

Executive Summary

Tookany/Tacony-Frankford Integrated Watershed Management Plan (TTFIWMP)

Foreword

This plan presents a logical and affordable roadmap for the restoration and protection of the beneficial and designated uses of the Tookany/Tacony-Frankford Creek basin. The Tookany/Tacony-Frankford Integrated Watershed Management Plan (TTFIWMP) is based on extensive physical, chemical, and biological assessments. It explores the nature, causes, severity, and opportunities for control of water quality impairments in the TTF Watershed. The primary intent of this planning process is to improve the environmental health and safe enjoyment of the Tookany/Tacony-Frankford Creek by sharing resources and through cooperation among residents and other stakeholders in the watershed.

The goals of the initiative are to protect, enhance, and restore the beneficial uses of the Tookany/Tacony-Frankford waterway and its riparian areas. This plan recommends appropriate remedial measures for the Tookany/Tacony-Frankford Creek basin and a financial commitment to initiate implementation of recommendations right away. This planning process has sought to provide the impetus for stakeholders of the Tookany/Tacony-Frankford basin to follow suit.

The Philadelphia Water Department conducted a comprehensive, multi-year assessment of the Tookany/Tacony-Frankford Watershed (see Figure E.1). Results of the watershed-wide assessment suggests that at some times during dry weather periods, bacteria contamination of the Tookany/Tacony-Frankford's waters prevents the achievement of water quality standards that would support swimming or other forms of primary contact recreation in the creek. (For a detailed account of the assessment methodology and data results, see the 2004 Tookany/Tacony-Frankford Comprehensive Characterization Report.) Stream aesthetics, accessibility, and safety are compromised due a number of factors, including litter and illegal dumping, trash from stormwater discharges, channelization of portions of the stream, and bank deterioration along stream corridors. The existing aquatic and riparian habitats have been degraded by urban runoff, limiting the diversity of fish and other aquatic life and preventing the development of healthy living resource conditions necessary to support recreational activities such as fishing. Wet weather water quality is limited by bacteria discharged from combined and separate storm sewers. High rates of urban runoff cause flooding during larger storms, and flood flows that erode the stream banks and bottoms and have subsequently exposed and compromised utility infrastructure.

The good news is that measurable progress can be made towards restoring the legislated designated uses of the stream. To this end, this plan provides a commitment from the Philadelphia Water Department to an investment strategy for achieving definable levels of environmental return in the Tookany/Tacony-Frankford Creek basin. It is estimated that significant progress towards improving the various areas of environmental concern can be made for an investment of less than \$290 per household per year over a 20-year horizon.

The plan proposes that the upstream municipalities of Montgomery County in the Tookany/Tacony-Frankford basin make similar financial commitments to implementation in order to ensure the restoration and preservation of the waters that flow through and from their communities, helping to shape their quality of life along the way. A significant portion of this funding is directed towards work that reflects the widely recognized national need to renew our water resources infrastructure. It is proposed that a combination of Federal, state and local government, along with private funding, be brought to bear in order to implement this plan watershed-wide. The Philadelphia Water Department has expended over \$1 million for the development of the plan, and will commit an additional \$2-3 million per year or more towards implementing its recommendations over the next 20 years.

