditions of the permit. For budgeting purposes, it is assumed that an Illicit Discharge Detection and Elimination Investigation Program will need to be implemented in all catchments. Catchments with no potential for illicit discharges (based on the catchment ranking exercise completed under Task 2.3.4.7.c.) can be excluded from the IDDE Program.	Budget $100,000 to $125,000/yr allowance in Years 2 to 10 for IDDE investigation, sampling & reporting. Budget includes $25,000/yr allowance in Years 2 to 10 for CCTV inspection and dye testing to investigate illicit connections. Budget allowance for removal of illicit connections included under 2.3.4.2.a.
2.3.4.8.a	Begin investigation of catchments associated with High and Low Priority Outfalls	After completion of outfall ranking - latest allowable timeframe is 3 years from effective date		
2.3.4.8.a	Complete Investigation of catchments associated with Problem Outfalls	7 years from effective date		
2.3.4.8.a	Complete Investigations of catchments where info on outfall/interconnection identifies sewer input	7 years from effective date		
2.3.4.8.a	Complete Investigations of catchments associated with all Problem, High- and Low-Priority outfalls	10 years from effective date		
2.3.4.8.c.i	Document the presence or absence of system vulnerability factors	Annual Report	Document the presence or absence of system vulnerability factors for each catchment.	To be completed as part of Item 2.3.4.7.a.ii. and iii, and reported in Annual Report (4).
2.3.4.8.c.iii	Report on all data collected as part of the catchment investigations	annual MS4 stormwater reports	Report data in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.4.8.e.i	Report on each illicit discharge identified and date of removal	annual MS4 stormwater reports	For each confirmed source, the following information shall be included: location of discharge and source; description of discharge; method of discovery; date of discovery; date of elimination, mitigation or enforcement action or planned corrective measures; and estimate of the volume of flow removed.	Cost included under Item 4.4.
2.3.4.8.e.ii	Conduct confirmatory outfall or interconnection screening	1 year from removal of discharges	If confirmatory screening indicates evidence of illicit discharge, the catchment shall be scheduled for additional investigation.	Cost is dependent on the number of illicit discharges identified.
2.3.4.9	Evaluate & report IDDE program progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 5 PERMIT REQUIREMENTS (JULY 1, 2022 to JUNE 30, 2023)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
2.3.4.10	Reprioritize catchments and schedule ongoing dry weather and wet weather (where system vulnerability factors are present) screening and sampling once all catchments have been investigated and all illicit discharges have been removed	Once every 5 years	Ongoing dry weather and wet weather (where system vulnerability factors are present) screening and sampling shall be completed every 5 years once all catchments have been investigated and all illicit discharges have been removed.	Catchment investigation work will not be complete until Year 10 so this work will not occur until at least Year 15.
2.3.4.11	Conduct IDDE employee training	at least annually	Train employees about the IDDE Program including how to recognize illicit discharges and SSOs.	Budget $25,000 to $30,000 to prepare training materials and complete required training.
2.3.4.11	Report on IDDE employee training	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
	CONSTRUCTION SITE STORMWATER RUNOFF CONTROL			
2.3.5	Implement & enforce Construction Site Stormwater Runoff Control (CSSRC) Program	not stated	Continue to implement and enforce a program to reduce pollutants in stormwater runoff from construction activities per the 2003 Permit.	-
	POST-CONSTRUCTION STORMWATER MANAGEMENT			
2.3.6.a	Implement & enforce SW management for New Development/Redevelopment	not stated	Continue to implement and enforce a program to address post-construction stormwater runoff from new development and redevelopment projects per the 2003 Permit.	-
2.3.6.a.iii	Report on measures to comply with 2.3.6.a.iii in annual MS4 stormwater report	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.6.d	Identify additional sites and infrastructure that could be retrofitted to maintain a minimun of 5 sites in the inventory; Report progress on implementation of BMP retrofits in Annual Report	annual MS4 stormwater reports beginning Year 5	Report progress in Annual MS4 Stormwater Report.	$2,500 to $5,000
	GOOD HOUSEKEEPING & POLLUTION PREVENTION FOR PERMITEE-OWNED OPERATIONS			
2.3.7.a.ii.2	Provide training on use, storage, & disposal of petroleum products to applicable staff as necessary	not stated	Provide training on use, storage, & disposal of petroleum products to applicable municipal staff as necessary.	Cost included under Item 2.3.4.11
2.3.7.a.iii.2	Implement routine inspection/cleaning/maintenance of catch basins to ensure sumps <50% full; report on activities as specified; investigate excessive sediment; log/report CB cleaning	continuous; annual MS4 stormwater reports	Clean catch basins as needed to ensure that no sump is more than 50% full at any given time. The Town has approximately 3,300 catch basins town-wide. In PY15, only 15% of catch basins were cleaned due to budget constraints. The Town anticipates that 50% of catch basins will need to be cleaned each year to meet permit requirements.	The Town anticipates spending $50,000 to $60,000 annually for catch basin cleaning to meet MS4 Permit requirements. These costs are not included in the MS4 Budget, and instead are included as part of separate O&M cost under the stormwater budget. Once the catch basin optimization plan is complete, additional funding may need to be allocated to increase catch basin cleaning frequency to meet permit requirements. The Town has been collecting data over the last 3 years to build their optimization plan.
2.3.7.a.iii.3 & 4.	Sweep streets/parking lots 1x/year in spring; report on efforts	annually; annual MS4 stormwater reports	The Town currently sweeps all public streets and municipal parking lots annually in the spring. Some streets and parking lots must be swept twice per year to meet the impaired waters requirements included under Appendix H. Part II.1.a.i.3.	The Town currently contracts out some of their street sweeping and does remaining sweeping in-house. They currently spend $12,000 per year. These costs are not included in the MS4 Budget, and instead are included as part of separate O&M cost under the stormwater budget. The Town will need to adjust street sweeping frequency so that streets located within catchments of phosphorous impaired waters are swept twice per year.
2.3.7.a.iii.4	Ensure proper storage of CB cleanings & street sweeping to prevent runoff	NA	Examine storage of CB cleanings & street sweepings	Cost included under 2.3.7.a.i.
2.3.7.a.iii.5	Establish procedures for winter road maintenance	not stated	Look at storage and usage of salt and sand; evaluate opportunities for use of alternative deicers.	Cost included under 2.3.7.a.i.

