

TONAWANDA



Restoring Our Waterfront

Future Land Use Plan Update



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Chapter 1

Introduction



Waterfront Land Use Plan Town of Tonawanda

“More and more people are seeing their waterfronts as the way to bring new life and energy to their community. They’re doing this by creating new economic activity, redeveloping historic and abandoned structures, improving waterfront recreation, and restoring and protecting natural resources. They have found the keys to make the most of their waterfront assets include a clear vision and plan, broad public involvement, creative partnerships, patience, persistence and a step-by-step strategy.”

~ NYS Division of Coastal Resources

Tonawanda has the largest single concentration of industry in the County outside of the City of Buffalo. That distinction has created immense opportunities as well as environmental challenges.

How this area is redeveloped over time will have a significant local and regional implications.

Remedial Action Plan (RAP) prepared by the Environmental Protection Agency (EPA) and the NYS Dept. of Environmental Conservation (NYSDEC) established a framework to improve the River. Since that time, several significant milestones have been achieved to identify and remediate the health of the river and, in turn, revitalize the surrounding community.

Recently, there have been numerous initiatives in Tonawanda related to the implementation of the RAP and redeveloping the waterfront in a sustainable fashion. Through a partnership among Erie County, the Buffalo Niagara Riverkeeper and the Town, a strategic watershed management plan is being developed to focus on New York’s portion of the Niagara watershed. Tonawanda’s Waterfront Land Use Master Plan is a complementary component of the larger watershed management plan.

Scope of the Waterfront Land Use Master Plan

Tonawanda’s Waterfront Land Use Plan encompasses over 4,200 acres of land bounded by the Niagara River and Interstates 190 and 290. The area consists of primarily industrial uses, but also includes large swaths of vacant land, some commercial areas, trails and recreational lands (Sheridan Park) and a small residential neighborhood. This planning effort builds upon the previous Waterfront Land Use Plan from 2002, reflecting physical changes and recent initiatives in the area. Specifically, there have been several waterfront-related planning and environmental projects as well as some redevelopment projects over the last decade.

The scope of the plan is broad. It includes an overview of physical, natural and economic conditions of the study area as well as recommendations for sustainable development strategies. The plan outlines opportunities to effectively protect the river while enhancing the Town’s quality of life and long-term viability.

Relationship to Other Plans

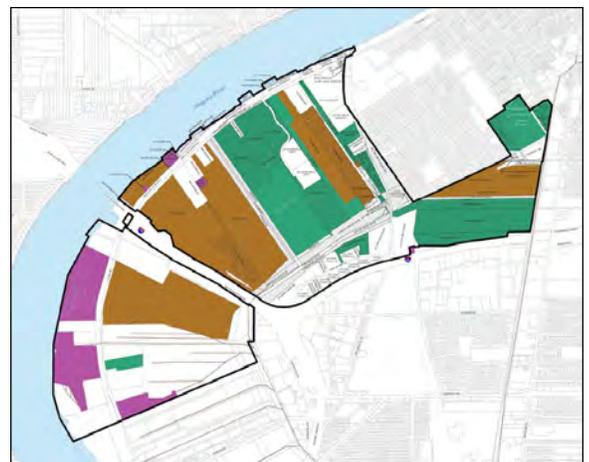
The Waterfront Land Use Plan outlines various policies and strategies to enhance, protect, and strengthen both the physical waterfront and the adjacent land in concert with Town's overall vision outlined in its 2005 Comprehensive Plan. The Town's proactive approach to planning for the future of the community is evident with the various plans and studies that have been undertaken in the past. Many of the policies, strategies, guidelines or recommendations in these documents have been incorporated into Town policies and review processes. With the development of this Waterfront Land Use Plan, a majority of those past planning initiatives still remain viable, while others will be replaced. The chart preceding this section highlights those plans and studies and their relationship to the adoption of this Plan.

Tonawanda Brownfield Opportunity Area – Pre-Nomination Study (November 2012)

As the first of a three step process in developing a State-sponsored plan to revitalize brownfield sites, the pre-nomination study for Tonawanda identified the extents of the opportunity area and provided a preliminary description and analysis of the properties included. The analysis included a review of local demographics and their relation to the region as well as the physical features of the individual properties. Completed in 2012, the Brownfield Opportunity Area (BOA) encompasses over 1,700 acres of land and 202 individual parcels. Located in portions of the Town and City of North Tonawanda, the opportunity area straddles I-190 and generally stretches from the River to I-290. From these parcels, 8 were identified as potential brownfield sites through a review of environmental and permitting records, historical aerial imagery, interviews and site reconnaissance while 21 were classified as either underutilized/abandoned properties or undeveloped/vacant properties. While the number of sites is relatively small, the acreage they contribute to the total opportunity area is approximately 46 percent of the total land area. The final two stages in the BOA process go into more detailed analysis of and explore opportunities available on the brownfield sites



The extent of the brownfield opportunity area (BOA) in Tonawanda. © LaBella, PC



The graphic above shows the extent of brownfields (brown), underutilized (purple) and vacant/undeveloped (green) properties within the BOA. © LaBella, PC

Waterfront Land Use Plan Town of Tonawanda



The "Old Town" neighborhood in the southwest corner of the Town.

(nomination stage) and develop strategies for remediation and redevelopment (implementation stage).

Old Town Neighborhood Plan (July 2010)

"Old Town" Tonawanda is a small waterfront neighborhood that is located in the southwestern corner of the Town that is bounded by the City of Buffalo / Riverside Park, the Niagara River and the General Motors plant. Its location physically isolates it from the other residential areas of the Town, yet it is the only neighborhood in the Town that has views of the waterfront. Initially settled as an area for travelers seeking rest and services along the Erie Canal, the neighborhood grew out of the need to provide housing for the nearby manufacturing facilities in the 1950's. Eventually the canal was filled in (present-day I-190) and local industries reduced their local workforce.

The "Old Town" plan seeks to revitalize the area and capitalize on the numerous assets available. Recommendations include improvements to community aesthetics, infrastructure, safety and security, building rehabilitation, commercial development and redevelopment and connectivity (pedestrian / vehicular). Following the recommendations within the plan, the General Business District (C) along Edgar Avenue was rezoned to Second Residential (B) to reflect the desire to reduce unwanted commercial businesses and changes that have occurred over time.



One of the NYS DEC air quality monitoring stations used at Beaver Island State Park as part of the community air quality study.
© NYS DEC

Tonawanda Community Air Quality Study (2007-2009)

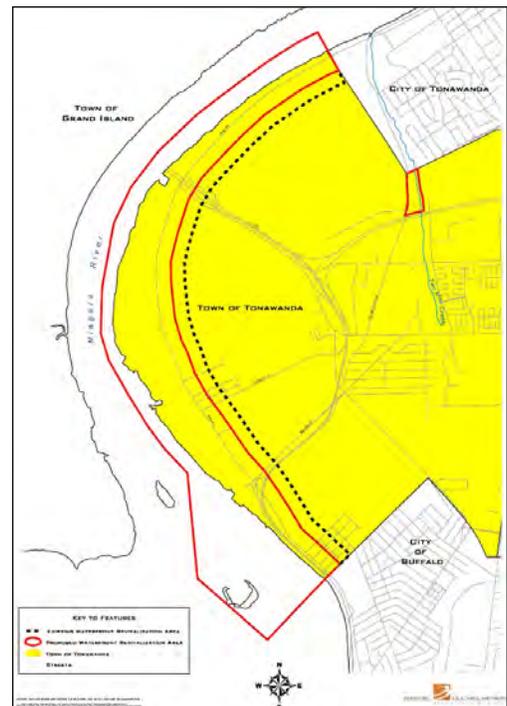
Between 2007 and 2009, the NYS Department of Environmental Conservation (NYS DEC) conducted an air quality monitoring study in response to citizen concerns regarding potentially elevated emission levels. A number of sites are located along the Niagara River in the Town of Tonawanda, ranging from gasoline terminals to chemical manufacturers and refineries, making it one of the more heavily concentrated industrial areas in the region. Monitoring stations were set up in four strategic locations to measure pollution concentrations and evaluate potential public health risks. Six air toxics, including 1,3-butadiene; acetaldehyde; acrolein; benzene; carbon

tetrachloride and formaldehyde, were measured and found to exceed NYS DEC guidelines for annual average air concentration.

As a result of the study, emissions compliance monitoring and facility inspection has increased, which have already resulted in decreased emissions. In addition, the Town has entered into an EPA E3 Program (Economy, Energy, Environment) to develop a coordinated solution to revitalize local manufacturing businesses. The E3 Program brings together Federal and State agencies and the local community under a common agenda to collaborate on initiatives and efforts to strengthen small and medium manufacturers. Specifically, all of the partners involved in the program in Tonawanda are working towards positive air quality improvements as result. This partnership provides a wealth of resources to assist those involved develop sustainable practices, improve efficiency, reduce waste, and become more competitive in the global market.

Town of Tonawanda Local Waterfront Revitalization Program (Amended April 2008)

The Town of Tonawanda originally prepared and adopted a Local Waterfront Revitalization Program (LWRP) in 1996 encompassing all of the lands along the Niagara River waterfront inland to 1,000 feet east of River Road. The updated LWRP decreases the inland boundary to a distance to 500 feet east of River Road as the relocation of River Road, the impetus for the 1,000 foot distance, was not realized. The LWRP boundary was revised to help concentrate waterfront development protection policies and resources and provide greater flexibility for development outside of the boundary. In general, the LWRP seeks to balance the development potential in the area, including industrial and commercial, with recreational uses and public access opportunities in and along the waterfront. The plan addresses and highlights several areas of environmental concern, both past and present, and includes recommendations for their future remediation and / or reuse. A variety of policies and recommendations are contained in the LWRP addressing development / redevelopment, fish and wildlife protection, flooding and erosion control, public access,



LWRP Waterfront Revitalization Area Boundary map with revised boundary shown in red.

Waterfront Land Use Plan Town of Tonawanda

historic and scenic resource protection and enhancement, energy and ice management, and water and air resource protection.

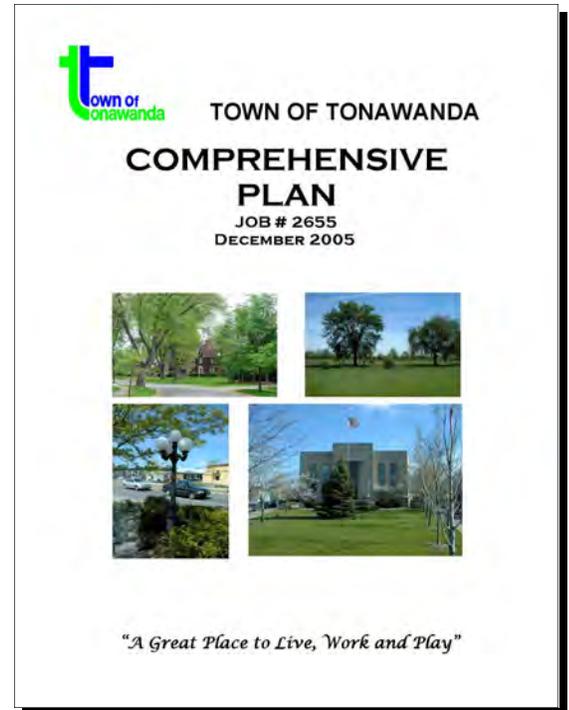
Tonawanda Comprehensive Plan (December 2005)

The Town's last comprehensive plan was completed in 1955 and guided the community during a period of strong growth and development. In 2005, the community updated their plan to reflect the physical and demographic changes that have taken place and to consolidate the goals and recommendations from several studies into one cohesive document. In general, the updated plan focused on redevelopment opportunities in the east, as it is significantly built-out, and development for the western portion of the Town, which is primarily geared towards industrial and commercial uses. Specific recommendations for the waterfront include the encouragement of new industrial parks, redevelopment of vacant lands (especially the Town landfill and United Refining sites), improving recreational trail connectivity with other local and regional systems, continued implementation of the Local Waterfront Revitalization Program (LWRP) and continued cleanup of contaminated sites.

Tonawanda Waterfront Rezoning Study (April 2002)

In 2002, a waterfront land use and rezoning plan was developed to examine the waterfront area north of Sawyer Road between the River and Interstate 190/290 and determine a new direction for redevelopment. As part of a typical land use plan, existing conditions were analyzed that included physical / natural features, socio-economics, and demographics. Noting the industrial background of the area and the associated environmental constraints, site contamination as well as physical constraints such as wetlands and floodplains, the plan provided goals and recommendations for the waterfront to transition the area from primarily industrial to a mix of uses. The plan also focused on a several key areas along the waterfront and provided general action items related to redevelopment.

A primary deliverable from the land use plan was the development of specific zoning language for new districts

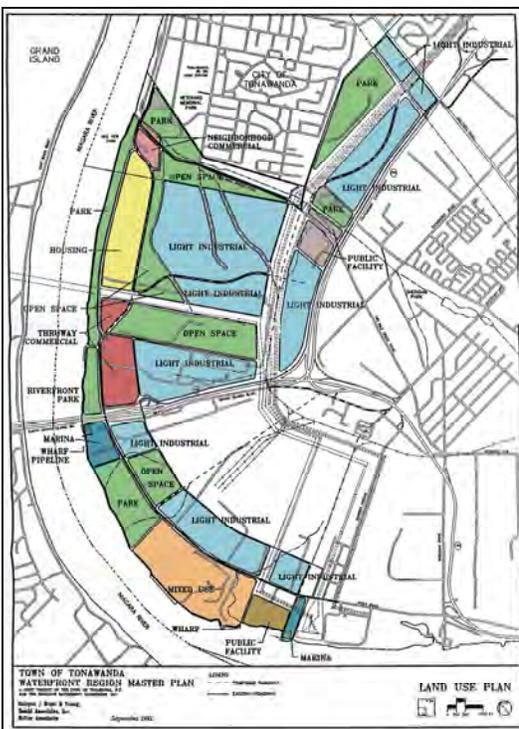


Boundary of the 1992 Waterfront Rezoning Study - it is about half the area of the current waterfront land use update study area.

within the study area that more closely aligned with the Town's Local Waterfront Revitalization Program (LWRP) and established more conformance with waterfront-related uses. The new districts included Waterfront Mixed Use, Office/Research Development, Retail/Highway Commercial, and Waterfront Industrial. Generally, district regulations included specific design standards specific to each in addition to uses permitted and dimensional requirements. A River Road Overlay district was also developed which divided the River Road corridor into three distinctive character areas based on geographic location – Business Transitional, Thruway Impact, and Light Industrial Corridor – to provide further detailed standards for the waterfront. The overlay called for additional site design standards and requirements to ensure a higher quality final design of structures and property. Subsequently, the Town adopted some, but not all, of the new zoning districts proposed in the plan.

Waterfront Master Plan (1992)

The 1992 Waterfront Region Master Plan built upon earlier recommendations provided by the Horizons Commission for the waterfront (see Section IV, page 3-4 of the LWRP for additional background). Outlining a new vision for the Tonawanda waterfront, the plan included an assessment of conditions and created a land use plan for the region as a whole. Back in 1992, the area was also seen as being in a transitional state, with a move away from heavy industry towards a mix of uses that are centered on contributing to the vitality of the waterfront. In general, the plan called for rerouting River Road 1,000 feet inland north of Grand Island Boulevard to provide more waterfront land for development, primarily housing; designating the east side of the road for light industrial use (up to 4 million square feet) and commercial; and open space and recreation predominantly along the waterfront. Cherry Farm, River World and the extension of Isle View Park are all identified as significant contributors to the overall plan and provide a regional recreational draw. In addition to the general land use areas, six target projects were also identified including the River Road relocation, office and light industrial development sites (300 acres and Thruway Commerce Center), recreational sites (Cherry Farm and Riverfront Park), and riverfront housing (north of Grand Island Blvd, west of relocated River Road).



This digitally enhanced copy of the land use plan from the 1992 Waterfront Land Use Plan shows recreation and open space interspersed throughout the region with strategic commercial and light industrial uses on the interior. Subsequent planning efforts have followed this same general pattern for redevelopment.

Waterfront Land Use Plan
Town of Tonawanda

Table 1-1: Existing Plan Relationship

Existing Plans	Impact to Existing Plans
Tonawanda Brownfield Opportunity Area - Pre-Nomination (2011)	Supports/Supplements - The pre-nomination plan establishes a baseline environmental conditions report on the northern part of the study area and provides additional detail beyond the scope of this plan. Various recommendations and findings in the plan have been incorporated or referenced with more emphasis on waterfront land use. No further action is required.
Old Town Neighborhood Plan (2010)	Supports/Supplements - Being the only residential neighborhood in the study area, this plan provides specific recommendations for the residents and businesses in the neighborhood. While reference has been made to the plan, it still is an important local planning resource. At this point, no further action is required. The Town may wish to revisit and update the plan in the near future as development changes in the waterfront.
Tonawanda Community Air Quality Study (2009)	Supports/Supplements - The community air quality study establishes a specific baseline for air quality impacts and improvements that help to drive future development and other performance-based criteria in the Town. This study provides valuable data and recommendations that pertain to areas outside of the Town of Tonawanda as well. No further action is required.
Local Waterfront Revitalization Plan (Adopted 1996, Amended 2008)	Supports/Supplements - The LWRP examines issues far beyond what the waterfront land use plan is intended to do, although there are various areas where the two intertwine. Recommendations in regards to land use have been referenced or incorporated into this plan where applicable. No further action is required. Where specific recommendations of this plan have been implemented, the Town should evaluate the LWRP and note “cross action” items that have been addressed.
Town Comprehensive Plan (2005)	Limited Replacement - The Town comprehensive plan looks at a number of issues throughout the Town, including the waterfront. Due to the age of the comprehensive plan and the changes that have occurred since that time, some of the recommendations of the waterfront land use plan supersede those within the comprehensive plan. When the current plan is updated, this plan should be reviewed and referenced or incorporated where necessary.
Waterfront Rezoning Study (2003)	Replacement - The previous rezoning study examined a similar area and provided limited recommendations to land use and zoning specifically. This updated plan expands upon the previous plan and includes more recent environmental actions and land use changes that have occurred since 2003. Pertinent recommendations are included.
Waterfront Master Plan (1992)	Replacement - This document, due to its age, has since been replaced by subsequent documents and development in the area. However, many of the general goals and land use patterns have been folded into other plans, including this update, although updated based on the most current physical and economic conditions.

Chapter 2

Community Vision



Chapter 2: Community Vision

Community vision is the expressed desire for a future condition or state of being. A well defined community vision will forecast—and set the stage for—the preferred outcomes in a defined area.

For the Waterfront Land Use Plan Update, the community vision focuses on the town’s aspirations for the Niagara Riverfront and adjacent lands. The vision for the area was developed with input and guidance from residents, businesses, land owners, community leaders and other stakeholders through a series of meetings. A summary of community input is contained in Appendix B.

The vision statement, goals and strategies defined in this chapter were developed to guide future decision making and investment. They are the foundation for the future land use plan and site specific recommendations contained in subsequent chapters of this plan. They should provide a framework for future development and redevelopment efforts within this area. They will also serve as guideposts for updates to the Town’s Comprehensive Plan, Zoning Code and other municipal regulations related to this area in the Town.

Vision Statement

Vision statements are intentionally broad and idealistic. They encompass diverse, but interconnected, concepts and ideas that will achieve a desired end when addressed comprehensively. In order for this vision statement to be meaningful and to be actively supported in future policy and decisions, it must be community based.

The vision statement developed in this process is a product of community input. It reflects and honors past planning efforts while at the same time addresses evolving community priorities and planning strategies. The core elements of the vision were derived through input received from advisory committee members, town leaders and the public at large. The vision was refined several times during the planning process in response to community, town staff and committee feedback.

Vision for the Tonawanda Waterfront

“The Town of Tonawanda desires a highly valued waterfront that encourages diverse activities and sustainable investment. The waterfront area will attract water-focused businesses, support existing industries, encourage passive and active recreation, allow for natural areas and open space, accommodate appropriately located residential development and balance the diverse uses located within the waterfront region.

The Town, along with community stakeholders, will continue to act as environmental stewards and ensure sustainable planning and design solutions are implemented by public and private partners. In this way the waterfront will improve as a key amenity that both enhances public access and fosters new investment.”

Goals and Strategies

In community planning, goals are broad statements. They are broad statements that define the community's desired condition(s) related to a specific issue or topic addressed in the larger vision. Goal statements help to answer the question, what is desired or preferred? The community's vision was broken down into the following elements:



Residents from the study area participated in an educational session to learn more about land use planning and provide their input about future land uses in the study area.

- ***Waterfront***
- ***Sustainability***
- ***Environmental Stewardship***
- ***Economic Development***
- ***Community Design***

These goal areas have been individually defined; however, they need to be considered and implemented in an integrated fashion in order to fulfill the Town's vision for its waterfront.

Understanding the “what” is an important step in determining future direction and helping to ensure that well-aligned, vision-supporting decisions are made. However, additional guidance is needed to provide the right path for Town's leaders, stakeholders and residents and to keep them on it.

With so many moving parts—various administrative actions by many departments, leadership transitions, personnel changes and other community dynamics—it is important to know how the goals can and should be achieved over time. Strategies defined within each goal area provide that “how-to” information. Strategies drill down to give more specific ideas about the means by which the goals can be achieved. If a goal describes the destination then the corresponding strategies provide insight about the possible routes the community can take to get there. This plan's goals and strategies are designed to allow adaptability and flexibility over time. They also provide the basis for the land use and phased implementation outlined in other sections of the plan.

Waterfront

The Town recognizes that Niagara River and waterfront areas are valuable assets that offer unique opportunities and inherent stewardship. Future land use and development decisions must be sensitive to the waterfront, increase public access to and views of the river, enhance trail linkages to and through the study area, and enhance connections among local and regional destinations. The Town's waterfront will be a place where economic and environmental sustainability are consistently balanced.



Strategies

1. Increase public access to and views of the waterfront. Physical and visual access to the waterfront should be a cornerstone of all future improvements within the study area boundary. Waterfront access provides a host of recreational, economic and social/psychological benefits for the community.
2. Encourage water-dependent uses and expanded passive recreation along the water's edge. Future development and redevelopment on parcels located immediately adjacent to the river should depend directly and/or indirectly on the waterfront presence.
3. Relocate ill-suited development as opportunity and resources are available, especially those that negatively impact air quality and, in turn, public health. Actively engage public and private stakeholders to relocate non-water dependent development to other viable location within the Town.
4. Engage regional partners to pursue joint initiatives. The Town must recognize and celebrate its regional connections and explore opportunities to develop projects and policies that mutually benefit multiple communities. The Town should seek joint grant funding opportunities (e.g. Niagara River Greenway) to implement regional initiatives.



The Niagara River shoreline offers many unique areas to enjoy the surroundings. These views and resources should be integrated with future development in a positive manner.

Sustainability



Future land use and development will promote sustainability by encouraging appropriate development patterns, encouraging eco-friendly site and building design and employing green construction techniques. The physical, environmental, economic and social implications of decision making in Tonawanda will be considered in order to promote long-term community health and prosperity.

Strategies



The Town already has various locations that have explored and actively installed renewable energy sources as part of their individual business practices. Continued encouragement of these resources through building and site design standards or guidelines will help to spur additional development.

1. Implement green building and site design standards. The Town should clearly define its minimum requirements for the use of green building and sustainable site development practices, including those employed as part of New York State's "Smart Growth" principles. These requirements need to be universally implemented in the town, with special emphasis in the waterfront area.
2. Encourage adaptive and beneficial reuse of vacant industrial facilities and landfill sites. The study area's brownfields and vacant industrial/commercial structures and sites present critical opportunities for redevelopment. Consider ways that existing structures can be repurposed and retrofitted to meet today's development needs.
3. Encourage and expand green technology businesses. Building on current successes in the area, the Town should identify preferred green industries and work with the economic development community to position the Town for future investment.
4. Expand connectivity to and through the study area. Land use patterns that allow active transportation and multi-modal access will be more sustainable in the future. The Town should explore capital improvements that will expand trail and street connections through the study area to allow user-friendly pedestrian and bicycle access.

Environmental Stewardship

Future land use and development decisions will consider the environmental implications to unique environmental characteristics and habitats. The Town and its private and public partners will foster opportunities to preserve and restore natural resources, including the Niagara River, wetlands, streams, woodlots and other environmental features.



Strategies

1. Continue and expand efforts to improve environmental and human health conditions at existing industrial facilities. The Town will continue to engage industries through the E3 program and find additional opportunities to influence facility operations and site management practices that minimize potential environmental and health threats.
2. Encourage best practices for shoreline stabilization and restoration. The River's ecosystem, including water quality, water quantity, and the plants, fish and wildlife that depend on the river, is important to overall quality of life. Understanding the context of the landscape, the local ecosystem(s), the landowners' goals, the regulatory framework, and former/future alterations to the landscape will help ensure restoration projects along the shoreline will be effective.
3. Work with state and federal partners and private landowners to implement environmental remediation at known sites. Public and private partnerships will be needed to comprehensively address environmentally compromised parcels and improve air quality in the community.
4. Consider human health impacts of proposed projects. Tonawanda's environmental challenges increase the Town's interest in considering human health in its project review processes. Consider regulatory and policy changes that would integrate human health factors into the decision making framework.



The Huntley Generation Station is a prominent presence along the River.

Economic Development



Future land use and development of the study area will support existing successful business and industrial enterprises while identifying and encouraging new opportunities for smart economic development and redevelopment. The Town will provide the appropriate land use regulations to provide opportunities for private investment in line with these local goals. The Town will consider physical enhancements needed to meet the evolving needs of emerging markets and industries. The Town will encourage and support public-private partnerships to redevelop brownfields, to expand smart industry and to increase the Town's tax base and local jobs.

Strategies



The Riverview Solar Technology Park home to various businesses, including the worldwide corporate headquarters of Unifrax, LLC.

1. Support existing successful industrial and commercial enterprises in the study area and work towards improving emissions and environmental quality of these businesses. The Town should work proactively to ensure existing thriving businesses stay in Tonawanda. The industries and commercial businesses located in the study area are an important component of the community's tax and employment bases.
2. Pursue brownfield redevelopment funding and encourage more eco-friendly industries (e.g. Riverview Solar Park). The push for "green" businesses is universal, particularly in the Greater Buffalo Region. Tonawanda should be working to identify local and regional opportunities to capitalize on this trend within the study area.
3. Invest in public improvements to improve the Town's "climate" for private investment. The public sector's investment in a defined area can improve the climate for investment from the private sector. The Town should work with other municipal partners to identify key infrastructure enhancements that may attract new development.
4. Develop a brand - either locally or regionally - to attract future business investment. Community branding will give Tonawanda an much needed opportunity to define, refine and promote its identity.

Community Design

Future land use and development in the waterfront area should be designed to improve visual appeal and create a defined sense of place. The unique mix and design of industrial, commercial and residential uses within the area will be coordinated through the Town’s regulatory programs and design guidelines. Public and private development projects will feature improved landscaping to create visual interest and adequate buffers. Corridors, public spaces and individual sites will utilize appropriate materials and incorporate pedestrian-scaled amenities where appropriate to improve the look and feel of the area. Neighborhood and district design themes will be encouraged, especially at gateways and key destinations within the study area to foster community pride and branding.



Strategies

1. Implement greening and buffering strategies throughout the study area. The large scale buildings and large swaths of vacant and industrial lands need to be transformed by restoring natural landscapes throughout the study area. Lush landscaping will signify community pride and investment while at the same time enhancing the human scale of existing and future development within the study area.
2. Utilize and enhance design standards to achieve better site and building designs. The Town should incorporate graphic-based guidelines and/or standards to ensure that redevelopment achieves the visual appeal and scale of development desired for the study area, especially on and near the waterfront parcels.
3. Develop design themes to distinguish and connect attractions and destinations. The study area boasts many unique assets that should be celebrated and interpreted. The Town should identify physical enhancements that will help share its story visually and encourage residents and visitors to spend time exploring this unique area.



The Old Town neighborhood in the Town of Tonawanda is one of the oldest neighborhoods in the Town and is the only one with direct views of the Niagara Riverfront.

Chapter 3

Context



Waterfront Land Use Plan
Town of Tonawanda



Figure 3-1: Study Area & Niagara River

Chapter 3: Context

The study area is a defined geographic boundary in a larger community. And that community is an integral component of a larger region. To better understand the issues and needs as well as define opportunities and constraints for the study area, it is important to consider the surrounding area and think about the bigger picture.

This chapter provides a glimpse of the broader conditions that can and should influence the defined geographic boundary focused on in much of this plan. The information contained in the chapter has been explored in more detail in other documents and resources. The summary information included here provides the context.

Community Profile

The Town of Tonawanda is located in the northwest corner of Erie County. The Town is bordered to the north by the City of Tonawanda, to the east by the Town of Amherst, to the south by the City of Buffalo and to the west by the Niagara River. Tonawanda, which includes the Village of Kenmore, is home to approximately 73,500 people.

A first-ring suburb of the City of Buffalo, the Town consists of a diverse mix of uses with two very distinctive areas separated by Military Road/State Route 265. The eastern portion of the Town is primarily residential in nature with commercial areas located along major thoroughfares and community services scattered throughout. The western section contains some residential areas, but is primarily industrial in nature and consists of a sizeable concentration of very large industrial parcels.

Brief History

Although the Town was officially incorporated in 1836, its history can be traced back to the early 17th century. The first settlers to the area appeared circa 1805.

The area's fertile lands initially spurred agricultural development and settlement. The Niagara River served as

Keystone of the Niagara Frontier

It was once tagged the "Keystone of the Niagara Frontier." Certainly, it remains one of the leading towns in Western New York. The Town of Tonawanda can boast of spawning the Niagara Frontier's pioneer suburban village, becoming the first to develop an extensive and varied industrial base, and being the first town to exceed a population of 100,000 people. The Town of Tonawanda's history has passed through successive stages of agriculture, industry, and suburbanization over the past century.

Source: Buffalo History Works

a natural transportation system, which promoted agricultural industry throughout the area.

The Erie Canal was completed in 1825 . The Canal utilized Tonawanda Creek for a distance before turning south and following the present-day route of River Road and Interstate 190 and terminating in the City of Buffalo. In 1836, the Buffalo and Niagara Falls Railroad was completed, which expanded the area's access to goods and resources, especially to and from the Midwest. The canal moved goods west, but also moved a multitude of people west. These new transportation systems brought immigrants from Ireland, Germany, England, Poland and Italy.

The Erie Canal Canal's completion marked the beginning of Tonawanda's birth as a leader for industrial development. The various transportation systems that traversed the area, coupled with the availability of land and spurred significant commercial and industrial growth along the waterfront.

Tonawanda unloaded its first cargo of lumber for distribution in 1867. The business increased at a rapid rate until, by 1890, over 700,000,000 feet of sawed lumber was docked. In addition, large quantities of other forest products were docked at the Tonawanda: shingles, laths, fence posts, railroad ties. At one time as many as forty lake vessels wintered in Tonawanda harbor.

By the turn of the century Tonawanda and North Tonawanda, jointly known as "The Lumber City", was the largest lumber supply center in the world. Though they held that distinction only briefly, they were second only to Chicago for many years.

Although the original canal route between Tonawanda Creek and the City of Buffalo was filled in in the early 1900's, the waterfront and adjoining area continued to attract more industries and manufacturing facilities. Many industries located long the Niagara River around the turn of the century. This riverside section of the town attracted a considerable number of workers from Serbia, Croatia, and Hungary who provided the work force for the new riverfront industries.

The employment opportunities, industrial tax base, and restriction of heavy industry to the western portion of the town encouraged additional suburban growth in Kenmore. By the 1920s the town was a home for electrical power generation, and steel, rubber, chemical, and aircraft plants. Other industries, such as oil refining and auto manufacturing, would follow a decade later. The Village of Kenmore's population grew by 500 percent over the next decade. It was settled predominately by upper and middle class white anglo saxon protestants (WASPs),

A rapid immigration of new people to the town who were employed by the burgeoning war industries necessitated construction of low-cost housing in a community which was very "middle class." The development of the Sheridan Parkside housing project raised concerns at the time. After the war, a higher number of people from different ethnic backgrounds began to move into the village, especially from Buffalo's west side. The formerly "WASP" Kenmore took on a more cosmopolitan character as Italians, Poles, and by 1964, African-Americans made their homes in the village.

This time also brought extensive development of new middle-class housing throughout the town. Within that decade most of the idle farmlands were developed by builders, The town's population nearly doubled from 55,270 in 1950 to 105,032 in 1960. In order to ensure the quality of life residents of the town had come to expect, a new water treatment plant, modern sewage and garbage disposal, and a vast storm sewer system were constructed.

At its height of development, the Town's population levels exceeded 107,000 and was sustained near this level until the 1960's. That marked the turning point in manufacturing and the entire region began to experience industrial decline.

A number of industries are still located along the Tonawanda waterfront, although not as numerous as in the past. The presence of industries also included a number of waste disposal sites, some of which remain active today, containing a wide range of substances. With the closure and downsizing of several industries in the area and a continued interest in waterfront, the Town is



In this historic, undated photo of the waterfront, small houses and cottages are located along the Niagara River with industry visible in the background. This is in the area of the present-day small boat launch looking north. © Town of Tonawanda



Views in and around the current Cherry Farm property show a much different picture of the area. A bridge carries traffic over the original Erie Canal (top) and a farmhouse along present-day River Road (bottom). © Town of Tonawanda

evaluating new opportunities to revitalize the area. The community's vision includes redevelopment of the area for public uses as well as businesses and industries that complement the waterfront without degrading it.

Regional Position

Within Erie County, the Town of Tonawanda is the third-largest community, including the Village of Kenmore. The density of industrial development in the mid to late 1900's helped to solidify the Town's importance in the region, even without the presence of the canal. The concentration of industrial and manufacturing facilities along the waterfront served as a prominent employment center throughout the Erie-Niagara region, the largest outside of the City of Buffalo.

Although the number of industries have declined since the 1980's, several sites, including DuPont, GM Powertrain, Dunlop, Erie County Water Authority and NRG's Huntley plant, maintain a strong presence in the region and will likely continue in the near future.

Chapter 4

Study Area Profile



Waterfront Land Use Plan
Town of Tonawanda



Chapter 4: Study Area Profile

The study area's pattern of development, mix of land uses, building types, natural features, and environmental conditions reflect the Town's history and its evolution of development over time.

An overview of current conditions helps tell the story of past events and helps us understand how previous policies and decisions have shaped the community, particularly the waterfront portion of the Town.

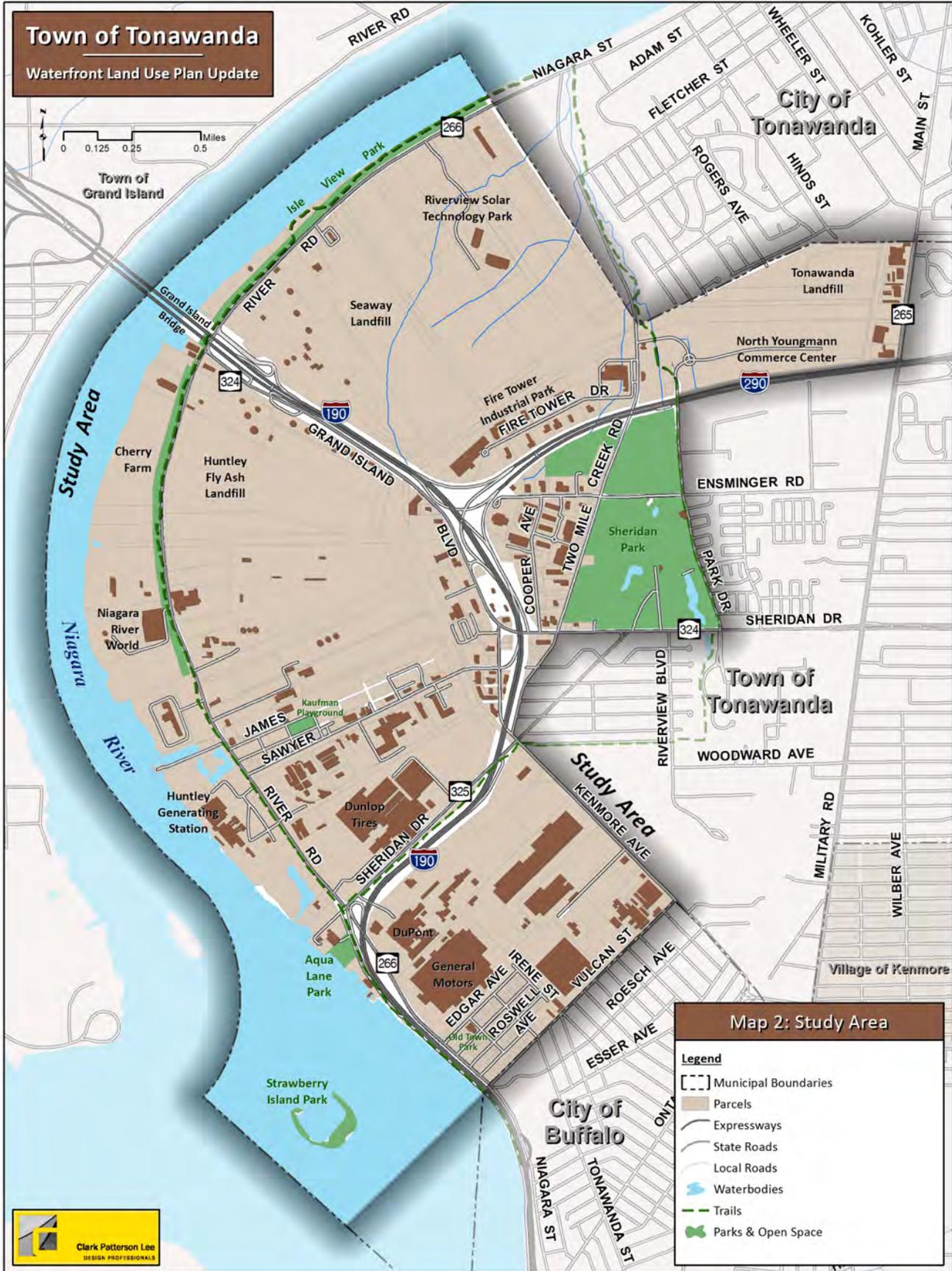
This chapter explores existing conditions through mapping and supporting narrative. It incorporates findings from other relevant plans and reports that were available at the time this plan was undertaken.

It is not intended to be an exhaustive assessment of the area or a parcel-by-parcel description within the defined boundary. Instead, this chapter provides a basis for the land use plan, future programming and development recommendations and potential target area improvements set forth in subsequent chapters of this plan.

The study area profile broadly describes existing conditions and outlines the potential opportunities and constraints associated with the physical and natural features of the study area. These conditions influenced the Town's vision and goals, and they will have a critical impact on future enhancements within the boundary.

All of the map graphics provided in this chapter are included in Appendix A.

Waterfront Land Use Plan Town of Tonawanda



Inventory and Analysis of Existing Physical and Environmental Conditions

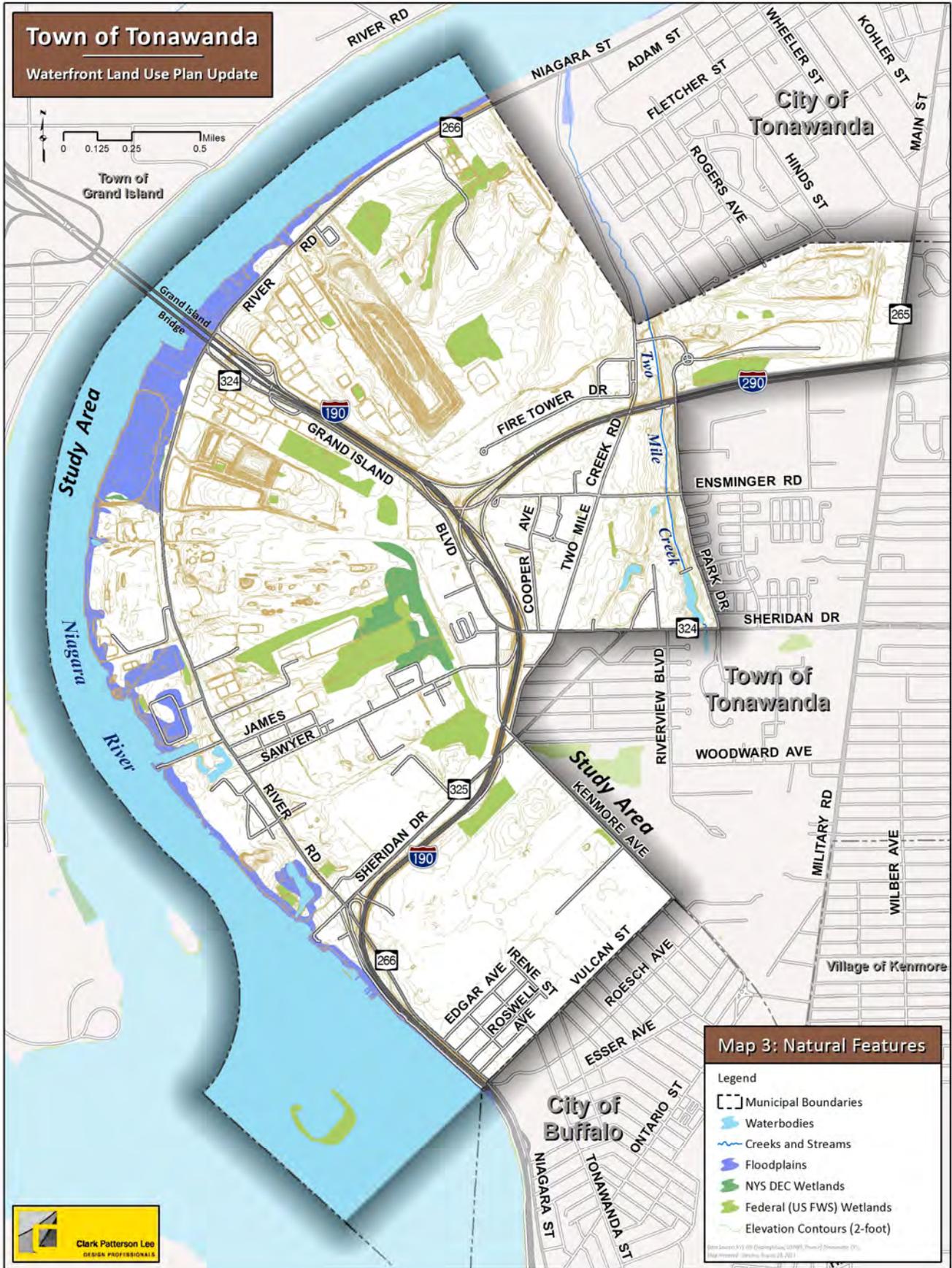
Study Area Location

The study area is comprised of over 820 parcels on approximately 3,200 acres and features approximately 6 miles of Niagara River shoreline. The study area in the context of the greater Buffalo-Niagara region is shown on Map 1 on page 24. Located entirely within the Town of Tonawanda, the study area borders the City of Tonawanda to the north and the City of Buffalo to the south. The eastern boundary is generally located along the edge of Sheridan Park and Kenmore Avenue. Grand Island is located directly across the Niagara River and is connected directly to the study area via the South Grand Island Bridge.

Strawberry Island is situated in the Niagara River within the boundary of the study area as well. The island was originally around 100 acres in the early 1800's, doubled in size in the early 1900's from Black Rock lock construction deposits, then later reduced to its present size (~10 acres) due to dredging from private interests and erosion. It is home to various wildlife including great blue herons and great egrets; restoration efforts between 1993-2002 have stabilized the island and kept the island intact. Although Strawberry Island is a critical natural feature within the study area, it is not the subject of examination or future planning by the Town as it is owned by the State Office of Parks, Recreation and Historic Preservation.

Map 2 provides a detailed view of the study area's location and key properties within its boundary, including Town and County parks, trails, three landfills, the Town of Tonawanda Water Treatment Plant, various industries, and two distinct residential neighborhoods.

Waterfront Land Use Plan Town of Tonawanda



Natural Features

Map 3 on page 28 provides the location of key natural features, including waterbodies, creeks and streams, floodplains, wetlands and steep slopes. The location of these features helps to understand existing patterns of development.

The study area's natural features are paramount to the plan's vision and Town's plan for this part of the town. Future development and preservation activities within the study area will impact the condition and restoration of these features. The Town must make decisions that will protect vital natural environments.

Waterways

The Niagara River is largest and most critical of the area's natural features. The Niagara River is a 37-mile strait connecting Lake Erie to Lake Ontario. The river varies widely in depth, from an average of 20 feet in the branches around Grand Island to soundings of 190 feet in the upper gorge. The study area falls within the Niagara River watershed, which includes 1,225 square miles with 7 major tributaries, including Tonawanda Creek and Two Mile Creek.

According to information provided through the Buffalo Niagara Riverkeeper, the Upper Niagara was historically lined by marshes that provided feeding, breeding, and resting areas for abundant array of resident and migrating animals. Over 80 different species of fish have been documented in the Niagara River since the 1900's (*Buffalo and Niagara Rivers Habitat Assessment, 2008*) and although the number of species today is far less, the River in general continues to be a popular fishing destination.

However, development and industry in the past several hundred years have severely altered the habitat and water quality in the Niagara River. Industrial contamination from chemicals such as PCBs, mirex, chlordane, PAHs, dioxin, and pesticides has resulted in the Niagara River being listed as an Area of Concern by the International Joint Commission, a regulatory agency of U.S.-Canada shared waters. Fish consumption advisories exist for many fish in the upper and lower Niagara River. The river

Waterfront Land Use Plan

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is also affected by sewer overflows and stormwater runoff. Sewage and stormwater raise bacteria levels in the river and elevate levels of phosphates and nitrates, nutrients which can cause algae blooms and low dissolved oxygen. In addition, the river can be impacted by pollution from its tributaries.

Two Mile Creek cuts across a narrow portion of the study area and its tributary, Rattlesnake Creek, traverses the Isle View site, which is the largest area of vacant land in Tonawanda's waterfront area. As long as development patterns and materials are designed to protect these natural features, creeks and streams can be readily incorporated into site designs and often are viewed as an asset.

Floodplains

The study area features a significant amount of 100-year floodplains (approximately 195 acres upland), which are low-lying lands next to rivers and streams. Floodplain systems, when left in their natural state, store and dissipate floods without adverse impacts on humans, buildings, roads and other infrastructure. Natural floodplains provide open space, habitat for wildlife, fertile land for agriculture, and opportunities for fishing, hiking and biking. However, buildings, roads, and parking lots are being built where natural systems used to be located, which decreases the land's natural ability to store and absorb water.

While the presence of floodplains does not preclude development, it is critical that new buildings, structures or other alterations to the land within these areas adhere to the Town's floodplain regulations as well as state and federal requirements.

Wetlands

Wetlands (e.g. swamps, marshes, bogs, and similar areas) are areas saturated by surface or ground water, either seasonally or year round, that support distinctive vegetation adapted for life in saturated soil conditions. Wetlands serve as natural habitat for many species of plants and



Examples of wetland restoration in industrialized areas can be found across the northeast. This tidal marsh in New Jersey has been incorporated into the 270-acre Lincoln Park in Jersey City and includes walking trails and recreational space. Half of this blighted section of Jersey City was returned back to a fully functional tidal marsh; the other half is being developed into a nine-hole public golf course.

animals and absorb the forces of flood and tidal erosion to prevent loss of upland soil. State and federal designated wetlands are located throughout the study area, with a high concentration of them located north of James Avenue. Development near wetlands requires careful design techniques to reduce or eliminate any negative impacts associated with their disruption.

Wetlands' importance in local and regional ecosystems and their key role in natural stormwater management make them a natural asset worth designing around. Wetlands can easily be incorporated into various site designs or become the focal point of parks and open spaces.

Street Network

Map 4 on page 32 highlights the various transportation networks found throughout the study area. In addition to local roadways, several State and Interstate routes traverse this section of Tonawanda, providing efficient access to industries throughout the region. Major truck routes are generally found along these major roadways, although River Road is designated as a truck route as well.

These roads provide a regional flow of heavier traffic volume, connecting arterials and other high access roadways. There are very few local roads that provide lower volume/speed access, especially east to west. As identified in the Brownfield Opportunity Area plan, this lack of access has prevented access into the larger properties and discouraged property development and/or subdivision.

In addition to roadways, railines provide another level of potential transportation along the waterfront. The presence of various industries in the area led to the construction on multiple railroad sidings/spurs. Although the map shows numerous lines and sidings, many of them remain unused or seldom used and, in some cases, only old railbeds remain, available for re-use or adaptation for other means.

Environmental Constraints

Tonawanda's waterfront area's industrial heritage has created environmental constraints that will require

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Landfills & the waterfront

The presence of landfills along the waterfront are obvious when viewing the study area on the ground - the elongated pyramidal-shaped grassy surface that rises up at a steady slope and surrounded by fencing. The BOA study, outlined on page 35, identified approximately 380 acres or 22 percent of the land area north of James Avenue as brownfields (includes landfills) (see page 34-35). When taking into account the full 3,280 acres that constitutes the study area and the additional landfills located in the southern half of the waterfront, the percentage is closer to 10-15 percent, but the physical impact of landfills on redevelopment of are clear. Transforming the waterfront from its current state to the one desired by the community will require creative reuse and redevelopment of the landfills to provide a positive contribution from an economic and, more importantly, a visual aspect. The action plan (Chapter 7) provides additional details and direction for the Town to incorporate these features and transform them into resources.

creative, responsive solutions in the future. The Town has been proactive in working with public and private entities to cleanup various sites throughout the area and will continue to do so. With three landfills, a coke refinery, and several large manufacturing facilities, concerns about air quality and the potential impacts of brownfields will be two critical concerns the Town will need to address with state and federal agencies, including the NYSDEC, USEPA, USACOE, and the New York State Department of Health.

Landfills

With heavy industry comes material disposal and common practice was to locate landfills within close proximity. The waterfront area contains several landfills, some of which have been closed and officially capped off. The contents within these landfills range from post-consumer materials at the former Town landfill site to industrial by-products and the presence of radioactive or other hazardous materials from outside the area.

The Town landfill, located off of East Park Drive has an especially unique history with its future still being determined today. Although used for regulated waste disposal (household, sewer sludge, C&D, etc.), it was later identified as a site in the vicinity of and potentially impacted by the Linde Site, which processed radioactive materials during World War II and contains contaminated soils and groundwater. Although the Linde Site has since been remediated and reused and the US Army Corps of Engineers had effectively signed off on the landfill site (2008), the Town expressed concern with that decision. Since that time, additional monitoring and sampling has been undertaken which identified some underground migration and the presence of hazardous materials. Final grading is underway and a 2012 assessment of the site recommends a feasibility study to evaluate and determine remediation for eventual reuse of the site by the Town.

Just like with other landfills in the waterfront area, the Town would like to reuse these areas for other beneficial uses, including passive recreation and solar arrays, which are discussed elsewhere in this study. Coordination with Federal and State agencies will be crucial to maintain a safe environment while providing a coexisting resource for the community.

Air Quality

Tonawanda's air quality is a well documented issue that will need vigilant attention for the foreseeable future. In 2009, the NYS Department of Environmental Conservation (NYS DEC) released the Tonawanda Community Air Quality Study, which measured ambient concentrations of hazardous air pollutants modeled dispersion patterns. The air quality study showed that the concentrations of benzene and formaldehyde were much higher in the Tonawanda area than in other areas with industrial and urban monitoring data in New York State, excluding New York City. The air quality study results also indicated that the Tonawanda Coke Corp. (TCC) facility was the most important factor in the high air concentrations of benzene. Other benzene emission sources include automobile and truck traffic, the Huntley power plant, and the NOCO and Sunoco petroleum product terminals.

Since then, the Town has proactively participated in several initiatives and programs to improve air quality. While air quality conditions have improved significantly over the last five years, with a 50% reduction benzene levels in the area, it is still the highest recorded level in the State according to NYS DEC analysis and tracking.

BOA Pre-Nomination Study and recent Phase 1 Analysis

Recently, the Town of Tonawanda, in cooperation with the Erie County Department of Planning, completed a pre-nomination study for the Tonawanda Brownfield Opportunity Area (see map at right). As part of the study, a preliminary analysis of the area included an examination of physical features and resources, a review of environmental records, and economic conditions that could impact future development.

Within the study area, the vast majority of the land uses fall under the vacant category, followed by industrial uses - the vacant uses include the landfills, Cherry Farm along the Niagara River and several former manufacturing sites. Taking a more proactive approach, the Town has

Air Quality Update

Continual monitoring and analysis of the air quality in Tonawanda by the NYSDEC in the last four years has shown a reduction of benzene levels by 86% at Grand Island Boulevard and 69% at Brookside Terrace according to a 2013 update by the NYS DEC. Operational modifications to the Tonawanda Coke Corp. by order of the DEC and USEPA have led, in part, to these reductions. In addition, concentrations of other air contaminants have also declined since the 2007 monitoring study. These improvements are a positive sign, but there is still much work that needs to be done to improve air quality and public health. A NYS Dept. of Health (DOH) health outcomes review was developed for the Town in 2010-2012 based on the results of the NYS DEC air quality study. Although there was no casual relationship identified between an increase in various cancers and local air quality, the review recommended a biomonitoring project to provide further analysis of residential exposure, especially around Grand Island Blvd.

- *NYS DEC (Tonawanda Community Air Quality Study - Update, January 2013)*
- *NYS DOH (Tonawanda Study Area Health Outcomes Review: Birth Outcomes and Cancer, October 2013)*



Brownfield Opportunity Area boundary.

implemented zoning districts within the brownfield opportunity area (BOA) to encourage more appropriate development and take advantage of the expansive views along the Niagara River. Consistent with the Town’s previous 2009 Land Use Plan for the Waterfront and the amended 2008 LWRP, land north of I-190 is geared towards commercial development with waterfront related uses adjacent to River Road and the River itself. South of I-190 and east of River Road retains the general industrial classification, reflecting current conditions and encouraging their continuation. Lands south of I-190 and along the River are split between waterfront business and mixed use.

Landfill/Brownfield	Area (acres)
Huntley Power	117
United Refining	17
Ashland Oil & Refining	20
Seaway Industrial Dev.	97
Lake Ontario Steel	37
Town of Tonawanda	60
Private Owner	38
TOTAL	386

The table above highlights the brownfields and landfills as identified in the BOA study and within the northern section of the waterfront land use study area. Although not specifically identified as part of this plan, there are additional sites located south of James Avenue (the southern boundary of the BOA).

Analysis of environmental records in the area indicate 29 properties are classified as brownfields, underutilized sites or vacant/undeveloped sites. Brownfields are considered sites that contain documented contamination on the property while underutilized and vacant sites have either had limited development or no development in the past, respectively. Within the BOA, the brownfield sites generally consist of either waste disposal sites (buried or temporary storage) or former energy production or storage sites.

Inventory and Analysis of Existing Land Uses and Development

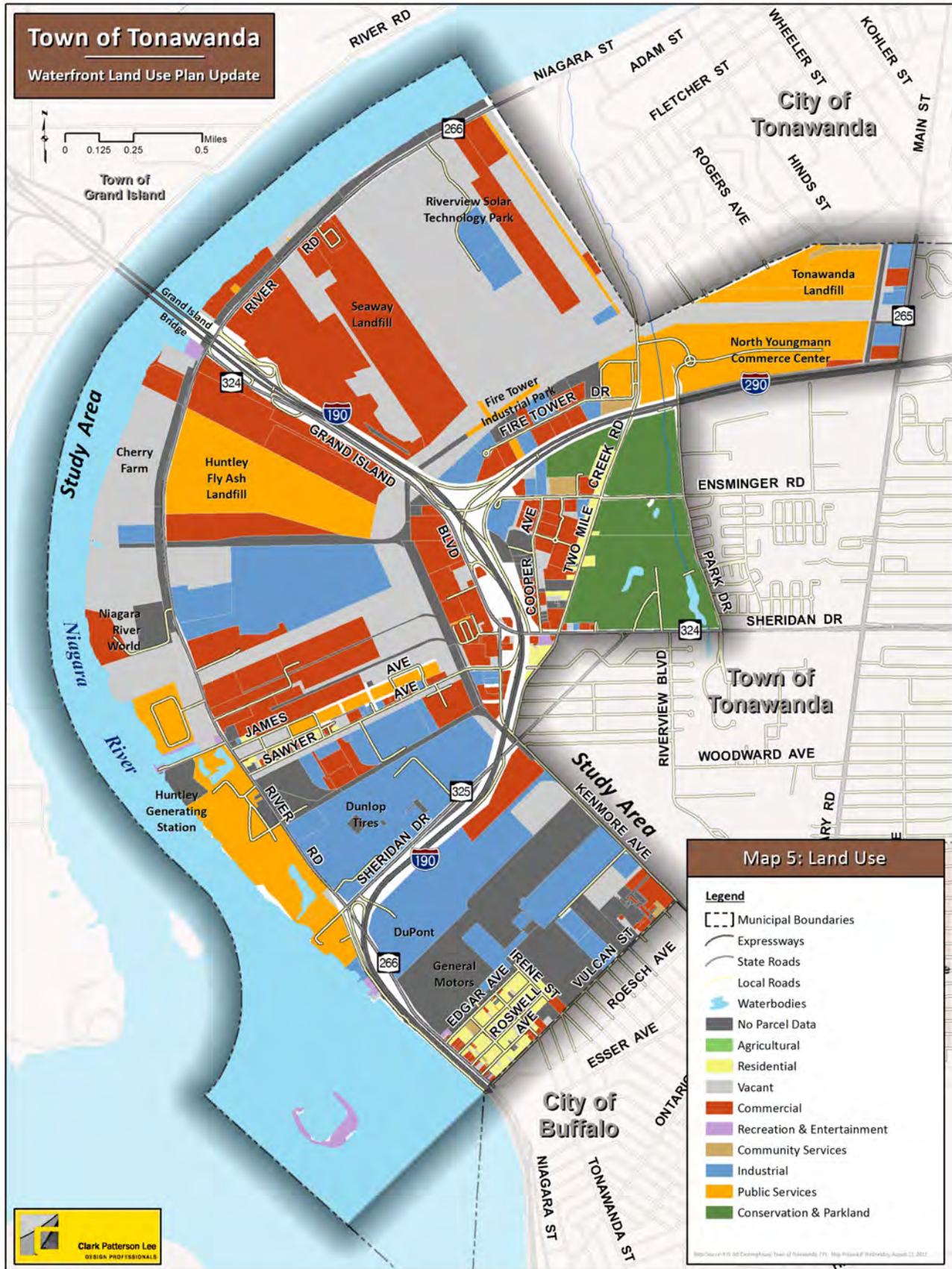
Land Use

As the map on page 36 illustrates, the existing mix of land uses in the study area is varied. There are nine land use categories represented in the boundary, based on real property land use classification codes, shown in the table on page 37.

The study area has a large concentration of industrial properties, many of which are located on large parcels. The industrial uses concentrated in southern portion of the boundary, south of Sawyer Avenue, are active industries that have recently made significant investments in their facilities and/or operations. They are expected to continue in their current capacity for the foreseeable future.

There is also a relatively high percentage of land area dedicated to commercial enterprises. The properties

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classified as commercial vary more in parcel size and configuration, ranging from small two to three acre lots to many acres in size. Some of the commercial properties may present opportunities for new future uses and/or adaptations in development that would better suit and highlight the natural features of the area.

The public service land use category generally represents municipally owned properties that are not parks or recreation facilities. However, one exception to this on the map is Aqua Lane Park, which is characterized as public service, likely due to its proximity to the Town’s water treatment plant to the north. Aqua Lane Park is in fact the only waterfront park that the Town owns and maintains and includes a boat launch located on the north side of the treatment plant.

Within the study area, Sheridan Park is the only property officially classified as forested/public parks (code 900) and comprises the largest recreation area. Similar in case to Aqua Lane Park, there are other community/pocket parks located throughout the Town that are classified as public service or another use, including Kaufman playground, Old Town Park, and Isle View Park (Erie County owned). The Town may want to revisit its land use coding to more accurately reflect existing land uses.

The only area zoned as residential along the waterfront on the existing land use map is the Old Town neighborhood.

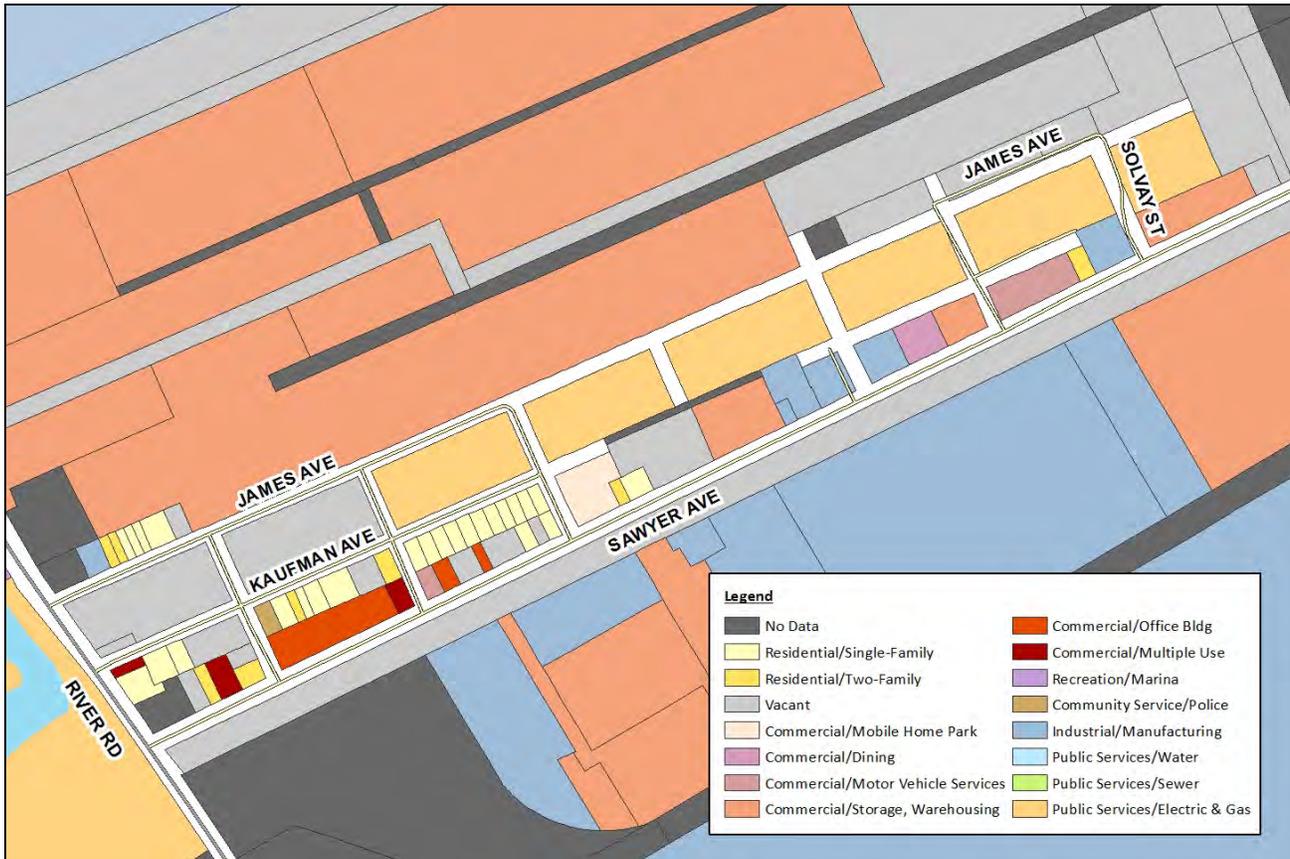
Table 4-1: Existing Land Use Classifications

Land Use Code	Description	Parcel Count	Percent	Acreage	Percent
0	No Data ¹	74	9%	16.9	1%
100	Agricultural	0	0%	0.0	0%
200	Residential	334	42%	49.3	2%
300	Vacant	164	21%	807.9	31%
400	Commercial	136	17%	729.6	28%
500	Recreation	11	1%	35.3	1%
600	Community Services	6	1%	8.6	0%
700	Industrial	42	5%	519.1	20%
800	Public Service	21	3%	348.1	13%
900	Forested/Public Parks	4	1%	99.8	4%
TOTAL		792	100%	2614.6	100%

¹ According to the Town Assessment Office, parcels classified as “No Data” have differing property ID’s and therefore do not have appropriate classification information available. Records are being reviewed and updated.

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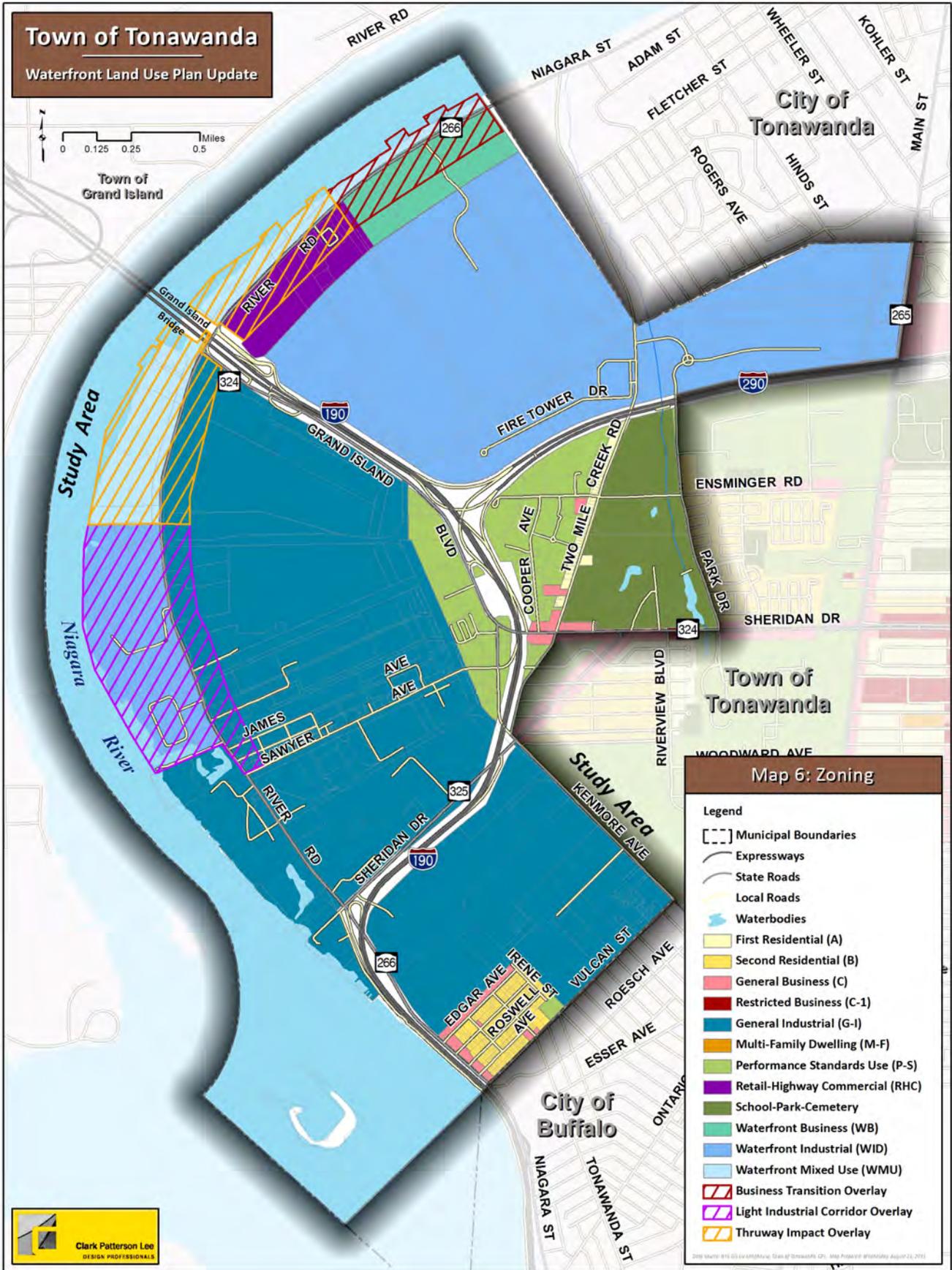
Figure 4-1: Sawyer Avenue Area Detail



That compact residential area borders a City of Buffalo residential area and is expected to remain intact for the foreseeable future. In the future land use section of the plan (Chapter 6), there are recommendations for improving the cohesiveness and physical conditions of this residential area within the boundary.

Detail of land use property classifications on James, Sawyer and Kaufman Avenue. Sporadic residential uses are located in the area, predominantly on the western side, surrounded by commercial, industrial and public service uses.

The existing residential properties on and in the vicinity of James Avenue were most likely in place before zoning was adopted and are not zoned for residential use (see Map 6 on page 39) making these uses preexisting, nonconforming. The area's proximity to large industrial facilities and high power tension lines do not make it conducive to long-term future residential use., making this area suitable for redevelopment for other uses. The Town and interested developers may pursue land assembly to create one or two large parcels or a series of mid-size parcels for redevelopment. Additionally, vacant and/or underutilized properties on Sawyer Avenue can be rehabilitated for future commercial or light industrial occupancy.



Waterfront Land Use Plan

Town of Tonawanda

Zoning

The Town of Tonawanda is divided into 12 zoning districts with three individual overlay districts located along the waterfront. Of the 12 total districts in the Town, 10 districts are located in the study area alone, thirteen including the overlays. In general, the districts have been developed in a manner consistent with the Town's Comprehensive Plan and LWRP to transition from a predominantly industrial environment to a mix of uses. However, the study area is still predominantly zoned for General Industrial (G-I), especially west and south of I-190 due to the presence of businesses such as Dunlop, GM, and DuPont among others.

The less intensive Waterfront Industrial (WID) district is located north of I-190 generally permits office and light industry as a transition to adjacent areas. The River Road overlay districts break up the area along the riverfront into three distinct areas, each with their own development standards and general intent for future development. The Old Town neighborhood is shown as an island of residential among the industrial areas in the study area, although the adjacent properties in the City of Buffalo are zoned as residential as well. The interior areas of the study area permit additional commercial and industrial uses as well as recreation (i.e. Sheridan Park).

Chapter 5

Economic and Market Analysis



Chapter 5: Economic and Market Analysis

The physical and environmental conditions of the study area are important components in determining the extent of development in the area. Of equal importance, the local economic and market conditions of the waterfront help to dictate the type of development the area can sustainably support.

This chapter provides a summary analysis of economic and market conditions for the study area from both a local and regional perspective; additional details are provided in Appendix C. The analysis includes an assessment of key population, business and employment characteristics and trends that effect the study area.

Based on the information contained within this chapter, the market potential in the study area can be better defined, justifying future land uses and providing feasible recommendations for potential development.

