CHAPTER 5

UTILITIES

VISION STATEMENT:

Our community recognizes the importance of a well maintained and planned community utility systems that protects our water resources and provides us with the necessary facilities and services that our community needs to thrive.

February 25, 2019

Introduction

The subject of this chapter, utilities, is critical to our community's health, livability, and economy. For our plan, utilities are the physical systems of sanitary sewer, potable (drinkable) water, storm water, and private utilities (electric, gas, and telecommunication) that provide for the necessities and conveniences of everyday life in Red Wing. These systems are at times referred to as the "grey" infrastructure or "pipes and wires" because, unlike green infrastructure, these systems are built and installed solely to serve development. Because both grey and green infrastructure serve similar roles, the utilities chapter will duplicate some information that is found in the Green Infrastructure chapter.

The 2040 Community Plan suggests that Red Wing should critically evaluate its community utility systems for their 1) capacity to serve development, 2) health and physical condition, and 3) sustainability. The plan suggests that Red Wing continually innovate and strengthen these community utility systems through normal capital investment cycles (insuring overall health of the systems), agency partnerships (insuring collaboration and efficiencies in delivery of service) and the process of development (making sure new growth is coordinated and the overall systems remain resilient). The community utility systems specifically addressed by this chapter are:

Sanitary Sewer System – public system of pipes that collect waste water from homes and businesses – lift stations that are powered to help force wastewater through the system that does not flow by gravity – and treatment plants that treat the wastewater to enable clean water to be released.

Storm Water System – public and private system of pipes and ponds that collect rain water that run off hard surfaces and alternative systems that help manage flood control and treatment of rain water to clean it before it re-enters ground or surface water bodies.

Potable Water System – public system of wells, water treatment plants, pipes, and booster stations that provide clean and safe drinking water, good water pressure throughout the city, and water for fire protection.

Gas and Electric Systems – private utilities delivering power to homes and businesses.

Communication Systems – private utilities that provide communications linkages throughout the city and ensure a connected Red Wing.

Grey Infrastructure

"Grey infrastructure" is the term for the city's basic physical systems — transportation, communication, sanitary sewer, water, natural gas, and electric systems are all examples of grey infrastructure. These systems tend to be higher-cost investments and are vital to Red Wing's livability and economy.

Community Engagement

While community engagement efforts did not focus on community utility systems, the concerns, aspirations, and desires expressed by the community through the engagement effort are reliant on community utilities. The key principles that emerged from the engagement process provide sound direction for utility systems planning:

- Sustainability: we must build our infrastructure system in a way that ensures future generations share in the same opportunities.
- Health: our system must be built and maintained to ensure good fiscal health, to provide clean drinking water and to preserve if not enhance the health of our environment.
- Accessibility: key infrastructure systems need to be accessible to all residents in order to enable all to thrive.
- Resiliency: our infrastructures systems must be adaptable and redundant so that major changes in technology, or disruptions to the environment minimize disruptions to everyday life and progress in our community.
- Equity: our infrastructure must be delivered in a fair and just manner, without barriers.

Storm Water System

It wasn't long ago that our primary approach to storm water was to pipe it underground as fast as possible to the nearest surface water body (i.e. rivers, creeks or lakes). Then we realized that it was causing floods and carrying pollutants so we began constructing intermediary ponds where storm water was held for a time to mediate flooding and remove pollutants. Now we understand that both of these approaches are negatively impacting groundwater supplies because storm water doesn't have a chance to soak into the ground before it is carried away. So the contemporary approach is to build our infrastructure in a way that allows greater areas of ground surface to infiltrate and cleanse storm water. Techniques such as pervious roadway and parking lot pavement, rainwater gardens and underground infiltration trenches are becoming common practices that infiltrate storm water across broader areas and reduce the need for pipes and ponds.

Storm water management is one of the most important infrastructure improvements that Red Wing can address. It is one that will contribute to Red Wing and continue contributing right on down the Mississippi River. Policy directions suggest a more sustainable development pattern that seeks to minimize runoff through more thoughtful community design and development and more education. Through the process it was noted that many older Red Wing homes have cisterns that once were used to capture rainwater for reuse. This is a good example of a technique called "resource recycling" that is supported by the 2040 Community Plan. An implementation initiative is to create a guide that will provide examples of how smaller development projects and existing properties can better manage storm water runoff for the betterment of water quality in the region and ultimately everyone downstream.

