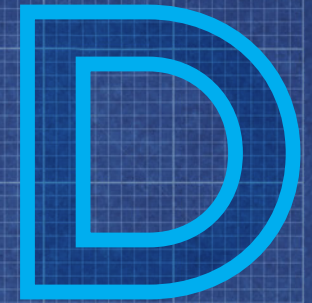


CHAPTER V



THE BLUEPRINT BINGHAMTON MINI-PLAN ON
INFRASTRUCTURE

A PLAN FOR WHERE THE
RIVERS MEET THE CITY

BLUEPRINT
BINGHAMTON

INFRASTRUCTURE:

A PLAN FOR WHERE THE RIVERS MEET THE CITY

D

EXISTING CONDITIONS

The infrastructure chapter or **BLUEPRINT BINGHAMTON MINI-PLAN ON INFRASTRUCTURE** recognizes the realities that Binghamton faces as a City trisected by rivers. In addition to strategies that address energy, utilities, and operating costs in an era of budget cuts, this portion of the Plan puts forth strategies to address the volume and quality of water flowing downstream which threaten Binghamton's riverfront and low-lying properties during riverine flood events; stormwater regulations and opportunities for smaller-scale interventions that mitigate flash flood events caused by rainfall; and the relationship between water and urban land use decisions in the future.

The City of Binghamton, similar to other cities of comparable size, has a fair amount of City-owned infrastructure. Tracking the age, condition, repairs, and replacement of this infrastructure is critical to the efficient operation of the City. The Departments of Public Works, Water and Sewer, and Engineering oversee the City's water, sewer, street lights, parks, and road maintenance. The Department of Public Works is responsible for road maintenance, refuse collection and street lighting, as well as the maintenance of City-owned property and vacant property through the Department of Parks and Recreation. The Water and Sewer Department oversees the water filtration plant, water distribution services, water meter services and sewer collection services which include sanitary, storm, pumping, and combined sewer overflow (CSO) discharge facilities. The Engineering Department provides engineering services for City projects that include street reconstruction, water and sewer systems, parks, bridges and all infrastructure, as well as administration of the Sidewalk Assistance Program and Street Work Permits.



Susquehanna Flood Wall along North Shore Drive

WATER SYSTEM

A fundamental purpose of the City's water storage and distribution system is fire protection; manufacture of potable water is also a primary purpose of the system. The City owns and operates a water filtration plant that produces potable water by treating surface water sourced from the Susquehanna River. The City's secondary water source is a well located off of Omstead Street with a million gallons per day capacity. There are also interconnections with all the surrounding towns and villages. The interconnections are primarily for selling water to those municipalities, providing municipal water supply where other sources of potable water are not available or viable in the current regulatory environment, and allowing for mutual aid support in the event of catastrophic failure or system maintenance requirements. Currently, the Towns of Vestal, Binghamton, and Dickinson and the Village of Port Dickinson purchase water from the City on a regular basis.

The City's water filtration plant has capacity to produce 20 million gallons per day. The current daily production varies between six to nine million gallons per day. There are fixed costs at the plant that do not change based on the amount of water produced. Based on this, it costs the City \$137,000 per year for each additional one million gallons produced per day. The revenue from one million gallons per day is approximately \$900,000 per year. The City could realize some of this

additional revenue by attracting high water use (low sewage discharge) industries and by selling water to municipal and private outside users. The City could provide a reduced water rate for these users while still realizing a cost savings on the production of water.

The City has approximately 177 miles of water main in its transmission and distribution system. The majority of the water mains in the aging water system are cast iron pipe, which is less durable and more susceptible to corrosion than ductile iron or high density polyethylene (HDPE) pipe. The City spends about \$1 million each year on capital improvements of the water system. They replace roughly a couple thousand feet of water main each year and have replaced approximately 15% of the cast iron pipe within the City, mostly with HDPE pipe.

Currently the City cannot account for the disposition of approximately 30-40% of the water that is filtered at the plant. The water is lost through non-metered locations, leaks, meter inaccuracies or unauthorized usages. The City should ensure that all locations that use City water are metered, either permanently or temporarily, while the water is being used so the City can track consumption accurately. The City had a water system model built over 10 years ago, but it has not been updated, and the program it was modeled in is no longer supported. If the

City were to have a new model built and input the usage information from all locations using City water, they would be able to identify where water system improvements are warranted to target leaks and water loss.

The City has a Supervisory Control and Data Acquisition (SCADA) system that controls the water flow between the plant and the pump stations and tanks. This allows for more efficient operation of the plant as the water demand is monitored in real-time. The system also gives the City some indication of large water main breaks by monitoring pump run times and water flows in a specific zone.

Solar Array on the Binghamton Water filtration plant



SOURCE: CITY OF BINGHAMTON

SANITARY SEWER

Currently the City has very few wireless meters. Therefore, the vast majority of meters have to be read in person. This is a labor intensive process but the cost of implementing a wireless system (upwards of \$5 million) and ongoing operational overhead costs have delayed any plans for implementing a wireless system.

Water treatment is a very energy intensive process. In 2011 the City installed solar panels on the water plant to control energy costs of the plant. The City estimates these panels will save \$560,000 over the life of the system.

The City should continue to make upgrades to their system, update their water model, meter all water usage, and investigate additional opportunities to utilize renewable energy at the plant. These actions will allow the City to reduce the operating costs of the water system and increase revenue from any previously unauthorized use or water losses.

The City owns and maintains roughly 460 miles of sanitary sewer system, approximately 40% of which is combined with the storm sewer, 3,647 manholes, 10 sanitary sewer pump stations, and nine permitted Combined Sewer Overflows (CSOs). Four of the CSOs are for emergency use only and must be operated manually. Half of the system is 63 years old or older, with 30% having been installed 88 years ago or more. The City invests approximately \$1 million each year into sewer upgrades and improvements. Portions of the City's sewer carries sewage from neighboring towns and villages to the Binghamton-Johnson City Joint Sewage Treatment Plant. The City of Binghamton is a 54.8% owner of the Treatment Facilities.

The Joint Sewage Treatment Plant (Plant) is presently permitted by the New York State Department of Environmental Conservation (DEC) to discharge a maximum 12-month rolling average hydraulic flow of 35 million gallons per day (MGD) treated effluent into the Susquehanna River. The Plant is designed to receive and provide treatment for a peak hourly

wet-weather hydraulic flow rate of 60 MGD. Even though the Plant is operationally capable of receiving and providing treatment up to these maximum rates and capacities, the actual flows received at the Plant for treatment are ordinarily much less than the Plant's hydraulic capacity. Dry weather flow has declined at the Plant over the last few years due to the installation of water saving measures and a substantial decrease in demand for water use in Binghamton.

Exceptions to these norms in flow occur during significant wet-weather events and high groundwater table conditions when the additional volume of infiltration and inflow (I/I) - the largest component of which is inflow from storm water in the remaining combined sewers of the City's sewer collection system - is mixed with sanitary sewage. The resulting flow volume is greater than what the City's conveyance system to the Plant can accommodate and results in discharges through the CSOs. The CSOs are permitted to discharge in order to prevent damage to the sewer collection system, as well as minimize sewer system back-ups.