Current and Projected Demographic and Economic Conditions

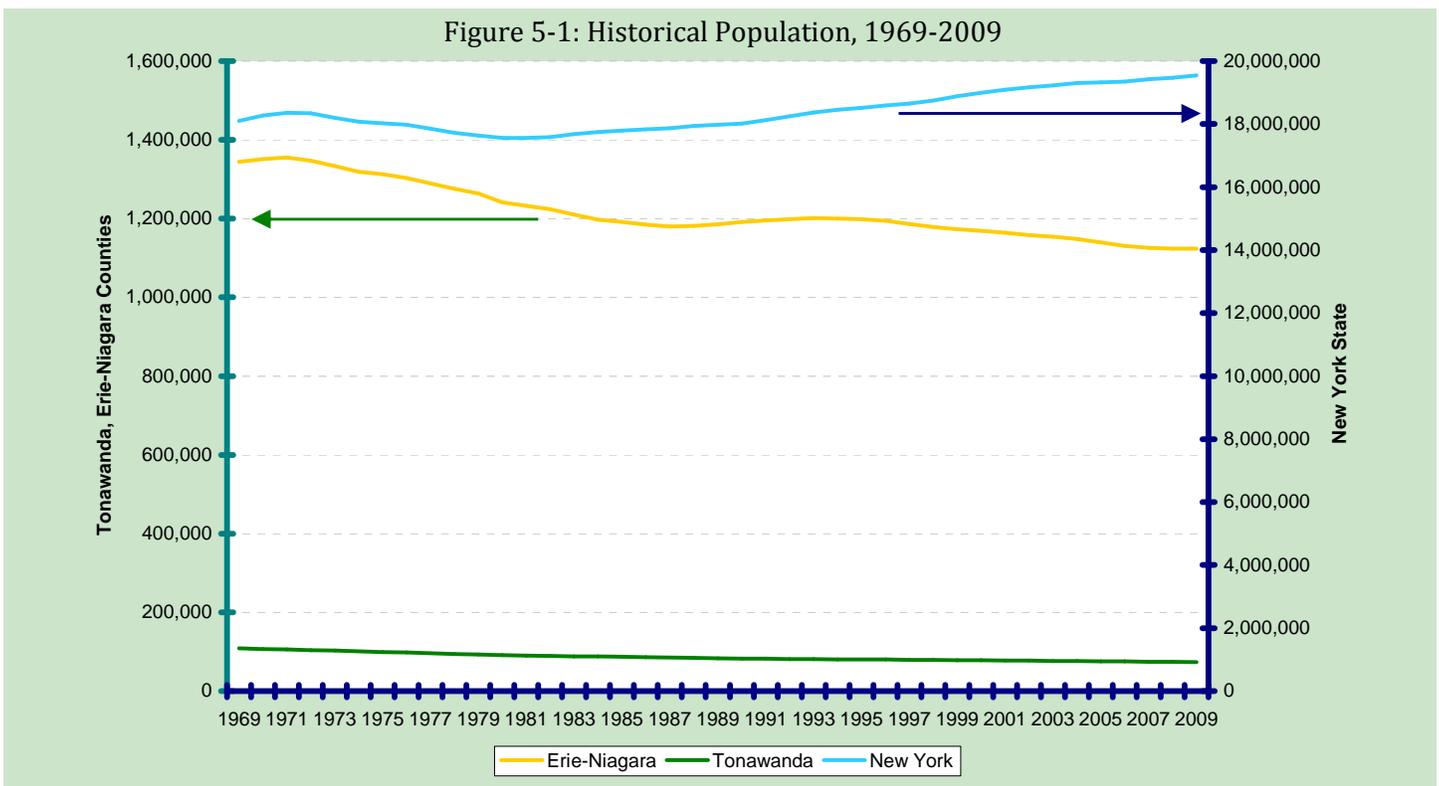
Demographic information provides a valuable description of the community in terms of its historical and current population and the makeup of its residents and workforce. This can be utilized to determine future population and household growth within the study area and can help frame recommendations for different types of development. Table 5-1 shows historical and current population in the study area as well as the projected population and rate of growth between 1990 to 2015.

In 2010, the study area had an estimated population of 1,161 people which represents a decline of almost 12 percent since 2000. In comparison, the Town of Tonawanda and the Erie-Niagara County MSA (Metropolitan Statistical Area) also declined in total population between 2000 and 2010, although at approximately half the rate of the waterfront area.

Historically, the Town of Tonawanda and the Erie-Niagara Counties have been declining in population since the early 1970's while the State has been increasing since the early 1980's as shown in Figure 5-1. Population projections between 2015 and 2030 indicate that the waterfront area, Town and Counties will continue to decline in population through 2015 and then recover through 2020. Household populations mirror these trends and are expected to follow a pattern similar to the overall population changes in the future.

Table 5-1: Regional Population, 1990-2015

	Study Area	Tonawanda	Erie-Niagara Counties	New York State
1990 Census	1,329	82,464	1,189,288	17,990,405
2000 Census	1,318	78,155	1,170,111	18,976,457
2010 Estimate	1,161	73,567	1,117,169	19,562,561
2015 Projection	1,084	69,494	1,085,144	19,697,478
Growth 1990-2000	-0.83%	-5.23%	-1.61%	5.48%
Growth 2000-2010	-11.91%	-5.87%	-4.52%	3.09%
Growth 2010-2015	-6.63%	-5.54%	-2.87%	0.69%



Source: Table 5-1 & Figure 5-1, FXM Associates

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Median household income in the study area (\$27,716) is approximately 64 percent of the median income in the Town of Tonawanda and 60 percent of the Erie-Niagara Counties overall, \$43,489 and \$47,272, respectively. Slightly more than a quarter of the households in the study area have incomes below the Federal poverty level (between \$14,000 and \$18,000 annually for a median size household of 2.48 people), compared to 11 percent in the Town and 10 percent in the Erie-Niagara Counties.

The majority of the housing units in the study area (77 percent) are renter-occupied with over 60 percent of the residents living in buildings with 3 to 19 dwelling units. Approximately 11 percent of the households reside in single-family detached dwellings. For those few that are owner-occupied, the median house value is 85 percent of the same type of housing found in the Town of Tonawanda. From a regional perspective, the median value of homes (\$140,079) is greater than the value in the Erie-Niagara County MSA (\$117,339).

According to available real estate market data for 2013, the average selling price for residential homes in Tonawanda was approximately \$110,000. This is in line with average sales from 2012 (\$110,800) and 2010 (\$111,400) and higher than 2011 (\$106,500),

It should be noted that these figures represent an area that contains very few households - in 2010 the study area only contained 1.5 percent (492) of the total households in the Town (32,295). The majority of the land uses in the study area are classified as vacant, industrial or commercial uses.

Other demographic indicators in the study area include:

- The median age (31.5 years) is lower than both the Town (40.6) and Erie-Niagara Counties (40).
- 63 percent of the residents have a high school education or higher, as compared to approximately 80 percent in the Town and 88 percent in Erie-Niagara Counties.
- Over 40 percent of the workforce (16 years or older) in the study area is considered “blue collar” as compared to 37.5 percent considered “white collar.”

The Town and Counties have an opposite distribution with over 55 percent “white collar” and around 25 percent “blue collar.”

- Unemployment is slightly higher in the study area (7.4 percent) as compared to the Town and Counties (4.8 and 4.1 respectively).

Regional and Local Market Conditions and Trends

There are an estimated 217 business establishments within the study area with over 8,500 employees and nearly \$767 million in annual business sales. Table 5-2 summarizes the number of establishments, employees, and sales by major industry group for the study area, The Town of Tonawanda, and Erie-Niagara Counties. In

Table 5-2: Summary of Employment by Category, 2010

Erie-Niagara Counties

SIC Code	Business Description	Total Establishment	Total Employees	Sales (Millions)	Sales per Employee
TOT	All Industries	40,034	672,657	74,281.9	\$110,431
MAN	All Manufacturing (SIC 20-39)	2,102	71,467	5,607.8	\$78,467
RET	All Retailing (SIC 52-59)	8,507	113,070	12,689.3	\$112,225
SERV	All Services (SIC 70-89)	17,982	290,225	27,169.0	\$93,614
ADM	Public Administration (SIC 90-97)	1,483	36,223	0	\$0

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TOT	All Industries	2,662	43,457	4,309.0	\$99,155
MAN	All Manufacturing (SIC 20-39)	146	10,875	813.4	\$74,795
RET	All Retailing (SIC 52-59)	624	8,851	928.2	\$104,870
SERV	All Services (SIC 70-89)	1,174	14,292	1,400	\$97,957
ADM	Public Administration (SIC 90-97)	77	1,667	0	\$0

Study Area

TOT	All Industries	217	8,574	766.9	\$89,445
MAN	All Manufacturing (SIC 20-39)	39	5,957	410.7	\$68,944
RET	All Retailing (SIC 52-59)	25	249	42.1	\$169,076
SERV	All Services (SIC 70-89)	50	342	30	\$88,012
ADM	Public Administration (SIC 90-97)	6	131	0	\$0

Source: Table 5-2, FXM Associates

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general, the study area contains about 10 percent of total jobs and 6 percent of business sales in the Town of Tonawanda.

An estimated 39 manufacturers within the study area comprise over a quarter of the overall manufacturing establishments in the Town of Tonawanda. These businesses account for 55 percent of the manufacturing jobs and 51 percent of the total manufacturing sales in the Town.

The retail sector is the industry group that is least represented in the study area relative to all business types, accounting for less than three percent of Town retail jobs and business sales.

Table 5-3: Key Study Area Sales by Category, 2010

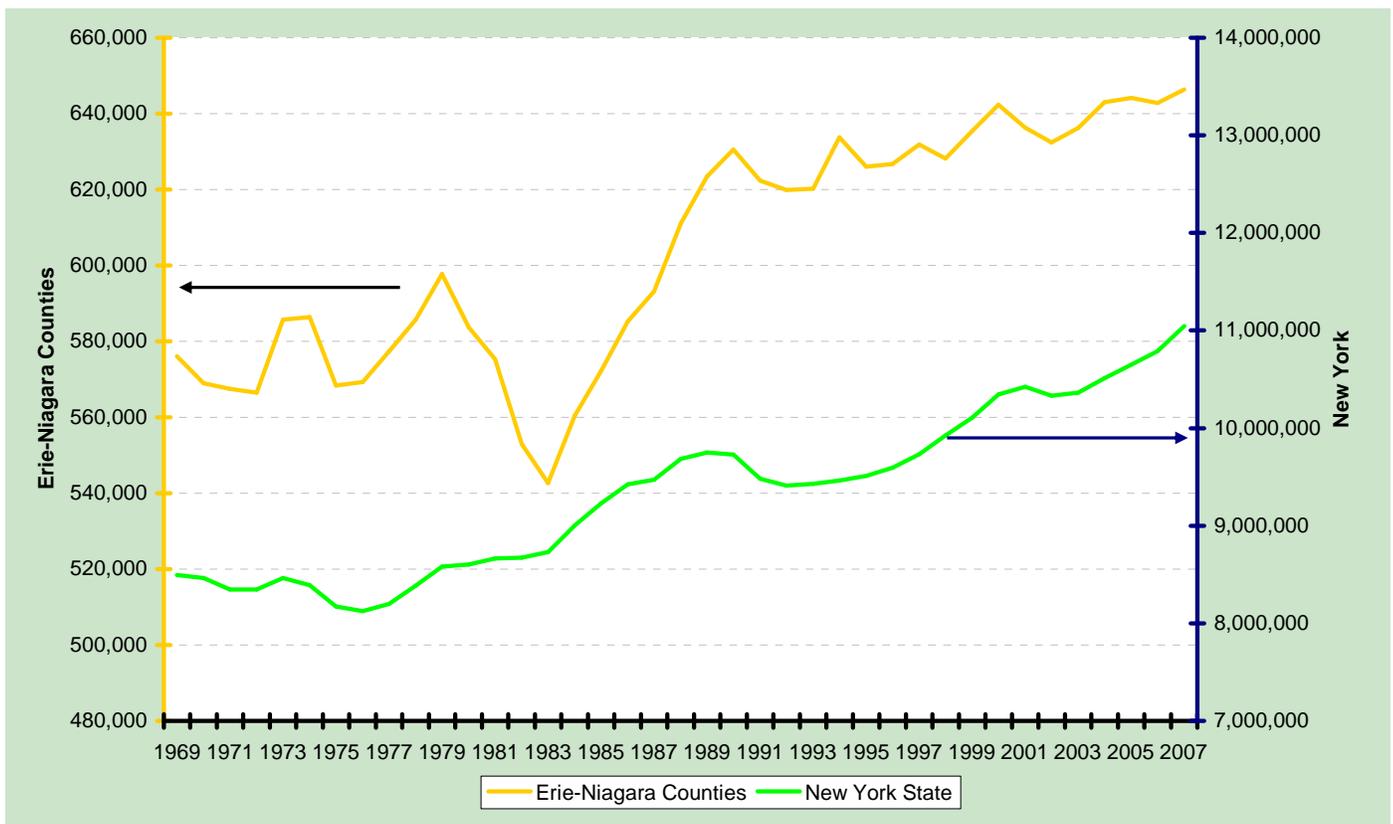
Business Description	Establishments	Sales (Millions)	% Total Sales (Study Area)	% Sales (Tonawanda)	% Sales (Erie-Niagara County)
Transportation Equipment	5	160.5	20.9%	1.3%	2.3%
Wholesale Trade-Durable Goods	19	137.7	12.9%	2.3%	14.3%
Rubber/Misc. Plastic Products	3	99.2	12.3%	1.5%	1.4%
Chemicals/Allied Products	3	94.3	18.0%	0.7%	1.7%
Wholesale Trade-Non Durable Goods	14	36.8	4.5%	0.6%	7.8%
Motor Freight, Transportation & Warehouse	17	34.3	2.3%	0.7%	2.2%
Construction-Special Trade Contractors	16	28.1	1.8%	2.0%	8.0%
Transportation Services	10	19.9	4.8%	0.4%	2.2%
Industry & Commercial Machinery	11	17.7	3.7%	1.3%	4.0%
Building Materials, Garden Supply	3	15.0	2.6%	0.7%	3.8%
Stone, Clay, Glass and Concrete Products	4	13.9	1.7%	0.1%	0.6%
Electric, Gas and Sanitary Services	2	13.0	1.1%	0.2%	1.3%

Source: FXM Associates

Table 5-3 shows a more detailed breakdown of establishments and business sales for key sectors within the study area and compares the total study area employment to the share of category employment for the Town of Tonawanda as a whole. Five (5) establishments in transportation equipment are the leading generators of business sales in the study area with 21% of all sales; however it accounts for only 1% of town-wide sales in that industry. Wholesale trade businesses capture 18% of study area sales, but only 2% of town-wide wholesale trade services.

Historical employment trends between 1969 and 2009 in the Erie-Niagara Counties and New York have been up and down with a significant decrease between 1979 and 1983. Since that point in time, employment has generally increased in both areas with some smaller dips between. This general growth trend looks to continue into the near term.

Table 5-4: Historical Employment Trends, 1969 to 2009



Source: FXM Associates

Potential Absorption of Residential and Commercial Uses

The Town of Tonawanda and other communities in the Buffalo metropolitan area have mounted effective transformation of former industrial waterfronts through aggressive site remediation and a major emphasis on public realm improvements. Communities have targeted government brownfield funds, state and regional resources for Niagara River waterfront public improvements, and infrastructure that supports existing companies and accommodate emerging business sub-sectors.

The Niagara River and its adjoining waterways will continue to provide a draw for development, with waterfront access and views being prominent, distinctive features, evident in recently developed or proposed projects. In addition, parks, scenic overlooks, recreational facilities, water-dependent activities, landside waterfront access points interfacing with the Niagara River Greenway/Bikeway, and with other public realm amenities have attracted new private investment.

The *Western New York Regional Economic Development Strategic Plan* identifies eight key industry sectors with significant business and real estate development potential, including Advanced Manufacturing; Energy, Health/Life Sciences; and Tourism/Hospitality. Regional growth employment projections in Health/Life Sciences sectors are relevant in Buffalo, but not reflective of trends in Tonawanda. Moreover, any spin-off development in pharmaceutical businesses locating in Tonawanda are likely to choose one of the relatively new office parks in Tonawanda, each with 50+ acres and directly competitive with the study area.

Office & Industrial/Commercial Market

Commercial real estate professionals report steady commercial demand in the Buffalo area over the past few years, primarily for replacement space, and foresee no major change or signs of significant growth over the next three to five years. The Town of Tonawanda has been described as a secondary market within a secondary market, with Amherst being the nearest competitive



Before (top) and after (bottom) photos of 5335 River Road show how brownfields can successfully be remediated and made shovel ready. The back of the solar panels at Riverview Solar Tech Park are visible in the bottom photo on the right.

© Town of Tonawanda

location that captures most of any new demand for commercial space. The Tonawanda and study area market potential is constrained by prospective tenant's ability to see beyond existing conditions, and accept it as a better deal than paying premium prices to locate elsewhere.

Currently, Tonawanda's commercial demand is mainly from price-sensitive builders/tenants looking for 3-4 acre "shovel ready" sites, inexpensive built space, or warehouse/distribution space. In addition, perceptions about brownfield property redevelopment also could impede the study area revitalization plans.

Commercial realtors indicate that many businesses view cleaned-up sites skeptically, and developers usually find site remediation costs don't warrant return on investment. However, the recently built industrial park on Route 5 in Buffalo attracted a large, single tenant, and the project was cited as a successful example of how cleaning-up brownfields can be an incentive for private investment. In addition, cleanup of 5335 River Road and the adjacent development of the Riverview Solar Technology Park are viewed as other, more local examples of remediation efforts that have spurred successful development. Active cleanup and positive marketing of future sites as "shovel ready," whether larger parks or smaller sites, should be the primary directive of the Town.

The Niagara River along the Tonawanda waterfront reportedly has a very swift current, narrow width between the shoreline and Grand Island, and heavy vessel traffic, which makes water navigation for water-dependent commercial development difficult. Local developers have indicated that construction of an inlet or breakwall would be needed to overcome this, which would require costly dredging and Army Corps permitting. Three marinas and two marine service businesses exist in the study area, although expansion is limited due to the reasons mentioned above.

One water-dependent commercial uses that could be explored further would be excursion/charter tours and services, especially with the development intent of the former Wickwire/Riverworld site. This site was previously designed for berthing and stevedoring large

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commercial vessels, so this site is one of the few that could easily accommodate waterborne passenger services, promoting waterfront access and water-oriented activities.

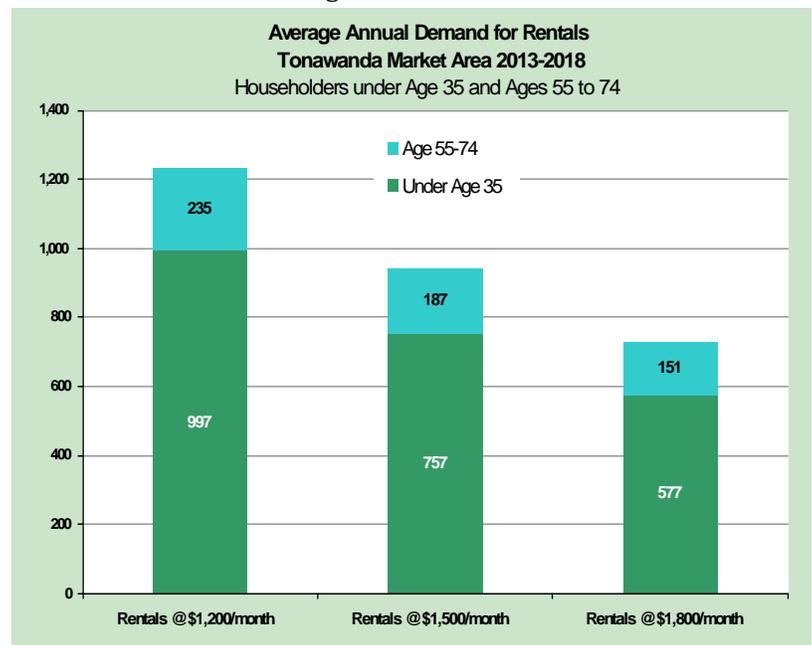
Residential Market

The study area has large manufacturing facilities in the southern and middle sections that limit opportunities for feasible residential development. Residential developers and real estate brokers noted that the missing product is housing for older couples and singles, many whom are downsizing and some who are still employed. Residential and mixed-use development on the Buffalo waterfront has targeted this demand, and also attracted Canadian investors, who could be interested in the Tonawanda waterfront with its easy access from Lake Erie.

Residential demand in Tonawanda also is mostly for senior housing, and recently built patio homes with many high-quality upgrades sold for \$200-\$300,000 in a neighborhood with home prices in the \$90,000 range. The residential component of the analysis indicates that average annual rental demand within a 20-minute drive time from the study area ranges from 2,400 units per year at \$900 per month to 260 units for \$2,700 per month.

The study area can capture a proportion of the total rental housing demand with the combination of public realm and infrastructure improvements, especially with residential specific or mixed use developments. Under conditions of significant site improvements that make the waterfront attractive for residential development, 50 to 80 units per year renting at \$1,200 to \$1,800 per month could be absorbed on an average annual basis through 2018. Single family development is much less likely to be developed in the study area according to local developers and realtors.

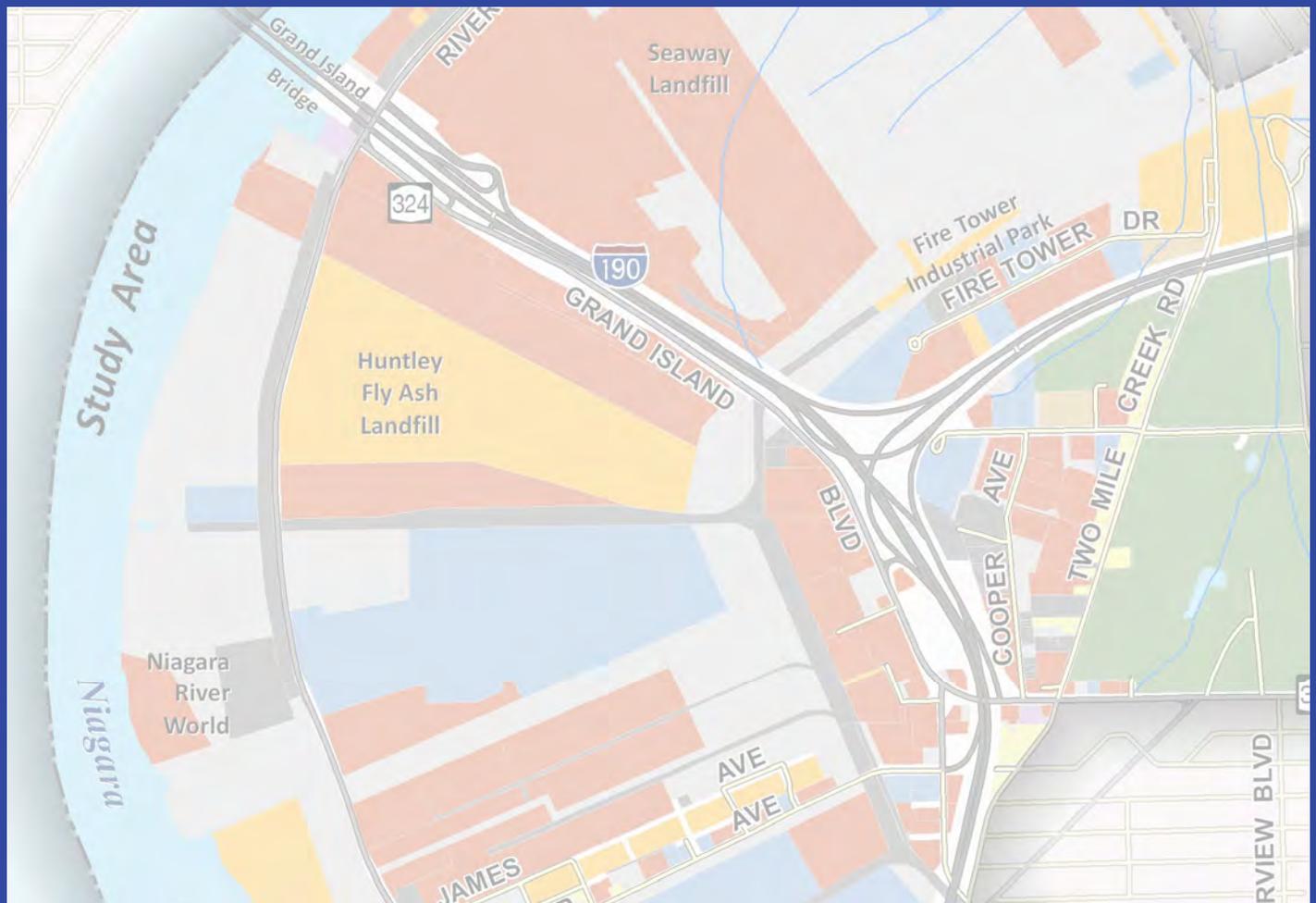
Table 5-5: Average Annual Demand for Rentals



Source: FXM Associates

Chapter 6

Land Use Master Plan



**Waterfront Land Use Plan
Town of Tonawanda**

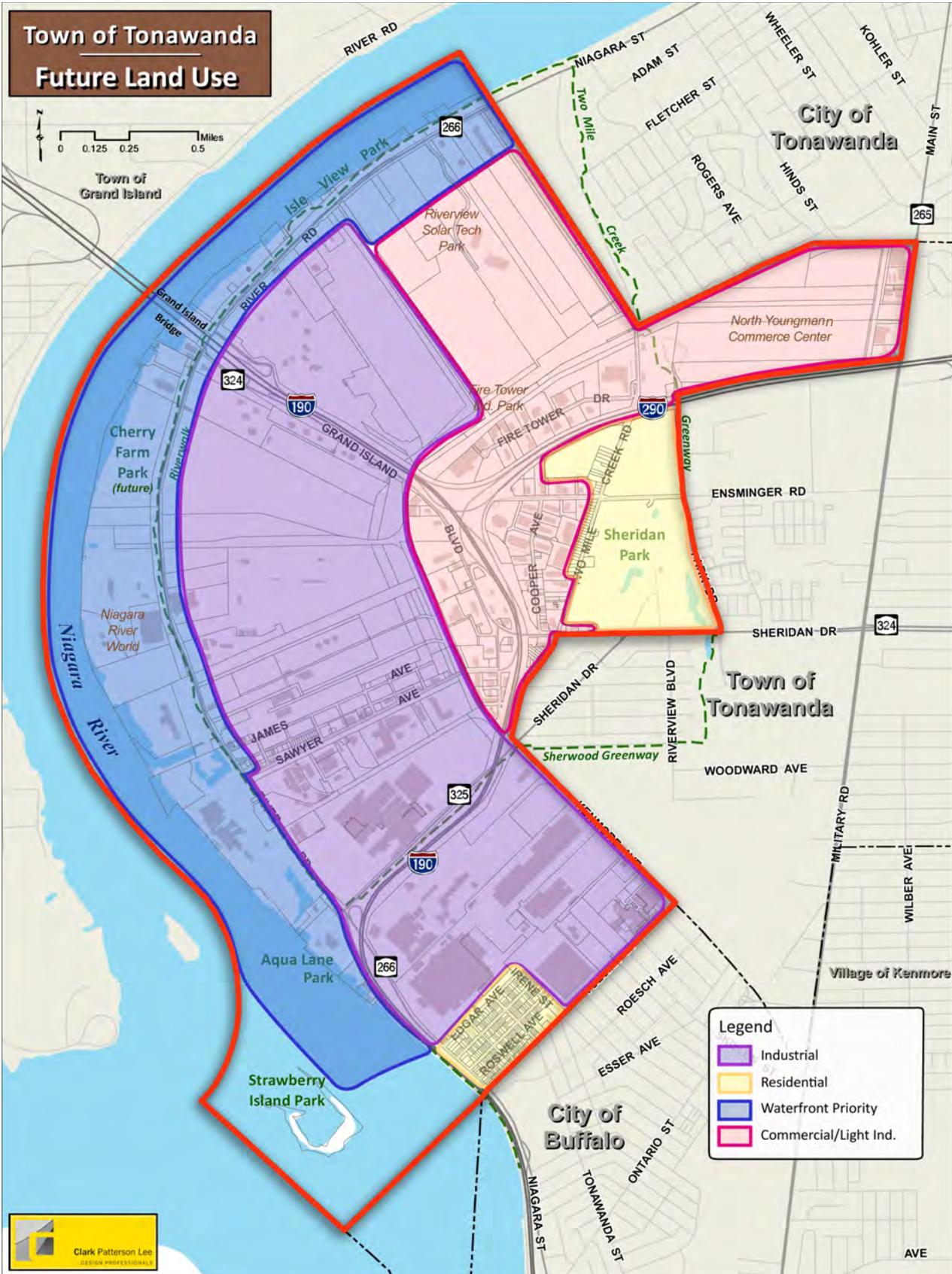


Figure 6-1: Future Land Use

Chapter 6: Land Use Master Plan

Land Use Master Plan

Future land use preferences are the physical representation of the community’s desire for its natural and built environments. While the factors that influence land use decisions can be complex, the underlying principles are fairly straight forward.

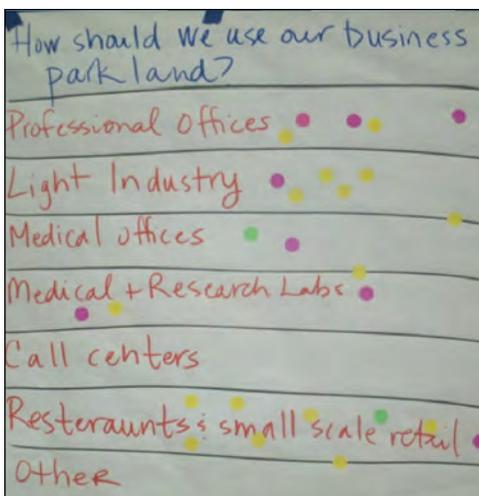
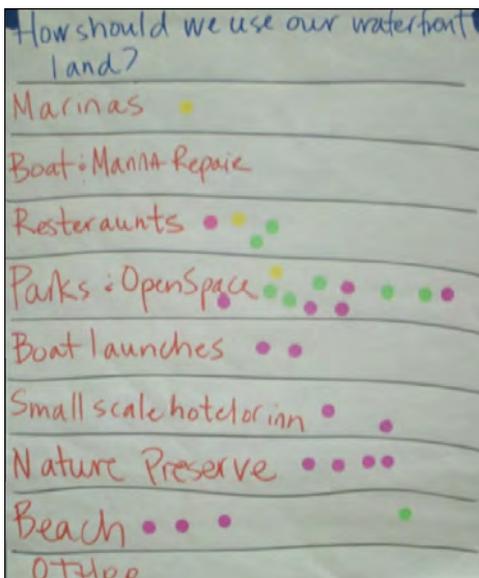
Well defined land use plans identify the highest and best use of the land in a given area based on a number of factors, including:

- Physical geography;
- Type, location and condition of natural features;
- Existing and proposed infrastructure;
- Projected demographics and economic factors;
- Development pressure and/or desire;
- The community’s overall vision; and
- Best practices in land use.

Any future development that occurs in the study area will likely take place on sites that have been previously used for other activities. It will be in the Town’s best interest to ensure that all projects in this area meet high-level standards. Projects that fail to achieve the Town’s expressed preferences and standards for this area will likely become a burden in the future.

The future land uses outlined in this chapter will provide guidance to future development decisions, inform the next Comprehensive Plan update, and provide a basis for immediate and future zoning code revisions. This chapter also offers basic guidelines for the way new developments should look and feel as well as how they relate to adjacent uses. The design recommendations were developed to improve Tonawanda’s overall image and economic prospects.

Given the profound influence this plan’s recommendations can have on the community’s waterfront area and beyond, it was important to ensure community support. The land



Prioritized brainstorming input from current study area residents gathered at a land use education session facilitated by Clean Air Coalition staff.

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use plan reflects community input received from this and previous planning efforts. The ideas and concepts developed in this process were reviewed by the public and refined based on comments and feedback received from a diverse range of stakeholders—from area residents to elected leaders.

Key Elements of Future Land Use Master Plan

The future land use map depicted on the previous page and further identified on the following pages features four distinctive land use types. The land uses were delineated based on proximity to the Niagara River, the mix of current and anticipated development types and evaluations about the highest and best uses of the corresponding parcels.

As the Town addresses zoning code revisions to this area, additional refinements may be needed to more specifically guide development types and/or provide guidance about design standards. Some general design standards and land use preferences have been included within each land use category for reference.

Waterfront Priority

General Intent

In Tonawanda's Waterfront Priority Area, the Town should encourage true water dependent uses and developments that maximize views of, and physical access to, the waterfront. Passive, public spaces should be available directly adjacent to the shoreline to the greatest extent feasible. New trail loops and linear connections to the Niagara Riverwalk should be created wherever possible to expand physical linkages and recreational opportunities through this area. Residential uses, whether stand alone or part of a mixed use development, should be limited in density and height to minimize blocking views of the water. Sustainable development practices and natural resource protection best practices should be implemented to preserve and improve water quality and natural habitats.

Considering Health Impacts

Future development within the study area will require careful consideration of impacts to human health. Air quality issues, soil contamination, waterborne diseases and invasive plant and animal species pose potential risks to human health. In addition, noise and light pollution from industry and highways can also have a negative effect on health. Although these issues are addressed indirectly through state and national environmental review regulations (SEQRA and NEPA), the direct examination of human health is not always fully considered in development and redevelopment projects.

Given the area's environmental history, the Town may want to take additional steps to ensure that any future development projects, especially those involving residential living, fully examine human health impacts and mitigate them to the greatest extent possible.

Health Impact Assessments (HIA) is an emerging process being used throughout the U.S. to consider human health in major policy decisions and large-scale projects. The process can take many forms, from rapid to comprehensive and the results are used to inform decision makers to improve health outcomes for impacted populations.

Compatible future land uses would include:

- Residential development (with public access)
- Mixed use development (higher density with waterfront commercial component such as the concept for Riverworld, Figure 7-2)
- Marinas
- Boat and marine repair facilities
- Restaurants
- Parks and open space (including boat launches)
- Small-scale retail
- Small inn or boutique hotel

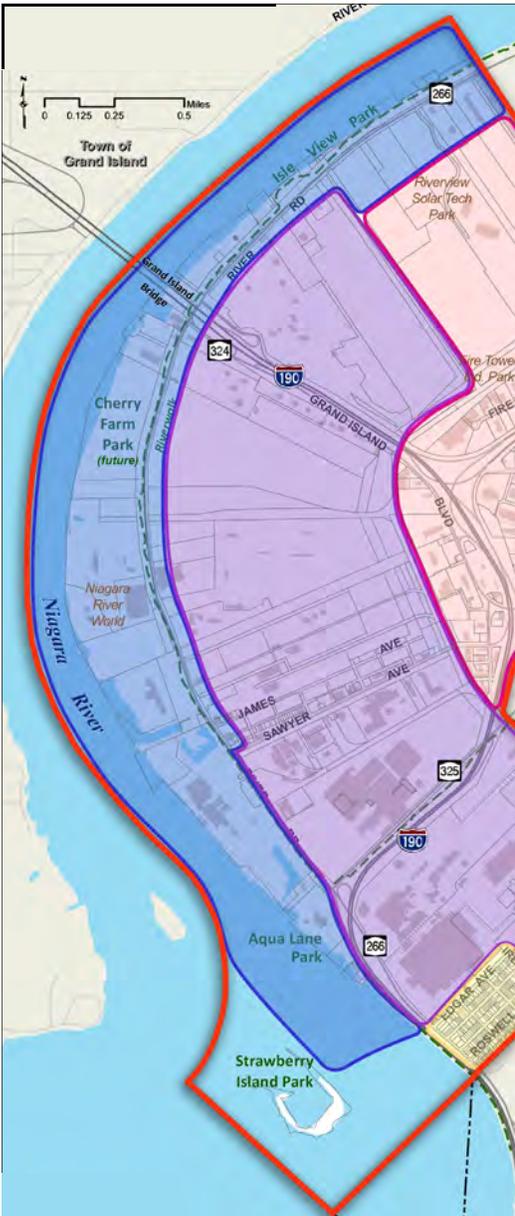
See Appendix G for example zoning district text.

Design Considerations

Inland development along River Road should be compatible in scale, style and use with future developments on the riverfront (west side) of the road. In the past, development along River Road did not fully consider its riverfront because this area was designated for industrial use. As the Town works to transform the character of the area and transition to mixed use environment, development and redevelopment along River Road will need to be compatible.

The community's desire for continuous access to its waterfront was clearly stated throughout the process. Tonawanda needs to promote consistent public access to the waterfront. Public access will be easier to provide and expand along the parcels that are publicly owned. To achieve access along parcels that are privately owned, the Town will need to use a range of potential tools, such as incentive zoning, riparian buffers, and/or public access easements. Determining the need for and utilizing one or a combination of the above tools should be assessed during the development review process.

Although the use of sustainable site design and building strategies is a growing priority for the community as a whole, this area of the Town requires the most stringent encouragement and enforcement. Chapter 7 contains an overview of the some of the sustainable design strategies that can be implemented to ensure future development protects natural resources for generations to come.



The Waterfront Priority boundary extends across the east side of River Road to ensure that upland development and redevelopment is compatible with its proximity to and views of the river.

Waterfront Land Use Plan Town of Tonawanda

In a similar vein, strict protection of environmental resources will be critical for the entire study area and in this land use area in particular. The Town will need to carefully consider environmental and human health impacts of proposed development and redevelopment actions. Unfortunately, Tonawanda's industrial heritage has resulted in an legacy of environmental challenges the Town is still trying to overcome decades later. Tonawanda has expressed a clear intent to end that cycle. Therefore, the Town must take steps to ensure that future generations inherit better protected environmental conditions.

New structures adjacent to the river should be designed to maximize views to and from the river. This is best achieved through smaller building footprints and clustering multiple buildings to create open visual corridors to the river.

Often when communities think about residential and retail combined developments, they envision large towers or sprawling complexes. That scale of development wouldn't be well suited to Tonawanda. However, smaller-scaled mixed use development, similar to those pictured below, might be adaptable in these locations and other places within the waterfront priority land use boundary. The higher density residential units - whether rental or owner occupied - would appeal to both young professionals and empty nesters, which are two demographics the Town needs to better accommodate as it positions itself for the next two decades.



Examples of smaller-scaled mixed use redevelopment. Left: Wauwatosa, Wisconsin. Right: Seattle, Washington

Interstate 190 - Design & Noise Impacts

The presence of I-190 is a benefit economically for its high level of access, but it also brings constant noise and an expansive amount of pavement that can have a visual impact. Although the highway is depressed, reducing these impacts to the Old Town neighborhood compared to an at-grade highway, issues still remain. The limited amount of right-of-way and other potential highway restrictions limit what could be done, but some retrofits can be considered along Niagara Avenue include semi-transparent walls (short height) and strategic vegetation plantings (evergreens).



Current view of Niagara Ave at Riverdale; cars and trucks are still visible at eye level. © Google maps



Semi-transparent wall examples. © FHWA

Residential Area

General Intent

Although labeled as residential, this land use area consists of both existing residential and recreational uses, namely Sheridan Park. Within the study area, residential development in properly zoned areas should be limited to strategic areas, especially where it currently exists in established neighborhoods bordering the City of Buffalo and around Sheridan Park. In these areas, residential development will consist largely of single-family dwellings in the near future and remain so. However, well designed multi-family or mixed-use developments with neighborhood commercial uses may be appropriate, depending on location and context. Density, height, and aesthetics would be crucial to review for this type of development.

Appropriate future land uses would include:

- Single-family dwellings
- Mixed use residential and neighborhood commercial uses
- Multi-family dwellings
- Parks and recreational facilities
- Public facilities
- Schools and daycare

Design Considerations

Given the existing and anticipated land uses within the Residential Area, the Town does not expect significant changes in the overall land use pattern. The character of this area will not be altered drastically by future development and redevelopment. Future enhancements to streetscape and/or private property within the area should explore opportunities to improve landscaping and create visual buffers between residential and non-residential developments.

Higher density, mixed use residential redevelopment could be accommodated at key intersections within or immediately adjacent to the defined residential area boundary. For example, Sheridan Drive at the intersection

Waterfront Land Use Plan

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of East Park Drive or Two Mile Creek Road could present redevelopment potential.

The Town needs to incorporate design standards to improve transitions among adjacent land uses. The area designated for residential in the future land use map demonstrates this opportunity well. Ensminger Road transitions from residential to parkland to commercial/industrial moving east to west. The change in scale and building type are somewhat abrupt, which could detract from residential properties' value and resale ability. However, if adjacent development is well buffered or designed to fit the context of the surrounding neighborhood, those transitions among uses are less likely to have a negative impact on the community.

The Town envisions that Sheridan Park and the golf course will continue for the near and long-term future, with strategic upgrades being made over time to further enhance the park for users. Additional trails, loops and connections should be incorporated into any new development to expand the current system, especially when adjacent to existing facilities. Sheridan Park is an amenity that many residents appreciate and may be an amenity that those living in condominiums, townhouses or other similar housing types would be interested in living in proximity to.

Commercial/Light Industrial



NOCO Pavilion in Sheridan Park overlooking the golf course.

General Intent

Building off the existing development patterns and recent development trends, the Commercial/Light Industrial Use area will be comprised largely of professional offices, light industrial and sustainable industry business enterprises. This area may also be suitable for a mix of uses including supportive commercial businesses to meet employees daily needs while in their workplace.

Appropriate future land uses would include:

- Professional offices
- Light industry
- Medical offices (e.g. doctors, dentists, etc.)
- Medical research and labs
- Bio-technology enterprises
- Call-centers
- Restaurants and small-scale retail (convenience stores, delicatessens, etc.)

Design Considerations

This area is intended to support a diverse range of business types and building styles, ranging from professional and medical offices to light industry and call centers. This kind of diversity requires consistent site design and building materials to create a unified sense of place. Compatible design elements help to create visual continuity and foster community character. The Town will need to ensure that redevelopment and new development within this area share consistent design principles.

Many of the parcels in this area have limited frontage and very long depth with minimal interior access. Resubdivision and land assembly should be encouraged to provide more conducive property dimensions for development. Facilities could range in footprints from around 30,000 SF for commercial uses to 200,000 SF for light industrial uses. The larger facilities would be better suited to the interior portions of the area or the Industrial land use area with smaller facilities along the edges to improve transitions to adjacent areas. Flexible space

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building designs should be encouraged to allow for easier adaptive re-use in the future. Larger building envelopes should be designed in a way that will allow spaces to be easily divided in the future. This approach can be used for both commercial or industrial spaces.

Access management strategies should be implemented as redevelopment occurs to encourage access into the interior portions of properties regardless of resubdivision or land assembly. Other access management strategies would include shared access driveways and shared parking to the greatest extent feasible. Other forms of connectivity should also be incorporated

Mixed Use Design Considerations



- A. In commercial mixed-use areas, non-traditional, eclectic signage may be appropriate.
- B. Landscaping should be utilized to provide visual relief in large parking areas.
- C. Variation in building scale and style can be accommodated.
- D. Simple building forms can be transformed by façade elements painted trim and planters.
- E. Landscaping, street trees, streetscaping and façade elements will improve larger buildings' sense of human scale.

into future development including sidewalks, multi-use paths and trails, bike lanes, park and rides, and bus stops. This enhanced connectivity will accommodate multiple forms of transportation (including pedestrian and bicycle access), encourage active transportation and provide opportunities for alternative transportation to and from work and access to area businesses by local employees. Currently, there is limited bus service available along River Road to this portion of the Town, but with an increase in development and potential ridership, a sufficient case can be made to extend bus lines to the area.

Industrial Development Area

General Intent

The area's industrial heritage and ongoing contributions to the local tax base and economy should be valued and strengthened in the future. Future development and redevelopment in these areas should capitalize on the industry-supportive infrastructure available, including rail lines and access to highways. In the future, the Town will continue to work with existing industries to improve their sustainability and decrease their potential negative impacts on environmental conditions and human health. New industrial development should be concentrated on emerging ecologically-friendly industries.

Appropriate future land uses would include:

- Manufacturing
- Warehousing
- Rail-related industries
- "Clean tech" and other alternative energy enterprises (e.g. solar, wind, hydroelectric, geothermal)
- Other "green" technology-based industries

Design Considerations

In the past, industrial uses were developed without much thought about appearance, context or impacts to adjacent areas. Consequently, industrial development created uninspired collections of pavement and structures with little to no green space, insufficient buffering at the edge of parcel boundaries and a lack of continuity between

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parcels. Tonawanda's waterfront area has several examples of this kind of development. Currently, vacated, underutilized or undesirable industrial properties lack a sense of place and do not help create a positive community identity for the Town; future industrial development should not repeat history. More recent industrial and commercial development efforts have better responded to the Town's desire for well-designed industrial development. That preference should be codified in future updates to the zoning and/or implemented through graphic-based design guidelines.

Larger industrial complexes should incorporate ample landscaped or hardscaped buffers and on-site amenities, such as water features and trails, to make future industrial developments attractive to potential investors, employees and nearby residents. When designed well, industrial campuses and development complexes can become a destination for non-employees.

The area designated for industrial uses has historically been the location of large industrial operations. Consequently, much of the land area within this future land use designation are comprised of very large parcels. The current parcel configuration presents opportunities for the Town to attract operations and facilities that require large parcels. This could provide a competitive advantage in attracting developers who do not want to be encumbered by complex land assembly transactions. However, if the demand for large parcels does not materialize for the Town, it may be beneficial to consider how these larger parcels could be easily resubdivided to create a series of smaller development sites. In most instances, this may require additional roads to provide interior circulation and provide connection points for future smaller lots.

There are several smaller facilities that present significant redevelopment opportunities because of their adaptive re-use potential. The Town should consider public infrastructure enhancements that will help promote these areas and parcels.

Several existing properties will continue to operate in



These photos of an industrial park in Monroe County, New York (located adjacent to the Erie Canal) demonstrate how industrial development can be landscaped, incorporate natural features (such as wetlands), and include amenities to make a more attractive site

their current capacity. In those cases, there may not be a regulatory trigger to implement the enhanced design elements needed to transform this area. The Town will need to work with property owners to encourage voluntary implementation of site improvements that promote the future land use plan.

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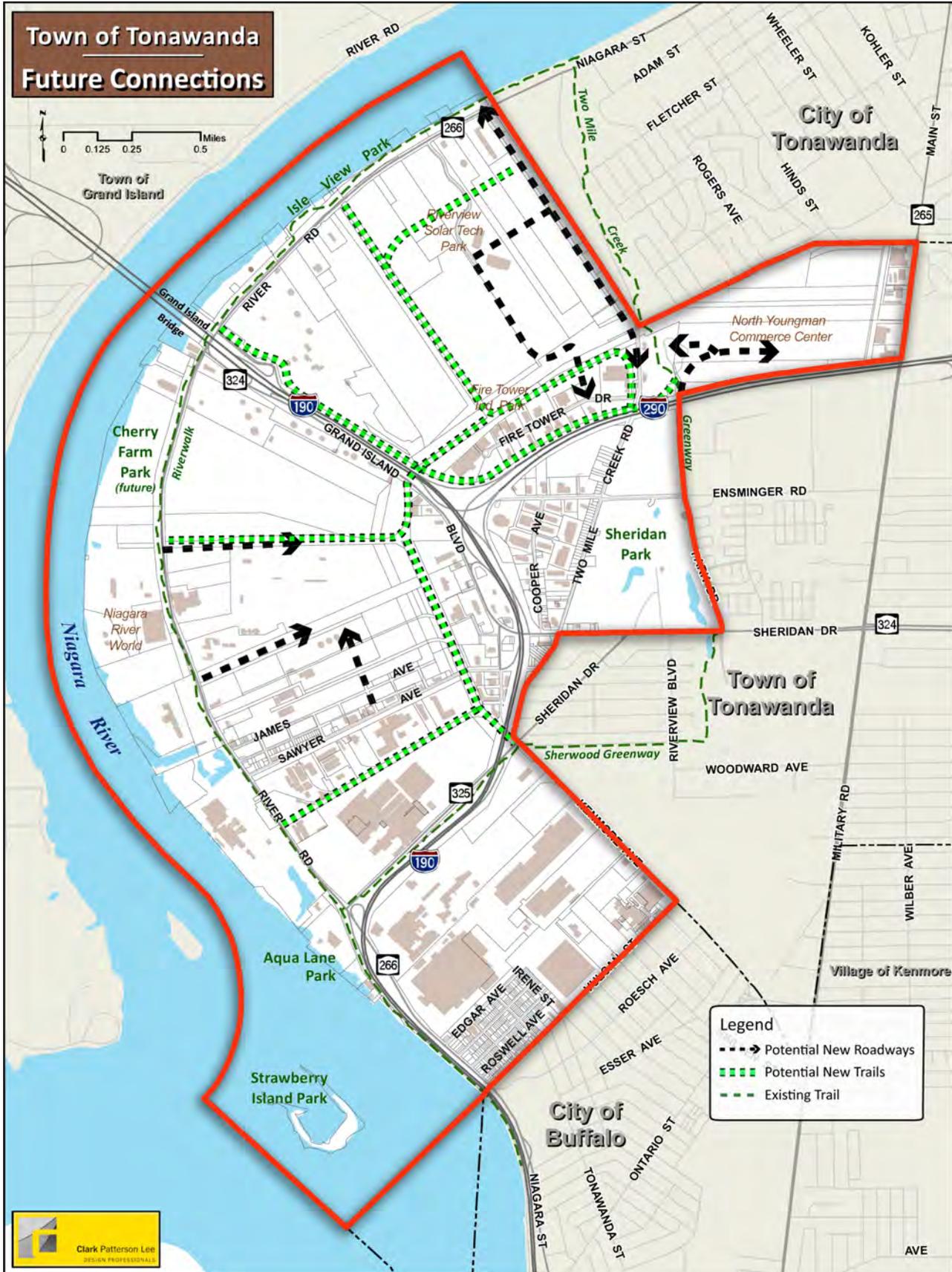


Figure 6-2: Future Access and Transportation Connections

Future Access and Transportation

Although not typically an element of a future land use plan, the unique nature of the study area provides an opportunity to include potential access and transportation improvements. The long, linear properties and high number of vacant lands can and should be resubdivided and/or assembled in configurations to encourage future development. Including an overall plan for transportation will help to facilitate multi-modal access opportunities and create better connections in the area.

The concept plans highlighted on the following pages highlight interior and arterial roadway connections as well as trail connections to existing trails in the Town. In addition, priority areas for streetscape improvements, which will help to change the visual quality of the study area, are included.

Future Connections

With any future redevelopment of the vacant or underutilized industrial parcels in the study area, enhancing connections and access will likely help to improve marketability and spur additional development. Internal roadway systems, similar to what has been occurring at the Riverview Solar Tech Park, brings development further into interior portions of the properties.

However, extending those internal roadways to other adjacent roadways further improves connections and helps to disperse traffic and thereby reduces volumes. In many instances, this would require the conversion of underutilized or abandoned rail spurs and sidings or grade crossings. This is especially evident on the north side of the study area between the Solar Tech Park and Fire Tower Drive. Other potential key locations for future roadway expansions are illustrated, although the broad nature of this planning effort does not specify their exact location or alignment. Further examination would be required and likely occur during subdivision or site plan review by the Town.

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What this map does not address is the potential for improved on-site circulation at existing parcels. As road networks expand, future redevelopment should utilize best practices in site design by creating on-site connections to multiple roadways when available. This approach minimizes congestion on arterials and collectors and provides alternative routing options to accommodate large freight trucks that will likely continue to serve area businesses and industry.

The plan does not preclude the continued use of existing on-site railroad systems. In fact, future redevelopment of key parcels may be bolstered by the availability of rail connections. The Town and its economic development partners will need to determine which underutilized rail connections should be maintained to facilitate appropriate, town-supported business development opportunities.

Several potential trail alignments are also highlighted on Figure 6-2, showing connections between existing trails and parks. With the presence of several regional and local trails, connections between them have been identified as an opportunity by the community. The trail alignments identified utilize vacant, underutilized, or abandoned corridors such as rail lines, utility access networks, and wide right-of-ways to facilitate these connections. In some cases, trails and rail could co-exist within the same right-of-way (i.e. Rails with Trails). As redevelopment of property in the study area occurs, trail connections should be included in plan review by the Town. Several east-west connections have been identified in Chapter 7 as being of higher potential or warranting further analysis to examine their potential.

Roadway Characteristics

In the process of transitioning the waterfront from one of predominantly industrial uses to a mix of commercial, industrial, recreational and some residential uses, visual improvements can make a huge psychological impact. The existing roadways in the study area present opportunities for improved aesthetic design and streetscaping. The map on the adjacent page identifies and prioritizes existing roadways that would have the greatest impact for visual improvements.



Figure 6-3: Roadway Characteristics

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The designations provide guidance about how the Town can invest in future streetscaping improvements and also indicate the extent of the enhancements.

Although the roadways were differentiated for the purpose of future capital investment planning, it is likely that certain streetscape enhancement elements would be similar across all three categories. For example, the Town should encourage right-of-way plantings (native shrubs and street trees), sustainable design practices and durable materials usage in every streetscape enhancement project, regardless of location.

Streetscape Priority 1 - These roads were designated as the highest priority for future enhancements because they are major connector routes, they play a prominent role in defining community identity and/or they are proximate to key destinations and attractions. These roadways would likely receive the most intensive streetscape enhancements.

Streetscape Priority 2 - These roads were designated because they provide secondary or cross access within the study area and may be the connection point for future road networks. Although these roads provide important linkages to the waterfront, their enhancement may not have as large an impact on enhancing community character or investment climate.

Streetscape Priority 3 - The roads in this category are local neighborhood streets that do not have high volumes or through traffic. They focus in these areas would be to maintain good conditions in the right-of-way (pavement and sidewalks) and provide additional landscaping and buffering where feasible.

In 2013, the Town received funding from the Niagara Greenway Commission to develop a feasibility study and preliminary design for several Priority 1 and 2 roadways as part of a multi-phased approach. This plan will examine and implement not only the recommendations within this plan, but also the circa 1990 detailed landscaping plans for River Road and Grand Island Blvd. that were developed and never realized.



Streetscaping examples that could be feasible along any number of the priority roadways identified include roadside trees, raised/landscaped medians, bus shelters, decorative street signs and gateways, and alternative pavement materials in strategic locations (i.e. intersections).

Design Studies

As part of the planning process, a series of design studies for the potential development within the Waterfront Land Use Plan study area were prepared. The purposes of these studies were to determine:

- What the mix of future uses could be that would initiate revitalization of the district and reposition environmentally-challenged sites;
- The massing and design of future development with enough detail that the dimensions could be considered as potential zoning district standards;
- What relationships could be crafted between land uses to integrate them into a district that creates destinations for multiple purposes;
- The required infrastructure for future development of the district; in particular, access and links between districts and distinguishing characteristics of the different road types.

The land use and design concepts were organized according to the recommendations of the draft master plan, public input, real estate market information and trends, and the options and limitations for different types of development as determined by the planning team. After these analyses, the plan was further refined and detailed to include:

- Landfill reuse strategies, which are dependent on the closure design;
- Building and site design guidelines based on the prototypical development with suggested buffers and setbacks;
- Guidelines for street styles that relate to the road classifications and adjacent land uses; and
- Guidelines and conceptual layouts for pathways and links.

Types of Studies

The design studies include a series of illustrations and descriptions. The full collection of study illustrations and conceptualizations are included in Appendix D. Examples are provided here to provide a glimpse of the recommendations derived through this planning effort.

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KEY PLAN



RAY 1



Figure 6-3: Key Plan for Design Studies

First are five rays for transects which start at Sheridan Park as the center point and radiate out to the Niagara River waterfront. Within these rays, land use areas are suggested with boundaries either by dimensional standards or by the location of existing or proposed infrastructure such as the interstate highways and new roads. These design studies include twelve different land use prototypes, ranging from passive open space to residential, commercial and industrial uses.

The second set of illustrations is used to further refine the proposed land use plan indicated in the rays. These are site plans of the prototypes with buildings, access, parking, and buffers that include the associated dimensions for the development prototype.

Third are prototypical sections for four styles of street and path systems that were created and designated for the existing and newly proposed accessways and links. These include design elements, which could be translated into standards and guidelines for pedestrian and bicycle pathways, local streets, collector streets, and local arterials.

The updated master plans for the significant open space areas - Cherry Farm Park, Sheridan Park, Riverfront Park, and the town's Aqua Lane Park - are included in Chapter 7's target area recommendations. These are updated with suggestions for facilities and activity areas that are designed based on Low Impact and Sustainable Design principles and standards.

Findings

The studies suggest ideas and directions for the Land Use Plan. Following are the key findings suggested by the use and spatial analyses.

Land Use

The Town could revise land use management plans to encourage redevelopment over the long-term. The Town should also make or encourage specific short-term land use choices that will influence broader change.

Waterfront Land Use Plan Town of Tonawanda

Residential development could be an attractive option for the northern section of the district. However, residential use (e.g. townhouse type development) will only be a legitimate option if small in scale and if area-wide environmental issues are addressed.

Commercial uses, such as R&D office and flex spaces are desirable in many locations. They are also acceptable on the waterfront where the depth of the lots also allow inclusion of riverfront buffers and linked waterfront walkways.

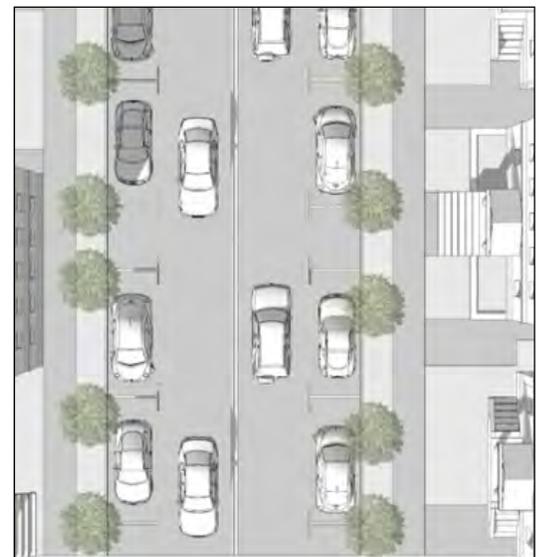
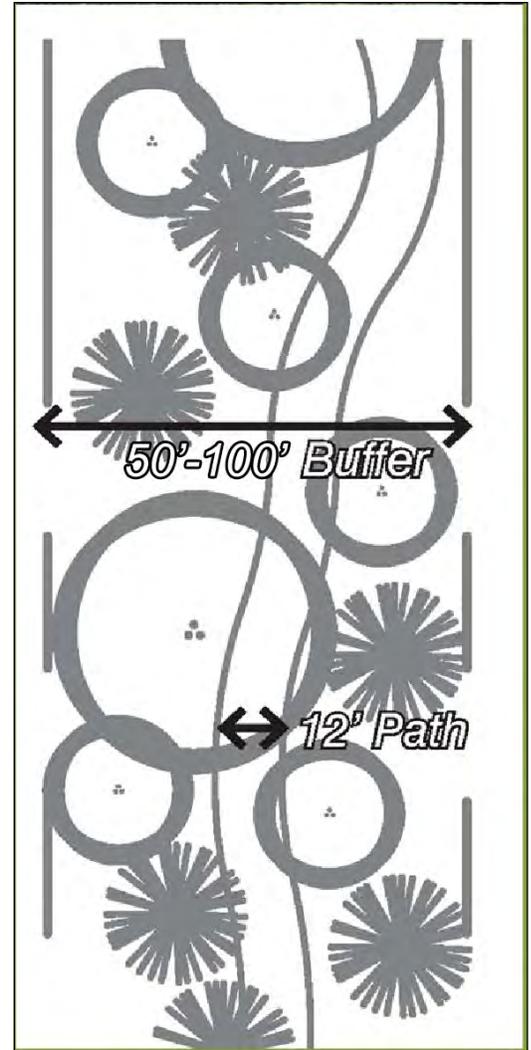
A commercial and institutional use such as a workforce training center could have substantial benefits by filling multiple local needs for development and training. Revenue-producing uses that have been successfully built in other locations should be considered for construction on the district landfills. These could include recreational uses and alternative energy production, but will be dependent on the final land fill closure design.

Design Standards

Low Impact Design and sustainable design elements should be included in all improvements. This will help brand the area as a district in transition from its past environmental problems.

The Town should implement greening and buffering strategies throughout the study area that include improvements to both public and private lands. This includes active and passive park spaces on the waterfront. Vegetative buffers should be a minimum of 30' for most uses except the largest buildings and corporate parks which should have a minimum buffer of 50'. Open space and riverfront buffers, which include pathways, should range from 50' to 100' where appropriate.

Zoning districts could be used for separation of less desirable uses from the public ways. When applied, residential districts on the waterfront or on River Road should have a minimum depth of 200' and commercial districts should have a minimum depth of 250'.



Illustrative graphics demonstrating land use preferences and design standards as part of the design studies.

Infrastructure

The Town will be in a position to re-brand the district as an area in transition through the utilization of infrastructure design themes that distinguish areas and link attractions and destinations.

A more intricate system of connections for vehicles and other modes of travel could separate industrial traffic and allow shared ways for the non-truck modes. This could include repurposing of the railroad rights of way for other modes of travel.

The Town should adopt different levels of right of way improvement designs to distinguish different areas of the district. These design standards should coincide with the desired future classification of the street; i.e. local, collector, arterial.

Parks and Open Space

Active recreation and programming of spaces on the riverfront will significantly improve public perception of the district. This requires creating public assembly areas for events, together with play fields on the public lands. In addition, considerations for inclusion of boating support facilities should be part of the designs.

Improvements to the parks should include demonstrations of the town's commitment to sustainable and low impact construction. Carefully chosen materials, pollution-controlling drainage systems, and designs that control impacts to the wetlands and waterways should be included in the designs. Examples are included in the conceptual drawings for the Cherry Farm and Aqua Lane parks.

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Chapter 7

Action Plan



Chapter 7: Action Plan

Implementation Overview

The most important aspect of any plan is its implementation. For land use planning, future outcomes depend on decisions taken and policies initiated over time by various interests. Tonawanda's goals and strategies, which were outlined in Chapter 2, provide the framework for implementation. This chapter includes a range of recommended actions within each of the goal areas, reflect community priorities, and provide a basis for the future land use decisions outlined in this plan report.

The actions include both recommendations for physical alterations to both the built and natural environment (natural landscapes, water bodies, etc.) as well as policy/regulatory recommendations to facilitate desired the outcomes. Where applicable, each action item includes a general timeframe for the length of time involved to complete each item, estimated cost, and potential stakeholders.

This chapter does not describe or include every possible action or probable outcome. The actions set forth are a culmination of community input, economic feasibility, and best practices in community planning, design, and development. They are intended to guide future investment and decisions and provide a reference point as new, perhaps even unforeseen, opportunities emerge.

However, this plan is intended to be a working document to be actively used and referenced during the redevelopment of the waterfront. As such, space is provided for the Town to "mark off" when specific actions have been achieved or are significantly underway. This provides the Town with a way to track progress over time and highlight where action has been taken.

In addition to these broad recommendations, this chapter contains targeted site recommendations for several key areas within the study area that outline various levels of improvements. These target areas include Aqua Lane Park, Cherry Farm, Riverfront Park, Sheridan Park and a new east-west trail connection.

Action Plan Key

For each goal area, a series of actions have been outlined. The following key will help municipal leaders and interested stakeholders track the goal area to which the strategies and proposed actions correspond.



Waterfront



Sustainability



Environmental Stewardship



Economic Development



Community Design

Some of the actions could be easily categorized under more than one goal area. For implementation purposes, the actions were placed in the goal area deemed most reasonably connected to the idea or concept. Timeframes are generally broken down into **short** (1-2 years), **medium** (3-5 years) and **long** (5-10 years). Funding sources are based on current/known sources available. Economic and political issues can impact availability of these funds; existing funds can be revised or suspended or new funds may become available.



Waterfront Action Items

Strategies (summarized from Chapter 2)

1. Increase public access to and views of the waterfront.
2. Encourage water-dependent uses and expanded passive recreation along the water's edge.
3. Relocate ill-suited development as opportunity and resources are available.
4. Engage regional partners to pursue joint initiatives.



Various opportunities are available for increasing public lands and access along the River, with the most prominent being Cherry Farm. The primary obstacle to overcome with this action item is transferring the land from private to public hands. More detail on Cherry Farm specifically is found at the end of this chapter. © Bing Maps

WF-1. Expand public lands along waterfront

Timeframe: Medium-Long
Stakeholders: BNRK
Estimated Costs: Dependent on market value
Funding Sources: CFA, NRGCC

Action Achieved/Underway

Detail: Several significant parcels located along the waterfront have been identified as potential/future public parks, including Cherry Farm and Riverfront. The Town has initiated talks with outside sources regarding partnerships and avenues for converting these lands from private to public. Continue to actively pursue developing these lands into public resources with direct access to the waterfront. Conceptual development plans and other details are provided at the end of this chapter.

WF-2. Trail interconnections

Timeframe: Short-Medium
Stakeholders: Planning, Town Board
Estimated Costs: Unknown
Funding Sources: Private, NRGCC, EPF, MAP-21

Action Achieved/Underway

Detail: Trail spurs in the form of loops, vantage points, connecting boardwalks or other means of public access should be incorporated into the development of all properties immediately adjacent to the river. Where any public or private development is located adjacent to the Riverwalk Trail, a connection to the trail should be a

Waterfront Land Use Plan

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condition of final approval, through easements, dedications or other means. For private development, this connection to the waterfront can terminate at a boardwalk, trail loop, or other public access / vantage point agreed upon between the Town and developer/ applicant. Incentive zoning can be utilized in which access is the benefit in exchange for an agreed upon incentive to the developer / applicant. It is recommended that incentive zoning text be added to the zoning code to address not only trail interconnections, but to also allow other kinds of flexibility in overall site design (see sidebar).

WF-4. Coordinate waterfront efforts

Timeframe: Short
Stakeholders: Planning, Town Board
Estimated Costs: None
Funding Sources: None

Action
Achieved/
Underway

Detail: Continue to coordinate efforts with Buffalo Niagara Riverkeeper, Niagara River Greenway Commission, and other Niagara River communities about efforts to preserve views and access, including joint policy statements, consistent zoning and site development requirements, shoreline stabilization, water quality improvements, and habitat restoration.

WF-5. Engage special interests

Timeframe: Short
Stakeholders: Town Board, TTDC
Estimated Costs: None
Funding Sources: None

Action
Achieved/
Underway

Detail: Although every effort was made during this plan to engage outside interests, opportunities still exist to engage other special interest groups in the region, including those related to trails, biking, fishing, birding, rowing/kayaking, and others. To help increase the visibility and potential marketability of the waterfront, informal meetings with representatives from these groups will help to highlight improvements made to the waterfront, identify opportunities for organized activities and further promote Tonawanda's waterfront to a wider audience.

Incentive Zoning: Carrots and Sticks

The purpose of incentive zoning is to empower the Town to grant incentives (carrots) in exchange for a private developer to provide a public benefit or amenity (stick). The incentives offered by the Town must be in accordance with documented policies, strategies, or mechanisms outlined in a community-based comprehensive or other land use management plan. Incentives can include, but is not limited to conservation of features or land, land donation, and construction of recreational amenities. Permitted incentives can include increase in density, changes in lot dimensional requirements, or changes in use. The Town Board is responsible for review and final approval of any incentive zoning - Town Law §261-b provides specific procedures and requirements for this process. Incentive zoning does not take the place of existing zoning regulations in a district, but supplements it and needs to be agreed upon by all involved parties. In Tonawanda's case, this form of zoning would provide a mechanism for increasing public access to the waterfront while also increasing the prominence of the waterfront to the community in the form of increased development.



Grand Island, NY boat launch for canoes and kayaks.

WF-6. Expand and market small boat launches

Timeframe: Medium
Stakeholders: Town Board, TTDC, Erie Co.
Estimated Costs: Unknown
Funding Sources: NRG, CDBG, EPF, CFA

Action
 Achieved/
 Underway

Detail: Personal-powered watercraft (kayaks, canoes, rowboats, etc.) boat launches should be pursued at any Town property along the waterfront. Aqua Lane Park and Cherry Farm are two key locations for this type of facility, as is the Town’s Water Treatment Plant, depending on its status in the near future. (Although a launch currently exists at Aqua Lane Park, room for expansion and enhancements exists.) In addition, creating a user-friendly map or flyer illustrating public access points and description of activities and amenities at key public entry points and destinations along the riverfront would provide good publicity for the Town’s waterfront.

**Waterfront Area
 Acceptable Uses**

Appendix G provides example text for a dedicated Waterfront Priority District. In order to facilitate a mix of uses along the waterfront and change its character, the following uses are generally acceptable and should be considered:

- Recreation/cultural facilities (public or private)
- Boat launches, marinas, yacht clubs
- Boat storage/repair facilities
- Multi-Family Dwellings, Townhomes
- Mixed-Use Buildings with ground floor parking
- Bar/Tavern/Pub, including microbreweries
- Restaurants
- Retail
- Hotel/Motel
- Live/Work facilities

WF-7. Revise waterfront zoning districts

Timeframe: Short - Medium
Stakeholders: Planning Board
Estimated Costs: \$15,000-\$45,000
Funding Sources: Local budget, CFA (LWRP)

Action
 Achieved/
 Underway

Detail: Currently, there are 10 different zoning districts within the study area. Along River Road, there are five different districts; six including the River Road Overlay and eight when taking the River Road Overlay subareas into consideration. This variation does not provide a consistent, desired objective for the waterfront. Additionally, although the overlay district was intended to implement the goals of the LWRP, it has generally underperformed for various reasons.

New zoning districts and/or revised boundaries should be developed that more accurately reflect the goals and objectives of the Town for the waterfront, including those within the Brownfield Opportunity Area (BOA) Pre-Nomination Study and LWRP. A Waterfront Priority District would one of the more important districts to establish to transform the area from primarily heavy industry and vacant lands to a mix of uses with open spaces. This district would

NRG - Niagara River Greenway Commission, CDBG - Community Dev. Block Grant, EPF - Environmental Protection Fund, CFA - Consolidated Funding Application, LWRP - Local Waterfront Revitalization Program

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mirror the LWRP boundary by extending 500 feet beyond River Road on the upland (east) side. The Future Land Use map provides a useful starting point for these revisions.

The design standards contained within the existing Overlay District are valuable and should be retained in any revised zoning text, albeit in a different format and outline specific requirements, criteria, and recommendations for design. (See action item CD-1)

WF-8. Engage waterfront landowners

Timeframe: Short
Stakeholders: Town Board, private landowners
Estimated Costs: None
Funding Sources: None

**Action
 Achieved/
 Underway**



Detail: In addition to the input provided by the companies involved with the Town’s E3 Sustainability Initiative as well as the waterfront corridor landscaping study currently underway, periodically conduct confidential surveys of property owners on the waterfront and along the east side of River Road to learn about short and long-term plans for their properties, including potential site improvements, expansions and/or relocation. Share the goals, strategies, and recommendations contained within this plan with them to build up cooperative efforts at rebranding and redeveloping the waterfront in an effective and sustainable manner.