Water Quality - Clean Runoff

A primary way communities can affect surface water quality is by treating stormwater runoff before it enters natural water bodies. Like many established communities, much of the stormwater runoff from older parts of Red Wing enters storm sewers and is piped directly to the Mississippi River and its tributaries. Newer portions of Red Wing have been developed to include stormwater treatment ponds that treat runoff before it enters the storm sewer system and reaches natural waters. Through comprehensive stormwater management that concentrates on infiltration and treatment, we can protect our surface waters from the pollutants that are carried by stormwater. Implementation of best management practices (BMPs) and other green infrastructure solutions, including tree trenches, infiltration basins, raingardens, stormwater planters, and bioswales, can all contribute to cleaner water and less runoff.

Flood Protection

The other important function that storm water management system serves is flood protection. Severe rain storms have the

potential to cause damage to private and public property and development. When not managed properly, flooding also poses a significant public safety and health problem.

The city maintains a Storm Water Pollution Protection Plan (SWPPP) that establishes a number of educational, operational and regulatory improvements aimed at improving surface water quality. This is a new program in which the city will need to invest resources in order to implement.

Minnesota communities, industry and regulatory agencies have become very sophisticated at protecting the water quality of wetlands and lakes. Protection of streams and rivers, on the other hand, is more challenging and not as far along. How does Red Wing address surface water knowing that their actions are only a part of a broader solution?

By regulating development in a way that requires sustainable, resilient, and adequate storm water infrastructure flooding hazards can be prevented and storm water runoff can be returned to groundwater or surface waters cleaner than when it dropped from the sky.

Sanitary Sewer System

High-quality wastewater treatment

The sanitary sewer system includes a central wastewater treatment plant constructed in 1960. The plant is connected to a series of collection pipes that flow via gravity or pumping to the treatment plant. In Red Wing, the Municipal Wastewater Treatment Plant provides central treatment for the city, with an additional plant to pre-treat industrial wastewater from the S.B. Foot Tanning Company and other local industrial businesses.

While the main treatment plant and lift station facilities are old, ongoing continuous maintenance has kept them operating reliably and efficiently. These should continue to work as needed for the foreseeable future provided ongoing maintenance occurs.

Available space for new or additional process facilities at the treatment plant is limited. If the state or federal regulations change and require additional treatment such as nitrogen removal or phosphorus limits below 0.5 mg/l (current P limit is 1 mg/l) a new facility at a different location will likely be required. The cost for such a facility is significant and siting it would be challenging.

The industrial pretreatment plant is in very good condition but is essentially designed around treating waste from the tannery. Options for other types of wastewater would be limited at that location without extensive modifications.

The sewer collection system is in good condition. Infiltration is not a major problem except when the river up. Addressing the infiltration issue requires that the sewer from Broad Street to the main lift station, and along Levee Road from Jackson Street to Withers Harbor Road be lined and the concrete structures be sealed. This work is planned for the next few years. The City has been lining 10,000-12,000 feet of sewer every year and concentrating efforts in areas with root intrusion problems. These efforts will also continue. Lift station are renovated on regular basis and should be good with this type of maintenance program.

The municipal sanitary sewer system should be considered a necessity for urban growth and should be required in locations where density is to exceed a threshold of 0.5 to 0.33 units per acre or where there are commercial, institutional or industrial uses. The future land use plan (Figure 4.3 Planned Land Use Map) was developed based on the ability to serve future growth areas with a reasonable extension of municipal utilities including trunk sanitary sewer pipes.

Roughly three million gallons of wastewater a day are initially filtered and treated using biological treatment and mechanical solids handling. Solids extracted from the treatment process are heat-treated to create bio-solids used for farmland fertilizer. Liquid effluent (water that has been cleaned) is discharged into the Mississippi River after it has been through a cleaning process that meets or exceeds the standards set by the Minnesota Pollution Control and Federal Environmental Protection Agencies.