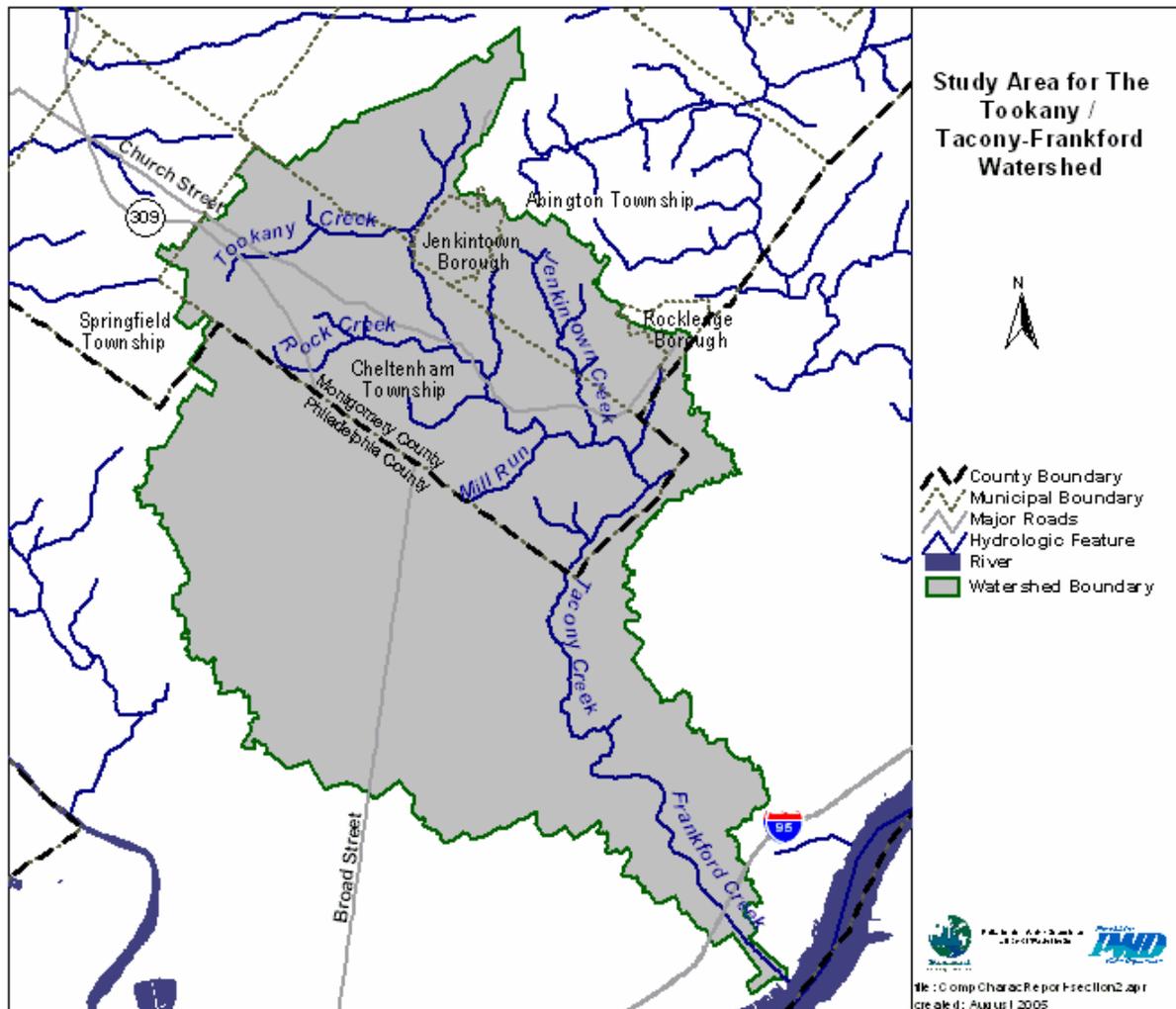


Figure E.1 Tookany/Tacony-Frankford Watershed

Background

Stewardship of a river must be built around the needs of the community. It will grow by making visible the critical way the health of the watershed is integral to basic quality of life issues. Once the seeds of stewardship have been planted, members of the community can be recruited to take action in protecting their watershed.

In 2000, PWD acted as the municipal sponsor of the Tookany/Tacony-Frankford Watershed Partnership, an exciting and groundbreaking effort to connect residents, businesses, and government as neighbors and stewards of the watershed. PWD hired the Pennsylvania Environmental Council (PEC), a well-respected, non-profit institution with a reputation for supporting watershed-based, holistic planning in the form of smart growth planning, as the facilitator and outreach coordinator of this partnership. PEC pulled together a diverse representation of the watershed including municipalities, “friends” groups, educators, agencies, residents, and other nonprofit organizations for participation in this planning process. Since then, the Partnership has been active in developing a vision for the watershed and guiding and supporting subsequent planning activities within the Tookany/Tacony-Frankford watershed.