WF-9. Expand local redevelopment efforts regionally

Timeframe: Medium
Stakeholders: TTDC, Erie Co, Sustainability Council, Planning Board, NYS
Estimated Costs: None
Funding Sources: NYSESD

**Action
 Achieved/
 Underway**



Detail: Coordinate and strengthen cooperative efforts with other County and regional entities such as Erie County Office of Economic Development or the IDA in regards to business attraction and retention. If these entities are not involved in the E3 Initiative, consider inviting them or establishing secondary meetings with them to gather

Split-Zoned Properties

The future land use map shows some of the properties adjacent to River Road as two separate areas and potentially two separate zoning districts. The intention of this is to provide an opportunity to change the existing environment along River Road from one of large industrial parcels to more manageable, non-heavy industrial-based development. While large industry still has its place in Tonawanda and is welcome for economic development and the overall vitality of the Town, the desire of the community is to transform the waterfront into a destination and make it into a “place.” Split land uses or zoning is intended to facilitate outparcel development or subdivision of lands to achieve this objective.

NYSESD - NYS Empire State Development Corp.

Tactical Urbanism

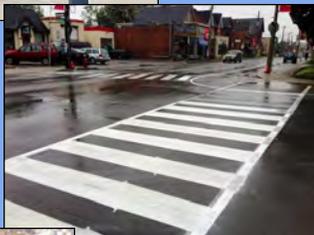
This style of community-backed design and implementation has grown in recent years thanks to grassroots efforts by community groups and designers to experiment with change. In Tonawanda, these efforts should include, at a minimum:

- Walkability
- Road diets
- Increased pedestrian access
- Multimodal access



“Guerrilla bumpouts” and crosswalks in Hamilton, Canada...

...which led to real crosswalks and tighter, painted “curbs.”



The more commonly seen “parklets” on PARK-ing Day.

Reflectors added by residents to existing bike lanes to improve safety.



additional input and coordinate growth and redevelopment of the waterfront.

WF-10. Expand/develop interpretive sites

Timeframe: Short - Medium
Stakeholders: Planning Board, private landowners
Estimated Costs: Unknown
Funding Sources: CFA, NRGCC

Action
 Achieved/
 Underway



Detail: Whether integrated into private development or developed as part of a public project, interpretive sites provide a valuable connection to the waterfront beyond just general observation. Interpretive sites can be as simple as a small descriptive plaque describing a specific environmental feature or a large kiosk with detailed information on an entire habitat. With assistance from local schools or conservation groups, the Town can map out key locations in the waterfront and, through the site plan development process and incentive zoning, require new development to include these amenities. Any public spaces or connections to the waterfront should also include interpretive elements. (See call out box on following page)

WF-11. Explore avenues for “tactical urbanism”

Timeframe: Short - Medium
Stakeholders: Planning Board, Town Board, DPW, local entertainment groups and businesses
Estimated Costs: Varies
Funding Sources: Unknown

Action
 Achieved/
 Underway



Detail: “Tactical urbanism” is an approach that allows a group or entity the ability to test a larger scale project in incremental steps at lower cost and effort; “experimentation informs design.” For example, striping curb bumpouts on a street to gauge motorist and pedestrian behavior prior to actual construction or setting up an impromptu event at an area that could conceptually become a community facility. These types of actions are much lower in cost than full implementation, are reversible/temporary, and provide a concrete answer to determining whether to move forward with a larger project.

Opportunities for Observation and Interpretation

The Niagara River and its environs provides natural habitats and passageway for diverse birds and animals. Strawberry Island, a u-shaped river island located between the shores of Tonawanda and Grand Island, also supports a variety of birds and marine life. There are large concentrations of waterfowl, nesting for Ring-billed Gull, Canada Geese, American Pigeon, Mallard and nesting and feeding for Great Blue Heron, Common Tern, Black-crowned Night Heron, Double-crested Cormorant and the North American Bald Eagle. Great Egrets can commonly be observed feeding in the area. Shoals and marshes supply winter resting and feeding sites for American Black Duck, Canvasback, Common Goldeneye, Common Merganser, Scaup and spawning shoals for bass, muskellunge, and other fish.



Tonawanda's waterfront should be a premier location to observe and learn about the natural assets of the community. Natural promenades and look out points would provide locations for birders to observe the native species in and near the river. Interpretative signage could teach residents and visitors more about the characteristics that draw diverse wildlife and aquatic life to this part of the river.

The Town may also want to work with NYS DEC and other partners to interpret the strategies being implemented to restore natural habitats and the development techniques utilized to support the Town's sustainability objectives.



Examples of interpretive signage detailing waterfront features and signage outlining sustainable systems utilized in a recent enhancement project.

The Village of Williamsville recently undertook a similar approach by shutting down Main Street (State highway) to not only draw attention to Main Street, but also to see how traffic would be impacted if Main Street became more active. In addition, the Parkside Avenue neighborhood in Buffalo staged a similar event to draw attention to the traffic and high speeds on the roadway and signal their support for traffic calming measures.

Cherry Farm would be a prime location for a tactical urbanist event in order to draw attention to the waterfront and make implementation of the plan more active. Examples for this might include setting up an impromptu concert, sponsoring a nature or other outdoor recreation fair, or any other similar event or action that would bring the attention to the area.

Sustainability Action Items



Strategies (summarized from Chapter 2)

1. Implement green building and site design standards.
2. Encourage adaptive and beneficial reuse of vacant industrial facilities and landfill sites.
3. Encourage and expand green technology businesses.
4. Expand connectivity to and through the study area.

S-1. Use municipal facilities as test sites

**Action
Achieved/
Underway**

Timeframe: Short - Medium
Stakeholders: Town Board, Parks Dept.
Estimated Costs: Dependent on material/use
Funding Sources: NYSERDA, CFA, USEPA



Detail: Various types of green infrastructure and sustainable building materials are available that could be utilized on a larger scale for public and private development. In some cases, pilot sites are needed to test the feasibility of materials and designs prior to larger deployment, especially with the varied weather in Western New York. For example, the use of pervious pavement materials (grid pavers, porous concrete, etc.) could be implemented in parking areas or trails at Aqua Lane Park or Sheridan Park. These pilots areas could serve as demonstrations points that can be referred to during site plan review in order to encourage additional development throughout the waterfront as well as neighboring communities. The Town has already done this in select locations (e.g. cistern at highway garage) and should continue to do so where feasible and warranted.

Going “Green” Development Strategies

Native Landscaping

The addition of landscaping to any otherwise blank, grassy area adds not only aesthetic value but also valuable habitats for animals and additional vegetation to absorb and filter rainwater. However, not all plants are created equal. Native plants should be utilized in both commercial and residential landscaping projects. Native plants and trees are uniquely adapted to the local weather and climate, water and soil conditions. Choosing these types of plants decreases the amount of water needed, maintenance, fertilization and also decreases the likelihood of diseases or untimely death. In addition, some native species are specially suited to unique local conditions, such as compacted soils around parking lots or salt prone areas near high-volume roadways.

Rain Gardens

Rain gardens contain native vegetation and allow water to be naturally infiltrated into the ground. They are usually located adjacent to impervious surfaces, such as parking lots, buildings. Rainfall during a storm can carry sediment and pollutants as it travels along impervious surfaces. Native plantings and soil filter out these pollutants and allows natural breakdown. In a rain garden, the plantings also provide a visually appealing landscaped buffer.



Rainwater Harvesting

Utilizing barrels and cisterns, rainwater harvesting captures and stores rainwater. After being filtered to remove any sediment, this water can then be pumped to an irrigation system and/or used for watering landscaping. Rainwater cisterns can easily be disguised aboveground or landscaped or be placed below ground if space and design allows. Commercial and residential applications are viable options.

Living or Green Roof

Green roofs utilize a low-growing, low maintenance, tolerant vegetation installed over a specially-designed roofing system. Although this method is more expensive than traditional roofing systems (e.g. asphalt) during design and construction, green roofs provide many valuable benefits. The vegetation on green roofs absorb the water or delays the time and amount of runoff that occurs. In addition, green roofs also help to insulate the ceiling of the structure from heat loss and sound, provide an extended habitat for birds, help to regulate temperatures and provide a



unique area for workers or employees if roof access or views are incorporated into the design.

Pervious Pavements

Pervious, or porous, pavements allow liquids such as rainwater to pass through to the subsoil below and eventually be naturally filtered and returned to the groundwater. The most common types of these surfaces are made with bricks or pavers as they have joints and cracks between them that allow liquids to pass through. New pervious concrete and asphalt products are also being produced. The benefit of this type of surface is to decrease the strain on stormwater systems, allow nature to naturally filter out pollutants and to recharge the groundwater system. This can be used in various applications; not only parking lots, but also trails, sidewalks, and access roads.

Vegetated Swale or Bio-Swale

Traditional swales are shallow, grassy ditches that are sloped to carry excess stormwater from developed areas to a retention pond, field drain or other man-made stormwater management system. Bio-swales are designed to capture surface runoff and slowly allow it to permeate into the soil below. Bio-swales incorporate native vegetation, which allows the water to be further absorbed and filtered on site. Bio-swales are built to accommodate everyday storm events. However, to ensure that site designs can handle larger rain events, they typically include underground drainage pipes that can accommodate excessive stormwater runoff.



High-albedo Surfaces

High-albedo surfaces refers to surfaces that are typically lighter in color to reflect, rather than absorb the sun's rays and heat. Lighter colored surfaces are especially important on large expanses such as buildings roofs and parking lots. On building roofs, by reflecting the sun's rays and heat, the internal heating, ventilation and cooling (HVAC) system can more efficiently maintain a comfortable temperature and there is less degradation to the roofing materials. For parking lots, reflected heat also decreases material degradation as well as reduces the "heat island" effect - areas where temperatures are noticeably higher despite the actual temperature.

"Dark Sky" Compliant Lighting

Commercial uses typically require lighting for safety and security around their buildings and in parking lots. "Dark sky" compliant lighting fixtures are designed to shed light only onto the ground and not beyond the property on which it is located. These fixtures decrease unwanted glare for pedestrians, bicyclists and motorists who may be traveling nearby; saves energy by concentrating the light only where needed; and increases visibility at night. Compliant lighting can be applied in residential settings, including street lighting.

“Green” and sustainable development

There are various standards around today that deal with “green” and sustainable building. Identifying the most appropriate one can itself be a challenge. LEED (Leadership in Energy and Environmental Design) is probably the most popular one. Although it has a site component, it does mainly pertain to structures. Another guideline that exists that deals predominantly with a site and land development is the Sustainable Sites Initiative. The vision for these guidelines are clear:

“any landscape, whether the site of a large subdivision, a shopping mall, a park, an abandoned rail yard, or a single home, holds the potential both to improve and to regenerate the natural benefits and services provided by ecosystems in their undeveloped state.”

Although it is still in the pilot phase, these guidelines (and eventual standards) would complement the Town’s desire to enhance and improve the waterfront and should be referenced during development review with incentives to encourage their use.

See Sustainable Sites Initiative at: www.sustainable-sites.org/

S-2. Incorporate green building standards and practices into future development.

Action Achieved/ Underway

*Timeframe: Short
Stakeholders: Town, Planning Board, Sustainability Council
Estimated Costs: \$5,000-\$10,000
Funding Sources: Local budget*



Detail: Although “green” building practices are practical throughout the Town, the sensitive nature of the waterfront makes it even more important to incorporate these types of building practices into future development and redevelopment efforts.

The Town can start this process by adopting a resolution requiring green building practices in any municipal or municipally-supported buildings and sites. Using the incentive zoning approach, these practices can also be used in private development in exchange for density, signage, or permit processing, for example. Parking lots, stormwater control, alternative energy for primary or supplementary on-site use, increased vegetation for shade and stormwater, and water conservation are some of the more common elements to incorporate into the site plan development and processes.

S-3. Develop local database for available green programs and incentives.

Action Achieved/ Underway

*Timeframe: Short
Stakeholders: TTDC*
Estimated Costs: None
Funding Sources: NYSERDA, NYSEFC, USEPA*



Detail: Various programs and incentives, both technical and financial, are available for businesses to increase or implement green practices in design and operation. While the E3 Initiative is catered mainly to the larger industries and businesses in the waterfront area, smaller businesses can be included by providing a central database for them. The Town can work with NYSERDA and Erie County (and others as they are identified) to develop this resource. A number of programs currently exist that would potentially fit with the proposed uses for the waterfront including

* TTDC - Town of Tonawanda Development Corporation. NYSERDA - NYS Energy Research and Development Authority, NYSEFC - NYS Environmental Facilities Corporation, USEPA - US Environmental Protection Agency

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manufacturing technology development and on-site power applications and building research & development programs.

S-4. Continue to explore “green” alternatives for redevelopment of closed landfills.

Timeframe: Short - Medium
Stakeholders: TTDC, Planning, Town Board, Private landowners*
Estimated Costs: None
Funding Sources: CFA, NYSERDA, USEPA

**Action
 Achieved/
 Underway**

Detail: The intent to redevelop Cherry Farm from a former landfill to the recreational park is a good adaptive reuse for the community. There already has been some interest generated for the other landfills by outside agencies (e.g. EPA) and creative redevelopment options should be explored with an emphasis on green strategies such as solar arrays, wind energy generation, additional recreational amenities or other green pursuits. As a champion for successful redevelopment, the Town can become an integral liaison, resource, and provide support between interested agencies and the private companies that own the landfills. Additional examples, case studies and information on landfill redevelopment is found in Appendix E.

S-5. Expand trail network

Timeframe: Short - Medium
Stakeholders: Planning Board, GBNRTC, Erie Co, Parks Dept., CSX, National Grid
Estimated Costs: \$20,000-\$40,000 (planning)
\$1.5-2.5 million (development @ \$400,000/mile)
Funding Sources: GBNRTC UPWP, CFA, TAP/MAP 21

**Action
 Achieved/
 Underway**

Detail: This plan identifies several key locations for future trail connections and loops within the study area as well as one significant east-west trail connection. Although these locations are identified, further work is required to determine their feasibility. The Town should work with Greater Buffalo-Niagara Regional Transportation Council (GBNRTC) to develop a formal trails masterplan for the Town with special focus on trails and loops connecting to

Landfills as Green Energy?

Although often considered the antithesis of sustainability, landfills offer opportunities to be retooled for renewable energy. The EPA’s RE-Powering America’s Land Initiative (2011) partners the agency and the U.S. Dept. of Energy’s National Renewable Energy Laboratory (NREL) in evaluating the feasibility of siting renewable energy facilities on brownfields, Superfund sites and former landfill or mining sites. Several sites throughout the country, including the Bethlehem Steel Winds site in Lackawanna, NY (below), have successfully been reused for renewable energy generation. While development on landfills present several challenges (e.g. settlement, landfill caps, regulations, etc.), potential remedies and opportunities are being evaluated and designed to make redevelopment of these areas possible.

Sources: U.S. EPA - RE-Powering America’s Lands (<http://www.epa.gov/oswercpa/>), Contaminated Site Clean-Up Information (<http://www.clu-in.org/>) and “Solar Power Installations on Closed Landfills: Technical and Regulatory Considerations” - U.S. EPA, Sept. 2009.



Steel winds site viewed from Lake Erie © New York Times

CFA - Consolidated Funding Application, NYSERDA - NYS Energy and Research Dev. Authority, GBNRTC UPWP - Greater Buffalo-Niagara Regional Transp. Council Unified Planning Work Plan, TAP - Transportation Alternatives Program/MAP-21, USEPA - US Environmental Protection Agency

the Riverwalk Trail. The trail master plan would explore the feasibility of specific alignments, provide preliminary engineering analysis and indicate associated costs. This information would be used to develop a prioritized trail linkages project list to guide public and grant funds investments over the next decade.



Environmental Stewardship Action Items

Strategies (summarized from Chapter 2)

1. Continue and expand efforts to improve environmental and human health conditions at existing industrial facilities.
2. Encourage best practices for shoreline stabilization and restoration.
3. Work with State and Federal partners and private landowners to implement environmental remediation at known sites.
4. Consider human health impacts of proposed projects.



Plantings along the edge of parcel provide a visual buffer and enhance the appearance of adjacent roadways.

ES-1. Implement & expand “greening” strategy

Timeframe: Short - Medium
Stakeholders: NYS DOT, NYSTA, Planning, Town Board, National Grid, Erie County*
Estimated Costs: \$10,000-\$40,000
Funding Sources: TEP, CFA, NRG, NYSDEC

Action
 Achieved/
 Underway



Detail: Building on the roadway streetscaping improvement and prioritization recommendations outlined in Chapter 6 (Roadway Characteristics), the Town should establish an overall “greening” strategy to significantly increase the amount of trees within the study area. Although the Town only has jurisdiction within the right-of-way on Town roads, providing support and links to funding opportunities to private landowners can encourage additional planting on the private side of the road. The local Boys and Girls Club has an existing tree farm program that could be further supported and expanded in cooperation with the Town which can then be used in both public and private plantings.

* NYSTA - NYS Thruway Authority. CFA - Consolidated Funding Application, TEP - Transportation Enhancement Program, NRG - Niagara River Greenway Commission, NYSDEC - NYS Dept of Environmental Conservation (Urban Forestry)

Waterfront Corridor Landscape Project

The area's industrial heritage has profoundly impacted the waterfront area's character and sense of place. Much of this area's development occurred at a time when little attention or funding was dedicated to well designed streetscapes and adequately buffered parcels. Landscaping and design were not high priorities in community development efforts, especially in the design of new roadways and highways. Additionally, landscape design was not addressed significantly, if at all, in the site planning of industrial and commercial enterprises. Unfortunately, the current conditions along River Road and its connecting corridors illustrate the unfortunate effects of missed landscaping opportunities in infrastructure and site design.

The Town is currently and should continue to seek funding from the Niagara River Greenway Commission to study, design and construct landscaping improvements to the River Road corridor and surrounding main roadways, such as Grand Island Blvd, Sheridan Drive and Sawyer Avenue.

The project would be an important part of the Town's efforts to create a better Tonawanda waterfront. In addition to complimenting the natural beauty of the Niagara River, landscaping the waterfront area's key corridors will:

- *Enhance environmental conditions*
- *Support the Town's sustainability initiatives*
- *Improve community character*
- *Change negative perceptions of the Town's waterfront*
- *Create a better climate for future investment*

The proposed landscape project could be divided into multiple phases to allow for incremental implementation over time. The first phase of the project, which is now underway, includes a feasibility study and preliminary design. This initial phase would allow the Town and future project partners to clearly understand the current condition of the natural and built environments, assess the best design approach and practices, define an implementation plan and outline associated costs of subsequent phases. The feasibility study would also assess the possibility of burying overhead utilities and deconstructing any defunct above-grade utility structures.

This project and others like it would allow Tonawanda to better support the Niagara River Greenway Vision:

"The Niagara River Greenway is a world-class corridor of places, parks and landscapes that celebrates and interprets our unique natural, cultural, recreational, scenic and heritage resources and provides access to and connections between these important resources while giving rise to economic opportunities for the region."

ES-2. Expand and build upon E3 Initiative

Timeframe: Short –Med
Stakeholders: Sustainability Council, Town Board
Estimated Costs: None
Funding Sources: None

Action
 Achieved/
 Underway



Detail: The E3 initiative (discussed further in Chapter 1) has provided a valuable mechanism for identifying and improving environmental conditions in large industries within the study area. The Town should continue to engage with local industries and invite others to join in order to improve conditions in the waterfront and beyond. In addition, the Town should continue to work with industries and E3 partners to help enhance and renew their delivery of services.

ES-3. Conduct E3 Assessments and expand to outside entities

Timeframe: Short
*Stakeholders: Sustainability council, Chamber of Commerce, Town Board, TTDC**
Estimated Costs: None
Funding Sources: USEPA, NYSDEC, NYSERDA

Action
 Achieved/
 Underway



Detail: A key component of the E3 initiative is the “Lean and Green” assessment, which identifies waste and inefficiencies and recommends business operations and environmental improvements for the participating companies. For businesses not included in the E3, but associated with the Tonawanda Sustainability Council, the Town Chamber of Commerce, or the Town Development Corporation (especially within the waterfront area) the Town could encourage the use of a similar assessment using the E3 as a model. This would help to expand the overall sustainability portfolio of the Town and improve environmental conditions of smaller companies and other industries which have a multiplying effect on the economic and environmental condition of the waterfront.

*TTDC - Town of Tonawanda Dev. Corp. NYSERDA - NYS Energy and Research Dev. Authority, NYSDEC - NYS Dept. of Environmental Conservation,, USEPA - US Environmental Protection Agency

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ES-4. Identify preferred shoreline stabilization methods

Action
 Achieved/
 Underway



Timeframe: Short
Stakeholders: Planning Board, BNRK
Estimated Costs: None to \$10,000
Funding Sources: Local budget

Detail: Shoreline erosion contributes to decreased water quality and property loss, among other impacts. Where new development is proposed adjacent to the River and shoreline stabilization is identified as an issue, the use of bioengineering techniques should be the primary recommendation as part of development review. The Town should incorporate reference to bioengineering techniques into the site plan review process as well as identifying examples in design standards to ensure its use. The use of rip-rap and retaining walls should be discouraged and replaced where feasible.

Bioengineering is a combination of structural components and plant material to produce a dense stand of vegetation that serves as a “living system” to protect streambanks and shorelines. This technique works to stabilize many, but not all, erosion problems. One challenge in bioengineering is protecting the bank from erosion until the vegetation becomes established, which could take one to two years. There are a number of structural components available to provide temporary protection while the plant growth becomes established.

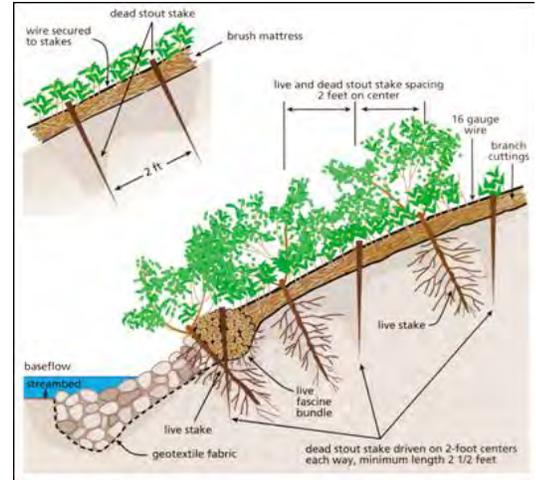
ES-5. Enhance shoreline setbacks

Action
 Achieved/
 Underway

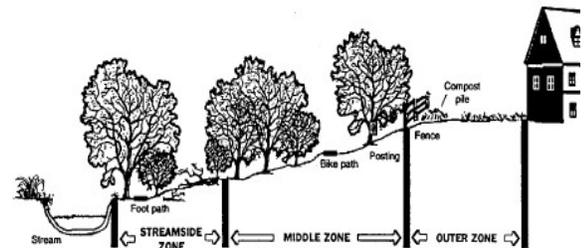


Timeframe: Short
Stakeholders: Planning Board, BNRK
Estimated Costs: None
Funding Sources: None

Detail: Currently, the Town requires a 50 foot buffer (setback) from the high water mark only along Two Mile Creek and Rattlesnake Creek within the Waterfront Business (WB) and Waterfront Industrial (WID) districts. In coordination with the recommendations from the Buffalo Niagara Riverkeeper, this buffer should be expanded or further enhanced to preserve water quality.



Shoreline stabilization techniques such as this brush mattress are being encouraged over revetment walls and bulkheads for not only erosion control purposes, but also to increase natural habitat and filter runoff. © Linden LAND Group



This illustration shows a typical three-zone urban stream buffer zone referenced in many stormwater publications. The first zone (25') is very restricted and protects the physical integrity of the water. The second (50-100') is restricted and provides distance between development and the water. The outer (25') is unrestricted but typically allows low intensity uses. Adapted from/© Stormwater Central/Center for Watershed Protection.

Floodplains and Wetlands

In addition to protecting riparian areas adjacent to creeks and other named waterbodies, protection zones around wetlands and within floodplains are equally important. As indicated in Chapter 4, both of these resources naturally help to absorb excess and filter stormwater as well as provide unique habitats for various flora and fauna. Current buffers around NYS DEC wetlands (100') should be strictly enforced and similar buffers around Federal wetlands should be considered. In addition, a Town-wide policy for "no net decrease" in wetlands should also be considered. In terms of floodplains, FEMA NFIP mapping is currently being updated and an updated floodplain management ordinance will be developed by the Town to replace their existing regulations (adopted 1982). Currently, development within a special hazard floodway area is severely limited and this is expected to continue with the revised regulations. The Town may wish to expand limited development to the 100-year floodplain as well to minimize damage to private property and natural resources.

Within the first 50 feet from the high water mark, no clearing of vegetation should take place and no structures should be placed. The second 25-50 feet should be significantly limited in vegetative clearing and only allow footpaths, permeable trails, or other low-impact recreational amenities within this area. At a minimum, a 100' buffer zone should be applied to the Niagara River and a 75' zone for Two-Mile and Rattlesnake Creeks, measured from the mean high-water mark. Rather than have these dimensions and standards buried within specific districts, it would be more pertinent to have them as a separate subsection in Article III (Provisions Applicable to All Districts).

ES-6. Actively engage brownfield property owners

Timeframe: Medium - Long

Stakeholders: Town Board, private landowners

Estimated Costs: Dependent on extent of cleanup

Funding Sources: NYSDOS/CFA, EPA RLF

Action
Achieved/
Underway



Detail: The Town has several brownfield or potential brownfield sites in various stages of clean up, including 3445 River Road (Polymer Applications). The Town should continue to work with the NYS DOS and DEC to continue planning and implementing projects identified in the Town BOA. Additionally, regular meetings with key property owners of such properties should be convened to review available funding resources and find out what remedial actions can or will be taken at the property.

ES-7. Continue BOA process (Step 2 and 3)

Timeframe: Short

Stakeholders: Town Board

Estimated Costs: \$275,400

Funding Sources: NYSDOS/CFA

Action
Achieved/
Underway



Detail: Momentum has built up around the waterfront in the past few years with the completion of the BOA Pre-Nomination Study, this updated waterfront land use plan, and the development of the Niagara River Watershed Management Plan by Buffalo Niagara Riverkeeper. The Town has been included in the 2013 announcement of

Using Landscaping to Improve Environmental Integrity

This planning effort renewed the Town's long-time interest in creating a greener waterfront. Urban landscaping improves air quality, creates additional wildlife habitats, helps naturally manage stormwater, and restores the integrity of natural resources.

Although all of the potential environmental benefits of trees are important to the Town's future, improved air quality may be one of the highest priorities. Installation of dense tree cover along corridors and on development sites can offset greenhouse gases, which is an identified goal of the Town. According to a USDA Forest Service report, urban trees impact air quality in four ways:

- *Temperature reduction and other microclimatic effects*
- *Removal of air pollutants*
- *Emission of volatile organic compounds (VOCs) and tree maintenance emissions*
- *Energy effects on buildings*

According to the Urban Forestry Network, **one acre of new forest** can sequester about **2.5 tons** of carbon annually. Trees reach their most productive stage of carbon storage at about 10 years, at which point they are estimated to absorb 48 pounds of CO₂ per year.

Trees also remove other gaseous pollutants through the stomata in the leaf surface by absorbing them with normal air components. Some of the other major air pollutants and their primary sources are:

- *Sulfur Dioxide (SO₂)* – Sixty percent of sulfur dioxide comes from coal burning for electricity and home heating while 21 percent comes from refining and the combustion of petroleum products.
- *Ozone (O₃)* – Ozone is a naturally occurring oxidant that exists in the upper atmosphere. O₃ may be brought to earth by turbulence during severe storms. Also, small amounts are formed by lightning. Automobile emissions and industrial emissions mix in the air and undergo photochemical reactions in sunlight releasing ozone and another oxidant, peroxyacetyl nitrate (PAN). Naturally, high concentrations of these two oxidants build up where there are many automobiles.
- *Nitrogen Oxides (NO_x)* – Probably the largest producer of nitrogen oxide is automotive exhaust. These are also formed by high temperature combustion when two natural air components are present; nitrogen and oxygen.
- *Particulates* – These are small particles emitted in smoke from burning fuel, particularly diesel, which enters our lungs and causes respiratory problems. With trees present, there is up to a 60 percent reduction in street-level particulates.

Tonawanda needs to ensure that tree plantings are a critical element of every future development and redevelopment project in the future.

Health Impact Assessments (HIAs)

HIAs are “policy and planning tool[s] used to provide decision-makers in non-health related sectors - such as elected officials and government staff - with recommendations and information on how their proposed plans and policies will likely impact the health of the communities they serve. To date, only one HIA has been completed in New York, although they have been completed throughout the United States. The general process includes:

- Screening (determine need and usefulness)
- Scoping (plan development, identify potential health risks and benefits)
- Assessment (baseline health, assess potential impacts of decision(s))
- Recommendations
- Reporting (disseminate findings)
- Monitoring and Evaluation

Sources: www.healthimpactproject.org, University of Rochester Department of Environmental Medicine (Community Projects)

additional funding for Step 2 of the BOA process. The Town needs to continue to pursue cleanup and redevelopment strategies and opportunities following completion of Step 2.

ES-8. Incorporate human health impacts in the waterfront

Action Achieved/
Underway

Timeframe: Short
Stakeholders: Planning, Town Board
Estimated Costs: None (applicant prepared)
Funding Sources: None

Detail: As recently indicated in the Tonawanda Coke lawsuit, heavy industry and manufacturing can have a significant impact on human health. Although SEQRA provides a mechanism for reviewing some health impacts associated with development, another type of assessment is gaining ground throughout the country that is specifically tailored towards this - a HIA or human health assessment. The overall goal of a HIA is to ensure that health is considered when a decision is made regarding a policy or development in a community. The process is similar to the SEQRA process with public outreach and the completion of an assessment form. Due to the history of the waterfront, HIAs should be required with new development, especially light industrial and manufacturing businesses to ensure health impacts are addressed. This requirement can be included within the site plan review process by the Town.

ES-9. Prioritize property remediation

Action Achieved/
Underway

Timeframe: Medium - Long
Stakeholders: Planning, Town Board, TTDC
Estimated Costs: Unknown
Funding Sources: NYSDOS/CFA, EPA RLFG

Detail: The Town needs to continue to take active steps to remediate vacant and underutilized properties, making on-site improvements where feasible to create shovel ready development. When deciding on site remediation and targeted investments, priority should be given to parcels in corridors with high visibility, such as River Road, Sheridan Drive, Grand Island Boulevard, and Sawyer Avenue.

ES-10. Grand Island tollbooth conversion

Timeframe: Medium - Long
Stakeholders: Planning, Town Board, NYSTA, Province of Ontario
Estimated Costs: Unknown
Funding Sources: Unknown

**Action
 Achieved/
 Underway**



Detail: Air quality is a concern in the Town not only from the various industries located on the waterfront, but also from the high volume of traffic from the Grand Island tollbooth. Conversion to an all-electronic toll (AET) would help to significantly reduce emissions and congestion and improve local air quality. Pilot programs are already underway in select locations on I-87 and I-95 in southeastern New York.



All-electronic toll collection (AET/AETC) is similar to the EZ Pass system in New York, except that it is typically higher speed and includes cameras for obtaining license plates identification as a secondary collection method for non-EZ Pass holders. © 3M Aylesbury/Denver, CO

ES-11. Work with NYS DOH on biomonitoring project proposal

Timeframe: Short - Medium
Stakeholders: Planning, Town Board
Estimated Costs: Unknown
Funding Sources: Unknown

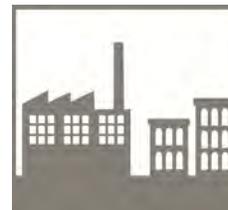
**Action
 Achieved/
 Underway**



Detail: The NYS DOH Health Outcomes Review recommended a biomonitoring project to provide further research and analysis in regards to chemicals noted in the NYS DEC's air quality study and community health concerns as result of the DOH review. The Town should continue to work with the State on implementing this recommendation to further quantify air quality impacts to residents.

Economic Development Action Items

1. Pursue brownfield redevelopment funding and encourage more eco-friendly industries (e.g. Riverview Solar Tech Park).
2. Invest in public improvements to improve the Town's "climate" for private investment.
3. Develop a brand - either locally or regionally - to attract future business investment.



ED-1. Permit limited housing along the waterfront

Action
Achieved/
Underway

Timeframe: Short

Stakeholders: Planning, Town Board

Estimated Costs: None (if done with zoning updates)

Funding Sources: Local budget

Detail: In order to transform the waterfront into a multi-faceted, active destination, there should be more human presence. Permitting multi-family housing in the form of townhouses and condominiums would provide additional mass for a commercial presence and move away from industrial uses along the water. The waterfront would not be the best location for single-family housing developments. Care needs to be taken in the design of such uses so that views are not obstructed, public access is incorporated, the waterfront environment is protected, and aesthetics are held to a high standard. In addition, Health Impact Assessments (pg 95) should be performed based on the environmental concerns with the area and additional site remediation should be taken as needed. IN general, housing should be marketed towards older couples downsizing and singles, as identified in the market analysis, to provide a higher potential for success.

ED-2. Identify potential space for green business incubator.

Action
Achieved/
Underway

Timeframe: Short - Medium

Stakeholders: TTDC

Estimated Costs: Land acquisition costs vary

Funding Sources: NYSERDA, CFA

Detail: The Town of Tonawanda’s various business parks in the waterfront (Riverview, North Youngman, & Fire Tower) are prime locations for establishing a green business incubator or a diverse collection of industry start-ups under one roof. A designated space will help to promote the waterfront even more and attract additional green industry, especially when coupled with the promotion of available land in the waterfront area. A public-private partnership is one widely used method for establishing business incubators.

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ED-3. Inter-municipal branding and visibility

Timeframe: Short
Stakeholders: Planning, Town Board
Estimated Costs: \$15,000-\$20,000
Funding Sources: CFA, TEP, local budget

Action
 Achieved/
 Underway

Detail: The Town of Tonawanda shares its name with the City of Tonawanda and the Town of North Tonawanda. The three communities should explore opportunities to collaborate on a signage and/or branding strategy. Shared signage along the waterfront will help connect points of interest and destinations along the Niagara River, especially as trails along the riverway expand and improve. In addition, the Town should work with the City of Buffalo on complementary gateway treatments at border areas along the waterfront.

ED-4. Identify locations for strategic public infrastructure investment.

Timeframe: Medium
Stakeholders: TTDC, Town Board
Estimated Costs: Unknown
Funding Sources: CFA

Action
 Achieved/
 Underway

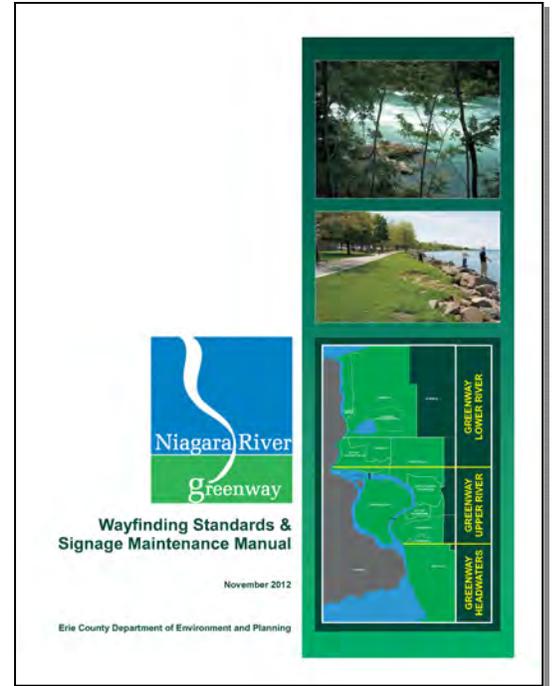
Detail: The North Youngman Commerce Center is recent example of a location in which the Town is making a strategic investment in infrastructure in order to encourage private development. This is a similar situation that many communities, whether a municipality itself or through its development agency, have undertaken or taken the lead on development and has been a success in many instances.

ED-5. Permit light industry in the Waterfront Business zone under special conditions.

Timeframe: Short
Stakeholders: Planning, Town Board
Estimated Costs: None (if done with zoning updates)
Funding Sources: Local budget

Action
 Achieved/
 Underway

Detail: The Riverview Solar Technology, North Youngmann Commerce, and Fire Tower Industrial Parks are good



The County has developed a design manual for signage along the greenway which can be referenced and utilized to develop a Town system for their parks and trails that complements the Greenway system.

examples of a lighter industrial uses that have a positive land use impact with limited or minimal environmental impacts when compared with general or heavy industry. By permitting these types of uses under special conditions (i.e. building & site design, landscaping, buffering, lighting, etc.), they can provide a positive contribution to the waterfront area by increasing exposure and economic potential to the area. This would entail combining some regulations from the Waterfront Business and Waterfront Industrial districts to ensure existing uses do not become nonconforming.

Local Business Parks

The Town of Tonawanda has had great success locally with the formation of various business parks in the study area, most recently Riverview Solar. The latest endeavor for the Town is North Youngmann Commerce Center, which is currently under construction north of I-290. Although preliminary analysis of the park indicates that the highest and best uses include traditional industrial uses such as manufacturing and



warehousing space, the design of the park should not be an after thought. Similar levels of quality design and materials similar to Riverview should be incorporated along with landscaping and efficient internal access as shown in the example images above.

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ED-6. Encourage land assembly where feasible.

Timeframe: Medium-Long
*Stakeholders: Town Board, private landowners, BENLIC**
Estimated Costs: Unknown
Funding Sources: Private funding

Action
Achieved/
Underway

Detail: The majority of the parcels on the east side of River Road consist of long, linear parcels that could be potentially difficult to redevelop. The Town should encourage land assembly and resubdivisions along the east side of River Road to provide more manageable properties by minimizing excessive review and /or conditions with the exception of any necessary remediation or mitigation needed for environmental or other significant community concerns.

ED-7. Permit and encourage appropriate water-dependent uses along the waterfront.

Timeframe: Short
Stakeholders: Planning Board
Estimated Costs: None (if done with zoning updates)
Funding Sources: Local budget

Action
Achieved/
Underway

Detail: In order to expand water-dependent uses in the area and based on the market analysis for the waterfront area, an opportunity exists for excursion and charter tour uses. The former Wickwire-Spencer steel plant (also referred to as the Riverworld site) was identified as a potential area for a use such as this, whether established as a new business venture or providing a secondary berth for existing ventures such as the *Miss Buffalo* operated by Buffalo Harbor Cruises. If a new marina is required, or as part of maintaining existing marinas, the Town's LWRP should be consulted for various policies and BMP's to follow.

*BENLIC - Buffalo Erie Niagara Land Improvement Corporation



Community Design Action Items

Strategies (summarized from Chapter 2)

1. Implement greening and buffering strategies throughout the study area.
2. Utilize and enhance design standards to achieve better site and building designs.
3. Develop design themes to distinguish and connect attractions and destinations.

Smart Growth Principles

The vision and proposed land uses for the waterfront incorporate many of the Smart Growth principles encouraged by New York State to improve quality of life, the environment, and economic health. In addition, design standards will help to illustrate the desired look and layout of individual sites to ensure the goals of Smart Growth are fully integrated. Some of the pertinent principles include:

- Preserve open space, critical environmental areas & natural beauty
- Foster distinctive, attractive communities with a strong sense of place
- Create walkable neighborhoods
- Take advantage of green building design
- Mix land uses
- Make development decisions predictable, fair and cost effective

CD-1. Develop comprehensive design standards

Action Achieved/Underway

Timeframe: Short - Medium

Stakeholders: Planning, Town Board

Estimated Costs: \$15,000-\$25,000

Funding Sources: Local budget, CFA (LWRP)



Detail: The new zoning districts that resulted from the 1992 rezoning study, and the subsequent overlay districts from recently, each included specific design standards for landscaping, fencing, parking, lighting, and circulation, among others. The standards included both requirements (“shall statements” and recommendations (“should” statements)). This intertwining of language within the text as well as the overall length of the standards may have contributed to their difficulty in enforcement by the Town and general confusion during plan review.

Rather than the existing text-based criteria found scattered throughout the code (see §215-152 and §215-70.30), true design standards would be comprehensive to address the entire Town with specific sub categories for land uses (waterfront, industrial, commercial, etc.). This would condense design standards and make it easier for both applicants and the reviewing Board(s). The standards would include not only a narrative description of the desired features and layout of a site, but also visual descriptions. Many of the criteria contained in the existing code are still pertinent and would be expanded upon in the document. The combination of narrative and visual

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representations provides a clearer direction for both the approving Board and the applicant and the document would be directly referenced in the site plan approval process.

CD-2. Equal aesthetic treatment for waterfront properties

Timeframe: Short
Stakeholders: Planning Board
Estimated Costs: None (if done with design standards)
Funding Sources: Local budget

Action
 Achieved/
 Underway



Detail: Properties between the Niagara River and River Road are in a unique position in that they essentially have double frontages, with both needing equal design emphasis to improve the appearance of the waterfront corridor. Development in this area should include architectural details for both water facing and road facing facades. For development on the east side of River Road, road frontage facades would have primary architectural emphasis. The specific architectural details for each façade would be outlined in the design standards mentioned previously.

CD-3. Revise landscape plan regulations.

Timeframe: Short
Stakeholders: Planning Board
Estimated Costs: None (if done with zoning updates)
Funding Sources: Local budget

Action
 Achieved/
 Underway



Detail: The current landscape plan regulations are included within each separate district. While this does provide a “one-stop shop” for determining requirements within a specific district, providing a single section related to landscaping, buffering and screening (included fences) would help to streamline the code and establish greater uniformity throughout the Town and especially the waterfront area. Specific requirements for landscaping in the waterfront area should include, but not be limited to:

- Use of native species in landscaping materials

Improving waterfront visibility

Design standards can be used to improve not only views of the waterfront, but also other key viewpoints throughout the Town. For the waterfront specifically, this can be achieved through the following:

- Smaller building footprints to open up views
- Grouping of structures
- Strategic siting to create interactions with the waterfront
- Higher amounts of windows
- Large walls without windows, service areas, and utilities should not be located on water-oriented facades.
- Maximum heights of 3 stories or 50 feet for residential or 2 stories for commercial
- Include interior landscaping and trees, but not excessive amounts that fully obscure waterfront views.

- Requiring a vegetated buffer of both trees and groundcover within a minimum of 25 feet of the high water mark of a waterbody
- Including landscaping as part of stormwater retention/detention facilities, especially in areas of high visibility. At a minimum evergreen trees along the top bank and aquatic vegetation along the interior edges would soften the facility
- Shade trees along public roadways or main access roads at a spacing of 30-50 feet on center

Landscaping plans would be prepared by a licensed landscape architect (preferred) or engineer and submitted with site plans during the review and approval process if not already required.

CD-4. Establish architectural review board

Action
Achieved/
Underway

Timeframe: Short

Stakeholders: Planning, Town Board

Estimated Costs: None

Funding Sources: None



Detail: “Reinventing” the waterfront from one of primarily industrial endeavors to a more mixed use area with greater connection to the River requires not only closer examination of site design changes, but also building architecture. Establishing an architectural review advisory board would provide a means for the Town to review development projects and ensure that certain aesthetic guidelines are met to preserve and promote residential and commercial streetscapes. These boards are typically advisory in nature and provide counsel and recommendations to the approving board(s). Whether the board is a stand alone one or a spin off of the approving board that meets on a separate day is the decision of the Town. The Town Code would be updated to provide regulations on the board’s formation, membership, extent of power, etc. much the same way as the formation of the Town Planning Board. The Towns of Orchard Park and Grand Island and Villages of Hamburg and Williamsville have dedicated review boards as local examples.

CD-5. Develop marketing design themes to link assets and resources

Action
Achieved/
Underway

Timeframe: Short

Stakeholders: Planning Board, NRGCC, NYSESD**

Estimated Costs: None to \$15,000

Funding Sources: Local budget, NRGCC



Detail: Much the as same as the Riverwalk Trail has a signage system with a central theme that informs a visitor/ user their location and nearby attractions, it would be beneficial to the Town to develop a similar design theme for marketing the waterfront (see also action item ED-3). The design theme can link resources in the Town that are (or will be) located in the waterfront, including unique viewpoints, parks, trails, and regional draws as well as other assets in the Town. Marketing and promotion of the waterfront can increase the visibility of the area and hopefully help to spur additional redevelopment opportunities. The Town lacks visibility on the *Niagara River Greenway Trail Map and Attractions* brochure and should work towards adding resources to increase visibility.

*NYSESD - NYS Empire State Development, NRGCC - Niagara River Greenway Commission

What is Good Community Design?

Good community design is based on some commonly accepted “rules” of physical form. As Tonawanda refines and defines its baseline “rules” it must address a wide range of topics, from building and site design to facades and details. The following should serve as the baseline for future design standards.

Context

- Appropriately relate proposed development and redevelopment to existing designs, styles, building forms and land uses.
- Encourage and promote the sensitive and contextual design of buildings, signs, sites and public spaces through the use of design elements, details, styles and architectural features as well as other amenities, materials or treatments that may be appropriate to further the design standards.
- Encourage and promote a sense of design continuity that appropriately relates the historic past of the area to ongoing revitalization and redevelopment efforts.

Site Planning

- The scale of buildings should reflect the context of the surrounding area.
- Building orientation should be aligned with the primary roadway it faces.
- Paved surfaces should be limited to what is reasonably needed for safety and flow.
- Parking should be placed at the side or rear of the lot and screened from view whenever possible.
- Encourage shared access, shared parking, and cross access between lots.
- Entrances should be easily visible from the roadway.
- Parking lots should be regularly shaped rectangles; parking lots should not follow irregularly shaped lot lines.
- Provide pedestrian linkages from building entrances to nearby roadways, parking areas and adjacent pedestrian systems. The use of public easements along and connecting to the waterfront should be explored and required where feasible.
- Dark sky compliant site lighting and fixtures

Form, Scale and Massing

- Place a majority of the building mass as close to the road as possible to help define the street edge.
- High-access, public functions (e.g. entryways, public art, displays) should be located

prominently at the front of buildings, with less public uses (e.g., storage, loading, drive-throughs) located to the side or rear of buildings. For waterfront properties, riverside treatments should receive equal treatment.

- Encourage different massing at building entries to enhance human-scaled appearance and improve visibility from many directions.

Façade

- Distinguish facades via the elaboration of architectural or ornamental details.
- Incorporate a visible entrance facing the sidewalk or street and/or the waterfront.
- Place windows, doors and architectural details symmetrically.
- Provide adequate glass to allow transparency between interior and exterior.
- Exterior lighting should be designed and arranged to reflect light away from and not impinge upon adjoining properties or streets.

Details

- Protect existing landscapes and habitats by integrating them into new development.
- Further enhance the natural landscape in public and private development with design details such as trees, lawns, plantings, fountains and public gathering areas.
- Pedestrian areas and vehicle parking areas should have lighting of an appropriate scale, design, color, and intensity.

Materials

- Attractive, durable materials affect the quality of the physical environment and the public's perception of the area and community. They instill pride and convey that people care about the area. Inexpensive building envelope materials deteriorate quickly and convey an unfavorable image. The materials used should relate to the local vernacular (e.g. vertical metal siding not applicable for retail commercial, but may be for waterfront industrial use).
 - ◇ *Walkways:* Concrete (porous, stamped or colored) recommended. Avoid asphalt and gravel.
 - ◇ *Façades:* Natural veneers (brick, stone), stucco, ground/split face concrete block, fiber cement siding, cedar clapboard and cultured stone recommended. Avoid plain concrete block, vinyl siding, EIFS (exterior insulation finish siding), metal siding.
 - ◇ *Trim:* Painted/stained finish grade wood, fiber cement panels, aluminum recommended. Avoid bare wood, rough lumber, pressure treated wood.
 - ◇ *Details:* Traditional style opaque awnings recommended. Avoid internally illuminated vinyl awnings.

Area Specific Recommendations



The graphic above shows the general location of the concept drawings detailed on the following pages. The yellow dots represent existing parks with enhancements, the lighter green dots and lines are existing parks and trails, and the dark green dots and lines represent new potential trail connections and parks.

The transition of the waterfront from primarily industrial to a mix of uses connected by recreation and open space warrants a closer examination of several locations. The locations outlined below represent areas that have been analyzed in the past or have greater potential for redevelopment and have opportunities for recreation and open space especially.

This section of the study demonstrates redevelopment scenarios of key waterfront locations, including Aqua Lane Park and the Cherry Farm (Park) and Riverview properties. In addition, upgrades at Sheridan Park and potential alignments for a new east-west trail connection are explored. Where future redevelopment of adjacent parcels exist (i.e. Riverworld), this section also considers how redevelopment should be coordinated to maximize connectivity and create an enhanced sense of place.

Although the conceptual designs provided here illustrate site-specific enhancements, their underlying recommendations have broader applications to other sites in the study area. Additionally, the designs are conceptual and not designed to be strictly implemented. These concepts need to be considered with some flexibility. The themes and best practices can be universally applied even though particular details in future design and construction may change based on evolving community needs, preferences and budget requirements.

The intent of these improvements is to make these locations attractive destinations on the waterfront for a regional public, thereby improving the visibility of the Town's waterfront and create an incentive and demand for further improvements. These designs are updated with suggestions for facilities and activity areas that are also designed based on low impact and sustainable design principles and standards. The designs include a narrative summary of improvements, an overview of specific tasks to be achieved, constraints and other issues that could impact final designs, and estimated costs. This information can be effectively utilized by the Town in future funding applications and to secure partnerships for successful redevelopment.

Waterfront Land Use Plan
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Figure 7-1: Cherry Farm Park Improvement Plan

Cherry Farm Park

Cherry Farm has been identified and viewed as a high priority area for a future public park since the early 1990's. This updated conceptual plan for the park references various improvements and amenities identified in past planning initiatives by Sasaki Associates (1992) and Wendel Duchscherer(1997). The current plan developed for this study includes the following elements:

- Grading to create space for program and functional elements, and to visually separate paths to create an experience of “discovery.”
- Small permanent structures, e.g. open pavilions, for gathering areas and events (due to subsurface restrictions from operation as a landfill)
- Hard surfaces for play courts clustered in the most active section of park (southeast)
- A 3-lane boat launch ramp and dry stack boat storage facility (potential rental stream)
- A single, gateway entrance for vehicles
- Parking located adjacent to active recreational uses, and a separate, small lot for walkers
- Multiple pedestrian and bicycle entrances
- Maximum use of native vegetative species to reduce maintenance requirements
- Use of porous pavements where appropriate
- Bio-swales which act as retention areas between the upland areas and wetlands and waterways

The *similarities* in the 2012 updated Master Plan, shown in this plan, to the previous conceptual plans are:

- Multiple access points are provided
- Water resource and wetland impacts are limited by design
- Multiple activity areas are distributed in the park
- Potential income-producing facilities are included

The *differences* in the 2012 updated Master Plan, shown in this plan, from the previous conceptual plans are:

- More attention to reducing impervious surfaces and creating an improved recreational experience
- Minimizing building footprints to reduce environmental remediation requirements
- Including new low impact development techniques for handling storm water and reducing water resource impacts
- Organizing spaces for active recreation and grading to create an improved passive recreational experience

Waterfront Land Use Plan

Town of Tonawanda

Although plans for Cherry Farm have been in the works for quite some time, there has been greater momentum recently to transform the site into what is envisioned by the community. In order to build on this momentum and begin the task of transforming the property from a former landfill to the parkland the Town desires, several key steps need to be taken.

- The Town needs to identify avenues for transferring the land from private to public ownership. Several options are currently being explored and conversations and partnerships with outside entities should continue.
- Final determination of the continued operation and maintenance (O&M) of the existing leachate/groundwater conveyance system within the landfill and any upgrades needed needs to be outlined.
- Detailed engineering and design of improvements will need to be prepared, especially in regards to proposed structures that can be built on the property due to any foundation or subsurface limitations as a result of the landfill.
- A phased approach to implementation, with passive uses installed primarily (trails, picnic tables, shelters, etc.) followed by parking and access and other active recreational uses.

As part of this conceptual planning for Cherry Farm, the cost estimate provided at right outlines the approximate costs for built out of the site. Including construction contingency, legal and design fees, and permitting, full development of the site would be anticipated to cost around \$6.5 million for the 55-acre site. It should be noted that full development of the park reflects all elements of the concept plan shown on the preceding page which, in its current form, could take between 5-10 years to achieve depending on timeframe for completing the steps above and funding.

Some elements from the conceptual drawing shown could change including additional wetlands for off site mitigation, less roadways, or more trails or recreational areas as the final designs progress. Funding from various sources, including EPF

		QTY	Units	Unit Cost	Cost
Buildings	Pavilion	3,200	SF	\$ 30.00	\$ 96,000.00
	Overlook Pavilion	4,700	SF	\$ 30.00	\$ 141,000.00
	Performance Structure	600	SF	\$ 30.00	\$ 18,000.00
Recreation	Sand Volleyball Courts	4	EA	\$ 5,000.00	\$ 20,000.00
	Asphalt Basketball Courts	3	EA	\$ 18,000.00	\$ 54,000.00
Site	Playground	5,000	SF	\$ 25.00	\$ 125,000.00
	8' Wide Asphalt Trail	3,000	LF	\$ 32.00	\$ 96,000.00
	5' Wide Asphalt Walkways	8,500	LF	\$ 18.00	\$ 153,000.00
	Asphalt Parking Lots	88,000	SF	\$ 5.00	\$ 440,000.00
	Permeable Paver Parking	35,000	SF	\$ 9.00	\$ 315,000.00
	3-Lane Boat Launch	1	LS	\$ 100,000.00	\$ 100,000.00
	24' Wide Asphalt Roadway	83,000	SF	\$ 6.00	\$ 498,000.00
	5' Wide Stone Dust Nature Trail	2,500	LF	\$ 12.00	\$ 30,000.00
	Culvert Crossings	3	EA	\$ 10,000.00	\$ 30,000.00
	Earthwork Structural & Topsoil Fill	10,000	SY	\$ 30.00	\$ 300,000.00
	Earthwork Grading	33	Acres	\$ 5,000.00	\$ 165,000.00
	Lawn Seeding	1,200,000	SF	\$ 0.15	\$ 180,000.00
	Plantings/Landscaping	1	LS	\$ 200,000.00	\$ 200,000.00
Site Concrete	10,000	SF	\$ 12.00	\$ 120,000.00	
Misc Amenities	Picnic Tables	40	EA	\$ 400.00	\$ 16,000.00
	Benches	40	EA	\$ 600.00	\$ 24,000.00
	Trash Receptacles	40	EA	\$ 250.00	\$ 10,000.00
	Main Entrance Sign	1	EA	\$ 5,000.00	\$ 5,000.00
	Misc. Signs	50	EA	\$ 400.00	\$ 20,000.00
	Bollards	50	EA	\$ 600.00	\$ 30,000.00
	Bike Racks	10	EA	\$ 600.00	\$ 6,000.00
Utilities	Main Gate	1	EA	\$ 5,000.00	\$ 5,000.00
	Bioswales/Constructed Wetlands	1	LS	\$ 250,000.00	\$ 250,000.00
	Site Light Fixtures	1	LS	\$ 150,000.00	\$ 150,000.00
	Site Electric Service	1	LS	\$ 300,000.00	\$ 300,000.00
	Water/Fire Protection	1	LS	\$ 300,000.00	\$ 300,000.00
	Sanitary Sewer Service	1	LS	\$ 200,000.00	\$ 200,000.00
Gas Service	1	LS	\$ 40,000.00	\$ 40,000.00	
				Construction	\$ 4,437,000.00
				Contingency	20% \$ 887,400.00
				Design and Permits	20% \$ 1,064,880.00
				Total	\$ 6,389,280.00
				Say	\$ 6,500,000.00

Phase 1: \$2,560,320.00
 Phase 2: \$2,715,840.00
 Phase 3: \$1,113,120.00
 * includes construction, contingency, design/permits



**Figure 7-2:
 Cherry Farm Park -
 Coordinated
 Waterfront Plan**

*(showing one of many
 concept plans developed
 for the site)*

and the Niagara Greenway will be pursued for this project by the Town. In an effort to highlight the coordinated efforts to transform the waterfront environment, the above figure shows how the Cherry Farm conceptual plan connects to and integrates with the Niagara Riverworld/Wickwire site further south (shown as the bottom dark green dot on the graphic on page 105). Several conceptual plans for Riverworld were developed in 2011 as part of a feasibility report and also through a graduate studio at SUNY Buffalo (Appendix H), although the current conceptual development model has shifted since that time. The Riverworld site is still envisioned as a mixed use type of development that would include various recreational elements, extensive green space and natural buffer areas, pedestrian access, likely some light industrial and office/mixed uses, and connection to the water. Development of the site would remain private with some public investment likely for infrastructure. Activity and investment of Riverworld by the owner/developer has continued throughout the planning stages, evident with the recent demolition of the former powerhouse structure on the site.

Regardless of the final design and development of this site, the connection between Riverworld and Cherry Farm would appear seamless and include trail connections to Riverwalk, enhanced buffer areas along the River, landscaping and natural vegetation, bioswales and wetland areas, cultural and interpretive areas (where applicable), and roadway connections.

Waterfront Land Use Plan
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Figure 7- 3: Aqua Lane Park Improvement Plan

Aqua Lane

The Aqua Lane Park concept shown on the opposite page highlights various upgrades to the existing park and provides enhanced and additional amenities to make it a more prominent destination. Although the concept plan includes the water treatment facility and its associated lands, this portion of the land is in fact cut off from the park by security fencing and public access is limited to the outer perimeter; the current improvements on the property are limited to those areas. The conceptual plan shows strategic enhancements that improve direct public access and views of the water for passive users; a public boat launch currently exists north of the treatment plant. This is the primary driver given the park's waterfront location. Other improvements to the park include:

- An enhanced entrance feature that identifies the location with plantings and new signage.
- Enhanced landscaping at prominent viewpoints to better frame access points and points of interest (e.g. waterfront point, connection with Riverwalk Trail)
- Additional trees and vegetation to buffer and provide greater separation of parking areas and adjacent buildings
- A reduction in heat island effects with the use of trees planted next to the parking areas and the vehicular travel ways
- A more natural experience through the use of varied plantings with native species, and
- A newly defined waterfront walkway linked from the access points and parking that improves the quality and experience of the waterfront
- Angled parking to increase the landscape area within the adjacent park and medians
- Relocated and enhanced playground
- A new seasonal performance space with a covered structure and mounded sitting area within the central portion of the park
- Additional paths on the treatment plant property (outside of secure areas) connecting the park to the boat launch and public walkway along the waterfront making a complete loop (opportunity for uses of pervious materials for walkways)
- Replacement of the existing picnic shelters with a larger, single shelter (similar to Sheridan Park replacement)
- Replacement and expansion of existing restroom facility
- Replacing the existing 90° parking area with a dedicated and buffered parking area to improve circulation and aesthetics; angled parking would be utilized to minimize infringing on existing greenspace to the greatest extent feasible (opportunity for uses of pervious materials)
- Additional tree plantings along Riverwalk Trail to provide visual and noise buffer from I-190 (There is also a potential for a green noise wall in addition to or in place of treed buffer here.)

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Currently, there are no significant or critical steps that need to be undertaken by the Town to improve this park, only the acquisition/application for outside funding or dedication of budget funds. However, a water supply study for the water treatment facility is currently being undertaken by the Town which may effect the disposition of the plant in the future. Should the plant become obsolete or downsized, additional land may become available for the Town to further expand this park. Regardless of the final determination, one other action item that is related more to the boat launch than the park is the extent of the security fencing bordering the launch property and water facility. Although additional vegetation is included in the concept plan to buffer the plant from the launch, the Town should look into the potential for decreasing the extent of security fencing in this area to improve aesthetics while maintaining appropriate security for the facility.

The cost estimate shown below outlines the approximate costs for the various upgrades shown on the plan and highlighted on the previous page. In its entirety, the park improvements would cost approximately \$885,000 (does not include potential green noise wall bordering Riverwalk Trail and I-190).

		<u>QTY</u>	<u>Units</u>	<u>Unit Cost</u>	<u>Cost</u>	
Hardscape	Asphalt Sidewalk	630	TON	\$ 120.00	\$ 75,800.00	
	Asphalt Paving	120	TON	\$ 82.00	\$ 9,840.00	
	Asphalt Base Course	120	TON	\$ 82.00	\$ 9,840.00	
	Crushed Stone Sub Base	240	TON	\$ 36.00	\$ 8,640.00	
Grading	Fill / Grading	600	CY	\$ 15.00	\$ 9,000.00	
	Granite Stairs	1,200	SF	\$ 90.00	\$ 108,000.00	
Structures	Performance Structure (1000 sf)	1	EA	\$ 20,000.00	\$ 20,000.00	
	Picnic Shelter	1	EA	\$ 55,000.00	\$ 55,000.00	
	Restroom Facility	1	EA	\$ 175,000.00	\$ 175,000.00	
Play Area	Playground (2,800 sf)	1	EA	\$ 25,000.00	\$ 25,000.00	
Furnishing	Benches	16	EA	\$ 1,200.00	\$ 19,200.00	
	Trash Receptacles	10	EA	\$ 900.00	\$ 9,000.00	
	Bike Racks	8	EA	\$ 450.00	\$ 3,600.00	
	Picnic Benches	4	EA	\$ 450.00	\$ 1,800.00	
	Lighting	1	EA	\$ 15,000.00	\$ 15,000.00	
	Vegetation	Turf Mix	2,222	SY	\$ 10.00	\$ 22,220.00
		Shrubs	30	EA	\$ 60.00	\$ 1,800.00
Groundcover		300	EA	\$ 10.00	\$ 3,000.00	
Shade Trees		65	EA	\$ 900.00	\$ 58,500.00	
Evergreen Trees		35	EA	\$ 800.00	\$ 28,000.00	
Signage	Ornamental Trees	55	EA	\$ 600.00	\$ 33,000.00	
	Entry Signs	2	EA	\$ 10,000.00	\$ 20,000.00	
				Construction	\$ 691,040.00	
				Contingency 20%	\$ 138,208.00	
				Design and Permits	\$ 55,283.20	
				Total	\$ 884,531.20	
				Say	\$ 885,000.00	

Riverfront Park

Located on River Road just north of the North Grand Island Bridge, this new 6.6 acre park would be carved out from existing land owned by United Refining and provide the Town with additional waterfront property and access. The Town has had an interest in this property for some time and has initiated various environmental studies to determine the extent of any soil contamination and associated work that would be required. Past analysis of the property indicated extensive Federal wetlands found throughout the site, with the only developable section located immediately adjacent to and northwest of the Lakeland Pipeline property (brown buildings and gray parking lot shown below).



Figure 7-4: Riverfront Park Concept Plan

Waterfront Land Use Plan Town of Tonawanda

With the extensive amount of vegetation and limited developable area, structures for this park would be limited to a gazebo, picnic shelter or other similar facility and trail amenities (sitting areas, kiosks, interpretive signage, etc.). A looped trail through the site would connect to the Riverwalk Trail which parallels the site on the south side. The loop trail would complement the out-and-back trail located south of this park adjacent to the bridge.

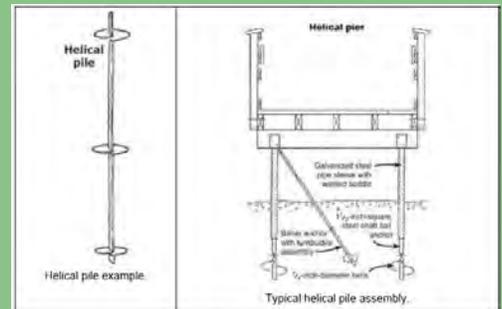
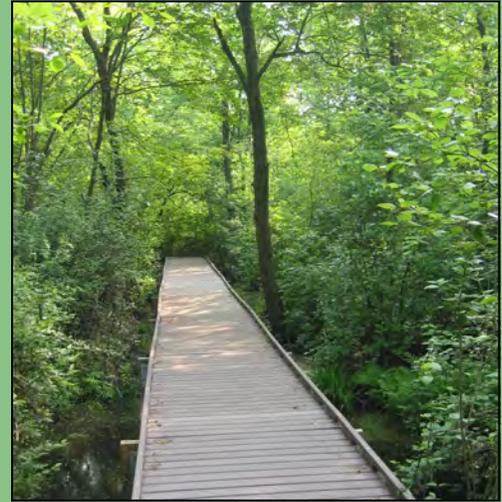
As shown in Figure 7-5, the park would encompass the western half of the United Refining property, leaving the eastern half under the ownership of United Refining; currently a chain link fence divides the property in half. A looped wetland trail is envisioned on the western side of the park bringing users out into the wooded portion of the property, providing a more natural experience of the Niagara Riverfront. The walkway, likely a floating style boardwalk to minimize wetland disturbance, would need to be mapped out to determine the most practicable path; a conceptual path is shown in Figure 7-5 for illustrative purposes.

Other park elements would include:

- Interpretive areas (see page 82)
- Viewing platforms, especially of the River (vegetative clearing may be required; extent to be determined)
- Sitting areas

Unlike Cherry Farm, no formal conceptual plans have been extensively developed for this property other than very simple schematic ones as part of the environmental analysis of the property. As previously indicated, the Town has already undertaken some background work as part of their due diligence to eventually acquiring and developing the property. Additional steps would need to be taken to further this conceptual plan and see the park come to fruition, including:

- Confirm the extent of environmental cleanup required on the site and develop/carryout the associated workplan.
- The Town needs to identify avenues for transferring the land from private to public ownership, whether through outright purchase or transfer of ownership, and would include the subdivision of the 6.6 acres of land from the parent parcel.



Floating wetland boardwalk in Newton Centre, MA (top); observation area in Sandusky, OH (middle); example helical pile used to elevate boardwalks in sensitive areas (bottom, Ipswich River Greenway Feasibility Study, 2008)



Figure 7-5: Riverfront Park Connections

Waterfront Land Use Plan
Town of Tonawanda

- Engage US Army Corps of Engineers (wetland jurisdiction) as well as NYS DEC (as needed) to begin dialogue on intent and extent of development of the property, including floating wetland boardwalk.
- Develop detailed engineering drawings for the site, especially for floating wetland boardwalk and any viewing/interpretive areas requiring larger platforms. Coordination with the Army Corps will be critical as permitting and specific construction details will be needed for wetland disturbance.
- Seek additional outside funding for identified park elements (e.g. Niagara Greenway, CDBG, EPF).

The cost estimate shown below indicates approximately \$840,000 would be required to fully develop the park. The estimate given for the elevated boardwalk trail does not include viewing platforms, additional seating or other trail amenities along the trail. Depending on the extent of other elements desired or permitted, the final figure will likely be higher, but would likely not exceed \$900,000.

		<u>QTY</u>	<u>Units</u>	<u>Unit Cost</u>	<u>Cost</u>	
Hardscape	Asphalt Sidewalk	100	TON	\$ 82.00	\$ 8,200.00	
	Asphalt Base Course	100	TON	\$ 82.00	\$ 8,200.00	
	Crushed Stone Sub Base	300	TON	\$ 36.00	\$ 10,800.00	
Structures	Overlook Pavilion (500 sf)	1	EA	\$ 10,000.00	\$ 10,000.00	
Furnishing	Benches	6	EA	\$ 1,200.00	\$ 7,200.00	
	Trash Receptacles	4	EA	\$ 900.00	\$ 3,600.00	
	Bike Racks	4	EA	\$ 450.00	\$ 1,800.00	
	Picnic Benches	2	EA	\$ 450.00	\$ 900.00	
	Lighting	5	EA	\$ 10,000.00	\$ 50,000.00	
Vegetation	Turf Mix	1,250	SY	\$ 40.00	\$ 50,000.00	
	Shrubs	30	EA	\$ 150.00	\$ 4,500.00	
	Shade Trees	2	EA	\$ 900.00	\$ 1,800.00	
	Evergreen Trees	20	EA	\$ 800.00	\$ 16,000.00	
	Ornamental Trees	10	EA	\$ 600.00	\$ 6,000.00	
Other	Elevated Boardwalk Trail	2,500	LF	\$ 190.00	\$ 475,000.00	
					Construction	\$ 654,000.00
					Contingency	20% \$ 130,800.00
					Design and Permits	8% \$ 52,320.00
					Total	\$ 837,120.00
					Say	\$ 840,000.00

Sheridan Park

Similar in scope to Aqua Lane Park, the conceptual plan shown in Figure 7-6 on the following page highlights various upgrades to the park to make it a more prominent destination. The primary difference is that the park improvements are only centered around the existing ballfields on the southern end of the park. The primary intent for these upgrades are to further enhance the fields to expand their use to college-level teams, which require longer outfields and additional facilities. The 90-foot ballfield would be the primary recipient of the upgrades; the 60-foot softball field would remain.

Currently, the baseball field has a fenceline out to approximately 375'. A 400' fenceline, which is what is proposed, would require earthwork due to the topography on the north end and some onsite wetland mitigation (detention pond classified as wetland by Army Corps). The concept plan identifies the proposed grading and drainage swales to carry runoff to the pond as well as increasing interior wetland vegetation to compensate for the disturbed vegetation as a result of earthwork.

The field lighting that currently exists would likely be sufficient to handle the extended fenceline, although detailed engineering of the field can confirm this. Relocation of one or two of the field lights may be needed to accommodate the new fenceline, which would be determined with final engineering of the field. Additional elements that can be included with the field enhancement, although not shown in the plan, include:

- Covered dugouts
- Unisex, multi-stall restroom facility
- Electronic scoreboard

The anticipated cost for the improvements is outlined below.

		<u>QTY</u>	<u>Units</u>	<u>Unit Cost</u>	<u>Cost</u>
Grading	Fill / Grading	2,200	CY	\$ 15.00	\$ 33,000.00
Fencing	New Outfield	612	LF	\$ 25.00	\$ 15,300.00
Vegetation	Turf Mix	2,200	SY	\$ 8.00	\$ 17,600.00
Other	Covered Dugouts	2	EA	\$ 10,000.00	\$ 20,000.00
	Restroom Facility	1	EA	\$ 80,000.00	\$ 80,000.00
	Scoreboard	1	EA	\$ 6,000.00	\$ 6,000.00
			Construction		\$ 171,900.00
			Contingency		\$ 34,380.00
			Design and Permits		\$ 17,190.00
			Total		\$ 223,470.00
			Say		\$ 225,000.00

Waterfront Land Use Plan
Town of Tonawanda



Figure 7-6: Sheridan Park Improvement Plan

East-West Trail Connection

The Town of Tonawanda has a tremendous resource in the Riverwalk Trail running along the Niagara River for connecting residents and users to the River. In addition, the Two Mile Creek Greenway and Sherwood Greenway (under construction) provide additional connections to the Riverwalk Trail north and south of the study area. In an effort to expand the trail linkages through the Town and waterfront area, various corridors were examined to determine the feasibility for developing a third east-west trail connection to the riverfront. Various corridors exist in the waterfront area that encompass utilities (mainly electric transmission), railroads (vacant/underutilized lines, abandoned lines, former railbeds), and vacant or underutilized lands that were the primary target for a third trail.