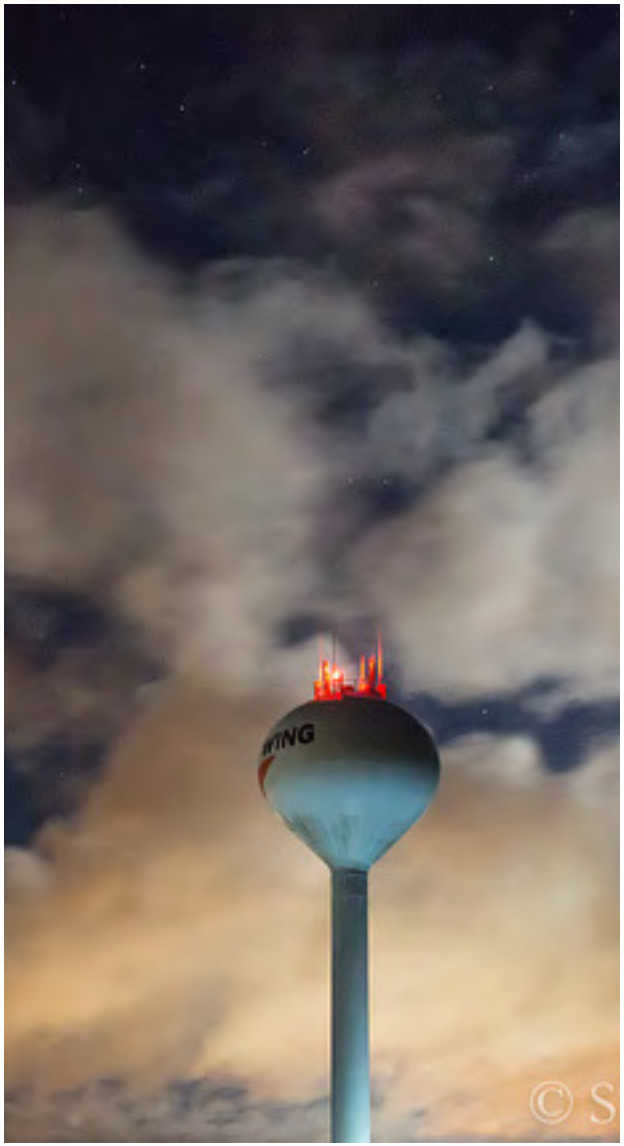

Photo Credit: Starin Photography

Potable Water System

The primary underground aquifer that provides Red Wing its source of potable water is the Mount Simon Sandstone aquifer. This deep aquifer is well protected by geological formations that isolate and protect it from surface related activities. Our five municipal wells are supplied by this aquifer. Like all communities that rely on underground aquifers, we have a vested interest in conserving the water drawn from them and cleansing surface water before it recharges them.

Drinking Water

Red Wing's public water systems are comprised of four parts: wells (five current wells), storage (nine current reservoirs), treatment plants, and a distribution system consisting of pressurized pipes that deliver water to homes and businesses for consumption and fire protection. Delivery of public water should coincide with sanitary sewer and other public infrastructure systems. The City has a master plan for its public water supply. This plan should be updated to incorporate key policies from the 2040 Community Plan process. Key directives that might influence the water supply and distribution plan include the emphasis of the 2040 Community Plan on green infrastructure and sustainability. Creating landscapes that require less irrigation and encouraging more environmentally sensitive lifestyles will put less pressure on the public water supply system. Land use regulations will also need to be established or modified to ensure locations of well fields are protected from inconsistent land use patterns.

The City of Red Wing has five independent water systems and six pumping stations. Regularly scheduled analysis of the municipal water system by city and state labs insures residents are receiving a safe water supply. A consumer confidence report is published annually.

Water Treatment Plants

The City of Red Wing has two water treatment facilities. The water treatment facilities bring Red Wing into compliance for safe drinking water regulations and reduce the amount of rust in residents' water.

Twin Bluff Water Treatment Facility

The Twin Bluff Water Treatment Facility is located on Pioneer Road next to the one-million gallon ground storage tank and water pumping facility. It produces up to 4,000 gallons of water per minute. There are three municipal wells that supply water to the facility.

Charlson Crest Water Treatment Facility

The other water treatment facility is the Charlson Crest Water Treatment Facility which is located behind the Burnside Elementary School. The Charlson Crest Water Treatment Facility uses the same manganese green sand filtration process as the Twin Bluff Plant and produces up to 3,000 gallons of water per minute. Two new municipal wells supply water for this facility.

Both water plants are less than 15 years old, but have problems with moisture intrusion (leaks). Both plants will require significant repairs, including roof replacement and masonry/flashing modifications totaling $1.5 – 2.0 million dollars. The Charlson Crest project has been awarded and will be completed this summer. The Twin Bluff Plant will be addressed in the next couple of years.

