Bensalem Greenway Master Plan

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# Bensalem Greenway Master Plan

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Chapter 1

Project Background

In recent years, the progress made toward the design and implementation of a continuous East Coast Greenway route through the southeast Pennsylvania region has been remarkable. Comprising dozens of individual trail segments, virtually the entire route through Bucks County, Philadelphia, and Delaware County has or will soon be in some stage of planning, design, or construction.

To this end, the Pennsylvania Environmental Council and Bensalem Township have collaborated to develop conceptual plans for the Bensalem Greenway, a key segment of the East Coast Greenway bicycle route planned to stretch from Maine to Florida. This document presents the plan for a pedestrian and bicycle trail along State Road in Bensalem, from the Township boundary with Philadelphia at Poquessing Creek to the entrance to Neshaminy State Park. At each end of the project area, the proposed greenway trail will link with segments already or soon-to-be designed.

Identified as a priority project by Bensalem, by Bucks County, and by regional and national stakeholders of the East Coast Greenway (ECG), this greenway trail is believed to require relatively low construction cost and could be implemented quickly due to its alignment along State Road, a public right-of-way. This section of the overall Bensalem Greenway System will be an important trail to connect the ECG with communities along the Delaware River. It will also contribute to a Township-wide “green” infrastructure system.

This Master Plan builds on analysis performed in a 2008 feasibility study, and prepares the project for the final engineering design phase of development. To accomplish this, the Plan:

1. Identifies a detailed preferred alignment for the Greenway along the State Road corridor;
2. Establishes design standards for the greenway;
3. Recommends an implementation strategy; and
4. Provides detailed cost estimates for implementation.

The implementation of a high-quality greenway system in Bensalem is indicative of the broader effort to promote sustainable transportation infrastructure in the region and beyond. The last two decades have seen a proliferation of multi-use recreation facilities.
trails in the United States. Throughout the country, trails and greenway corridors have become increasingly seen as highly valued public amenities, providing opportunities for recreation, environmental education, transportation, and physical linkages between places.

Waterfronts, especially, are the focus of trail development activity. The public value of waterfront access has been well-documented, as cities everywhere have made great strides toward recapturing their waterfront areas for public use. For Bensalem, the State Road greenway provides an opportunity to connect the public to the Delaware River in ways that have yet to be fully envisioned.

While the challenges of inserting new uses into congested corridors such as State Road can seem daunting, the potential to connect population centers to new recreational opportunities, and to connect trail users to economic and cultural vitality of urban areas, presents a great opportunity for community development. Greenway design provides a mechanism to merge economic development, recreation planning, and tourism promotion in new ways, promising great untapped potential for synergy.

The benefits of greenways are clear: they provide new recreation opportunities, foster improved public health, create alternative transportation options, promote environmental quality, and enhance the social fabric of communities. With the increasing public concern over traffic congestion, air quality, global warming, and oil dependency, pedestrian and bicycle greenways are an indispensable part of our sustainable future.
**Project Goals and Context**

The essential goal of the project is to produce a plan for a high-quality bicycle greenway along State Road as part of the overall implementation strategy for Bensalem’s and Bucks County’s trail and greenway plans, and the nationwide East Coast Greenway.

**East Coast Greenway**

At its broadest level, the goal of the project is to bridge a key gap in the East Coast Greenway (ECG) in Pennsylvania, by developing a Master Plan and conceptual design for implementation of a bicycle/pedestrian greenway along State Road in Bensalem. This trail connection is intended to be a critical component of the East Coast Greenway. The ECG is an ambitious project: a 3,000-mile long recreational greenway linking Calais, Maine to Key West, Florida through some of the nation’s most densely urban spaces. Upon completion, the greenway will not only provide additional recreational opportunities for a large portion of the nation’s population; but will also have helped revitalize old abandoned waterfronts and urban residential areas. Despite its ambitious scope, the ECG is proceeding steadily, with over 21 percent of the route already completed as an off-road trail. However, Pennsylvania lags behind, with only 10 percent of the approximately total 60 miles completed as off-road trail so far.

Regionally, the planning for the East Coast Greenway has progressed rapidly over the past few years, with existing and planned trails extending north and south from Bensalem along an alignment roughly parallel to the Delaware River. In Philadelphia, the Pennsylvania Environmental Council (PEC), the Delaware River City Corporation (DRCC), and City of Philadelphia have been collaborating with a range of public agencies and private-sector stakeholders to bring to life plans for a Delaware River Greenway in the City. This segment is planned to extend across Philadelphia and connect to existing and planned trails along the Schuylkill River, and from there west into Delaware County.

North of Bensalem in Bucks County, progress on an East Coast Greenway alignment has advanced substantially. The PA Department of Conservation and Natural Resources has started design and engineering on two projects, which are intended to close the gap on 2 of 5 obstructions currently existing along a 9-mile stretch of the ECG in Morrisville, Falls Township, Tullytown, and Bristol Borough. The PA DCNR and the Pennsylvania Environmental Council are currently collaborating in trying to find funding for construction for these two projects, and for additional small amounts of funding to address the remaining, less complex three gaps.
Immediately south of this 9-mile stretch, an existing 2 miles of the Delaware Canal Trail bring the ECG into the heart of Bristol Borough. However, a large gap south of the Borough currently exists. A study was recently completed to propose a solution to this gap, and Bristol Borough is currently seeking funding to build the first mile of new trail. Beyond this first mile, it is expected that the next segment of the ECG, in Bristol Township, will be completed as an on-road bike lane or as a “sharrow” (mostly on River Road) within the next two years, at a small level of investment. This segment will thus bring the ECG to the northern edge of Bensalem Township, just across the Neshaminy Creek from the Neshaminy Creek State Park.

With the ECG segments soon to be completed north of Bensalem in Bucks County, and south into the City of Philadelphia, the approximately 3.6 miles of the ECG in Bensalem are now the critical gap in the system. The Master Plan will help fill in this last gap in Bucks County.

The Bensalem section is a key gap in the East Coast greenway plan for the region.
Local and Regional Greenway Network

While establishing Bensalem as a critical link in a national trail system is a lofty goal, there are also goals of local importance in developing the local and regional trail network as a benefit to Township and County residents.

State Road has been identified as the preferred alignment of the East Coast Greenway in Bensalem by multiple prior studies, including the Bensalem Township Greenway & Trails Feasibility Study (2008), the Bucks County Waterfront Revitalization Plan (2005), and the Delaware River Heritage Trail: State of the Trail Report (2003). However, none of these studies actually performed a detailed analysis of the available rights-of-way along State Road, rights-of-way width, or need and availability of easements or property acquisition. This Master Plan study is the first significant effort yet made toward implementation, to make the ECG in Bensalem a reality.

The idea for a greenway trail paralleling the Delaware River through Bucks County and Bensalem has been around for decades. As early as the 1990s, the National Park Service began the process of developing concepts for a Delaware River Trail. In 2000, NPS transferred planning and coordination of the Trail to the Delaware River Greenway Partnership, and that organization continued to build public support for the concept in subsequent years. The Delaware River Heritage Trail: State of the Trail Report prepared in 2003 serves as a detailed inventory of a multitude of specific efforts undertaken to advance planning for the trail across the region.

In 2008, Bensalem Township commissioned a Greenways and Trails Feasibility Study to establish a plan for a Township-wide greenway system. This study examines opportunities and constraints to greenway development, and recommends the State Road (or, “Delaware River Heritage Trail”) alignment as one of 9 separate potential corridors within the Township for development as greenways.

Throughout the Southeast Pennsylvania region, planning for
an expanded greenway network is proceeding at an impressive pace. Successful implementation of an integrated system relies upon an effective collaboration at all levels of government. At the regional level, agencies such as the Delaware Valley Regional Planning Commission (DVRPC) and Pennsylvania Environmental Council (PEC) have played lead roles in securing funding and coordinating among diverse stakeholders. County governments in the region have promoted trails by allocating funds and sponsoring planning initiatives. And dozens of municipalities large and small have done planning and construction of individual segments.

To foster collaboration in promoting trail planning, more than a dozen of these varied entities recently joined together under the umbrella of the Circuit Coalition. The Circuit Coalition is a collaboration of non-profit organizations, foundations and agencies working to advance completion of a connected network of trails – The Circuit – in the Greater Philadelphia region. The Circuit Coalition’s goal is to raise the profile of trails and their public benefits so that building The Circuit becomes a significant regional priority.
**Expected Benefits**

The establishment of a pedestrian/bicycle greenway along State Road is expected to result in the significant *transportation, livability, and sustainability benefits* to the Bensalem residents. Sixteen percent of homes in Bensalem are located within a ten minute walk of the proposed greenway and 38% live within a mile of it. Through this project, all of these users and many more from surrounding areas will finally have the opportunity to bike, exercise, and walk along the East Coast Greenway in Bensalem, and will reconnect to the Delaware River as well as communities all around. Among the specific benefits expected are:

1. A direct link to the national East Coast Greenway system, linking Bensalem north to Bristol, Morrisville, New Hope, and Trenton, and south into Philadelphia and beyond.
2. Enhanced opportunity for biking as a means for commuting, especially through connections to mass transit, such as the Cornwells Heights and Eddington Regional Rail Stations (the first of which is the largest park-and-ride facility in the region).
3. Reduced number of conflicts between cars, pedestrians, and bicycles on State Road.
4. New landscaping and trees, enhanced storm water management, and improved environmental quality and aesthetics of State Road.
5. Potential related economic development opportunities.
6. Increase in the appeal and the real estate value of surrounding properties.
7. Opportunity to connect existing natural, cultural, and recreational resources into an integrated open space network, as well as opportunities to develop new open space resources.
8. Enhanced opportunities for the community to connect to the Delaware River.
9. Integration into, and support for, specific mixed-use real estate redevelopment efforts.

Trails can provide a wide range of benefits to a wide range of users, including recreation, transportation, and creating opportunities for economic development.
Situated along the Delaware River bordering Philadelphia and across the river from the state of New Jersey, Bensalem is squarely located at a critical juncture along the major transportation corridors of the eastern United States. It is traversed by major interstate transportation routes including Interstates 95 and 276 (PA Turnpike) and the Amtrak northeast corridor rail line. Bensalem Township is the southernmost of the Bucks County municipalities, and is also the largest one in population, with approximately 60,000 residents. Bensalem has a storied past, but is also a vibrant, youthful community. In fact, three out of ten households have children under the age of 18. Its original suburban and rural character saw great changes during growth spurts in the 20th century, especially so in the 1950s and 1960s. Today, the Township is mostly built-out, with a varied mix of residential and commercial land use.