The mission of the TTF Partnership was summarized as follows:

- To increase public understanding of the importance of a clean and healthy watershed.
- To instill a sense of appreciation and stewardship among residents for the natural environment.
- To improve and enhance our parks, streams, and surrounding communities in the Tookany/Tacony-Frankford Watershed.

With this Tookany/Tacony-Frankford Integrated Watershed Management Plan, PWD, supported by the TTF Partnership, has now completed the multi-year watershed planning effort intended to lead to the restoration of the Watershed as one that can boast fishable, swimmable, and enjoyable streams.

The main purposes of the plan, as articulated by the stakeholders, are: to mitigate wet weather impacts caused by urban stormwater runoff and combined sewer overflow (CSO); to identify ways to improve water quality, aesthetics, and recreational opportunities in dry weather; and to restore living resources in the stream and along the stream corridor. PWD placed a high priority on the development of the TTFIWMP because it represents one of the three major components of the City of Philadelphia’s CSO Long Term Control Plan strategy. This component entails a substantial commitment from the City to watershed planning to identify long term improvements throughout its watersheds, including any additional CSO controls that will result in an improvement of water quality and, ultimately, the attainment of water quality standards.

PWD was not alone in this planning effort. Significant support from other agencies has helped to fund various components of the plan and helped to better integrate this effort

with other regulatory programs. The U.S. EPA provided funding under its Wetland Program Grant to help assess existing wetlands within the Tookany/Tacony-Frankford Watershed and provide basic data for developing wetland restoration projects. Through the Act 167 Stormwater Management Program, PA DEP provided funding to PWD for modeling and analysis to support stormwater planning, as well as to initiate the creation of an Act 167 Plan for this watershed. Finally, initial planning efforts and the development of planning goals were embodied in two Rivers Conservation Plans (one for the Montgomery County portion and one for Philadelphia portion of the watershed) funded by PA DCNR.

Plan Goals

Considerable stakeholder input towards developing watershed goals was sought from the beginning of this planning effort. Stakeholder input was primarily organized through the Partnership; through a weighting and evaluation process, consensus on a set of planning goals and objectives was achieved. In addition, the plan sought to integrate goals derived from other relevant regulatory programs and both Rivers Conservation Plans to more fully achieve the ideal of integrated water resource planning. The resulting integrated planning goals, and their relation to the major regulatory programs, are summarized in Table E.1.

Table E.1 Regulatory Support for Stakeholder Goals for the Tookany/Tacony-Frankford Watershed

Goal Description	Act 167 Stormwater	Act 537 Sewage Facilities	TMDL Program	NPDES Stormwater	CSO Program	RCPs
1. Streamflow and Living Resources. Improve stream habitat and integrity of aquatic life.	X		X	X	X	X
2. Instream Flow Conditions. Reduce the impact of urbanized flow on living resources.	X				X	X
3. Water Quality and Pollutant Loads. Improve dry and wet weather stream quality to reduce the effects on public health and aquatic life.		X	X	X	X	X
4. Stream Corridors. Protect and restore stream corridors, buffers, floodplains, and natural habitats including wetlands.						X
5. Flooding. Identify flood prone areas and decrease flooding by similar measures intended to support Goals 1, 2, and 4.	X					X
6. Quality of Life. Enhance community environmental quality of life (protect open space, access and recreation, security, aesthetics, historical/cultural resources).	X	X	X	X	X	X
7. Stewardship, Communication, and Coordination. Foster community stewardship and improve inter-municipal, inter-county, state-local, and stakeholder cooperation and coordination on a watershed basis.	X	X	X	X	X	X

Planning Approach

Once the Partnership had established the goals and objectives for the TTFIWMP, a planning approach was designed to achieve the desired results through a cooperative effort between the City of Philadelphia and upstream municipalities. The approach has four main elements:

- Data collection, organization, and analysis
- Systems description
- Problem identification and development of plan objectives
- Strategies, policies, and approaches

Watershed Status and Problem Identification

An integral part of this plan is the assessment and description of existing conditions within the watershed and stream. This assessment has identified specific problem areas, while establishing a “watershed baseline” from which we can measure our future progress as recommendations are implemented. Based upon these existing conditions, a series of “watershed indicators” were developed so that as implementation occurs in the coming years, progress can be quantified. “Indicators” are specifically designed to be measurable. For the TTF Watershed, 21 indicators (discussed in Section 4) were used for assessing current conditions and will be revisited annually to measure progress.