Two specific alignments were identified and are highlighted on the following page and described below.

Trail option #1 connects Riverwalk Trail to the Two Mile Creek Greenway through a former/underutilized railbed on the eastern end, become a rail-with-trail east of Grand Island Boulevard, cross over Interstate 190 using the existing rail bridge, continue as a rail-with-trail and follow another public/private corridor, terminating at Park Road and the Two Mile Creek Greenway.

Trail option #2 connects Riverwalk to Sherwood Greenway and uses existing access corridors that are currently utilized for electric transmission lines in the waterfront area. In an effort to use existing cleared areas and maintain a safe distance from higher-voltage towers, the trail alignment parallels the medium voltage lines (typical ones alongside roadways) before turning north along impromptu access roads. The trail then becomes a rail-with-trail heading south and crossing Sawyer Avenue and Sheridan Drive, terminating at the Sherwood Greenway.



The existing rail bridge over I-190 off of Grand Island Boulevard that would be part of trail option #1. The line appears to be seldom used; a rail-with-trail opportunity exists for this location.

Unlike the other recreation areas identified in this section, the new trail connections identified above have several logistical hurdles that need to be overcome or otherwise dealt with in order to bring these trails, or a similar alignment in the study area, to fruition. The issues, concerns, precautions, and means for implementation surrounding using utility corridors for trails have been reviewed by various organizations, including American Trails and the National Trails Training Partnership. These include:

- Increased exposure to liability and possible injuries due to potential or perceived hazardous areas or structures
- Interference with operations by the utility, regardless of whether the infrastructure is regularly used or not

**Waterfront Land Use Plan
Town of Tonawanda**



Figure 7-7: East-West Trail Connection Options

- Potential for increased crime and vandalism
- Maintenance and management of facilities

As the majority of the corridors are owned by other entities, permanent easements would be required for public access through trails. In some instances, physical ownership is required through some funding sources.

However, the Town has a desire to develop additional trails in the study area and view these utility corridors as having a high potential for future opportunities as they arise. Although constraints exist, there are examples of trails that have been developed that are co-located with rail lines and utility corridors. Rail-with-trails is the more well-known trail development opportunity that is supported with its own advocacy and resource group (Rails-to-Trails Conservancy). Over 20,000 miles of rail-trails have been successfully developed since 1986 and the group's website has various case studies and technical resources available to support the development of a rail-trail in the study area. Local examples of rail-trails include the Lehigh Memory Trail in Williamsville, Clarence Pathways from Clarence to Akron, and Pat McGee Trail around Salamanca.



Burnham Rail-with-Trail in Minneapolis, MN © pedestrians.org/topics/row.html

Although not as common, trails following along and sharing power line corridors do exist. One of the most visible is a section of the Washington & Old Dominion Trail in Falls Church, Virginia. Here, a section of the trail runs directly underneath the power lines as observed in the photo at left. With a detailed plan for operation and maintenance in place, this shows that a trail similar to this could be developed in the Town of Tonawanda.



In general, the next steps for the Town to establish trails in the study area that follow the general intent of the two options identified in this section are outlined below. More work beyond what is indicated is anticipated and will be further identified as the process is carried out.

- Develop a more detailed feasibility study examining the opportunities and constraints associated with the two options, including estimated costs, jurisdiction/maintenance issues, and liability.
- Initiate conversations with respective corridor property owners (i.e. CSX, Niagara Mohawk/ National Grid) to indicate the Town's desire to establish additional trails, citing available case studies (see Appendix F).
- Develop detailed engineering plans for final trail alignment. Continuing discussion with property owners will be required for easements, security measures, etc.

Appendix A

Study Area Maps

Town of Tonawanda

Waterfront Land Use Plan Update

0 0.5 1 2 Miles



Study Area

Niagara

River

Lake Erie

Map 1: Regional Location

Legend

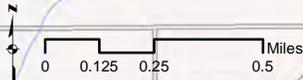
- Municipal Boundaries
- Expressways
- State Roads
- Waterbodies

Data Source: NYS GIS Clearinghouse, Town of Tonawanda, CPL. Map Prepared: Tuesday, May 28, 2013



Town of Tonawanda

Waterfront Land Use Plan Update



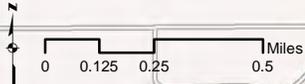
Map 2: Study Area

Legend

- Municipal Boundaries
- Parcels
- Expressways
- State Roads
- Local Roads
- Waterbodies
- Trails
- Parks & Open Space

Town of Tonawanda

Waterfront Land Use Plan Update



Town of Grand Island



Map 3: Natural Features

- Legend
- Municipal Boundaries
 - Waterbodies
 - Creeks and Streams
 - Floodplains
 - NYS DEC Wetlands
 - Federal (US FWS) Wetlands
 - Elevation Contours (2-foot)

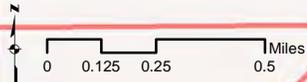
Data Source: NYS GIS Clearinghouse, USFWS, Town of Tonawanda, CPL.
Map Prepared: Tuesday, August 20, 2013



Clark Patterson Lee
DESIGN PROFESSIONALS

Town of Tonawanda

Waterfront Land Use Plan Update



Town of Grand Island

City of Tonawanda

Study Area

Town of Tonawanda

City of Buffalo

Map 4: Transportation Network

Legend

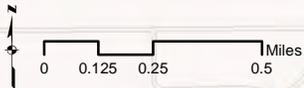
- Municipal Boundaries
- Interstate
- Expressway
- Collector
- Minor Arterial
- Principal Arterial
- Local Streets
- Truck Routes
- Toll Plaza
- Street Signals
- Rail Crossings
- Waterbodies
- Traffic Volumes (2008 E) = estimated

Data Source: NYS GIS Clearinghouse, Town of Tonawanda, GBR/TC, CPL
Map Prepared: Tuesday, August 20, 2013



Town of Tonawanda

Waterfront Land Use Plan Update



Town of Grand Island

City of Tonawanda

Tonawanda Landfill

North Youngmann Commerce Center

Fire Tower Industrial Park

Huntley Fly Ash Landfill

Cherry Farm

Niagara River World

Huntley Generating Station

Riverview Solar Technology Park

Dunlop Tires

DuPont

General Motors

City of Buffalo

ENSMINGER RD

SHERIDAN DR

Town of Tonawanda

WOODWARD AVE

Map 5: Land Use

Legend

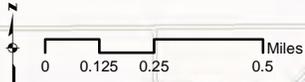
- Municipal Boundaries
- Expressways
- State Roads
- Local Roads
- Railroad Lines
- Waterbodies
- No Parcel Data
- Agricultural
- Residential
- Vacant
- Commercial
- Recreation & Entertainment
- Community Services
- Industrial
- Public Services
- Conservation & Parkland

Data Source: NYS GIS Clearinghouse, Town of Tonawanda, CPL. Map Prepared: Wednesday, August 21, 2013

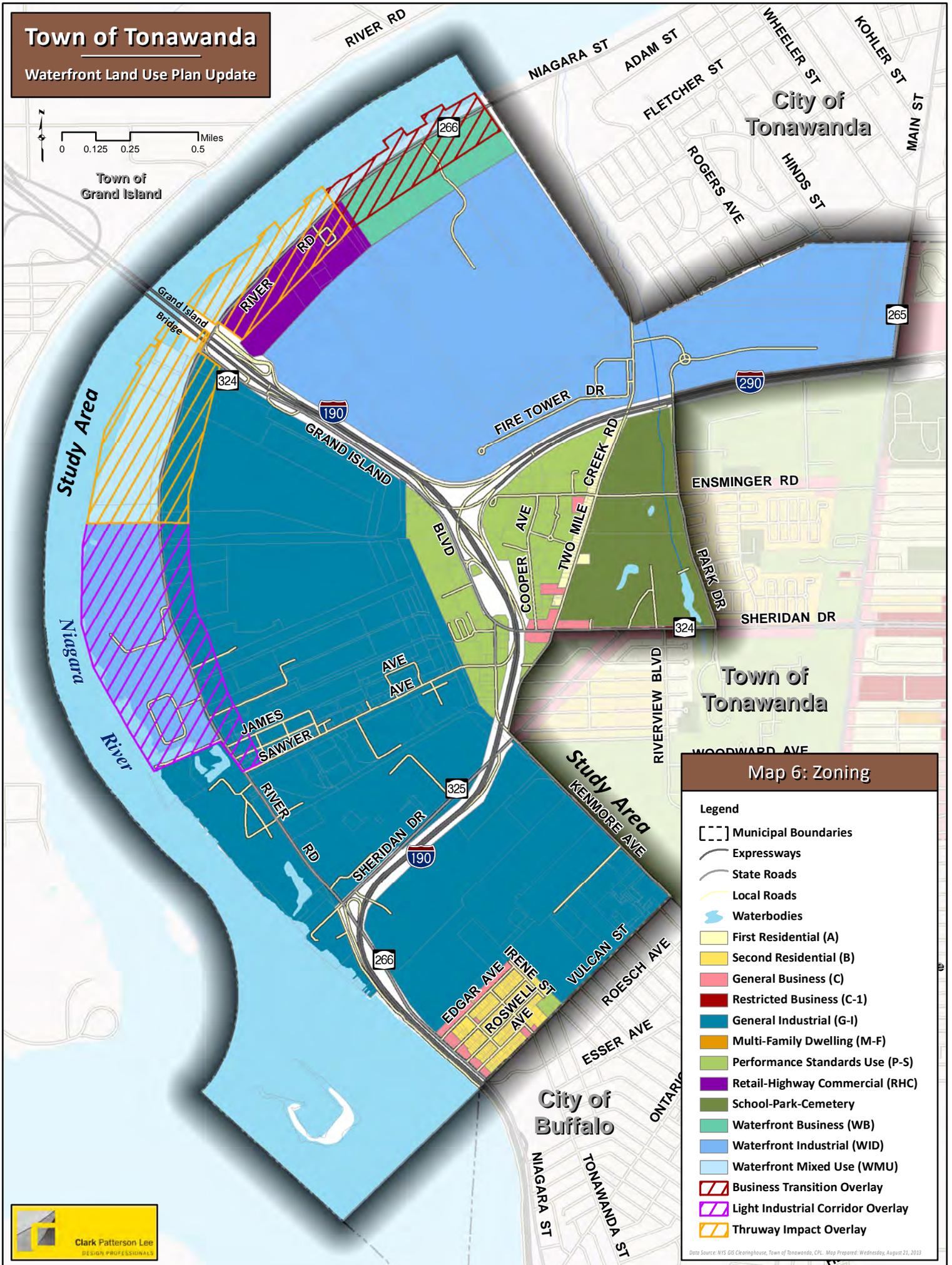


Town of Tonawanda

Waterfront Land Use Plan Update



Town of Grand Island



Map 6: Zoning

Legend

- [---] Municipal Boundaries
- Expressways
- State Roads
- Local Roads
- Waterbodies
- First Residential (A)
- Second Residential (B)
- General Business (C)
- Restricted Business (C-1)
- General Industrial (G-I)
- Multi-Family Dwelling (M-F)
- Performance Standards Use (P-S)
- Retail-Highway Commercial (RHC)
- School-Park-Cemetery
- Waterfront Business (WB)
- Waterfront Industrial (WID)
- Waterfront Mixed Use (WMU)
- Business Transition Overlay
- Light Industrial Corridor Overlay
- Thruway Impact Overlay

Data Source: NYS GIS Clearinghouse, Town of Tonawanda, CPL. Map Prepared: Wednesday, August 21, 2013



Clark Patterson Lee
DESIGN PROFESSIONALS

Town of Tonawanda

Waterfront Land Use Plan Update



Town of Grand Island



City of Tonawanda

Town of Tonawanda

City of Buffalo

Village of Kenmore

Map 7: Community Resources

- Legend**
- Municipal Boundaries
 - Multi-Use Trails
 - Sidewalks
 - NFTA Bus Routes
 - Parks
 - Fire Stations
 - Boat Launches
 - Marinas
 - Other Community Resources

Appendix B

Meeting Summaries

Town of Tonawanda

Healthy Niagara – Waterfront Land Use Plan Update

Meeting Notes - August 1, 2011

Attendance:

Jim Jones (Town of Tonawanda); Mike Kaiser (Town of Tonawanda); Jim Hartz (Town of Tonawanda); Rich Tindell (Buffalo Niagara Riverkeeper); Ken Swanekamp (Erie County) Thomas Hersey (Erie County); Joanna Panasiewicz (County); Amy DeGaetano (NYS DOS); Rick Henry (Clark Patterson Lee); Kerry Ivers (Clark Patterson Lee)

Major Points of Discussion:

Introductions

- Advisory Committee members introduced themselves and their affiliation(s). Amy participated via tele-conference.

Riverkeeper Project Status Update

- Rich provided a progress report about Riverkeeper's current activities related to the Watershed Management Plan. The Watershed Atlas is near completion. Riverkeepers is in the process of identifying valuable data that has not been collected previously.
- Jim discussed the E-3 Program that is currently underway in the town. The program provides funding for environmental and energy enhancements at eligible facilities. There are 53 permitted facilities and the Town has identified its top 10.

Scope and Schedule Review

- Kerry provided a more detailed schedule that identified critical pre-task and task activities per the scope outlined in the proposal. The group reviewed the detailed schedule and identified upcoming milestones. The next two critical tasks include a project area site visit and the first public informational meeting. The site visit (to be scheduled) would include key members of the project team and interested/available members of the advisory committee. The site visit needs to be conducted in advance of the public information meeting, which is slated for mid-September. Possible dates for the public meeting were discussed as well as logistics (e.g. location) and the meeting format. Kerry emphasized the need for that first meeting to be interactive and informative.
- Many of the early tasks will be conducted concurrently by project team members to ensure timely information gathering.
- Stakeholder group meetings will be scheduled in conjunction with other planning activities. Potential stakeholder groups include: industry/business representatives; and involved/interested municipal agencies; and residents/visitors.

Town of Tonawanda

Healthy Niagara – Waterfront Land Use Plan Update

- Jim J. and Mike discussed the current BOA study being facilitated by LaBella. The committee agreed that coordination among the two planning efforts will be important to the progress and success of both. Both teams will need to share information as needed and coordinate tasks to reduce/eliminate planning fatigue for the community and advisory committee members.
- The group discussed options related to online surveying and other outreach opportunities. Those options will be explored to determine if and how they can be implemented, likely to be used on the Town's website.
- Kerry briefly discussed deliverable format and suggested that the specific approach to visualization would be defined as the project proceeds.

Project Issues and Opportunities

- Kerry discussed some general issues related to project identification and community outreach strategies. Kerry suggested developing an identifiable logo/theme so that all future communication and project deliverables are easily identified as belonging to the Waterfront Land Use Update.
- Rich noted the need to consider riparian buffers, reforest and encourage uses/development practices that will address uncontrolled runoff. Kerry indicated that sustainable development practices would be addressed as part of the visioning process.
- Ken discussed the need to carefully consider the most recently completed Waterfront Land Use Update. That plan was based on the premise that industrial development is and should continue to be the primary land use in this area. Future land use should not preclude/hinder industrial development. However, he noted that very little new industrial development had taken place since that study was completed. Although it is important to note that considerable reinvestment at existing facilities (south of Sawyer Street) has taken place since that study was completed. Jim Hartz noted that the elimination of Empire Zone may have impacted that condition. The group discussed the limited economic development incentives currently available.
- Jim J. and Mike identified the five target areas to be focused on in the planning effort: Cherry Farm Park, Aqua Lane Launch, riverfront park area, Sheridan Park, and a centralized (direct) trail linkage between Sheridan Park and the waterfront.
- Kerry facilitated a brainstorming session to identify strengths and weaknesses of the study area (see attachment).

Town of Tonawanda

Healthy Niagara – Waterfront Land Use Plan Update

STRENGTHS

- Beautiful views of waterfront and across the river
- Niagara River is an internationally known waterway
- Waterfront property
- Employment center for the town and a key center for the region
- Tax base
- Thruway access/transportation network
- Potential rail access
- Water and sewer infrastructure
- Large amounts of vacant land or land in transition
- Potential cheap power
- Most of the brownfields/abandoned buildings have been identified
- Proximity to Buffalo and Amherst
- Riverwalk – recreational opportunities
- Boating and fishing activity
- Proximity to Riverkeepers' office

WEAKNESSES

- Landfills (at least a couple of hundred acres; radioactive materials present)
- Brownfields
- Impaired air quality
- Tonawanda Coke
- Perception of heavy industry/bad stuff (it's the first thing seen coming over the bridge)
- No fiber optic
- Land use patterns (pre-existing, non-conforming uses and land use conflicts)
- Terrorist vulnerability – concentration of large industrial/chemical facilities
- Concern about security
- Lack of public access to the water (especially between grand island and Aqua Lane)
- Transportation around the bridge (congestion at tolls and bridge)
- Corridor configuration may be a weaknesses
- Long narrow parcels (awkwardly shaped) not development/land assembly friendly – risks of land locked parcels
- Riverwalk is located away from river's edge, limited direct connection to river
- Elementary school – a favorable step up from the city schools, but low rung for town residents
- Business/commercial/industrial vs. residential development



Tonawanda Brownfield Opportunity Area

Pre-Nomination Study

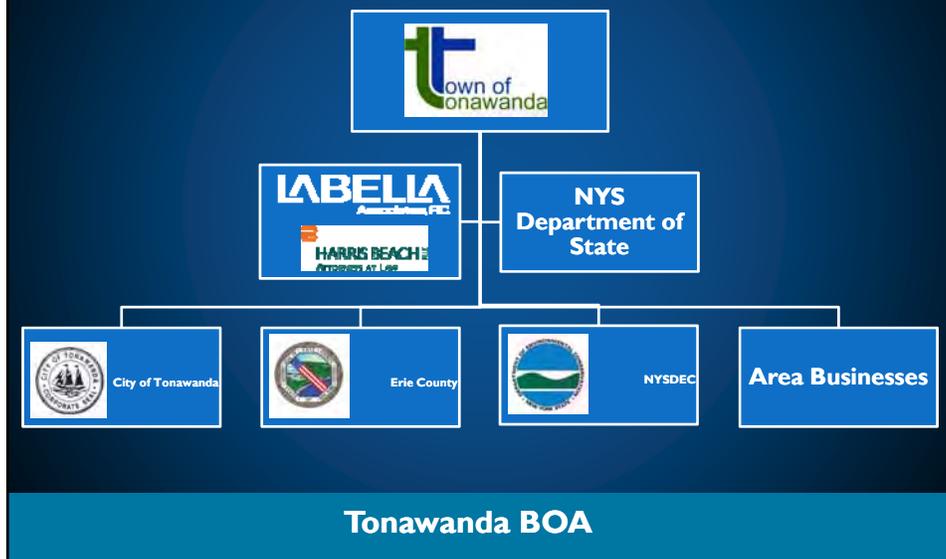
Tonawanda BOA

Agenda

- What is a Brownfield & the Brownfield Opportunity Area Program
- Tonawanda BOA Characteristics
 - Demographic/Economic
 - Land Characteristics
- Brownfield Incentives
- Schedule
- Next Steps

Tonawanda BOA

Project Team & Partners



What is a Brownfield?

A site, where the expansion, redevelopment, or reuse can be complicated by the presence or potential presence of a hazardous substance, pollutant or contaminant.

Source: U.S. EPA

Tonawanda BOA

What is a Brownfield?

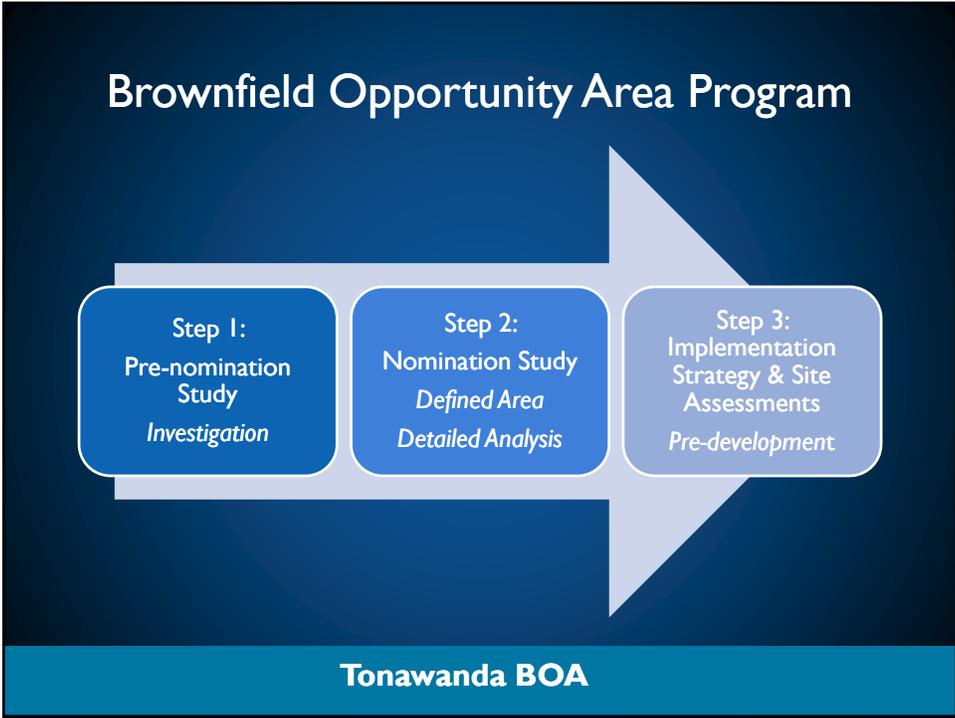


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Brownfield Opportunity Area (BOA)

- Multiple Brownfield Sites . . .
 - and Vacant, Underutilized, Abandoned Sites
- Area Revitalization Plan
- Partnerships
 - Local Community
 - Department of State
 - Department of Environmental Conservation
 - Other local, regional and state partners

Tonawanda BOA

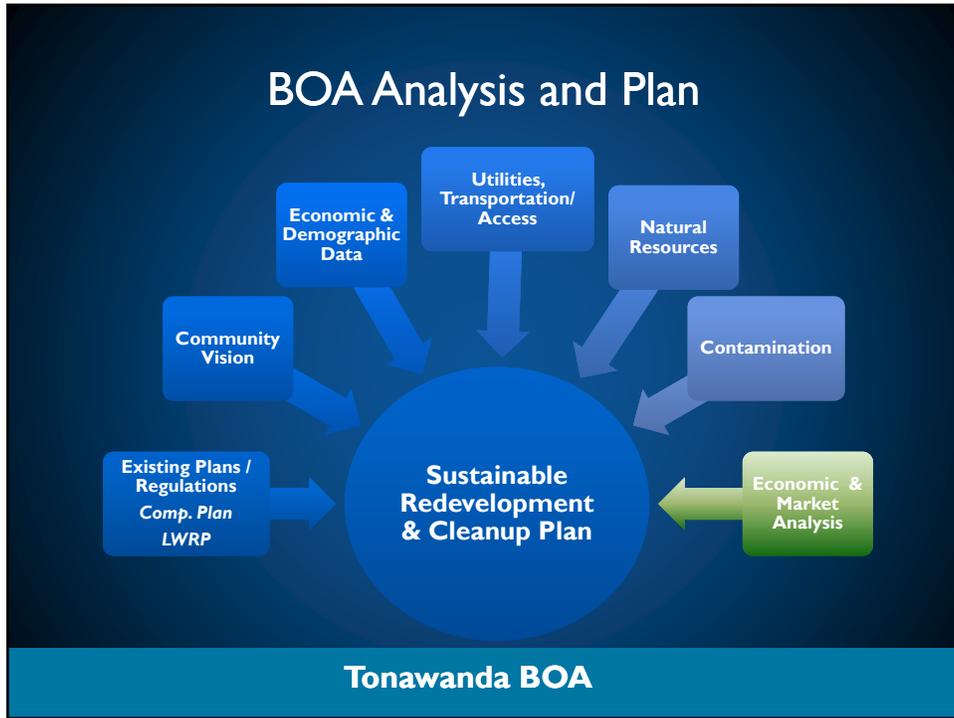


Brownfield Opportunity Area

Benefit - Advances projects to the marketplace

- Community support / Partnerships
- Revitalization strategy
- Transparency of environmental conditions
- Grants/Tax Incentives
- Project marketing

Tonawanda BOA

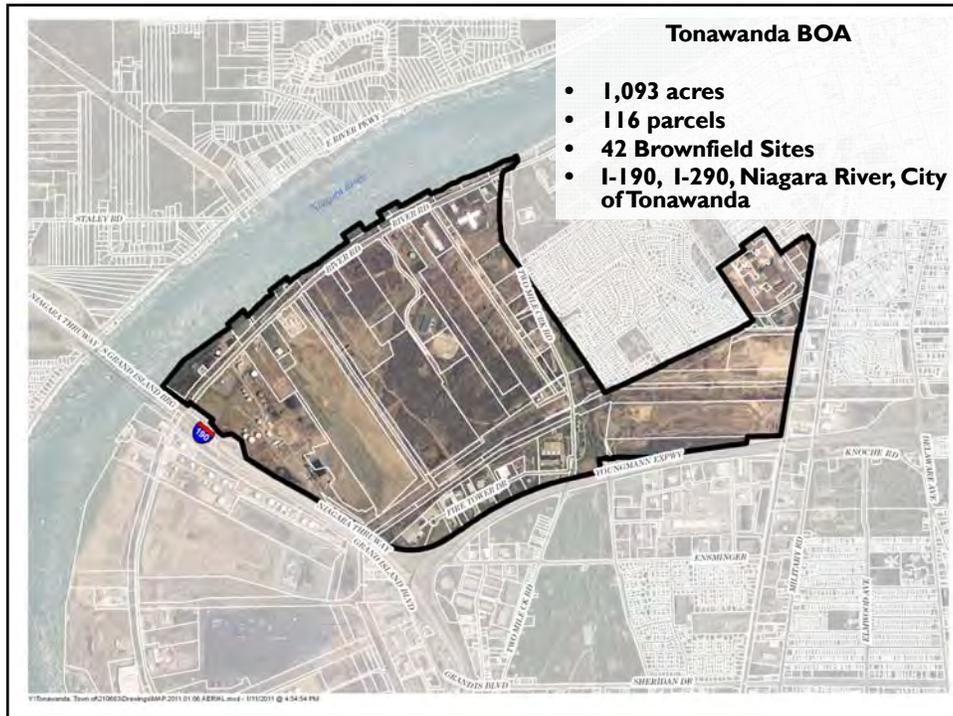


BOA Analysis and Plan

	Low Contamination	High Contamination
High Development Potential	Developer Sites	Public – Private Partnership
Low Redevelopment Potential	Public Sector Projects	Cleanup & Closure

Source: Rutgers University, Brownfields Capacity Building Assistance program for CBOs

Tonawanda BOA

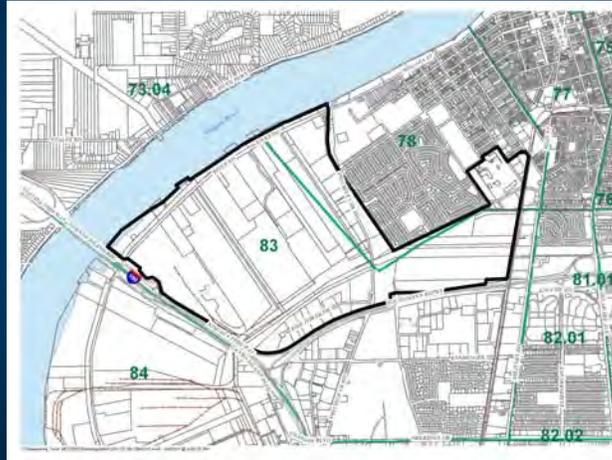


Tonawanda BOA Images



Tonawanda BOA

Tonawanda BOA Characteristics Census Tracts



Tonawanda BOA

Tonawanda BOA Characteristics Population

Area	Population (Year)			Change 1990-2000		Change 2000-2009	
	1990	2000	2009 (Est.)	Number	Percent	Number	Percent
Census Tract 78	6,154	5,615		(539)	-8.8%		
Census Tract 83	3,076	2,864		(212)	-6.9%		
City of Tonawanda	17,284	16,136	14,766	(1,148)	-6.6%	(1,370)	-8.4%
Town of Tonawanda	82,464	78,155	71,749	(4,309)	-5.2%	(6,406)	-8.1%
Erie County	968,532	950,265	909,247	(18,267)	-1.8%	(41,000)	-4.5%
New York State	17,990,455	18,976,457	19,541,453	986,002	5.5%	564,996	3.0%

Source: U.S. Bureau of the Census

Tonawanda BOA

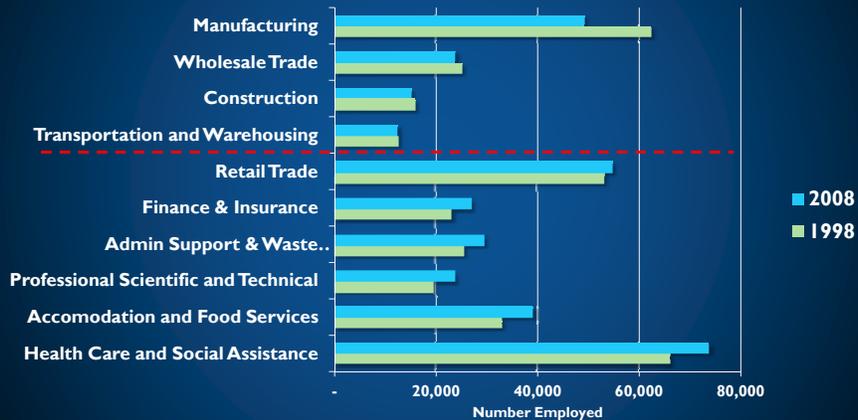
Tonawanda BOA Characteristics Census Tract (Neighborhood) Profiles

Subject	Tract 78	Tract 83	City of Tonawanda	Town of Tonawanda
Housing Vacancy Rate	5.0%	10.9%	5.3%	3.9%
% Housing Units Owner Occupied	75%	21.3%	72.5%	72.9%
% Housing Units Renter Occupied	25%	78.7%	27.5%	27.1%
% High School Graduates	83.8%	76.7%	85.2%	87.5%
% Individuals Below Poverty Level	9.3%	37.7%	7.1%	6.9%
% Homes Built Before 1939	25.3%	14.5%	41.4%	20.5%
1999 Median Household Income	\$ 36,956	\$ 17,490	\$ 37,523	\$ 41,453
1999 Per Capita Income	\$ 18,109	\$ 10,649	\$ 18,789	\$ 20,947
1999 Median Housing Value	\$ 75,500	\$ 75,800	\$ 73,400	\$ 85,100
Median Age	41.5	28.3	38.9	41.1

Source: U.S. Bureau of the Census

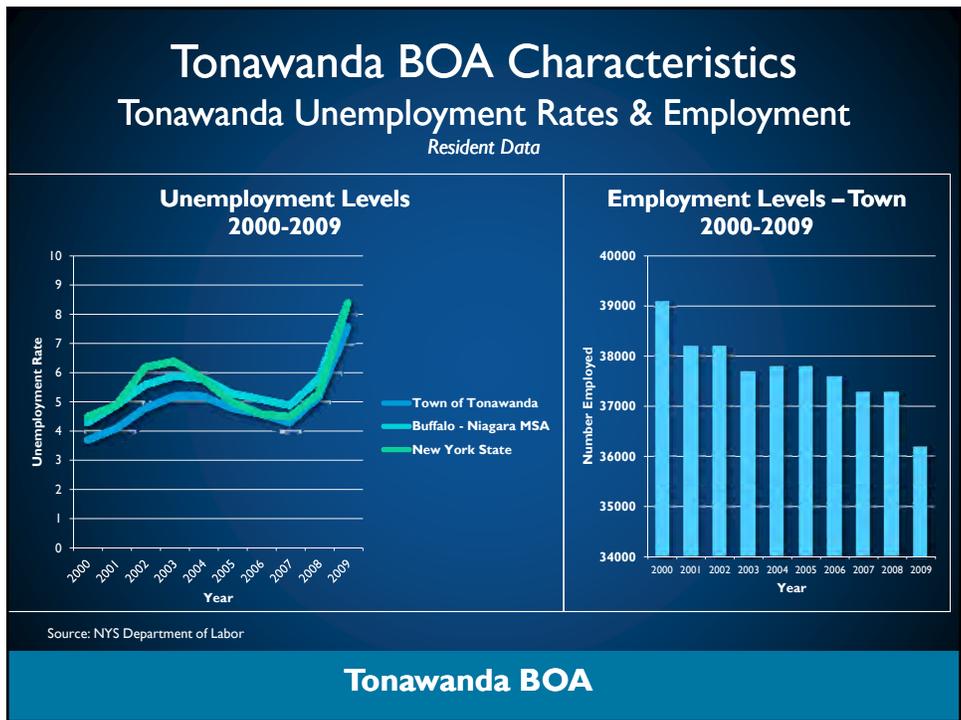
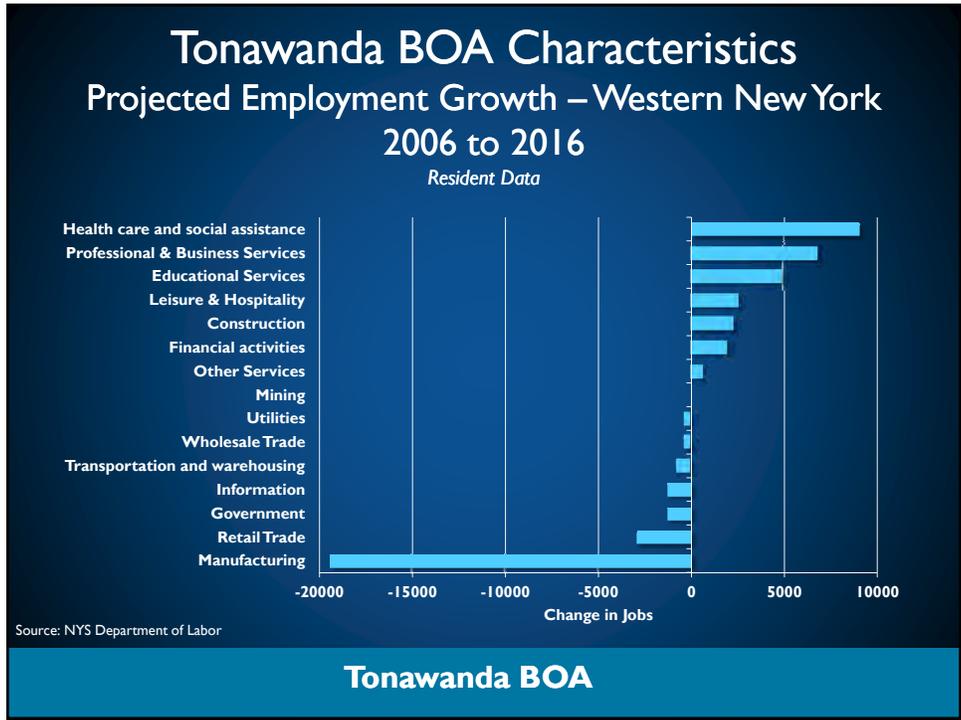
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Tonawanda BOA Characteristics Industry Employment – Erie County *1998 and 2008*



Source: U.S. Bureau of the Census, County Business Patterns

Tonawanda BOA



Tonawanda BOA Characteristics Relevant Plan Recommendations

- Comprehensive Plan
- Local Waterfront Revitalization Plan
- Waterfront Land Use Plan
 - Roadway System/Connectivity
 - River to Spaulding Fibre via proposed North Youngmann Center
 - Shovel Ready Economic Development
 - River Road Image
 - Environmental Protection/Remediation




Tonawanda BOA

Tonawanda BOA Characteristics Current or Planned Development



Riverview



North Youngmann

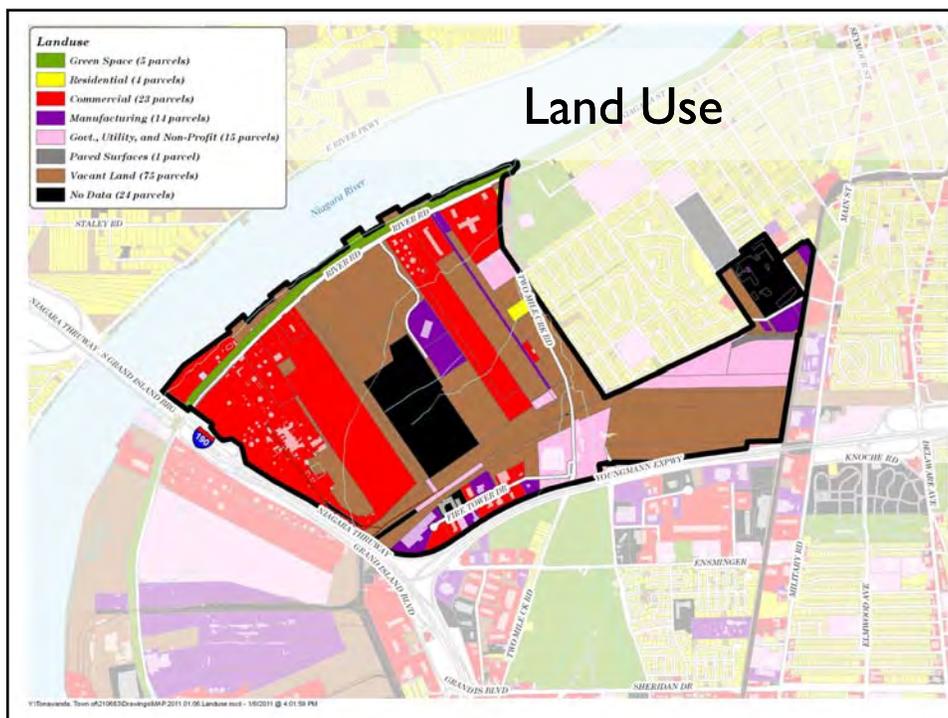
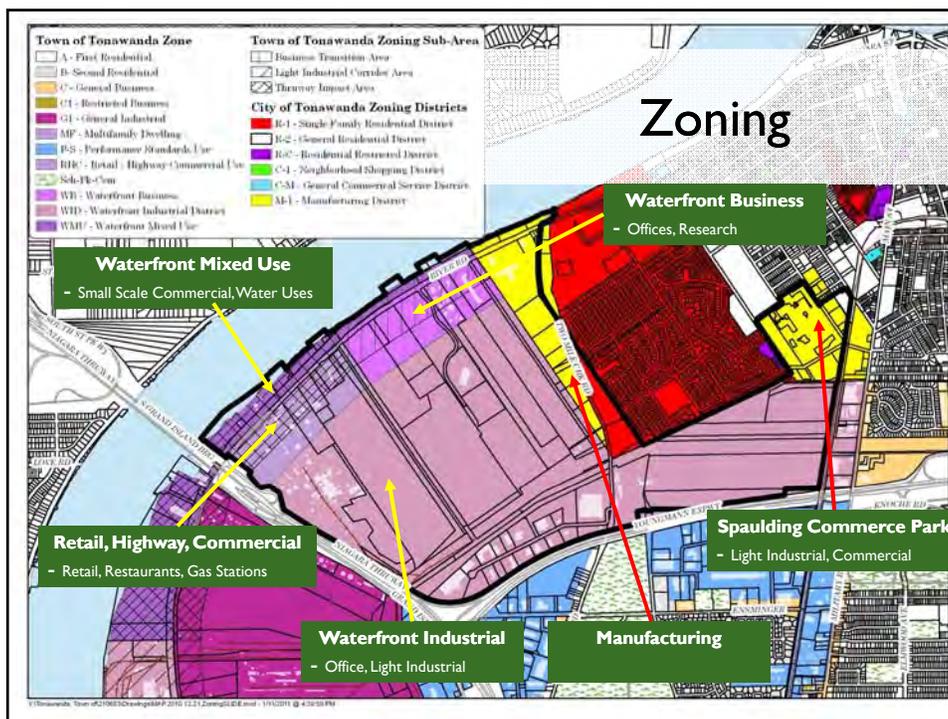


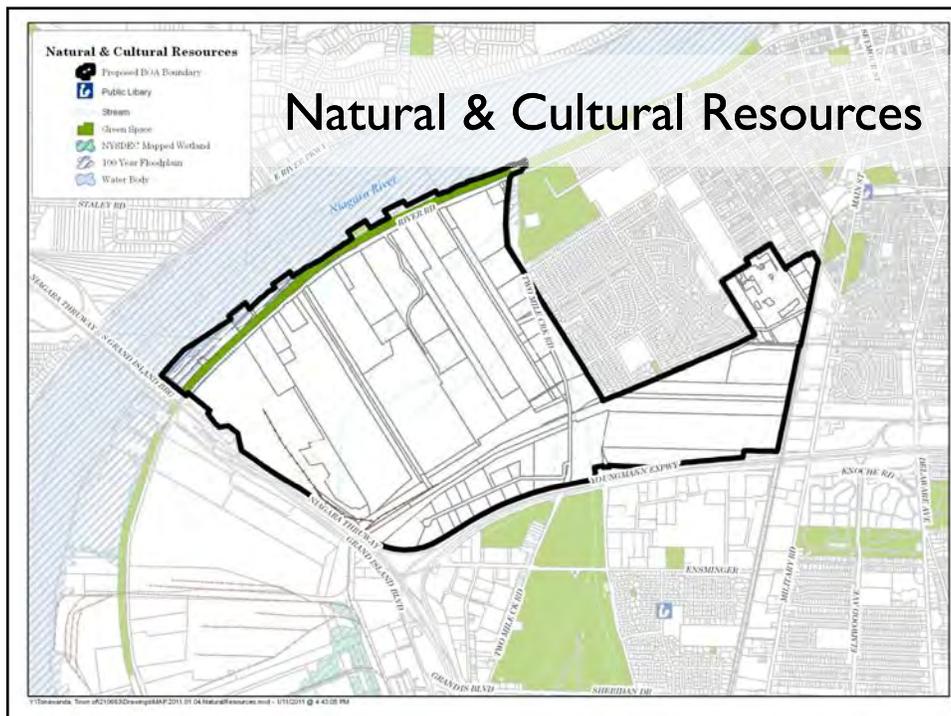
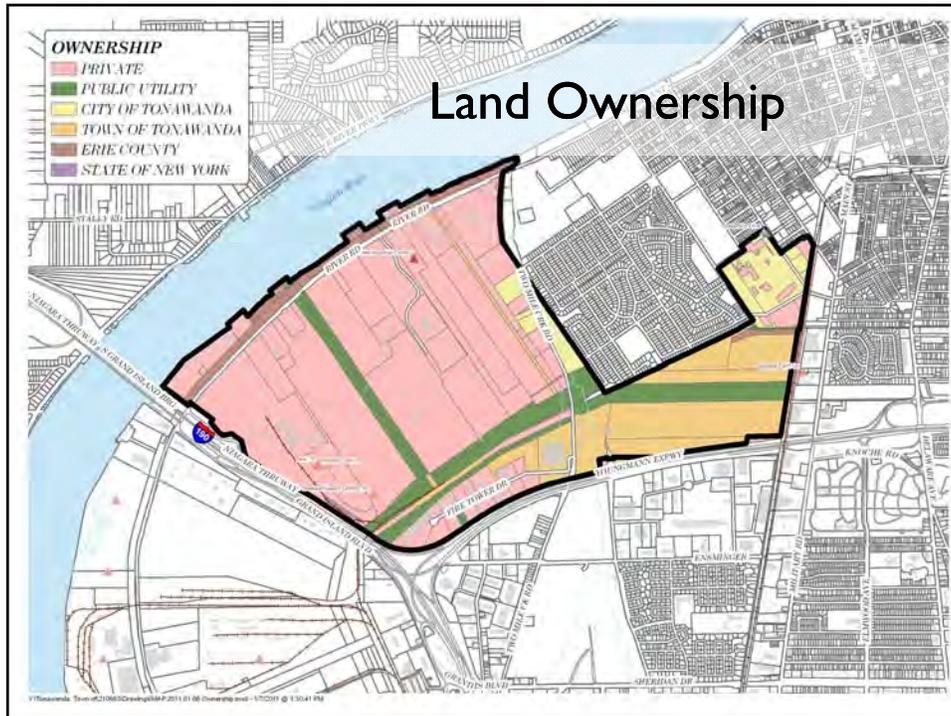
5335 River Rd. Tank Farm

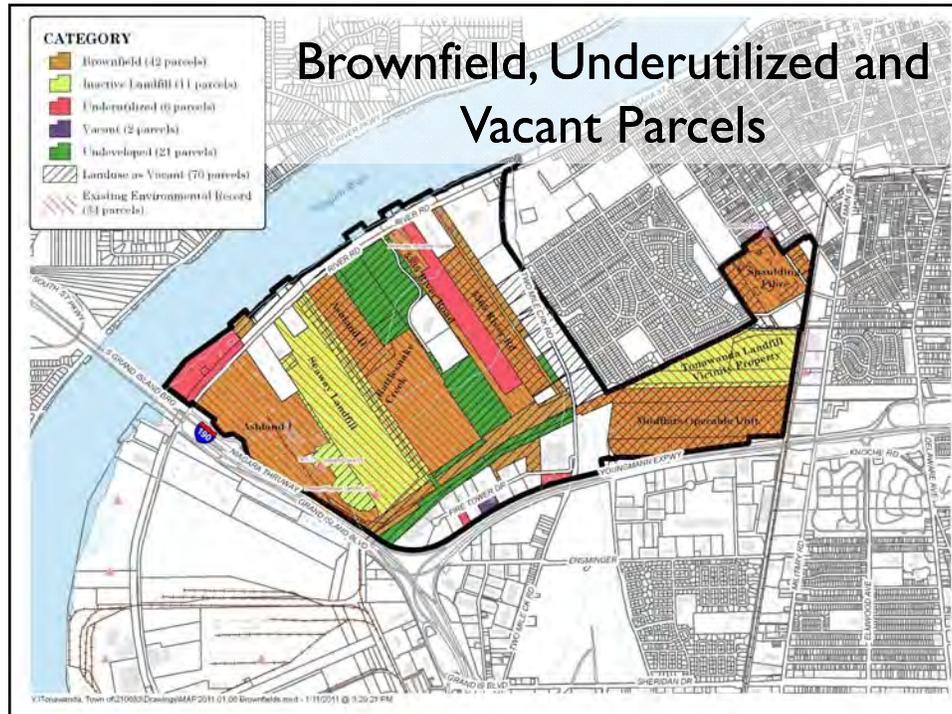


Spaulding Commerce

Tonawanda BOA







Environmental Issues Identified Brownfield Sites

- **42 parcels identified as potential brownfields:**
 - Site Reconnaissance
 - Environmental Records
 - Historical Aerials (1927, 1951, 1972)
- **Includes Ashland I and the Tonawanda Landfill**
 - Manhattan Project-related radiological materials need to be removed from the Tonawanda Landfill
 - Hazardous substances/petroleum contamination not fully assessed at Ashland I

Tonawanda BOA

Environmental Issues

Potential Additional Remediation Needed



- **5335 River Road**
 - Former above and underground tank farm
 - 5 areas of concern (AOCs) identified
 - October 2010 Site Investigation Report:
 - 3 AOCs cleaned up; 2 remain
 - Pipeline
 - Potential Orphan USTs
- **5565 River Road**
 - Historically used for disposal of industrial waste
 - November 2010 Preliminary Site Assessment recommended further investigation for industrial waste

Tonawanda BOA

Environmental Issues

Partially Remediated Brownfield Sites

- **Ashland II and Rattlesnake Creek**
 - Remediated for Manhattan Project-related radiological materials
- **Seaway Landfill**
 - Manhattan Project-related radiological materials being managed
 - Multiple systems in place to prevent leaching of radiological and hazardous substances
- **Spaulding Fibre**
 - Remediated for hazardous substances
 - 99% complete
- **Tonawanda Landfill Vicinity Property (TLVP)**
 - Comprised of the Town Landfill and Mudflats area
 - Manhattan Project-related radiological materials need to be removed
 - Portions of the Town Landfill are currently being closed and capped

Tonawanda BOA

Brownfield Redevelopment Incentives Financial Incentive Planning Tip

- **Plan early** – Get a team in place ASAP and Establish Timelines
 - Attorney
 - Accountant
 - Architect/Engineer
 - Lobbyist
 - Project Manager/Owner's Representative
 - Community Relations Consultant
- **Identify All Incentives Up-Front** – Best to identify/analyze all benefits together
- **Overlap:** Overlap financial Incentive Planning with site acquisition, permitting, and lending considerations and timing
 - Project Description for permits and incentives need to match
 - Need to tell a good story and get Community and NYS buy-in
 - * Job Creation
 - * Investment
 - * New Real Property Taxes

Tonawanda BOA

Brownfield Redevelopment Incentives Brownfield Opportunity Program (BOA) Benefits

- **The BOA has already (most likely) undertaken initial data collection** and the BOA provides an additional 2% REFUNDABLE tax credit as part of the Brownfield Cleanup Program (BCP).
- Thus – the BOA introduces time and costs savings re data collection plus additional financial incentives to develop a brownfield site.

Tonawanda BOA

Brownfield Redevelopment Incentives

BCP Tax Benefits

Three Refundable New York State Tax Credits:

1. **Brownfield Redevelopment Tax Credit (BRTC)**
Refundable investment credit based on cleanup and build out and equipment costs (site prep, groundwater treatment, tangible property)
2. **Tax Credit for Remediated Brownfields (TCRB)**
Refundable Real Property Tax Benefit
3. **Environmental Remediation Insurance Credit (ERIC)**
Refundable insurance premium credit

Tonawanda BOA

Brownfield Redevelopment Incentives

BCP Tax Benefits

BCP: BRTC is the most Significant Refundable NYS Tax Credit

- **2008 BCP Brownfield Redevelopment Tax Credit Amendments**
 - Recall BRTC consists of (1) Site Preparation, (2) Tangible Property, and (3) Groundwater Remediation Component
- **For Projects Accepted After June 23, 2008:**
 - Amendments to calculation of BRTC Site Preparation/GW Component
 - Amendments to calculation of BRTC Tangible Property Component

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Brownfield Redevelopment Incentives BCP Tax Benefits

BCP Amendments to BRTC Tax Credits Changes to BCP Site Prep/Ground Water Tax Credit

- Site Preparation and Groundwater Remediation Component increased from 10% to 22% of such costs to 22% to 50%
- Cleanup to Soil Cleanup Objectives as follows:

Use	Unrestricted	Residential	Commercial	Industrial
Track 1	50%	N/A	N/A	N/A
Tracks 2 and 3	N/A	40%	33%	27%
Track 4	N/A	28%	25%	22%

RESULT – More tax credit available/generated for cleaner cleanups

Tonawanda BOA

Brownfield Redevelopment Incentives BCP Tax Benefits

Message – Under the new BCP, the key is Understanding and Maximizing Site Preparation Costs

- Note: Site Preparation Costs Definition Remains Unchanged:

The term "site preparation costs" shall mean all amounts properly chargeable to a capital account, (i) which are paid or incurred in connection with a site's qualification for a certificate of completion, and (ii) all other site preparation costs paid or incurred in connection with preparing a site for the erection of a building or a component of a building, or otherwise to establish a site as usable for its industrial, commercial (including the commercial development of residential housing), recreational or conservation purposes.

Site preparation costs shall include, but not be limited to, the costs of excavation, temporary electric wiring, scaffolding, demolition costs, and the costs of fencing and security facilities. Site preparation costs shall not include the cost of acquiring the site and shall not include amounts included in the cost or other basis for federal income tax purposes of qualified tangible property, as described in paragraph three of this subdivision.

NY Tax Law Section 21(b)(2).

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Brownfield Redevelopment Incentives BCP Tax Benefits

BCP: Site Preparation (level of cleanup) Component is KEY

Activities Potentially Qualifying as Site Preparation Activities

- Barricades/Fencing
- Erosion Control
- Post work/signs
- Protection of existing utilities
- Demolition or removal of utilities
- Removal of debris
- Demolition of structure
- Demolition of Foundation
- Remove and relocate rail lines
- Dust Control
- Demolition of roadways
- All soft and hard costs (engineering, architectural, consulting, legal, accounting) related to BCP
- New Roadway construction/access Roads
- Brush removal and disposal
- Topsoil fill, stripping, and stockpiling
- Handling processes related to earth materials
- Rough site grading
- Disposal of regulated waste
- Interim remedial measures
- Final remediation measures
- On-site management of solid non-hazardous wastes
- Community area monitoring during earthwork phases
- Stormwater management during construction

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Brownfield Redevelopment Incentives BCP Tax Benefits

BCP Amendments to BRTC Tax Credits **Changes to BCP Tangible Property Credit Component**

- 1) BRTC for Tangible Property Credit Component increased by additional 2% to maximum 24% of eligible costs if project is within a BOA (Range 10 to 24%)
- 2) BRTC Tangible Property Credit Component calculated in same manner
- 3) BRTC Cap – BRTC that is claimed cannot exceed lesser of :
 - i) For non-manufacturing project: \$35mm or Product of (Site Prep and groundwater remediation costs) x (3)
 - ii) For manufacturing project: \$45mm or Product of (Site Prep and groundwater remediation costs) x (6)

SUMMARY - 22% to 50% refund of site prep/cleanup
 - \$3 or \$6 refund for every \$1 spent on site pre/cleanup

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Brownfield Redevelopment Incentives

Other Incentives

To maximize developer interest in brownfield projects, it is important to consider a range of other economic development incentives and programs:

- Provide lower cost or alternative financing, including grants
- Provides tax credits that significantly reduce/eliminate state tax liability
- Provides reduction or elimination of real property taxes for a fixed amount of time
- Examples of a few major programs are listed on the following slides

Tonawanda BOA

Brownfield Redevelopment Incentives

Other Incentives

Local	Industrial Development Agencies Revolving Loan Funds Local Development Corporations
New York State	BOA Enhanced Tax Credit Brownfield Cleanup Program NYS Rehabilitation Tax Credits Excelsior Program Build Now New York Linked Deposit Program NYSERDA
Federal	HUD Community Development Block Grant Economic Development Administration (EDA) HUD Brownfield's Economic Development Initiative (BEDI) New Market Tax Credits Federal Historic Tax Credits
Other	EB-5 Foreign Investment Program Many others!!!

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Brownfield Redevelopment Incentives Industrial Development Agency Incentives

- Straight Lease or Bond Financing (federal Tax-Exempt Bonds)
 - Use of Local Development Corporations for Not-for-profits
- Sales Tax Exemption (local and state) on Build-Out Only
- Mortgage Recording Tax Exemption
- Tax Abatement – Payment in lieu of Taxes (PILOT)/tax stability
- PILOT Increment Financing (PIF)
- Revolving Loan Funds (RLF's)

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Brownfield Redevelopment Incentives New York State Excelsior Program Incentives

Excelsior Jobs Tax Credit

- Based on salary paid for each net new job
- Scaled percentage of credit but cannot exceed \$5,000/job
- Can be claimed for up to five consecutive years
- Refundable

Excelsior Investment Tax Credit

- Equals 2% of cost basis of a qualified investment
- Refundable

Excelsior Research and Development Tax Credit

- Equals 10% of Federal R&D tax credit
- Refundable

Excelsior Real Property Tax Credit

- Must be located in an Investment Zone or be an RSP
- Credit equals 50% of RPT paid in year prior to year accepted into Excelsior Program
- Credit is 40% in year 2, 30% in year 3, 20% in year 4, and 10% in year 5
- Refundable

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Brownfield Redevelopment Incentives

HUD Brownfields Economic Development Initiative

- Must be used in conjunction with HUD Section 108
- Must meet HUD national program objectives
- Can be used for: land write-downs, site remediation costs, funding reserves, over-collateralizing the Section 108 loan, direct enhancement of the security of the Section 108 loan, provisions of financing to for-profit businesses at a below-market interest rate
- Maximum BEDI to Section 108 is 1:1
- \$17.5 million appropriated in 2010
- Maximum grant amount TBD

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Brownfield Redevelopment Incentives

Build Now New York Program

- Helps to complete “pre-permitting” work for priority development sites
- Currently no funding available, but certification still important as a marketing tool to facilitate development

THERE ARE MANY OTHERS – SEE HANDOUT FOR FURTHER DETAILS

Tonawanda BOA

Brownfield Redevelopment Incentives

Case Study: Remington Lofts on the Canal, N.Tonawanda



- Adaptive Reuse - historic 176,000 square foot former manufacturing facility

- Mixed-use - 81 work/live lofts with parking and 1st floor commercial/retail space

Tonawanda BOA

Brownfield Redevelopment Incentives

Case Study: Remington Lofts on the Canal, N.Tonawanda

- Approximately \$22,500,000 remediation/rehabilitation costs
- Approximately \$1,700,000 in BCP tax credits
- Approximately \$3,975,000 in Federal Historic Tax Credits
- Approximately \$3,975,000 in State Historic Tax Credits
- \$1,000,000 Restore New York Grant
- \$750,000 New York State Capital Projects Grant
- NCIDA Sales Tax, Mortgage Recording Tax, and PILOT
- NY Canal Corp Grant for canal improvements

Tonawanda BOA

Brownfield Redevelopment Incentives Final Thoughts – You cannot Plan Too Early

- Pursue all available local, state and federal level incentives
- Do not be afraid of contaminated Property - seek it out!!
- Consult with qualified economic development attorney, accountant, and economic development-minded engineer/architect/professional
- Properly understand timing issues related to permit approvals, funding/grant/incentive approvals
- Obtain Incentives Analysis – work with attorney and accountant to identify and pro forma incentives

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Schedule



Tonawanda BOA

Next Steps

- Prepare Draft Plan
 - Market Analysis
 - Stakeholder Discussions
 - Recommendations
 - Economic
 - Environmental
 - Quality of Life/Social
 - Preliminary “Master Plan” Concepts
- Final Public Meeting
 - Late Spring/Summer
 - Review of Draft Plan, Recommendations

Tonawanda BOA

Project Information

- www.tonawanda.ny.us
- Jim Jones, Town Engineer, Town of Tonawanda, 877-8805
- Ed Flynn, Senior Planner, LaBella Associates
eflynn@labellapc.com
- Bob Murray, Esq., Harris Beach,
bmurray@harrisbeach.com
- Richard Rising, Mgr. Economic Development,
rrising@harrisbeach.com

Tonawanda BOA



October 10, 2012 Public Meeting Summary

The Town of Tonawanda conducted a community meeting to discuss the Town's ongoing revitalization efforts and to provide feedback about the future land use plan's visions, goals and key recommendations.

The meeting included a formal presentation that was facilitated by Kerry Ivers (CPL) and Ken Buckland (The Cecil Group). At the conclusion of the presentation, a comment and questions session was conducted before the open house began. Meeting attendees asked questions about the anticipated future land uses along Sawyer street and surrounding neighborhood. Questions about the planning process and subsequent policy changes (comprehensive plan and zoning code updates) were also raised. The Town, via Jim Jones, explained that the Town's next steps had not yet been formalized. However, he indicated that budgeting for the comprehensive plan update was being explored. Future planning and/regulatory changes would be conducted with public input and information would be circulated in a variety of way.

The public meeting also included an open house with graphics boards as the "stations." Meeting attendees were invited to review the boards on display and share their comments, either verbally with staff standing by each station or via writing on comment sheets made available at the meeting. To date, two comment sheets were submitted.

In general, the commentary and feedback from the community seemed to favor the concepts and ideas set forth in the plan. Specifically, the comments were mostly on implementing the aspects of the plan that improve public access and enjoyment of the waterfront. No significant modifications to land use or redevelopment concepts were identified.

The information provided at the meeting (presentation and handouts) will be made available online at the Town's website.



Meeting Notes
March 27, 2012

Meeting Notes

1. Future Land Use Map

The committee reviewed the draft future land use map, which contained four character areas. Discussion of each one is provided below.

Waterfront Priority Area

- Discussed the boundary of the Waterfront Priority Area. Should the waterfront priority boundary cross river road (specific depth TBD) to ensure that future investment/development better reflects the waterfront. Committee discussed the fact that in Tonawanda, overlay zones and design guidelines have not been as effective in achieving the visual character or quality of development that the Town wants.
- What's the prototype of the type of the development that might be sited across the street (that would fit with the waterfront proximity)? That will help determine the depth of the boundary across River Road.
- Consider relocation program to encourage higher value land uses in waterfront area and relocate non-waterfront developments to lower valued land away from the waterfront.
- Need to explore rear yard buffer for those properties on the east side of River road to minimize negative impact of industrial lands or vacant land behind the properties fronting on River Road.
- Where are access points for existing industrial development that currently would be affected by different development along the road frontage?
- Need to look at waterfront and consider big changes that could occur 10-20 years down the road. What if the water treatment plant goes away? Huntley could shut down over time. How would land use change if those current uses go away? Plan needs to look at long term land use contingencies.
- Transportation fleets are part of the air pollution issue. Minimizing transportation routes through this area will improve air quality.
- Opportunity to develop a case study – consider exploring the truck terminal relocation scenario.
- Environmental impacts and human health impacts associated with potential redevelopment need to be outlined.
- Good food will attract people from everywhere.
- However, convenience retail will not. That will be more of a challenge for this overall area potentially. General rule of thumb, a convenience store requires 10K-12K people within a 5 minute drive.

Business Park

- The land uses designated for this area makes sense.
- Same issue/comment related to convenience retail.
- Opportunity for mixed use development – look at BOA recommendation.
- Consider trail connections



Meeting Notes
March 27, 2012

- Minimum destination retail usually requires about 80,000 sf mall of smaller businesses to attract people to the location.

Industrial

- Much of the areas designated for industrial, are industrial now. Only exception is the Sawyer and James Avenue area, which is currently distressed residential area. The committee discussed the proposed Industrial designation and is in favor of the idea
- However, there are some important concerns about how and when to communicate those future land use plans to current residents.
- Partner with Clean Air Coalition to interact with the neighborhood residents in that area. They have existing relationships.
- This neighborhood is classified as an environmental justice neighborhood b/c of their proximity to permitted air emissions facilities. Focus on raising awareness about clean air. CARE grant (\$100,000) to continue community outreach. Erin Haney is the main contact.
- Some businesses wouldn't want to be located in close proximity to this area now, b/c of the residential component.
- Opportunity for CDBG funds to purchase properties.

Residential

- Defined in the other two areas where it currently exists and where it makes sense to sustain in the long run.

General questions to consider:

- Will Canadian economy be a factor in this area? How will that influence development in this area?
- Could this be a location for a New Bills Stadium? Hotels? Conference space? Meeting venues?

2. Future Contacts for Economic/Market Analysis and future partnership identification

- Tom Montante – Developer of Riverview Solar Park. (TM Montante Development / Broad Elm Development)
- Mike Tiedeman – housing developer
- Mike Alpern – real estate
- Rich Schechter – Pyramid
- John Battaglia (Ensol – runs the landfill)
- Huntley Power – need to get contacts from the Town
- GM – Steve Finch (Facilities)
- Ciminelli – Developer (need contact from Town)
- EPA – Charles Harewood prime contact. Project coordinator for the E3.



Meeting Notes
March 27, 2012

3. Connections and Streetscaping Maps

- Discussed connections map and identified potential new connection and the implications of future connections being located too closely to Tonawanda Coke.
- Discussed the streetscaping priority and suggested a few modifications.
- Expand width of streetscaping priority buffer to include both sides of the 190.
- Remember that greening town streets is also an important air quality remediation strategy. The plan should explicitly identify those benefits.
- Discussed the Boys and girls club existing tree program and the opportunity to expand/enhance this and other similar programs to encourage sustainable greening of Tonawanda's streets, particularly in the waterfront land use boundary. Sustainable business development opportunities – using a brownfield to grow trees.
- Town Highway Department has a small staging area for street trees.
- Consider adding murals on the tanks to enhance their visual quality.
- Clean air through the CARE program. Community strategy to address air quality and community development

4. General comments

Need to plan for community outreach both through existing meetings and through a stand alone public meeting. The public meeting will be held in April or early May. The Town will need to identify some target dates.

Appendix C

Market Analysis Data

Technical Memorandum

Tonawanda Waterfront Study: Existing Social and Economic Conditions

To: Clark Patterson
From: FXM Associates
Date: November 2011

I. Introduction

The Town of Tonawanda is located in western New York about ten miles north of Buffalo. It is adjacent to the US-Canada border and is served by I-90, a major east-west interstate artery, and several of its spur routes, I-190, I-290, and I-990. This Technical Memorandum is part of the Tonawanda Waterfront Land Use Plan Update Study.

This Technical Memorandum assesses key population, business and employment characteristics and trends affecting economic development potential in the Study Area of the Town of Tonawanda. Data have been compiled and analyzed for the Waterfront Study Area, the Town of Tonawanda, Erie-Niagara Counties, and New York overall.

The Waterfront Plan Study Area is shown in Figure 1. The Study Area has excellent access to/from the rest of the region via I-190 and I-290 and their several interchanges within the Study Area.

This Introduction section notes data sources used for the analysis. Section II covers Tonawanda Waterfront Land Use Plan Update Study Area Characteristics. Section III discusses Population-related Trends and Section IV assesses Employment-related Trends in Tonawanda and Erie-Niagara Counties.

Data Sources

FXM compiled extensive population, income and employment data from public and private data sources. These were:

- US Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, 2010. Tables CA 04, county level income and employment summary; CA 25N, full and part-time employment by NAICS industry code; CA 25, county level full and part-time employment by SIC industry code; and CA 30, regional economic profile including population and employment.
- US Bureau of Labor Statistics (“BLS”). Quarterly Census of Wages and Employment by NAICS industry code.
- US Census Bureau, 2010 Census: Public Law 94-171 redistricting population data.
- New York State Department of Labor, 2010. ES-202, Employment and wages data; CES-790, Current Employment Statistics.

FXM Associates

- Claritas *SiteReports* and Claritas Business Facts for the Year 2010, by the Nielsen Company, August 3, 2011. Claritas is a proprietary data service that purports to use the most recent US Economic Census and “other” government and private data sources, including proprietary algorithms to disaggregate the data to the community level. Claritas provides data for their current or most recent year estimates (2010), and 5-year projections (2015) for certain population-related variables.

These sources provided continuous data on changes in population and employment characteristics at the county level from 1969 to 2000 by SIC industry group code, and from 2001 to 2009/10 by NAICS industry group code. The Standard Industry Classification (SIC) was the employment classification system used by state and federal governments to track employment data by industry. In 2001, the federal government adopted the North American Industry Classification System (NAICS) that established a common industry classification system for the US, Mexico and Canada. FXM conducted extensive analysis of SIC and NAICS data for New York and Erie-Niagara Counties to establish a consistent dataset for 1990 to 2010 based on NAICS industry classifications to analyze trends in state and county employment.

Nielsen Claritas *SiteReports* is a proprietary database that provides annual detailed demographic and employment estimates and is reconciled with government estimates only for Census years. For all other years, Claritas conducts independent research and uses proprietary formulas to derive its estimates.

Figure 1. Tonawanda Waterfront Land Use Plan Update Study Area



Source: Nielsen Claritas SiteReports 2010.

II. Waterfront Study Area Characteristics

The Tonawanda Waterfront Study Area is located in western Tonawanda along the Niagara River. The Study Area is bordered by the Niagara River on the west, the City of Tonawanda and Kenmore Avenue and Vulcan Street to the south/southeast.

Demographics

Table A compares population and households within the Waterfront Study Area to those within the Town of Tonawanda, Erie-Niagara Counties, and the State of New York overall and shows projected changes in each through 2015. In 2010, the Waterfront Study Area had an estimated population of, 1,161 people and 492 households. Both population and households within the Tonawanda Town and the Erie-Niagara MSA are expected to decline slightly through 2015.¹

Table A. Regional Population and Households, 1990 - 2015

Population	Study Area	Tonawanda	Erie-Niagara Counties	New York
1990 Census	1,329	82,464	1,189,288	17,990,405
2000 Census	1,318	78,155	1,170,111	18,976,457
2010 Estimate	1,161	73,567	1,117,169	19,562,561
2015 Projection	1,084	69,494	1,085,144	19,697,478
Growth 1990-2000	-0.83%	-5.23%	-1.61%	5.48%
Growth 2000-2010	-11.91%	-5.87%	-4.52%	3.09%
Growth 2010-2015	-6.63%	-5.54%	-2.87%	0.69%

Households	Study Area	Tonawanda	Erie-Niagara Counties	New York
1990 Census	591	33,765	461,803	6,639,305
2000 Census	548	33,278	468,719	7,056,860
2010 Estimate	492	32,295	457,435	7,263,927
2015 Projection	462	30,886	447,485	7,305,437
Growth 1990-2000	-7.28%	-1.44%	1.50%	6.29%
Growth 2000-2010	-10.22%	-2.95%	-2.41%	2.93%
Growth 2010-2015	-6.10%	-4.36%	-2.18%	0.57%

Source: Claritas SiteReports, 2010; and FXM Associates.

Selected key demographic characteristics in the Waterfront Study Area are compared to the Town of Tonawanda and Erie-Niagara Counties in Table B using Claritas *SiteReports* estimates for 2010. Key observations from Table B include:

- Nearly one-fifth (18.8%) of residents aged 25+ in the Waterfront Study Area have not completed a high school level education compared to 7% in the Town of Tonawanda and 3% in Erie-Niagara Counties overall.
- For residents of the Waterfront Study Area, Median Household Income (\$27,716) is about 64% of median household income in the Town (\$43,489) and 60% of Erie-Niagara Counties overall (\$47,272). Per Capita Income (\$18,505) is about 82% of that for residents of the overall Town of Tonawanda.

¹ Claritas Demographic Snapshot, 2010.

FXM Associates

- Twenty-seven percent (27%) of family households in the Study Area have incomes below the federal poverty level, compared to 11% in the Town, and 10% in Erie-Niagara Counties overall.
- Study Area residents have fewer vehicles per household, 1.1 in the Study Area compared to 1.5 in the Town and Erie-Niagara Counties overall. Nearly 29% of household in the Study Area have no vehicles compared to 12% of households in the Town and region reporting no vehicles.
- The majority of housing units in the Study Area (77%) are Renter Occupied. For those few that are Owner Occupied, the Median Value of this housing is about 85% that of other owner-occupied housing in Tonawanda.
- Only a few households in the Study Area live in residential structures with 50 or more units; most residents live in buildings with 3 to 19 units (64%). Only about 11% of households are in single-family detached houses.