The Township’s overall diversity is exemplified along State Road, where the setting for the Greenway is a highly varied landscape. The corridor is an urbanized mix of commercial and residential land use punctuated with historic properties and naturalistic open spaces. While the most feasible trail route is within reach of the Delaware River, the river itself is largely out of sight, with very limited public access.

Trail planning presents an opportunity to connect together the existing natural and cultural resources to form a true open space network. The challenge is to design effectively for the spaces in between, which are in some places inhospitable for recreational use.
**Project Area**

The project area for this study is the State Road corridor along the southern edge of the Township, in proximity to the Delaware River. The study corridor is approximately 3.6 miles long, with Neshaminy State Park forming the northern terminus, and the City of Philadelphia at the southern terminus. Along the length of the corridor, the Delaware River on one side and the I-95/Amtrak corridor on the other side provide strongly-defined edges.
Land Use

The project area is characterized by a mix of residential and light-industrial land uses, interspaced with significant historic and open space resources. The northern half of the study area is largely light-industrial. Adjacent properties include manufacturing, warehousing, shipping, and associated office uses. Two prominent properties within this zone are currently vacant and subject to planning for new high-density residential development. These two properties (“The Landings” and “Waterside”) will be developed by separate firms in accordance with the Township’s goal of encouraging a transition from heavier industrial uses to light industrial, residential, and mixed-use. Such redevelopment, if and when it occurs, will have substantial impact on the character and function of the corridor.

In the center of the project area, Pen Ryn and Andalusia are significant historic properties. These are described in further detail below.

The southern portion of the study area is largely mixed residential/commercial. Two distinct pockets of single family houses flank State Road south of Pen Ryn, along with a sprinkling of multi-family residences and apartment buildings. The Salem Harbour apartment complex occupies the southern edge of the corridor.

For the entire project area, the I-95/Amtrak corridor forms a barrier that allows access to areas on the other side only at relatively few locations. For this reason, this riverfront section of Bensalem surrounding the State Road corridor is in some ways isolated from the rest of the Township.

There are two notable public open spaces within the project area. Neshaminy State Park at the northern terminus is a regional public park offering hiking, fishing, swimming pool, and boat launch. Further south, a Pennsylvania Fish and Boat Commission boat launch is located along the Delaware River at the end of Station Ave.
Transportation Infrastructure

State Road is classified by PennDOT as a minor arterial roadway. It has a posted speed limit of 40 mph. For the majority of its length through the study area, it is a 2-lane roadway within a 50-foot wide right-of-way. At the approaches to Tennis Avenue, the State Road right-of-way is 80-feet wide, to accommodate the additional width needed to elevate the road bed above the adjacent rail line.

The roadway carries a heavy volume of local traffic, including considerable traffic serving the commercial and industrial properties along State Road and in the vicinity. The most direct access to I-95 is at Street Road. Not surprisingly, this intersection sees perhaps the most traffic congestion within the project area.

There are four signalized intersections along State Road within the 3.6 mile project length, at Tennis Avenue, Station Avenue, Street Road, and Dunks Ferry Road. This relative few number of controlled crossings contributes to a relatively high speed of traffic. These cross streets are also among the few streets that perforate I-95/Amtrak, and as a result are highly important connectors for State Road users.

The Amtrak northeast corridor rail line parallels State Road along its entire length, and carries not only Amtrak passenger trains but also SEPTA regional rail commuter trains bound for Philadelphia along the Trenton line. The Cornwells Heights station is located just west of State Road along Station Avenue, and offers boarding for both Amtrak and SEPTA passengers. Two other stations – the Eddington Station (Street Road) and Torresdale Station (Grant Avenue) – board SEPTA passengers only.
Historic/Cultural Resources

Despite steady urbanization that has occurred over the last 50 years, the long history of the project corridor remains in evidence with the presence of several prominent historic homes.

Pen Ryn dates to 1744 and is listed on the National Register of Historic Places. It has been restored in recent decades and is open for private events and functions, as is the adjacent Belle Voire Manor. The buildings themselves are privately owned, while the surrounding property is owned by Bucks County.

A short distance away, Andalusia is a registered National Historic Landmark and a noted example of American Greek Revival architecture. The home was built in 1795 by Nicholas Biddle, a prominent businessman who served as president of the Second Bank of the United States during the 1820s and was one of the richest and most powerful men in America. It remains in the Biddle family today, and is open for special events and private tours.

Another historic home, Glen Foerd, is located at the southern terminus of the project area, at the very edge of the Philadelphia city limits. As with Pen Ryn, this estate is open for private functions.

With such a number of significant intact historic properties located in close proximity along the same road, there is great potential to connect them both physically and thematically. The possibility of linking these properties with a bicycle trail is a valuable opportunity to promote the area’s cultural heritage.

Clockwise from top right: Pen Ryn, Andalusia, Glen Foerd, and Belle Voire.
Natural Resources

Though the corridor is heavily developed, there is nevertheless a significant presence of natural resources within the project area, including wooded areas, wetlands, floodplain areas, and natural flora and fauna habitat.

The project area is within the Delaware River Watershed, and portions of the corridor are within the 500-year floodplain. The existing open space parcels located mostly in the southern half of the area (i.e., Pen Ryn, Andalusia, etc.) contain mapped wetlands and are subject to periodic flooding. The roadway itself is subject to flooding along its length, due to insufficient drainage infrastructure and relatively flat topography.

Wetland areas have the potential to contain sensitive or endangered plant species indigenous to such habitat. A Pennsylvania Natural Diversity Inventory (PNDI) search indicates possible presence of a number of such endangered or threatened species. In general, wooded sites coincide with the wetlands, and occur mostly in the middle portion of the project area.

It is likely that a future trail may bring the public into close proximity to these sensitive natural areas. This could be a strong positive feature of the trail, providing the potential for educational and interpretive engagement of the public. However, such interventions must be handled sensitively to ensure the integrity of the natural resource. Protection and conservation of these sensitive areas should remain a priority of the trail plan.

Portions of the corridor are within the floodplain of the Delaware River, and wetlands are present in low-lying areas.

Hydrology
Source: Bensalem Greenway Trail Feasibility Study, 2008

Wooden Areas
Source: Bensalem Greenway Trail Feasibility Study, 2008
Property Ownership

With such close proximity to the Delaware River, the ultimate goal is for the East Coast Greenway to follow a riverfront alignment – or at the very least provide a connection to other public pathways offering riverfront access. However, along this stretch of the Delaware River, the riverfront is mostly in private ownership. Public access connecting State Road to the river is available at each end of the project area: Neshaminy State Park to the north and Glen Foerd to the south. In between, such access is available at only two points: Pen Ryn Mansion, and the Pennsylvania Fish and Boat Commission boat launch at the end of Station Avenue.

With most of the river frontage in private hands, the search for a greenway alignment has been focused on the public right-of-way of State Road. The 50-foot wide right-of-way is generally wide enough to accommodate a trail (provided there are only two lanes of traffic). The preference, however, remains strongly for an off-road alignment, which can be made possible through acquisition of easements of other rights to adjacent property.

Fortunately, various public entities have title or rights to many of the properties alongside State Road. Bucks County owns the Pen Ryn estate as well as a sizable undeveloped parcel across the street. The Bucks County Industrial Development Authority (BCIDA) owns a number of commercial properties along the northern stretch of the project area. Also, the Bucks County Water and Sewer Authority (BCWSA) holds title to a utility easement along east side of the roadway. Taken together, these properties constitute a substantial portion of the total length of the desired trail alignment.

In addition to these public entities, two private developers have indicated a willingness to accommodate the trail on their properties. The Landings and Waterside are both large-scale prospective residential developments proposed for the river side of State Road north of Station Avenue. Initial plans for each site include provisions that would allow for an off-road trail.

There are dozens of other individual privately-owned properties along State Road. These span the gamut of types and uses, including single-family residences, apartment buildings, large-and small-scale commercial properties, and a smattering of retail operations. Residential neighbors, particularly, are likely to be concerned about the potential impact of the trail located at the edge of their properties.

Parallel to State Road and within very close proximity is the Amtrak northeast corridor rail line. This rail right-of-way may have great potential as a location for a portion of the trail for a few critical short-length sections, especially as a way to reduce the impact to residential neighborhoods along the route. Use of the rail right-of-way for trail purposes will need to be negotiated with Amtrak.
Physical Constraints

Along the preferred trail route, there are a variety of physical obstacles that will factor into the determination of a final trail alignment. Some of these will place physical limitations on the space available for the trail. Others, while surmountable, will require engineered solutions that will increase construction cost.

Examples of such constraints include:

**Utility Poles:** Utility poles occupy the shoulders of the roadway on both sides for most of the route. In areas where the trail must be located within the 50-foot right-of-way, these poles occupy space that otherwise could be used for the trail. Relocation of the utility poles is possible, but adds to the project cost.

**Street Trees:** In residential sections of State Road, mature street trees are found within the right-of-way just off the travel lanes, blocking roadway shoulder space that might be used for the trail. Given the contribution the trees lend to the character of the neighborhood, the preference is to preserve the trees.

**Stream Crossings:** In several locations (both on-street and off-street), it will be necessary to cross major or minor streams and drainage swales, which will require construction of culverts or bridges.

**Steep Slopes:** The intersection of State Road with Tennis Avenue is elevated, to allow Tennis Avenue to cross over the nearby rail lines. As State Road climbs to this higher elevation, there are steep embankments along both shoulders. To fit the trail within the right-of-way in this location, a structural solution must be employed to create flat space for the trail surface. In other locations along the trail route, re-grading and minor retaining walls may be necessary.

**Lack of Road Crossing Opportunities:** Along the 3.6 mile length of State Road, there are only 4 signalized intersections (Dunksferry Road, Street Road, Station Road, Tennis Avenue) – an average of about one per mile. This presents very limited opportunity for safe and controlled crossing of State Road for trail users.

Some of the site challenges for trail design:
Left Top: Re-grading necessary in section 1
Left Middle: steep slopes on Tennis Ave. shoulders
Left Bottom: trees, utility poles, and drainage swales occupy roadway shoulders
Right Top: periodic flooding due to poor drainage
Right Middle: truck loading is one example of incompatible adjacent land use
**Incompatible Adjacent Land Uses:** Some stretches of State Road are more compatible with pedestrian/bicycle activity than others. In one area in particular, heavy truck loading takes place immediately adjacent to the street, and presents a potential hazardous condition.