WATER + SEWER INFRASTRUCTURE

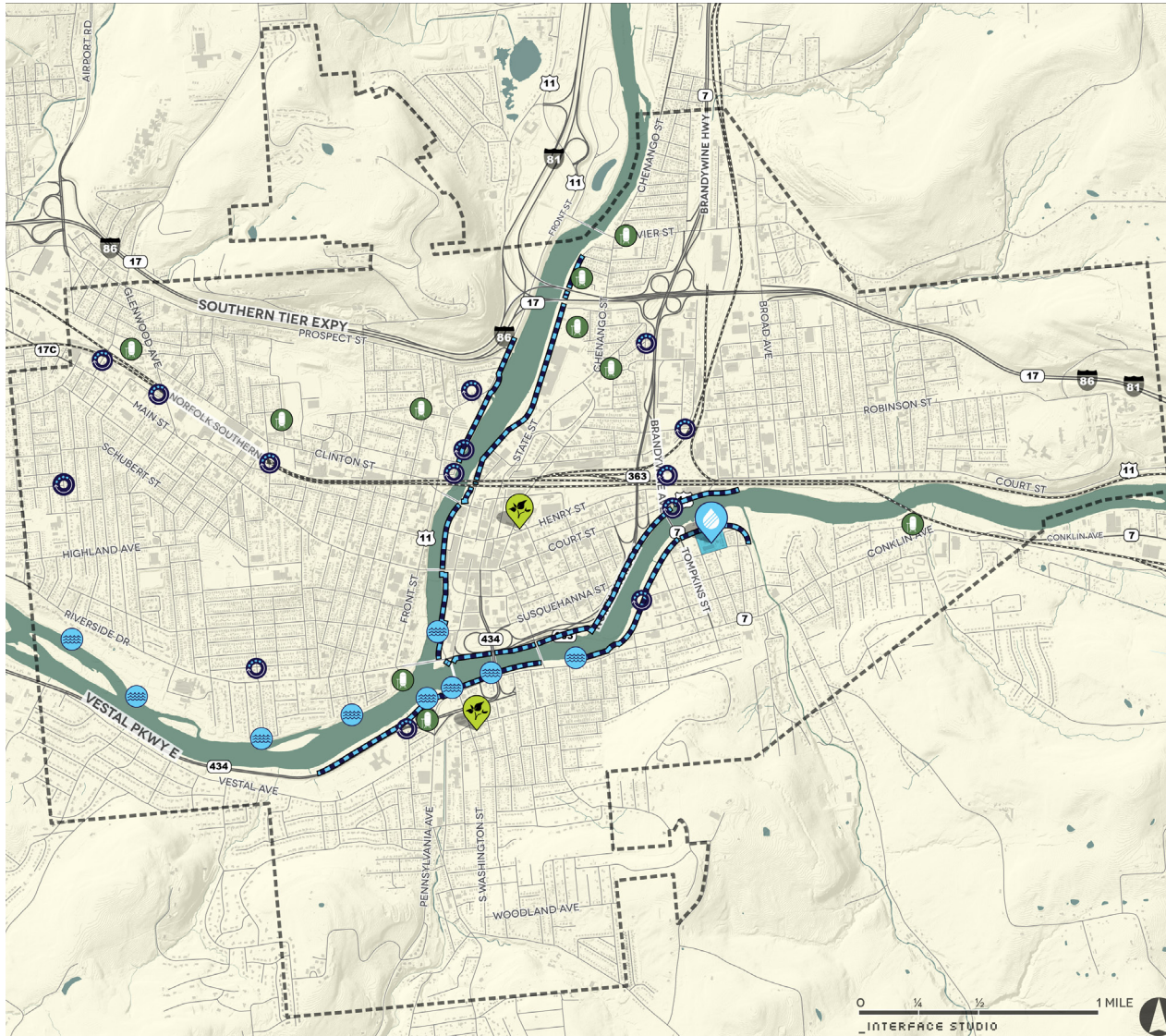








FIGURE 49: Water + Sewer Infrastructure

The current Sewage Treatment Plant Administrative NYSDEC Consent Order of 2007 requires that flows received by the Plant from Municipal Users' sewer collection systems be evaluated and managed so as not to overburden the Plant or cause violation of the Plant's discharge permit. Currently the City is in compliance with this order through the use of their permitted CSOs and exceeds the wet weather flow capture limits in the current State Pollution Discharge Elimination System (SPDES) permit for the CSO. The Consent Order mandated the preparation of a Flow Management Evaluation Report and a Flow Management Plan, focusing on the goal of stabilizing annual average flows at a volume less than the Plant's hydraulic and pollutant loading design flows. The Consent Order does not require any specific quantitative or qualitative reduction in inflow or infiltration, but requires no net increase in flows from future development.

-  FLOODWALL
-  COMBINED SEWER OVERFLOW (CSO)
-  STORM WATER PUMPING STATION
-  WATER FILTRATION PLANT
-  SANITARY LIFT STATION
-  GREEN INFRASTRUCTURE

The Flow Management Plan aims to “balance” future growth and expansion with wet weather flows and investments in existing dry weather capacity through four key programs, one of which is the I/I Offset Program. The I/I Offset Program includes a Flow Credit Bank and a one-to-one offset requirement applicable prospectively after December 31, 2012 to new or modified sewer connections adding more than an average 2,500 gallons per day net new sanitary wastewater flow to the sewer system. Municipalities can be allocated new Flow Credits, which can then be sold or granted to developers, through successful planning, construction, and documentation of I/I Remediation Projects that remove infiltration and inflow from the collection system, including pipe and manhole leak and crack repair as well as separation of combined sewers into storm and sanitary sewers. Currently, the City has no long range plan to address infiltration; inflow through combined sewers will be addressed on a street by street basis.

When a combined sewer is separated or when a non-combined sewer is rehabilitated to reduce the amount of infiltration the pipe or manhole is allowing into the system, the City receives flow credits for the amount of storm water inflow and infiltration removed from the system. These credits can be used as incentives to steer development within the City by making the cost of development in the City comparable to

greenfield development if building infrastructure is taken into account. The City has separated approximately 60% of its combined sewers. Including retroactive credits for work completed back through 1999, the City has been granted 1,994,364 Flow Credits, which equate to gallons per day of flow that can be added back into the system by new development. The City of Binghamton holds 84% of the Flow Credits existing in the Joint Sewage Board’s I/I Offset Bank as of early 2014, with the balance being allocated among the 10 other Municipal Users of the Plant. This gives the City an overwhelming advantage in attracting new development projects given that all Municipal Users discharging to the Plant are subject to the regulations governing new or modified sewer connections.

It is estimated that 2.5 billion gallons, or 55.85%, of the influent flow received at the Plant on the Binghamton Flow Side in 2012 was “non-billable flow” largely attributable to inflow and/or infiltration. This shows the City has more flow credits that it can obtain in the future to continue to promote development within the City.

In 1994, the United States Environmental Protection Agency (EPA) issued a National CSO Control Policy. The Wet Weather Water Quality Act of 2000 requires combined sewer systems to conform to the requirements in the National CSO Control Policy. The requirements include

implementing Nine Minimum Controls (NMC) and a Long-Term Control Plan (LTCP). The NMCs are technology-based controls that can be used to abate CSOs. The LTCP consists of more extensive characterization and monitoring of the combined sewer system and the receiving water, as well as selection and implementation of CSO control alternatives, with the intent of minimizing the impacts of CSOs on water quality. The City’s CSO are operated under a NYSDEC permit (#0024406) and approved Long Term Control Plan (LTCP). Four of the CSO’s are operated manually when emergency situations arise. Eight of the CSO’s discharge to the Susquehanna River and one discharges to the Chenango River. The permit and LTCP were last updated in 2013. Within NYS there are two types of abatement categories for CSOs: water quality and technology based. Generally, water quality based abatement options are more expensive to implement. The following are options for abatement of CSO discharges as part of the Long-Term Control Plan:

- Separation of stormwater and sewer lines
- Storage tanks to hold overflow during storm events
- Expansion of waste treatment capacity
- Retention basins to hold overflow during storm events

STORM SEWER

- Screening and disinfection facilities for the overflow
- Green infrastructure to reduce stormwater flows into combined sewer system

Currently the City employs sewer separation and promotion of green infrastructure to control flows within the CSOs. They employ screening to control the quality of the effluent discharged from the CSOs. Given the Plant's capacity, the City's strategy is to send wet weather flow to the Plant for treatment, which is much less expensive than to attempt to construct individual treatment systems or storage facilities at each CSO.

Facilities with permitted CSO discharges are required by law to post signs at all CSO outfalls to alert the public that the water may be contaminated with untreated sewage after a rainfall event. The City has to file a yearly CSO report that details their efforts to abate the CSOs and their compliance with the LTCP.

Since the waterways around the City are vital components to the City's future, continued effort needs to be made to reduce the CSO overflow discharges.

The City owns and maintains roughly 85 miles of storm sewer, 2,616 catchbasins and 2,062 manholes. Stormwater runoff from the City storm sewer system empties into the Susquehanna and Chenango Rivers. During heavy rain events, when the rivers are already at high levels, it can be difficult for the storm sewers to empty into the river, thereby causing localized flooding within the City. The City owns and maintains 14 storm sewer pump stations, which pump the water from low lying areas either to a gravity sewer or to the rivers.

FLOOD PLAIN

EXISTING



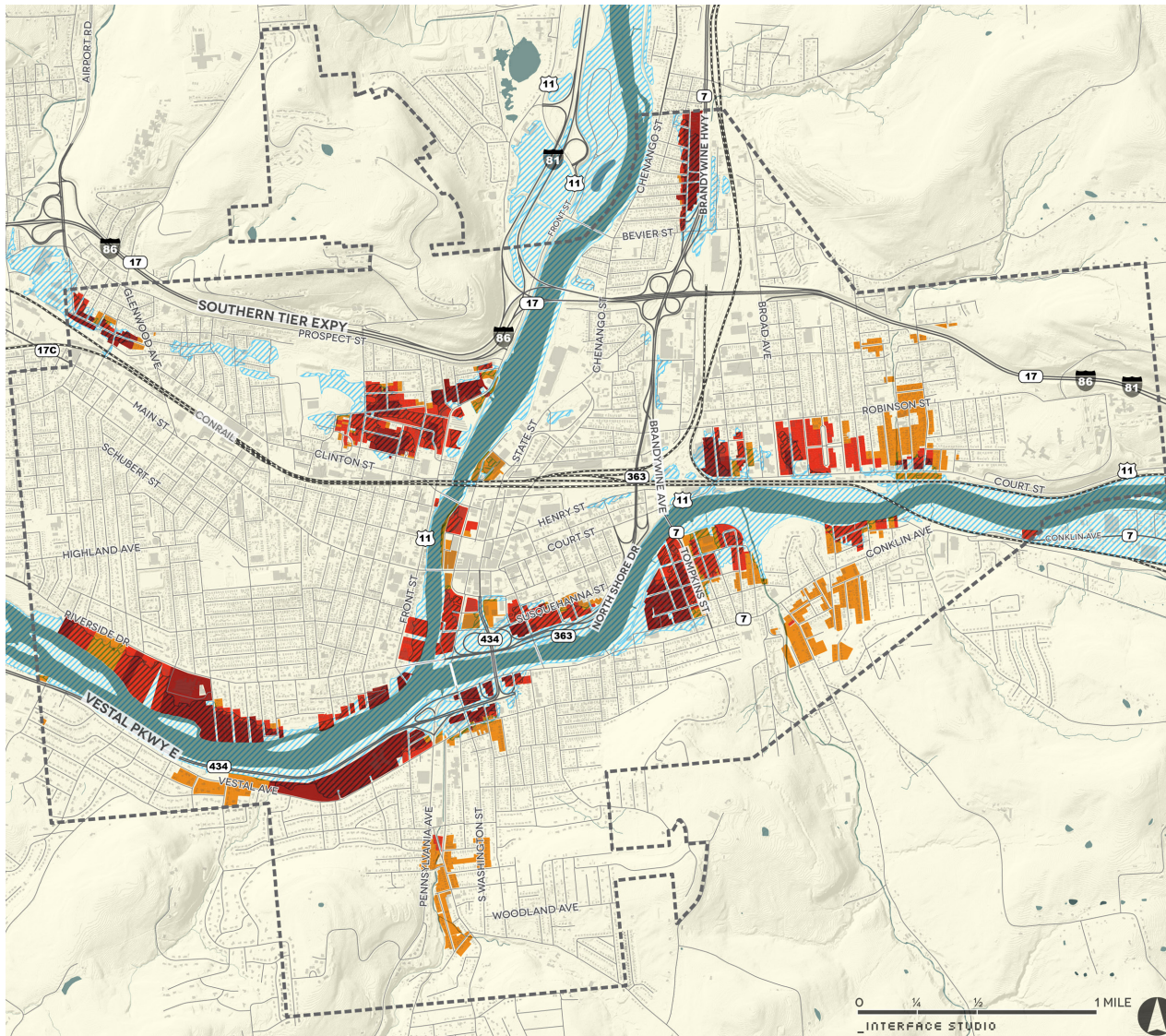
FIGURE 50: Existing Flood Plain

FLOOD CONTROL

The City is protected from inundation from flood waters by approximately 7.2 miles of levees, floodwalls, and channel improvements; the system also encompasses several reservoirs and dams on the Chenango and Susquehanna Rivers. The Binghamton flood protection system was built in response to two floods that devastated the City in 1935 and 1936. Construction of the flood protection system took place between 1940 and 1952. The floodwalls are inspected and maintained by the NYSDEC. They were rated as minimally acceptable during a 2008 inspection, and several construction projects have been undertaken to repair identified deficiencies. The walls were overtopped in several locations during the 2006 and 2011 floods but the infrastructure did not fail.