Through the extensive field studies, modeling, and data analysis, the highest priority problems in the Tookany/Tacony-Frankford Creek were identified, and the means for addressing the problems were developed. Given that the Tookany/Tacony-Frankford Watershed is highly urbanized with both CSOs and significant stormwater flows, some of the highest priority problems included:

Dry Weather Water Quality and Aesthetics

- Water quality concerns including high fecal coliform during dry weather
- Potential dry weather sewage flows in separate sewered areas
- Trash-filled, unsightly streams that discourage residential use
- Safety concerns along streams and stream corridors

Healthy Living Resources

- Degraded aquatic and riparian habitats
- Loss of wetlands
- Channelized stream sections
- Limited diversity of fish and other aquatic life
- Periodic, localized occurrences of low dissolved oxygen in downstream areas
- Wide diurnal swings in dissolved oxygen
- Utility infrastructure threatened by bank and streambed erosion
- Limited public awareness and sense of stewardship for the creek

Wet Weather Water Quality and Quantity

- Water quality concerns including high fecal coliform, and nutrients and metals during wet weather flows
- CSO impacts on water quality and stream channels
- Little volume control and treatment of stormwater flows in separate sewer areas

Development and Screening of Management Options

Lists of options were developed as potential “solutions” to address the identified problems and to meet each of the goals and objectives established for the Tookany/Tacony-Frankford Watershed. Only those options deemed feasible and practical for the TTF Watershed were considered in the final list of management options. Options were developed and evaluated in three steps:



Since the plan cannot prescribe actions to be undertaken by all the participants in the planning process, recommendations and guidelines for implementation were developed. Modeling and other analyses were used to help recommend an approach for municipalities. Ultimately, it will be up to the TTF Partnership and the Montgomery County municipalities to turn these recommendations into a watershed-wide implementation plan.

Implementation Approach

In developing a recommended watershed management alternative and discussing goals and objectives with stakeholders, it became clear that implementation could best be achieved by defining three distinct targets to meet the overall plan objectives. Targets A and B were defined so that they could be fully met with full implementation of a limited set of options. For Target C, it was agreed to set interim objectives, recommend measures to achieve the interim objectives, implement those controls, and monitor and reassess the effectiveness of the plan in meeting the objectives.

Target A: Dry Weather Water Quality and Aesthetics

The first target is to meet water quality standards in the stream during dry weather flows. Target A was defined for Tookany/Tacony-Frankford Creek with a focus on trash removal and litter prevention, and the elimination of sources of sewage discharge during dry weather.

Sewers must be assessed to identify segments in need of rehabilitation, particularly where leakage is directly flowing into the stream. In separate sewer areas, a detection program for potential cross-connections is needed in order to eliminate dry weather flows.

Target A is also associated with improving the esthetic quality of the stream so that it can be viewed and treasured as a resource. Stream clean-ups are a way to achieve this while also involving residents and volunteers in the process.

Target B: Healthy Living Resources

Improvements to the number, health, and diversity of benthic macroinvertebrate and fish species in the Tookany/Tacony-Frankford Creek will require investment in habitat improvement and measures to provide the opportunity for organisms to avoid high velocities during storms. Improving the ability of an urban stream to support viable habitat and fish populations must focus primarily on the elimination or remediation of the more obvious impacts of urbanization. These include loss of riparian habitat, eroding and undercut banks, scoured streambed or excessive silt deposits, channelized and armored sections, trash buildup, and invasive species.