**Wetlands:** Several properties – including the county property opposite from Andalusia – have designated wetland areas. The trail alignment will need to skirt these areas, or mitigation of some form may be required.

**Poor Drainage:** In several areas, the State Road corridor lacks drainage infrastructure, and is prone to flooding even in relatively minor rain events. The additional paved surface for the trail has the potential to exacerbate this condition. At the same time, the design and construction of the trail may be the opportunity to make improvements to the drainage system as an overall community benefit.
Chapter 3
Greenway Design Recommendations

The ultimate goal of this study is to propose a design concept that will satisfy the functional requirements of a shared use path (where appropriate) for recreational bicyclists and pedestrians. While a completely off-road trail is preferred, in certain sections the constraints of property rights and existing physical conditions may require that modified bike lanes within the street right-of-way will be the best possible solution.

It is presumed that a shared-use pathway is preferable to separated pathways. The goal is to create something much more substantial than simple bike lanes on State Road. Striped bicycle lanes, typical to many streets and familiar to everyone, is the most basic example of separated pathways, with a separate lane for each direction of travel. The advantage of such a layout is that it often can be easily and inexpensively constructed within the existing right-of-way, on what is essentially the shoulder of the road. While relatively easy to implement, bicycle facilities such as this do not provide a high degree of user safety, especially on busy roadways, since the user is not buffered from traffic. Neither do they accommodate pedestrians or other types of users.

For the Bensalem Greenway, user safety and the quality of the experience for all users is a high priority. Therefore, the objective is to provide a wide, shared, 2-way pathway that is off-road, or at the very least sufficiently buffered from vehicular traffic. In all respects, the design of the greenway is intended to comply with all applicable design and safety standards, including those set forth by AASHTO, MUTCD, PennDOT, and the East Coast Greenway Alliance.
Alignment Selection Criteria

While the objective of connecting from one end of the study area to the other along State Road is straightforward, a wide variety of potential options for trail alignment along the route were considered. Selection of the final recommended route was made based on objective design criteria:

Quality of Experience: Overall experience on the route, including ease of access to the trail, visual quality of the surroundings, safety (real and perceived), compatibility with surrounding land uses, ability of the route to accommodate the expected volume of users, and suitability of the trail facility for a range of user types and abilities. Given the heavy volume of vehicular traffic, off-road alignments buffered from on-street traffic offer a higher quality of user experience. Conversely, on-street alignments have a lower quality of experience.

Availability of Right-of-Way: In identifying an off-road alignment, it is necessary to secure property rights from adjoining property owners. Given the highly varied land uses and disparate ownership of properties along the route, the potential to acquire the necessary easements is highly inconsistent. In simple terms, some owners are more amenable to allowing a public trail on their property than others. The likelihood of acquiring necessary rights is a significant determinant of the proposed alignment.

Quality of Connections: A major feature of an ideal greenway alignment is one that connects neighborhoods and community facilities to maximize the network of recreation resources. Higher consideration is given to routes that connect many existing destinations, and serve as a feasible way to circulate between them. In Bensalem, this includes existing opens spaces such as Neshaminy State Park, cultural resources such as Pen Ryn, and most importantly the riverfront. Since most of the frontage of the Delaware River is in private hands, the trail should capitalize on those opportunities that can and do exist to provide public access to the river.

Relative Implementation Cost: Relative cost to implement, including cost for land acquisition and construction. Factors that will add to cost include: overall length of the alignment; necessary acquisition of land and/or easements; need for structural improvements such as bridges and walls; need to relocate existing facilities, and other factors.

Physical Obstructions: In certain places along the route, existing physical obstructions would add to the cost of the trail, or degrade the overall user experience. These may include steep slopes, stream crossings, utility poles, wetlands, or incompatible adjacent land use. It is desirable to avoid these obstructions if possible.

Roadways and Traffic Impacts: Adverse impact on existing vehicle traffic patterns, including traffic capacity, parking, speed of travel. Priority will be given to routes that have the least adverse impact.

Economic Impacts: The potential to serve as a catalyst for private economic growth and development, and produce positive and tangible economic value for the Township and region.

Community Support: The support of neighboring communities and advocacy groups for the project and their view of the alignment as a positive asset for the community.

Environmental Impacts: Potential for incorporating environmentally-sustainable design elements, such as sustainable storm water management practices, facilitation of multi-modal transportation, restoration of native habitat, use of native species, etc.

Consistency with Local Plans: Degree to which the alignment is compatible with other trail/bikeway plans and policies, and with other urban land use and planning objectives of the Township and affected property owners.

Operations and Maintenance Considerations: Relative cost and difficulty of maintaining each alignment. Includes identification of potential public- and private-sector partnerships that may help to perform and subsidize maintenance and operations such as cleaning, security, repairs, promotions, etc.

Synergy: Positive relationship of the alignment to other projects and programs, and the potential for the trail to improve the quality of life for residents and to function as a recreation resource, transportation resource, cultural resource, environmental resource, and memorable experience.
Stakeholder Input

This plan was developed through extensive outreach and dialogue with a wide range of interested stakeholders, including local public officials, regional planning agencies, advocacy groups, adjacent property owners, and the general public. The study was conducted over a 11-month period from August 2011 through June 2012.

Outreach took place on several levels. An ad hoc steering committee, comprised of key relevant stakeholders, was established to review and guide the progress of the study. Formal meetings of the committee took place on four occasions: In August and December 2011, and in February and June 2012. Additionally, numerous other meetings took place with individual public agencies and property owners which could potentially be impacted by the greenway, to seek input and gauge response as the plans developed. A public meeting that presented the trail plan to community groups and the general public was advertised and held in May 2012, near the conclusion of the project.

The reactions of stakeholders to the plans presented in this study were almost uniformly positive. Overall, there was widespread consensus in support of the project and its underlying goals and principles. There was almost universal agreement expressed in the value of promoting the local network of trails and bicycle routes. Valid concerns were also expressed, and much effort has been made to identify these concerns and address them conscientiously within the scope of this study.

The principal concern of the public was the impact of the trail on adjacent properties. As the proposed trail route relies heavily on cooperation of adjacent property owners for an off-road alignment, the perception of the trail and its potential impact is of significant importance to property owners. While neighbors are generally receptive to the idea of the trail as a positive amenity, they remain understandably concerned about the direct impact it might have on their property. Specific concerns voiced (and the responses given) include:

- **Will my property be “taken” against my will?**
  - Response: Most definitely not. The purpose of the trail is as a community benefit and amenity. The trail will be located on public property, or on private property with full permission of the owner.

- **Will my taxes go up to pay for it?**
  - Response: Most definitely not. The trail construction will be funded entirely from outside the Township operating budget. The trail will be funded by a combination of state/federal grants and private-sector contributions.

- **Will the added public presence along my property be a security risk?**
  - Response: Studies have shown that trails pose no security risk. The street itself is a public thoroughfare and available for continuous public access.

- **Who will maintain the trail, and will I be stuck with a maintenance burden?**
  - Response: The trail is a public improvement and maintenance for it will be the responsibility of the Township and/or County.

Along with concerns, the public also expressed hopefulness that opportunities to enhance the overall trail experience be explored and undertaken. Some of these included:

- **Will the trail spur the development of additional parks and open spaces?**
- **Can the trail be used to connect together existing historic resources?**
- **Will the trail connect to transit stations?**

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**Project Steering Committee**

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Jeff Marshall, Heritage Conservancy
Fran Hanney, PennDOT
Scott Burton, PennDOT
BENSALEM GREENWAY
BENSALEM

TWO LANE ROAD SECTION
THREE LANE ROAD SECTION (FUTURE)
MASTER PLAN
TOWNSHIP, PA

TWO LANE ROAD SECTION
Greenway Trail Design Concept

The landscape of State Road along the 3.6 mile length in Bensalem is diverse. As a result, the ultimate trail configuration is expected to vary along the route, in response to the wide variety of individual property constraints and specific opportunities for off-road alignment.

This Plan identifies 18 distinct trail segments, each defined by unique constraints and characteristics. Overall, these many segments can be described as 4 principal sections. From north to south, these are:

- **Section A - Industrial**: This industrialized section of State Road has the heaviest traffic and land use most incompatible with the trail. However, an adjacent sewer easement and sympathetic property owners offer opportunities for an off-road alignment.
- **Section B - Open Space**: County-owned property will allow for an off-road alignment, and the undeveloped wooded parcels provide for a naturalistic trail setting.
- **Section C - Residential**: This is the best opportunity to connect residents to the trail. But the narrow roadway and adjacent private property presents a challenge for identifying a favorable alignment. Locating the trail along the rail line behind the houses appears to be the best option.
- **Section D – Mixed Use**: The connecting link to Philadelphia is constrained by a mix of adjacent uses. Easements will be necessary to achieve an off-road alignment. Portions of the trail may need to be within the right-of-way.
Design Standards

The landscape of State Road along the 3.6 mile length in Bensalem is diverse. As a result, the ultimate trail configuration is expected to vary along the route, in response to the wide range of conditions that will be encountered.

The general design standard is for an asphalt-paved, 12-foot wide, bi-directional shared use path.

Where the trail can be accommodated outside the street right-of-way, this standard should be achievable. For a significant length, it is expected that the trail can be sited within a 30-foot sewer easement next to the street (Configuration C, right). At several intervals, such as the Pen Ryn estate, the trail will be relatively free from dimensional constraints, and can follow a gentle curving alignment to take advantage of natural landscape features (Configuration A).

Constraints to this design objective are where the trail must fit within the existing 50’-wide street right-of-way (Configuration B). For these segments, the trail must compete with space with vehicular travel lanes, roadway shoulders, drainage swales, utility poles, and other obstructions. Depending on the specific conditions along the route, it is likely that a narrowed trail of 10-feet or even 8-feet may be necessary in some locations. To the extent that obstructions can be moved (i.e., relocate utility poles, shift cartway to one side of the ROW, etc), more room will be available for the trail.
Recommendations

Trail Section A: Segments 1 - 9

Bensalem Greenway
Section A

Future 3-lane Road Section

1  2  3  4  5  6  7  8  9

Neshaminy Park
Street Road
The Lancings (future)
Waterade (future)
Sexton Ave.
Segment 1: Neshaminy Park to Street Road

At the northern end of the project area, the trail will connect to Neshaminy State Park. Currently the Park has an internal network of paved pathways popular for walking, biking and roller blading. The trail will connect to this internal Park circulation network. Plans are being developed separately for the trail to continue north beyond the Park, across Neshaminy Creek, and into Bristol Township.