FLOOD DAMAGE

2011



2,029 PARCELS DAMAGED

12.7% OF ALL CITY PARCELS

- MINOR DAMAGE
- MODERATE DAMAGE
- MAJOR DAMAGE
- 2011 FLOOD

FIGURE 51: Damage from 2011 Flood

The 2006 and 2011 floods demonstrated that multiple factors are responsible for flooding in the City: rising river waters, underground streams, and outdated infrastructure, separately and in combination. The conditions of flooding and its consequences are both local and regional in character. Design solutions and mitigation measures, therefore, must be contingent upon the type of storm event and flooding. In some areas, primarily in the East and South Sides, and in portions of Downtown, the flooding is due to rising river waters, which is one of the most difficult challenges to address. Unfortunately,

rising river waters are becoming more frequent due to the increasing number of severe storms. Rainwater begins draining into the river far upstream, which makes river flooding a regional issue that cannot be solved with engineering fixes, such as higher flood walls, in the City or even the County, alone.

In portions of the First Ward and Brandywine BOA, flooded underground streams caused failed pumps, which were rendered inoperable once submerged by excessive water runoff. These conditions can be mitigated through

upgraded underground infrastructure as well as new green infrastructure such as wetlands that can slow the water from entering the City's storm sewers. Regardless of the solutions employed, careful engineering and investment are required to ensure that flood waters do not threaten neighborhood residents or businesses. Plans for redevelopment in the City will need to balance the need for creating market-ready, developable land with adequate space and infrastructure to manage rainwater.



Chenango Flood Wall at Front and Prospect Streets



Chenango Flood Wall along the Riverwalk

FLOOD PLAIN

FEMA PROPOSED

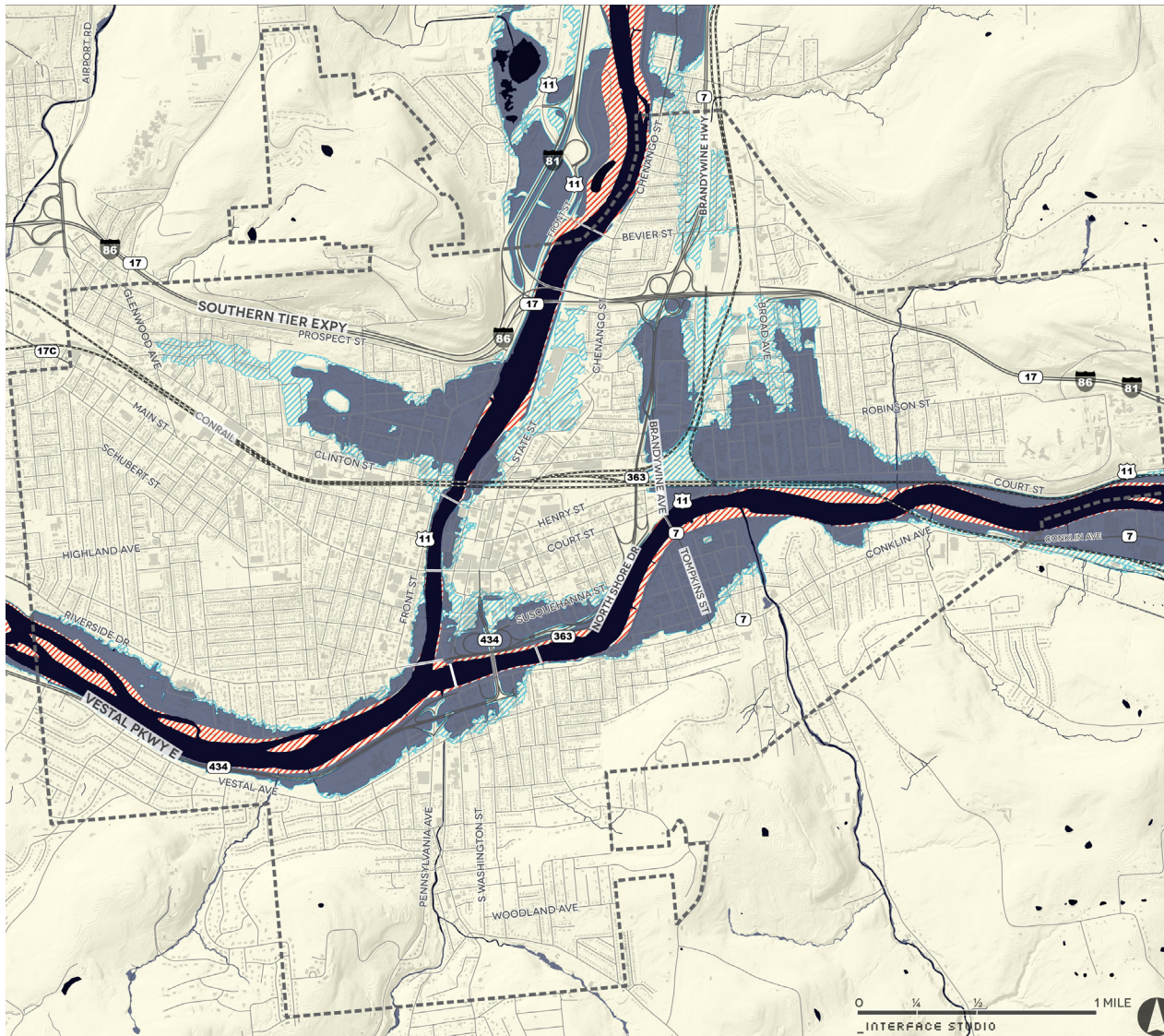


FIGURE 52: Proposed FEMA Flood Plain

The Federal Emergency Management Agency (FEMA) completed a set of preliminary Digital Flood Insurance Rate Maps (DFIRMs) for Broome County that were submitted to local officials for review on February 1, 2010. The preliminary DFIRMs indicate that 12 sections of the County's levees no longer meet federal requirements for minimum flood protection. Because of this, structures on the other side of the levees will be designated as being in a Special Flood Hazard Area (SFHA). According to the new maps, approximately 8,000 structures are located in the flood zone, and consequently, flood insurance for these owners will be required if the structures carry a Federally-backed or Federally-regulated mortgage. The communities most affected by this are the City of Binghamton, the Villages of Endicott and Johnson City, and the Towns of Vestal and Union.

The Biggert-Waters Flood Insurance Reform Act of 2012 further exacerbates the situation for property owners within the floodplain. The act calls on FEMA to change the way the National Flood Insurance Program (NFIP) is run by making it more financially self-sufficient, which will effectively increase flood insurance rates to reflect the true risk of flood damage and remove Federal subsidies.

- WATERWAY
- FLOODWAY
- 100-YEAR FLOODPLAIN
- 500-YEAR FLOODPLAIN

GREEN INFRASTRUCTURE

Green infrastructure is an alternative to traditional infrastructure and can be used by the City to reduce the negative effects produced by flooding and stormwater runoff. Instead of upgrading pipes, which is costly and limits a City's ability to make the most of its limited funds for infrastructure maintenance, green infrastructure systems are engineered landscapes that serve to capture water before it reaches the storm sewer system. Other cities have found that green infrastructure practices such as raingardens, swales, tree trenches and even wetlands (where space is available), are more cost efficient and bring added benefits to the community including a greater awareness of stormwater challenges as well as a more visually appealing urban landscape that helps to attract new residents and businesses.

The NYSDEC implemented new State Pollution Discharge Elimination System (SPDES) rules in 2010 requiring that all projects disturbing over an acre and requiring a full Stormwater Pollution Prevention Plan (SWPPP) include green infrastructure practices. In addition, the State has incorporated green infrastructure practices

into the NYS Stormwater Design Manual. The manual provides guidance on how to design and locate stormwater management practices to comply with State performance standards.

The City, too, is exploring green infrastructure practices, including several built demonstration projects (Kennedy Park and Southside Commons) and, in 2011, the completion of their own Urban Runoff Reduction Plan (URRP) requirements for projects under an acre of disturbance to complement the SWPPP program. The URRP is part of the development review process and requires developers to utilize green infrastructure such as porous pavement, rain gardens and green roofs to minimize the runoff from their sites, which will reduce the runoff that flows into the City's storm sewer and eventually into the rivers, having a significant cumulative effect on discharge over time and across the entire area of the City. The City is also committed to implementing green infrastructure in its own capital projects and has sought grant assistance to incentivize these practices within private developments.



Southside Commons Green Infrastructure Project



Kennedy Park Green Infrastructure Project

POWER AND TELECOMMUNICATIONS

Power and telecommunications within the City limits are provided by regulated private corporations. New York State Electric and Gas provides electricity and natural gas service, while Time Warner and Verizon provide high-speed internet service; Direct TV and Dish network provide satellite TV and internet, Time Warner, Verizon, AT&T and Choice One Communications provide landline telephone service. The companies with physical infrastructure are regulated through the Public Service Commission (PSC) to ensure safe, secure, and reliable access for New York State's residential and business consumers, at just and reasonable rates. The PSC reviews the reliability and quality of service the utilities are providing

and requires the utility to make corrective measures when issues are found.