TEWKSBURY, MA
MS4 GENERAL PERMIT REVIEW - YEAR 5 PERMIT REQUIREMENTS (JULY 1, 2022 to JUNE 30, 2023)
Breakdown of Permit Requirements & Estimated Costs (Based on 2016 Final Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Tewksbury	Estimated Cost to Comply
2.3.7.a.iii.6	Establish/implement procedures to inspect/maintain storm drains & structural BMPs; and for annual inspection of treatment structures	not stated	Establish/implement procedures to inspect/maintain storm drains & structural BMPs; inspect treatment structures annually at a minimum.	Cost to develop procedures included under 2.3.7.a.i.; Costs for maintenance calculated as part of separate O&M cost under stormwater budget.
2.3.7.a.iv	Report on all Good Housekeeping/Pollution Prevention requirements	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.7.a.v	Keep written record of all Good Housekeeping/Pollution Prevention activities under 2.3.7.a	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
2.3.7.b.ii & iii	Perform SWPPP required actions/inspections/training	frequencies as per permit	Perform quarterly inspections at the DPW Facility and the Water Treatment Plant, and conduct annual employee training on SWPPPs developed for each facility.	Assume Town staff will perform quarterly inspections. Costs for employee training included under Item 2.3.4.11.
2.3.7.b.iii	Report on Stormwater Pollution Prevention Plan inspections	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
2.3.7.b.iv	Maintain written records for all SWPPP related items under 2.3.7.b	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
SECTION 3 - ADDITIONAL REQUIREMENTS FOR DISCHARGES TO SURFACE DRINKING WATER SUPPLIES AND THEIR TRIBUTARIES				
3.0.a	Make MS4 discharges to surface drinking water supply sources & their tributaries a priority in the SWMP	continuous; report annually	The Town's MS4 discharges to the Merrimack River, which is a surface drinking water supply source in Tewksbury. The Town's MS4 also discharges to the Concord River, which is tributary to a section of the Merrimack River, which is a surface drinking water supply source. The Shawsheen River appears to discharge just downstream of the section of the Merrimiack River that is a water supply source.	As part of the IDDE Investigations, the Town will designate catchments tributary to surface drinking water supply sources as high priority.
3.0.b	Provide pretreatment/spill control for MS4 discharges to public surface drinking water supply sources & their tributaries to the extent feasible	continuous; report annually	The Town's MS4 discharges to the Merrimack River, which is a surface drinking water supply source in Tewksbury. The Town's MS4 also discharges to the Concord River, which is tributary to a section of the Merrimack River, which is a surface drinking water supply source. The Shawsheen River appears to discharge just downstream of the section of the Merrimiack River that is a water supply source.	Allocate $5,000 to $10,000 per year to investigate source protection needs and for potential implementation of BMPs. Both water bodies are impaired for phosphorus so there will be additional potential BMP retrofits installed in these areas as part of the Phosphorus Source Identification Report.
3.0.c	Avoid direct discharges to Class A waters	continuous; report annually	There are no Class A Waters located in Tewksbury.	-
SECTION 4 - PROGRAM EVALUATION, RECORDKEEPING & REPORTING				
4.1.a	Self-evaluate compliance with the permit; include documentation of evaluation in written SWMP	annually	Annually evaluate Town's compliance with permit conditions.	Cost included under Item 4.4.
4.1.b	Evaluate BMP effectiveness & change if needed under provisions of permit	not stated	Evaluate BMP effectiveness in achieving permit objectives & modify BMPs accordingly as needed.	Cost included under Item 4.4.
4.1.b	Report BMP modifications	annual MS4 stormwater reports	Include in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
4.2	MS4 must keep records for ≥5yrs; make available to public	Continuous	Maintain annual MS4 stormwater reports and make available to the public.	-
4.3	Document results of MS4 outfall screening/sampling & any other monitoring/studies	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	Cost included under Item 4.4.
4.4	Submit Annual MS4 Stormwater Report	annually 90 days from effective date	Prepare Annual MS4 Stormwater Report.	$5,000 - $7,500/yr (It is anticipated that first year annual costs will be higher than subsequent years.)