From the Park, the trail will cross Dunks Ferry Road at the signalized intersection, and is proposed to continue about 1/3 mile on an off-road alignment along the east (river) side of State Road. The trail through this segment will cross three separate private commercial properties, and it is intended to occupy a 30’ wide sewer easement that exists outside the street right-of-way (see pages 52-53). Some re-grading and landscaping will be required to accommodate the trail. However, it appears the trail can be constructed within the sewer easement without undue complications, and with minimal impact to the adjoining properties.

Segment 1: Quick Facts

Approx. Length: 1,800 ft. (0.3 miles)

Proposed Trail Alignment:
- sufficient space for greenway outside ROW and within 30’ sewer easement

Ownership of Adjoining Properties (3):
- Albert Chadwick
- Dunks Ferry Assoc. (Croydon Mattress)
- Philadelphia Gun Club

Easements/Permissions Required:
- BCWSA

Significant Technical Issues and/or cost impacts:
- Grading at gun club
Segment 2: Street Road to vicinity of American Drive (The Landings)

This segment of the trail is planned to cross the frontage of a large property planned for development as a residential community. Known as The Landings, the property will consist of a relatively dense collection of single- and multi-family dwellings centered around a series of generously-sized landscaped courtyards. A key feature of the site plan is a deep setback from the street to be landscaped as an open space amenity for residents and the public. The greenway trail would be accommodated within this area.

Another important feature of the site plan for The Landings is the provision for public access along the river, in the form of a continuous river-front trail across the property. This would enable the creation of a paved loop offering public access around the site, and critical public access to the river.

In the short term prior to development of the site, or in case the development does not occur as planned, the trail could be located within the sewer easement, similar to the alignment proposed for Segment 1.

Once the site is developed, the expectation is for the developer to incorporate the trail into the landscaping proposed for the front yard buffer area from the street.

Segment 2: Quick Facts

Approx. Length: 1,600 ft. (0.3 miles)

Proposed Trail Alignment:
- Short term: trail located outside ROW and within 30’ sewer easement
- Long term: trail incorporated into The Landings site improvements

Ownership of Adjoining Properties (1):
- Strategic Realty Investments

Easements/Permissions Required:
- BCWSA

Significant Technical Issues and/or cost impacts:
- none

The planned Landings development will allow for an off-road trail, and also provide public access to the river.
Segment 3: vicinity of American Drive

South of the proposed Landings development, the trail alignment may continue off-road within the sewer easement, as described for Segment 1. However, in contrast to Segment 1, there is less room for the trail across the frontages of the two commercial properties that comprise Segment 3. These two properties are built out to the property line, with active parking lots within the sewer easement area. In addition, utility poles occupy the shoulder of State Road where the trail might otherwise be situated.

There are two apparent options for alignment of the trail:

Option 1: Relocate the utility poles to the edge of the street right-of-way, and locate the trail within the existing shoulder of the roadway. This would require reconstruction of the roadway, to shift it to the west.

Option 2: By relocating the utility poles and narrowing the parking lots approximately 5 feet, the trail can be accommodated without shifting the roadway. It appears the parking lots can indeed be narrowed without adversely impacting their function or existing circulation patterns, since the drive aisle is wider than necessary.
Option 1: On-street (Shift Roadway +/- 5 feet)

Option 2: Off-street (Reconfigure Parking Lots)

**Segment 3: Quick Facts**

Approx. Length: 700 ft. (0.14 miles)

**Proposed Trail Alignment:**
- Option 1: On-street (shift roadway)
- Option 2: Acquire easement and narrow parking lots to allow for off-street trail

**Ownership of Adjoining Properties (2):**
- Bucks County Industrial Dev. Authority

**Easements/Permissions Required:**
- BCWSA
- Property owner/tenants

**Significant Technical Issues and/or cost impacts:**
- Bridge needed over stream
- Narrow and reconfigure parking lots
Segment 4: vicinity of American Drive

Segment 4 is similar to Segment 1, in which the trail can be located within the sewer easement, outside the right-of-way of the street. The surface parking lot associated with the adjoining property is set back far enough from the street to allow construction of the trail with no apparent impacts.

Segment 4: Quick Facts

Approx. Length: 550 ft. (0.11 miles)

Proposed Trail Alignment:
- sufficient space for greenway outside ROW and within 30’ sewer easement

Ownership of Adjoining Properties (1):
- Yellow Equipment Inc.

Easements/Permissions Required:
- BCSWA

Significant Technical Issues and/or cost impacts:
- none

Along portions of the route, the trail is envisioned to be off-road within the adjacent sewer easement.
Segment 5: American Drive to Camer Drive

One of the most challenging locations along the trail alignment occurs between American Drive and Camer Drive, where loading docks for a local business front directly onto State Road. Loading operations occupy the space fully out to the street right-of-way, including the 30’ sewer easement, and pose a serious potential conflict for safe greenway travel.

For this reason, the recommendation is to accommodate the trail along this property within the 50’ right-of-way of the street. This will require narrowing the travel lanes and shifting the cartway to one side of the right-of-way, to allow for a narrow 10’ wide trail and sufficient (though minimal) buffers.

Adequate space for the trail appears to be available within the setback of properties on the other side of State Road. However, locating the trail on the opposite side of the street would require the trail to be shifted from one side of the street to the other, then back. With many other favorable options for an off-road trail alignment on the east (river) side of the street, maintaining continuity for the trail along this side is preferred. Furthermore, the potentially compromised safety condition of the trail located along the loading docks would seem to be no worse than the alternative alignment requiring two additional road crossings.

Another potential long-term option might be to work with the building owner and lessee(s) to change the location of the loading dock to another part of the building, or to close it altogether. This would improve public safety and allow more space for the trail.
Segment 5: Quick Facts

Approx. Length: 600 ft. (0.12 miles)
Number of adjoining properties: 1

Proposed Trail Alignment:
- shift roadway, locate trail inside utility poles
- long term (3-lane) – shift roadway further west

Ownership of Adjoining Properties (2):
- Merit Industries
- Bucks County Industrial Development Authority

Easements/Permissions Required:
- None (trail is within 50’ ROW)

Significant Technical Issues and/or cost impacts:
- Buffer between trail and street

View north at loading dock

Proposed Section at Loading Docks
Segment 6: Camer Drive to Birch Ave. (Waterside)

Similar to Segment 2, this segment of the trail is intended to cross the frontage of a large property planned for future residential development. Known as Waterside, the property is similar to The Landings development described earlier, in that the developer will be required to accommodate the trail outside the street right-of-way within the development’s landscaped setback.

In the short term prior to development of the site, the trail can be located within the sewer easement. Once the site is developed, the expectation is for the developer to incorporate the trail into the landscaping proposed for the front yard buffer area from the street.

Segment 6: Quick Facts

Approx. Length: 2,000 ft. (0.4 miles)

Proposed Trail Alignment:
- Short term: trail located within sewer easement
- Long term: trail incorporated into Waterside site improvements

Ownership of Adjoining Properties (1):
- Mignatti Company

Easements/Permissions Required:
- BCWSA
- Mignatti Company

Significant Technical Issues and/or cost impacts:
- none

Future site of the Waterside development. Proposed site plan above.
**Future 3-lane Roadway**

**Segments 2 through 6:**

To accommodate the additional vehicular traffic generated by the planned Waterside and Landings developments, these developers will be required to widen the cartway of State Road from the existing two lanes to three lanes, to provide a dedicated left turn lane. A preliminary concept for this widening has already been developed and received tentative approval from PennDOT. This widening is planned for the entire stretch of roadway that includes the two developments and the intervening distance between them – the length represented by Segments 2 through 6 of this trail plan.

Adequate space exists to create the additional third lane within the existing 50-foot street right-of-way. However, within that existing right-of-way there is **not** room for **both** the additional travel lane and the trail. Therefore, it is important to find an off-road alignment for the trail through this section.

Where it crosses each of the development parcels, the trail is indeed planned to be off-road. Here, space for the trail within the right-of-way is not required.

However, in between the developments, locating the trail off-road is exceptionally difficult. As described in Segment 5, loading docks occupy the area alongside the street in one location. For reasons of safety, the trail cannot be located off road through the loading dock area. That leaves two apparent choices for trail alignment:

- **Option 1:** Acquire space for the trail on the other side of State Road. While room for the trail appears to exist, this would require two unsignalized crossings of the roadway, to get to the other side and back. These crossings would pose safety concerns and degrade the overall user experience.

- **Option 2:** A second option is to maintain a continuous trail alignment on the river-side of the street, and shift the widened roadway to the other side. This will require property acquisition of approximately 9-feet when the time comes to construct the 3-lane roadway (see diagram at right).
Segment 7:
Birch Ave. to Wallace Ave.

South of the planned Waterside development, the trail is proposed to continue within the 30-foot sewer easement, similar to other segments described previously. Currently the Penn Yacht Club property is fenced out to the property line. The fence would need to be relocated a minimum of 15 feet back to allow for trail construction.

The neighboring property is the Pistol People shooting range. There appears to be space for the trail to be off-road here without adverse impact to the property. An easement would be required.

Segment 7: Quick Facts
Approx. Length: 350 ft. (0.06 miles)
Proposed Trail Alignment:
- Yacht Club within 30’ sewer easement
- shooting range yard
Ownership of Adjoining Properties (2):
- Penn Yacht Club
- Linda Veitz (shooting range)
Easements/Permissions Required:
- BCWSA
- Shooting Range
Significant Technical Issues and/or cost impacts:
- Fence at Yacht Club
Segment 8:
Wallace Ave. to Hemlock Ave.

Within this segment, the trail passes in front of four single-family residential houses. In order to be sensitive to the privacy and property rights of these residents, the proposal is for the trail to be located within the street right-of-way. This will require the roadway to shift slightly to the west, to allow for room for the trail and necessary buffers.

**Segment 8: Quick Facts**
- **Approx. Length:** 400 ft. (0.7 miles)
- **Proposed Trail Alignment:**
  - Shift roadway to allow trail inside utility poles (widen existing roadway radius)
- **Ownership of Adjoining Properties (4):**
  - Individual residential owners
- **Easements/Permissions Required:**
  - none
- **Significant Technical Issues and/or cost impacts:**
  - shift roadway
Segment 9: Hemlock Ave. to Station Ave.