The power and telecommunications infrastructure within the City is a mixture of above ground and below ground transmission and distribution lines. Most of the power and telecommunications infrastructure is aging. Many of the facilities have long surpassed their design life, yet are still in service because of the high cost of replacement. The utility owners do not have major upgrade plans but make upgrades when repairs or capacity changes are needed. The companies will periodically review the status of their infrastructure and make upgrades when they have been having

a reoccurring problem. The companies will traditionally replace the underground utilities along a street that the City is reconstructing. Both of these practices are reactionary and cost driven in that upgrades are made when the cost of the upgrade will reduce the cost of maintenance or reduce repeated service interruptions.

If there is a need for new service run along a street where the utility currently does not have any facilities or a service must be upgraded for additional capacity, the utility will provide it to the facility or residence at a cost.



Power Lines near Front and Prospect Streets

SUMMARY OF KEY ISSUES & OPPORTUNITIES

Binghamton must be creative in addressing some of the very pressing infrastructure and water issues facing the City. With aging infrastructure, threats of future flooding, and a limited budget, a coordinated effort is needed to tackle these issues in an environmentally and financially sustainable manner.

All of the recommendations address one or more of the objectives listed below:

- **REDUCING** operational and **MAINTENANCE COSTS**
- Maintaining **INFRASTRUCTURE REPAIRS** and upgrades
- Enhancing existing flood protection
- **REDUCING EFFECTS** of small scale and **FLASH FLOODING** through **GREEN INFRASTRUCTURE**

COMMUNITY VOICE

Blueprint Binghamton asked **YOU** for your thoughts and ideas, concerns and priorities related to water and infrastructure. Your ideas for how people interact with the City's man-made and natural waterways, encompass flooding, water quality, energy efficiency, green infrastructure, and various other ways to both respect and enjoy the waterways.

COLLABORATIVE MAP COMMENTS

About **13%** of all **COLLABORATIVE MAP COMMENTS** addressed "environmental" issues, which included areas such as flood plain, parks, riverfront, sustainability, trees, and urban agriculture.

COLLABORATIVE MAP

IDEAS. INSIGHTS. BARRIERS

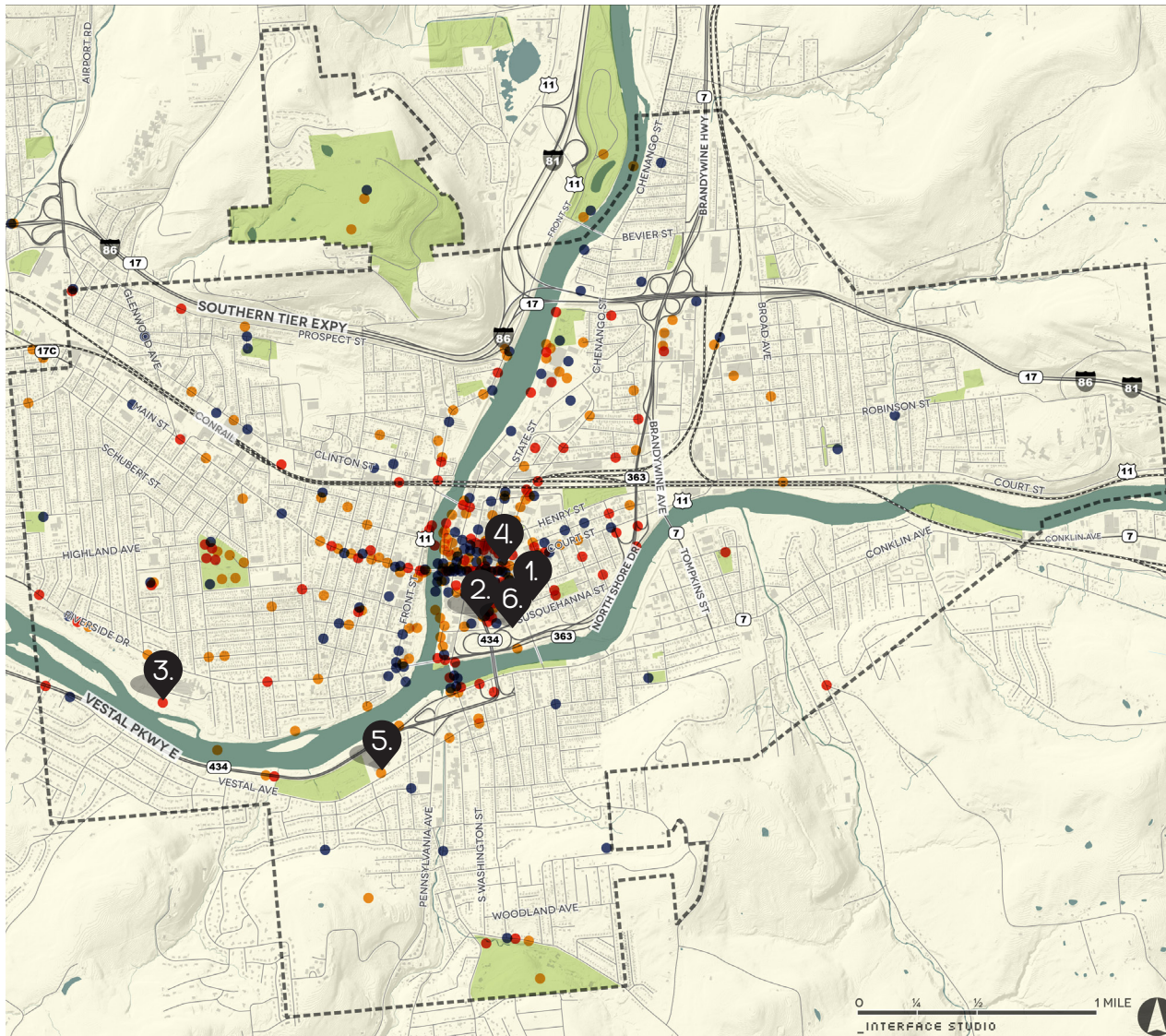


FIGURE 53: Collaborative Map Comments Locations

1.

“ NIGHT TIME - ADD MORE STREET LIGHTS! ”

2.

“ PUBLIC WORKS NOT EFFICIENT - NOT ENOUGH MONEY - POLITICS ”

3.

“ THE RIVER FLOOD PLAIN IS VERY INTERESTING TO EXPLORE BUT POORLY ACCESSIBLE. ”

4.

“ CLEAN UP - TRASH, DUMPSTERS, STREETS. ”

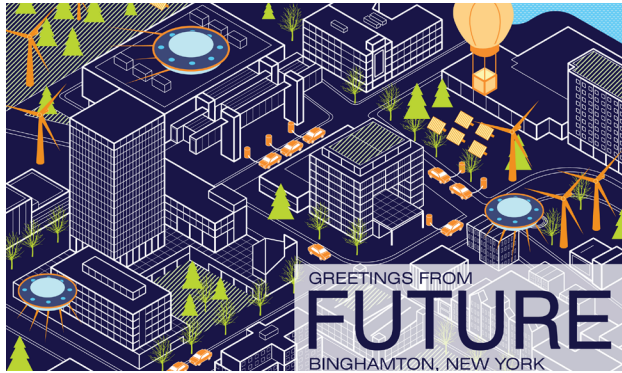
5.

“ CARBON NEUTRAL INFRASTRUCTURE ON REBUILT MACARTHUR SCHOOL. ”

6.

“ MANY FLAT ROOFS NEED SOLAR PANELS. ”

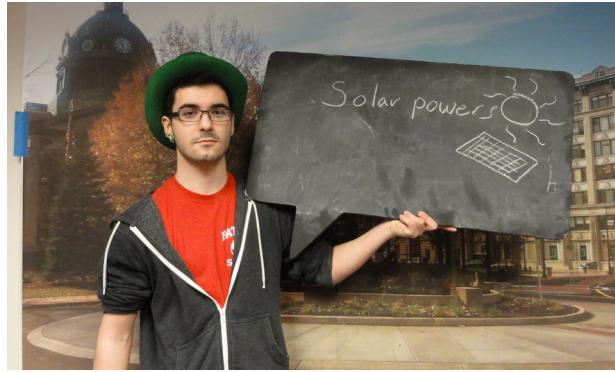
POSTCARDS FROM THE FUTURE



WE'VE FORTIFIED FOR FUTURE FLOODING & HAVE MADE USE OF VACANT LOTS FOR RAIN GARDENS, PUBLIC ART, GARDENS, ETC.

IT IS ALSO VERY ENVIRONMENTALLY FRIENDLY, AND YOU FEEL THE ESSENCE OF NATURE EVERYWHERE YOU GO.