Requirements specific to discharges to waters with approved TMDLs (see Appendix F)
Requirements specific to discharges to impaired waters without an approved TMDL (Appendix H)

Planning Level Estimate for Year 5: **$217,500 to $323,000**

Notes
(1) The permit has a 5-year term, and most permit requirements will be implemented within that timeframe. However, there are certain requirements that the Town will have a longer period of time to implement. These include the planning and installation of structural BMPs for phosphorus removal (Item H.II.1.c). The first BMP retrofit must be constructed in Year 6. The Town is able to establish implementation timeframes for the remaining BMP retrofits. For the purpose of estimating costs, it was assumed that the Town would construct three additional retrofits in Permit Years 7, 8, and 9. The Town also has 10 years to complete IDDE investigations in catchments identified as Problem, High and Low Priority (Item 2.3.4.8.a), and those costs were allocated equally among Permit Years 2 through 10.

APPENDIX C

Rate Structure Options and Revenue by Parcel Type

STORMWATER FINANCE ANALYSIS

RATE STRUCTURE OPTIONS

*Under Options 1A—1E as described below, residential parcels (1, 2 & 3-Families, Multiple Houses) would be charged a flat fee. All other parcels would be charged varying fees based on their actual impervious area. Using the impervious area, the number of ERUs would be calculated for each parcel, and then rounded up to the nearest whole number and multiplied by the ERU rate to determine the fee for each parcel.

Option #1A

- Flat Fee for Residential Parcels (1, 2 & 3-Families, Multiple Houses)
- Fees for All Other Parcels Based on Impervious Area
- ERU = 4,359 SF; ERU Rate = $75
- Revenue generated = $1,202,250 annually

Parcel Type	No. of Parcels	Total Impervious Area (SF)	ERUs	ERU Rate	Flat Rate	Fees Collected
Residential						
• Single Family	7,433	-	-	-	$75	$557,475
• Single Family with In-law Unit (Two-Family)	397	-	-	-	$75	$29,775
• Three-Family	16	-	-	-	$75	$1,200
• Multiple Houses on One Parcel	9	-	-	-	$75	$675
Other Residential/ Commercial/ Industrial/Tax-Exempt Parcels	641	35,636,521	8,175	$75	-	$613,125
					Total Revenue Collected:	$1,202,250