Between the Union Fire House and Station Avenue, the expectation is for the trail to have an off-road alignment outside the current right-of-way. At the fire station, the hope is that an easement will be secured to allow this. Between the fire station and Station Avenue, the trail is proposed for the 30’ sewer easement, similar to some previously-described segments.

Segment 9: Quick Facts

Approx. Length: 550 ft. (0.11 miles)

Proposed Trail Alignment:
- In front of fire house outside ROW
- within sewer easement for apartment bldg.

Ownership of Adjoining Properties (2):
- Union Fire Company
- Louis & Joseph Diegidio

Easements/Permissions Required:
- Sewer authority
- Fire Company

Significant Technical Issues and/or cost impacts:
- Landscaping at apartment building will be impacted, and will need to be replaced or enhanced
**Trail Section B:**
**Segments 10 – 11**

In Section B, the trail will occupy County properties on either side of the street, with a marked crossing at Gravel Pike.

Once funding for final design has been secured for this section, the County, Township, and stakeholders will coordinate necessary ecological enhancements and the degree of public access allowed for these sites.

**Trail Section C:**
**Segments 12 - 14**

Section C is largely residential in character. Roadway shoulders are crowded with trees, utility poles, drainage swales, and landscaping. With very little space available for the trail, a possible alternative is to utilize the right-of-way for the adjacent Amtrak Northeast Corridor rail line.
Segment 10:
Station Ave. to Gravel Pike (Pen Ryn)

Station Avenue is one of the key crossroads within the project area. The busy Cornwells Heights rail station is located on Station Ave. just west of State Road. The close connection of the trail will enable non-motorized access transit.

At the east end of Station Avenue (aka Herringbone Lane), the state boat launch provides direct public access to the Delaware River, one of the few locations within the project area where such access is available.

One of the most favorable trail segments promises to be where the trail crosses through the Pen Ryn estate. This county-owned property has great historic significance, and is already publicly accessible. The trail will allow users to connect to the property as part of a recreational experience in one of the few naturalistic settings along the planned route. No negative impacts to the property are foreseen, as the trail is intended to be situated in the wooded area near the road, and not in close proximity to the historic mansion, which is farther within the property.

**Segment 10: Quick Facts**

- Approx. Length: 1,300 ft. (0.25 miles)
- Proposed Trail Alignment:
  - Behind stone wall on Pen Ryn property
- Ownership of adjoining properties (1):
  - Bucks County
- Easements/permissions required:
  - Bucks County
- Significant technical issues and/or cost impacts:
  - Stream crossing may require bridge
  - Unsignalized road crossing at Gravel Pike
Gravel Pike Road Crossing

To take advantage of favorable opportunities for trail alignment, and to avoid obstacles, it will be necessary at intervals for the trail to cross from one side of State Road to the other. The optimal location for these would be at existing signalized intersections, where traffic controls can facilitate safe crossing for bicyclists and pedestrians. Unfortunately, the few signalized crossings along the route (Dunksferry Rd., Street Rd., Station Ave., Tennis Ave.) are not at locations where the ideal trail alignment would need to shift across State Road.

At the locations where the trail does need to shift sides, it is not feasible to establish a new signalized intersection, since traffic volumes do not meet the necessary warrants.

The remaining option is to establish unsignalized crossings of State Road at appropriate locations. In conformance with PennDOT requirements, such crossings must occur at existing intersections of public streets, and cannot be located “mid-block.”

While vehicular traffic would not be required to stop, the crossing can be clearly indicated through use of signs, pavement markings, and flashing warning lights. These warning lights can be triggered by pole-mounted push buttons activated by trail users. Marked crossings such as this can be designed in a fashion acceptable to PennDOT, and have proven at other trail locations to be workable solutions. As trails proliferate in the region, they are becoming more common and familiar to motorists.

For the Bensalem Greenway, the recommended alignment includes three such crossings. The northernmost of these is proposed for Gravel Pike, which is the best location for the trail to cross from a favorable location within the Pen Ryn estate to another favorable alignment within a county-owned property across the street.

A road crossing at Gravel Pike will allow the trail to access county property across the street. The crossing will be identified through signs, pavement markings, and flashing warning lights.
Segment 11:
Gravel Pike to Biddle Lane

Roughly across the street from Pen Ryn, and extending south toward Philadelphia, there is an undeveloped county-owned property that provides a valuable opportunity to locate the trail off-road in a natural setting. A fair portion of this property includes known wetlands. Currently unimproved and wooded, this property could serve as a valuable addition to County parks.

Although a trail alignment will be selected that minimizes impacts to wetlands, there may be sections of the trail where wetlands are unavoidable. Wetlands are unique natural resources that require protection. The portion of the trail that will go through wetland areas will be sensitively designed to protect the resource, with boardwalks and culverts integrated into the trail where necessary. The trail will provide users with the opportunity to experience a range of habitats, and can provide a unique opportunity to install educational signs that highlight the value of wetlands with respect to ecology and the water cycle. Any impacts to wetlands resulting from trail construction will be permitted with the Pennsylvania Department of Environmental Protection. Any loss of wetland acreage will be mitigated by expanding the footprint of the existing wetlands by grading and planting at the wetland-upland boundary.

**Segment 11: Quick Facts**

- **Approx. Length:** 2,300 ft. (0.4 miles)
- **Proposed Trail Alignment:**
  - Off-road on unimproved County property
- **Ownership of Adjoining Properties (2):**
  - Pen Ryn Joint Venture (Bucks County)
- **Easements/Permissions Required:**
  - Bucks County
- **Significant Technical Issues and/or cost impacts:**
  - Wetlands

The County property contains wetlands, which will provide an educational opportunity for the trail.
Segment 12: Maria Circle/Clemens Court

South of the county-owned parcel described in Segment 11, there is an undeveloped property owned by the Biddle family, which also owns the historic Andalusia property across the street and next to Pen Ryn. If an off-road alignment is to be continued, an easement across this property would be necessary. This parcel could serve as the connection back to an off-road alignment along the side of the Amtrak northeast corridor rail line.

Dialogue with Amtrak should take place to discuss the conditions under which the agency may grant permission for the trail. Issues of public safety, rail security, and liability would need to be clarified and resolved.

A cluster of homes flank State Road at Clemens Court and Maria Circle. Various encroachments on the roadway, including trees, landscaping, and at least one large outbuilding, make an alignment along State Road very difficult.

Segment 12: Quick Facts

Approx. Length: 1,600 ft. (0.30 miles)

Proposed Trail Alignment:
- Option 1: Alongside rail line
- Option 2: on-street along State Road

Ownership of Adjoining Properties:
- Andalusia Foundation (Biddle)
- Various single family residential

Easements/Permissions Required:
- Andalusia Foundation (Biddle)

Significant Technical Issues and/or cost impacts:
- Option 1: Buffer along rail line
- Option 2: Relocate utility poles, remove mature street trees
Segment 13: Tennis Avenue north and south approaches

As State Road approaches Tennis Avenue, steep embankments on both roadway shoulders will make trail construction difficult, as structural modification of the roadway will be necessary to create room for the trail.

For this reason, locating the trail within the rail right-of-way may be the best choice. Issues of safety and security would need to be addressed. Presumably, this would require a secure barrier fence to separate trail users from the rail line.

On either side of Tennis Ave., undeveloped properties present possible opportunities to connect between the rail line and State Road.

Segment 13: Quick Facts

Approx. Length: 1200 ft. (0.23 miles)

Proposed Trail Alignment:
- Option 1: Along rail lines
- Option 2: across private property
- Option 3: State Road

Ownership of Adjoining Properties:
- Various residential
- William Chamberlin

Easements/Permissions Required:
- Amtrak

Significant Technical Issues and/or cost impacts:
- Structural solution required along State Rd.
- Wetlands on private property
- Physical buffer required from rail line
**Segment 14:**

**Locust Ave to Walnut Ave.**

Between Locust Avenue and Walnut Avenue, the expectation is for the trail to have an off-road alignment outside the right-of-way. The roadway shoulders in this area are crowded with drainage swales and mature street trees. The trees contribute greatly to the character of the street in this neighborhood, and their removal is likely to meet with strong disapproval from neighbors.

A preferred option is for the trail to be located along the rail lines, as described in previous segments. Between Locust and Walnut Avenues, an option exists to locate the trail as a shared-use pathway along Rural Ave. This shared-use pathway would continue down Walnut Ave. to State Road, and cross State Road at this location.

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**Segment 14: Quick Facts**

**Approx. Length:** 500 ft. (0.10 miles)

**Proposed Trail Alignment:**
- Option 1: Shared-use path on Rural Lane and Walnut Ave
- Option 2: Along rail line
- Option 3: Along State Road

**Ownership of Adjoining Properties:**
- Various residential

**Easements/Permissions Required:**
- Option 2: Amtrak

**Significant Technical Issues and/or cost impacts:**
- Option 1: none
- Option 2: Buffer separation at rail lines
- Option 3: Remove trees and reconstruct drainage infrastructure
Trail Section D:
Segments 15 - 17

Section D completes the trail connection to the City of Philadelphia, where striped bike lanes on either side of State Road have recently been completed up to Grant Avenue. The trail in this section is a combination of on-road and off-road segments. Some easements will be necessary from adjacent property owners.
Segment 15: Walnut Ave. to Harbour Drive

South of Walnut Lane, the most favorable alignment is on the east (river) side of State Road. There is room for a narrow (10’ wide) trail within the right-of-way on the unpaved shoulder of the road. Utility poles in this segment are along the back of the right-of-way line, with only a few exceptions. These limited number of poles can be relocated.

**Segment 15: Quick Facts**

- **Approx. Length:** 1,250 ft. (0.25 miles)
- **Proposed Trail Alignment:**
  - Narrow trail can fit within right-of-way
- **Ownership of Adjoining Properties:**
  - Various private
- **Easements/Permissions Required:**
  - none
- **Significant Technical Issues and/or cost impacts:**
  - Tree removal, possible utility pole relocation
Segment 16:
Harbour Drive to Mill Road

South of Harbour Drive, the best option for the trail is along the river-side of the street adjacent to the Salem Harbour apartment complex. Room exists for the trail to run between the utility poles and existing security fence. A portion of this width (about 10 feet) is outside the right-of-way, on private property. An easement from the property owner would be necessary. However, as the trail would be fully accommodated outside the existing fence line, we anticipate no adverse impact on the adjoining property.