Storage

Red Wing has water towers provide adequate storage; however some portions on the east side of town have inadequate fire flow protection. This may require a new tower and booster station to create a new pressure zone, or improved hydraulics (larger forcemains, new forcemains and additional looping). This is a priority project in the near term.

Groundwater Conservation and Protection

We can use numerous methods to promote groundwater conservation practices. For example, many of the oldest homesteads in Red Wing have underground cisterns that stored rainwater captured by roof gutters. The stored rainwater was used to water gardens, wash clothes, and fill other household water needs. Capture of rainwater for reuse in irrigation and toilet flushing is once again gaining favor in the United States as a water conservation practice, and promotion of the use of cisterns and rain barrels in Red Wing could have a significant impact on reducing the use of groundwater. These green infrastructure features also reduce the volume of stormwater entering storm sewers and the river after large rainfalls, which can help prevent flooding. Promotion of other similar methods, including Leadership in Energy and Environmental Design (LEED) building practices like low-flow toilets and automatic faucets, can also decrease groundwater usage rates.

The second major way we can positively impact groundwater is by ensuring that stormwater runoff is clean and that a majority of the ground surface can infiltrate it.

Wellhead Protection Plan (WHPP)

The Wellhead Protection Plan (WHPP) for the City of Red Wing, prepared in cooperation with the Minnesota Department of Health (MDH) and Minnesota Rural Water Association, is essentially a series of actions taken to fulfill and maintain wellhead protection (WHP) requirements. The WHPP was updated in 2017. Its goals include:

- Creating public awareness and general knowledge of WHP importance for safe and adequate drinking water supply;
- Minimizing the potential for water contamination;
- Increasing awareness of the importance of preventing water contamination;
- Documenting progress and plan future activities.

The WHPP can be accessed on the Online 2040 Document Library. Our WHPP is an important policy and regulatory document to ensure current and future water sources are protected.

Communication Systems

Communications infrastructure is an important aspect of community livability and maintaining a strong economy. It is becoming more and more a necessity for the ability to compete in a global economic environment. Such infrastructure systems including Wi-Fi, fiber optic, and other high speed data communication systems should continue to be advanced by the city.

Red Wing implemented a the High Speed, Fiber-to-the-premise Broadband Network in the City in 2010. This system provides high speed data service to almost all property within the City.

Terminology

Goals:

Goals are broad statements that describe a desired outcome. They are often long-term and aspirational in scope.

Strategies:

Strategies are policies, projects, programs, and practices that support one or more of the plan's goals. They address the "who, what, when, where, and how" of reaching a goal and may involve multiple sub-strategies and actions. Strategies may be ongoing and may or may not have definitive start and completion dates.

Goals, Strategies and Actions

Goal 5.A: Provide a storm water system that is functional, economically sustainable, aesthetically pleasing, and environmentally sound.

Strategy 5.A.1: Design the surface water systems to mimic natural hydrology and provide flood protection.

Strategy 5.A.2: Promote groundwater recharge in areas that are most suited to recharge and while protecting drinking water sources.

Strategy 5.A.3: Infiltrate, detain or retain surface water as close to where rain falls as possible in order to limit runoff reaching tributaries and the Mississippi River.

Strategy 5.A.4: Maximize storm water infiltration and surface filtration to minimize need for underground storm water infrastructure.

Strategy 5.A.5: Support storm water management practices that maintain runoff volumes of greenfield development and reduces runoff volumes on redevelopment sites.

Strategy 5.A.6: Integrate built storm water facilities into development in the form of art or landscape enhancements.

Strategy 5.A.7: Inform and educate the public on surface water protection and impacts of water runoff on ground and surface water resources.

Goal 5.B: Provide a sanitary sewer system for all development in Red Wing that is economically sustainable, energy efficient, and environmentally sound.

Strategy 5.B.1: Meet or exceed the required standards for water quality of municipal sewage effluent reaching public waters.

Strategy 5.B.2: Measure, monitor, and manage inflow and infiltration to minimize clear water entering the system.

Strategy 5.B.3: Provide an efficient and cost effective sanitary sewer system that is equitably financed.

Strategy 5.B.4: Integrate alternative energy sources into operations (such as powering of lift stations) to minimize energy demands.