Option #1B

- Flat Fee for Residential Parcels (1, 2 & 3-Families, Multiple Houses)
- Fees for All Other Parcels Based on Impervious Area
- ERU = 4,359 SF; ERU Rate = $100
- Revenue Generated = $1,603,000 annually

Option #1C

- Flat Fee for Residential Parcels (1, 2 & 3-Families, Multiple Houses)
- Fees for All Other Parcels Based on Impervious Area
- ERU = 4,359 SF; ERU Rate = $150
- Revenue generated = $2,404,500 annually

Option #1D

- Flat Fee for Residential Parcels (1, 2 & 3-Families, Multiple Houses)
- Fees for All Other Parcels Based on Impervious Area
- ERU = 4,359 SF; Split ERU Rate of $75 for Residential (1, 2 & 3-Families, Multiple Houses) and $100 for all other parcels
- Revenue generated = $1,406,625 annually

Option #1E

- Flat Fee for Residential Parcels (1, 2 & 3-Families, Multiple Houses)
- Fees for All Other Parcels Based on Impervious Area
- ERU = 4,359 SF; ERU Rate = $30
- Revenue Generated = $480,900 annually

STORMWATER FINANCE ANALYSIS

*Under Options 2A, 2B, and 2C, as described below, residential parcels (1, 2 & 3-Families, Multiple Houses) would be charged a flat fee. All other parcels would be charged varying fees based on their actual impervious area based on tiers.

Option #2A

- Flat Fee for Residential Parcels (1, 2 & 3-Families, Multiple Houses)
- ERU = 4,359 SF
- Varying Fees for All Other Parcels Based on Impervious Area Tier
- Tie Impervious Area Tier Mid-points to ERU
- Revenue Generated from 1, 2 & 3-Families, Multiple Houses = $785,500
- Revenue Generated from Other Residential/Non-Residential = $752,200

Parcel Type	No. of Parcels	Total Impervious Area (s.f.)	ERUs	ERU Rate	Flat Rate	Fees Collected
Residential						
• Single Family	7,433	-	-	-	$100	$743,300
• Single Family with in-law unit (Two-Family)	397	-	-	-	$100	$39,700
• Three-Family	16	-	-	-	$100	$1,600
• Multiple Houses	9	-	-	-	$100	$900
Other Residential/Non-Residential Tier 1 (IA < 5,000 SF)	222	-	-	-	$125	$27,750
Other Residential/Non-Residential Tier 2 (5,000 ≤ IA < to 10,000 SF)	65	-	-	-	$200	$13,000
Other Residential/Non-Residential Tier 3 (10,000 ≤ IA < to 15,000 SF)	56	-	-	-	$325	$18,200
Other Residential/Non-Residential Tier 4 (15,000 ≤ IA < to 25,000 SF)	61	-	-	-	$500	$31,500
Other Residential/Non-Residential Tier 5 (25,000 ≤ IA < to 50,000 SF)	83	-	-	-	$1,000	$83,000
Other Residential/Non-Residential Tier 6 (50,000 ≤ IA < to 75,000 SF)	44	-	-	-	$1,500	$66,000
Other Residential/Non-Residential Tier 7 (75,000 ≤ IA < to 100,000 SF)	24	-	-	-	$2,250	$54,000
Other Residential/Non-Residential Tier 8 (100,000 ≤ IA < to 200,000 SF)	44	-	-	-	$3,750	$165,000
Other Residential/Non-Residential Tier 9 (200,000 ≤ IA < to 300,000 SF)	17	-	-	-	$6,250	$106,250
Other Residential/Non-Residential Tier 10 (IA ≥300,000 SF)	25	-	-	-	$7,500	$187,500
					Total Revenue Collected:	$1,537,700

STORMWATER FINANCE ANALYSIS

Option #2B

- Flat Fee for Residential Parcels (1, 2 & 3-Families, Multiple Houses)
- Flat Fee = $100
- Varying Fees for All Other Parcels Based on Impervious Area Tier
- Revenue Generated from 1, 2 & 3-Families, Multiple Houses = $785,500
- Revenue Generated from Other Residential/Non-Residential = $1,502,400