**Segment 16: Quick Facts**

- **Approx. Length:** 2,000 ft. (0.38 miles)
- **Proposed Trail Alignment:**
  - Trail can fit between utility poles and existing security fence. Requires easement of approx. 10 ft.
- **Ownership of Adjoining Properties (1):**
  - Salem Harbour Assoc.
- **Easements/Permissions Required:**
  - Salem Harbour Assoc.
- **Significant Technical Issues and/or cost impacts:**
  - Grading. Retaining wall may be necessary in specific locations.
Segment 17: Mill Road to Grant Avenue (Philadelphia)

For the final leg of the trail connecting to Philadelphia, there are two feasible options. To maintain an off-road alignment, there is an opportunity to route the trail behind the Gate House apartment building, and connect with the SEPTA Torresdale Station. This would require a bridge crossing over Poquessing Creek, and an unsignalized street crossing at Mill Rd. While this additional infrastructure would add cost to the project, this off-road alignment would add the benefit of a direct connection to transit, and of avoiding the difficult on-street connection to Philadelphia along State Road. This alignment would also require an easement from the property owner.

A second alternative is to keep the trail on State Road for the remaining distance, in an on-street alignment. Ultimately the trail must align with on-street bike lanes recently constructed on State Road in Philadelphia up to Grant Avenue. As a result, we recommend establishing the on-street bike lanes at Mill Road. In this segment, it is not practical to keep a two-way trail to one side of the right-of-way, as is proposed for earlier segments, since this would require shifting the roadway. The existing State Road bridge over Poquessing Creek represents, for all practical purposes, a fixed condition that would prevent realignment of the roadway in this area. The cost of bridge reconstruction would likely be beyond the scope of the trail project.

Option 1 connects the trail to the SEPTA Torresdale Station.

Segment 17: Quick Facts
Approx. Length: 1,200 ft. (0.24 miles)
Proposed Trail Alignment:
- Option 1: Off-street, behind apartment building, over creek
- Option 2: On-street striped bike lanes
Ownership of Adjoining Properties:
- Salem Harbour
Easements/Permissions Required:
- Salem Harbour
Significant Technical Issues and/or cost impacts:
- Option 1: Bridge needed over creek
- Option 2: narrow, curving road geometry, poor sight distance around curves
Recommendations

Bensalem Greenway Master Plan

Existing pavement markings approaching Grant Avenue

Proposed pavement markings approaching Grant Avenue

State Road looking north at Grant Avenue

Option 2: On-Road

Road crossing at Mill Road

Striped lanes, both sides of street
Chapter 4

Implementation

This study is focused on determining a preferred alignment and facilitating implementation for the Bensalem Greenway. In this section, implementation of the greenway will be described by what actions are necessary, how they may best occur, who is best positioned to lead each effort, and which phasing order would be most beneficial for the greenway.

Perhaps the most important key to successful implementation is to foster opportunities for partnership between the public and private sectors. In general, pedestrian and bicycle improvements are often best accomplished as part of broader roadway or development construction projects, where economies of scale and the overall mobilization of resources can serve as a great benefit to trail planners. In Bensalem, several potential partners can be identified to assist with trail implementation. It will be necessary for parties to cooperate to best effect, and take advantage of opportunities to work together for mutual purposes.

In general, the basic steps necessary to implement the recommendations include:

1. **Acquisition**: Since an off-road alignment is preferred, it will be necessary to acquire easements to allow access across a significant number of individual properties.

2. **Fund Raising**: Total cost for constructing the trail will be several million dollars. These funds are expected to be raised from grants and other private sources, which must be competitively pursued, and not funded through municipal operating budget.

3. **Design and Construction**: The design presented in this Master Plan is conceptual. Final design and engineering will be necessary to prepare complete design documents suitable for construction.

4. **Maintenance and Operation**: Once the trail is constructed, ongoing responsibilities will include maintenance, repairs, cleaning, security, and programming.

The Cynwyd Trail in Lower Merion, Pa, was successfully completed in 2011. Construction (left), ribbon cutting (above), and finished trail (top).
Implementation

Project Stewardship

Implementation of the Bensalem Greenway will depend on the continued effective collaboration of the Pennsylvania Environmental Council (PEC), Bensalem Township, Bucks County, and other public and private partners. To date, PEC and the Township have developed a highly collaborative relationship in laying the groundwork for the trail.

The Pennsylvania Environmental Council (PEC) has for many years taken a strong leading role in the planning and development of trails and greenways, as a key strategy to promote environmental sustainability. PEC has been one of the chief proponents of the East Coast Greenway in the Philadelphia region. PEC has extensive experience working with numerous public and private partners and governments at all levels on greenway development.

In implementing the Greenway, it is expected that the proper role for PEC is to remain in a lead role during planning and design phases. PEC is well-positioned to seek grant funding, to negotiate the acquisition of property and easements, and to lend a public face to the project in leading outreach and communications efforts. However, PEC’s interest as an organization is to limit its involvement to planning and early design phases, and to not be the constructing or operating entity for capital projects, or to hold title to land or easements. With PEC’s role to plan the greenway, the actual construction is expected to be as a municipal project.

Bensalem Township is expected to be the lead entity responsible for final design and construction of the various greenway segments. While the trail will serve as a link for the East Coast Greenway, it is in its essence a Township resource, and an amenity for Township residents and visitors. The greenway has significant implications for township-wide concerns such as traffic and transportation, economic development, and public recreation. For these reasons, the township should have a controlling interest in the final form and function of the trail. Also, the Township has the institutional capacity to and expertise to build capital improvements.

Bucks County: Several of significant properties along State Road that can accommodate an off-road trail alignment are county properties. These include the Pen Ryn estate and the large undeveloped parcel across the street. County permission and support for the project will be necessary. Bucks County has been a consistent advocate for the development of trails in the region, particularly along the Delaware River front. Through its Planning Commission, the county can play an important role in coordinating the many independent planning initiatives that may be in play at a given time, and identifying opportunities for synergy. Furthermore, County funding may be made available through its ongoing Open Space program. Once the trail is built, the County may be able to assist with operations and maintenance.

A number of other agencies will need to play effective roles to facilitate implementation. These include:

PennDOT: State Road is a Pennsylvania state route (SR 2002), and therefore any construction or modifications of the roadway must be approved by PennDOT through the agency’s Highway Occupancy Permit process. Where the Greenway occupies space within the public right-of-way of the street, all aspects of the design must meet PennDOT standards. PennDOT has proven to be a sympathetic partner for trail planning projects in the region, as these are consistent with agency priorities in promoting multi-modal transportation.

Bucks County Water & Sewer Authority: The BCWSA is an independent, non-profit agency, created under the Pennsylvania Municipal Authorities Act to provide water and sewer services in the State of Pennsylvania, and serves more than 385,000 people in both the Bucks and Montgomery County areas. The BCWSA holds a sewer easement along State Road for more than a third of the proposed trail route. The trail is proposed to be located within this easement, to allow for a significant off-road alignment. Cooperation of the BCWSA in modifying the existing easement to provide for recreational use will be essential.

The Delaware Valley Regional Planning Commission: DVRPC is the regional planning organization for the nine-county area surrounding Philadelphia in Pennsylvania and New Jersey. The agency plays a leading role in shaping planning policy for the region, with a key focus on promoting smart transportation. It administers a number of grant programs to fund planning and design for transportation and community development projects, as well and plays a strong role in directing federal transportation funds to worthy projects.
Right-of-Way Acquisition

Since an off-road alignment is preferred, it will be necessary to acquire rights-of-way in the form of easements to allow access across a significant number of individual properties:

**Bucks County:** The county owns the Pen Ryn estates and the undeveloped property across the street. Both these properties are key to an off-road alignment and naturalistic trail experience. In the case of Pen Ryn, it also offers the possibility of river-front trail access. The County is amenable to the trail being located on these properties.

**Bucks County Sewer and Water Authority:** The BCSWA holds a sewer easement that could serve as a suitable off-road alignment along a significant portion of the route. Consent of underlying property owners may be required.

**Bucks County Industrial Development Authority:** Several commercial properties toward the north end of the project area are owned by the BCIDA, which leases these to private commercial tenants. While the tenants have certain contractual rights to the properties, the BCIDA, as a public agency, in sympathetic to the goals of greenway as a public amenity.

**Major Developers:** Two significant properties along the northern stretch of the route are currently being planned for residential development. Strategic Realty is developer for The Landings and the Mignatti Company is developer for the Waterside. As part of the land development approval process, both owners have indicated willingness to allow and construct the segments of the trail that cross their properties.

**Amtrak:** Controls the right-of-way for the Northeast Corridor railroad, which is desired for a portion of the proposed trail route. Coordination with Amtrak’s Real Estate and Operations Department is expected.

**Andalusia Foundation (Biddle family):** Owns a small but strategically-located undeveloped property which could serve as a bridge between county lands and the Amtrak rail corridor, enabling a continuous off-road alignment.

**Salem Harbour:** Property easement along the edge of the Salem Harbour development can allow for an off-road alignment along a stretch leading to Philadelphia, with little or no impact to the property.

**Other private owners:** As described in the recommendations chapter, other individual properties offer potential for an off-road alignment, with owner permission.
Construction Cost

For the alignment proposed in this Master Plan, the estimated construction cost is roughly between $5 and $7 million. However, as the design is at a conceptual level, this is an order-of-magnitude estimate. These costs are preliminary and are based on only a general understanding of specific site constraints and design responses that will ultimately be necessary to fully realize the trail potential. (See detailed cost estimate in the Appendix.)

Actual construction costs for each individual segment of the greenway will depend on a variety of factors, including:

Length: The total length of the Bensalem Greenway is approximately 3.6 miles. However, within this overall project area several specific options exist that could lengthen or shorten the total route. Depending on the length of the chosen greenway alignment, the cost of construction could increase or decrease accordingly.

Coordination with Adjacent Development: The cost of constructing the greenway may vary for some segments based on the contribution of adjacent developers. While cost sharing is expected, the final determination of total costs and funding responsibility is subject to the formal land development approval process which must take place.

Physical Constraints: Technical constraints are described in Chapter 2, and include bridges for several stream crossings, presence of wetlands, steep slopes in certain places, and inadequate drainage. Where multiple options exist for trail alignment, the need to address these obstacles, and associated costs, may vary.