Target B is focused on improving the instream conditions of the Tookany/Tacony-Frankford Creek. Implementation projects are aimed at habitat improvements as well as measures to provide the opportunity for organisms to avoid high velocities during storms. Improvements to the number, health, and diversity of the benthic macroinvertebrate and fish species are anticipated as a result of these measures.

Target C: Wet Weather Water Quality and Quantity

The third target is to restore water quality to meet fishable and swimmable criteria during wet weather and address flooding issues. Improving water quality and flow conditions during and immediately following storms is the most difficult target to meet in the urban environment. The only rational approach to achieve this target must include stepped implementation with interim targets for reducing wet weather pollutant loads and stormwater flows, along with monitoring for the efficacy of control measures.

Initial load reduction goals for parameters such as stormwater flow, metals, total suspended solids, and bacteria were set in conjunction with the stakeholders. Based on preliminary work by PWD, a 20% reduction has emerged as a challenging but achievable interim goal.

Implementation Guidelines

All management options were thoroughly screened and evaluated using a variety of approaches, including computer simulation modeling and cost-effectiveness. This resulted in the selection of only those options appropriate and deemed effective for the particular conditions found in the Tookany/Tacony-Frankford Watershed. The Implementation Guidelines (Section 8) seek to present the options in such a way that each major stakeholder or responsible party understands what is expected. The guidelines are designed such that, if implementation follows the recommendations, all plan objectives associated with Targets A and B will be fully met, and the interim objectives for Target C will be met or even exceeded.

In Section 8, each recommended option is fully described, and a recommended level of implementation is provided. Where possible, locations for on-the-ground implementation are indicated.

Implementation Plans

The Implementation Guidelines presented in this document are intended to present a long-range vision for implementation over the upcoming 20-year horizon, and to be used as a

reference by parties creating actual Implementation Plans in the future. Such plans will be designed to provide a detailed blueprint for specific tasks during a shorter planning period. Detailed planning for implementation of the TTFIWMP will be broken into four sequential 5-year periods to cover our 20-year implementation horizon.

The Philadelphia Water Department has created and committed to a detailed 5-year Implementation Plan for the portion of the Tookany/Tacony-Frankford Watershed within the City of Philadelphia (see summary in Appendix E). This plan has been designed to begin in 2006 and run through 2011; however, many recommended projects had already been initiated prior to 2006.

Planning Level Costs

Planning-level cost estimates have been developed for the majority of the options recommended. Because actual costs are highly dependent on site specific conditions and the extent to which implementation occurs, cost estimates are only approximate. These estimates are useful, however, in providing order of magnitude funding needs, and also as a comparison to potential costs associated with more traditional approaches to CSO control (e.g., large scale storage tanks designed to reach the 85% capture goal).

Estimated costs to PWD are separated from those to outside agencies (primarily municipalities) by apportioning costs based on ownership of facilities or simply by the relative areas of the watershed within and outside of Philadelphia City limits. "Cost per acre" values (Table E.2) are provided as a simple measure of the way costs are apportioned in the tables. Actual costs will depend on the exact mix of options ultimately implemented.

Table E.2 Total Watershed Plan Cost

Total		Philadelphia		Montgomery County	
Annual Cost	One-Time	Annual Cost	One-Time	Annual Cost	One-Time
\$6,172,000	\$148,459,000	\$3,532,000	\$68,839,000	\$2,637,000	\$79,625,000
\$290/ac	\$7,060/ac	\$290/ac	\$5,650/ac	\$300/ac	\$9,000/ac

The affordability of the costs associated with this plan was also analyzed. The results of this analysis are presented in Table E.3 for Philadelphia and for the combined suburban communities comprising the remainder of the watershed. For Philadelphia, the affordability calculation indicates that the incremental cost of the Tookany/Tacony-Frankford improvements would be approximately \$10 per household per year, representing 0.03% of median household income. For the combined suburban communities, the cost would be \$157 per household per year, representing 0.26% of the weighted median household income for those areas. Both of these values are well within U.S. EPA affordability guidelines, and represent relatively limited increases in the current rates being paid for water, sewer, and stormwater in Philadelphia.