Table B. Selected Waterfront Study Area Demographic Characteristics (2010)

Description	Study Area	Town of Tonawanda	Erie-Niagara Counties
2010 Est. Population	1,299	54,072	1,117,169
2010 Est. Households	606	23,100	457,435
Persons per Household	2.14	2.34	2.44
Median Age, years	31.50	40.6	40
Educational Attainment (Age 25+)			
Less than 9th grade	18.8%	6.6%	3.4%
Some high school, no diploma	18.2%	12.5%	8.3%
High school graduate	31.5%	39.7%	31.5%
College	31.5%	41.2%	56.8%
Income Statistics			
Median Household Income	\$27,716	\$43,489	\$47,272
Per Capita Income	\$18,505	\$22,464	\$25,468
% Family Households Below Poverty Level	27.3%	11.4%	9.5%
Population Age 16+ by Employment Status			
Not in Labor Force	39.5%	36.7%	36.5%
Unemployed	7.4%	4.8%	4.1%
Employed	53.1%	57.9%	59.4%
Population Age 16+ by Occupation Classification			
Blue Collar	43.0%	29.0%	22.2%
Service and Farm	19.5%	19.4%	19.1%
White Collar	37.5%	51.6%	58.7%
Transportation Characteristics			
Average travel time to work, minutes	23.5	20.8	22.8
Average number of vehicles per household	1.1	1.5	1.6
% with No Vehicles in Household	28.7%	11.6%	12.4%
Tenure of Occupied Housing Units			
Owner Occupied	23.4%	61.6%	67.0%
Renter Occupied	76.6%	34.4%	33.0%
Median Value Owner-Occupied Housing	\$140,079	\$164,198	\$117,339
Housing Units by Units in Structure			
1 unit attached	1.2%	5.1%	3.0%
1 unit detached	10.4%	46.2%	58.2%
2 units	17.4%	13.6%	19.4%
3 to 19 units	64.2%	26.6%	13.0%
20 to 49 units	4.9%	2.6%	1.4%
50 or more units	1.8%	3.9%	2.9%
Modile home, trailer, boat, RV, etc.	0.0%	2.0%	2.1%

Source: Claritas SiteReports, 2010; and FXM Associates.

Employment and Businesses

There are an estimated 217 business establishments within the Tonawanda Waterfront Study Area with over 8,500 employees and nearly \$767 million in annual business sales. Table C summarizes number of establishments, employees, and sales by major industry group for the Waterfront Study Area, Tonawanda overall, and Erie-Niagara Counties. The Waterfront Study Area contains about 10% of total jobs and 6% of business sales in the Town of Tonawanda.² Other observations from the data shown in Table C include:

- The estimated 39 manufacturers within the Waterfront Study Area comprise 27% of all manufacturing establishments in Tonawanda overall. These businesses account for 55% of Town manufacturing jobs and 51% of Town manufacturing sales.
- The retail sector is the industry group least represented in the Waterfront Study Area relative to all business types, accounting for less than 3% of Town retail jobs and business sales.

Table D shows a more detailed breakdown of establishments and business sales for key sectors within the Waterfront Study Area and compares to total Study Area employment and the share of category employment for the Town of Tonawanda as a whole. Five (5) establishments in Transportation Equipment are the leading generators of business sales in the Waterfront Study Area with 21% of all Study Area sales; however it accounts for only 1% of citywide sales in that industry. Wholesale Trade businesses capture 18% of Study Area sales but only 2% of Townwide Wholesale Trade Services.

Table E presents similar data for employees by industry. Transportation Equipment, Rubber and Plastics Products, Chemical Products, Wholesale Trade, and Transportation and Warehousing are the top categories in number of employees. These five categories account for 69% of sales and 76% of employment in the Waterfront Study Area.

- The estimated 39 manufacturers within the Waterfront Study Area comprise 27% of all manufacturing establishments in Tonawanda overall. These businesses account for 55% of Town manufacturing jobs and 51% of Town manufacturing sales.

² Claritas Business Facts for New York, Erie-Niagara Counties and Town of Tonawanda, 2010.

Table C. Summary of Employment by Geographic Area (2010)

Table C. Summary of Employment by Category, 2010

Erie-Niagara Counties

SIC Code	Business Description	Total Establishment	Total Employees	Sales (in Millions)	Sales Per Employee
TOT	All Industries	40,034	672,657	74,281.9	\$110,431
MAN	All Manufacturing (SIC 20-39)	2,102	71,467	5,607.8	\$78,467
RET	All Retailing (SIC 52-59)	8,507	113,070	12,689.3	\$112,225
SERV	All Services (SIC 70-89)	17,982	290,225	27,169	\$93,614
ADM	Public Administration (SIC 90-97)	1,483	36,223	0	\$0

Town of Tonawanda

SIC Code	Business Description	Total Establishment	Total Employees	Sales (in Millions)	Sales Per Employee
TOT	All Industries	2,662	43,457	4,309.0	\$99,155
MAN	All Manufacturing (SIC 20-39)	146	10,875	813.4	\$74,795
RET	All Retailing (SIC 52-59)	624	8,851	928.2	\$104,870
SERV	All Services (SIC 70-89)	1,174	14,292	1,400	\$97,957
ADM	Public Administration (SIC 90-97)	77	1,667	0	\$0

Study Area

SIC Code	Business Description	Total Establishment	Total Employees	Sales (in Millions)	Sales Per Employee
TOT	All Industries	217	8,574	766.9	\$89,445
MAN	All Manufacturing (SIC 20-39)	39	5,957	410.7	\$68,944
RET	All Retailing (SIC 52-59)	25	249	42.1	\$169,076
SERV	All Services (SIC 70-89)	50	342	30	\$88,012
ADM	Public Administration (SIC 90-97)	6	131	0	\$0

Source: Claritas SiteReports, 2010 and FXM Associates

Table D. Key Study Area Sales by Category for 2010

Business Description	Establishment	Sales*	% of Study Area Total Sales	% of Tonawanda Category Sales	% of Erie-Niagara Category Sales
Transportation Equipment	5	160.5	20.9%	1.3%	2.3%
Wholesale Trade-Durable Goods	19	137.7	12.9%	2.3%	14.3%
Rubber and Miscellaneous Plastics Prod	3	99.2	12.3%	1.5%	1.4%
Chemicals and Allied Products	3	94.3	18.0%	0.7%	1.7%
Wholesale Trade-NonDurable Goods	14	36.8	4.5%	0.6%	7.8%
Motor Freight Transportation and Warehc	17	34.3	2.3%	0.7%	2.2%
Construction-Special Trade Contractors	16	28.1	1.8%	2.0%	8.0%
Transportation Services	10	19.9	4.8%	0.4%	2.2%
Industry and Commercial Machinery and	11	17.7	3.7%	1.3%	4.0%
Building Materials, Garden Supply and M	3	15.0	2.6%	0.7%	3.8%
Stone, Clay, Glass and Concrete Product	4	13.9	1.7%	0.1%	0.6%
Electric, Gas and Sanitary Services	2	13.0	1.1%	0.2%	1.3%

* in millions of dollars per year

Source: Claritas Site Reports, 2010, and FXM Associates

Table E. Key Study Area Employees by Category for 2010

Table E. Tonawanda Study Area Employment for Selected Industries, 2010

Business Description	Establishment	Employees	% of Study Area Total Employees	% of Tonawanda Category Employees	% of Erie-Niagara Category Employees
Transportation Equipment	5	2,796	33.2%	3.5%	2.3%
Rubber and Miscellaneous Plastics Produc	3	1,522	18.1%	3.4%	1.4%
Chemicals and Allied Products	3	943	11.2%	1.2%	1.7%
Wholesale Trade-Durable Goods	19	776	9.2%	2.0%	14.3%
Motor Freight Transportation and Warehou	17	376	4.5%	1.1%	2.2%
Industry and Commercial Machinery and C	11	246	2.9%	2.8%	4.0%
Stone, Clay, Glass and Concrete Products	4	208	2.5%	0.3%	0.6%
Wholesale Trade-NonDurable Goods	14	207	2.5%	0.5%	7.8%
Construction-Special Trade Contractors	16	176	2.1%	1.9%	8.0%
Transportation Services	10	120	1.4%	0.3%	2.2%
Electric, Gas and Sanitary Services	2	108	1.3%	0.4%	1.3%
Business Services	7	77	0.7%	51.4%	34.4%

Source: Claritas Site Reports, 2010, and FXM Associates

III. Historic Population Trends

Erie-Niagara Counties had a population of 1,117,000 persons and the Town of Tonawanda had an estimated 74,000 persons in 2010.³ As shown by data in Table A, the Study Area, the Town of Tonawanda, and Erie-Niagara Counties lost population and households over the past 10 years while New York overall grew during that period. The Town of Tonawanda is estimated to have declined in population (-5.8%) and households (-3.0%) over this same period. According to data provided by Claritas *SiteReports*, Tonawanda is projected to continue to lose both population and households over the next five years, as shown by data in Table A.⁴

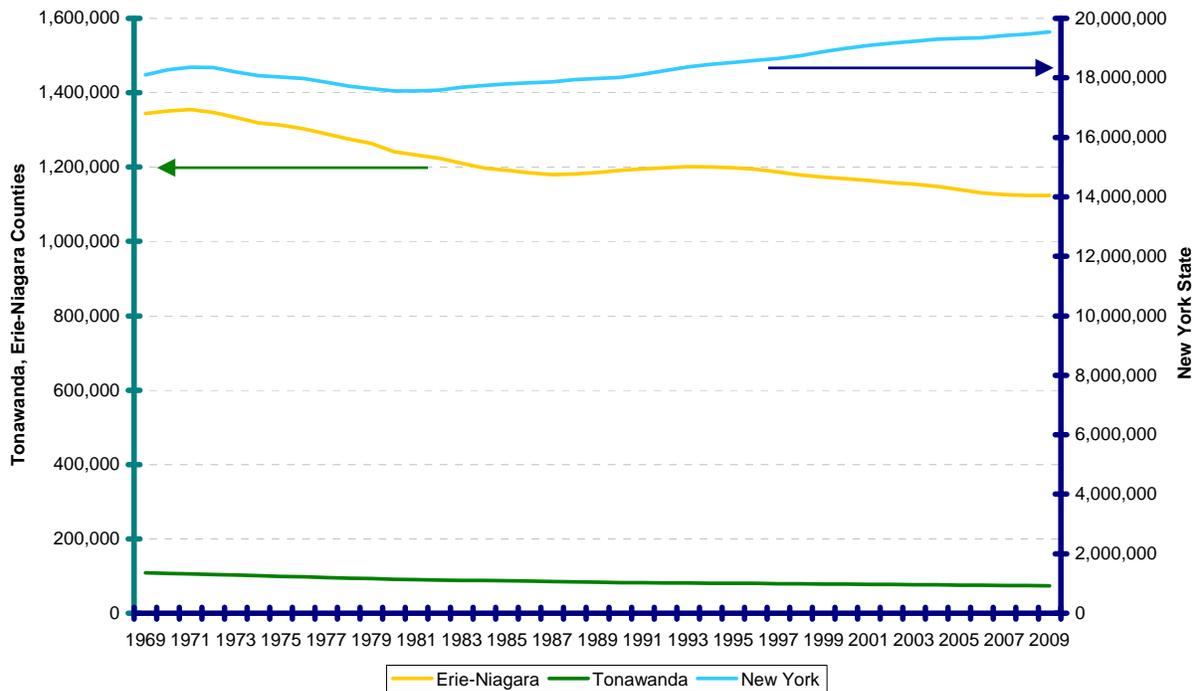
As indicated in Figure 2, the Erie-Niagara Counties population has declined steadily since 1969 while the state has slowly but steadily gained population. Note that the scales are different with the left-hand scale applying to Erie-Niagara Counties and Tonawanda, and the right-hand scale for the state of New York.

³ Claritas SiteReports, New York, Erie-Niagara Counties, Town of Tonawanda, 2010.

⁴ Ibid.

Figure 3 compares New York, Erie-Niagara Counties, and Tonawanda annual population trends from 1990-2009. This chart shows even more clearly than Table A the gradual increase in New York State’s population and the declines in Tonawanda and Erie-Niagara Counties population from 2000 to 2009.

Figure 2. Erie-Niagara Counties and New York Population, 1969 - 2009



Source:

The 2010 population estimates for Tonawanda and Erie-Niagara Counties do not match exactly the values in Table A because they are from different sources. The data in Figure 2 are from published government sources that only go through 2009 and are intended to show short and long-term trends in major characteristics; they do not attempt to match the Claritas level of detail between Censuses.

One method commonly used to portray growth trends between two or more datasets is to create an index chart using a common base year and the ratio of annual values to that base year. For Tonawanda, Erie-Niagara Counties, and New York, 1990 was selected a common base year. Growth relative to 1990 is shown in Figure 3; this graph clearly shows that the State of New York has grown steadily since 1990. Tonawanda and the Study Area have declined since 1990 and are trending toward continued decline in the future.

A similar method is used to portray personal income data. That is to again use a common base year and illustrate income growth (total, by household or per capita) in current dollars (i.e., the year in which the dollars were earned) and in constant dollars (showing changes in relative purchasing power). Figure 4 shows the trend in per capita income for New York and Erie-Niagara Counties. These data are readily available only at the state and county levels. Income

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per capita increased steadily through 2008, but took a downturn from 2008 to 2009. Comparing Figures 4 and 5, which shows state and county per capita incomes in constant 1969 dollars, the Erie-Niagara Counties income doubled in current dollars since between 1990 and 2009, but increased by 63% in constant 1990 dollars.⁵

The number of persons per household has been declining statewide since 1990, and as illustrated in Figure 6, and that trend is reflected in Tonawanda as well as Erie-Niagara Counties. Erie-Niagara Counties had approximately the same profile as New York, but Tonawanda had a lower rate of persons per household at 2.34 versus 2.60 in 2010.

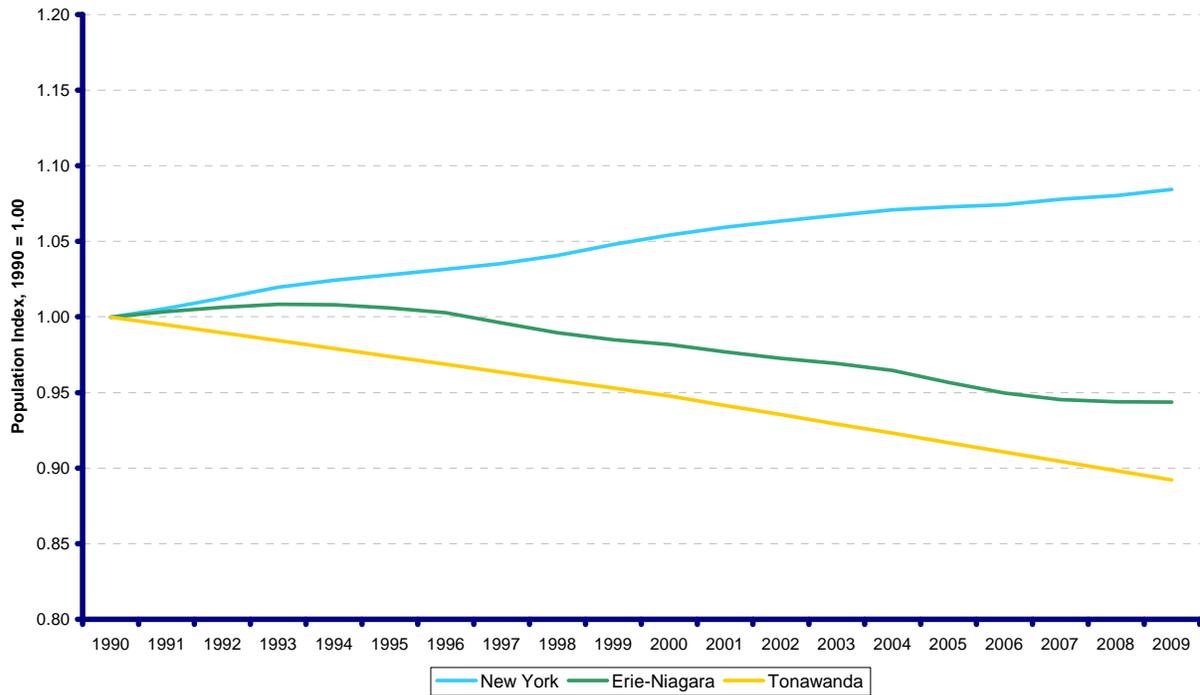
Other relevant demographic observations include:

- Tonawanda's Median Household Income (\$61,065) and Per Capita Income (\$31,810) are greater than incomes in Erie-Niagara Counties and New York Statewide. (Figure 8)
- Residents of Tonawanda are slightly better educated than the rest of the state. Forty-one percent (41%) of residents in Tonawanda have college degrees compared to 38% for the region and 39% for the state as a whole. (Figure 9).
- Residents of Tonawanda have a 10% shorter commute to work at 21 minutes than the average for Erie-Niagara Counties (23 minutes).⁶

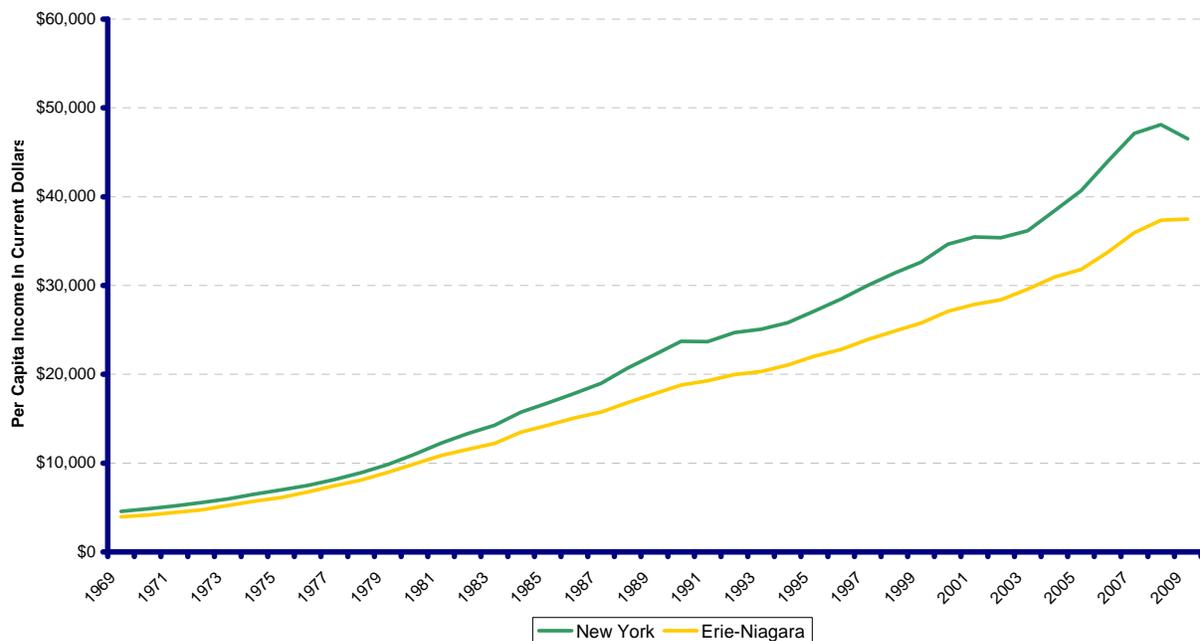
⁵ Current dollars are the value of income in the year it is recorded (i.e., \$1999 dollars are those earned in \$1999), while constant dollars represented the change in purchasing power relative to the 1969 base year. As an example, an income of \$38,000 in 2000 only buys as much as \$30,000 would have in 1990. Personal income data were not available for the Town of Tonawanda.

⁶ Claritas Site Reports, 2010.

**Figure 3. Tonawanda, Erie-Niagara Counties and New York Population Indices
1990 = 1.00**

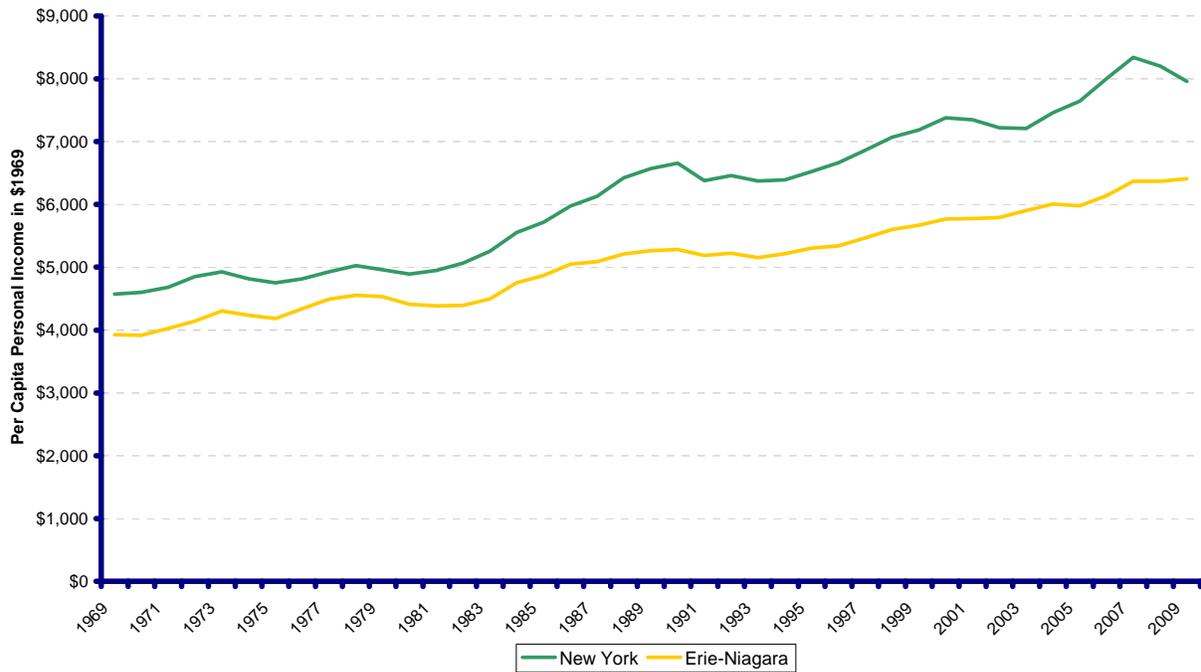


**Figure 4. Erie-Niagara Counties Personal Income per Capita,
Current Dollars and Constant Dollars, 1969 - 2009**



Source: US Department of Commerce, REIS Database, Table CA30 and FXM Associates.

Figure 5. Erie-Niagara Counties and New York Income per Capita, 1969 - 2009 in Constant \$1969 Dollars



Source: US Department of Commerce, REIS Database, Table CA30 and FXM Associates.

Figure 6. Tonawanda, Erie-Niagara Counties and New York Persons per Household, 1990 - 2015

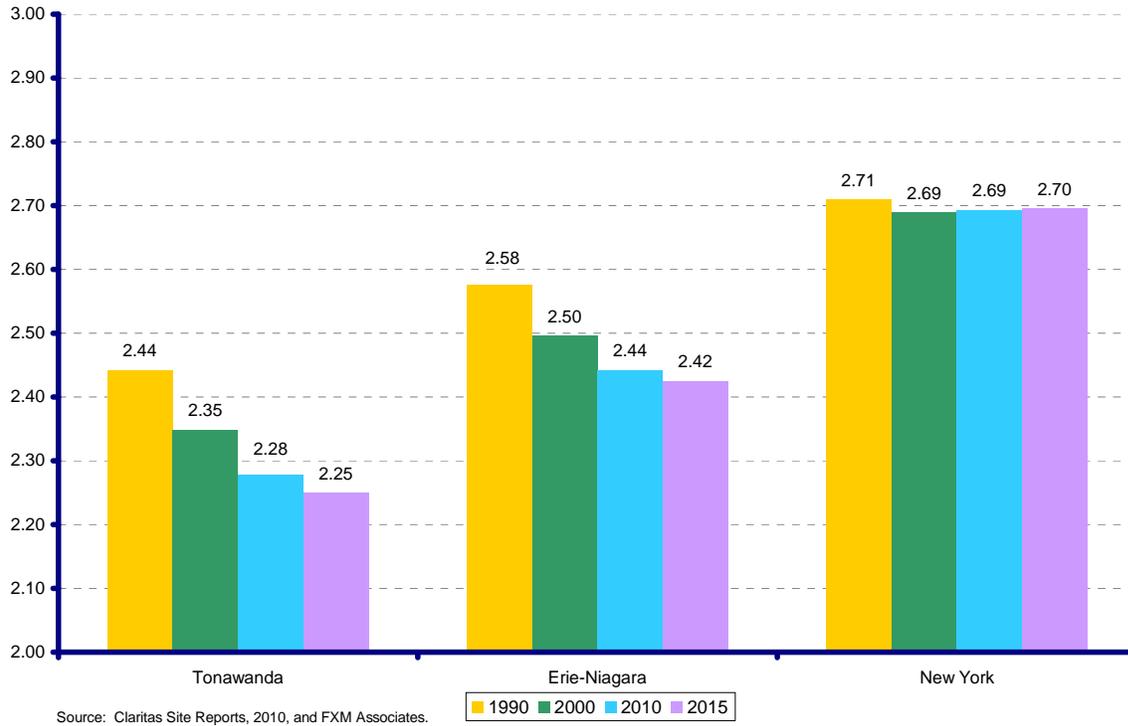


Figure 7. Percent of Dwellings Owner Occupied, 2009

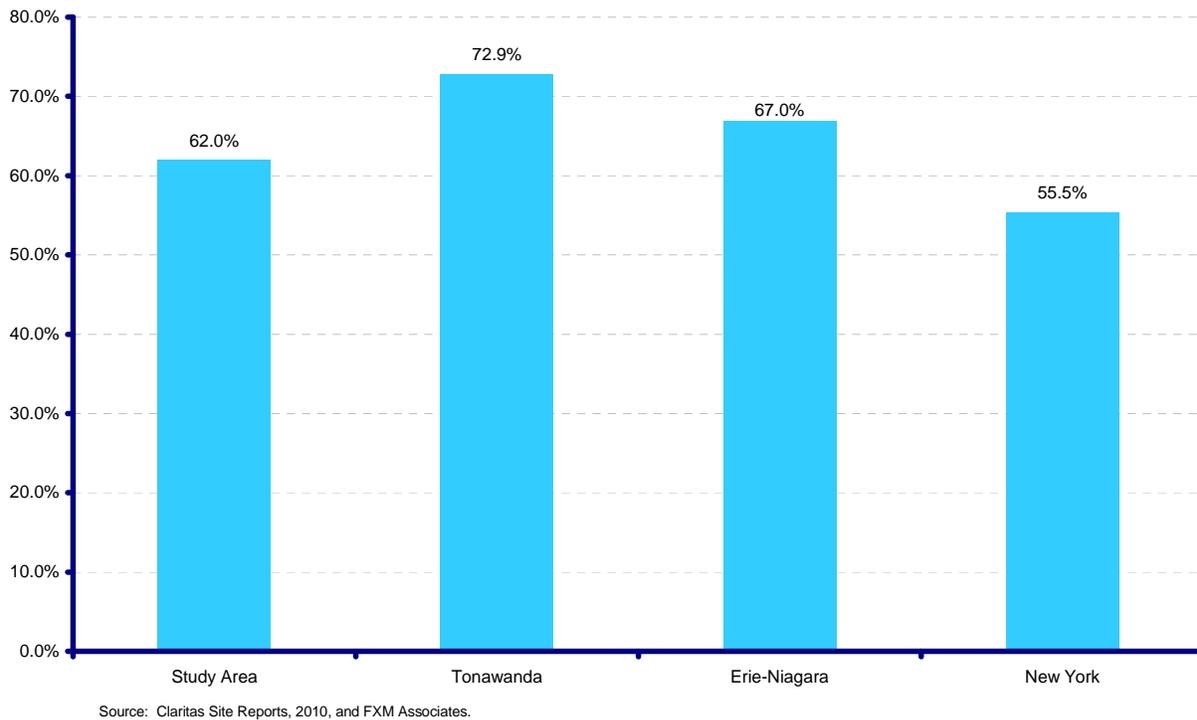
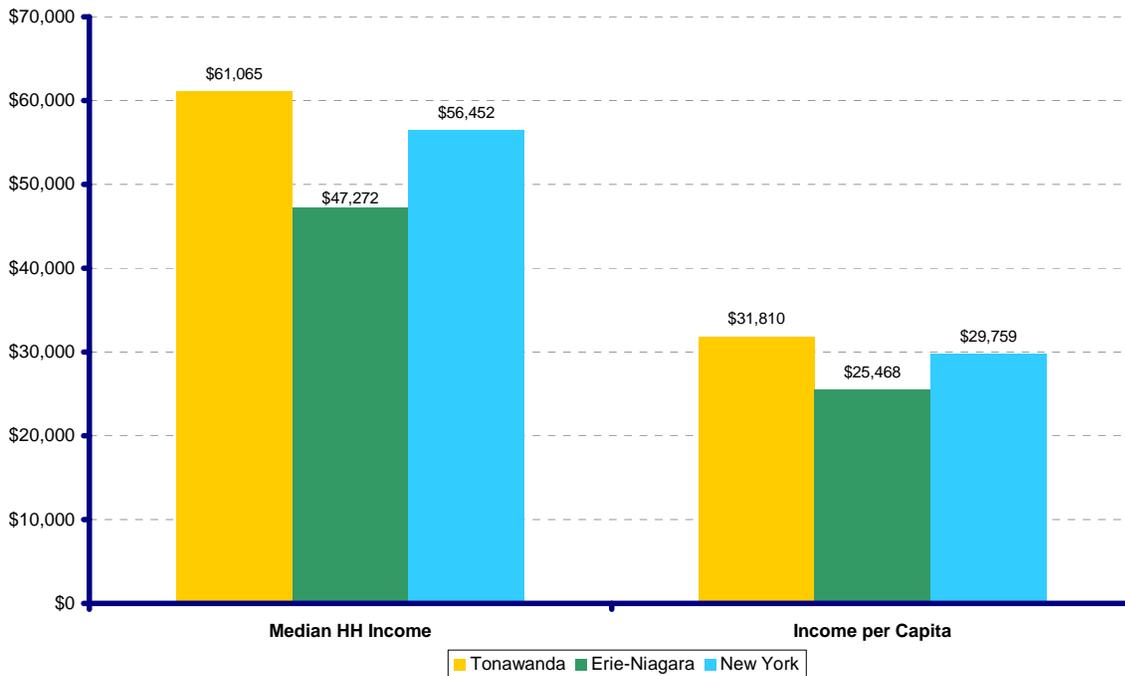
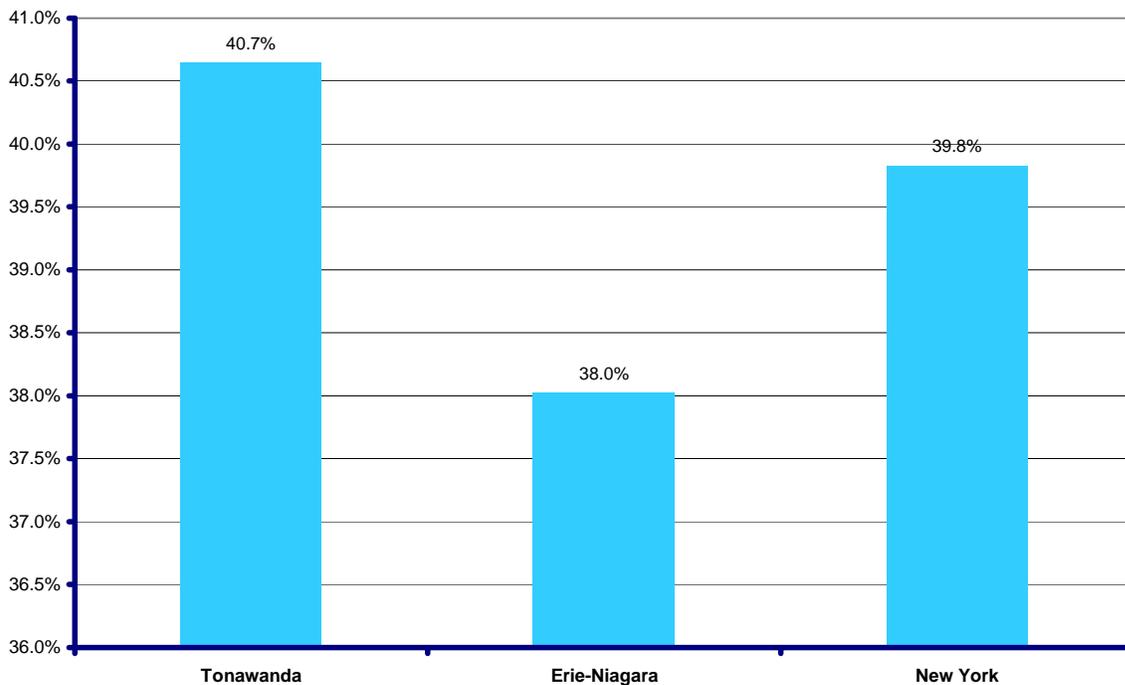


Figure 8. Tonawanda, Erie-Niagara Counties and New York Income Comparison, 2010



Source: Claritas Site Reports, 2010, and FXM Associates.

Figure 9. Tonawanda, Erie-Niagara Counties and New York Percent of Adult Population with College Degrees, 2009



Source: Claritas Site Reports, 2010, and FXM Associates.

While historical changes in population and households are important to consider in understanding baseline, or Existing Conditions within the Waterfront Study Area, as well as the larger city-wide and county-wide social environment, they are not necessarily indicative of future conditions. Potential population and household growth over the long term, and the assumptions that underlie such forecasts, have been carefully considered by the regional planning agency (Greater Buffalo-Niagara Transportation Plan Council) in its forecasting process for year 2035 demographics. The same caveat needs to be considered in the subsequent section on Employment-related Trends.

IV. Historic Employment Trends

Figure 10 shows long-term employment trends in Erie-Niagara Counties and New York from 1969 to 2009. The graph reflects that Erie-Niagara Counties' employment has been up and down since 1969 with a big drop from 1979 to 1983. More recently there has been a general increase from 1990 through 2009 and this growth trend looks poised to continue into the near term.

Figure 11 shows the relative employment growth indexed to 1990 for the county and state for 1990 to 2009.

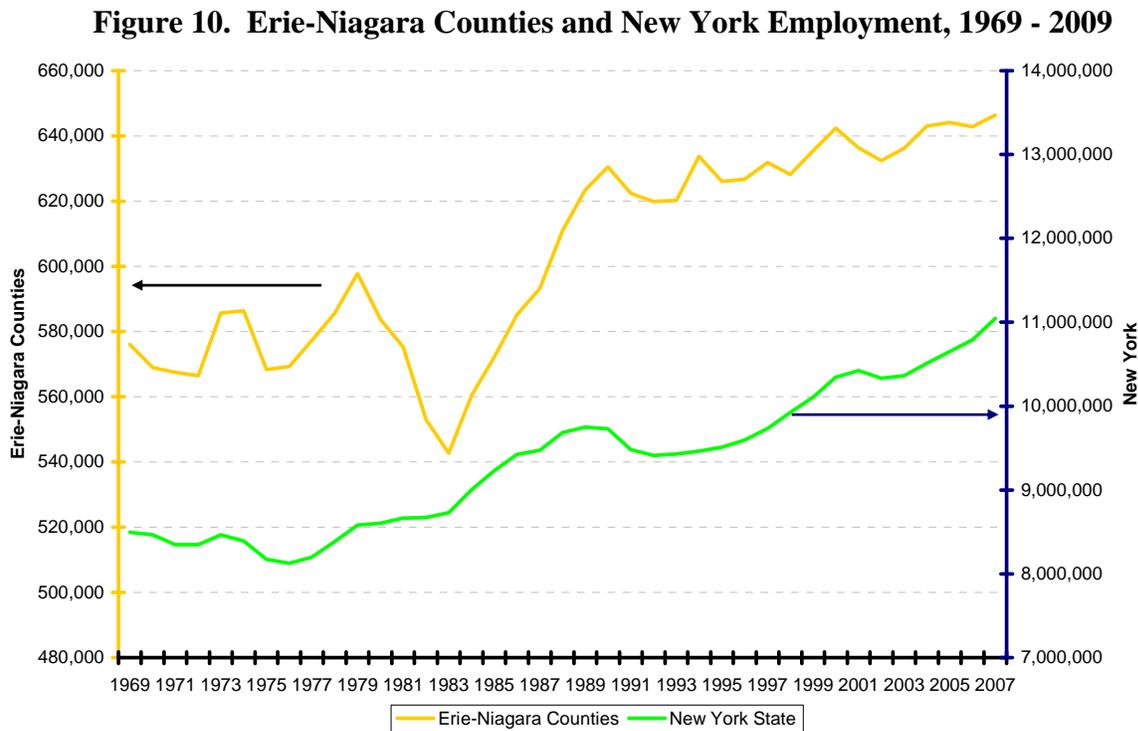
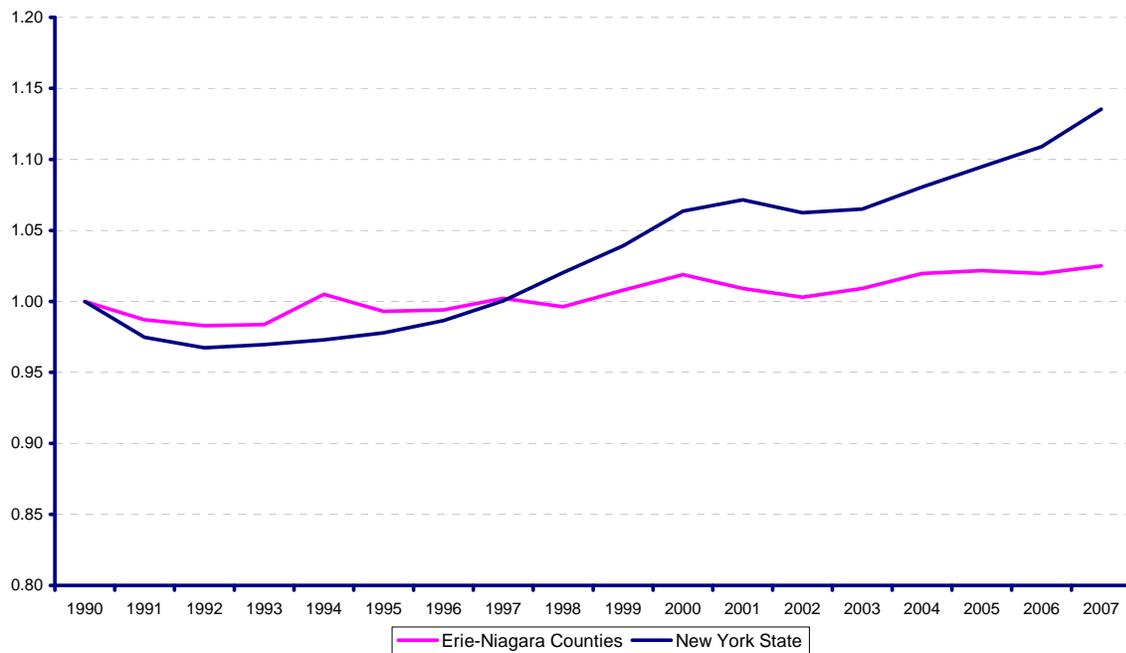


Figure 11. Erie-Niagara Counties and New York Employment Indices, 1990 = 1.00

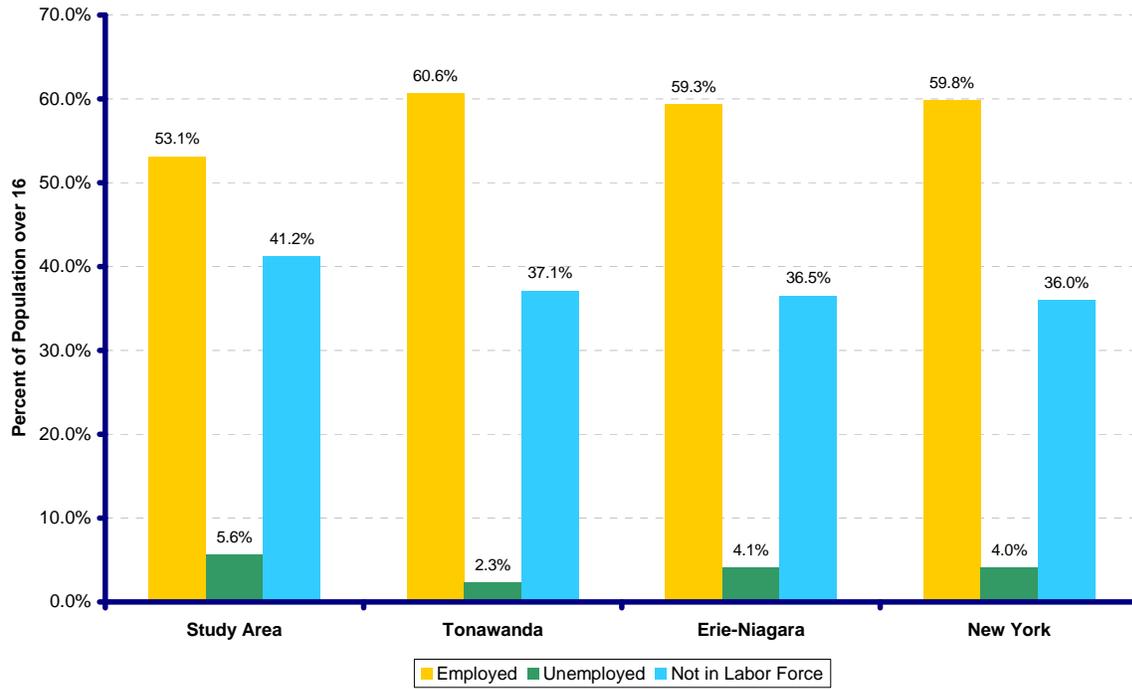


Source: US Department of Commerce, REIS Database, Table CA 30 and FXM Associates

Figures 12 through 14 present a snapshot of key employment characteristics for 2010 from Claritas *SiteReports*.

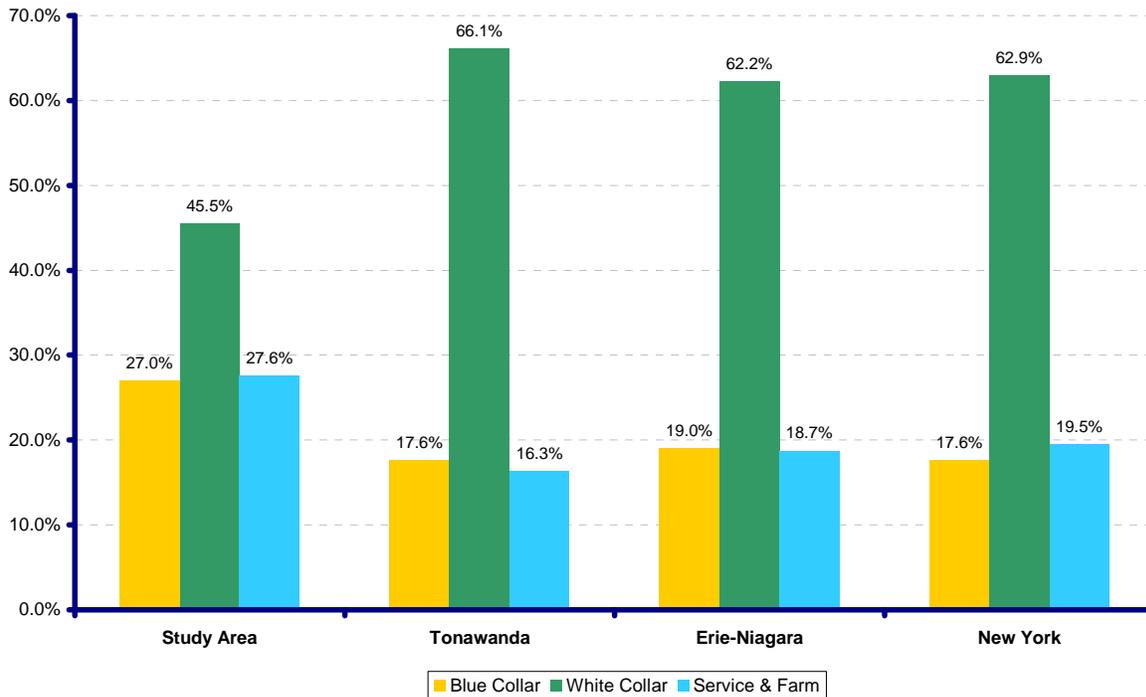
- Figure 12 indicates labor force status for the four geographic areas used in this analysis. The Waterfront Study Area has the lowest percent of employed labor force (53%) and the highest percentage of residents aged 16 and older not in the labor force (41%).
- Figure 13 shows that the Waterfront Study Area has noticeably lower rates of white-collar employment compared to the Town, region, and the statewide averages. The Study Area has a higher percentage of its employment in blue collar and service industries.
- Figure 14 illustrates the percentage of employed persons by occupation in Tonawanda, Erie-Niagara Counties and New York. This graph shows higher Town employment rates in Management, Office/Admin Support, and Sales-Related occupations, and lower employment percentages in Farming, Legal and Life Science occupations.

Figure 12. Employment Status, 2010



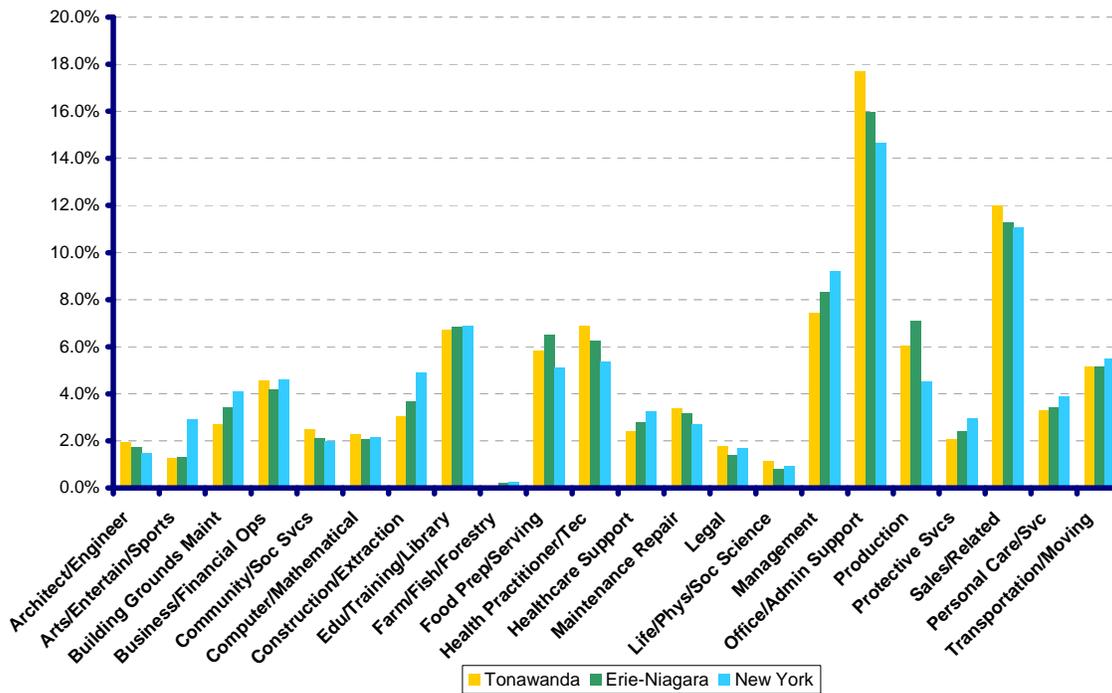
Source: Claritas Site Reports, 2010, and FXM Associates.

Figure 13. Percent of Workers by Occupation Class, 2009



Source: Claritas Site Reports, 2010, and FXM Associates.

Figure 14. Tonawanda, Erie-Niagara Counties and New York Percent of Workers by Occupation, 2009



Source: Claritas Site Reports, 2010, and FXM Associates.

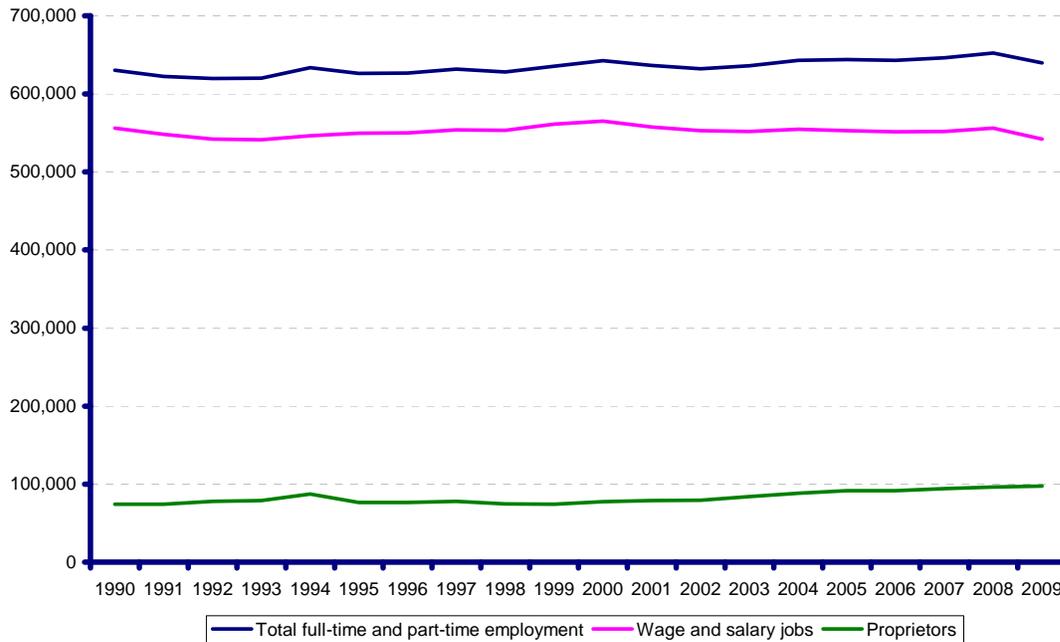
Figure 15 portrays long-term trends in Erie-Niagara Counties for total employment by wage and salary jobs and sole proprietors' employment. Both population and employment have been increasing slowly but steadily since 1991. Wage and salary employment declined after 2000 with around 550,000 jobs in 2009. However, the number of proprietors in the region has grown by 26% since 2000 indicating that one and two person firms have been a primary source of new jobs in recent years.

Figure 16 shows growth indices for total employment and total county population indexed to 1990 levels. Regional population has dropped steadily since 1993, while employment has been up and down for the past two decades. The latest downward trend shows total employment approaching the same level as in 1990.

Figure 17 shows New York jobs per capita declined in the early 1990s but had increased from 0.51 in 1994 to 0.57 in 2008, but dropped to 0.56 by 2009. Values for Erie-Niagara Counties have been more constant going from 0.52 jobs per capita in 1993 to 0.58 in 2008.

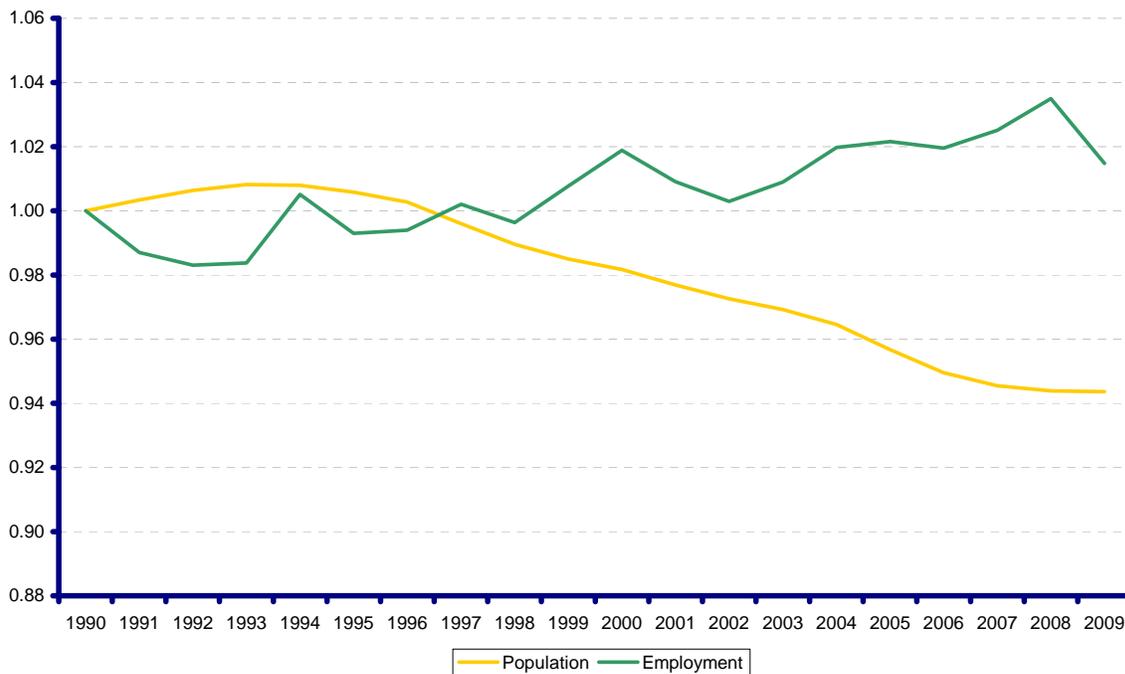
As mentioned above, FXM used two basic data sources for employment: the Bureau of Economic Analysis (BEA), Regional Economic Information System (REIS); and the New York Department of Labor's Quarterly Census of Employment and Wages (QCEW). Figure 18 shows a comparison of employment estimates from these two sources of employment by category. The principal difference between the two datasets is that QCEW includes only those workers covered by state unemployment insurance while REIS includes all full-time and part-time employees and sole proprietors regardless of whether they are eligible for unemployment compensation or not. The differences are found in those jobs with a considerable amount of part-time and seasonal employment (Retail Trade,) or self-employed people (Finance and Insurance, Real Estate, and Professional and Technical Services).

Figure 15. Erie-Niagara Counties Total, Wage and Salary, and Proprietors Employment, 1990 - 2009



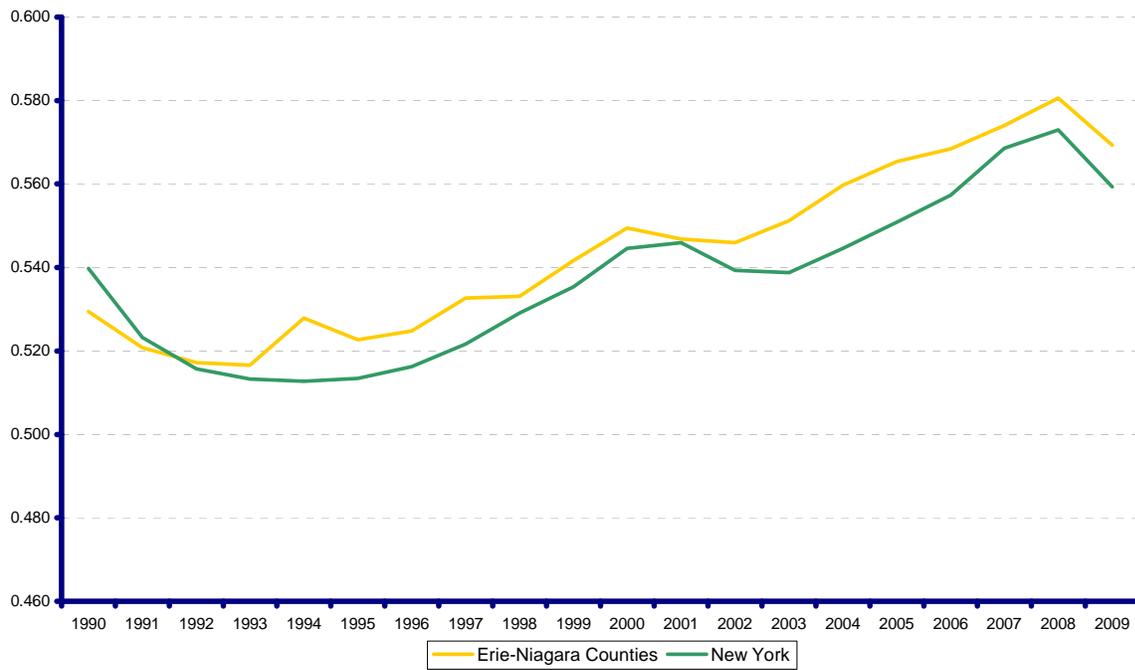
Source: US Department of Commerce, REIS Database, Table CA 30 and FXM Associates.

Figure 16. Erie-Niagara Counties Population and Employment Indices, 1990 - 2009 (1990 = 1.00)



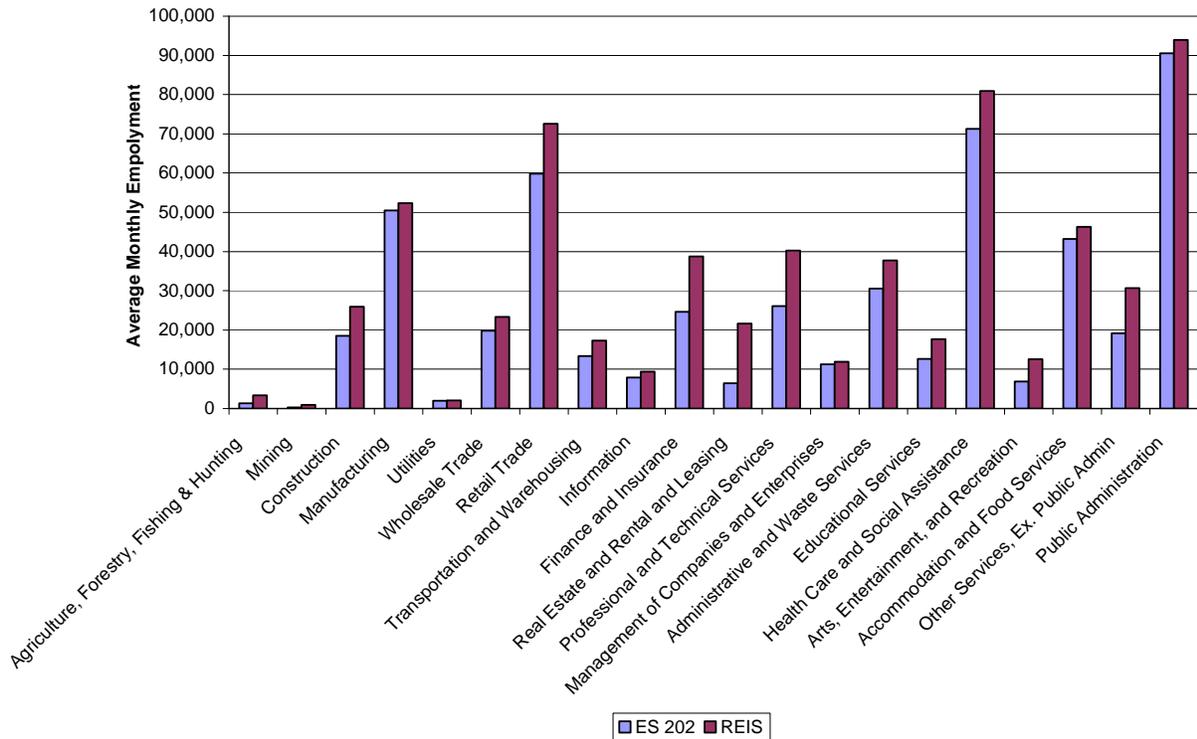
Source: US Department of Commerce, REIS Database, Table CA 30 and FXM Associates.

Figure 17. Erie-Niagara Counties and New York Employees per Capita, 1990 - 2009



Source: US Department of Commerce, REIS Database, Table CA 30 and FXM Associates.

Figure 18. Compare REIS and ES 202 Sources for Erie-Niagara Counties Employment, 2010



Year 2010 employment by NAICS category is shown in Table F and Figure 21 for Erie-Niagara Counties and Tonawanda. In the county, the top employers are in the Health Care and Social Assistance, Retail Trade, Educational Services and Manufacturing sectors. In the Town of Tonawanda, the leading categories are Manufacturing, Retail Trade and Educational Services.⁷

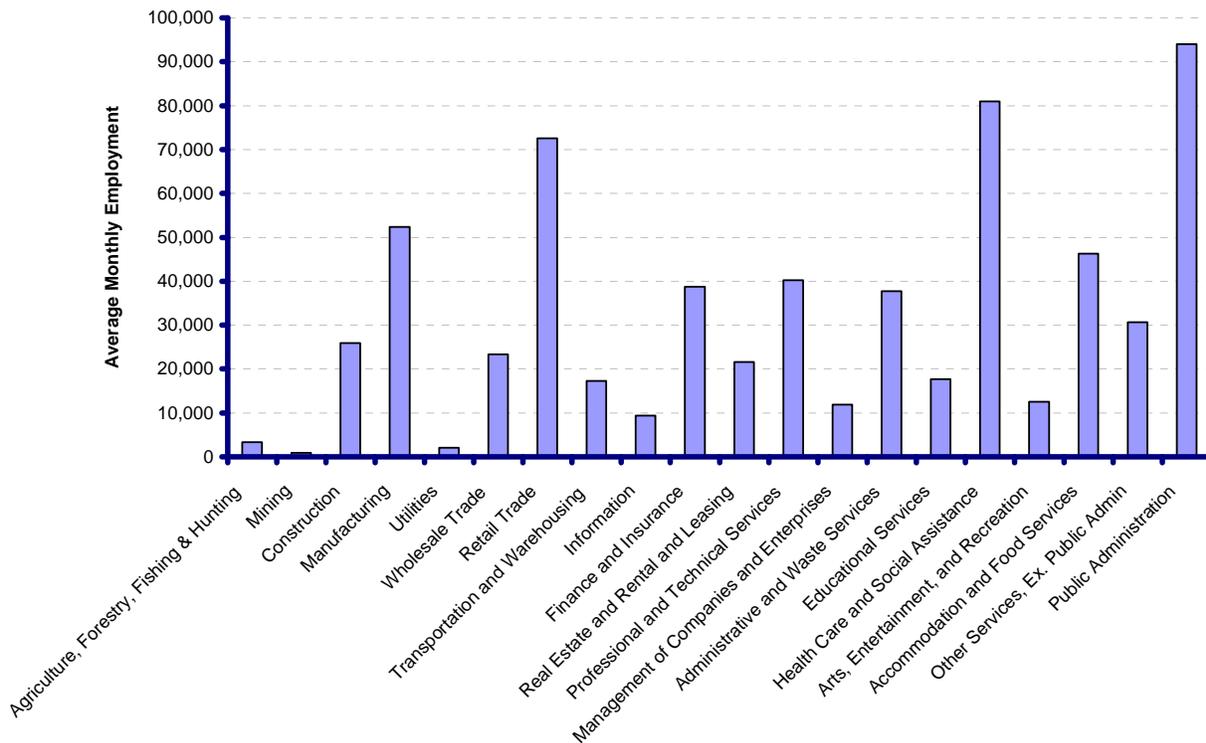
⁷ US Department of Labor, Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2010.

Table F. Erie-Niagara Counties Employment by NAICS Category, 2010

NAICS Category	Erie-Niagra Counties
Agriculture, Forestry, Fishing & Hunting	3,304
Mining	901
Construction	25,929
Manufacturing	52,353
Utilities	2,077
Wholesale Trade	23,340
Retail Trade	72,549
Transportation and Warehousing	17,319
Information	9,387
Finance and Insurance	38,772
Real Estate and Rental and Leasing	21,626
Professional and Technical Services	40,216
Management of Companies and Enterprises	11,917
Administrative and Waste Services	37,768
Educational Services	17,681
Health Care and Social Assistance	80,987
Arts, Entertainment, and Recreation	12,520
Accommodation and Food Services	46,277
Other Services, Ex. Public Admin	30,658
Public Administration	93,981
Total, All industries	639,562

Source: US Department of Labor, Bureau of Labor Statistics, Quarterly Census of Employment and Wages, average for 2010 calendar year.

Figure 19. Erie-Niagara Counties Employment by NAICS Code, 2009



III. Population and Employment Forecasts

This section summarizes future population and employment forecasts for Tonawanda and the Erie-Niagara region from various public sources. The first source is the *Claritas* population and household projections for 2015 which have been included in Table A earlier in this report.⁸

These projections are based on proprietary formulas from Nielson Claritas, and are basically short term trends based on the latest available Census and American Community Surveys data.

The second source is long term forecasts of population, households, and employment from the Greater Buffalo-Niagara Region Transportation Council (GBNRTC) which were prepared for the 2030 Long-Range Transportation Plan Update.⁹

The third source is the New York DOL 2018 forecasts of population and employment for New York State and the Erie-Niagara region.¹⁰ Long-term industry employment projections are currently available at the statewide and regional levels for approximately 90 detailed industries (at the 3-digit NAICS industry level), and cover the 2008-2018 period.

Employment

Figure 20 illustrates the projected long term population (2030) trend for the Town of Tonawanda and Erie-Niagara Counties from the GBNRTC, incorporating the 2015 projection from Claritas (2018 projection from New York DOL for employment adjusted to 2015). The two trends are parallel, showing a dip bottoming out in 2015 and then recovering through 2030.

Households

The number of households in Tonawanda and Erie-Niagara Counties are expected to follow a similar pattern as population. As shown in Figure 21, households are expected to dip in the future until roughly 2015 and then recover through 2020.

Total Employment

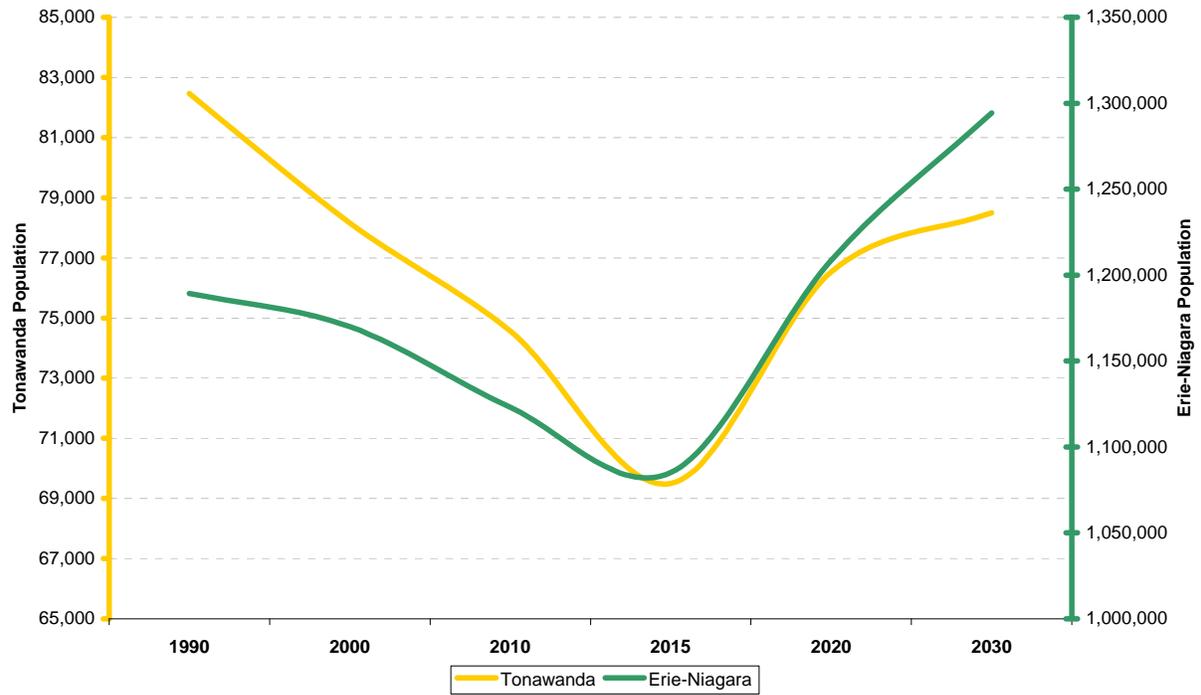
Figure 22 shows historical and future employment in Tonawanda and Erie-Niagara Counties from 1990 through 2030. These estimates are from GBNRTC's projections TAZ-level forecasts developed for the 2030 Regional Transportation Plan Update. The forecasts for 2015 were derived by applying the annual growth rates from NYSDOL's 2008-2018 projections to the 2010 GBNRTC estimates. The resulting trend is about the same as the population trends for the 2010-2030 period: employment peaked about 2000, has declined and will continue to decline through about 2015, and then recover through 2030.

⁸ *Claritas SiteReports*, Demographic Snapshot, 2010.

⁹ Greater Buffalo-Niagara Regional Transportation Council, *2030 TAZ Demographics-Employment and 2030 TAZ Demographics-Population and Households*; www.gbnrtc.org/data retrieved 9/18/2011.

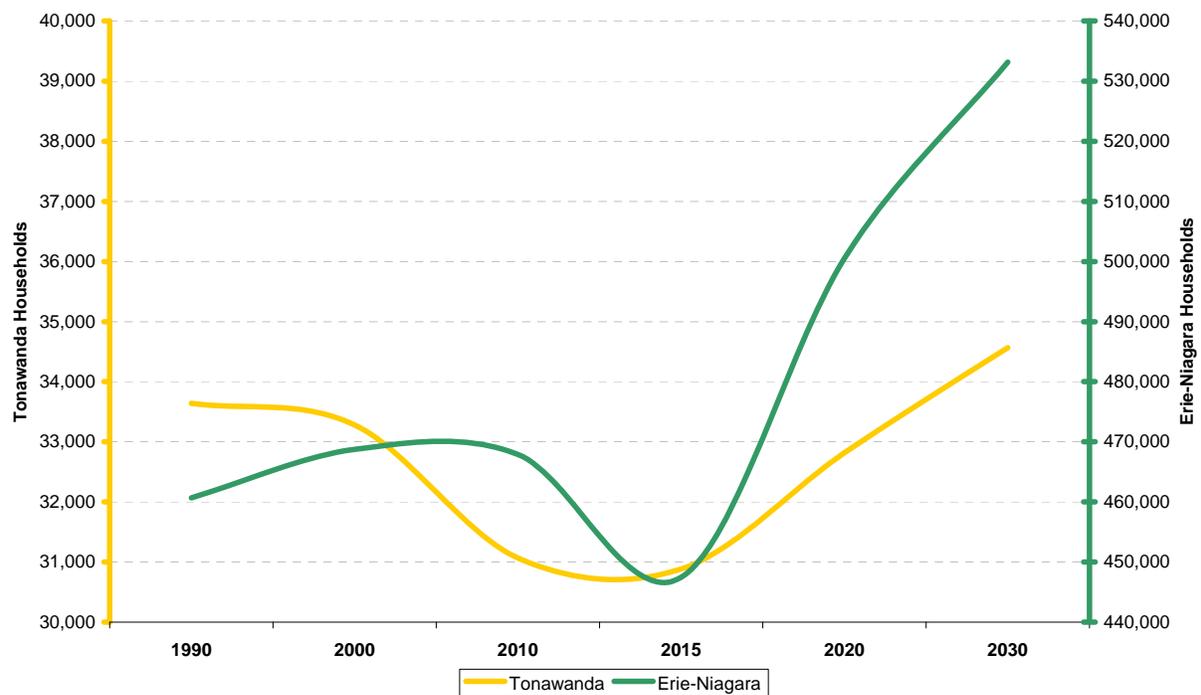
¹⁰ New York State Department of Labor, Division of Research and Statistics, *Long-Term Industry Employment Projections, 2008-2018*, 2006.