Property Acquisition Costs: Estimated costs presented in this report are for construction only, and do not include costs for acquisition of property and/or easements. Given the cooperative spirit of existing partnerships, along with the civic nature of the project, it is hoped that most or all of the necessary acquisition will be donated. However, this is subject to negotiation, and tangible costs may result.

Specialty Features: The conceptual design and corresponding cost estimate assumes a modest level of amenity typical for a local or regional recreation trail. The cost of various materials and design details can vary greatly. The specific features and design amenities that will accompany the trail will be determined during the final design stage. These may include: trail head features such as benches, lighting, restrooms, and parking; security features; landscaping; size and aesthetic treatment for bridges and other structural features; educational and interpretive features such as signage or seating areas.

### Bensalem Greenway

<table>
<thead>
<tr>
<th>Segment</th>
<th>Location</th>
<th>Base ($)</th>
<th>Premium ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment 1</td>
<td>Neshaminy Park to Street Rd. (sewer easement)</td>
<td>$325,000</td>
<td></td>
</tr>
<tr>
<td>Segment 2</td>
<td>Street Rd. to American Dr. (The Landings)</td>
<td>$225,000</td>
<td></td>
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<tr>
<td>Segment 3</td>
<td>vicinity of American Dr. (parking lots)</td>
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<td>Segment 4</td>
<td>vicinity of American Dr. (sewer easement)</td>
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<td>Segment 5</td>
<td>American Dr. to Camer Dr. (loading docks)</td>
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<td>Segment 6</td>
<td>Camer Dr. to Birch Ave. (Waterside/Mignatti)</td>
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<td>Segment 7</td>
<td>Birch Ave. to Wallace Ave. (Yacht Club)</td>
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<td>Segment 9</td>
<td>Hemlock Ave. to Station Ave. (Fire station)</td>
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<td></td>
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<td>Segment 10</td>
<td>Station Ave. to Gravel Pike (Pen Ryn)</td>
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<td>Segment 11</td>
<td>Gravel Pike to Biddle Lane (county property)</td>
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<td>Segment 12</td>
<td>Clemens Court (residences)</td>
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<td>Segment 13</td>
<td>Tennis Ave. approaches (steep embankment)</td>
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<td>Segment 14</td>
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<td>Segment 15</td>
<td>Walnut Ave. to Harbour Dr.</td>
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<td>Segment 16</td>
<td>Harbour Dr. to Mill Rd.</td>
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<tr>
<td>Segment 17</td>
<td>Mill Rd. to Grant Ave.</td>
<td>$255,000</td>
<td>$450,000</td>
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</table>

**Total** | $5,370,000 | $6,900,000 |
Sources of Funding

Potential opportunities for capital funding for the Greenway include federal, state, and local grants. Each has specific requirements, and may limit the funds to propery acquisition or design and construction, respectively.

Federal Funding Sources

Congestion Mitigation and Air Quality Improvement (CMAQ): CMAQ-funded projects must help manage pollution and increase air quality to help meet National Air Quality Standards. These funds are administered by the Delaware Valley Regional Planning Commission and typical projects include bike and pedestrian trails, coordination of traffic signals, and efforts to increase the use of alternative modes of transportation.

Moving Ahead for Progress in the 21st Century Act (MAP-21): In 2012, Congress authorized funding for a range of multi-modal transportation projects, including the planning, design and construction of pedestrian and bicycle infrastructure. Administrative procedures for this funding have not yet been finalized, but it is likely that the funds would be at least partially administered through regional planning organizations such as DVRPC.

State Funding Sources

PA Department of Conservation and Natural Resources (DCNR): DCNR administers the federally-funded Recreation Trail Program and the state-funded Community Conservation Partnership Program. The Recreation Trails Program is designed to develop and maintain recreational trails and trail related facilities for trail users. Project examples include development and rehabilitation of trailside and trailhead facilities and trail linkages and acquisition of easements or property for recreation trails. The Community Conservation Partnership Program is designed to provide grants for comprehensive recreation and park planning and greenway and master site development planning. Potential projects include development of public park and trail recreation facilities, acquiring land for park and conservation purposes, site development planning, and feasibility studies.

Redevelopment Assistance Capital Program (RACP): RACP is a Commonwealth grant program administered by the Office of the Budget for the acquisition and construction of regional economic, cultural, civic, and historical improvement projects. The grant requires a 50% match, and eligible projects must have a total cost of at least $1,000,000.

Local Funding Sources

Bucks County Open Space Program: This program provides County boroughs and townships with financial assistance for open space planning, acquisitions and improvements. In addition to a base allocation of $200,000, each municipality receives an adjusted share according to its percentage of overall county land area and population.

Delaware Valley Regional Planning Commission (DVRPC): DVRPC administers a range of funding programs to facilitate planning and design of trails and greenways. These programs evolve annually. In recent years, relevant programs oriented toward multi-modal transportation have included the Transportation and Community Development Initiative (TCDI) and Regional Trails Programs. It is expected that programs of a similar nature will be offered in future years.

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<th>Grant</th>
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<th>Notification Date</th>
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<td>CMAQ</td>
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Project Phasing

The presumption is that, for a variety of reasons including cost, rights-of-way, and other factors, the possibility of building the entire 3.6 length of the greenway trail at one time is unlikely. It may be necessary to build the greenway one segment at a time, as funds and opportunity become available. If that is the case, then it becomes prudent to define and prioritize individual segments of the trail, and to establish a logical sequence of implementation, so that resources can be allocated accordingly.

The Master Plan identifies 17 distinct trail segments, based on specific design characteristics and constraints. For the purpose of this phasing plan, we are proposing that these 17 segments can be grouped into 4 discreet phases, based on common characteristics.

To determine the most sensible sequence for construction, the decision criteria is based on the following:

- **Right-of-way:** Significant portions of the preferred alignment lie outside the public right-of-way of the street. These will require property easements and/or acquisition. Therefore, easily-acquired properties have the greatest chance for near-term implementation. More difficult acquisitions may take longer.

- **Construction Cost:** Significant technical challenges exist at intervals along the preferred alignment. These may include the necessity for stream crossings, roadway modifications, potential wetlands mitigation, and utility relocation. All of these have associated costs. Trail segments that have a higher relative cost may require more time to identify funding and/or funding partners, as compared to less costly segments.

- **Implementation Partners:** Based on prior and ongoing discussions, it is believed that the implementation of several proposed trail segments will be assisted by private developers, who will allow the trail to be located on their properties and are expected to fund a portion of the construction. Other potential partners may exist for other segments. Opportunities to take advantage of such funding partnerships should not be overlooked.

- **Public Benefit:** Certain segments may offer the highest immediate benefit to the public. It makes sense that these segments be developed first if possible, to establish the trail as a valued public amenity, build support for construction of future segments, and provide justification to attract further funding.
# Phasing Plan

<table>
<thead>
<tr>
<th>Final Link</th>
<th>Development Partners</th>
<th>Link</th>
<th>Public Space</th>
<th>Rail Adjacency</th>
<th>Connect to Philadelphia</th>
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<td>13</td>
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<td>15</td>
<td>16</td>
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</tr>
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</table>

- Nashawnty Park
- Street Road
- The Landings (future)
- Waterside (future)
- Station Ave.
- Pen Ryn
- Tennis Ave.
- Grant Ave./City of Phila.
Recommended Implementation Sequence

In consideration of the statements above, we propose the following project phasing for implementation of the Bensalem Greenway. See accompanying Phasing Diagram.

Section 1: Public Space (Station Avenue to Kings Lane)

This section establishes the trail on public property and provides a meaningful recreational benefit to the public that is expected to build support for the project and facilitate the implementation of future segments. The proposed alignment is almost entirely off-road, and mostly on existing public property owned by the county, which is understood to be a willing partner. This segment transects the Pen Ryn property, and provides access to the open space and cultural value of that historic property. Access to the river is enabled at the public park and boat launch down Station Avenue. The trail also takes advantage of existing undeveloped county property on the opposite side of State Road, with the potential to create a safe and family-friendly user experience through this wooded parcel. Relative to other greenway sections, construction cost is expected to be modest. A grant request for this section was submitted to DCNR in April, 2012.

Section 2: Development Partners

This section is characterized by two proposed large-scale residential developments that are expected to build portions of the trail as part of their projects. Simultaneously, the roadway would be widened from a 2-lane to a 3-lane cross section. Timing for implementation of this section is dependent on these private developers moving forward with their plans. Given the fact that the developers are expected to shoulder a large part of the implementation cost for the trail, it makes sense to wait until those partners are ready to move forward, rather than build the trail in advance of their projects. Secondly, since the planned developments would reconstruct the roadway in its entirety, any short-term investment in trail construction would be lost once the long-term configuration was built. This section may become a later-term project if opportunities arise to build other sections before the developers are ready to build their projects.

Both north and south of the planned developments, additional trail segments will be necessary to complete the alignment. The southern link connects between the Waterside development and the Pen Ryn estate at Station Road. Relative to its distance, the cost of construction for this segment will be substantial, since a portion of the roadway will need to be constructed to accommodate the trail within the existing 50-ft right-of-way as it passes in front of existing single family residences.

A final link would be necessary at the northern end of the trail route, between Neshaminy State Park and Street Road. With few obstacles to implementation, this segment could conceivably be constructed sooner. But without the previous segments it would not connect to anything, and therefore would have relatively little public value.

Section 3: Rail Adjacency

Roughly between Kings Lane and Walnut Avenue, the potential exists to establish an off-road trail alignment alongside the Amtrak northeast corridor. This alignment avoids a narrow section of State Road, where trail implementation would be difficult. While the prospect for successful negotiation with Amtrak is not known, the property is nonetheless within the control of a single agency. A successful negotiation will enable implementation of the entire segment. Directly adjacent to Section 1, implementation of Section 3 will connect pockets of residential development with the open space and recreation resources offered by Section 1. Relative to other greenway segments, construction cost is expected to be modest.

Section 4: Connection to Philadelphia

This Section will connect the Bensalem Greenway to existing bicycle lanes that terminate at Grant Avenue at the Philadelphia city line. The proposed alignment within this section is partly within the street right-of-way and partly outside. Easements will be required to utilize narrow portions of property belonging to Salem Harbour Associates. However, the trail will have no adverse impact on those properties, so there is a high prospect for successful negotiation. There are multiple options for the southernmost leg of this section, one of which requires a bridge crossing over Poquessing Creek, along with associated costs. If implemented in the proposed sequence, this leg would provide for a continuous trail connection from the City of Philadelphia to Station Avenue, including access to the Delaware River and multiple public open space parcels along the way.
Maintenance and Operations

A common characteristic of greenways everywhere (and public spaces in general), is that maintenance and operations is almost always a struggle. While the investment of time and money required to build a greenway is often huge, the task of finding resources to maintain and operate a trail is sometimes equally daunting.