BIG IDEAS



CITYWIDE SURVEY

And your responses on the **CITYWIDE SURVEY** echoed your desire for infrastructure improvements:

- 38%** Proactive Flood Management
- 31%** New Waterfront Connections

FIGURE 54: Postcards From the Future

Images from the "Photo Suggestion Booth"

INFRASTRUCTURE GOALS:

The recommendations that comprise **BLUEPRINT BINGHAMTON'S MINI-PLAN ON INFRASTRUCTURE** [a plan for where the Rivers meet the City] are organized into three goal areas, each titled by a key infrastructure goal:

01

REDUCE THE IMPACT OF FLOODING AND PROTECT BINGHAMTON NEIGHBORHOODS

02

IMPROVE STORMWATER MANAGEMENT AND RIVER QUALITY

03

CONSERVE WATER/ENERGY RESOURCES AND REDUCE OPERATING COSTS

Taken together, the **INFRASTRUCTURE GOALS** and their related objectives and strategies support the following themes of **BLUEPRINT BINGHAMTON'S** vision for the future of our City:

- **THRIVING** - a more efficient City that functions in a financially and environmentally sustainable way
- **RESILIENT AND SUSTAINABLE** - conserve water quality and protect neighborhoods through smart planning and coordination
- **ALIVE** - a waterfront and infrastructure system that serves the City and its residents by protecting from future flooding, creating recreational spaces, and improving environmental quality

**FOR FULL VISION STATEMENT,
SEE PAGE 40.**

GOAL :

01

REDUCE THE IMPACT OF FLOODING AND PROTECT BINGHAMTON NEIGHBORHOODS & BUSINESSES

Flooding is an environmental, quality of life, and, most importantly, economic concern for the City. The Broome County Hazard Mitigation Plan estimates that the 2006 flood caused over \$5.5 million in damages to the County. Further, the Plan estimates that approximately 30% of the County population lives within the floodplain defined by the current FIRM. In Binghamton over 11,000 residents live in the National Flood Insurance Program (NFIP) Special Flood Hazard Area (SFHA) as of 2012, and the property within this flood area accounts for 17.5% of Binghamton's general building stock replacement cost value.¹ Binghamton residents recognize that flooding could be a regular occurrence in the future and the existing safeguards, which protected the City in decades past, are no longer adequate. The City must take a multi-valented approach to protect the City and its residents. The following infrastructure recommendations support Goal 1:

IMPLEMENT THE CITY'S ESTABLISHED PRIORITY PROJECTS IN THE COUNTY'S 2013 MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

1.1

The City should utilize FEMA/SEMA flood mitigation funding programs to implement the projects listed as priorities in the Broome County Hazard Mitigation Plan in order to assist in reducing future flooding issues. The high priority Proposed Hazard Mitigation Initiatives for the City of Binghamton include administrative, structural and programmatic initiatives, such as working with Broome County to update the floodplain (FIRM) maps, researching the feasibility of mitigating all three HUD housing developments Downtown, and considering non-structural flood hazard mitigation for at risk properties in the floodplain. The recommendations in this Comprehensive Plan are in alignment with those of the County's Hazard Mitigation Plan.

¹ Broome County Multi-Jurisdictional All-Hazard Mitigation Plan (2013), <http://gobroomecounty.com/planning/hazardmitigation/plandocuments>

1.2 COMPLETE CRS APPLICATION TO MAKE PROPERTY OWNERS ELIGIBLE FOR REDUCED INSURANCE RATES

The City should complete the NFIP Community Rating System (CRS) application outlining how the City will assist in reducing flood damage to insurable properties, strengthen and support the insurance aspects of the NFIP, and encourage a comprehensive approach to floodplain management. Completing this process will help property owners by reducing flood risk and making them eligible for discounted flood insurance premium rates. Currently, initiating the CRS has been incorporated into the First Ward BOA project.



Flooding on the Chenango River During Tropical Storm Lee in 2011

1.3 PARTNER WITH BROOME COUNTY IN THE NEW YORK RISING COMMUNITY RECONSTRUCTION PROGRAM PLANNING EFFORTS TO ENSURE CONSISTENCY ACROSS PLANS

Flooding and stormwater runoff in the City are affected by development and changes in areas outside the City. The New York Rising Community Reconstruction Program provides communities affected by Hurricanes Sandy and Irene and Tropical Storm Lee with rebuilding and revitalization assistance and facilitates community redevelopment planning. By partnering with the County, the City can better enhance the effect the plans will have on the City's flood prone areas.



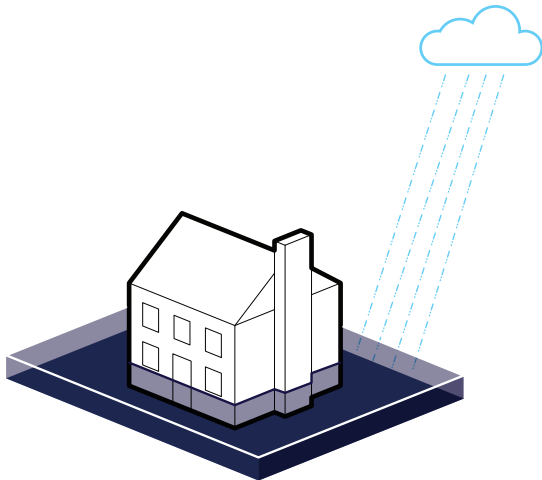
Flood Waters at the Washington Street Bridge

1.4
HELP RESIDENTS REDUCE THE IMPACT OF FLOODING ON THEIR HOMES AND COMPLY WITH NEW FLOODPLAIN STANDARDS TO REDUCE FLOOD INSURANCE COSTS

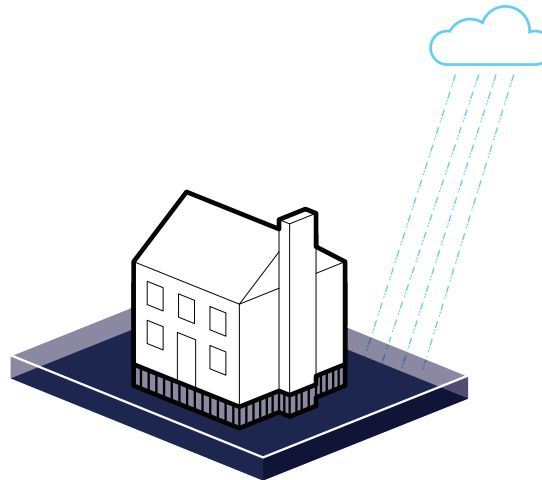
Residents should be empowered to reduce the impact of flooding on their homes through floodproofing and mitigation measures that address the contributing conditions for flooding. Community floodplain management activities identified through the CRS (Recommendation 1.2) can be implemented through funding from flood mitigation programs to help residents reduce their flood insurance costs. Floodproofing measures include elevating utilities, emptying and floodproofing basements, and elevating homes above the base flood line, a requirement for lower insurance premiums with the new

floodplain standards. While elevating homes is expensive, it is likely to cost less in the long run than the added flood insurance cost, and Flood and Hazard Mitigation Grants can provide funding assistance. Residential flood mitigation tactics are designed to reduce the amount of runoff that makes its way to the streams and rivers in the first place. These tactics, which include diverting runoff with rain barrels, rain gardens and tree plantings, will also have a positive impact on quality of life by improving the look and feel of Binghamton's streets and neighborhoods.

STATUS QUO
REOCCURRING FLOODS



OPTION: 01
RAISE OUT OF FLOOD PLAIN



OPTION: 02
RELOCATE TO HIGHER GROUND

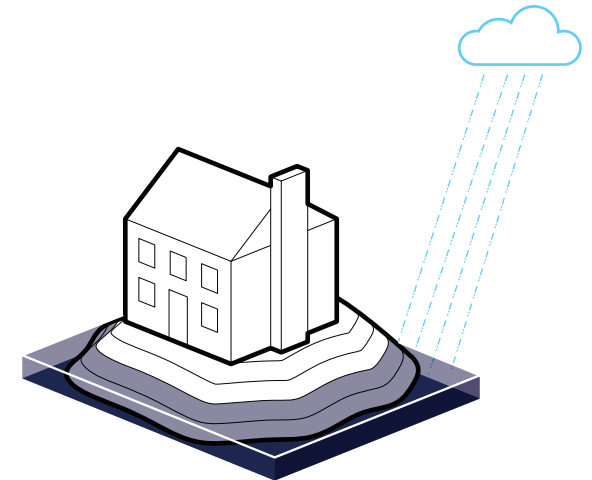


FIGURE 55: Future Housing Options due to Flooding

1.5
**PROACTIVELY MANAGE LAND IN THE FLOODPLAIN
TO REDUCE BLIGHT AND IMPLEMENT FLOOD
MITIGATION MEASURES**

As described in Land Use and Zoning Recommendations 1.3 and 2.3, after the new FEMA FIRMs are finalized, the City should revisit the land use and zoning recommendations for parcels within the new floodplain. While existing residents who want to remain in their homes should be assisted to do so, new development in environmentally sensitive locations does not make financial or economic sense because it will require significant capital investment to comply with the new floodplain standards or be subject to far higher new insurance premiums. As a long-term strategy, existing businesses and residents in the floodplain should be offered, when available, relocation assistance to safer / non-flood prone areas in the neighborhood and City. As a part of this process, their flood-damaged properties would be obtained through existing buy-out programs and converted to green infrastructure to help reduce flood impacts on surrounding properties

and nearby commercial areas. As an alternative, the Broome County Land Bank could be used to consolidate abandoned or vacant properties in the floodplain.

Once the title on these properties is cleared, long-term ownership should be conveyed to the City for use as open space to protect the surrounding community from future flooding. Steps should also be taken to disconnect building sewers, laterals, and City sewer mains formerly serving bought-out properties in the floodplain. If properly planned, carried out, and documented, this will entitle the City to Flow Credits under the Joint Sewage Board's I/I Offset Program to the extent infiltration and inflow are removed from the sewer collection system. Transportation Recommendation 1.4 also explores the opportunities to align land use and roadway infrastructure maintenance decisions with decisions to support a more resilient City in the future.

1.6
**PARTICIPATE IN REGIONAL COOPERATION EFFORTS
FOR RIVERINE FLOODING**

Flooding due to rising river waters is a regional issue that Binghamton cannot tackle alone. Events upstream have a major impact on all of the river communities. Addressing riverine flooding will require a long-term rethinking of the relationship of the City to its Rivers. The City should continue to participate in regional cooperative flood control efforts such as the Broome County Flood Task Force and the

Broome County Multi-Jurisdictional Hazard Mitigation Plan, and work with the US Army Corp of Engineers, Susquehanna River Basin Commission, and NYSDEC to enhance flood protection.