The overall impact on affordability would need to be evaluated in the context of all the programs comprising water quality improvement within a given community. For example, residents of Philadelphia will ultimately help pay for management programs in five or more

watersheds, while residents of Cheltenham, for example, will pay only for this one program. Because residents of Philadelphia will ultimately pay for improvements in a number of watersheds, the total cost per household in Philadelphia likely will be similar to the cost for households in the suburban communities.

Table E.3 Incremental Affordability Measure

		Philadelphia	Suburban Communities (Combined)
1	One-time cost (annualized)	\$3,338,000	\$3,875,000
2	Annual cost	\$2,598,733	\$2,268,386
3	Total annual cost associated with TTFIWMP	\$5,936,733	\$6,143,386
4	Cost per acre in watershed	\$487	\$694
5	2000 MHI (median household income)	\$30,746	\$59,621
6	Estimated annual sewer user charge*	\$343	\$250
7	WMP cost per household in watershed (in entire municipalities)	\$52.53 (\$10.06)	\$258.93 (\$157.00)
8	WMP cost as % of MHI in watershed (in entire municipalities)	0.17% (0.03%)	0.43% (0.26%)
9	Existing sewer cost + TTFIWMP cost in watershed (in entire municipalities)	1.59% (1.15%)	0.62% (0.46%)

* The sewer user charge in Philadelphia includes a stormwater collection and treatment fee. Stormwater-related charges outside Philadelphia were not investigated.

Tables E.4 and E.5 provide data to help communities outside Philadelphia place projected TTFIWMP costs in a local context. Table E.4 expresses estimated costs for communities per acre and per household inside the watershed boundaries; Table E.5 presents costs within the boundaries of all municipalities that intersect the watershed. These cost tables are but one illustration of a possible cost distribution, and are provided to help municipalities decide what funding and institutional mechanisms may be most appropriate given local conditions.

Table E.4 Distribution of Costs among Rate Payers in Tookany/Tacony-Frankford Watershed in Communities Outside Philadelphia

	Abington	Cheltenham	Jenkintown	Philadelphia	Rockledge
Municipality area in watershed (ac)	2,712	5,691	367	12,178	81
Area of municipality in watershed (% of municipality total)	27%	98%	99%	13%	37%
Households in municipality and watershed	7,147	14,218	2,013	113,022	348
Annual cost associated with TTFIWMP	\$807,899	\$1,695,749	\$109,277	\$3,532,000	\$24,075
Cost per acre (within watershed)	\$297.95	\$297.95	\$297.95	\$290.03	\$297.95
Cost per household (within watershed)	\$113.04	\$119.27	\$54.29	\$31.25	\$69.18
Median household income (\$/year)	\$59,921	\$61,713	\$47,743	\$30,746	\$47,958
Cost per household (% of MHI)	0.19%	0.19%	0.11%	0.10%	0.14%

Table E.5 Distribution among All Rate Payers in Communities Outside Philadelphia

	Abington	Cheltenham	Jenkintown	Philadelphia	Rockledge
Municipality area (ac)	9,893	5,779	369	91,287	219
Watershed area in municipality (ac)	2,712	5,691	367	12,178	81
Watershed area in municipality (% of watershed total)	12.9%	27.1%	1.7%	57.9%	0.4%
Households in municipality	21,690	14,346	2,035	590,071	1,060
Annual cost associated with TTFIWMP	\$807,899	\$1,695,749	\$109,277	\$3,532,000	\$24,075
Cost per acre (whole municipality)	\$81.66	\$293.42	\$296.36	\$38.69	\$109.91
Cost per household (whole municipality)	\$37.25	\$118.20	\$53.70	\$5.99	\$22.71
Median household income (\$/year)	\$59,921	\$61,713	\$47,743	\$30,746	\$47,958
Cost per household (% of MHI)	0.06%	0.19%	0.11%	0.02%	0.05%