Figure 20. Population, Historical and Forecast, 1990 - 2030



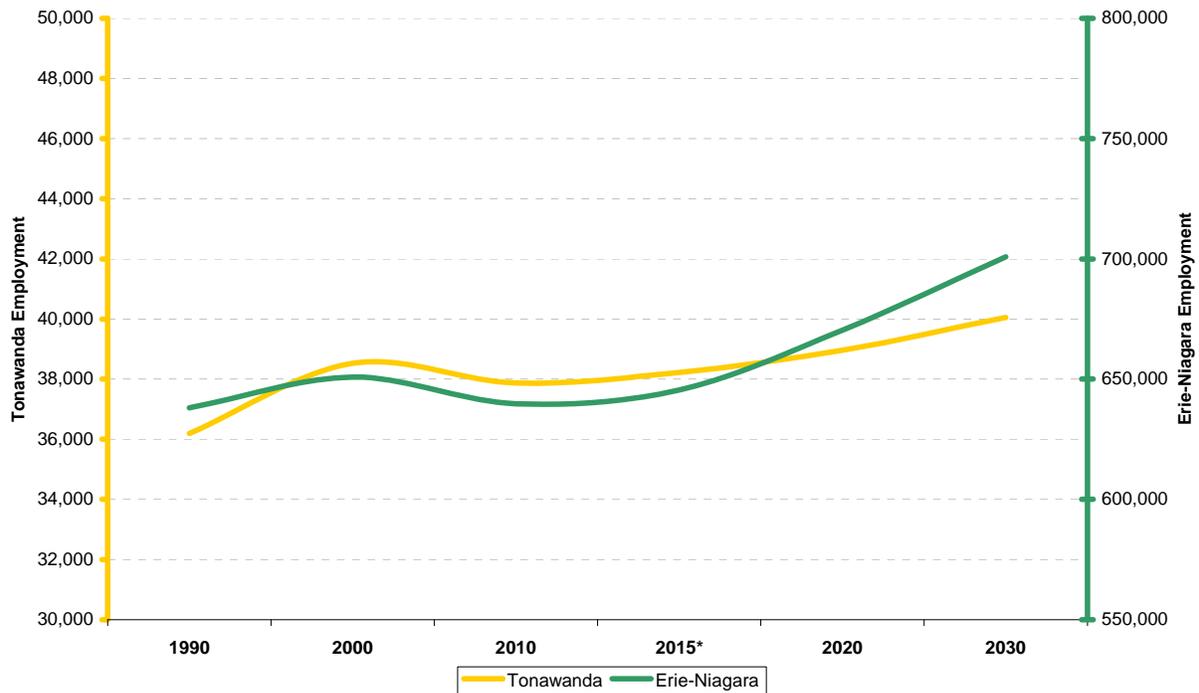
Source: Greater Buffalo Niagara Regional Transportation Council, 2006; and FXM Associates.

Figure 21. Households, Historical and Forecast, 1990 - 2030



Source: Greater Buffalo Niagara Regional Transportation Council, 2006; and FXM Associates.

figure 22. Employment, Historical and Forecast, 1990 - 2030



Source: Greater Buffalo Niagara Regional Transportation Council, 2006; and FXM Associates.

Summary Forecasts and Growth Indices

Table F summarizes population, household, and employment growth to 2030 as described above. The primary source for all forecasts is the Greater Buffalo Niagara Regional Transportation Council historical and forecast data by traffic analysis zone (TAZ).

Table F. Demographic and Employment Projections, 1990 - 2030

	Population					
	1990	2000	2010	2015	2020	2030
Tonawanda	82,464	78,155	73,567	69,494	76,034	78,501
Erie-Niagara	1,189,288	1,170,111	1,123,000	1,085,144	1,208,685	1,294,370
	Households					
	1990	2000	2010	2015	2020	2030
Tonawanda	33,636	33,278	31,070	30,886	32,818	34,567
Erie-Niagara	460,707	468,719	467,917	447,485	500,536	533,155
	Total Employment					
	1990	2000	2010	2015*	2020	2030
Tonawanda	36,193	38,528	37,877	38,218	38,966	40,055
Erie-Niagara	638,068	650,819	639,817	645,575	670,359	700,900

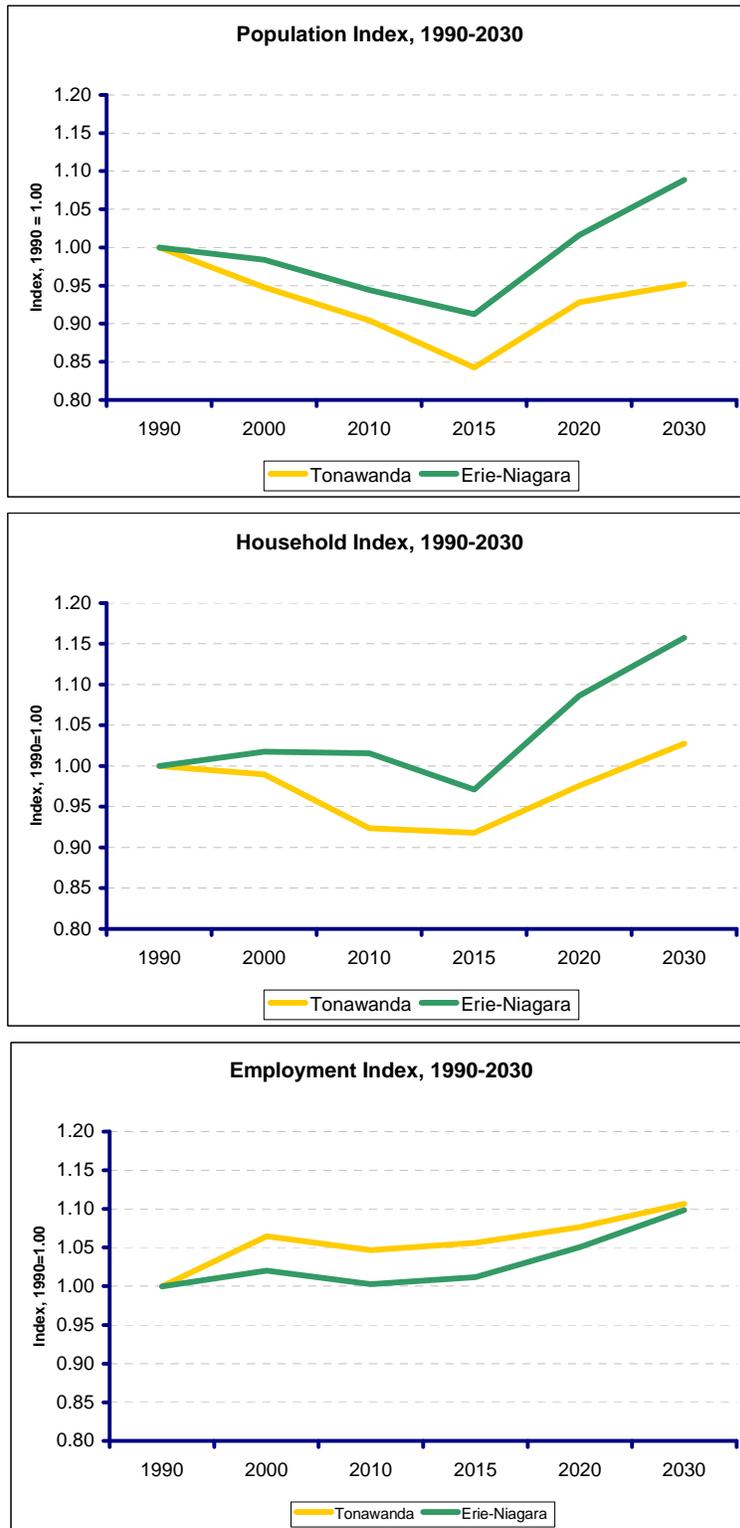
*FXM estimate based on growth rate from NYSDOL applied to GBNRTC Base data.

Source: Greater Buffalo Niagara Regional Transportation Council, 2006; and FXM Associates.

FXM Associates

Another way to portray growth is to index future years to some base year. In this case the base year was 1990, and population, households, and employment values for 2000-2030 were divided by their respective 1990 values and displayed in separate graphs in Figure 23.

Figure 23. Growth Indices for Population, Households, and Total Employment, 1990-2030



Source: Greater Buffalo and Niagara Falls Regional Transportation Council, 2006, and FXM Associates

Regional Economic Development Context

The Tonawanda Waterfront Study Area is situated within the Buffalo-Niagara sub-region of the larger Western New York region. The Town of Tonawanda and other communities in the Buffalo metropolitan area have mounted effective transformation of former industrial waterfronts through aggressive site remediation, and major emphasis on public realm improvements. Communities have targeted government brownfield funds, state and regional resources for Niagara River waterfront public improvements and infrastructure that supports existing companies and accommodate emerging business sub-sectors.

The Niagara River and its waterways, public water and waterfront access, water views are prominent, distinctive features of recent commercial and residential redevelopment projects in Buffalo and North Tonawanda, as well as residential development recently permitted in the Study Area. Parks, scenic overlooks, recreational facilities, water-dependent activities, landside waterfront access points interface with the Niagara River Greenway/Bikeway, and with other public realm amenities have attracted new private investment.

The *Western New York Regional Economic Development Plan* identifies eight key industry sectors with significant business and real estate development potential, including Advanced Manufacturing, Energy, Health/Life Sciences, and Tourism/Hospitality. Regional growth employment projections in Health/Life Sciences sectors are relevant in Buffalo, but not reflective of trends in Tonawanda. Moreover, any spin-off development in pharmaceutical businesses locating in Tonawanda are likely to choose one of the relatively new office parks in Tonawanda, each with 50+ acres and directly competitive with the Study Area.

Focusing on solar technology as a competitive advantage, *Riverview Solar Technology Park* is the 'flagship' public-private partnership that is establishing the Town of Tonawanda as a center for renewable energy commerce. *TM Montante Development* is implementing its 2010 master plan to transform a 100-acre vacant site on River Road into an eco-friendly business park powered by on-site solar energy systems. The Park has two fully leased buildings with 125,000 SF of occupied commercial space, and is expanding with construction underway for a 90,000 SF FedEx facility. The *DuPont* company operates a facility within the Study Area that manufactures material for solar modules, and is installing the latest version of its Apollo solar system to power signs and lighting at the Park entrance. The Town prepared new legislation promoting solar energy production, and *TMM* also can service solar projects on a 3rd party basis outside the Park. Other energy related business development in Tonawanda includes an engineering firm engaged in wind energy R&D recently received patents for small, more efficient turbines for residential, and commercial installation, and, plans to start-up manufacturing with 30 employees.

Tonawanda & Study Area Market Trends

Office/Industrial Commercial Market

Commercial real estate professionals report steady commercial demand in the Buffalo area over the past few years, primarily, for replacement space, and foresee no major change or signs of significant growth over the next three to five years. The Town of Tonawanda has been described as a secondary market within a secondary market, with Amherst being the nearest competitive location that captures most of any new demand for commercial space. The Tonawanda and Study Area market potential is constrained by prospective tenant's

ability to see beyond existing conditions, and accept it as a better deal than paying premium prices to locate elsewhere.

Currently, Tonawanda commercial demand is mainly from price-sensitive builders/tenants looking for 3-4 acre 'shovel ready' sites, inexpensive built space, or warehouse/distribution space. In addition, perceptions about Brownfield property redevelopment also could impede the Study Area revitalization plans. Commercial realtors indicate that many businesses view cleaned-up sites skeptically, and developers usually find site remediation costs don't warrant return on investment. However, the recently built industrial park on Route 5 in Buffalo attracted a large, single tenant, and the project was cited as a successful example of how cleaning-up Brownfields can be an incentive for private investment.

WATER-DEPENDENT COMMERCIAL USES

- *Marinas* – Three marinas operate in the Study Area: *Mid River Marina, Inc.* (3670 River Road), *Stinger's Marina, Inc.* (10 Aqua Lane), and *Collins Marine* (4444 River Road). Preliminary land use investigations of Study Area property conditions and developable indicate existing marinas in the Study Area have limited, if any, suitable area for facility expansion. Reportedly, the Niagara River has very swift current along the Tonawanda waterfront, narrow width between the shoreline and Grand Isle, and heavy vessel traffic. Local planners and developers identified these navigational constraints as problematic, and necessitating construction of an inlet to develop a marina site, which would require costly dredging and ACOE permits.
- *Marine Services* – *Collins Marine* and *Mid River Marina* provide a range of repair and maintenance services for marina boats, and *Collins Marine* offers on-site engine and related services to other vessels, as well as boat sales, charters, and transportation. Although suitable landside locations may exist in the Study Area, reportedly, the absence of such uses in the Tonawanda waterfront area is due to large vessel navigation restrictions at Black Rock Channel.
- *Excursion/Charter Tours* - The bulkhead and paved area along the former Wickwire-Spencer steel plant was designed for berthing and stevedoring large commercial vessels, and easily could accommodate waterborne passenger boats, including charter/excursion vessels. The Wickwire redevelopment concept promoting waterfront access and water-oriented activities, could incorporate a 'Wickwire Landing' for waterborne transportation uses, such as the *Miss Buffalo* operated by *Buffalo Harbor Cruises*.

Residential Market

The Study Area has large manufacturing facilities in the southern and middle sections that limit opportunities for feasible residential development. Residential developers and real estate brokers noted that the missing product is housing for older couples and singles, many are downsizing and some still employed. Residential and mixed-use development on the Buffalo waterfront has targeted this demand, and also attracted Canadian investors, who could be interested in the Tonawanda waterfront with its easy access from Lake Erie.

Residential demand in Tonawanda also is mostly for senior housing, and recently built patio homes with many high-quality upgrades sold for \$200-\$300,000 in a neighborhood with home prices in the \$90,000 range. In the Study area, *Giuseppe Holdings LLC* has received Town approval to build a residential complex with three apartment buildings and 19 marina

slips. Originally planned as a condominium development with units priced at \$500,000, reportedly, the townhouses will be rental units.

As part of the assessment of residential markets, FXM Associates applied its proprietary *Housing Demand Model* to specifically analyze the potential for market rate rental housing within the project area. Rental housing has been particularly dynamic over the past few years compared to other real estate markets, even in slow growth and declining urban areas, and developers have been able to obtain financing for rental housing projects more easily than for single family homes or commercial projects. FXM's model is unusual in that it focuses on overall market activity, including turnover in the existing housing supply, to quantify potential demand whereas most housing market studies focus on net new demand from population and household growth. Over 80 percent of housing market activity in all but the fastest growing areas is driven by households moving from one location to another within a region. Developers of new or rehabilitated housing units can and do capture a share of this mobility. FXM's model quantifies potential demand at various price points based on all local movers, including but not limited to new households within a region, and does so taking into account householder mobility by age group, income (and housing affordability) by age group, and propensity to own or rent by age group. Demand is projected outward by 5 years based on forecast changes in households by age and income groups and then converted to average annual demand over the 5 year period.

Figure 1 shows average annual demand for rental housing by householders of all age groups within the Tonawanda Market Area, defined as a 20-minute drive-time distance from the Study Area. As shown by the data in **Figure 1**, average annual demand ranges from 2,400 units per year for rental units priced at \$900 per month to 260 units per year for rentals costing \$2,700 per month.

Figure 2 shows average annual demand for rental units targeted to households under age 35 and over age 55. The rental rates tested for affordability are considered the minimum necessary to support the costs of new construction or rehabilitation of existing. These two age groups – young working households and empty nester householders -- have been shown in prior projects assessed by FXM (and others) to be the two age groups most likely to choose rental housing in urban areas. The younger households are much more mobile (**Figure 3**) and more inclined to rent (**Figure 4**) than other age groups. The older households (over age 55) are the highest projected growth cohort (age grouping) with the financial ability to afford rental rates, as shown in **Figure 5**.

CAPTURING POTENTIAL DEMAND

The Study Area can capture a proportion of total rental housing demand within the Tonawanda Market Area. Most moving households will choose among existing units. Public realm and infrastructure improvements planned for the Study Area are essential to accomplish potential residential and mixed-use redevelopment. Even a site with water views may be unable to capture demand at prices high enough to warrant new construction or rehabilitation. Under conditions of significant site improvements that make the waterfront area attractive for residential development, 50 to 80 units per year renting at \$1,200 to \$1,800 per month (**Figure 2**) could be absorbed on an average annual basis within the Study Area through 2018.

Figure 1

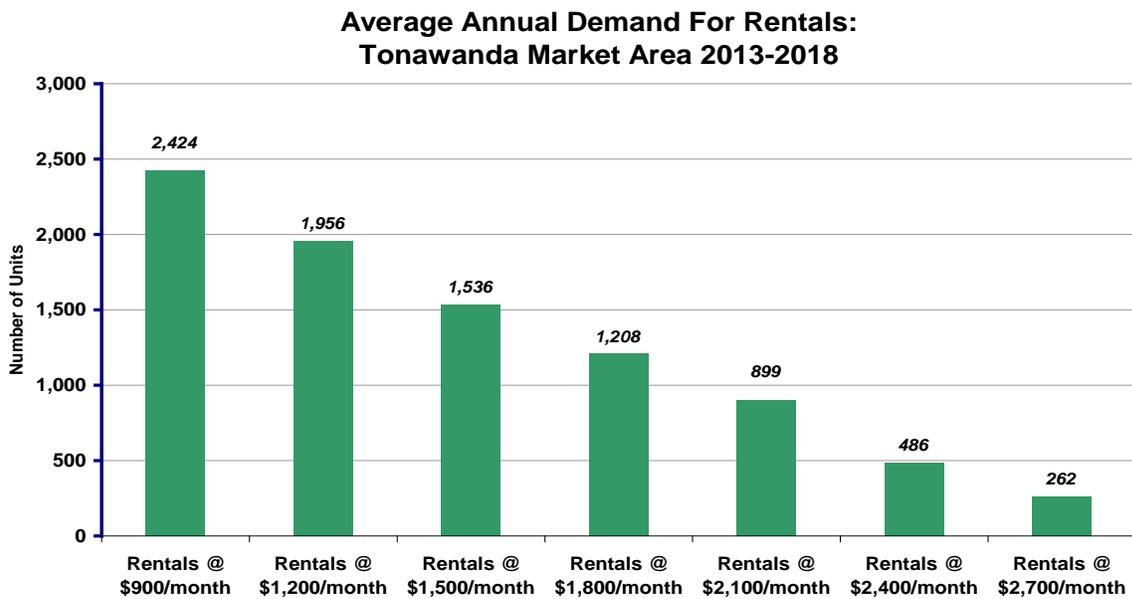


Figure 2

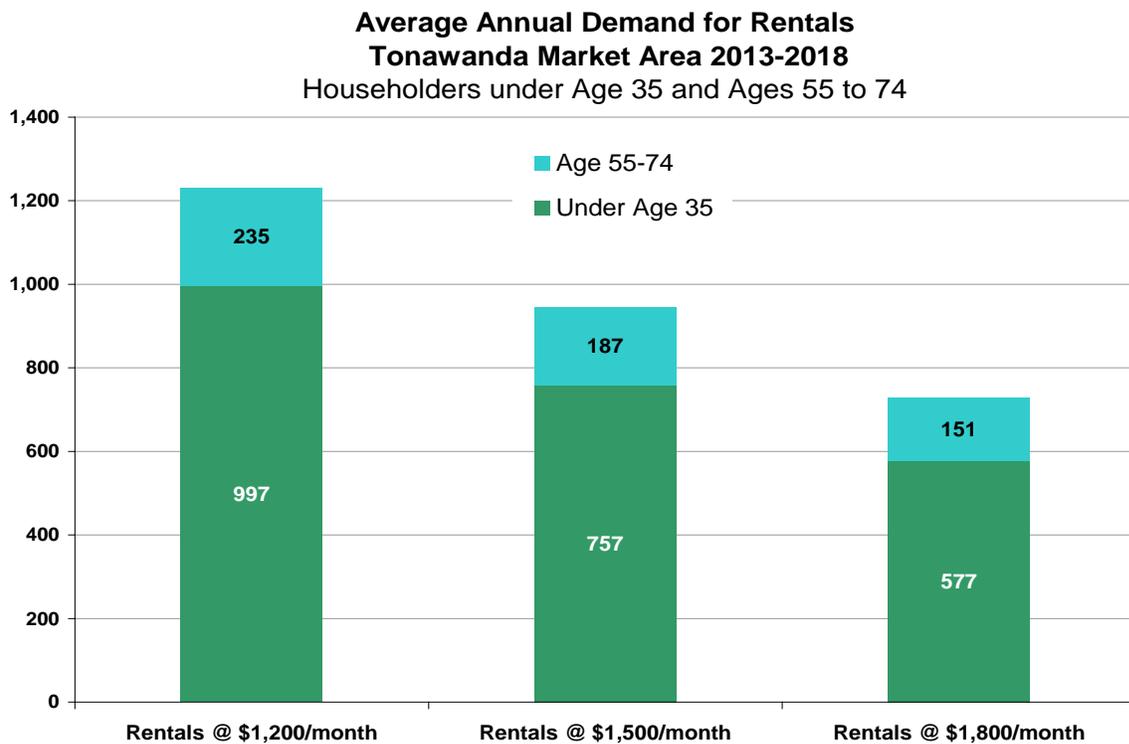


Figure 3

Annual Mobility Rates by Age of Householder

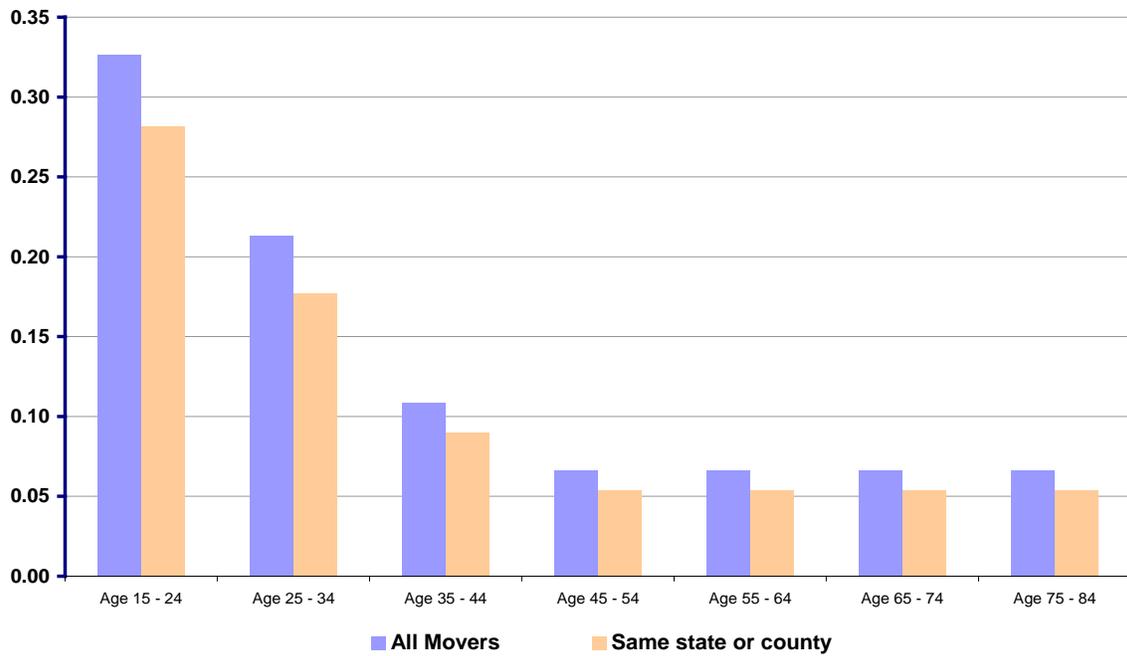


Figure 4

Propensity to Own or Rent by Age of Householder

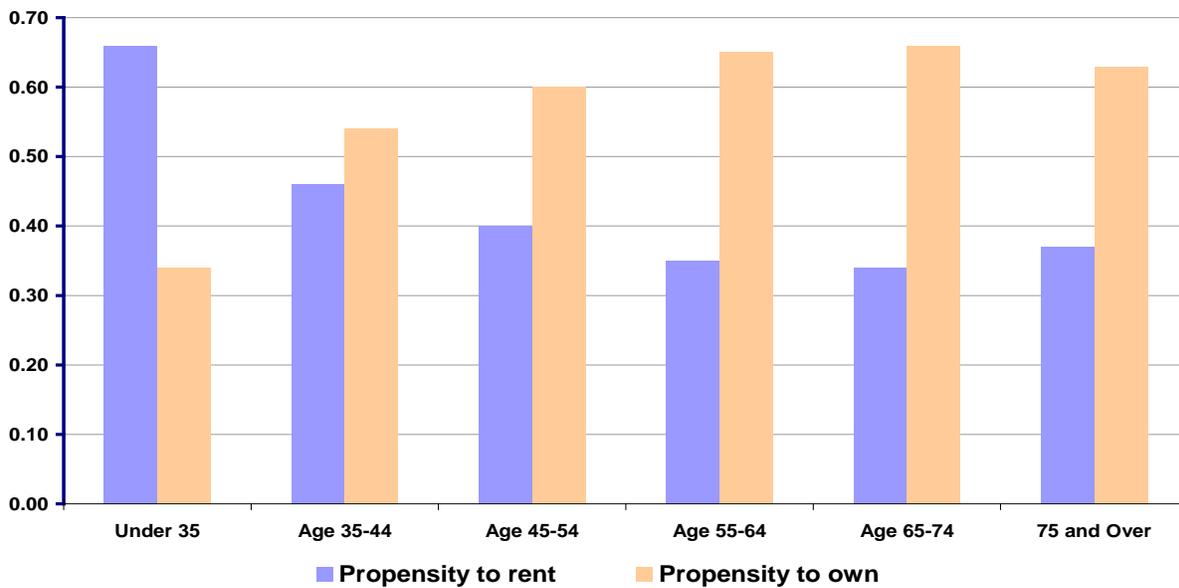
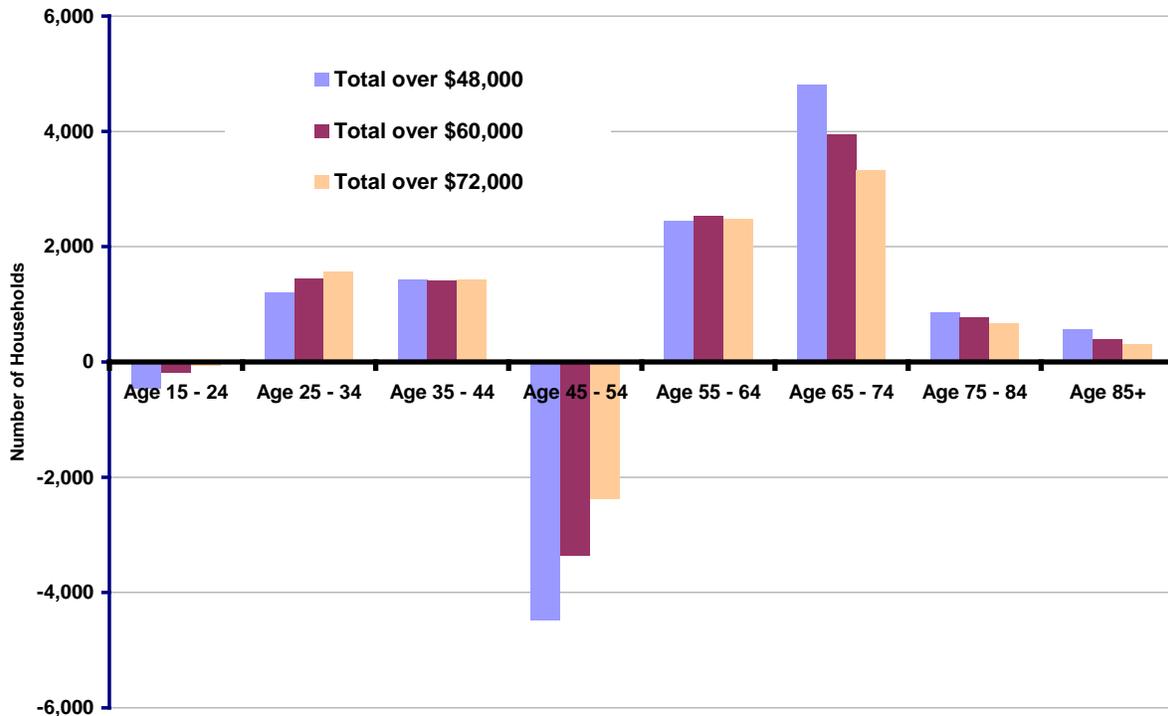


Figure 5

**Change in Number of Households by Age and Income Cohorts:
Tonawanda Market Area 2013-2018**



STUDY AREA REDEVELOPMENT

Public Realm Improvements

Waterfronts can be a powerful lure to real estate development but only if the surrounding environment is attractive enough to compete with other prospective sites for development within the overall market area. As noted in the preceding description of potential rental housing development, public realm and other improvements are necessary within the Study Area for new residential or more commercial development to take place. Waterfront and infrastructure improvements also enhance the marketability of the Riverview Solar Technology Park and other industrial and commercial uses that currently represent the best short-term opportunities to generate jobs and tax revenue within the Study Area. Visitor attractions, such as excursion/charter vessels calling at the Tonawanda waterfront will also enhance the overall marketability of the Study Area and can help support ancillary retail uses that are important to successful residential and office space development.

Niagara River Greenway

The Niagara River Greenway contains interconnected parks, river access, links to upland communities, and waterfront trails along the right riverbank from Lake Ontario to Lake Erie, as presented in the 2004 plan prepared by The Niagara River Greenway Commission. The

Greenway boundaries include 13 municipalities, including the Town of Tonawanda, and will encompass approximately 35 miles of public 'greenspace' along the Niagara River. The Greenway incorporates land under public stewardship, including a linear park along the river edge (Isle View Park) and a bike/hike path (Riverwalk) that were developed by Erie County.

In May 2013, the Commission announced the 33rd round of projects determined consistent with principles, goals and criteria defining the Niagara River Greenway Plan. Tonawanda submitted its first project application, and is using the award for River Road landscaping improvements that will change the streetscape character. The Wickwire site redevelopment plans for waterfront public access improvements also are eligible for Greenway Commission support, and the Town/TDC may seek funds for design/engineering plans.

In addition to these on-going and planned public infrastructure projects, Town and regional officials have an immediate, significant opportunity to improve visibility of the Niagara River by removing overgrown foliage between the waterfront and landside locations. Although the river may be nearby, overgrown foliage obscures the water, except from the rocks and restaurants, creating a perceptual barrier that makes the river seem inaccessible.

Riverview Solar Technology Park

The *Riverview Solar Technology Park* on River Road will contain 1 Million SF of mixed-use space on a 180-acre scenic, waterfront campus with on-site solar power for businesses, based on an approved 2010 master plan. *TM Montante Development* designed the business park to preserve mature trees, protect wetlands and habitat by meandering roads, and provide a model of economic and real estate development coexisting with natural resources. *TMM* considers the Park environment an essential part of its attraction; existing walking and biking trails will be augmented with a range of amenities and facilities typical of contemporary business parks as the employment base grows.

Currently, two (2) buildings totaling 125,000 SF are fully occupied by seven companies engaged in diverse commercial and light manufacturing businesses. In 2012, the *Unifax* company moved its operations (high temperature insulation products) from Niagara Falls to the Park, and occupies 44,000 SF with 200 employees. Solar Technology Park users pay 30% less for energy, one occupied building is powered by a 25 kilowatt array nearby, and the Park master plan includes a 50-acre 'solar farm' to provide on-site power for tenants. Construction is underway for the FedEx 90,000 SF trade network facility consisting of a 35,000 SF building and 65,000 SF warehouse on 25 acres portion of a 125-acre campus that will accommodate future expansion plans. The *DuPont* company is weather-testing the newest version of its high –efficiency Apollo solar system in the Park, where it will power sign and lighting at the Park entrance.

TMM advertises 'shovel ready, build to suit' space for office, flex, assembly, and light manufacturing to conventional companies seeking a location with good roadway access, lower energy costs, and competitive pricing. As part of a national promotion, DuPont will install 'state of the art' solar panels at the new *FedEx* distribution center to spur production; DuPont manufactures Tedlar, an integral part of solar modules, at a nearby plant in the Town of Tonawanda. In partnership with National Grid, *TMM* will begin directly marketing commercial space at the Park, to companies engaged in alternative and green energy uses to generate jobs and investment in the Western New York region.

Wickwire Waterfront Project

The former Wickwire-Spencer steel plant, a 50-acre under-utilized waterfront site will be redeveloped as a priority project by the *Tonawanda Development Corp (TDC)* and the *Niagara River World* property owners. The Wickwire property redevelopment will target government funding for waterfront access to build public improvements that will attract private investors. The project will create an area extending 200 feet eastward from the water's edge for public access to the Niagara River, and will incorporate a variety of water-oriented activities. The Cherry Farm property adjacent to the Wickwire site is a key component of the overall redevelopment project, and will become a public park for active and passive recreational uses. Buildings for the site are planned for residential and commercial uses (office, flex, light manufacturing), and the state DEM has indicated the mixed-use residential/commercial uses are permitted.

TDC would welcome the *Miss Buffalo* or other charters/excursion boats, which could easily dock at a 'Wickwire Landing' using the paved bulkhead area designed for commercial vessels. Recreational boating uses at Wickwire are desirable but considered unlikely due to ACOE permit issues related to narrow river width, swift current, and volume of vessel traffic in the vicinity of Wickwire and Grand Isle. Prior studies determined that constructing an inlet for marina or recreational boating use would require cost-prohibitive excavation of slag/ore-contaminated soil under the paved area on the Wickwire waterfront.

Riverview Townhouse & Marina Project

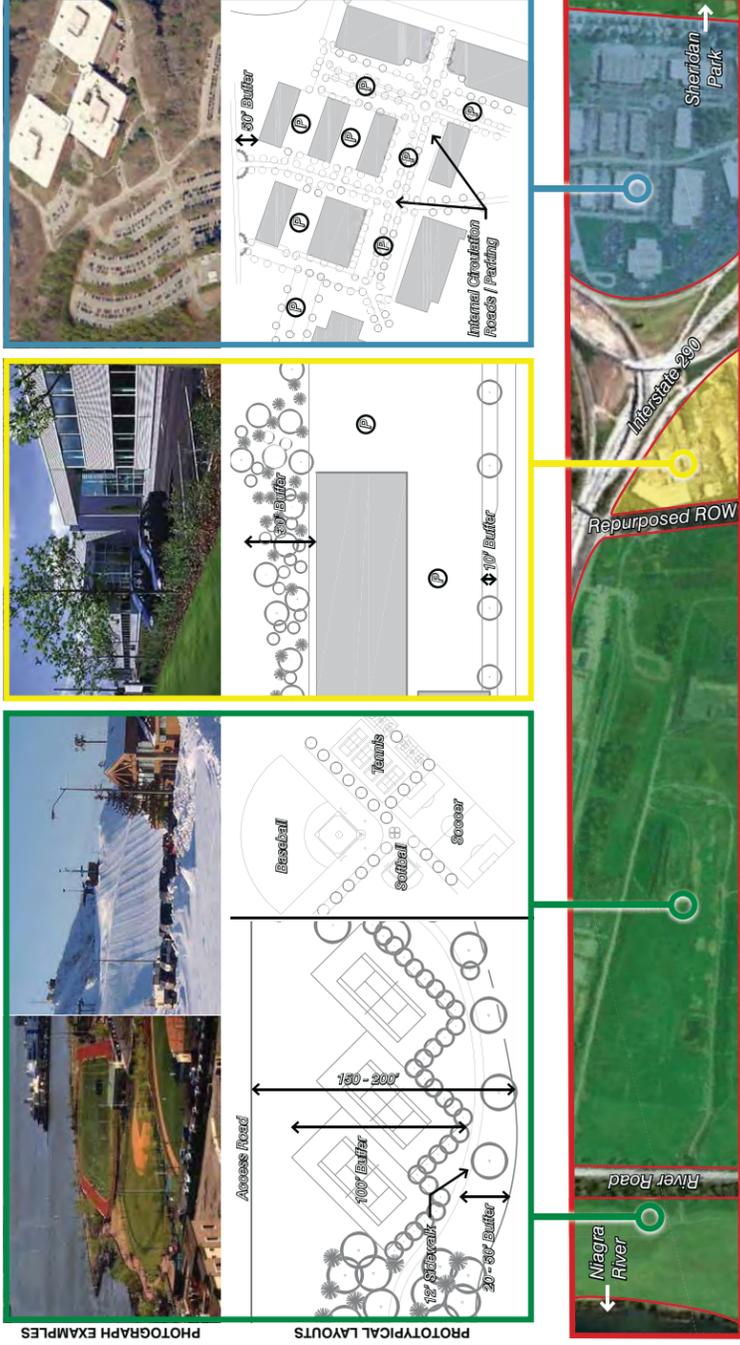
Giuseppe Holdings LLC received Town approval to build three apartment buildings with a total of 51 units and 19 boat slips on a 3-acre site with 440 feet of shoreline (4530 River Road). The initial phase of the project includes site remediation to meet state DEC standards for residential use; the site was contaminated by run-off from previous operations of the United Refinery Company and is included within the Brownfield Cleanup Program. In addition to a small fishing pier, 3 docks will be for visitors, and 16 docks for residents and accessible from their front doors, a unique feature in Western New York. Each apartment building has an elevator, stone façade, a cupola, framed columns, French doors, and access to a shared garage. Originally planned as a condominium development with units priced at \$500,000, reportedly, the development will be rental units when completed.

Appendix D

Prototypes for Redevelopment

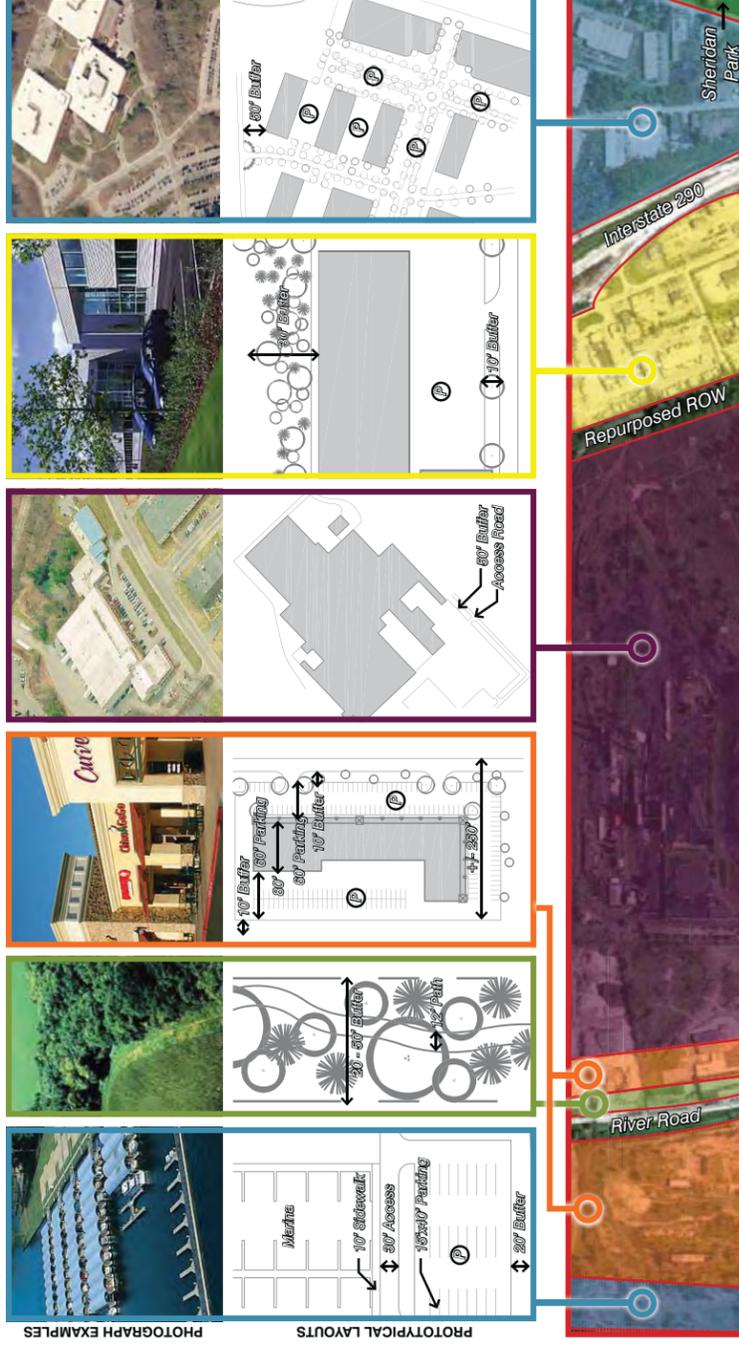
DIAGRAMMING RAYS

RAY 3



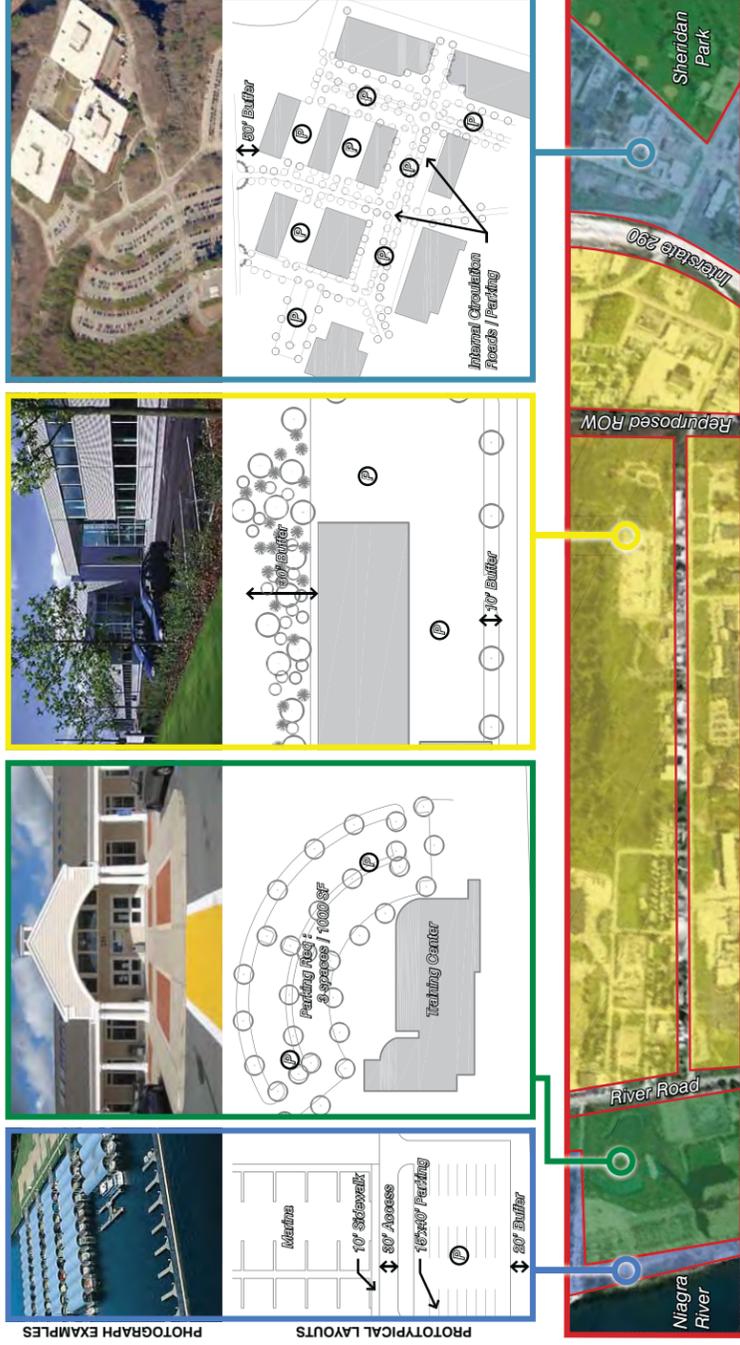
COMMENTS

RAY 4



COMMENTS

RAY 5



COMMENTS

DIAGRAMMING RAYS

KEY PLAN



COMMENTS

RAY 1

PHOTOGRAPH EXAMPLES

PROTOTYPICAL LAYOUTS

LEGEND

- Active Open Space
- Passive Open Space
- Residential
- Commercial
- Light Industrial
- Heavy Industrial
- Business/Office Park
- Water Dependent Use
- Educational Training Center
- Parking Zones
- Alternative Energy Farm

0 300 600 1200' NORTH

Niagra River
River Road

Repurposed ROW
Interstate 290
Sheridan Park

COMMENTS

RAY 2

PHOTOGRAPH EXAMPLES

PROTOTYPICAL LAYOUTS

LEGEND

- Active Open Space
- Passive Open Space
- Residential
- Commercial
- Light Industrial
- Heavy Industrial
- Business/Office Park
- Water Dependent Use
- Educational Training Center
- Parking Zones
- Alternative Energy Farm

0 300 600 1200' NORTH

Niagra River
River Road

Repurposed ROW
Interstate 290
Sheridan Park

Internal Circulation Roads / Parking

COMMENTS

Appendix E

Landfill Reuse



EXPANDING THE OPTIONS

Engineers seeking to help clients maximize the profitable operation of landfills well into the future should consider adding renewable energy technologies to the sites—and if the waste disposal areas can be increased by mechanically stabilized earth berms first, the opportunities for energy generation will multiply.



By Ranjiv Gupta, Ph.D., A.M.ASCE, and Jeremy W.F. Morris, Ph.D., P.E.

OVER THE PAST SEVERAL YEARS, Geosyntec Consultants, based in Boca Raton, Florida, has worked with numerous clients who as owners or operators of landfills have sought to increase the operational life of their properties and maximize their ability to profitably operate them even after they are filled, covered, and closed. In recent years, there has been a confluence of this desire with a goal to reuse the sites for purposes that benefit the community in tangible ways.

A popular approach to extending the operational life of a landfill is to increase its disposal capacity through vertical expansion made possible by a mechanically stabilized

earth (MSE) berm constructed along the perimeter of the landfill's footprint. This certainly helps to keep normal landfill operations going for some time, but once the additional space has been filled, many landfill owners have become interested in adopting sustainable approaches that would enable them to continue managing the property after landfill closure. As an extension of a feasibility study recently undertaken for such a client, we examined how the twin goals of beneficial reuse and environmental stewardship could be combined by strategically integrating a vertical expansion with the construction of renewable energy technologies (RETs) at a theoretical landfill. We took the theoretical property from its operational state to its postclosure state, transforming it in the process from a waste disposal facility to a renewable energy

Two 80 m tall, 1.6 MW_p wind turbines are operating on a portion of the Frey Farm Landfill, in Creswell, Pennsylvania, that does not accept waste but is part of the overall site.

LANCASTER COUNTY SOLID WASTE MANAGEMENT AUTHORITY

park. The results illustrate how a phased installation of these RETs could be implemented during and after the construction of an MSE berm at a landfill to optimize the beneficial reuse of the site. As engineers seek to assist their clients by developing ways to use and reuse landfill properties, the guidelines discussed here may be useful, and some of the approaches have already been implemented on a small scale.

Four RETs were evaluated as part of this study: solar photovoltaic (PV) arrays, wind turbines, methane gas utilization, and the use of the landfill as a geothermal heat source. The energy potential at the landfill from the four RETs is available in two major forms: electric energy can be generated using solar and wind sources, and heat or thermal energy can be obtained from methane and geothermal sources. These forms of energy become available in differing degrees at different stages of the landfill's life cycle. Therefore, a key focus of the study was determining the best time to construct and implement each RET and to optimize that timing in relation to the MSE berm construction. Although it is certainly not necessary to construct an MSE berm at a landfill to take advantage of the landfill's potential as a source of renewable energy, our study demonstrates that doing so significantly improves the site's energy generation potential for all four RETs over both the short and the long term. What is more, transforming a landfill into a renewable en-

ergy park would enhance the sustainable use of the property while providing renewable energy for the local community, offsetting the community's consumption of energy from fossil fuels and thus reducing its carbon footprint.

Modern landfills are essentially inground treatment vessels that promote natural organic waste decomposition and the conversion of raw waste from solid form to liquid and gas form. The by-products of the degradation process include landfill gas, which is typically 40 to 60 percent methane, and leachate, which is liquid that has passed through or emerged from the solid waste and contains soluble or suspended materials removed from the waste. To achieve their performance objective of protecting the environment while operating their landfills, owners typically use multiple systems simultaneously during all phases of the landfill's life, including operation, closure, and postclosure. The objective is to protect such sensitive receiving media as groundwater, surface water, unsaturated soil, and air, and these media are often monitored to ensure that the goals are met.

A typical landfill comprises a liner system, which contains the waste and its by-products and is typically a composite of clay and geosynthetic material; a leachate management system, which collects leachate to minimize the buildup of hydrostatic head above the liner and removes it for treatment and disposal; a landfill gas

The Hickory Ridge Landfill, in Conley, Georgia, is covered with a geomembrane that is inset with a 1 MW_p photovoltaic array.



AMERICAN ENVIRONMENTAL GROUP

management system, which collects the gas and removes it for thermal destruction (flaring) or renewable energy production; and, after closure, a final cover system, which provides long-term containment and controls the rate at which water enters the landfill from rainfall or snowmelt, provides storm-water management, protects the quality of surface water, and can also provide a suitable platform for beneficial reuse options.

Closed landfills offer significant potential for beneficial reuse, particularly as urban areas continue to expand at their boundaries. These reuse options can be passive, as seen in wildlife habitats, or active, for example, golf courses, recreation areas, parks, or grazing land; they can also be used to grow livestock feed or stock for making biofuels.

However, several geotechnical, hydrogeologic, ecological, and other factors that depend on the site in question may limit the number and type of reuse options available and should be clearly understood at the outset. As mentioned above, decomposition of waste in a landfill produces leachate and landfill gas and results in settlement of the waste body over time. These processes may be expected to continue for several decades after closure. It is important, therefore, that any proposed reuse of a site be compatible with maintaining the necessary long-term integrity and performance of the landfill's component systems, particularly the cover.

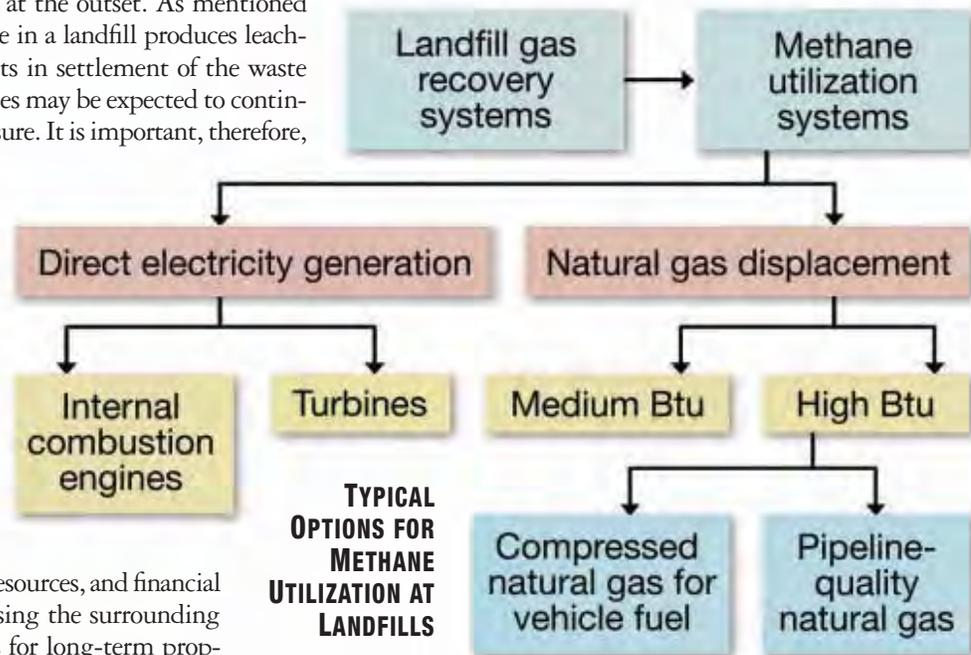
The main objectives of an environmentally responsible and sustainable landfill management strategy are to minimize, over the entire life of the project, the depletion of energy, material resources, and financial resources without compromising the surrounding environment or passing costs for long-term property management and monitoring on to future generations. In practical terms, any discussion of landfill sustainability and reuse must therefore include goals for the postclosure reuse of the landfill property. If these sustainability objectives are to be realized, landfill owners and operators will have to focus on reducing the potential environmental and financial liabilities of landfills by optimizing design, operation, and management over the lifetimes of the facilities.

Clearly, a key component of such optimization is the investigation of methods by which an active disposal facility can be made suitable for a compatible postclosure reuse. Planning enables the operator to implement strategies during late-stage operations that cannot be implemented after the landfill is closed. In our study, we examined the successful construction and operation of solar and wind RET projects at a closed landfill—the Stadtreinigung Hamburg, in Germany—for which revenues from energy production have exceeded the postclosure costs, even after accounting for the engineering work needed to meet the foundation requirements.

Most landfill-based solar power systems use PV cells, which convert sunlight into direct current using the photo-

electric effect. PV systems can be designed to provide direct current or, if fitted with an inverter, alternating current, and the systems can operate independently or be connected to the utility grid. They can also be connected with other energy sources and energy storage devices. In northern climates, landfills offering significant south-facing exposure are ideal for the installation of PV systems. These systems typically take the form of stand-alone flat panels on support stands anchored above the landfill cover or of flexible thin-film panels glued to an exposed geomembrane cover.

It is estimated that more than 20 landfill-based solar projects were operational in the United States as of December 2011. A benchmark unit cost that is commonly used by the solar energy industry is the installed price per peak watt (W_p), which is defined as the capacity of a standard PV panel when exposed to standard conditions. This measure does not

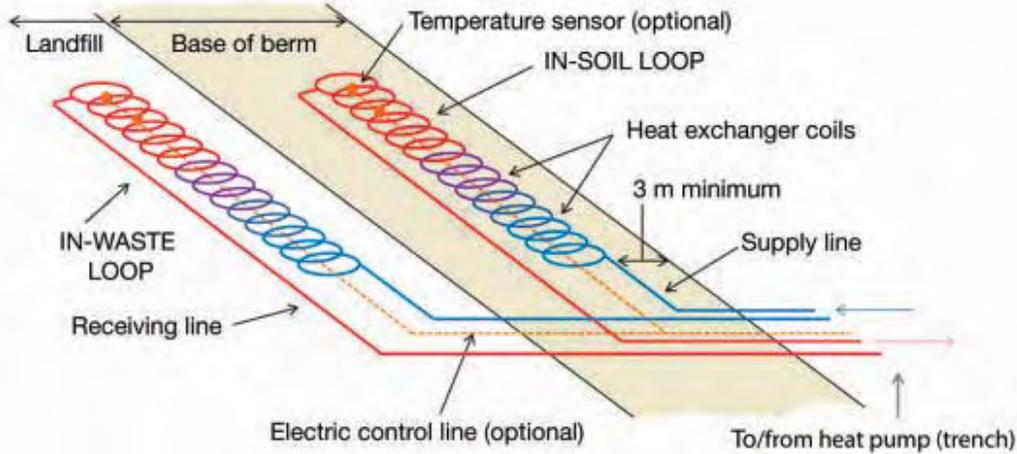


take into account actual solar conditions at a site; therefore, the solar radiation at the site must be considered separately when estimating the actual capacity of a PV system. (The actual average capacity for current PV technologies is in the range of 5 to 15 percent of peak.)

The current capital cost of installing a PV system on a landfill is estimated at about \$5 per peak watt, roughly 70 percent of which is for materials, 10 percent is for inverters and cabling, and 20 percent is for installation. On the basis of preliminary estimates, a 1 MW_p facility in the Middle Atlantic states would cost approximately \$6 million and require 2 to 3 ha of land.

Wind power is created by converting the kinetic energy of moving air into mechanical energy using a wind turbine. Wind turbines can be divided into two major categories, depending on whether the axis is horizontal or vertical. The horizontal-axis wind turbine is significantly more common than its vertical counterpart and has the main shaft and generator at the top of a tower pointing into the direction of the wind. The vertical-axis wind turbine has the main

**LANDFILL
HEAT
EXCHANGER
PIPING IN
WASTE AND
BENEATH
MSE BERM**



rotor shaft in the vertical direction and can be placed independent of the direction of wind. These turbines can also be placed closer to the ground and thus are relatively easier to maintain. However, they are less efficient and have to be spaced farther apart than do horizontal-axis turbines. In both systems, the turbines power a rotor that produces direct current, which is typically inverted to alternating current for the power grid.

Wind turbines designed for onshore applications need moderate but steady winds and start producing energy as wind speeds reach 15 to 20 km/h. The efficiency of a horizontal-axis wind turbine depends on the amount of energy extracted by the blades (the swept area of the rotor), the installation height of the rotor, and the spacing between the towers (5 to 15 times the rotor diameter is recommended). Greater height provides better access to steadier winds of higher speed, and this is the main advantage of installing a turbine on top of a landfill.

The wind power industry

A geothermal heat exchanger installed at the North Country Environmental Landfill, in Bethlehem, New Hampshire, generates 250,000 Btu per hour.

rates a wind system in terms of its “name-plate” (peak) generating capacity, which assumes that the wind conditions prevailing at a site are available 100 percent of the time at the speeds required for maximum efficiency. The actual average capacity of a horizontal-axis wind turbine is typically about 25 percent of peak. The current capital cost for installing this type of turbine is about \$3 per peak watt.

As of December 2011, two successful wind turbine systems were operating on landfill properties in the United States.

Through a cooperative partnership, the Lancaster County Solid Waste Management Authority installed two 80 m tall, 1.6 MW_p wind turbines on a nonoperational portion of its Frey Farm Landfill, in Creswell, Pennsylvania. Electricity output from the turbines is supplied to an adjacent dairy products manufacturer. Enthusiastic support for “Hull Wind 1,” a 660 kW_p, publicly owned turbine installed in Hull, Massachusetts, in 2001, led to the installation in 2006 at

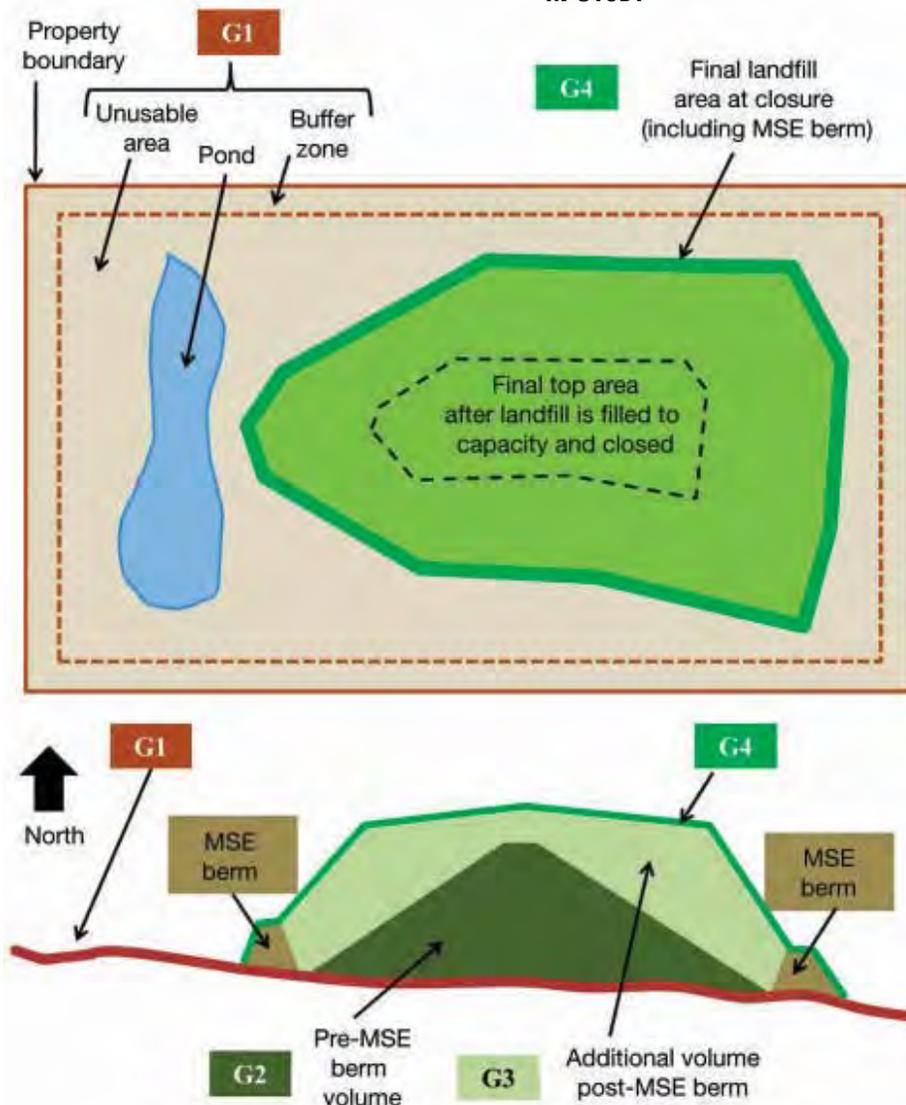
**PLANNING ENABLES THE OPERATOR
TO IMPLEMENT STRATEGIES
DURING LATE-STAGE OPERATIONS
THAT CANNOT BE IMPLEMENTED
AFTER THE LANDFILL IS CLOSED.**

the closed Hull Landfill of “Hull Wind 2,” which is larger, being 60 m tall, and has a capacity of 1.8 MW_p. The two turbines are operated by a volunteer organization of residents and supply more than 10 percent of the town’s electricity.

Selecting a wind turbine system for a landfill must take into consideration the need for an appropriate foundation system to support the turbine. This is particularly true of tall horizontal-axis wind turbines, which experience high bending moments. Considering the significant compressibility of waste, the settlement and foundation stiffness requirements are critical to the design of a wind turbine system on such a site. The technical solutions that have been adopted include such preconstruction ground improvement techniques as dynamic compaction, the replacement of a layer of waste with less compressible material, and grouting. When greater deformation control has been required, deep foundations have been used.

While the wind turbine is being constructed, the transportation of its parts to the site may impose significant loads on the roadways that access the landfill, and these may therefore need to be upgraded.

PLAN VIEW AND CROSS SECTION OF HYPOTHETICAL LANDFILL USED IN STUDY



What is more, when the wind turbine is being erected, the work area that supports the construction equipment must have a sufficient bearing capacity. To satisfy these requirements, modifications to the existing final cover system may be necessary, for example, replacing certain areas of the final cover soil with stronger gravel fill or installing geosynthetic reinforcement.

Landfill gas is a natural by-product of the decomposition of organic waste material under anaerobic conditions. The biochemical degradation of organic material yields gas containing roughly 50 percent methane and 50 percent carbon dioxide by volume with trace concentrations (less than 1 percent) of volatile organic compounds and inorganic compounds. Methane in landfill gas has the same chemical characteristics as natural methane gas. Such medium-Btu gases as raw landfill gas have a heating value approximately half that of natural gas and can be used directly for electricity generation or to provide heat energy. It can also be used on-site in place of natural gas or can be sent to a nearby industrial facility. Moreover, it can be purified and the resultant high-Btu methane can be injected into the natural gas grid, and it can be used to produce compressed natural gas, an alternative vehicle fuel. (See the figure on page 76.)

The collection of landfill gas is common and, in many circumstances, mandatory in the United States. Generally, the gas is collected by installing horizontal collector trenches as the waste is placed or by drilling vertical wells into the landfill after the waste has been placed. Trenches and wells are connected to controlling wellheads that transport the collected gas via lateral piping to a main collection header. Mechanical blowers are used to induce a vacuum in the collection system. The overall efficiency of gas collection at a landfill varies widely, from less than 60 percent to more than 95 percent, and depends mainly on the cover type, the timing of the installation, and operational factors. For those locations at which methane utilization is not practiced, the gas is simply flared as a control measure.

The goal of a methane utilization project is to convert the methane in landfill gas into useful energy by direct use or through electricity generation. Both of these options have three basic components: a gas collection system and a backup flare; a gas compression and treatment system; and an energy recovery system. The capital costs for such

a project generally include the costs for design engineering, permitting, site preparation, utility installations, equipment, start-up, and training. The U.S. Environmental Protection Agency estimates in its *LFG Energy Project Development Handbook* ("LFG" denoting landfill gas) that developing a well field at a landfill would entail a capital cost of roughly \$50,000 to \$60,000 per hectare. Key factors influencing this cost include the number and depth or length of the wells and trenches installed, as well as the total length and gauge of the lateral and header gas piping required.

Geothermal energy projects are developed to take advantage of the thermal energy from the earth. In the case of landfills, such projects capture heat generated by the decomposition of waste. A geothermal heat pump is a good fit for landfill applications, as it can pump heat from the waste or from the ground beneath an MSE berm. Geothermal systems take advantage of the stable, high temperature at the base of the landfill. The figure at the top of page 77 illustrates a conceptual cross section of a geothermal piping system that recovers heat both from the waste and from the ground beneath an MSE berm at a landfill. The heat exchanger unit requires an electrically driven compressor and heat exchanger to concentrate the heat for subsequent release inside the building or other structure that is being heated. The heat exchanger collects heat by means of supply and receiving loops that carry the heat exchange fluid (a saline solution) and are generally made of high-density polyethylene (HDPE) pipe, which is both durable and flexible.

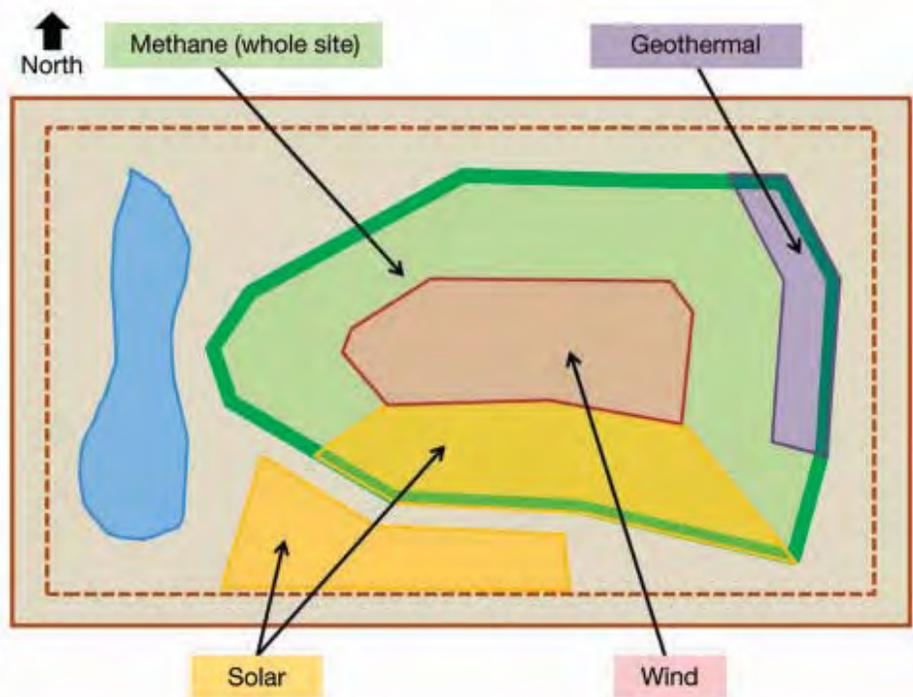
The length of the pipes or ground loops depends on the heat and air-conditioning load, the depth of burial, the waste or ground conditions, the local climate, and the available land area. The first landfill-based geothermal project in the United States was recently installed in New Hampshire. This low-cost (\$50,000), small-scale (250,000 Btu/h) project uses heat exchanger loops installed directly on top of a 0.2 ha area of the landfill liner system and heats the maintenance building at the landfill.

The installed cost of a geothermal system depends primarily on the depth of the geoexchanger wells, the lengths

of the pipes, the temperature of the geothermal fluid, the level of contaminants, and the ease of access to electrical transmission lines.

The cost involved in drilling the wells generally accounts for half of the total initial capital costs. However, if the geothermal system is installed as the landfill or its liner is being built or as the MSE wall is being constructed, no drilling is required; the pipes can be laid horizontally on the ground prior to berm construction, on the liner as it is being laid, or in the waste mass during active waste placement in the landfill. Based on the experience gained from the first U.S. project of this kind, it is reasonable to expect that about 1.25 million Btu per hour could be obtained for each hectare of installed heat exchanger loops. The cost of developing 1 ha in this way is estimated to be between \$200,000 and \$350,000, depending on the size of the heat pump and other facets of required infrastructure.

Areas within a landfill can be broadly categorized as off-limits, inactive, or active. Areas that are off-limits are generally those that cannot be developed for landfill disposal but may be suitable for other uses. Such an area can be further subdivided into three types: areas that can be used to create a buffer zone to meet setback requirements but are otherwise unsuitable for development for topographical, ecological, operational, or other reasons; areas that contain ponds for storm-water management and other surface water



COMPLETED TRANSITION OF HYPOTHETICAL LANDFILL TO RENEWABLE ENERGY PARK

THE COST INVOLVED IN DRILLING THE WELLS GENERALLY ACCOUNTS FOR HALF OF THE TOTAL INITIAL CAPITAL COSTS. HOWEVER, IF THE GEOTHERMAL SYSTEM IS INSTALLED AS THE LANDFILL OR ITS LINER IS BEING BUILT OR AS THE MSE WALL IS BEING CONSTRUCTED, NO DRILLING IS REQUIRED.

features or wetlands; and areas that are required for the operation and administration of the facility, including access roads, scales, scale houses, offices, buildings, maintenance shops, citizen recycling and drop-off centers, and landscaped areas.

Inactive areas are those portions of the landfill that have achieved their final elevations and can no longer be used for waste disposal. An active area is still being used for landfill waste placement. If an MSE berm is constructed for a vertical expansion of the landfill, the area enclosed by the berm is considered part of the active area until the landfill is filled to capacity.

In our study, a hypothetical landfill property was divided into four groups broadly consistent with the categories outlined above. The category G1 includes areas of the landfill property that are off-limits and are outside of the current and proposed limits of waste disposal. G2 is the total waste volume that is in place prior to the construction of an MSE berm; its surface comprises both inactive and active areas. G3 indicates the volume of additional waste that can be placed atop G2 after the MSE berm has been constructed and therefore represents an area that will be active in the future. And group G4 encompasses the external, inactive surface of the landfill and MSE berm once the expanded landfill is filled to capacity and closed. G4 essentially encompasses G3 and the berms. The figure on page 78 presents a plan view and cross section of these areas. It is assumed here that during the vertical expansion of the landfill the footprint of the current landfill area will remain largely unchanged and that the MSE berm will be constructed along the landfill's perimeter.