Parcel Type	No. of Parcels	Total Impervious Area (s.f.)	ERUs	ERU Rate	Flat Rate	Fees Collected
Residential						
• Single Family	7,433	-	-	-	$100	$743,300
• Single Family w/ in-law unit (Two-Family)	397	-	-	-	$100	$39,700
• Three-Family	16	-	-	-	$100	$1,600
Multiple Houses	9	-	-	-	$100	$900
Other Residential/Non-Residential Tier 1 (IA < 5,000 SF)	222	-	-	-	$250	$55,500
Other Residential/Non-Residential Tier 2 (5,000 ≤ IA < to 10,000 SF)	65	-	-	-	$400	$26,000
Other Residential/Non-Residential Tier 3 (10,000 ≤ IA < to 15,000 SF)	56	-	-	-	$650	$36,400
Other Residential/Non-Residential Tier 4 (15,000 ≤ IA < to 25,000 SF)	61	-	-	-	$1,000	$61,000
Other Residential/Non-Residential Tier 5 (25,000 ≤ IA < to 50,000 SF)	83	-	-	-	$2,000	$166,000
Other Residential/Non-Residential Tier 6 (50,000 ≤ IA < to 75,000 SF)	44	-	-	-	$3,000	$132,000
Other Residential/Non-Residential Tier 7 (75,000 ≤ IA < to 100,000 SF)	24	-	-	-	$4,500	$108,000
Other Residential/Non-Residential Tier 8 (100,000 ≤ IA < to 200,000 SF)	44	-	-	-	$7,500	$330,000
Other Residential/Non-Residential Tier 9 (200,000 ≤ IA < to 300,000 SF)	17	-	-	-	$12,500	$212,500
Other Residential/Non-Residential Tier 10 (IA ≥300,000 SF)	25	-	-	-	$15,000	$375,000
					Total Revenue Collected:	$2,287,900

STORMWATER FINANCE ANALYSIS

Option #2C

- Flat Fee for Residential Parcels (1, 2 & 3-Families, Multiple Houses)
- Flat Fee = $75
- Varying Fees for All Other Parcels Based on Impervious Area Tier
- Revenue Generated from 1, 2 & 3-Families, Multiple Houses = $589,125
- Revenue Generated from Other Residential/Non-Residential = $752,200

Parcel Type	No. of Parcels	Total Impervious Area (s.f.)	ERUs	ERU Rate	Flat Rate	Fees Collected
Residential						
• Single Family	7,433	-	-	-	$75	$557,475
• Single Family w/ in-law unit (Two-Family)	397	-	-	-	$75	$29,775
• Three-Family	16	-	-	-	$75	$1,200
Multiple Houses	9	-	-	-	$75	$675
Other Residential/Non-Residential Tier 1 (IA < 5,000 SF)	222	-	-	-	$125	$27,750
Other Residential/Non-Residential Tier 2 (5,000 ≤ IA < to 10,000 SF)	65	-	-	-	$200	$13,000
Other Residential/Non-Residential Tier 3 (10,000 ≤ IA < to 15,000 SF)	56	-	-	-	$325	$18,200
Other Residential/Non-Residential Tier 4 (15,000 ≤ IA < to 25,000 SF)	61	-	-	-	$500	$31,500
Other Residential/Non-Residential Tier 5 (25,000 ≤ IA < to 50,000 SF)	83	-	-	-	$1,000	$83,000
Other Residential/Non-Residential Tier 6 (50,000 ≤ IA < to 75,000 SF)	44	-	-	-	$1,500	$66,000
Other Residential/Non-Residential Tier 7 (75,000 ≤ IA < to 100,000 SF)	24	-	-	-	$2,250	$54,000
Other Residential/Non-Residential Tier 8 (100,000 ≤ IA < to 200,000 SF)	44	-	-	-	$3,750	$165,000
Other Residential/Non-Residential Tier 9 (200,000 ≤ IA < to 300,000 SF)	17	-	-	-	$6,250	$106,250
Other Residential/Non-Residential Tier 10 (IA ≥300,000 SF)	25	-	-	-	$7,500	$187,500
					Total Revenue Collected:	$1,341,325