Strategy 5.B.5: Inspect and maintain the existing system for optimal performance and fund appropriately through usage fees.

Strategy 5.B.6: Educate the community on appropriate disposal methods and discourage inappropriate wastes from being disposed in the sanitary sewer system.

Goal 5.C: Provide adequate sanitary sewer capacity that serves existing neighborhoods and allows for continued growth and renewal of Red Wing.

Strategy 5.C.1: Expand municipal utilities (sewer, water, energy) in an orderly manner that discourages leap-frog development and minimizes bluff impacts.

Strategy 5.C.2: Coordinate improvements to the existing system with redevelopment (land use and street reconstruction) projects.

Strategy 5.C.3: Implement a phased replacement plan that will lessen the financial and logistical burden of infrastructure replacement in the future.

Strategy 5.C.4: Plan, design and construct the sanitary sewer system with reserve capacity for localized higher residential densities or commercial sewer users. Reserve capacity can also be used to connect areas that are currently unsewered if it becomes necessary in the future.

- Prepare a sanitary sewer master plan to document current assets (age, condition, capacity) and establish an ongoing maintenance, management, and replacement strategy.
- Establish an inspection program to periodically inspect older areas of sanitary sewer infrastructure to monitor I&I.

Goal 5.D: Develop the water supply in a manner that minimizes detrimental impacts on natural resources, provides clean drinking water and adequate fire protection for current and future generations, and safeguards against climatic changes and natural disasters.

Strategy 5.D.1: Maintain an emergency response and preparedness plan across all city departments and affected jurisdictions.

Strategy 5.D.2: Encourage conservation water usage practices to minimize excessive water usage.

Strategy 5.D.3: Educate the public on sustainable water usage practices and the impacts of water usage on groundwater supplies.

Strategy 5.D.4: Participate in regional and national discussions on drinking water quality and quantity/supply.

Strategy 5.D.5: Plan, design, construct, and maintain the water supply system infrastructure in coordination with the sanitary sewer system improvements in an efficient and orderly manner.

- Prepare an annual water usage report that combines the water confidence report information with general data on how water is used, sustainable and efficient water usage practices and other general education information.

Goal 5.E: Collaborate with private utility and communications providers to ensure services meet the needs of current residences and businesses and facilitate future growth without compromising the quality of the natural environment.

Strategy 5.E.1: Coordinate with private utility and communications providers to co-locate infrastructure in public right's of way or existing utility corridors.

Strategy 5.E.2: To the extent possible, provide the latest communications infrastructure to the full community.

Strategy 5.E.3: Design utilities and communications infrastructure to fit in with the landscape and enhance the public realm (i.e. buried power lines, screened utilities, or integrated with development/architecture etc.)

Strategy 5.E.4: Allow for space within existing and future ROW to accommodate future communication infrastructure.

Online Library

You can see all of the foundational work of Red Wing 2040 on the City's website, *www.red-wing.org/red-wing-2040.html*

TABLE 5.7 STRATEGY MATRIX

Strategy	SHARE Principle(s)	Who can help achieve this?	Timing
Goal 5.A: Provide a storm water system that is functional, economically sustainable, aesthetically pleasing, and environmentally sound.			
» Strategy 5.A.1: Design the surface water systems to mimic natural hydrology and provide flood protection.	Sustainability, Resilience	City, Private Developers	Ongoing
» Strategy 5.A.2: Promote groundwater recharge in areas that are most suited to recharge and while protecting drinking water sources.	Sustainability, Resilience, Health, Accessible, Equity	City	Ongoing
» Strategy 5.A.3: Infiltrate, detain or retain surface water as close to where rain falls as possible in order to limit runoff reaching tributaries and the Mississippi River.	Sustainability, Resilience	City	Ongoing
» Strategy 5.A.4: Maximize storm water infiltration and surface filtration to minimize need for underground storm water infrastructure.	Sustainability, Resilience	City	Ongoing
» Strategy 5.A.5: Support storm water management practices that maintain runoff volumes of greenfield development and reduces runoff volumes on redevelopment sites.	Sustainability, Resilience	City, Private Developers	Ongoing
» Strategy 5.A.6: Integrate built storm water facilities into development in the form of art or landscape enhancements.	Health, Accessible	City, Arts Community, Nonprofits	Long term
» Strategy 5.A.7: Inform and educate the public on surface water protection and impacts of water runoff on ground and surface water resources.	Sustainability	City, School District	Short term
Goal 5.B: Provide a sanitary sewer system for all development in Red Wing that is economically sustainable, energy efficient, and environmentally sound.			
» Strategy 5.B.1: Meet or exceed the required standards for water quality of municipal sewage effluent reaching public waters.	Sustainability, Resilience	City	Ongoing
» Strategy 5.B.2: Measure, monitor, and manage inflow and infiltration to minimize clear water entering the system.	Sustainability	City	Ongoing
» Strategy 5.B.3: Provide an efficient and cost effective sanitary sewer system that is equitably financed.	Sustainability	City	Ongoing
» Strategy 5.B.4: Integrate alternative energy sources into operations (such as powering of lift stations) to minimize energy demands.	Sustainability, Resilience	City, Third Party Agreements	Long term
» Strategy 5.B.5: Inspect and maintain the existing system for optimal performance and fund appropriately through usage fees.	Sustainability, Resilience	City	Ongoing