Nationally, the typical model is for actual ownership of trails and greenways to be in public hands, usually a county or municipality. Maintenance, however, is often performed by, or in cooperation with, local non-profit organizations and community volunteers. This is a win-win relationship. Most non-profit groups wish to avoid owning property due to liability concerns. Local governments, having the capacity to own property and accept the attendant legal issues, benefit from reduced maintenance costs and responsibilities.

In Bensalem, it is likely that specific responsibility for maintenance and operations of the Greenway may involve multiple private and public entities, and it is reasonable to expect that many stakeholders will contribute in some meaningful way to the effort necessary to carryout trail operations.

One model is for governmental entities to take responsibility for aspects of the trail related to public safety, for reason of liability. These elements would include maintenance of the pavement surface, pavement markings, drainage facilities, curbs and other physical buffers, traffic regulatory signs, and operations of traffic signal equipment. These items fall generally within typical municipal maintenance regimens, and should be within the Township’s capacity to carry out.

Private partners may be sought to assist the Township with the provision and maintenance of “supplemental” greenway elements, which might include:

- Cleaning and trash removal
- Identity and wayfinding signage and maps
- Landscape maintenance
- Public communications and safety
- Marketing and promotional events

There is ample precedent in the region for public-private partnership for operations and maintenance of public open space. In many cases, basic services are provided by the municipality and supplemental services are provided by partners. These additional services can include volunteer labor, financial contributions, technical expertise, or other in-kind services. Just a few local examples are:

Landscape maintenance, security, and promotions are some of the operational tasks that are necessary to assure long-term success of the trail.
• In Philadelphia, the Schuylkill Banks organization manages portions of the Schuylkill River Trail, through agreement with the City. Similarly, the Delaware River City Corporation oversees a large section of the existing and planned Delaware River Greenway. These organizations are both private, independent non-profits that raise their own funds and provide a level of maintenance, advocacy, and programming beyond what the municipal government would be capable of.

• Throughout the region, various “Friends” groups contribute labor and financial resources to maintain public open space. In Lower Merion Township, the Friends of the Cynwyd Trail have provided a substantial amount of volunteer labor to beautify and maintain the Cynwyd Trail. Construction of the trail itself was by the municipality, while associated landscape maintenance and improvements has been by the Friends groups.

As the Greenway will be seen primarily as a resource for Bensalem Township, it is anticipated that the Township will provide a level of basic maintenance and service to the trail. Since a substantial portion of the trail is proposed to be located on County property, it is hoped that Bucks County will partner in some fashion with the Township for maintenance. Prior to construction of the Greenway, it is strongly advised that Bensalem Township and Bucks County come to agreement on satisfactory level of maintenance and specific tasks that each can be responsible for.

At the same time, the prospect of creating a private non-profit entity to supplement public services should be explored.
Bensalem Greenway Master Plan

Appendices
## Bensalem Greenway Master Plan

### APPENDICES

**Order of Magnitude Opinion of Probable Construction Cost**

**Pennoni Associates**

7/10/2012

### Segment 1
- **R significantly Park to Street R: (new) (alignment)**
  - **700 LF**
  - **100 LF**

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<tr>
<th>Item</th>
<th>Unit Cost</th>
<th>Unit QTY</th>
<th>Total Cost</th>
<th>Unit Cost</th>
<th>Unit QTY</th>
<th>Total Cost</th>
<th>Unit Cost</th>
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**Note:**
- 1: reconfigure parking lots
- 2: additional drainage work
- 3: fence relocation

### Segment 7
- **Birch Ave. to Wallace Ave.**
  - **300 LF**
  - **200 LF**

### Segment 8
- **Wallace Ave. to Hemlock Ave.**
  - **500 LF**
  - **500 LF**

### Segment 9
- **Hemlock Ave. to Station Ave.**
  - **500 LF**
  - **500 LF**

### Segment 10
- **Station Ave. to Gravel Pike**
  - **2,000 LF**
  - **2,000 LF**

### Segment 11
- **Gravel Pike to Biddle Lane**
  - **2,000 LF**
  - **2,000 LF**

### Segment 12 A:
- **off-road (Clemens Court)**
  - **2,000 LF**
  - **2,000 LF**

### Segment 12 B:
- **off-road (Clemens Court)**
  - **2,000 LF**
  - **2,000 LF**

**Note:**
- 4: additional landscaping and fencing to buffer residential neighbors
- 5: trail over amenities
- 6: wetlands premium
- 7: storm water drainage
- 8: fencing along train tracks

### Pennoni Associates

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### Bensalem Greenway Master Plan

**Order of Magnitude Opinion of Probable Construction Cost**

**Pennoni Associates**

7/10/2012

<table>
<thead>
<tr>
<th>Segment 13A</th>
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<td><strong>Unit Cost</strong></td>
<td><strong>Unit</strong></td>
<td><strong>QTY</strong></td>
<td><strong>Total Cost</strong></td>
<td><strong>Unit</strong></td>
<td><strong>QTY</strong></td>
<td><strong>Total Cost</strong></td>
</tr>
<tr>
<td>Paved Trail, 12' wide</td>
<td>$80 LF</td>
<td>1200</td>
<td>$96,000</td>
<td>$1450</td>
<td>$116,000</td>
<td>$560</td>
</tr>
<tr>
<td>Roadway Reconstruction</td>
<td>$175 LF</td>
<td>0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Concrete Curb</td>
<td>$40 LF</td>
<td>1200</td>
<td>$48,000</td>
<td>$950</td>
<td>$38,000</td>
<td>$0</td>
</tr>
<tr>
<td>Lane Painting</td>
<td>$120 LF</td>
<td>0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Utility Relocation</td>
<td>$10,000 EA</td>
<td>6</td>
<td>$60,000</td>
<td>$20,000</td>
<td>$60,000</td>
<td>$8</td>
</tr>
<tr>
<td>Ped Bridge/Structure</td>
<td>$1,500 LF</td>
<td>1000</td>
<td>$750,000</td>
<td>$500</td>
<td>$50,000</td>
<td>$6</td>
</tr>
<tr>
<td>Street Crossing (minor)</td>
<td>$5,000 EA</td>
<td>1</td>
<td>$5,000</td>
<td>$5,000</td>
<td>$5,000</td>
<td>$1</td>
</tr>
<tr>
<td>Street Crossing (major)</td>
<td>$20,000 EA</td>
<td>0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Fencing/Painting</td>
<td>$60 LF</td>
<td>1200</td>
<td>$72,000</td>
<td>$900</td>
<td>$54,000</td>
<td>$1</td>
</tr>
<tr>
<td>Trail Head Features</td>
<td>$15 LF</td>
<td>0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Mobilization</td>
<td>$4 LF</td>
<td>1200</td>
<td>$4,800</td>
<td>$1200</td>
<td>$4,800</td>
<td>$500</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>$999,800</td>
<td>$222,800</td>
<td>$107,000</td>
<td>$260,000</td>
<td>$193,000</td>
<td>$150,000</td>
</tr>
<tr>
<td>Contingency 20%</td>
<td>$199,960</td>
<td>$44,560</td>
<td>$21,400</td>
<td>$52,000</td>
<td>$38,600</td>
<td>$32,600</td>
</tr>
<tr>
<td>General Conditions 2%</td>
<td>$119,976</td>
<td>$26,796</td>
<td>$12,840</td>
<td>$33,200</td>
<td>$23,160</td>
<td>$21,360</td>
</tr>
<tr>
<td><strong>Subtotal Construction</strong></td>
<td>$1,319,736</td>
<td>$294,906</td>
<td>$141,240</td>
<td>$343,906</td>
<td>$254,760</td>
<td>$210,960</td>
</tr>
<tr>
<td>Design/Engineering (13%)</td>
<td>$197,960</td>
<td>$44,134</td>
<td>$21,186</td>
<td>$51,480</td>
<td>$38,214</td>
<td>$54,054</td>
</tr>
<tr>
<td>Construction Admin (5%)</td>
<td>$65,987</td>
<td>$14,705</td>
<td>$7,062</td>
<td>$17,150</td>
<td>$12,738</td>
<td>$18,008</td>
</tr>
<tr>
<td>Easements/Acquisition</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td><strong>TOTAL PER SEGMENT</strong></td>
<td>$1,583,683</td>
<td>$352,915</td>
<td>$169,488</td>
<td>$413,940</td>
<td>$305,712</td>
<td>$432,432</td>
</tr>
</tbody>
</table>

**Typical Unit Costs per LF**

### Paved Asphalt Bike Trail

**12' wide**

- **Clearing/removals:** LF $6.00 allowance
- **Earthwork:** LF $10.00 allowance
- **Drainage:** LF $4.00 allowance
- **Light & Dark:** LF $2.00 allowance
- **Asphalt Paving:** LF $40.00 1 If = 12 LF = 1.33 sq yd at $3.25/yd = $37
- **Pavement Markings:** LF $2.00 allowance
- **Basic Landscaping:** LF $1.00 seed 1 LF = 6 sq ft = $0.66/LF = $1.00/LF = $0.66
- **Premium Landscaping:** LF $5.00 trees, shrubs, etc
- **Signage:** LF $5.00 $500 per 100 ft
- **MPT:** LF $5.00 allowance

**Total LF:** $80.00

### Roadway Reconstruction

- **Asphalt Paving - wearing:** LF $22.00 1 If = 28 LF = 3.1 sq yd at $51.70/yd
- **Asphalt Paving - binder:** LF $23.00 1 If = 16 LF = $15.00/yd = $240.00/yd
- **Mill:** LF $15.00 1 If = 28 LF = $1.1 yd at $5.30/yd
- **Removals/adjust grade:** LF $50.00 allowance
- **Drainage:** LF $50.00 allowance
- **Pavement Markings:** LF $4.00 allowance
- **MPT:** LF $12.00 allowance
- **Survey control:** LF $2.00 allowance

**Total LF:** $172.50

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**Notes:**
- Note 8: fencing along trail tracks
- Note 9: under under - engineered solution
- Note 10: connection to street and/or lane markings
- Note 11: allowance for grading/retaining wall
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