We first turned our attention to installing a PV system, the size of which would depend on the extent of the south-facing slopes available. Land within G1 depends only on geometry and operations and offers immediate potential for PV development. The deployment of solar panels on the current surface of G2 is limited because so far no areas of the landfill have achieved their final elevations. As a result, slopes cannot be graded to achieve the maximum efficiency for installed solar panels. G3 never offers an opportunity for solar, as it will be covered by G4, and installing a PV system atop G3, even temporarily until G4 is created, would not be cost effective. The best opportunity to install solar panels will exist on the south-facing side slopes within G4 after closure.

Onshore wind turbines are generally feasible when installed such that their rotor height is at least 75 m above the surface of the surrounding terrain. Thus, the top surface of G4 represents an optimal location. G1 areas are unlikely to offer sufficient elevation. The surface of G2 may offer limited opportunities if future development of the landfill does not significantly change the final grades in the selected locations. Again, installing such a system on G3 would offer no realistic opportunities, as it would be subsumed by G4.

Because methane collection infrastructure is for the most part subterranean, it can be installed during the active landfilling phases of both G2 and G3. Horizontal collectors are preferable because they allow ongoing waste placement without the need for vertical extensions (which

would be needed if vertical wells were to be installed). Vertical wells can be sunk through the entire depth of waste in G4 once the landfill achieves its final grade, but it is recommended that as much gas collection infrastructure as possible be installed during the life of the facility once a decision has been made to recover methane. The G1 area offers no opportunity for methane.

It is important to note that geothermal energy systems are significantly different from other RETs in that excess heat energy cannot be stored in a grid or used to generate electricity. It is also unable to directly offset natural gas or other fuel usage. The extent to which a geothermal system is developed therefore generally depends on the demand from nearby users for direct heat. To avoid deep trenching and minimize costs, it would be advisable to install any geothermal heat exchanger loops during construction of the MSE berm and the lining of the internal berm slopes—in other words, within G3. G1 areas also can be developed for ground-based geothermal energy, but this does not take advantage of the heat capacity of the waste.

The table on page 81 gives the best times for deploying RETs for each of the four areas.

The figure on page 79 illustrates the completed energy park after the RETs have been installed in G4 at the hypothetical landfill. (Areas within G1 are assumed to be available throughout the life of the landfill and are independent of the landfill activities.) It is assumed that a small unused area of G1 in the southern part of the property could be immediately developed with PV systems.

G2 represents the landfill waste mass before construction of the MSE berm and offers only methane collection as a viable RET. G3 does provide an opportunity for the installation of a geothermal system, as well as a methane collec-

ONSHORE WIND TURBINES ARE GENERALLY FEASIBLE WHEN INSTALLED SUCH THAT THEIR ROTOR HEIGHT IS AT LEAST 75 M ABOVE THE SURFACE OF THE SURROUNDING TERRAIN.

tion system. It is therefore assumed that the methane collection infrastructure will be in place throughout the life of the landfill and will be present during the G2 and G3 stages. A small geothermal loop also will be installed as early as possible within G3. This will be when the first part of the MSE berm is being constructed. In this study, it was assumed that the paucity of users of heat energy in the vicinity of the site would preclude further development of geothermal loops. However, it should be noted that significant additional heat exchange capacity exists. Given the relatively low cost and the ease of loop installation in conjunction with liner construction, it may be worthwhile to install more loops than there is currently demand for and to advertise the availability

of renewable heat energy to current or future landfill neighbors (a “build it and they will come” approach).

Finally, once the landfill is filled to capacity and closed, G4 comes into existence. This surface area is most suitable for solar and wind installations. In addition, after waste filling commences and the landfill is filled to its final grade, vertical wells can be installed through the G4 area to supplement methane collection from horizontal collectors installed in G2 and G3.

ing the total heat capacity of the landfill. This would also help overcome limits on the scale and duration for which operating a geothermal system is practical from a technical and economic perspective.

Most RET deployments, in particular, those using solar and wind sources, are capital intensive and require a long payback period. This is often the key factor limiting the development of such projects. By providing more certainty that the landfill will remain in profitable operation for a period beyond what is required for RET projects to become financially viable—generally at least 15 years—engineers can help owners make long-term decisions about capital investments for RETs. Furthermore, an active landfill operation will provide a diversified income stream and reduce the financial risk associated with developing an energy park.

RETs in the form of solar panels and wind turbines have been implemented on a number of landfills while they were in operation

and after they were closed. Hundreds of landfills across the United States have installed systems for recovering methane for generating electricity and other purposes. However, only recently has a landfill in the United States harnessed the heat capacity of waste by means of a geothermal system. This study reveals that pursuing a “mixed-use” energy park strategy would enable a single landfill to offer four major RETs and remain economically viable for many years into the future. In this scenario, expanding the landfill would increase the renewable energy potential in the local area, which could help nearby communities reduce their carbon footprints by relying to a lesser extent on fossil fuels. What is more, utilizing the existing landfill footprint for a longer period through the construction of an MSE berm would certainly be a more efficient way to manage waste and would minimize the need to develop new waste disposal facilities.

Implementing RETs at landfills would also benefit the site owners by providing additional financial resources to fund maintenance activities, thereby preventing the marginalization of landfill properties after closure. Transforming a waste disposal facility into a renewable energy park thus provides a way to beneficially reuse the property—a clear demonstration of sound environmental stewardship. **CE**

Ranjiv Gupta, Ph.D., A.M.ASCE, is an engineer with Geosyntec Consultants in Austin, Texas. Jeremy W.F. Morris, Ph.D., P.E., is a senior engineer in Geosyntec's Columbia, Maryland, office. This article is based on a paper the authors presented at Geo-Congress 2013, a conference sponsored by ASCE and its Geo-Institute and held in San Diego in March.

OPPORTUNITY TIME FRAMES FOR DEPLOYING RENEWABLE ENERGY TECHNOLOGY

GROUP	RENEWABLE ENERGY TECHNOLOGY				WINDOW OF OPPORTUNITY FOR DEPLOYING TECHNOLOGY
	SOLAR	WIND	METHANE	GEOTHERMAL	
G1	Yes	Yes	No	Yes	Time not a factor
G2	No	No	Yes	No	Through completion of MSE berm construction
G3	No	No	Yes	Yes	From completion of MSE berm construction to closure
G4	Yes	Yes	Yes	No	After closure

What became clear from this study is that increasing the capacity of a landfill through the construction of an MSE berm can aid the development of all four RET types. The construction of an MSE berm could be designed to significantly increase the area covered by the southward-facing side slopes, which would provide a larger area for the deployment of solar arrays with higher incident solar radiation exposure. Increasing the top deck area available at the highest elevation of the landfill after the MSE berm has been constructed would facilitate the installation of wind turbines with rotor heights significantly above the surrounding terrain. As mentioned above, higher elevations provide access to steadier winds of higher speed. With a vertically extended landfill, there will be no need to construct excessively tall turbine towers. A larger top deck area would also make it possible to install a larger number of turbines, increasing the total generating capacity and enabling the power interconnection infrastructure to be used for more turbines.

It should also be noted that the rates of methane production are highest in new waste and decrease exponentially with time. Thus, increasing the total quantity of waste and the period of waste placement in the landfill would therefore not only increase the total methane yield but also overcome any limits on the scale and duration for which methane utilization is practical from a technical and economic perspective. Finally, constructing an MSE berm would make the implementation of a geothermal system more cost effective. After the berm was constructed, the amount of waste in place in the landfill would increase, thereby increas-



Gupta



Morris

Appendix F

Trail Development Reference Information

High Voltage Transmission Line (HVTL) Right-of-Way Usage for Transportation Facilities

FEASIBILITY STUDY

FINAL REPORT

April, 2002



Maryland Department of Transportation
Office of Planning & Capital Programming

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Executive Summary

Executive Summary

Finding locations for new transportation corridors has grown more difficult as Maryland becomes more developed and available land in urbanized areas becomes scarce. Beginning with a proposal to the Montgomery County Council, the Maryland Department of Transportation agreed to conduct a study that would determine the feasibility of using existing high voltage transmission line (HVTL) corridors for transportation purposes as well. This involved locating a transportation facility in a corridor that often has very different characteristics from a traditional transportation alignment. Important considerations include the types of HVTL structures and corridor dimensions in comparison with various design requirements for different transportation modes. Because of the variability of these factors in Maryland, the study does not identify specific HVTL corridors for adaptation to transportation use. Rather, the study concludes with recommendations based upon general feasibility and lists the local conditions that would either favor or preclude joint use of HVTL corridors with transportation facilities.

In Maryland, five power companies transmit electricity on separate and individually maintained HVTL rights-of-way. The HVTL corridors vary in geographic location and transmission line voltage. The land within an HVTL corridor is either owned outright by the power company or purchased through an easement. Some common layouts of corridor width and structure location within the corridor are used as a starting point for further feasibility study. Footprints of towers on the ground as well as the necessary safety clearances, based on voltage and transportation type, reveal available portions of the corridor viable for transportation use.

Standards and guidelines for power structures vary by utility company. There is little precedent for guidelines regarding how power companies accommodate transportation along their rights-of-way or vice versa. The Maryland State Highway Administration (SHA) has a Utility Policy that outlines acceptable amounts of impact for HVTL structures in highway rights-of-way; however, it does not address sharing rights-of-way for long parallel sections. The necessary clearances and functionality stated in the Utility Policy would need to be achieved with no negative impact on the capability of the HVTL corridor as required by the power company's needs. Any improvements that would require modifications to the HVTL structures would require compensation to the Power Company and extensive modification could rapidly diminish any of the initial cost savings by using previously existing rights-of-way.

Design criteria for different modes of transportation are similarly documented. In addition to highway improvements, busways, light rail, sky train¹, and high speed rail (including Maglev technology) options are also considered along with each of their unique requirements. The possible combinations of these modes in several typical HVTL corridors are presented in the body of the report.

The Issues and Consequences chapter addresses the different design philosophies for HVTL and transportation corridors. HVTL corridors are not sensitive to elevation and can span many obstacles. Transportation corridors, however, need to have even grades and smooth transitions and often must go around major geographical obstructions. Maintenance of facilities is an issue

¹ A hybrid of light-rail and metro transit technology on elevated track and stations.

for both transportation facilities and utilities in the event of an incident or emergency. Safety concerns and sufficient clearance from the base of HVTL towers are also a major concern. Limiting the access to the towers causes an extra burden on the power company to maintain its property and could also preclude future expansion of the HVTL corridor to meet growing electrical demand. Costs increase and the ability to adapt transportation to an HVTL corridor decrease when the terrain is mountainous or there are multiple steep slopes. Examples of successful joint use occur in Louisiana where the land is flat and power companies benefit from having paved access to their structures. Within Maryland, there are numerous examples where HVTL and transportation share a corridor, but not over large distances where a previously existing HVTL corridor is adapted to transportation use.

The study reached five primary recommendations. The first recommendation is that only short segments of HVTL corridors should be utilized. Long distance use of HVTL corridors for transportation purposes is unlikely since a long HVTL corridor has a higher probability of rapid changes in direction or obstacles not easily negotiated by a transportation facility. A second recommendation is for low speed transportation options in HVTL corridors. Lowering operating speeds offers increased flexibility through less rigid design requirements and higher safety margins. Additionally, lower speed highway and transit modes have more tolerance for the grades and uneven ground that characterize an HVTL corridor in rolling terrain. A third recommendation calls for the use of guided transportation vehicles. Guided technology offers a higher safety margin and vehicles can operate closer to structures, thus better utilizing narrow HVTL corridors. A fourth recommendation is for a wide HVTL corridor on level terrain. The width of HVTL corridors analyzed within this report generally varied from 150 feet to 250 feet. Corridors less than 250 feet, afford little room for roads or rail to negotiate obstacles. Level terrain is important, as transportation facilities often require cuts or fills through rolling terrain, which may be incompatible in an HVTL and require costly retrofits. The fifth and final recommendation is for HVTL corridors with steel poles supporting the transmission wires. Steel poles have a smaller footprint on the ground and can offer increased buffer space between the base of the structure and the transportation facility. The recommendations are general in nature further study would be required for a particular corridor within Maryland. Even after a candidate HVTL corridor has been identified, the report emphasizes that only with an appropriate transportation mode and under a special set of circumstances would joint use likely be feasible.

In summary, the overall recommendations of this study for those conditions that would best support the implementation of a transportation facility within an existing HVTL corridor are as follows:

- Utilization of short HVTL corridor segments instead of long segments
- Lower speed
- Guided transportation systems
- Wider corridors with level terrain
- Steel poles used as HVTL structures

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I. Introduction

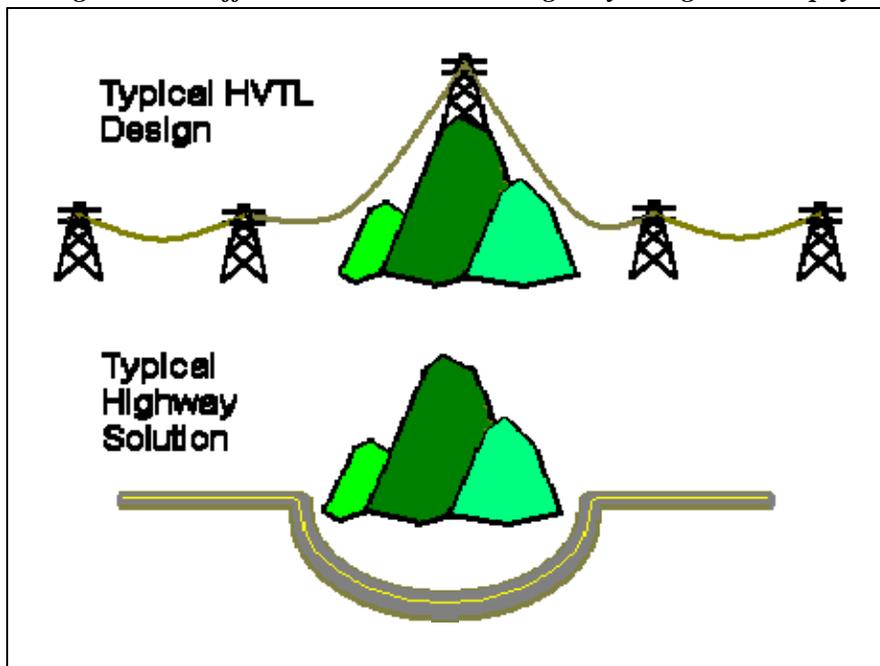
I. Introduction

Introduction / Project Purpose

As Maryland becomes more urbanized, there is a need to identify new strategies for locating transportation facilities. The traditional approach of purchasing an exclusive use right-of-way has become cost prohibitive. As a result, the Maryland Department of Transportation (MDOT) is interested in alternative ways to locate transportation facilities when the cost and availability of land would otherwise prevent the outright acquisition of a new transportation right-of-way. The goal of this study is to analyze the feasibility of using HVTL rights-of-way for transportation purposes while maintaining the utility companies' ability to maintain a safe, reliable, and economic electric supply. This general feasibility approach involves examining the different design philosophies of HVTL and transportation corridors and determining the conditions that would favor joint use.

The selection of transportation and HVTL corridors is based upon many factors. Transportation corridors are very sensitive to elevation changes and every effort is made to minimize grades. HVTL corridors use straight alignments where possible and are much less dependent on elevation differences. An HVTL corridor also has the ability to span certain obstacles or obstructions, while a transportation corridor often needs to go around such impediments (see Figure I-1). Across Maryland, there are many different HVTL structure configurations, each based upon specific conditions. The line voltage, number of circuits, available span lengths, and number of angles in the line route all determine types of poles and towers and their placement within the corridor. Transportation facility design is impacted by many factors including design speed, method of vehicle guidance, vehicle performance, and safety. This variability requires a broad examination of transportation requirements and HVTL corridor conditions across Maryland.

Figure I-1 - Differences in HVTL and Highway Design Philosophy



This study was initiated by MDOT subsequent to interest outlined by the Montgomery County Council, based upon a proposal submitted by Mr. Byrne Kelly, the principal of a Takoma Park planning and landscape architecture firm. Study recommendations identify the combinations of HVTL corridors and transportation modes that are most compatible and the circumstances that make the economic and environmental benefits of using HVTL rights-of-way superior to other rights-of-way for transportation purposes.

HVTL corridors are networked throughout the State of Maryland. The corridors are managed and maintained under the jurisdiction of five separate utility companies. A 'high voltage' transmission line is defined as one with an electrical phase-to-phase voltage in excess of 69,000 volts (69kv) or higher. The lines are located primarily above ground and supported by various types of tower structures. The corridors range in right-of-way width from 50 to 500 feet, with overall corridor width dependent upon the voltage of the electricity in the line. Higher voltages require more physical separation both within and along the corridor for safety considerations and this may necessitate larger corridor widths. The utility company may either own the corridor right-of-way in fee simple or be granted easements from the property owners in which to place their lines and structures. Likewise, higher voltages require more physical separation both within and along the corridor for safety considerations and this necessitates larger corridor widths.

The original intention of the study was to look at several specific corridors within Maryland and to recommend which corridors may be viable for transportation use. It was soon realized, however, that it would be difficult to base corridor specific feasibility of joint HVTL and transportation on only a few examples. Other concerns that arose included heightened public sensitivity towards the study of specific corridors, possibly raising public concerns and creating perceptions that transportation facilities were indeed being planned and designed within these corridors. As a result, the study was refined to look at general feasibility across the State. First, the study investigated the characteristics of various HVTL corridors in Maryland. The second phase included an analysis of various transportation options that could potentially utilize an HVTL right-of-way. Following these two steps, the study identified issues and consequences of for combined usage through discussions with stakeholders. Finally, the study concluded with recommendations concerning general feasibility of various transportation options in different corridors. The recommendations steer any future study of corridor specific implementation to the most promising candidates of transportation options based upon the HVTL corridor conditions. Throughout the study, national and statewide examples were gathered to represent some of the various possibilities for joint use, highlighting their practical benefits and issues.

Scope Summary

To prepare this feasibility study, the following activities were undertaken:

- Gather information and create a database of local and national examples of transportation facilities that were either built within HVTL corridors or contain HVTL issues, such as crossings, easements, etc.
- Initiate a Technical Advisory Committee, comprised of representatives from the statewide power companies and the transportation modal administrations, to serve as a 'two-way' sounding board throughout the study.
- Develop typical sections for several transportation modes and analyze the impact of locating these sections within generic HVTL corridors.
- Develop a comprehensive list of the issues associated with using HVTL rights-of-way for transportation use.

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- Determine the anticipated difficulties that will arise through constructability concerns, applying to both the utility and transportation infrastructure.
- Summarize the above-mentioned tasks and key project activities and offer recommendations for possible transportation facility design concepts for different HVTL corridor types, geographical regions, and power company jurisdictions within a final report.

In developing typical sections, the study analyzed HVTL corridors of 150 and 250-foot right-of-way width, which included standard placements of towers within each type of corridor. To further reduce the complexity and number of typical sections to generate, transportation design criteria were established from the onset of the study. Design criteria identified the safety and performance requirements of certain transportation options that must be satisfied within the limits of an existing HVTL right-of-way.

This report can be used as a tool during the alternatives development phase of a transportation planning project and aid in determining whether or not to consider an HVTL corridor as a viable alternative for study through the project planning development process.

II. Statewide HVTL Characteristics

II. Statewide HVTL Characteristics

Maryland Power Companies

The electrical power transmission lines, steel structure and corridors dispersed throughout Maryland are owned, designed and maintained by five power companies, all with specific jurisdictions (see *Figure II-1*). The companies are listed and briefly described below:

- **Allegheny Power (The Potomac Edison Company)** – Within Maryland, Allegheny Power serves Maryland’s westernmost counties and small portions of Montgomery, Howard and Carroll counties. Its jurisdiction also extends into Pennsylvania, West Virginia, Virginia and Ohio.
- **Baltimore Gas and Electric (BGE)** - Includes all or part of the nine counties within central Maryland, including Baltimore City.
- **Conectiv** – Serves all the Maryland Eastern Shore counties, Cecil County and part of Harford County, all of Delaware and the southern portion of New Jersey.
- **Potomac Electric Power Company (PEPCO)** – Serves the majority of Prince George’s and Montgomery counties and the entire District of Columbia.
- **Southern Maryland Electric Cooperative (SMECO)** - Serves Charles, St. Mary’s and Calvert (except the northeastern tip) Counties, and the southernmost portion of Prince George’s County.

Representatives from the five power companies have been involved with the study since its inception in 2001. They met five times as part of the Technical Advisory Committee (TAC) and contributed ideas and voiced comments and concerns throughout the study. Other members of the TAC included utility experts from SHA’s Offices of Construction and Highway Development, a representative from SHA’s Office of Planning and Preliminary Engineering, representatives from the Maryland Transit Administration (MTA), and representatives from MDOT’s Office of Planning and Capital Programming.

The TAC meetings were quite helpful and provided the groundwork for this report.

Typical Corridors

Each power company serves a different geographic region and coverage area throughout Maryland. The result is that each company’s HVTL corridor characteristics vary. The density of the power company’s network affects corridors when customers are located at large distances from generating facilities. For efficient transmission, this necessitates longer HVTL corridors that require increased right-of-way width for safety clearances. Typically, corridor width increases as the transmission line voltage increases. The final step in delivering electricity to customers involves localized and low voltage power distribution lines to residential or retail/business communities. These lines, with their lower voltage and safety requirements, often utilize an existing transportation right-of-way and run along existing arterial roadways and collector streets. See the Transportation Options section for typical section sketches.

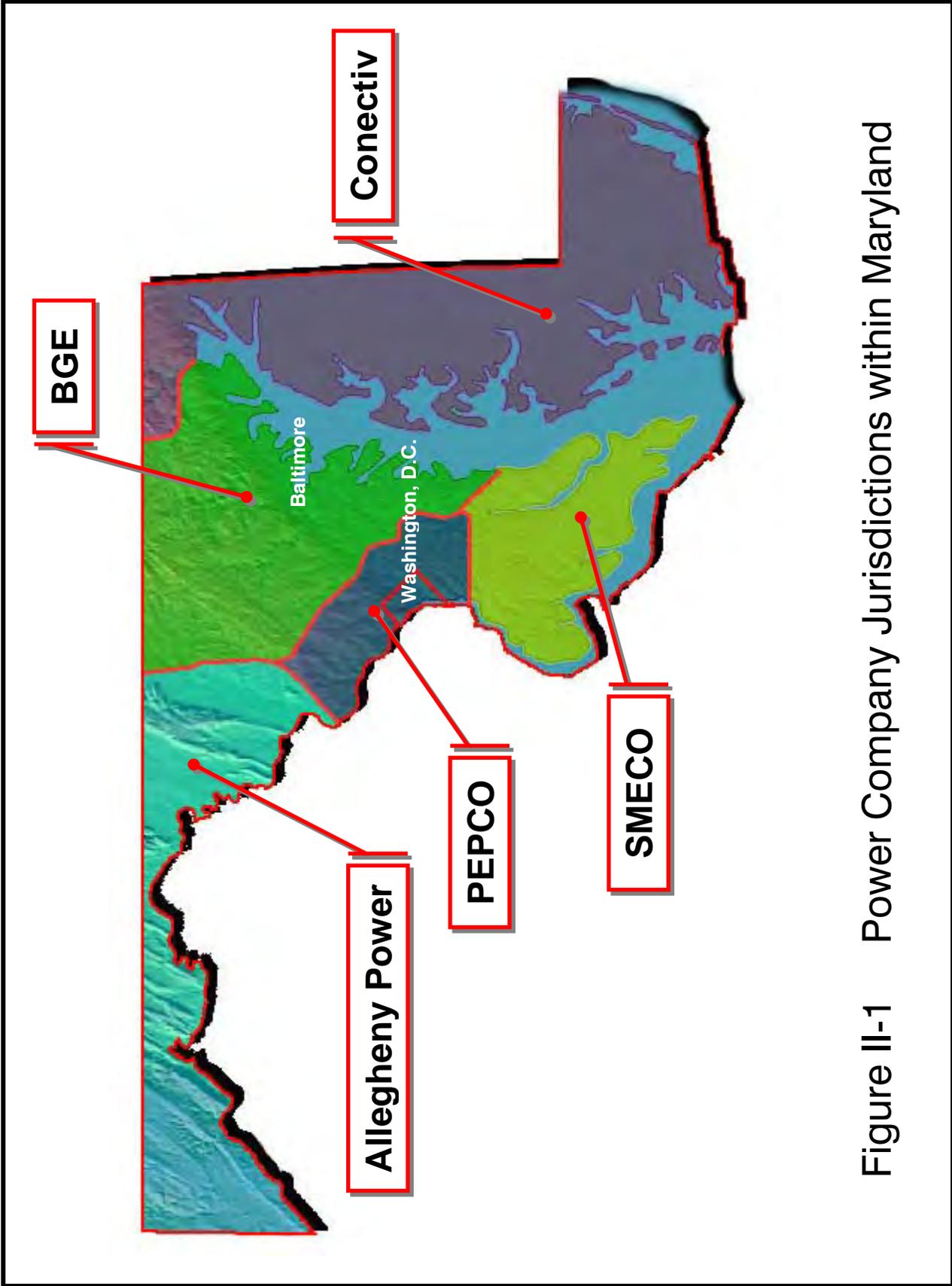


Figure II-1 Power Company Jurisdictions within Maryland

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the wires that must be maintained. Also, it usually means the HVTL structures must be built stronger to carry the increased weight of lines carrying the higher voltage.

Other factors affecting HVTL structures include the span lengths, the available land, and the number of angles in the transmission line route. The severity of the angle is a very important criterion in transmission line design. It takes a stronger or more stable structure to support the wires turning an angle versus a tangent section. *Photo 1* shows a pole supporting wires turning an angle. Its construction is much sturdier than the pole shown in *Photo 2*, which is along a straight segment.

The strength to support heavier wires and span large distances dictate that HVTL structures be of substantial construction. For these reasons, usually only the lighter, lower voltage lines (typically less than 100 kv) are considered for wood structures. In the past, the only choice other than wood poles was the steel (lattice) tower configuration. Beginning about 40 years ago, tubular steel poles were manufactured to replace steel (lattice) towers. These steel poles provided sufficient strength while occupying less space at the ground level. Initially, steel poles were very expensive and used sparingly, but improved manufacturing and design processes have now made this type of structure more economical and its use has increased throughout the State.

Figures II-2 and II-3 are detailed sketches of a typical steel pole structure with 230kv dual circuits. *Figure II-2* shows the dimensions for a pole within a tangent section of the corridor. *Figure II-3* shows the dimensions of a pole used to support wires with medium and heavy angles.



Photo 1 - Large Steel Pole / Tower

This pole is 4 feet in diameter and is designed to withstand higher loads since the transmission lines and conductors form an angle. The voltage carried by this pole is 115 kv.



Photo 2 - Steel Pole in Tangent Section

The steel poles carrying 115kv transmission lines shown here are along the edge of the public right-of-way for MD 3, near Crofton, Maryland. The pole diameter is 3 feet.

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Lattice towers are the most common structures found in Maryland's HVTL corridors. As shown in *Photos 3 and 4*, lattice towers have a much larger footprint than steel poles. This is due to the lattice tower's expanded base. The size of the structure footprint is important in determining the viability of implementing a transportation facility within the HVTL corridor right-of-way.

The base of a lattice tower is generally square and ranges from 16 feet per side to over 40 feet per side. The size depends on the height of the tower (the higher the tower, the wider the base) and the loading on the tower from the weight of transmission lines.



Photo 3 - Dual Lattice Tower Configuration

This photo shows the dual lattice tower configuration, one of the most common HVTL corridor configurations in Maryland. Figure II-4 describes the dimensions and spacing at this location.



Photo 4 - Single Lattice Tower Configuration

This is an example of a single lattice tower configuration. It has a narrower corridor due to the single row of towers.

The exact shape and placement of transmission wires can vary among lattice towers. This depends on the amount of support needed for the particular transmission wire circuitry. As evidenced by *Photo 5*, this tower was designed to handle only one horizontal row of transmission wires.



Photo 5 – ‘Short and Wide’ Lattice Tower

This corridor carries 230kv wires within BGE’s jurisdiction. The base members of these structures are similar to those of the ‘common’ lattice towers, but the difference is that this tower widens at the top.

When the lattice towers need to be upgraded to handle higher loads (more circuits, higher voltage, etc.), they are often replaced with steel poles. Eventually there will be more steel poles than lattice towers throughout Maryland, especially if corridors are upgraded to handle 500kv transmission lines. Currently, there are very few 500kv HVTLs in Maryland, which typically connect power plants to main substations.

Photo 6 - Steel Poles Supporting 500kv Wires



Photo 6 shows typical steel pole structures within 500kv corridors.

Photo 7 - 500kv Corridor



Photo 7 shows the same corridor, as in Photo 6, crossing a limited access highway (MD 3 in Crofton).



Photo 8 – Multiple Steel Poles

The steel poles in this photo need to provide extra support for the 500kv transmission wires due to the angle in the corridor. Absent any angles, fewer poles would be needed.

Standards and Guidelines

Each power company has their own general design standards and guidelines that are based in part on the National Electrical Safety Code (NESC). The purpose of the NESC is to provide the minimum accepted standards and guidelines for the practical safeguarding of persons during the installation, operation, and maintenance of electric supply and communication lines and associated equipment. Naturally, these safeguards would need to be extended to the vehicles using any transportation facilities placed in the vicinity of the HVTLs.

The NESC contains the basic provisions that are considered necessary for the safety of employees and the public under specified conditions. The NESC is not intended to be used as a design specification or an instruction manual. Individual power companies develop their own design standards and guidelines.

Table II-1 on the following page summarizes each power company's general guidelines for HVTL spacing and clearance requirements between transmission line structures and transportation facilities. NESC guidelines are also shown for comparison reasons. The horizontal clearances between the structure and the roadway facilities are generally determined on a case-by-case basis, depending on the transportation facility's design speed, types of protection barriers, and MDOT's fixed object safety standards. The vertical clearance categories are determined by the transmission line voltages.

See *Figure II-5* for a three-dimensional visual representation of the clearance locations.

Table II-1 - Safety Spacing/Clearance Guidelines in Maryland

	Allegheny Power	BGE	Conectiv	PEPCO	SMECO	NESC minimums
Horizontal Clearance from tower base to the edge of hwy. shoulder or rail track	15'	30'	25'	35' preferred	MDOT req.+ barrier	Not specified
Horizontal Clearance between the vertical projection of the overhead conductor to the edge of hwy. shoulder or rail track	Not given	Not given	Not given	10'	Not given	8.7'
Horizontal Clearance from tower base to excavation work (blasting, grading, etc.)	Not given	40'	25'	Not given	Not given	Not given
Vertical Clearance between 115kv – 138kv conductor wires to the highway surface	25'	Exceed NESC	Exceed NESC	Not given	Exceed NESC	20.6' ¹
Vertical Clearance between 230kv conductor wires to the highway surface	27'	Exceed NESC	Exceed NESC	35'	Exceed NESC	22.4' ¹
Vertical Clearance between 500kv conductor wires to the highway surface	35'	Exceed NESC	Exceed NESC	Not given	Exceed NESC	27.9' ²
Vertical Clearance between 115kv – 138kv conductor wires to the rail track surface	33'	Exceed NESC	Exceed NESC	Not given	Exceed NESC	28.6' ¹
Vertical Clearance between 230kv conductor wires to the rail track surface	35'	Exceed NESC	Exceed NESC	35'	Exceed NESC	30.4' ¹
Vertical Clearance between 500kv conductor wires to the rail track surface	43'	Exceed NESC	Exceed NESC	Not given	Exceed NESC	35.9' ²

¹The NESC computes minimum vertical clearances by adding 0.4 inches of clearance for each kilovolt over 22kv, up to 470kv. This spacing is added to the overall minimum clearance of 18.5 feet over highways, and 26.5 feet for rail tracks. For example, to calculate the additional clearance above 18.5 feet for a 230kv line spanning a highway, multiply the 230 kv * 105% (to obtain maximum operating voltage); then 242kv * $\sqrt{3}$ (this give the voltage to ground), then you would multiply (140kv-22kv) * (0.4") * (1 foot/12").

²The formula for determining additional spacing for transmission lines above 470kvkv is more complicated than for lines less than 470kv.

Note: Transmission wires naturally sag between tower connections due to the span length between towers and the downward force of gravity. However, the sag distance (drop in elevation at the low point of the wire) can vary depending on a number of factors. They include the conductor wire material, conductor wire tension, current flow, temperature, and precipitation (especially ice). For spans upwards of 1000 feet, the sag increase can be as much as 6.5 feet closer to the ground.

III. Transportation Options

III. Transportation Options

Overview

Transportation options or typical sections were developed as part of this study with the purpose of demonstrating the feasibility of implementation within existing HVTL corridors, or incorporated within the design of new HVTL corridors. The study team was unable to evaluate all possible scenarios due to almost unlimited number of typical sections that could be applied, particularly since the HVTL corridor vary tremendously. Modal options include heavy rail and light rail transit lines, general-purpose or managed highway lanes, and bus rapid transitways (BRT).

In developing these transportation options, the guidelines set forth by the five power companies and the National Electrical Safety Code (NESC) were important requirements. The power companies currently work with the Department of Transportation while designing their infrastructure improvements within or near transportation corridors. The power companys' designs must gain the approval of the administration, which owns rights to the transportation corridor or facility before any implementation can take place. This often requires complicated agreements for design, maintenance, and operations.

The next section discusses an example policy set forth by the Maryland State Highway Administration (SHA), regarding guidelines for utility lines adjacent to or crossing state highway facilities.

Maryland Utility Policy

The Maryland Department of Transportation, State Highway Administration's Utility Policy (SHA Utility Policy) regulates utility occupancy in SHA highway rights-of-way. This policy was developed in 1989, following a declaration by the Federal Highway Administration (FHWA) that granted approval authority of longitudinal occupancy of utility installations within highway rights-of-way to the state governments.

Potential impacts of HVTL installations upon the functions of a highway include the disruption of traffic flow, safety, and provisions for maintenance and future expansion of the highway. These impacts are addressed in several broad categories of regulation contained in the SHA Utility Policy, including:

- Obstruction of, or interference to, the operation of a State highway.
- Maintaining State highway safety during access and maintenance of utility installations.
- Utility design specifications and minimum construction standards within State highway right-of-way.
- Cost responsibility for any required modifications or relocation of utility facilities as required by State highway regulations.

Of most concern to utility companies currently enjoying unrestricted access to their facilities are the following safety precautions set forth by the SHA Utility Policy¹:

¹ SHA Utility Policy, 1989. Page 2-4.

HVTL Right-of-Way Usage for Transportation Facilities - Feasibility Study

- Utilities will take precautions to protect the traveling public. No lane closures during the peak hours will be allowed. In some cases, it may be necessary to perform the work during off peak times or at night.
- Private automobiles and non-essential construction vehicles shall not be parked on SHA rights-of-way.
- Mud and debris tracked or spilled on the roadway shall be removed promptly.
- Appropriate protective measures, approved by the SHA, including warning signs and barricades, may be necessary around excavations or construction sites.

In general, the SHA Utility Policy states that longitudinal utility lines, whether above ground or underground, are not permitted within the right-of-way of existing highways. Wireless telecommunication installations are permissible within expressway rights-of-way and the requirements governing this use could also apply to highway locations around pre-existing HVTL structures. The priority order of utility structure location within expressway rights-of-way is stated as follows:

- 1) Vehicle access to the site can be obtained from outside the through roadway and connecting ramps.
- 2) Within interchanges, vehicle access can be obtained from the right hand side of the diagonal ramps.
- 3) Within interchanges, vehicle access can be obtained from the left hand side of the diagonal ramps.
- 4) Vehicle access can be obtained from the outside shoulder of the mainline.
- 5) Vehicle access can be obtained from the inside shoulder (median side) of the mainline.

Arterial and collector highways do not require such strict location criteria. In general, a lower design speed of the highway allows for more flexibility in utility structure placement and affords an extra margin of safety that helps to reduce some concerns regarding access to, and the maintenance of, the structure itself.

Federal Policy

Federal-aid policy states that a lack of sufficient right-of-way width to accommodate utilities outside the roadside border, in and of itself, is not a valid reason to preclude highway facilities and utility structures to coexist. In fact, the policy only presents guidelines rather than a fixed requirement for horizontal separation. Vertical separation is explicitly governed by State policy. However, these minimum clearances are less than the NESC and power companies' guidelines. For longitudinal lines, the following minimums must be maintained:

Table III-1 - Vertical Clearances (SHA)

Minimum Vertical Clearance (feet)	Transmission Lines
18	Guy wires and secondary power wires below 750V.
20	750V – 22kv
21	22kv – 50kv
21 feet plus 0.4" per kv in excess of 50kv	50kv – 470kv

When the state agency lacks authority over the right-of-way, Federal policy dictates that an agreement must be reached with the utility such that the degree of protection to the highway is at least equal to the protection provided by the State agency's utility accommodation policy. In this case, SHA requirements must be upheld in any agreement reached with a utility company for the use of utility right-of-way for highway purposes. The specifics of these requirements can be referenced in the SHA Utility Policy².

Federal participation for funding the replacement and modification costs incurred by the utility company is available under certain conditions. Replacement right-of-way costs may be provided when the portion of the utility's existing right-of-way is transferred to the State Highway Administration (SHA) at no cost to the project. When relocation work is shared between SHA and the utility company, a written agreement stating the shared responsibilities of each entity is required for Federal-aid. The provisions of the FHWA's regulations covering reimbursement for utility work is for actual costs incurred to functionally restore a utility's existing operating facilities prior to the commencement of the highway project. The utility's financial and productive situation is to be maintained as if the highway project had not occurred. Where possible, this would not require construction of a replica facility, rather that the utility service is to be made whole by restoring the existing functions of the impacted facilities.

Use and occupancy agreements are used to establish the terms and conditions under which utility and highway installations co-exist. Federal-aid policy³ stipulates what such an agreement must include, with the following being critical to this study:

- The State agency standards for accommodating utilities. Since all of the standards will not be applicable to each individual utility installation, the agreement at a minimum must describe the requirements for location, construction, protection of traffic, maintenance, access restriction, and any special conditions applicable to each installation.
- The extent of liability and responsibilities associated with future adjustment of the utilities to accommodate highway improvements.
- The action to be taken in case of noncompliance with the requirements.

² Maryland State Highway Administration, Utility Policy

³ Federal-Aid Policy Guide, 23 CFR 645 A, Sec. 645.213

Transportation Design Criteria

Introduction

The design criteria for any transportation facility will ultimately determine the feasibility of its use in an HVTL corridor. The criteria determine the accuracy and the specification of the design and establishes the physical constraints that must be applied. Depending on the type of transportation facility or mode certain guidelines apply. Examples include the size and characteristics of the design vehicle, method of operation, the intended level of service, as well as the number of people expected to use a transportation facility. “Design criteria” are more specific. Some examples include the lane or track width, grades, sidewalk width, maximum and minimum superelevation (banking), maximum travel speed, maximum structure width or span, and horizontal and vertical clearances. Environmental considerations are vital since permits are needed and environmental documents must be approved before a facility is ultimately constructed. Also, the designs must be reasonable and practical from an economic standpoint.

Design Criteria for Highways

AASHTO Design Standards

The American Association of State Highway and Transportation Officials (AASHTO) publishes a design criteria standards manual, entitled: ‘A Policy on Geometric Design of Highways and Streets’, approximately every five years. It aids state highway administrations in the design of their facilities. The following is a list of the primary guidelines that were used to develop the highway options for this study (assuming a fully access-controlled, 4-lane highway).

- The ideal 4-lane highway consists of two, 12-foot traffic lanes in each direction, separated by a wide grassy median. If a wide median (54 feet or wider) is not feasible, then roadside barriers need to be implemented. AASHTO guidelines state that an 8-foot wide outside shoulder is the minimum, but it ultimately depends on the anticipated amount of traffic. Also, in some cases an 11-foot wide travel lane can be used, but the percent of truck usage has to be low.
- Design speed for urban and rural expressways vary from 40 mph to 70 mph, respectively. Terrain has a major influence on the selection of a design speed. This study uses a ‘rolling’ terrain with a design speed of 60 mph.
- With a 60 mph design speed, the minimum radius of horizontal curvature is approximately 1,350 feet. Therefore, if a HVTL corridor makes an abrupt turn, adjacent rights-of-way may need to be purchased to ‘round-out’ the curve.
- Grades depend on the type of terrain as well as the type of highway vehicle. For a 60 mph highway, a 4% maximum grade is used for rolling terrain, and up to 6% for freeways in mountainous terrain. A maximum grade of 5% is used in this study.
- A 16-foot vertical clearance should be provided for any bridge structure spanning the entire roadway width. Some additional clearance has to be taken into consideration for future resurfacing of the under passing roadway.

Design Criteria for Transit

Light Rail

The design speed of a light rail system depends on the type of vehicle and the type of terrain. It is normal for a light rail vehicle to operate between 40 and 50 mph along restricted access rights-of-way. The horizontal curves can be tighter than that required for a 60 mph freeway because the operating speed is controlled and can be lowered to a safe speed while maneuvering curves. The maximum grade for a long, sustained segment is 4%, but up to 6% for short segments of less than 2,500 feet between the crests and sags. At light rail stations, grades can vary from a desirable 0.5% to a maximum of 2.5%, but this is also dependent on the type of rail vehicle. Track spacing for two-way service varies based on vehicle specification, superelevation, and terrain. Using this standard, minimum track spacing of 12.25 feet center to center would be acceptable. A more desirable track spacing of 14 feet center to center would be used. Vertical clearance depends on the type of vehicle as well. Light rail vehicles receiving power from overhead wires require a clearance of 15 feet from the top of the rail to the overhead wire.

Busways

The design guidelines for busways are similar to light rail. However, busways can accommodate steeper grades and tighter turns. For this report, we will group them together. Of note, is that busways are flexible and can be either exclusive alignments or shared with highways.

High Speed Rail / Maglev

The design constraints are much more stringent for high-speed rail options. Included in this category is Amtrak and local commuter rail services (MARC, etc.), SkyTrain and Magnetic Levitation (Maglev).

Basic design requirements for high-speed rail systems are listed below:

- **Speed** – The design speed of high speed rail lines primarily depend on the type of vehicle that will be utilizing the tracks. For many existing commuter rail lines, the tracks are shared with freight trains and in most cases were initially designed for the lower speeds associated with the freight lines, which would mean tighter horizontal curves. Even though commuter train systems (Amtrak, MARC, etc.) are capable of speeds in excess of 100 mph, they would be limited to the maximum design speed used when the tracks were initially built. The design speed for commuter rail using new tracks implemented within HVTL corridor rights-of-way would depend on the lengths of the tangent sections and the severity of the corridor angles. The scenario would change quite drastically though, if a Maglev line were to be implemented, with speeds reaching 240 mph.
- **Horizontal Curve Radii** – The minimum horizontal curve radii increases almost exponentially as the design speed of the facility increases. Therefore, for tracks that are designed to carry a Maglev train designed for 240 mph, it may take over a mile to complete a single curve.
- **Grades** – Similar to the speed, the grade depends on the type of vehicle that will be used. Generally, a maximum grade is about 2% to maintain speeds, but there are exceptions. In fact, the Maglev could travel on a maximum 10% grade. Other heavy rail systems, such as the Washington Area Metropolitan Transit Authority's Metrorail line, have segments with grades as high as 4.5% where operating speeds must be lowered. At

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station locations, the maximum grades are reduced to a desirable grade of 0.35%. This would be the same for surface, underground and raised platforms station.

- Track Spacing – The minimum track spacing between the centerlines of parallel tracks is 14 feet, but can be up to 15 feet due to the size of rail cars used.
- Vertical Clearance - Vertical clearance depends on the type of structure, and the type of vehicle. Vertical clearance is usually measured from the top of a rail to the bottom of a structure. A preferable minimum vertical clearance for a heavy rail corridor is usually 22 feet. In some cases, such as the Washington Area Metrorail (a fixed structure in an open environment), the minimum clearance is as little as 13 feet. Vehicles that require overhead contact wiring would require additional vertical clearance.

SkyTrain is a rail system built primarily on an elevated guideway consisting of concrete pylons. It has been in use in other countries besides the United States for over 20 years. SkyTrain is faster and more environmentally safe than most existing rail lines since it runs exclusively on electricity, therefore producing no harmful emissions. Even though SkyTrain systems travel at speeds in excess of 50 mph, they are relatively quiet compared to other rail systems, and much quieter than a diesel truck. As an automated system, SkyTrain runs more frequently and efficiently than other transit systems, with as little as a 75-second gap separating trains. Because it operates along a dedicated guideway separate from the road system, SkyTrain does not interfere with highway traffic operations. The cost to design and construct a SkyTrain system is between \$30 million and \$40 million per-mile, dependent upon a number of factors. This cost incorporates approximately \$20 million per-mile of concrete elevated guideway, \$5 million to \$7.5 million per station, various “cut and cover” tunnel and related structures along the line, and other miscellaneous items.

Maglev is a newer technology incorporating an electromagnetic, non-contact levitation and propulsion system that is an alternative to traditional wheel-on-rail trains with a system that lifts, guides and propels the vehicle along a guideway at speeds up to 240 mph. Still in its planning stages in the Baltimore/Washington corridor, it could be implemented within the next 10 to 12 years. Test tracks have been built in Europe and the results are positive thus far. The cost to design and construct a Maglev system is between \$70 million and \$80 million per-mile, incorporating the same elements and contingencies as the SkyTrain system.

Hypothetical Corridor(s)

Based on the above criteria, typical sections were developed for a variety of potential HVTL corridor configurations. The purpose of this was to create a template to evaluate the typical section through a hypothetical HVTL corridor, consisting of the common tower configurations and corridor widths found in Maryland. The results help the study team determine what impacts the transportation typical section would cause to the HVTL infrastructure and what cost might be necessary to mitigate these impacts.

Two HVTL right-of-way widths were analyzed; 150 feet and 250 feet. Each corridor width was analyzed along an actual 5-mile tangent section that exists within Maryland. Several tower configurations were hypothetically considered within each corridor width with upwards of 3 large steel poles and two wooden poles per corridor. This would serve to represent a future ‘full build-out’ scenario, or most highly constrained HVTL corridor.

Topographically, these corridor(s) represent the terrain found in a typical HVTL corridor throughout almost all counties west of the Chesapeake Bay. Several of the towers are placed on hills while the transmission wires span ravines and valleys. To stay within the guidelines set forth by both AASHTO and the SHA / MTA, it was realized that several large cuts and/or fills would be required, along with retaining walls to protect the foundations of the towers. Otherwise, to move one tower is to move or affect the system of towers. Vertical profiles were created under each scenario, noting that the grade requirements for highways, light-rail systems and BRT were all quite similar, but highly constrained for the heavy rail option.

Typical Sections

The following series of figures (*Figures III-1 through III-7A*) represents the various combinations of typical sections with corresponding 'elevation' sketches illustrating the projected clearance distances. Note that several other typical sections were developed and initially analyzed, but were found to be less desirable than the sections evaluated here. Some proved impractical while others violated the standards and policy guidelines for highway and HVTL use (these typical section figures can be found in *Appendix B*). An explanation of the reasons why those typical sections were not carried for further analysis is also in *Appendix B*.

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Ownership of the corridors varies by power company. PEPCO is the only company in Maryland that purchased and continues to own the land rights (with a few exceptions) for their HVTL corridors. BGE owns roughly half of their HVTL corridor rights-of-way. SMECO, Allegheny Power and Conectiv have limited land rights through easements from private property owners. Essentially, the amount of land purchased or obtained through easements depends on the land area needed to construct, operate, maintain, and expand the HVTL corridor.

ALLEGHENY POWER

Allegheny Power's typical HVTL corridors vary dependent upon the transmission voltage. For 500kv corridors, the right-of-way widths are typically 200 feet and the primary structures used are steel (lattice) towers. For 230kv corridors, the right-of-way width is usually 125 feet and the structures can be steel lattice towers, steel poles, or multiple wood 'H' frame structures. For 138kv corridors, the right-of-way width is usually 100 feet, and the steel structures can be steel poles, steel towers, or multiple wood 'H' frame structures.

BGE

There are several types of HVTL corridors within BGE's jurisdiction. The corridors vary in width and contain several different types of structures. Voltages carried in the various corridors include 115kv, 230kv and 500kv. BGE has examples of shared use corridors in its system, including shared right-of-way with Amtrak along the Northeast Corridor and a short corridor shared with the Baltimore Light Rail Transit (LRT).

CONECTIV

Conectiv's corridor easements are typically 150 feet wide and have long tangent segments due to the flat topography and a larger percentage of available land, primarily with agricultural land-uses. Most corridors have at least one wood pole H-frame line in the center of the easement.

PEPCO

PEPCO's 230kv corridors are typically 250 feet wide. The width of 500kv corridors varies. Most of the corridors have dual steel (lattice) towers. PEPCO's ultimate build-out scenario for 230kv corridors is a triple steel pole configuration with the third line of structures constructed along the centerline of the corridor. The corridors also have lower voltage transmission lines, primarily wooden poles carrying 69kv lines, near the edge of the corridor. Due to PEPCO's high service demand within the Washington Metropolitan region, many of the existing 230kv corridors already include one or more 69kv lines along the edge of the corridor.

SMECO

SMECO's only HVTL corridor is a 230kv line with an average right-of-way width of 150 feet. Within this corridor, there is a single line of steel poles down the centerline of the corridor, with wooden poles carrying lower voltages approximately 25 feet from the corridor edge. The opposite side of the corridor will be used for future expansion needs, possibly dualization of the wooden poles.

Typical Tower Structures

Statewide, there are various structure configurations for HVTL corridors. Different utilities use different configurations depending on the specific conditions in the corridors. The differences are due to factors such as line voltage, the number of circuits, the current capacity required and the line route. In general terms, the higher the voltage, the larger the required safety area surrounding

IV. Issues and Consequences

IV. Issues and Consequences

Types of Issues

The study identifies several issues and concerns related to the utilization of HVTL rights-of-way for transportation facilities, especially compared to potential rights-of-way in undisturbed areas. Utility company representatives and highway officials have also identified issues and concerns. The issues represent the specific interests of the stakeholders but can also have a broader effect upon the likelihood of an HVTL corridor being selected for use as a transportation corridor. These issues may be an advantage, a disadvantage, or even both, dependent upon the stakeholder. A generalized collection of issues have been prepared and their effects, based upon the individual stakeholders, summarized below:

Access Issues:

- **HVTL rights-of-way generally do not run in areas of high transportation demand.** Most HVTL corridors are in rural or low-density areas. The areas where HVTL corridors exist generally do not generate travel demand sufficient to support transit service or a highway. The corridor may not easily connect with the existing transportation network. And due to safety concerns associated with development near HVTLs, it could be difficult to target growth to the corridor.
- **Easier access for maintenance equipment to towers and lines.** If a transportation facility is in the HVTL corridor, it should facilitate the power company's ability to bring maintenance workers and equipment from its storage facility to the structures and lines. Many HVTL corridors have rugged terrain and the addition of a graded, paved road would facilitate access. Having a better and quicker means of access would also be beneficial in emergencies.
- **Power line maintenance could become less time efficient.** In many cases today, rights-of-way are already accessible for the power companies' maintenance needs, including the use of access agreements with adjacent property owners. A paved corridor could result in quicker access times, but the time savings could be reduced because of the additional time needed to restrict and control traffic so that maintenance activities can be performed in a safe manner for workers and the general public.
- **Traffic Impacts.** Maintenance and repair of the HVTL and associated structures could impact traffic flow on the transportation facility.
- **Loss of private property owners' individual crossing rights.** When HVTL rights-of-way have been purchased by the utility companies in fee simple, most adjacent property owners have been granted crossing rights. In a number of cases, adjacent property owners are allowed to continue to use the land for agricultural purposes. Should a transportation facility be constructed in the corridor, the adjacent property owners' rights would be eliminated. Multiple parcels along a corridor require extensive title searches to determine the property owners affected and negotiation and compensation with these adjacent property owners for this loss. This could slow down any land acquisition process, which would cause this issue to be categorized as an economic issue as well.

Safety Issues:

- **Increased hazards for transportation facility users.** Constructing a transportation facility in an HVTL corridor increases the number of hazards a transportation user would encounter on the facility. The towers are fixed object hazards that drivers could hit. Towers or parts of towers could fall onto the facility, which could cause delays and accidents. If severed or faulted wires come into contact with the facility, users could experience fatal or severe electrical shock.
- **Increased risk to workers during construction and maintenance of the transportation facility.** Using large trucks and construction equipment, such as construction cranes, around HVTLs increases the possibility of a worker being killed or severely injured by electrical shock. A truck or crane could touch, or simply come too close, to the transmission line and cause an electrical shock. Death or severe burns and injuries happen instantly if contact is made with an electrical transmission line. However, the risk for electrical shock is minimal if sufficient clearance is maintained.
- **Impacts on emergency response times.** Depending on power wire converge, a medivac helicopter may not be able to land in the corridor. This could increase medical response times as compared to those on other transportation facilities. However, the improved access provided by the transportation facility could provide shorter medical response times over current times to power company employees maintaining the lines.

Environmental Issues:

- **Reduced need to clear forested and wooded areas.** Many HVTL rights-of-way have been substantially cleared of trees to allow clearance for power line sag and sway. This would reduce the need to clear the right-of-way for transportation uses. If a transportation facility is constructed in an HVTL corridor, the incremental negative effects of the transportation facility on water quality, wetlands, air quality, flora and fauna could be similar to or less than in the impacts of a facility constructed in undisturbed woodlands.
- **Negative aesthetic characteristics of the facility.** The sight of the towers, poles and transmission lines could decrease the visual appearance of the transportation facility for some users.
- **Brownfields redevelopment opportunities.** Many HVTL corridors meet the broad definition of a “brownfield” - vacant or underutilized property with real or perceived contamination. If a transportation facility was constructed within a brownfield, it could make better use of the vacant or underutilized property.
- **Environmental Permitting.** Because HVTL corridors are previously disturbed, the number of environmental permits required may be less than for a corridor that is not disturbed. If the number of permits is the same as a disturbed corridor, it may be easier to obtain new permits. However, in order to obtain Federal funds for the project, wetland, tree conservation and sediment and erosion control permits would still be necessary. Although it has not been proved, the potential association between electromagnetic fields (EMF) and certain types of cancer could cause possible permitting issues.

Socio-Economic Issues:

- **Reduced socio-economic and community impacts.** Due to buffer width requirements for HVTL towers and lines, and depending on the design of the transportation facility, homes could be located further from the facility. For example, if a four-lane roadway were located in the center of a 250-foot wide HVTL right-of-way, there would be approximately 100 feet between the edge of pavement and the adjacent property line. This results in a greater distance than typical HVTL scenarios utilized in a majority of highways and arterials.
- **Localizes the effect on people.** Utilizing HVTL rights-of-way should simplify social-economic issues with adjacent property owners and the surrounding public, since the HVTL corridors are generally an accepted land-use within the community. The implementation of a transportation facility would alter this use, but the effects to this change would be less than if the use was previously an environmental conservation area for example.
- **Creates an incremental impact, instead of new impact.**
- **Concentrates linear land uses.**

Cost Issues:

- **Faster, less costly land acquisition process.** If the HVTL corridor right-of-way were owned primarily by the power company, the government would need only deal with one property owner opposed to potentially hundreds. Land acquisition could be resolved in one negotiation and be a minimization of eminent domain issues, speeding the acquirement process. In addition, where adjacent property owners have been granted crossing or agricultural rights, significant negotiations may be needed to eliminate these rights.
- **HVTL and transportation facility geometry.** Depending upon the topography of the HVTL corridor, the cost of building a transportation facility could either increase or decrease accordingly. If the corridor is flat and straight, such as many Maryland HVTL corridors, construction costs may decrease. If the corridor traverses mountainous areas, low-lying wetlands or includes 90-degree turns, construction of the facility could be quite costly. In addition, to ensure safe clearances between power and transportation functions are maintained, it may be necessary to make significant and expensive modifications to the existing power facilities.
- **Limited expansion opportunities.** If a transportation facility is built within the HVTL right-of-way, there will be limited space available to construct additional HVTL towers. Future expansion would require the power companies to purchase additional rights-of-way. This process may be a disadvantage to both power companies and Maryland citizens as the demands upon available electricity increase.
- **Relocation of other utilities.** Within several HVTL corridors, easements have been granted to utility companies for gas and phone lines and fiber optic cables. Construction,

Potential Costs

Developing accurate implementation cost estimates for various transportation options is not possible because they are within hypothetical corridors with unknown variables and a large number of assumptions about the corridors have been made. To prepare a detailed cost estimate, a specific corridor must be selected and an environmental inventory be conducted. This study estimates costs using a 'cost-per-mile' approach. For example, the average *base* cost for building a new 4-lane divided freeway ranges between \$5 million-per-mile on flat terrain and \$6 million-per-mile over mountainous terrain. The base cost excludes "intangibles" such as right-of-way acquisition, structures, utilities, signing, lighting, marking, beautification, preliminary engineering, contingency, and overhead. Because the base cost typically covers earthwork, paving and drainage, base costs would be similar for any highway improvement, regardless of whether it is located within an HVTL corridor. It is the intangibles that create the cost differences. Building a transportation facility in an HVTL corridor will reduce some of the base-cost exclusions, but will increase others.

Cost savings can occur through a simplified right-of-way purchasing process if the power company owns the land and would be willing to allow areas of dedication or to enter into joint usage agreements. Clearing and grubbing costs would be significantly lower, and reforestation mitigation and other environmental costs would be minimized. The light poles and overhead sign lighting associated with interchanges should be easier to construct because of the land has already been cleared. However, even though the transportation facility is located in an electricity corridor, the power for the lights cannot come directly from the HVTL's because the voltages are too high. A separate, lower voltage electrical line would need to be used. Some HVTL corridors already have lower voltage lines within them, and in those cases, costs would be reduced.

The primary additional costs associated with building a transportation facility in an HVTL corridor occur if the terrain is mountainous with multiple steep slopes or there are impacts to avoid with grading. This is because bridges will need to span ravines and retaining walls and barriers will need to be constructed to protect the towers and provide sufficient clearances. The average cost for a bridge is \$100 per square foot. Retaining walls cost approximately \$50 per square foot. Depressing the transportation facility through the crests to eliminate high grades and to increase safety clearances will increase construction costs and take longer to build as the HVTL structures would need to be protected or moved.

Another cost associated with building a transportation facility in the HVTL right-of-way is relocating existing HVTL towers or poles if they are impacted by the transportation facility. The redesign, relocation or modification of an existing steel lattice towers or large steel pole can cost between \$100,000 and \$400,000 per structure. In addition, it is not uncommon to find that the relocation or modification of one tower creates the need to relocate or modify the adjacent towers until the transmission lines can be set at a constant tension throughout the tangent section of the corridor. If given the choice between relocating towers or constructing new ones, the power companies would rather construct new, large steel poles adjacent to the existing line because it will be easier to build and will allow for future expansion. Burying the conductor wires is an option, but the cost can be up to 10 times more expensive than relocating the lines above-ground. The increased cost is due to design complexity, cost of materials, electrical arching prevention and construction of casing pipes filled with oil to insulate the wires. Because of the extreme costs and safety requirements associated with insulating 500kv transmissions lines, they cannot be placed underground.

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To determine the estimated implementation costs, the study adds the base cost-per-mile for a particular transportation facility to the cost-per-mile increase associated with using the HVTL corridor that occurs and subtracts the cost-per-mile savings associated with using the HVTL corridor. *In general, the cost savings equal the additional costs, leaving little difference between the costs of implementing a transportation facility within an HVTL corridor versus an undisturbed corridor.* However, this finding could vary depending on the specific characteristics of the HVTL corridor. If the corridor's right-of-way is mountainous, is owned by several property owners, and has restrictive tower and/or pole placement, then the cost to construct the transportation facility could be more than 50% greater than building in an undisturbed corridor. Conversely, if the HVTL corridor is owned by one power company, the power lines and structures do not need to be relocated and some environmental mitigation has taken place as part of the HVTL construction, it could cost 50% less to build the transportation facility in the HVTL than in an undisturbed corridor.

Table IV-1 is a cost comparison matrix that breaks down the costs between the various transportation options and corridor configurations.

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which would require the relocation or avoidance of these utilities, could impact both maintenance and building costs of the transportation facility.

- **Additional tower protection.** Possibilities exist that vehicles may collide with the stationary power towers, requiring increased protection at the tower base. Examples of such include additional protective fencing and barriers at ground level, or constructing retaining walls.
- **Possible power line relocation.** If a transportation facility built in an HVTL right-of-way requires expansion, the costs associated with the relocation of the power lines would be incurred by the taxpayers.
- **Vertical clearance Constraints.** Design of the transportation facility must take into account the maximum wire sag between towers. Wire sag could limit the allowable vertical clearance of vehicles.

Miscellaneous Issues:

- **Electrical interference.** Electromagnetic Interference (EMI) is the disturbance or electrical noise electromagnetic fields within HVTL's can cause to vehicular radios, cell phones or other electronic devices. The EMI range is dependent on climate and a number of weather variables. For instance, it is such a problem in Hawaii that a "Faraday Shield" was designed and implemented to abate the interference on vehicles traveling along Interstate H-3 , but at high costs.
- **Reciprocity Concerns.** If a transportation facility is built in a HVTL corridor, how will fair compensation be determined? Can the utility companies be compensated for aggravation and loss of time associated with routine HVTL maintenance? Does allowing transportation facilities in existing HVTL corridors create a precedent for allowing HVTL's in existing transportation corridors? These questions illustrate the types of concerns that need to be resolved once the physical and environmental concerns about constructing transportation facilities in HVTL corridors are addressed. Answers will need to be researched thoroughly and possibly with input from lawyers.

V. National and Statewide Examples

V. National and Statewide Examples of Shared Corridor Use

Joint Transportation and HVTL Use Corridors

This section documents examples of power lines and transportation facilities sharing the same corridor. The examples highlight the circumstances that made joint use possible and may not represent typical HVTL and transportation design standards. However, the examples provide opportunities to learn about the types of projects and level of integration possible and to find out the case-specific circumstances that made joint use feasible. The examples cover two types of joint-use corridors. The most common type of joint use corridor is one in which the HVTL use comes in to the corridor after the transportation facility exists. Because of strict guidelines regarding placement of HVTL structures, the safety and operation of the transportation facility is not diminished by the combined use. The second type of joint use corridor – and the one that is the primary concern of this study – is a corridor in which the power company uses the right-of-way and the transportation facility is built after the HVTL line is in place. There are a limited number of examples of this type of joint use corridor, especially over long distances. A final type of corridor would be the design and construction of the HVTL and highway uses together from the outset. However, there are no examples of this type of activity in the United States.

HVTL Corridors Adapted for Transportation Use

The following examples show HVTL corridors adapted to allow for transportation uses in the corridor. The examples illustrate how different transportation modes can be accommodated in close proximity to HVTL structures. Because the examples have unique topography, political will and engineering, the findings they present may not be applicable to conditions in Maryland.

JEFFERSON PARISH, LOUISIANA

In Jefferson Parish, Louisiana, several roads have been constructed almost entirely within existing Louisiana Power and Electric Company's (LaPALCO) HVTL rights-of-way.

- Lapalco Blvd. 8 miles, 4-lane open section, partial control of access.
- Power Blvd. 4 to 6-lane open and closed sections, partial control of access
- Gretna Blvd. 2 to 4-lane residential street, no controls of access
- Stumph Blvd. 4-lane closed section, no controls of access (industrial land use)
- Dickory Avenue 4-lane open and closed section, no controls of access

The highways were designed and built in a way that allows the existing single tower configuration to remain in place as part of the highway median. LaPALCO supported the highway projects because the towers did not have paved access roads for HVTL maintenance and the LaPALCO vehicles were frequently getting stuck in the low-lying, wet terrain.

Photo 18

Trains pass directly beneath and through lattice HVTL towers. I-76 is visible to the right. Both modes share corridor space for approximately ¼ mile.



Photo 19

Even though this lattice structure has a wider base than the one from the above photograph, both, permit two tracks to pass beneath. They also have sufficient vertical clearance (minimum of 22 - feet) to allow double stack container trains.



MD 3 in Crofton

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These highways have proved to function safely beside the HVTL's and some of the roads are programmed for widening improvements.

- Power Blvd. (Vet.-W.Espl.) Widen from 4 to 6 lanes
- Lapalco Blvd. (Barataria-Destrehan) Widen from 4 to 6 lanes
- Lapalco Blvd. (Westwood-Barataria) Widen from 4 to 6 lanes



Figure V-1 - Jefferson Parish HVTL Corridor Location.



Photo 9 - Lapalco Blvd. westbound

The outside shoulder of Lapalco Blvd., with oncoming traffic. The towers are in the median. Notice the utility piping bridging over a stream crossing.



Photo 10 - Lapalco Blvd. eastbound

Lapalco Blvd., looking along the outside edge of pavement.

KING OF PRUSSIA, PENNSYLVANIA

An HVTL corridor near King of Prussia, PA (Figure V-2) provides an example of using a short segment of an existing HVTL corridor to build a new highway interchange. The surrounding region was completely developed, and the ¾-mile segment needed to connect three major highways was only available along an HVTL right-of-way. This new construction highlights the use (see Photos 11 and 12) of an HVTL corridor to enhance highway connectivity. The existing steel lattice towers were replaced with steel poles in the joint-use section to provide more flexibility in highway and ramp design.

Figure V-2 - King of Prussia Corridor
I-76, US 202, US 422 Interchange



Photo 11

This photo shows that a cut slope and retaining wall is utilized to maintain sufficient vertical clearance between the overpass and the power lines.



Photo 12

Here, a service road intersection lies directly adjacent to a steel pole. The service road runs at times through the middle of the corridor and between the two lines and also along the outside of the pole bases. The corridor width is generous, at approximately 400' across.

BALTIMORE LIGHT-RAIL TRANSIT SYSTEM

The Baltimore Light Rail Transit system provides an excellent example of implementing rail transit in close proximity to HVTL structures. In the mid-to-late 1980's, the Maryland Transit Administration (MTA) constructed a light rail line between Westport and Baltimore Highlands that utilized the existing HVTL corridor. Part of the corridor was originally owned by CSX for rail freight purposes, but portions of it were bought by BGE for HVTL's. The light rail tracks run between double circuit steel poles for a short segment near the Westport Stop (see Photos 13 through 17) and run parallel to the poles for a longer segment near Baltimore Highlands Stop.

Initially, BGE was opposed to building the rail line because it was concerned about potential conflicts with HVTL maintenance activities. However, funding and strong political support allowed the transit system to be built. Access to and maintenance of the HVTL structures has been arranged at the least possible inconvenience of either MTA or BGE in the extremely tight quarters illustrated in the following photos. Using the HVTL corridor allowed the light rail line to be built without disrupting adjacent properties while preserving a critical HVTL corridor into the city.

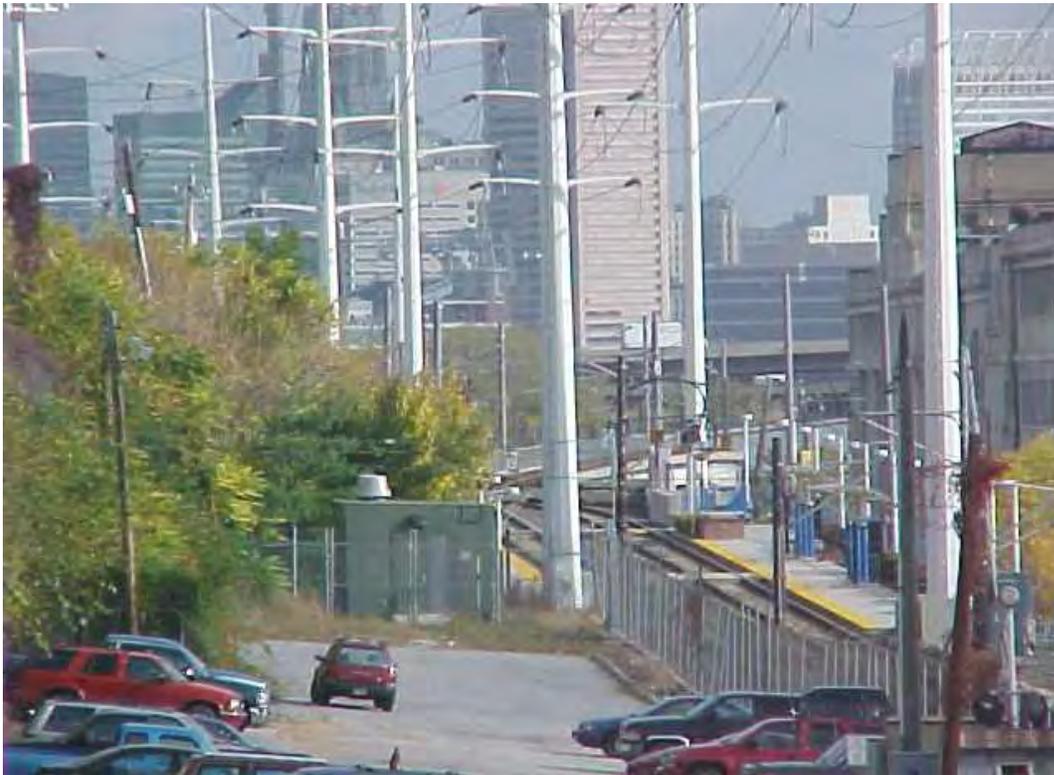


Photo 13

Looking north toward the Westport Station. The train lines are located between the two sets of HVTL towers.



Photo 14

The towers afford little horizontal clearance for passing trains in this view from Westport station.



Photo 15

A steel and concrete barrier provides the steel pole with protection from northbound trains (see Figure V-3).



Photo 16

Another view of the steel pole shown in Figure 1. It has a 52-inch diameter with an 8 ft diameter concrete base.



Photo 17
Looking across tracks at the steel pole and concrete barrier adjacent to the southbound track.

Transportation Corridors Adapted for HVTL Use

There are many more examples of transportation corridors being used for HVTL use, than HVTL corridors being used for transportation purposes. Transportation corridors have higher design standards than HVTL design standards. This is because of vehicle performance limitations and safety considerations. A result of the higher design standards is that it is easier to develop an HVTL in a transportation corridor than the other way around.

Philadelphia, PENNSYLVANIA

Topography limited the space available for an HVTL corridor along the Schuylkill River approaching Center City (see Figure V-4). Along this particularly narrow point, both the local power company and the Pennsylvania Department of Transportation were able to utilize the same segment of this corridor in very close proximity. The topography and constraints of the corridor required specially engineered structures to be used. (See Photos 18 and 19). The corridor had been initially purchased to construct a rail freight line in the late 1800's.