GOAL:

02

IMPROVE STORMWATER MANAGEMENT AND RIVER WATER QUALITY

Binghamton is surrounded by water, and the City has made great strides toward improved water quality. As rainfall and stormwater runoff are directly related to flooding, managing stormwater onsite is a cost-effective opportunity to reduce flooding. Reduction of stormwater flows to the combined sewers will lead to less CSO overflow and lead to improvements in the water quality of the Rivers. In this era of constrained City budgets, green infrastructure solutions can complement grey infrastructure projects like the separation

of storm sewers and sanitary sewers to protect neighborhoods from flooding with partially treated CSO flows. The City has to file a yearly CSO report that details their efforts to abate the CSOs and their compliance with the LTCP. In addition, the United States Environmental Protection Agency (EPA) is currently auditing cities' Municipal Separate Storm Sewer System (MS4) stormwater programs to ensure they meet minimum State measures and has already conducted an audit of Binghamton University. Binghamton is also required to meet pollution

limits for water quality, including storm water discharges, set by the Chesapeake Bay Total Maximum Daily Load, established by the US EPA to restore clean water in the Chesapeake Bay and the region's streams, creeks and rivers, these requirements are and will continue to be incorporated into the City's MS4 and CSO permits. These provide additional incentives to take proactive stormwater management measures. The following infrastructure recommendations support Goal 2:



Falls on the Susquehanna River

2.1
**ENFORCE AND ENHANCE URBAN RUNOFF
REDUCTION PLAN (URRP) REQUIREMENTS**

The City's URRP requirements for projects that fall below the NYSDEC threshold for a SWPPP, aim to help manage stormwater on-site and reduce runoff into the sewer system by using cost effective green infrastructure. The City has a large number of these smaller projects that cumulatively contribute a considerable amount of runoff into the streams and rivers and contribute significantly to CSOs. The City's URRP requirements should be updated as NYSDEC SPDES permit requirements change.

2.2
**CREATE A LANDSCAPE/STORMWATER OFFSET
BANKING SYSTEM**

The City should explore developing a stormwater offset banking system that will allow developers to construct stormwater best management practices (BMPs) and bank "credits" that can either be used for future projects or be sold to developers that cannot meet landscaping or onsite stormwater management requirements. This approach offers developers more flexibility in meeting landscaping and stormwater

management requirements. The City should develop an inventory of sites where stormwater BMPs can be installed to offset redevelopment sites where it is not possible to meet requirements. Baltimore is a model that has established simple banks for city agencies and is in the process of exploring more complex versions for private developers.

2.3
IMPLEMENT STORMWATER MANAGEMENT
PRACTICES FOR GREEN MITIGATION AND RUNOFF/
FLASH FLOOD CONTROL

A comprehensive stormwater management program should be implemented that combines the City's efforts with those of private individuals for maximum impact. In addition to managing stormwater in development projects, the City should integrate green infrastructure into road projects, using the City's ongoing separation of combined sewers as an opportunity to coordinate these investments. The NYSDEC SWPPP and the City's URRP require the use of green infrastructure to manage stormwater onsite for projects creating or adding impervious surface area that would affect runoff into the City's rivers and streams. The City should also encourage property owners not regulated by the SWPPP or URRP to undertake stormwater management practices. At a residential level, green infrastructure techniques for consideration might include rain barrels, rain

gardens, stormwater planters, and tree planting. Green infrastructure with larger impacts can be encouraged for commercial, institutional or industrial properties. These techniques include permeable paving, green roofs, rainwater harvesting and reuse, bioswales, bioretention areas, tree box filters, vegetated filter strips and swales. Areas prone to flash flooding should be analyzed to determine contributing factors and determine what types of green mitigation practices might best reduce the runoff volume and minimize the impacts of flash flooding. Incentives, such as the City's Stormwater Green Infrastructure 50/50 Fund which, while funds last, can cover a portion of eligible installation costs of green infrastructure for stormwater management on private property, can help defray the costs.

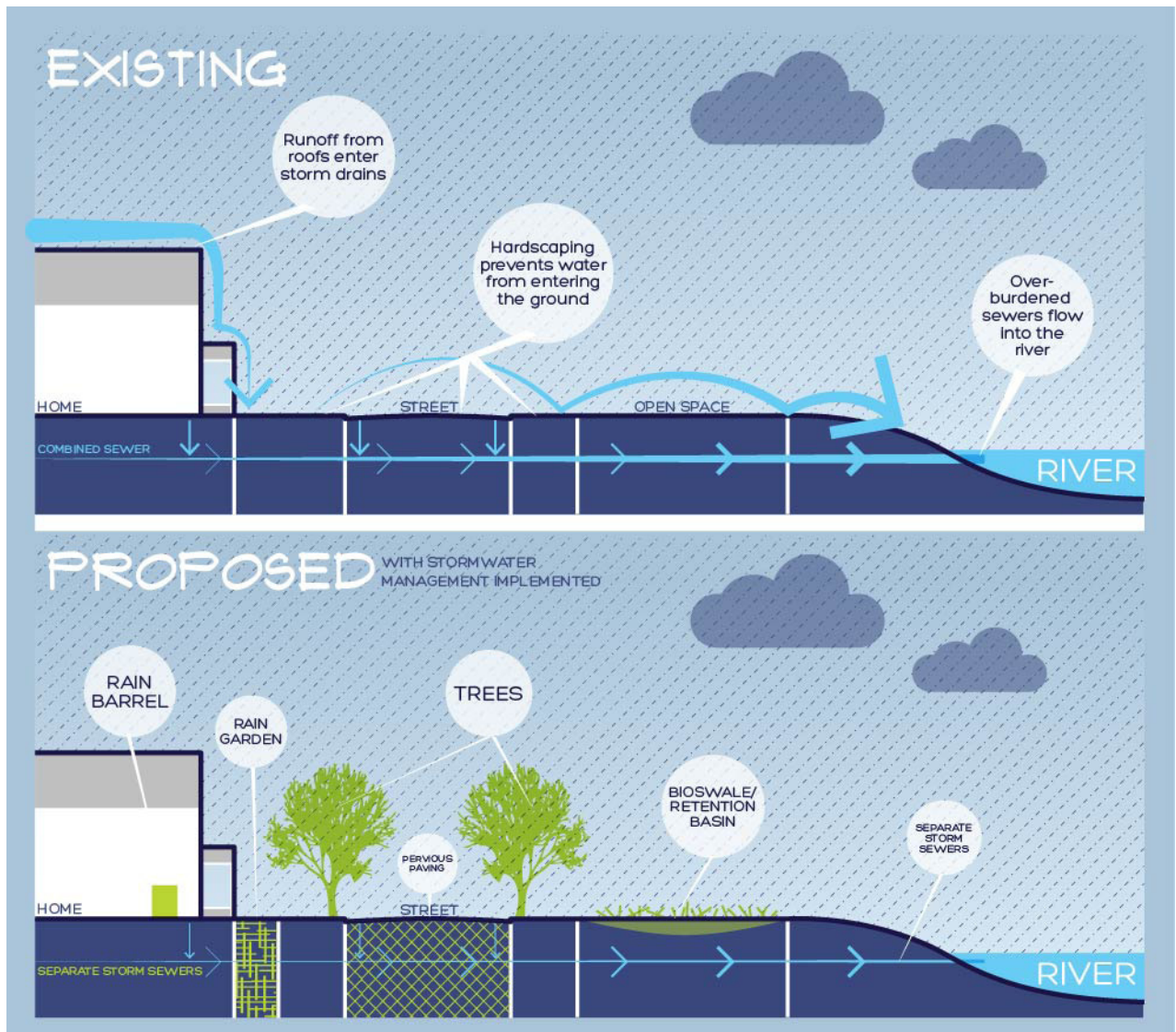


FIGURE 56: Examples of Stormwater Management Techniques

2.4 INTEGRATE STORMWATER MANAGEMENT INTO PARKS, ESPECIALLY RIVERFRONT PARKS AND TRAILS

Parks and trails are a natural opportunity to integrate low cost and aesthetically pleasing green infrastructure. Green spaces in the City, and especially those along the riverfronts, should continue to be designed with stormwater management and retention in mind. Materials and plantings that retain stormwater and allow it to slowly infiltrate not only help protect the City from overflow flooding and result in higher water quality, they also add to the beauty of these scenic places. Stormwater management practices for parks could include rain gardens, pervious pavement, and natural infiltration basins planted with low maintenance native vegetation such as wildflowers and grasses to temporarily store and infiltrate runoff. Along the Rivers, trees, shrubs, meadow grasses and other low maintenance native vegetation should be planted to provide a buffer, though planting restrictions within 15 feet of flood walls or levees must be observed to maintain the integrity of the built infrastructure.

A long-range opportunity exists to create a new wetland park below Susquehanna Street, an area in the floodplain that has suffered repeated flood damage. Several transformative changes must happen to move in this direction; the removal of North Shore Drive (see Transportation Recommendation 1.4), which was built for much higher capacity than is warranted today and is costly to maintain, the relocation of the public housing and privately-owned affordable housing developments to safer ground (see Housing Recommendations 1.3 and 4.5), and the gradual acquisition of property within the floodplain through buy-outs and transfers of abandoned and vacant property to the Broome County Land Bank (Recommendation 1.5). Wetlands provide multiple benefits including an increase of floodwater storage and reduction of flood elevations during higher flows for flood mitigation, and recreational space that provide river access through low-impact paths and viewing decks.



*Allegheny Riverfront Park, Pittsburgh
Source: Michael Van Valkenburgh Associates*

2.5
**CONTINUE TO MAKE SEWER SYSTEM
IMPROVEMENTS**

The green infrastructure techniques described in the recommendations above work together with important grey infrastructure improvements to reduce flooding and CSO overflows. The City should continue to separate combined sewers, where practical, to reduce wet weather CSO event flows dumping directly into the rivers. The City should also look to raise sanitary manhole covers that are in low areas (sumps) and use covers that do not allow runoff to enter the sanitary manhole through the cover. Making these improvements and separating the sewers will help the City maintain

its goals under its CSO Long Term Control Plan and continue to accumulate flow credits that can be used to offset new development in accordance with the Joint Sewage Treatment Plant's Flow Management Plan. Areas prone to flooding (i.e. South Mountain) should be analyzed to determine what the contributing factors are and if peak storm retainage and flow controls are needed or if other practices need to be employed to reduce flooding potential and impact. Reducing flooding events and their impacts will help better the communities where these events regularly occur.