Strategy	SHARE Principle(s)	Who can help achieve this?	Timing
» Strategy 5.B.6: Educate the community on appropriate disposal methods and discourage inappropriate wastes from being disposed in the sanitary sewer system.	Sustainability	City	Short term
Goal 5.C: Provide adequate sanitary sewer capacity that serves existing neighborhoods and allows for continued growth and renewal of Red Wing.			
» Strategy 5.C.1: Expand municipal utilities (sewer, water, energy) in an orderly manner that discourages leap-frog development and minimizes bluff impacts.	Sustainability, Resilience, Equity	City, Plan Commission	Ongoing
» Strategy 5.C.2: Coordinate improvements to the existing system with redevelopment (land use and street reconstruction) projects.	Sustainability, Resilience	City, HRA, Port Authority	Ongoing
» Strategy 5.C.3: Implement a phased replacement plan that will lessen the financial and logistical burden of infrastructure replacement in the future.	Sustainability, Resilience	City	Ongoing
» Strategy 5.C.4: Plan, design and construct the sanitary sewer system with reserve capacity for localized higher residential densities or commercial sewer users. Reserve capacity can also be used to connect areas that are currently unsewered if it becomes necessary in the future.	Sustainability	City	Ongoing
Goal 5.D: Develop the water supply in a manner that minimizes detrimental impacts on natural resources, provides clean drinking water and adequate fire protection for current and future generations, and safeguards against climatic changes and natural disasters.			
» Strategy 5.D.1: Maintain an emergency response and preparedness plan across all city departments and affected jurisdictions.	Resilience	City, County	Ongoing
» Strategy 5.D.2: Encourage conservation water usage practices to minimize excessive water usage.	Sustainability	City, Sustainability Commission	Ongoing
» Strategy 5.D.3: Educate the public on sustainable water usage practices and the impacts of water usage on groundwater supplies.	Sustainability, Health	City, Sustainability Commission	Ongoing
» Strategy 5.D.4: Participate in regional and national discussions on drinking water quality and quantity/supply.	Sustainability, Health	City, Coalitions	Ongoing
» Strategy 5.D.5: Plan, design, construct, and maintain the water supply system infrastructure in coordination with the sanitary sewer system improvements in an efficient and orderly manner.	Sustainability	City	Ongoing
Goal 5.E: Collaborate with private utility and communications providers to ensure services meet the needs of current residences and businesses and facilitate future growth without compromising the quality of the natural environment.			
» Strategy 5.E.1: Coordinate with private utility and communications providers to co-locate infrastructure in public right's of way or existing utility corridors.	Sustainability, Accessible	City, Utilities, Providers	Ongoing
» Strategy 5.E.2: To the extent possible, provide the latest communications infrastructure to the full community.	Sustainability	City, Utilities, Providers	Ongoing

Strategy	SHARE Principle(s)	Who can help achieve this?	Timing
» Strategy 5.E.3: Design utilities and communications infrastructure to fit in with the landscape and enhance the public realm (i.e. buried power lines, screened utilities, or integrated with development/architecture etc.)	Sustainability, Resilience, Health	City, Utilities	Ongoing
» Strategy 5.E.4: Allow for space within existing and future ROW to accommodate future communication infrastructure.	Sustainability, Resilience	City, Utilities	Ongoing