Figure V-4 - Norfolk Southern Main Line



Whereas the Baltimore LRT located within segments of a previously existing HVTL corridor, it is far more common for utility companies to locate within existing transportation corridors. An example from Maryland is along MD 3 near Crofton. The Maryland Department of Transportation State Highway Administration (SHA) has specific policy that governs the placement of such utility structures within highway rights-of-way. The SHA Utility Policy indicates the necessary clear zone required for safety reasons beside highways. These standards are represented by the horizontal separation between road and steel poles, while in this example the transmission line is located just outside the highway right-of-way on private land. The need for increased safety buffers along highways contrasts with the Baltimore Westport LRT example, where tight spacing was allowable between poles and light rail vehicles. The horizontal clearances are shown in detail in Figure V-5.



Photo 20

Looking south along MD 3 southbound lanes. The 2.5-foot diameter steel poles carry transmission lines of 115,000 volts.

The previous examples are either functional facilities or are very near completion. Locally, there are several projects in the planning stages that could potentially have joint-use HVTL implications. These projects would provide the most immediate application of the recommendations of this HVTL study. Descriptions of some example projects within Maryland and West Virginia are provided below.

- ***The Baltimore-Washington Maglev Project***

This Federally funded study is evaluating several high-speed rail alignments to connect Baltimore and Washington. One alignment utilizes for several miles an HVTL right-of-way that has a dual configuration of steel and lattice towers. All alternatives are still under evaluation and no date has been set for an alternate to be chosen.

- ***College Park Connection from I-95 (2012 Olympics)***

SHA's Regional Planning Office is conducting this study. One of the options is utilizing the HVTL right-of-way that extends south from the I-95/I-495 interchange towards College Park and beyond.

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- ***Northeast Baltimore Corridor Study***

This feasibility study was conducted by MTA to explore opportunities to extend rail transit from downtown Baltimore to the White Marsh area. Several alternatives looked at using the HVTL corridor that connects northeastern Baltimore City and the White Marsh Area. This project has recently been funded for further study

- ***West Virginia Route 9***

West Virginia Division of Highways initiated this study based on a future highway alignment shown in the adopted local Master Plan. As part of the NEPA evaluation process, other alignments were evaluated. While the study was being conducted, Allegheny Power built HVTL's within the master plan alignment. Joint usage is still a possibility since no highway alignment has been selected.

Transportation Facilities with HVTL Crossings

Maryland has many examples of transportation facilities and HVTL structures crossing.

The study team took some trips to the field to investigate HVTL crossings of existing transportation facilities in order to witness the clearance distances between the HVTL towers, transmission lines and highway / rail track. The purpose was to determine if there were any issues associated with these crossings that may help to develop an understanding of joint-usage possibilities.

One observation was discovering how many HVTL crossings there are within Maryland, and realizing how close some of the tower structures are to the edge of highway / rail track. The following paragraphs and photos represent key examples of these crossings and how they hinder future expansion possibilities for the transportation facility.

MD 32 – ANNE ARUNDEL COUNTY

This 115,000-volt transmission line corridor crosses MD 32 several times and runs parallel to the roadway for several miles (see Photo 21 through 23). One key observation was the close proximity of one of the towers situated in the median of MD 32, near the National Security Agency. The HVTL corridor crosses at a skewed angle in this instance.



Photo 21

The photographer is looking west along the median barrier of westbound MD 32. The HVTL tower is a lattice tower with a square base of 30 feet on each side. There is 19-foot horizontal clearance between the concrete base of the tower and the face of steel barrier.



Photo 22

This photo shows another view of the lattice tower shown in Photo 21. This view is from the outside of MD 32 westbound, looking towards the eastbound lanes. (See Figure V-6 for a plan view sketch.)



Photo 23

The HVTL Corridor is parallel to MD 32, south of the freeway. Note that the closest two lattice towers have extended heights to accommodate a long span and still maintain minimum vertical clearance distances between the transmission wire midpoint sag and the ground elevations.

MD 170 – ODENTON

This HVTL corridor crosses MD 170 at a skewed angle, near the town of Odenton. Note how the transmission wires span from a lattice tower to a steel pole in the distance; refer to Photo 24 below. The observation here is how close the towers are to the curbs, with no barriers. This was accepted most likely due to the lower design speed of 35mph along MD 170, which caused less of fixed object hazard risk. The sidewalk is even closer to the towers.



Photo 24

Looking north along the MD 170 southbound lanes. The steel (lattice) tower is 15 feet from the travel lane. (See Figure V-7 for a plan view sketch.)



Photo 25

Looking north along the sidewalk adjacent to the northbound lanes of MD 170. The diameter of the steel pole is slightly more than 4 feet. The distance between the base of the pole and the travel lane is 9.5 feet. (See Figure V-8 for a plan view sketch.)



Photo 26

A closer look at the wide steel pole adjacent to northbound MD 170.

I-95 / I-495 INTERCHANGE – COLLEGE PARK

This is feasible and practical since the towers / poles can be placed within the acres of underutilized land areas between the ramps and travel lanes of these major interchange configurations (see Photo 27).

Photo 27 - Large HVTL structures within the I-95/I-495 interchange



Photo provided by Bryne Kelly

There are several completed or ongoing transportation studies in Maryland with HVTL corridor right-of-way impacts, primarily due to perpendicular crossings HVTL crossings under study in the region include:

- ***MD 43 – Middle River Extension (Baltimore County)***

This project led by SHA is in Final Design. To accommodate maximum sag conditions, the transmission line height need to be at least 30-feet over the proposed highway. BGE is working with SHA to adjust tower and transmission line heights. Preliminary cost estimates for tower and transmission line modifications and relocations are approximately \$600,000.

- ***MD 33 – St. Michael’s Bypass (Talbot County)***

This project led by SHA almost made it through Final Design before the project was canceled due to an inability to obtain environmental permits. Some HVTL rights-of-way were purchased from, but will now be sold back.

- ***US 301 – Waldorf Upgrade / Bypass Study (Charles County)***

The eastern bypass alternative for Waldorf crosses an existing HVTL corridor several times and runs either within or alongside the corridor for several hundred yards. This alternative is still being evaluated and a Public Hearing on the alternatives is scheduled for 2002.

Appendix G

Example Waterfront Priority
District Text

Example Zoning Language: Waterfront Priority District

- A. Intent. The Waterfront Priority District is to encourage the development and maintenance of appropriate water-dependent and water-enhanced uses along the Niagara River. This district recognizes the significance of the River as an environmental, recreational, economic and scenic resource and intends to prevent the degradation of significant natural resources and water quality by controlling the location and intensity of uses and by providing development guidelines for these uses. Other specific purposes of the district include:
- a. Ensuring that development and land use activities along the shorelines of the Niagara River are consistent with the policies and objectives of the most current Local Waterfront Revitalization Program (LWRP).
 - b. To encourage and facilitate water-dependent recreational development along the River and to provide sufficient space in appropriate locations for recreational activities, certain commercial activities and other water-dependent and/or water-enhanced uses, to meet the needs and desires of the Town's present and future populations.
 - c. To recognize the Niagara River as a unique environmental and recreational resource and to protect this area from environmentally destructive uses and activities.
 - d. To provide for a desirable mix of water-oriented commercial uses and active and passive recreational opportunities that takes advantage of the unique location and characteristics of the Niagara River area.
 - e. To promote the maintenance and/or extension of public access to the waterfront, when practical and feasible, where such access relates to and is compatible with the primary purpose of the proposed development or activity.
- B. Permitted Uses. The following uses shall be permitted in the district with site plan approval set forth in Article XXIII.
- a. Public and private parklands, recreation areas and cultural/interpretive facilities
 - b. Boat launches
 - c. Marinas and yacht clubs
 - d. Boatyard and boat storage facilities
 - e. Commercial excursion and charter boat enterprises
 - f. Boat and marine repair facilities
 - g. Restaurants
 - h. Mixed use structures with non-residential use on first floor and office or residential on upper floors

- i. Mixed use with ground floor parking, side or rear access
 - i. Bar/tavern/pub, including microbreweries
 - C. Specially Permitted Uses. The following uses shall be permitted with a special use permit in the district in accordance with Article IXF with site plan approval set forth in Article XXIII.
 - a. Retail
 - b. Hotel/motels
 - c. Multi-family or attached residential development, including townhomes
 - d. Outdoor storage and storage structures with screening from adjacent uses and the public right-of-way
 - e. Business and professional offices
 - D. Dimensional Requirements.
 - a. Minimum lot size and frontage: Minimum required lot size and frontage shall be based on the amount of land necessary to adequately accommodate the proposed principal use, any accessory use(s), parking/loading space, vehicular access, open space, setbacks, and public waterfront access.
 - b. Minimum setbacks:
 - i. Rear: If property abuts the Niagara River, this shall be deemed “waterside” and be 75 feet from high water mark (no development or disturbance within first 25 feet of high water mark unless limited access required to the River, low impact development/limited clearing within remaining 50 feet). Otherwise 30 feet from property line.
 - ii. Front (Roadside): 50 feet from right-of-way line
 - iii. Side: 25 feet from property line
 - c. Maximum lot coverage: 65% (includes all impervious surfaces such as buildings, parking/paved surfaces, and compacted gravel). Remainder shall be open green space and/or landscaping.
 - d. Maximum height: 40 feet
 - E. Additional Regulations and Requirements.
 - a. The proposed design of the site and the arrangement of structures shall be done in such a manner to provide pedestrian access to the waterfront and public views of the River to the maximum extent possible. Buildings on the waterfront side of any roadway shall permit pedestrian access from both the waterfront side and the road side of the building.
 - b. The construction of water-dependent facilities shall be undertaken only if they do not impair water quality, cause harm to local habitats, destroy the natural beauty of the shoreline, reduce the stability of the shoreline, cause

erosion or sedimentation problems along the shoreline, or otherwise threaten the public health and safety.

- c. Upland design shall include as much porous land surface and vegetative cover as possible to prevent stormwater runoff and contaminated waters from reaching coastal waters or wetlands. Buffer zones of natural vegetation shall be established and maintained between property development and any waterways or wetlands.

Appendix H

Riverworld Concept Plans

- TVGA Planning and Feasibility Report (2011 excerpt)
- Niawanda Development - University at Buffalo Graduate Studio (2011 excerpt)
- Team Orange | Planning | Survey | Design - University at Buffalo Graduate Studio (2011 excerpt)

**PRELIMINARY PLANNING & FEASIBILITY REPORT
NIAGARA RIVERWORLD
4000 RIVER ROAD,
TONAWANDA, ERIE COUNTY, NEW YORK**

Prepared for:

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2011.0015.00

MAY 2011

NIAGARA RIVERWORLD

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APPENDICES

Figure 1: Site Location Map

Figure 2: Tax Map

Appendix A: Zoning Map and Regulations

Appendix B: Conceptual Redevelopment Plans A-C

Appendix C: Order of Magnitude Cost Estimates

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1. INTRODUCTION

The Town of Tonawanda Development Corporation (TTDC) commissioned TVGA Consultants (TVGA) to conduct a preliminary planning and feasibility study for the redevelopment of the Niagara Riverworld site located at 4000 River Road in the Town of Tonawanda, Erie County, New York (See Figure 1). The project site is privately owned by Niagara Riverworld, Inc. and was formerly occupied by a large industrial complex. The study was comprised of the following three major tasks:

1. Analysis of development constraints and opportunities;
2. Preparation of three conceptual redevelopment plans; and
3. Formulation of an implementation strategy.

A steering committee comprised of representatives from the TTDC, Town of Tonawanda, Erie County Department of Environmental and Planning, Erie County Industrial Development Agency and Niagara Riverworld were heavily involved in formulating the conceptual redevelopment plans and implementation strategy. The committee participated in a design charrette on March 22, 2011 to assist the consultant team with the selection of the type and desired character of the redevelopment concepts. Additionally, a round table meeting was held with the committee on April 26, 2011 to solicit input on the implementation strategy.

The following sections provide a description of the subject property; summarize the site analysis conducted by the consultant team; describe the three conceptual redevelopment plans generated; and address critical issues associated with the implementation of the redevelopment plans.

2. SITE DESCRIPTION

The Niagara Riverworld site encompasses approximately 62-acres situated between River Road to the east and the Niagara River to the west (See Figure 2). The site is bounded to the south by a petroleum storage facility operated by the Marathon Petroleum Company and largely vacant land owned by the Tonawanda Coke Corporation. Vacant land owned by Matthew Duggan and a ready-mix concrete plant owned by Lafarge Corporation abut the project site on the south. Active and former Industrial properties that include a concrete recycling plant operated by Swift River Associates, Inc. and the foundry coke production facility operated by Tonawanda Coke Corporation are situated to the east of the site, on the opposite side of River Road.

A steel sheet-pile bulkhead wall extends approximately 650-feet along the western site boundary, forming the shoreline of the Niagara River. The Riverwalk recreational trail extends along the former Erie Canal corridor that bounds the site to the east.

The site contains a 200,000 SF warehouse building that is located on the southeastern corner of the property and is actively utilized by a number of businesses that lease space from Niagara Riverworld, Inc. There are several other smaller structures situated in the vicinity of the warehouse that are also leased to tenants for various businesses. These buildings and the remnants of other industrial structures (i.e., buildings, foundations, retaining walls, railroad embankments, etc.) that occur on the remainder of the site were originally part of a steel manufacturing complex that operated on the site

from 1907 until the 1980s. While much of the former steel mill has been demolished and removed from the site, a large, dilapidated brick building that functioned as a boiler house remains in the central portion of the site and is flanked on the east and west by extensive foundations and retaining walls.

The site is currently accessed from River Road via an asphalt driveway located near the warehouse facility. An easement providing access to the site from River Road farther to the north also exists, but has not been improved. A network of gravel roadways exists within the site. Additionally, a small building that houses a groundwater treatment facility is located near the northwestern corner of the site.

3. SITE ANALYSIS

a. Zoning

As depicted on the zoning map included in Appendix A, the project site is located within a Waterfront Industrial District (WID). The Town of Tonawanda has indicated that the purpose and intent of the WID is to provide for a planned district for industrial development of a manufacturing, processing and/or assembly nature, as well as wholesale and warehousing activities and to encourage water-dependent or water-enhanced industrial or commercial uses on lands that are located along the Niagara River. This zoning district requires that the character and integrity of the surrounding land uses and the waterfront region be maintained and that appropriate design standards be applied within the Tonawanda waterfront region. The WID zoning regulations list the permitted uses, use restrictions, dimensional requirements, design requirements, and performance standards (i.e. noise, odor, smoke, etc.).

The project site is also located within the Town's River Road Overlay District. The regulations for this district are designed to supplement the zoning regulations for the WID and are to be used in conjunction with the zoning regulations and other performance regulations in the Town code. Where conflicting requirements are encountered, the overlay requirements shall supersede any other regulations. Developed in accordance with the goals and objectives of the Town of Tonawanda, the 2002 Waterfront Land Use Plan and the Town's Local Waterfront Revitalization Program, this overlay district is designed to better manage and accommodate business growth along the River Road corridor through the implementation of guidelines to regulate development and redevelopment. This district is divided into three separate areas with objectives and requirements applicable to the district as a whole as well as those applicable to the individual areas. The project site is located in the "industrial corridor area" of this district. Included in Appendix A are copies of the zoning regulations for both the Waterfront Industrial District and the River Road Overlay District.

b. Infrastructure

The project site is bordered to the east by River Road (NYS Route 266) which contains several public utilities that could be harnessed for development. The following is a listing and brief description of each utility:

- **Potable Water** – There is a 20-inch potable watermain on the east side of River Road that is owned and maintained by the Town of Tonawanda (TOT). The available capacity would need to be verified with the TOT technical support department, however, given its size, it is assumed that the capacity is sufficient.

Note that there is also an Erie County Water Authority (ECWA) transmission main in the River Road right-of-way, however it is unlikely that it would be able to be utilized as the project site is outside of ECWA's service area.

- **Sanitary Sewer** – There is a 15-inch sanitary sewer on the west side of River Road that is owned and maintained by the TOT. The available capacity would need to be verified with the TOT technical support department and the NYSDEC.

The existing sewer is approximately nine feet deep at River Road. Given that the project site slopes down to the west and a proposed sanitary sewer would need to flow east, it is likely that a pump station and forcemain would need to be installed.

- **Storm Sewer** – There are two options for storm sewer installation on the project site. The first is discharging to River Road, however, information on the existence of a storm sewer was not available at the time of the study. NYSDOT would need to be contacted to verify the existence and available capacity of that storm sewer. Discharges to this system would also require approval of the Municipal Separate Storm Sewer System (MS4) that has jurisdiction over that closed system.

The second option is to discharge stormwater directly to the Niagara River. That discharge would require permitting through the US Army Corps of Engineers (USACOE). However, it would present the advantage of eliminating the requirement for the retention of stormwater runoff.

Note that both options would require State Pollutant Discharge Elimination System (SPDES) permitting. This would entail the installation of Green Infrastructure Systems and Water Quality Treatment Systems that are compliant with the NYSDEC Stormwater Management Design Manual.

- **Natural Gas and Electric** – Natural gas and overhead electric service exist on-site per the Niagara Boundary ALTA map. National Fuel and National Grid would need to be contacted to determine the available capacity of natural gas and electric service, respectively.

c. Transportation

The project site is located in close proximity to major regional transportation systems, including roadway, rail, water and air. There are two existing access points to the project site from River Road located at the south end of the site that generally serve the existing warehouse facility. The study area offers excellent access to interstate highways (i.e. New York State Interstate Highway's 190 and 290) at multiple entrances and exits. The closest regional highway to the project site is the I-190 and the nearest interchange with the I-190 is located approximately 1 mile north of the project site at River Road.

The project site is also in close proximity to two major US/Canada truck bridge crossings including the Lewiston-Queenston Bridge, located approximately 16 miles north of the project site in the Town of Lewiston, New York and the Peace Bridge located approximately 7 miles south of the project site within the City of Buffalo, New York.

Rail lines in the vicinity of the project site are owned and operated by CSX. A single line is located southeast of the project site crossing Sheridan Drive and paralleling Kenmore Avenue and Grand Island Boulevard. Additionally, several spurs run toward River Road, providing access to companies south of the project site.

The Niagara Falls International and the Buffalo-Niagara International Airports are both located in close proximity to the project site. The Niagara Falls International Airport is located approximately 12 miles from the project site and the Buffalo Niagara International Airport is approximately 15 miles from the project site, in the Town of Cheektowaga, New York.

The Niagara River, which bounds the project site to the west is actively used by several industrial facilities in the vicinity of the project site as a mode of shipping, as well as by numerous recreational boaters in the area. The presence of the bulkhead wall that extends approximately 650-feet along the river shoreline on the project site, poses the potential to take advantage of this adjacent water transportation/shipping network.

d. Environmental

This project site, formerly the Roblin Steel complex (NYSDEC Site No. 915056), is identified as a Class 4 NYSDEC Superfund site. Class 4 sites have been properly closed but require continued site management. Roblin Steel reportedly disposed of an estimated 1 to 2 million gallons of spent pickle liquor at this property during the late 1960s. Also, the Wickwire Steel Plant (former site occupant from the early 1900s to the mid 1940s) used the site for disposal of excess slag. Within the boundaries of the Roblin site is a second site known as the Envirotek II facility, which consists of a 2.5-acre parcel that was operated as a solvent recovery facility during the 1980s. An Interim Remedial Measure on the Envirotek property was implemented in 2003 and 2004 and

consisted of the removal of waste in the boiler house and a disposal pit and removal of contaminated soil. A long-term groundwater monitoring program is in place for the Envirotek property. A remedial investigation of the portions of the Roblin plant site not impacted by Envirotek activities was completed in 2007. Minor contamination was documented; however, no hazardous waste was identified.

An environmental easement has been filed for the entire project site to address residual contamination occurring thereon. The Environmental Easement:

- Requires compliance with the approved Site Management Plan (SMP), which contains provisions for:
 - Addressing residual soil contamination that may be excavated from the site during future development
 - Future development of the site, which may include buildings, support structures, roadways and parking lots. Under such development, a vegetative cover should be provided beyond the building foot print and paved areas.
 - Managing, characterizing, and properly disposing of soil/fill that is excavated and is intended to be removed from the site in accordance with NYSDEC regulations and directives.
 - The reuse of soil/fill excavated at the site as backfill material on-site provided it contains no visual, olfactory or evidence of gross chemical contamination.
 - Ensuring that vapor intrusion (VI) mitigation techniques will be designed for new buildings constructed on the Site. These techniques will include the use of sub-slab vapor mitigation systems, designed into the foundation of the buildings, and installation of a vapor barrier between the building foundation and the lowest concrete slab flooring. The NYSDEC and NYSDOH will be provided with vapor intrusion mitigation design drawings for comment and approval prior to construction. After the building construction is complete, an indoor air sample will be collected to verify the effectiveness of the VI mitigation. Results of the sampling will be provided to the NYSDEC and NYSDOH.
 - Routine groundwater monitoring consisting of annual monitoring for three years starting in 2008, then every five years until 2025 (i.e. 6 sampling events).
 - Limits the use and development of the property to commercial or industrial uses only;
 - Restricts use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the Erie County Department of Health; and,
 - Requires the Site owner to complete and submit to the NYSDEC IC/EC certification.

There are no engineering controls on the Site as there are no active remedial systems.

e. Building and Foundations

The review of historic aerial photos and facility site plans indicated that the site was historically occupied by extensive industrial buildings and supporting infrastructure. Much of the former steel plant has been demolished and removed from the site, however, site observations confirmed that a number of vacant structures remain, including the large boiler house located in the central portion of the site. In addition to this structure, the remnants of many other buildings and structures are still present on the site. This includes reinforced concrete foundation walls, concrete building pads, retaining walls and process piping. If the demolition and removal of these remnants is necessary to facilitate the redevelopment of the site, site preparation and development costs would reflect these efforts.

Information provided by Niagara Riverworld indicated that asbestos containing material (ACM) is present within the Boiler House. Therefore, asbestos abatement is a prerequisite to the demolition of the Boiler House and possibly other remaining vacant structures.

4. CONCEPT PLANS

The scope of the consultant team's assignment included the preparation of three conceptual redevelopment plans. The range of uses to be depicted in the concept plans was prescribed in the TTDC's *Request for Proposals* and the agreement for consultant services, but was slightly modified following a design charrette conducted with the Steering Committee on March 22, 2011. As a result of the charrette, the consultant team advanced the following three concepts:

- a. Traditional Office Park
- b. Clustered Office Park
- c. Mixed Use Development with "Town Center" Feature

All three of these concepts incorporated a number of common design elements that surfaced as a result of the design charrette. The following bullets summarize the design elements common to all three concept plans:

- Provisions for green space along the Niagara River shoreline and interior of the site reflective of a higher quality development;
- Creation of a recreational trail connecting the existing Riverwalk to the waterfront green space;
- Utilization of the existing bulkhead wall for seasonal boat docking facilities;
- Preservation of Niagara Riverworld's existing warehouse facility as well as the existing groundwater treatment building;
- Creation of a zone of light industrial development around the existing warehouse facility to buffer the new development from this operation;
- Provisions for an entrance feature at River Road reflective of a higher quality development; and
- Use of the Niagara River as an aesthetic focal point of the development.

The resulting Concept Plans A-C are presented in Appendix B and described in the following paragraphs:

Concept A – Traditional Office Park

This concept plan reflects a traditional suburban office park development that is based on a 2-acre typical lot size. The site is subdivided into 12 lots and a new landscaped entrance road extends westward from River Road from the point of the current easement toward the river and branches into two segments that maximize the number of waterfront lots. The office building footprints depicted on this concept each encompass 10,000 SF. The layout provides the flexibility to combine lots should the demand exist for larger development parcels.

This concept also incorporates a light industrial development zone around the existing warehouse building that is served by a separate new access road. The new access road would loop around the existing warehouse building and connect with the existing access road located along the southern boundary of the site, which would also be improved. The buildings in this zone encompass 40,000-60,000 SF.

A central green zone extends from the eastern site limits to the waterfront, providing a connection from the existing Riverwalk trail to a waterfront green zone. The central green zone also incorporates the area of the boiler house and surrounding foundations. Following the demolition of the boiler house, fill would be placed in this area to cover the foundations and an elevated overlook with views of the river would be created. This approach would avoid the cost of removing subsurface foundations and other obstructions.

An order of magnitude cost estimate for Concept A was compiled by TVGA and amounts to \$7.5M as detailed in Appendix C. This estimate accounts for the rough costs of site preparation, including asbestos abatement and building demolition, and construction of site roadways, utilities, trails and landscaped amenities.

Concept B – Clustered Office Park

Concept Plan B is based upon a clustered development approach where buildings are concentrated in several “pods” and are served by common parking areas and amenities. Three development pods containing multiple office/mixed use buildings of varying heights and square footage are shown. These pods are accessed by a new access road that extends westward from River Road from the point of the current easement toward the river and branches into two segments. Each of the pods contains shared surface parking facilities, but could also incorporate some first level enclosed parking.

Like Concept A, this concept incorporates a light industrial development zone around the existing warehouse building that is served by a separate new access road. Additionally, a waterfront banquet facility has been included on the northwestern corner of the site to address the demand for such a facility identified by the Steering Committee.

As a result of the clustered development approach, nearly 50% of the site is available for green space and natural park areas and Concept B features an extensive network of

recreational trails that link the existing Riverwalk trail to the waterfront as well as the development.

As detailed in Appendix C, the order of magnitude cost estimate for Concept B is \$10M. As with the previous concept plan, this estimate accounts for the rough costs of site preparation, including asbestos abatement and building demolition, and construction of site roadways, utilities, trails and landscaped amenities. Additionally, the estimated cost of constructing the common parking facilities is included in this figure.

Concept C - Mixed Use Development with "Town Center" Feature

The third concept plan is the most ambitious and seeks to create a self-sustaining mixed use development that is focused on a "Town Center" feature. The mixed use development encompassed in Concept C is centered on a central corridor that extends westward to the river and contains a pedestrian plaza, focal pond/water feature, natural park area, recreational trail network and outdoor amphitheater. Site access under this scenario would be via a new parkway from River Road that is centered within the development area and branches out toward the river from the central corridor. Tiered, mixed use buildings of varying configuration and square footage extend along both sides of the central corridor and are served by shared parking facilities.

This concept retains the banquet facility depicted in Concept B, and also includes a twin pad ice rink facility to address the demand for such a facility identified by the Steering Committee. Like Concepts A and B, this concept also incorporates a light industrial development zone around the existing warehouse building that is served by a separate new access road. However, the extent of this zone is reduced to accommodate the parking requirements of the ice rink facility.

Green space consisting of natural buffer areas and landscaped roadway and parking areas occurs throughout the development. A natural park area and sloped lawn amphitheatre are focal points of the central corridor leading to the river. Additionally, a focal pond/water feature is located in the center of the development to anchor the "Town Center".

The order of magnitude cost estimate for Concept C is \$13M, as detailed in Appendix C. This estimate accounts for the rough costs of site preparation, including asbestos abatement and building demolition, and construction of site roadways, utilities, trails and landscaped amenities. Additionally, the estimated cost of constructing the common parking facilities is included in this figure.

5. STATE ENVIRONMENTAL QUALITY REVIEW

In New York State, most projects or activities proposed by a state agency or unit of local government, and all discretionary approvals (i.e. permits) from a NYS agency or unit of local government, require review under 6 NYCRR Part 617 State Environmental Quality Review (SEQR). Based on the nature and scale of this development project, SEQR review will be required. The basic purpose of SEQR is to incorporate the consideration of environmental factors into the existing planning, review and decision-making processes

of state, regional and local government agencies at the earliest possible time. The following summarizes the process to be undertaken as part of the SEQR review:

- The first step in the process is to classify the proposed action. There are three classes of actions under SEQRA including: Type I, Type II and Unlisted Actions. The proposed project would be classified as a Type I Action based on the fact that it involves the physical alteration of more than 10 acres of land (6NYCRR Part 617.4(b)(6)(i)).
- Part 1 of the Full Environmental Assessment Form (EAF) will need to be completed by the project sponsor for the proposed action and submitted to an involved agency together with any other applications that are required. The lead agency (see next step) is responsible for completing Part 2 of the EAF, and as needed, Part 3.
- The involved agency initially receiving an application for approval circulates the completed Part 1 and any other information to the other involved agencies identified by the applicant on the EAF. If only one agency is approving, funding or directly undertaking an action, that agency is automatically the lead agency. If there are two or more involved agencies, the involved agencies must agree on a lead agency within 30 calendar days.
- The lead agency has 20 calendar days to make its determination of significance. If the lead agency finds that it does not have sufficient information to make this determination, it may request that the applicant provide it. The lead agency must make its determination within 20 days of receipt of all the information it reasonably needs.
- Under a Type I action, the determination of significance will result in either a Negative Declaration (i.e. will not have a significant adverse impact on the environment) or a Positive Declaration (i.e. may have a significant adverse impact on the environment).
- In the event of a Negative Declaration, the lead agency must identify the relevant areas of environmental concern; thoroughly analyze the relevant concerns; and document the determination, in writing, showing the reasons why the environmental concerns that were identified and analyzed will not be significant.
- If a Positive Declaration is issued, the preparation of an environmental impact statement is required.

Based on the nature and scale of the proposed action, it is anticipated that potential issues that may be identified during the SEQR process could include but may not be limited to the management of increased stormwater runoff from impervious roof and parking systems; traffic to be generated by the new development corresponding potential impacts to the adjacent highway network; the capacity of existing utilities to

service the development; and potential impacts to human health and the environment associated with residual contamination on the site. These issues and the anticipated magnitude of the impacts will be identified in Part 2 of the EAF. Part 3 of the EAF can be utilized to evaluate the importance of the identified impacts and, if applicable, describe how the impacts could be mitigated. If these issues are adequately evaluated in part 3 of the EAF and the Lead Agency determines that they will not result in adverse impacts, a Negative Declaration could be filed, concluding the SEQR process. Conversely, the Lead Agency could issue a Positive Declaration requiring the evaluation of potential natural and human resource impacts within the context of an environmental impact statement.

6. IMPLEMENTATION STRATEGY

As a result of the round table discussion conducted by the consultant team with the Steering Committee on April 26, 2011 elements of an implementation strategy, including flow of ownership, funding, construction phasing and SEQRA compliance were identified and are summarized below. Consensus on the development of an action plan and schedule, however, was not achieved as Niagara Riverworld requested additional time to digest the potential redevelopment scenarios and select the approach that best suits their goals and objectives.

a. Flow of Ownership

Niagara Riverworld has expressed an interest in undertaking the development of the light industrial zone adjacent to their existing warehouse operation and partnering with, or otherwise divesting the remainder of the site to, a private developer that would advance the redevelopment project. In order to pursue this strategy, it was suggested that a rendering or 3-dimensional visual simulation of the potential development be created to market the site to developers and gauge developer interest. Additional site preparation work to remove the boiler house and other remnants of the former steel plant and improve the aesthetics of the site is another measure that could assist in the marketing process.

The committee agreed that the redevelopment project would likely follow a private development model with some level of public sector infrastructure investment likely. The potential for a public/private partnership via a local development corporation was also identified.

b. Funding

Potential funding sources and/or mechanisms identified for the project include:

- Niagara River Greenway Commission – Grant funding is available from this organization for projects that advance the vision of the Niagara River Greenway. Project components that will provide public access to the river; create scenic, recreational and interpretive opportunities along the river corridor; and preserve natural, cultural and heritage resources may be eligible for NRGCC funding. NRGCC Program funding information is provided in Appendix D. This program was identified as a potential funding source for roads and trails providing public access to the

river, as well as for the establishment of a waterfront green zone, parks and other public riverfront amenities.

- US Department of Commerce, Economic Development Administration (EDA) – EDA’s Public Works and Economic Development Facilities Program is a potential source of funding for new infrastructure (e.g., roads, utilities, etc.) related to the project. Eligible applicants include special purpose units of a State or local government engaged in economic or infrastructure development activities or consortiums of political subdivisions, as well as public or private non-profit organizations acting in cooperation with officials of a political subdivision of a State. Eligible applicants must meet one or more of the economic distress criteria established by EDA and can receive grants in the amount of 50-80% of the total project cost. Summary information concerning this program is provided in Appendix D.
- Community Development Block Grant (CDBG) – Low interest loans available under the CDBG program could be utilized to fund site preparation activities.
- The formation of a Special Assessment District and/or use of the PILOT Increment Financing model could also assist in financing the redevelopment project.
- NYSDEC Brownfield Cleanup Program (BCP) – The project site may be eligible for tax credits relating to the cleanup and redevelopment of the property under the BCP. Said tax credits could apply to site preparation activities and the costs of new buildings and infrastructure. A summary of the tax credits available under the BCP is provided in Appendix D.
- Restore New York Communities Initiative – Applications for future funding under this grant program are not currently being accepted, but should additional funding become available, the program could be a source of grant funding for site preparation activities inclusive of asbestos abatement and building demolition.
- Other potential funding sources can be identified as the redevelopment project becomes better defined.

c. Construction Phasing

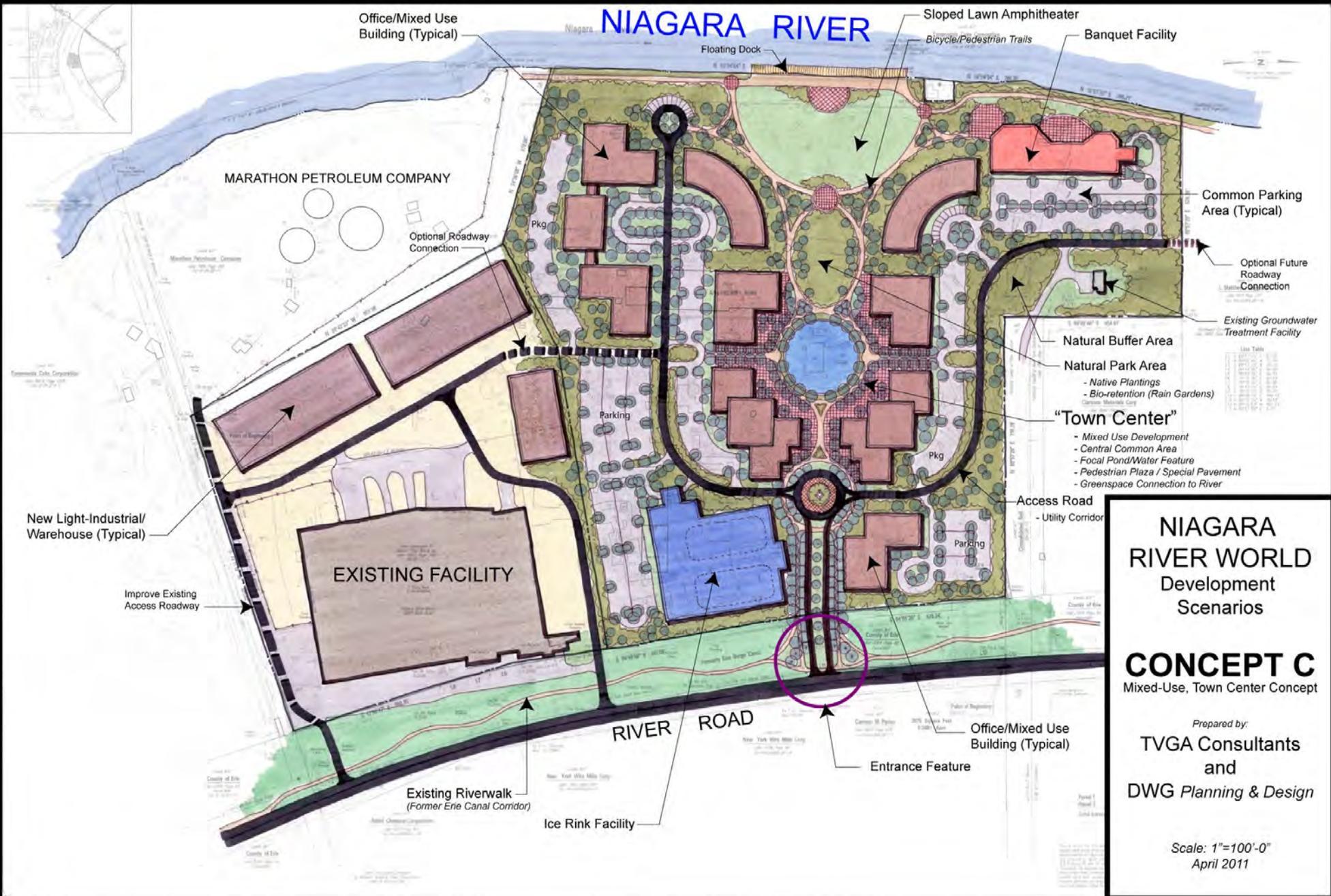
Many options for the phased construction of the redevelopment project are available and the actual phasing plan to be implemented will be determined based upon many project-specific factors including funding availability and constraints. As a result of the round table meeting conducted by the consultant team with the Steering Committee on April 26, 2011, the following conclusions were reached regarding phasing of the development:

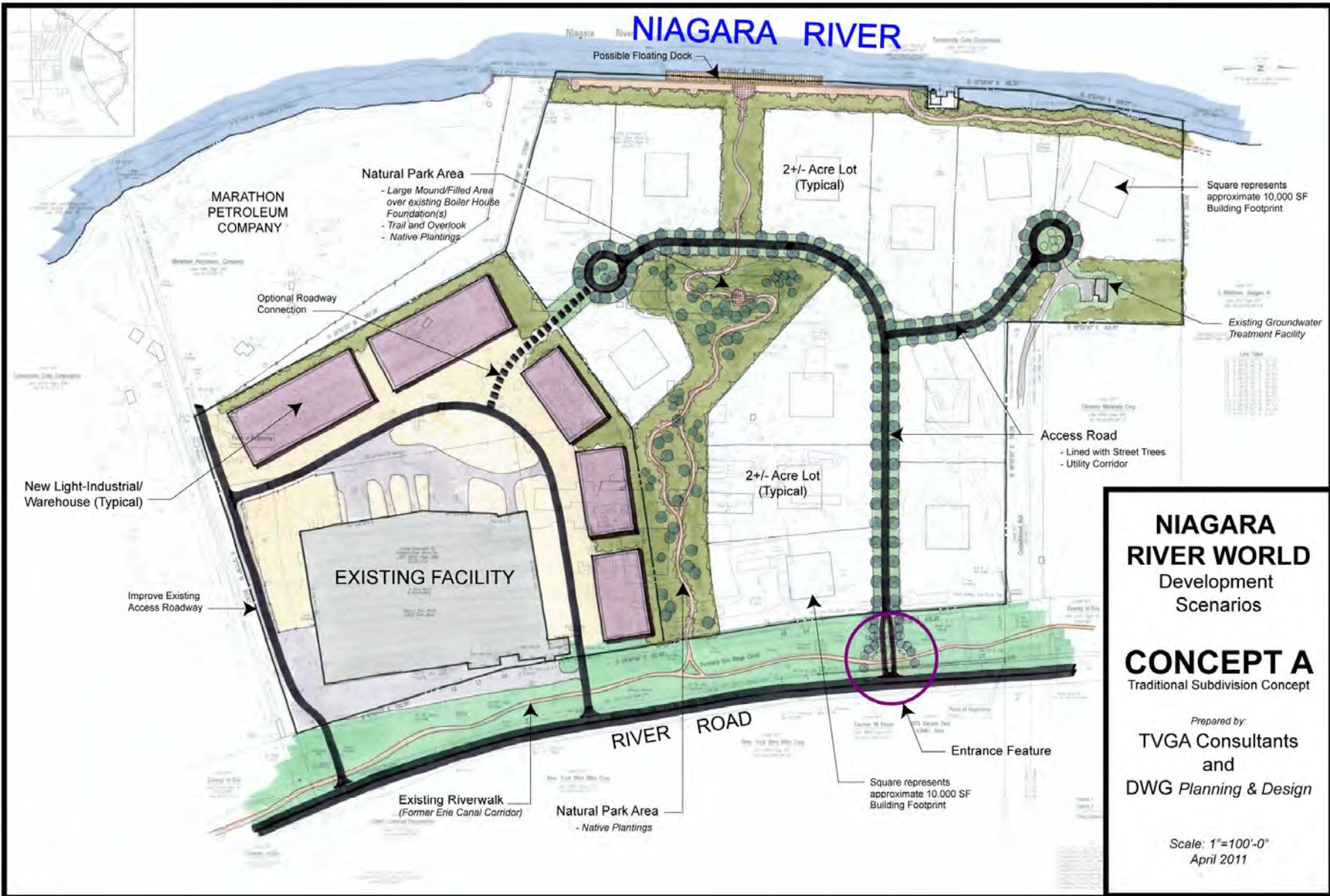
- The development of a public waterfront amenity during the initial phase of development would help to create an image for the site and reinforce its unique waterfront attributes as a selling point for developers and future occupants. This may also create an opportunity to construct access to the waterfront that can accommodate some portion of future site development.

- Subsequent staged infrastructure construction that promotes development flexibility and the ability to respond to evolving market demand was also defined as a critical element of the project.
- Given the long term timetable for the transition of the River Road corridor from heavy industry to one that would support higher uses that are more complementary and compatible with the corridor's waterfront setting, the phasing of the development should also support corresponding potential future uses.

d. State Environmental Quality Review

Based upon the type and magnitude of the redevelopment project, it is likely that the Town of Tonawanda will assume the role of Lead Agency under 6 NYCRR Part 617 once site plan approval is sought. Therefore, it was suggested that the Steering Committee meet with the Town familiarize them with the results of this study and introduce them to the redevelopment concepts.



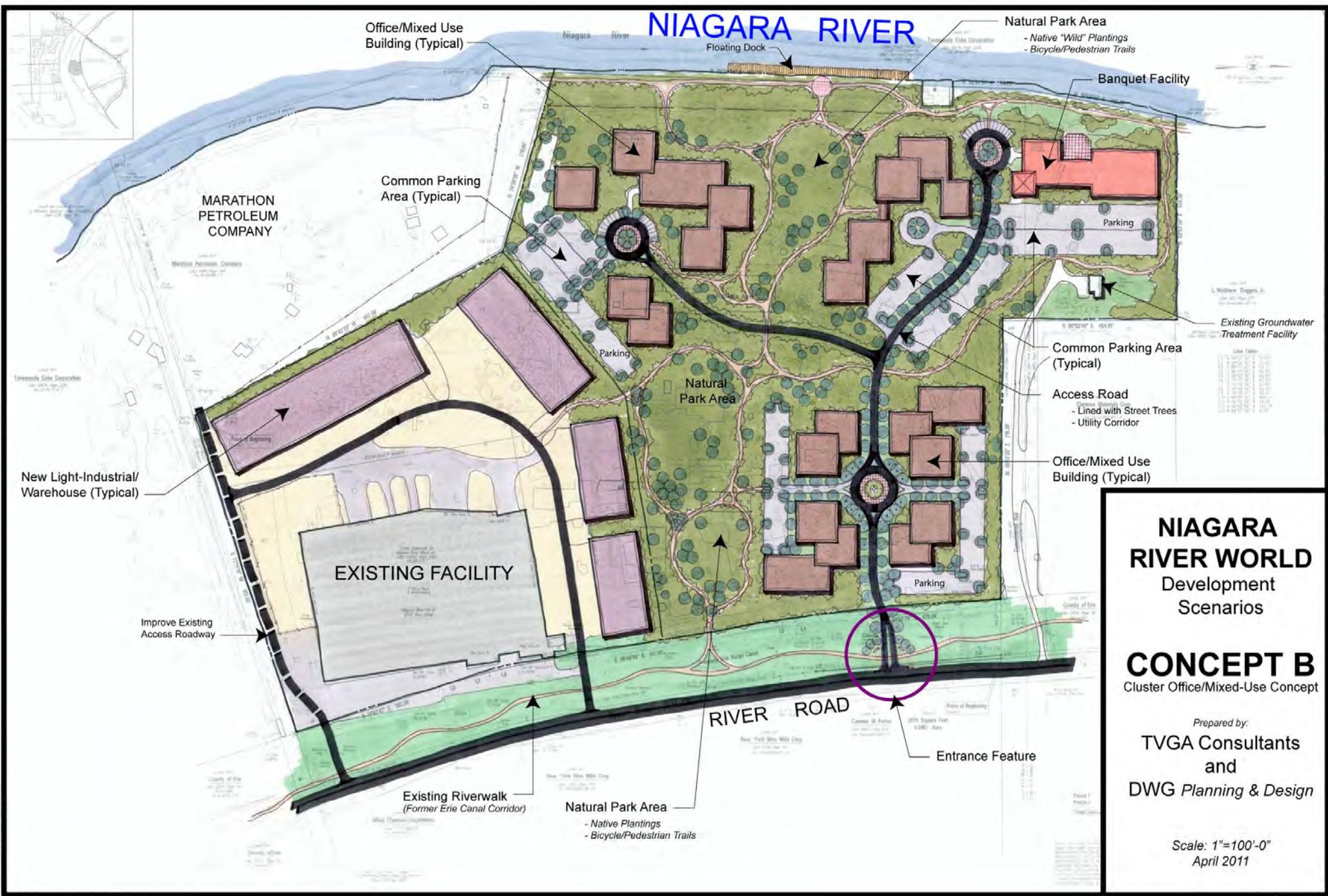


NIAGARA RIVER WORLD
Development Scenarios

CONCEPT A
Traditional Subdivision Concept

Prepared by:
**TVGA Consultants and
DWG Planning & Design**

Scale: 1"=100'-0"
April 2011



NIAGARA RIVER WORLD
Development Scenarios

CONCEPT B
Cluster Office/Mixed-Use Concept

Prepared by:
TVGA Consultants and DWG Planning & Design

Scale: 1"=100'-0"
April 2011

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NIAGARA RIVER WORLD

Redevelopment Plan



Niawanda Development
3435 Main Street
Buffalo, New York 14214
May 10, 2011

Professors Gillert and Swanekamp
Instructors, PD 574
University at Buffalo
3435 Main Street
Buffalo, New York 14214

To Professor Gillert and Professor Swanekamp:

Niawanda Development is pleased to submit the finalized site redevelopment plan for Niagara River World for your review. As requested, we have completed a thorough study of the parcel, the surrounding areas, and all existing conditions and have included them in the following document in order to assess the proper future development on the site.

The report consists of a brief summary of the physical and environmental elements of the River World site, as well as the socioeconomic conditions of the surrounding community, and other pertinent plans and programs. After exploring Niagara River World's circumstances and the Town of Tonawanda, our analysis suggests that the assets of the 62-acre site provide an opportunity to both reflect the community's desires as well as become an economically beneficial, innovative development for the local and regional community. We have incorporated our aligning vision of sustainability, low impact development, and placemaking into our site recommendations, with suggestions that any development on the site will capitalize on the natural assets of the land and the community as well as minimize any negative environmental impacts. Our proposal for an Entrepreneurial Park and alternative energy production is a viable and exciting prospect for your site.

We at Niawanda are confident that our analysis is a thorough and complete representation of the Niagara River World site. We have completed this phase of the River World project on time and under budgets. We continue to be excited about working with you in developing the Niagara River World site in order to maximize its potential for the local and regional community.

If you have any questions or concerns, please let us know.

Sincerely,



Tyler Mekus



Darren Cotton



Margaret Best

Niawanda Development

4. REDEVELOPMENT PLANS

After close reexamination of the Niagara River World site characteristics, as well as the socio-economic conditions and demographic features of the Town of Tonawanda and the region, Niawanda Development has concluded that it is in the best interest of all parties to redevelop the site within an innovative and original scope, combining the assets of the region and the Town with sustainable vision for economic productivity. In aligning the Town of Tonawanda Comprehensive Plan's vision and goals with the capabilities of the site, we propose the development of a state-of-the art entrepreneurial park complimented by open space and alternative energy sources, such as water and steam power.



4.1 Entrepreneurial Park

Niagara River World is a viable site for the development of an entrepreneurial park in the Town of Tonawanda because it supports the Town's vision for economic development along the waterfront region (Town of Tonawanda Comprehensive Plan 2005). Entrepreneurial parks are centers for innovation, or organizations that allow for entrepreneurs to develop their ideas from inception, through commercialization, to the launching of a new venture (Kirby 2004). These "incubators" provide hands on management assistance, access to financing and orchestrated exposure to critical business or technical support services that can relieve the prevalent pressures of start-up companies (US National Business Incubation Association 2001). The entrepreneurial park assists new business ventures by providing a space for ideas to develop and form with unprecedented accessibility to services such as management training, technological and communication services, accounting and back office support. The proximity to other new businesses also creates an atmosphere of innovation and encourages knowledge spillover and the pooling of resources, which are similar characteristics to some of the most successful regional economic cluster strategies within the United States. The economic climate has dramatically shifted in the United States and has impacted the Greater Buffalo Niagara Region significantly. Government sector jobs are being trimmed and nationwide layoffs have leave employment rates at a consequential low, creating a window for increases in individual responsibility and reinventing the role of small businesses in the United States as a prospect for the creation of new and innovative employment opportunities.

Niagara River World is a viable site for a new entrepreneurial park for multiple reasons. The location of the site makes it desirable because of its access and proximity to downtown Buffalo, the Town of Tonawanda, the Niagara River, Grand Island, Niagara Falls, and Canada. It is situated along many transportation routes and access points and has a waterfront view that is an asset in itself. This land once provided for some of the nation's most prominent and successful industries. Niagara River World is also located within a region with an abundance of colleges and universities that graduate educated, talented, and capable young minds who unfortunately often leave the region in search of better career prospects and opportunities. The retention rate of college graduates within the area is essential for the growth of this demographic and, thus, for the region as a whole. Furthermore, the educational aspect of the venture provides for opportunities for the park to create potential partnerships with educational programming via local colleges and universities.

The entrepreneurial park answers to some of Town's and the region's major issues. The chance for networking and knowledge overspill provides for an innovation-friendly atmosphere that would attract talent and new economic ventures. The encouragement for new small enterprises would potentially add to college graduate retention rates within the area, supplementing the traditionally decreasing population. The retention of talent, skill, and innovation would create a growing demographic of educated, business-savvy entrepreneurs that are known to compliment the vision of economic development. Furthermore, the park would be an asset to the surrounding community, as a local business culture would provide for new services and products available to consumers and potentially create a consumer destination within the Town.

The entrepreneurial park is a state-of-the-art development that will comply with the U.S. Green Building Council's LEEDS standards for new construction and major renovation projects. The 60-acre park will contain nine new structures, all designed with eco-friendly materials, features, and fixtures. Solar panels will be installed on some of the buildings. Complimented by a district heating system harnessed by the Huntley Power Plant and power generated from hydrokinetic turbines installed within the Niagara River, the development itself is surrounded by green space. The building will implement fixtures and fittings that aid in the reduction in water use. It will also utilize renewable energy sources by way of daylighting and solar panels in order to reduce the development's carbon

footprint and heighten its caliber as an economically and environmentally sustainable site. These elements will set the development apart and highlight the site and the Town as fresh, environmentally conscious, and innovative destinations.

Utilizing Niagara River World as a space for an entrepreneurial park will spark the economic development that the Town of Tonawanda seeks to achieve, harnessing local talent and ambition in order to output profitability and growth. The project aligns with the Town's major goals of economic development as well as the mitigation of environmental concerns within the area. It provides economic opportunities, goods and services for high quality of life for consumers, and addresses the issue of blight along the wasted waterfront lands. An entrepreneurial park will invigorate the commercial and industrial areas of the Town and help to grow and retain a young and talented demographic that will help to revitalize the Town and ensure sustainable investment in the future (Town of Tonawanda Comprehensive Plan 2005).

4.2 Alternative Energy Sources

The Town of Tonawanda can also take this opportunity to fulfill some of its goals in an environmentally and economically sustainable manner. By sourcing and selling alternative energy out of the Niagara River World site, both profit and prominence will be generated within the area. In utilizing innovative techniques in order to power and heat the entrepreneurial park would not only make the site a self-sufficient entity, but also a destination.

4.2.1 Hydrokinetic Turbines

Although hydropower has been helping to advance human society for centuries, only in recent decades have technologies begun to be developed to take advantage of water through applications outside traditional hydroelectric dams. One of those technologies currently under development is hydrokinetic turbines, which seeks to harness the kinetic power inherent to all bodies of water in motion. The specific technology that would be sought for installation at the Niagara River World site is in-river hydrokinetic turbines. Using the Niagara River's swift moving current, underwater turbines anchored to the river bed would spin and generate power that would then be converted to useable electricity to be fed into the existing infrastructure via underwater transmission lines ("In-river Hydrokinetics - Frequently Asked Questions.")

While hydrokinetic power can produce electricity at costs competitive with non-renewable sources, this requires a commercially sized array of turbines to become cost effective because of the associated capital and maintenance cost. Estimates from an analysis of the Tacoma Narrows in Washington State put the cost of an in-river commercial array somewhere in the region of \$100 million. The same study has shown the cost of electricity able to be produced is inversely proportional to the number of installed turbines (Polagye and Previsic 2006). However, many hydrokinetic projects have their beginnings in the pilot stage of production with an ability to scale up to a commercial development if financing is made available. Many of the existing pilot projects around the country involve 35KW to 100KW turbines. This is the course of action recommended for the Niagara River World site. A hydrokinetic pilot license, which is obtained from the Federal Energy Regulatory Commission, is required before developing small-scale demonstration project with an option to scale it up.

Before initiating this pilot project license, extensive testing to evaluate the site's suitability for hydrokinetic power will be required. Some of this testing will include average river velocity, both surface and underwater currents. The velocity of the water can greatly affect maximum power generated, turbine efficiency, and amount of annual maintenance required. Other test would focus on the sea bed

consistency and make-up to determine what sort of foundations/moorings will be required to steady the turbines against the current and at what depths they may have to be drilled. It would also be beneficial to initiate in-river monitoring to determine the turbines' impact on and interaction with marine life, both the direct impact of turbine blades on fish, and the potential for bio-accumulation such as seaweed, kelp, and barnacles. This evaluation will also include examining existing utility easements which may be used to route power cable and shore crossing, the availability of utility tie-ins, and the accompanying reduction in capital costs these may potentially entail. This project, being only one of a handful in the nation, would draw an incredible amount of positive public exposure to the River World site as well as the Town of Tonawanda as a regional locus for green and sustainable industry. The benefits associated with in-river hydrokinetic turbines as a renewable source of energy not only distinguish them from finite fossil fuels like coal and oil, but also from other renewable that have certain negative externalities.

4.2.2 District Heating

District Heating is a system that distributes heat in the form of water or steam generated in a centralized location for multiple buildings. The system works to distribute steam or hot water to multiple buildings for space heating or water heating. Heat Sources for district heating can include geothermal, cogeneration plants, waste heat from industry, solar installations, and purpose-built heating plants. The key to a district heating system is that heat normally generated through either power creation, or industrial processes is collected and sent through a system of pipes that can feed numerous buildings and structures. Each facility is then equipped with a heat exchanger which is used to draw energy from the water, and provide heat and hot water for the building.

As stated before, District Heating is usually developed around a heat generation source such as a power plant. Electrical Plants or other industries create steam to turn turbines or other machinery, and often this steam is released in the environment and never used. A district heating system can recover this waste heat, and are often developed with a boiler station to create a reliable source of heat 365 days a year. Once the heated water or steam leaves the source of heat generation, the heat is carried in a network of insulated pipes to the numerous buildings and customers that are served. This network is usually designed in a loop system, and as the water passes through each building the heat energy is exchanged within the building with the waste steam returning to the heating plant to be reheated and redistributed through the network. The size of these networks can range from a small campus such as a college or office park, to a city such as Helsinki Finland where over 1,230 kilometers of pipes criss-cross the city. Overall, District Heating has numerous benefits ranging from a reduced carbon foot print for urban areas heating with district heat; higher energy efficiencies and reduced pollution control in comparison to individual heating systems; and reduced heating and investment costs for building owners (<http://www.nrgenergy.com/pdf/thermal.pdf>).

The C.R. Huntley Generating Station located south of the RiverWorld site on River Road in Tonawanda is owned and operated by the NRG Company. This coal fired power plant was originally constructed in 1942, yet has expanded five times to its present generating capacity of 816 megawatts (http://www.sourcewatch.org/index.php?title=Huntley_Generating_Station). This plant in recent years has also undergone discussions of expansion with the implementation of gasification processes that would help clean the coal burning plant. However, these plans were canceled in 2008 due to the financial burden that an Integrated Gasification Combined Cycle power plant would cost New York State to subsidize.

With the inability to expand the Huntley Power Plant through clean coal technologies, this electric generation facility has the ability to use a waste product that could still help clean the local air while helping increase the company's bottom line. The implementation of a

cogeneration district heating system for the nearby River Road corridor and industrial tenants, would provide NRG an ability to reuse normal thermal waste and sell it to local customers to heat their facilities. With the amount of large scale manufacturers and facilities that exist near the Huntley Power Station, the implementation of a district heating system would be financially beneficial to both NRG and the local consumers. Sites such as the River World property, along with nearby manufacturers including DuPont, GM, and Dunlop could utilize the district heating system to help reduce facility costs and environmental impacts.

The expansion of district heating from the NRG Huntley Power Station would allow consumers such as the RiverWorld property to utilize this heating source for many uses. With the ideal expansion of an entrepreneurial office park at the RiverWorld site, district heating would be utilized for heating and cooling purposes. This low cost source of power would provide tenants with an environmentally friendly heating source, which would help heat and cool the buildings throughout the year. The district heating system could be used for facility and water heating, along with cooling for air conditioning of buildings during summer months. This system at RiverWorld would provide tenants with a source of heating and cooling that would rival any office location in the region for costs and environmental footprint. A district heating system would help continue the green energy and low impact theme of the RiverWorld site, as it would allow business tenants to help grow their companies through low utility costs and little environmental impact.

The utilization of a district heating system along the River Road corridor would have little impact on the aesthetics of the area. The system would most likely feature a dual network of pipes underground which would feed each facility consumer, and heat exchangers would be located within each building. The district heating pipes would be located underground at the RiverWorld site, and would feed off the main River Road line as they supplied each of the properties structures with compressed steam or water. Within each facility on the site would be a heat exchanger to convert the district heat into facility heating or hot water. The heat exchangers are relatively small and can often fit within a utility room, and help reduce maintenance and installation costs of traditional building heating systems. Overall, district heating at the RiverWorld site would lead to an overall low physical impact on the site, while allowing for no costly heating or cooling systems to be installed in individual structures.

4.3 Access and Parking

The Niawanda Redevelopment Plan creates access for pedestrians, bicyclists, automobiles and trucks. Constructing essential passages, including transit roads, sidewalks, and bike paths will be conducted during Phase 1 of development. The transit system within your site will be fluid and easily manageable with proper signage and access from all points of Niagara River World, from River Road to the Niagara River.

4.3.1 Site Entrance Access

There will be two entrance/exit points on Niagara River World. Access onto the site will be by way of an entrance point on River Road towards the center of the site. A two-lane road will allow traffic to enter and exit and travel in both directions. The other access point will be located on the southern side of the site, redeveloped from an existing driveway that provides access. This will also be a continuation of a two-way traffic road that will loop around the interior, connected to the eastern access point by way of a roundabout.

4.3.2 On-site Access

The eastern access point (located on River Road) will connect to the interior loop via roundabout. The 130,848 square foot two-way traffic loop located within the interior of the site will allow automobile access to all of the proposed nine structures within the area. Pedestrian walkways will line both sides of the interior loop as well as the access points for walking accessibility. Sidewalks and bike

paths will also connect the roadway to the exterior of the retention ponds on site. A sidewalk along the Niagara River will also be implemented, providing space for public access to the waterfront. The river vista serves as one of the site's greatest assets and can be highlighted with this boardwalk.

4.3.3 Parking Areas

A total of nine parking lots will serve each of the structures and the site as a whole, totaling in about 376,728 square feet of black top lots. These lots can accommodate up to 2,354 automobiles at any given time. This parking includes access for employees of the entrepreneurial park as well as customers, clients, and other visitors.

4.4 Open Space and Recreation Areas

One of the objectives of the Niawanda Redevelopment Plan is to incorporate green space and natural assets of the site into the entrepreneurial park. The value of open space and area for recreation creates a development in a new light that appreciates the setting and highlights the environment. The sites landscaping is designed to fit zoning codes for the Town of Tonawanda.

4.4.1 Open Space

The open space within the site totals up to 1,151,348 square feet. This leaves ample space in between structures within the site suitable for walking and other outdoor activities. It also implies a low-impact theme that incorporates the natural environment of Niagara River World within the park. Directly north of Niagara River World, the proposed Cherry Farm Park will serve as a public park for the community. Niawanda Development seeks to maintain that sentiment along the waterfront within the borders of the site by providing open space throughout the site.

4.4.2 Recreation Areas

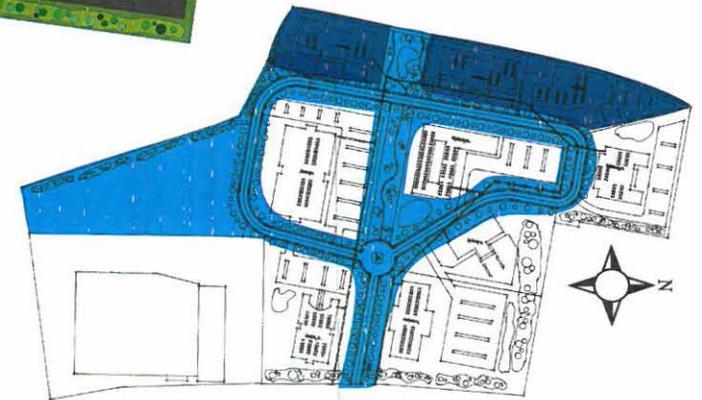
The recreation areas within the site at present are restricted to the pathways and open space within the site which allow for public access and the utilization of the waterfront. Future development of space dedicated to recreation within the site would have to be specially permitted by the Town Planning Board.

KEY TO FEATURES

- Hydrokinetic Turbine
- Solar Array
- District Heating Lines
- Landscape Buffer
- Sidewalk
- Road

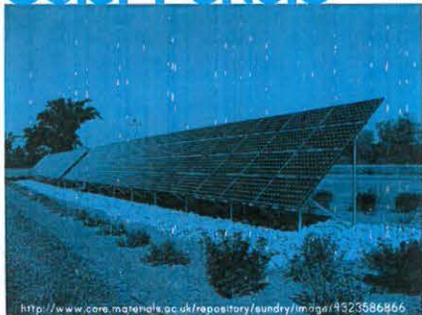
- ### Phase I
- Streets
 - Sidewalks
 - Landscaping
 - Solar Panels
 - Turbines
 - Solar Panels
 - District Heating
 - Demolition

- ### Phase II
- Waterfront Office Buildings
 - Parking



District Heating
The expansion of district heating from the NRG Huntley Power Station would allow consumers such as the RiverWorld property to utilize this heating source for many uses. With the ideal expansion of an entrepreneurial office park at the RiverWorld site, district heating would be utilized for low cost environmentally friendly heating and cooling purposes.

Solar Panels



The town of Tonawanda is taking solar power seriously in the hopes of becoming a hub for the renewable energy source. The town has made a push toward promoting solar power, especially since the designation this year of the Riverview Solar Technology Park on River Road by Kenmore-based TM Montante Development. The commerce park is being billed as New York's first solar ready park.



Hydrokinetic Turbines

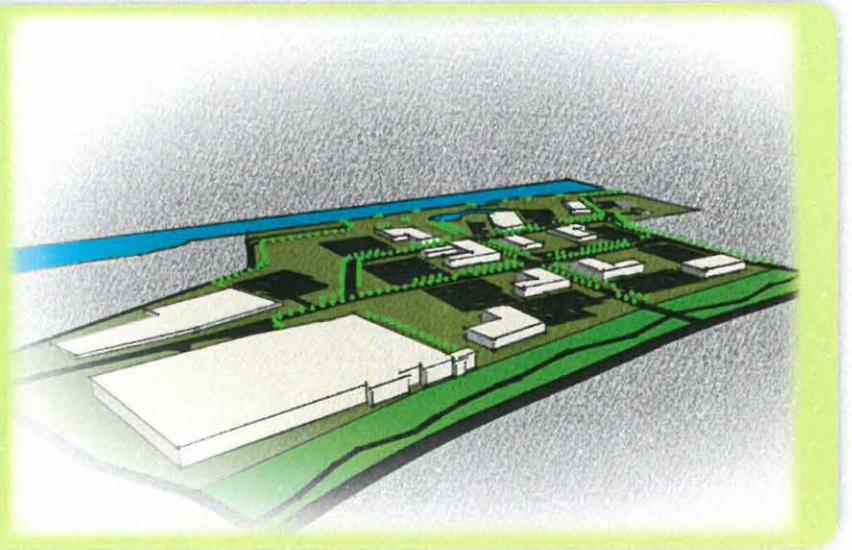
Using the Niagara River's swift moving current, underwater turbines anchored to the river bed would spin and generate power that would then be converted to useable electricity to be fed into the existing infrastructure via underwater transmission lines

Eastern View



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**SITE
DEVELOPMENT
PLAN**
NIAGARA RIVERWORLD
TONAWANDA, NY



PREPARED BY
TEAM ORANGE
[PLANNING] [SURVEY] [DESIGN]
MAY 2011

May 12, 2011

Eric Gillert
Director of Planning
Town of Amherst
5583 Main Street
Williamsville, NY 14221

Kenneth Swanekamp
Chairman, Town Planning Board
Town of Tonawanda
2919 Delaware Ave.
Kenmore, NY 14217

Dear Professor Gillert & Professor Swanekamp:

This site development plan is submitted from the collective semester long effort of team orange in the Projects in Physical Planning course in the Department of Urban and Regional Planning at the University at Buffalo. This four member team, consisting of Yi Chen, Michael Godfrey, James Kistner, and David Kruse have researched, evaluated, and designed a site development plan for Niagara Riverworld on River Road in the Town of Tonawanda, New York. The plan seeks to take advantage of the opportunities that the site offers while mitigating its constraints. The proposal seeks to create a campus-like commercial and light industrial development over the course of several phases dependent on economic constraints and market demand. What follows is a detailed plan that consists of a goal and vision statement, an assessment of the current condition, a master development plan, and desired outcomes and expectations.

Regards,

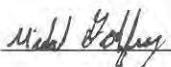
Yi Chen



James Kistner



Michael Godfrey



David Kruse



Executive Summary

This site development plan proposes a development of office space, medical research and light industrial on an approximately 62 acre site. The area is an industrial corridor that includes a coke processing and coal generating electrical plant. However, it is situated along the waterfront of the Niagara River with great views of Grand Island and the water.

Upon reviewing local land use plans and the Town of Tonawanda's 2005 Comprehensive Plan, a proposal was drafted that conforms with the vision of Tonawanda's waterfront and its updated zoning provisions. A prequel to this document was a site evaluation report that described and analyzed the current conditions, revealing the assets and liabilities Riverworld has to offer. Based on the findings and approval of a conceptual site design, the work culminated with a site development report.

The proposed uses are designed to maximize the outcome of recommendations made in the Town's Local Waterfront Revitalization Plan and Comprehensive Plan. A phasing plan calls for the demolition of existing structures, proper cleanup and disposal of materials; preparation, including roadways and utilities; and a two-tiered construction phase. It is estimated that a full build-out could take 10 years to complete. The site has the potential to become a key component of the vision established community. It marks the transition from a heavy industrial history to a cleaner, greener, more adaptable development prepared for the future.

Master Development Plan

Project Description

The proposed site plan incorporates an office + business park development in the heart of an old industrial corridor. It provides a transitional piece for the area that is called for through the LWRP and Comprehensive Plan. A coordinated arrangement of office buildings with ample open space and a single light industrial facility make up the design of the Riverworld site. The northwestern part of the site, as well as part of the sea wall remain open to the public. A main entrance road faces towards Niagara River offering a scenic vista while approaching the various buildings. Each structure is designed to accommodate a mix of small and large businesses. The sizes of the buildings promote an office-flex atmosphere with the ability to move closer towards the waterfront should a company choose to pay higher rents.

The 2002 Land Use Plan pointed out a need for additional office space within the Town. Specifically, research was done that showed nearby Amherst had occupancy rates in their office structures at 92 percent. Based on their numbers, 494,000 square feet of office space was demanded over a two year period. However, it could be assumed that on the basis of the recent economic downturn, those numbers have been altered. Still, the plan relayed the need for an a plan to develop an office-park style development that provided a high level of amenities, visually appealing landscaping, and one to two-story buildings.



Figure 9: Site Plan. Source: Authors

The plan that this document calls for is a site that aims to protect the value of open space and the character of the land. Buildings are modestly designed for two to three-story spaces. Ample parking is available for each building on the “campus” and a priority was given towards enhancing the aesthetics of the land while providing views towards the waterfront. A retaining pond will act as a visually pleasing water feature along the waterfront. There are a total of 10 commercial structures and one light industrial, however five clusters of the proposed buildings can be combined should additional space be required. Located within two of the buildings are cafes for use of employees on site. A recreational component has been developed on the northwestern part of the site in the form of tennis courts. The current Riverwalk in front of the property will be connected to a path system that extends into the site and adjoins the water’s edge. A connection is proposed to the neighboring Cherry Farm Park site towards the north.

Phasing Plan

Phase One: The current condition of the site is one to forget. There are old foundations that remain imbedded in the ground; soil contamination is still present; an old boiler house lies in the middle of the site; and circulation paths are nearly non-existent. One of the first steps to be taken to redeveloping the site, pending development approval, is the demolition of the remaining structures, and proper removal and handling of on-site materials.

Though the site has been cleaned based on New York State Department of Environmental Conservation (NYSDEC) efforts and standards, there are still a levels of pollution in the subsoil that warrant caution. An easement has been established on the site which outlines any removal of soil or debris must be done based on a permitting process. For this reason, where remediation is possible and/or needed, the first choice, based on cost concerns, is to test and recycle the material. When dealing with stone and concrete foundations, the reuse of material can be re-purposed as underground layers for constructing new roads and parking surfaces. The alternatives to demolition are untimely permits due to transportation off-site and the subsequent processing and handling efforts needed on the receiving end. Erie County lists on its website a contact list of companies that handle asphalt, brick, and concrete recycling. Those companies that can be solicited for hire are: Broad Spectrum, CID Refuse Service, CTS Crushing and Recycling, Metzger Removal Inc., and Swift River Associates Inc. Estimates for the demolition and preparation of the site for phase one are: \$1,099,950.

Phase Two: The second phase of redevelopment deals specifically with the preparation of the site for construction. Based on the successful demolition, recycling, and removal of materials from the site, the next phase of redevelopment involves regrading any parts of the site that will contain buildable footprints and installing access and circulation paths.

The site is generally flat, based on topographic studies, however, there are local variations that will require the engineered supervision. Where possible, existing growth should be maintained. During the regrading process, focus should be given to channeling runoff

Appendix



LEGEND



COMMERCIAL
INDUSTRIAL
LOADING
WATER
GREEN SPACE
PARCEL
STREET

SCALE



Sketch Rendering