2.6
**EVALUATE THE USE OF TRENCHLESS REHAB
ALTERNATIVES TO REHABILITATE SEWERS**

Trenchless technology techniques can be less expensive than an open cut trench if there is a structural issue with a pipe necessitating replacement. Instead of digging a trench and replacing the existing pipe with a new one, manholes and other smaller dug holes are used to access pipes and add liners inside the existing pipes, such as cured in place pipe (CIPP), spiral wound pipe, pipe bursting, etc. This process also causes less disruption to traffic as streets do not need to be closed down for work, and work can be completed in less time than open cut replacement. The cost savings associated with trenchless technology could allow the City to perform rehabilitation on a greater length of sewer infrastructure each year in comparison

to non-combined sewer main replacement requiring open cut trenches.

Trenchless technology can be an effective way to replace a structurally deficient pipe with a structurally sound pipe without having to open cut the area above the pipe. This technology has also been used to reduce the amount of infiltration and inflows (I/I) into the sewers. However, the effectiveness of the I/I reduction depends on the condition of the remaining non-rehabilitated sewer system. The City should evaluate the use of trenchless technology on each sewer system rehabilitation project to determine if it would result in cost savings to the project.



Trenched road reconstruction



Trenchless road reconstruction

The City has developed a Capacity, Management, Operations, and Maintenance (CMOM) Plan in accordance with the Joint Sewage Board Rules and Regulations. The CMOM plan is a living document and must be maintained and updated yearly. Within the CMOM and the accompanying Capital Improvement Plan (CIP), the City outlines its plans to perform Close Circuit Television (CCTV) inspection and capital repairs/replacements for the upcoming year. The CMOM is intended to assist the City and the Sewage Treatment Plant in meeting flow management plan goals and CSO water quality standards by reducing CSO overflows, Sanitary Sewer Overflows (SSOs) and sewer backups. One alternative to meet these goals would be to build separated sewers and laterals, which are roughly equal in length to the City's combined sewer system, thus removing the storm flow from the sanitary sewer system. Rehabbing the aging separated sanitary sewers to reduce the amount of wet weather infiltration is another option. This method can be used by private developers also. The sewer laterals are generally privately-owned and maintained, but collectively contribute I/I to the sewer system as well, such that trenchless technology may be a cost-effective means for a property owners to address sewer maintenance. Reducing I/I will

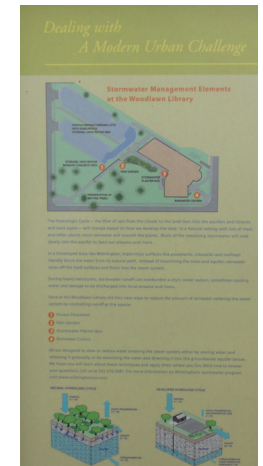
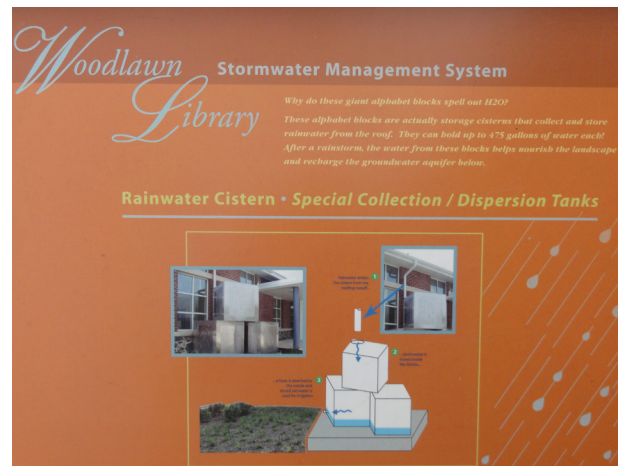
help to reduce the discharge for the remaining combined sewer overflows into the river during wet weather events, thereby helping the City continue to comply with its EPA-mandated CSO Long-Term Control Plan (LTCP). When properly planned, carried out, and documented, the City can earn Flow Credits for I/I reduction in accordance with the Flow Management Plan adopted by the Binghamton-Johnson City Joint Sewage Board (BJCJSB) and endorsed by City Council.

Flow credits can be sold to developers in support of new projects within the City built in the same I/I Remediation Basin upstream of a CSO discharge structure in which the Flow Credits were earned. Because the cost at which the City would sell its Flow Credits correlates to the City's cost for the I/I Remediation Projects that created them, trenchless technology could also reduce the cost for new development in an I/I Remediation Basin that did not have any available Flow Credits, but which involved addition of wastewater flows great enough to require I/I reduction equal to the wastewater flow the new development project would add to the Basin.

2.7
DEVELOP PUBLIC EDUCATION AND AWARENESS
CAMPAIGN FOR STORMWATER AND SEWER
OVERFLOWS TO ENCOURAGE INDIVIDUAL ACTION
AND RESPONSIBILITY

Residents are on the front lines of water runoff, and their efforts and advocacy are key to reducing the amount of runoff that makes its way to the streams and rivers. The City needs to make explicit the connection between individual actions and overflow flooding. Cities across the country are recognizing that managing stormwater with green infrastructure can help keep costs lower than using a purely grey infrastructure (expensive underground storage tanks and pipes) approach, and that to do so requires buy-in from an educated and engaged public. The Philadelphia Water Department's Green City, Clean Waters Program (<http://www.phillywatersheds.org/>) and Syracuse's Save the Rain Program (<http://savetherain.us/>) are just two examples of cities reaching out to educate citizens about their role in stormwater

management and water quality protection and offer green infrastructure assistance. The Broome-Tioga Stormwater Coalition, of which Binghamton is a member, has launched Water from Rain (<http://www.waterfromrain.org>), a stormwater media campaign to educate the public about environmental consequences, the link between stormwater and flooding, and how they impact daily life. Public education should be a greater component of all public projects and incorporated into the City's Municipal Separate Storm Sewer System program. Public outreach should be increased to ensure that residents and developers are aware of existing stormwater projects such as Kennedy Park, South Side Commons, and the MacArthur School and what their impact is on stormwater management through interpretive signage on-site.



Stormwater Management System and education campaign in Wilmington, DE

GOAL

03

CONSERVE WATER/ENERGY RESOURCES AND REDUCE OPERATING COSTS

Outdated infrastructure, inefficient energy consumption, and lack of coordination between government agencies cost the City of Binghamton money that could be better appropriated. For example, the City loses track of 30-40% of its treated drinking water, resulting in a significant loss of revenue. By making strategic investments that will pay for themselves in the long run, and increasing coordination between departmental agencies to prevent duplicative actions, the City will take a great step towards reducing costs and increasing efficiency. The following infrastructure recommendations support Goal 3:

3.1 MAKE THE CITY A MODEL OF RESOURCE CONSERVATION AND EFFICIENCY, AND USE PUBLIC PROJECTS TO RAISE PUBLIC AWARENESS

The City should lead by example to show that resource conservation and efficiency initiatives are not only possible to implement but also bring operational cost savings through reduced energy use. The City should conduct an energy efficiency audit and upgrade City facilities to meet the goals of the Energy Climate Action Plan. Actions to conserve resources and reduce emissions can be taken in areas such as procurement, facilities, fleet management, energy, water reduction, and storm water management. Public projects that incorporate conservation actions should be publicized as opportunities to educate and provide a model for issues of sustainability.



Landscaping on Court Street in Downtown

3.2
ESTABLISH ENERGY AND CLIMATE ACTION TASK FORCE TO MOBILIZE THE COMMUNITY TO HELP MEET ECAP GOALS

The Energy and Climate Action Plan outlines a proactive approach to climate change that also seeks to improve the quality of life for residents. The plan identifies actions to reduce emissions to 25% below 2006 levels by 2025 in key sectors that include buildings, energy, land use, waste management, transportation and food networks. The actions proposed in the Plan would improve the local economy and job market, improve transportation options, increase energy efficiency and cost savings, and

result in a healthier population and City. Meeting the goals of this Plan will require not only effort by the City of Binghamton but buy-in and participation from community stakeholders that include residents, businesses and institutions, such as schools and hospitals. A task force made up of representatives of these groups should be formed to push forward the ECAP agenda in their communities and work to identify and implement actions that can help to meet the ECAP goals.

3.3
INCENTIVIZE LOW IMPACT DEVELOPMENT PRACTICES

Low impact development practices have a bigger upfront cost but offer property owners reduced costs over time with energy savings. Incentives such as rebate programs can help property owners take advantage of the energy and cost savings of practices such as reflective roofs, green roofs, energy and water efficient systems, greywater use, alternative energy, and construction material reuse. The City's Stormwater Green Infrastructure 50/50 Fund

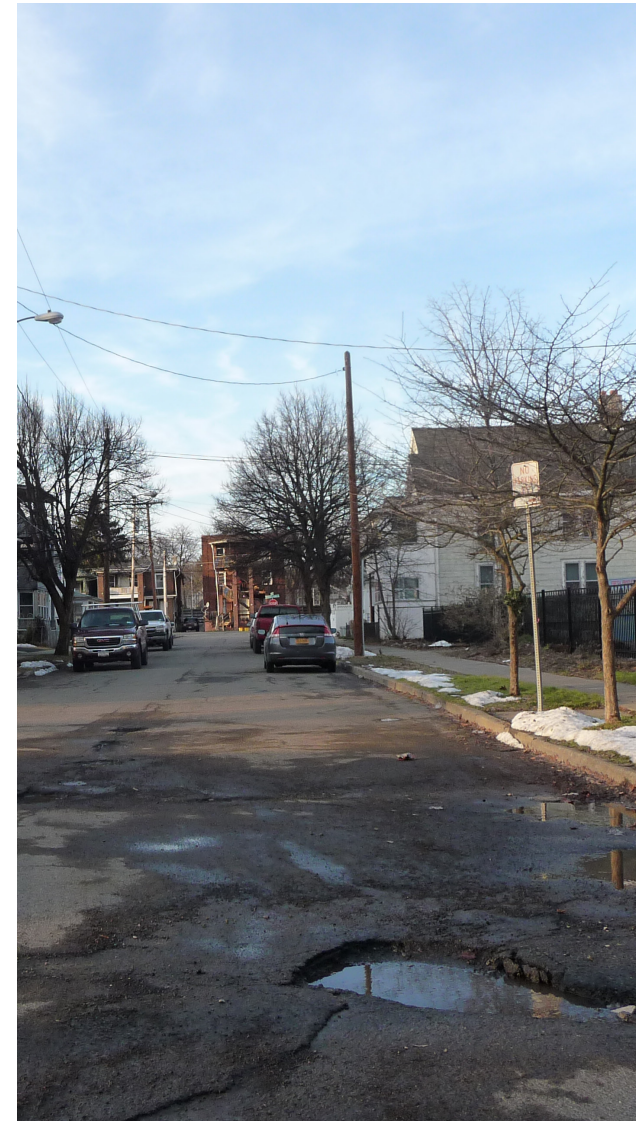
and energy efficiency assistance through grants from the Hoyt Foundation and Network Local Sustainability Matching Fund are examples that could be expanded. Low impact development practices also provide an opportunity to create green jobs in the community. Green Jobs - Green New York offers energy assessments, installation services, low-cost financing and training for green-collar jobs.

3.4
INVEST IN WIRELESS METER SYSTEM FOR ALL WATER USES, ALLOWING THE CITY TO MONITOR WHERE WATER IS BEING USED, AND CORRECT AREAS OF WATER LOSS

According to the EPA, the average water loss in public water systems in the U.S. is 16% of which 75% is recoverable. The City loses 30-40% of the water treated at the Plant, which is considerably higher than the average. Implementing a wireless meter system will help the City recover some of this loss by allowing the City to better monitor water usage and increase potential water billing amounts. It will also reduce operating costs for the Water and Sewer Department by reducing personnel costs, as currently meters must be read in person. The City should hire a consultant to perform a feasibility study and conduct a cost benefit analysis to measure the cost savings and potential revenue increase of a wireless meter system against the capital investment required to implement and maintain it in order to pursue funding opportunities.

3.5
UPDATE WATER MODEL TO ASSIST IN DETECTING AREAS OF CONCERN WITHIN THE SYSTEM TO TARGET FUNDING

Updating the City's water system model, which was built over 10 years ago, will help recover some of the water loss. By tracking usage information from all locations using City water, the City would be able to identify where water system improvements are warranted to target leaks and water loss. Given the significant capital investment required to build a new water system model and maintain it, the City should conduct a cost benefit analysis to measure the cost savings and potential revenue increase associated with a new model in order to pursue funding opportunities.



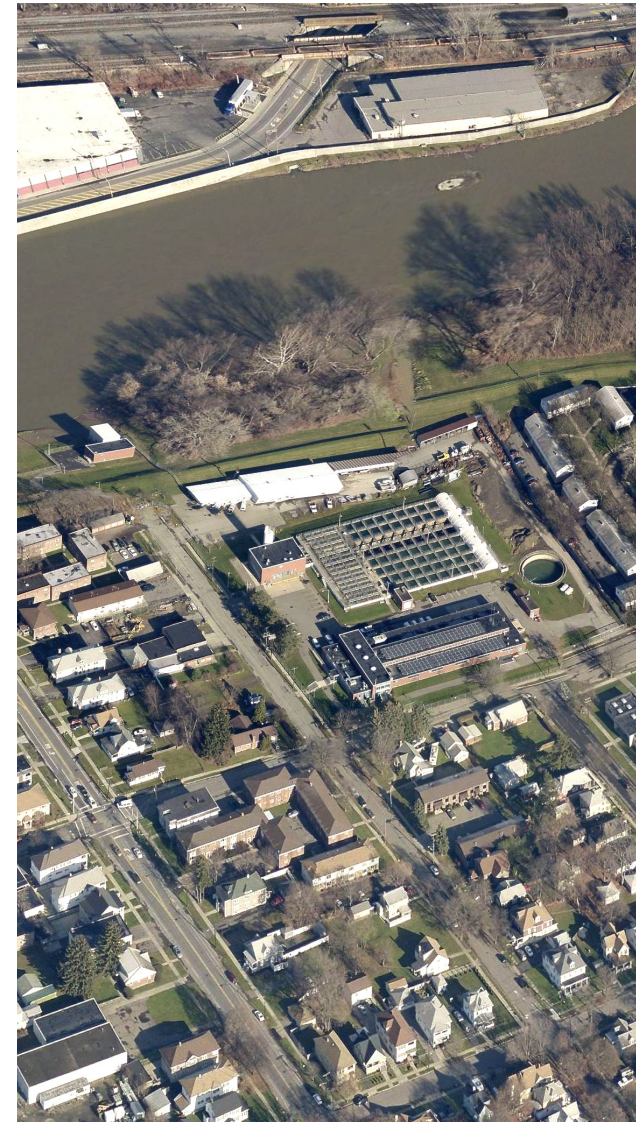
Road in Need of Repairs

3.6
CONTINUE TO UPGRADE AND REPLACE PIPE

The City's sewer and water system has surpassed its design life and is in the process of being upgraded. The majority of its water mains are cast iron pipe, which are being replaced with more durable ductile iron and HPDE pipe, which has a lifespan of 75 to 100 years. The City should continue its investment in replacing its aging sewer and water infrastructure to control overall operational and maintenance costs in the future.

3.7
UPGRADE WATER FILTRATION PLANT TO INCREASE ENERGY EFFICIENCY

Water treatment is an energy intensive process. With energy costs expected to keep rising, so will the operational costs at the water plant. The City should continue to look for ways to reduce energy usage and increase the use of renewable energy sources at the water filtration plant to reduce operational costs. Anaerobic Digester Gas (ADG)-to-Electricity Systems, which use dairy farm waste and/or dairy product processing waste for energy, are an option to consider. Over \$20 million in New York State Renewable Portfolio Standard (RPS) funds is available through 2015 for the installation and operation of such systems, and as such, the City should prioritize this grant application.



Water filtration plant on the banks of the Susquehanna

3.8
**REPLACE ALL STREETLIGHTS WITH ENERGY
EFFICIENT BULBS AND FIXTURES BY 2020**

The operational cost of the street light system is a heavy burden on the City. While the City owns the lighting system and owns some of the system's poles, many poles are owned by NYSEG. NYSEG changes the bulbs on the wooden poles (service class 6 lights) and bills the City. The City can reduce operational and maintenance costs by changing to LED lighting which will pay for themselves within several years, and by installing street light meters for NYSEG billing. Most of the system is not metered and the City is billed per light, if the lights were changed to LED and put on a meter, the cost to operate would be greatly reduced. Changing to LED lighting will require the City to take over lighting replacement from NYSEG. However,

since LED lighting has a lifespan of 10-15 years, which is three times the life of traditional lighting technologies, bulbs would not have to be replaced as often, reducing maintenance costs. LED lighting also consumes far less energy than traditional lighting technologies which would also reduce operational costs. Cities such as New York City and Raleigh, North Carolina have seen dramatic decreases in operational and maintenance costs with a coordinated up-front investment in LED lighting. A cost/benefit analysis and return on investment (ROI) analysis should be undertaken to determine the fiscal impact of converting Binghamton's streetlights to LED.

3.9
**ENFORCE CITY STANDARDS FOR PUBLIC
RIGHT OF WAY**

Street work permits allow the City to monitor and enforce its standards for street construction when private companies/developers need to impact an existing City street and/or sidewalk. This ensures the street and/or sidewalk is reconstructed consistent with the Engineering Department's Standard Specifications for streets and sidewalks and reduces future maintenance burdens on the City for repairing faulty work. The City should continue to inspect

utility trench restorations to ensure streets are reconstructed properly and reduce future maintenance burdens on the City for repairing faulty work. The Curb and Sidewalk Assistance Program can also be utilized to correct code violations related to improvements in the public right of way and ensure that projects eligible for assistance achieve the highest standards for sidewalk and curb work including considerations for landscaping and tree planting.

3.10
OPENLY COORDINATE/COMMUNICATE BETWEEN DEPARTMENTS AND UTILITIES ON ANY MAJOR PROJECTS TO REDUCE REDUNDANCIES

City departments and utilities should hold yearly meetings to coordinate where City street projects will be performed and where utilities might need to perform work. Exchanging information with the utility companies on planned street reconstruction and utility upgrades will allow for a coordinated effort to replace all the utilities in a street during (or before) reconstruction. This will prevent the utility companies from impacting recently upgraded or constructed facilities or roadways as well save both the City and utility companies money.

3.11
CONTINUE TO BUILD A DATABASE THAT TRACKS ASSETS, INVESTMENTS, AND SCHEDULES MAINTENANCE

The City is building a central database using Cartograph for data management and asset management. The City should continue working to build a database of assets, repairs and operational costs that integrates all City departments to realize the full potential for planning, programming, and operational costs savings. Furthermore, the City should work to ensure that its sewer infrastructure data is maintained in a form that is digitally compatible with the Broome County GIS sewer infrastructure overlay. This will allow the City's sewer system to be incorporated into the hydraulic sewer system model developed for the Joint Sewage Board as part of the flow management planning process.



Example of a Street Light on Court Street in Downtown



**WANT TO KEEP
READING?**

BLUEPRINT BINGHAMTON
HAS **7** MAIN CHAPTERS

A ECONOMIC
DEVELOPMENT

B HOUSING

C TRANSPORTATION

D INFRASTRUCTURE

E ENVIRONMENT &
OPEN SPACE

F LAND USE &
ZONING

G COMMUNITY
BUILDING