

Public Utilities and Services Profile

Infrastructure - The substructure or underlying foundation, especially the basic installations and facilities on which the continuance and growth of a community depends (Webster's New World Dictionary).

The Public Utilities and Services background report provides a foundation of information on city-wide infrastructure and utility systems, the regional context of utility systems, emergency services, and the current trends and issues facing the City of Duluth. This information is presented to put comprehensive plan decisions within the context of where Duluth is now, how the City arrived at this juncture, and what the City appears to be facing as it moves into the 21st century.

General

Utility services and emergency are provided by ComfortSystems (the City of Duluth utilities), the Duluth police and fire departments, Minnesota Power (a private electric utility), and the Duluth Steam Cooperative Association (district heating and cooling).

ComfortSystems of Duluth (formally the City of Duluth Public Works and Utilities Department) provides the following public utility services:

- Water Treatment and Distribution
- Wastewater Collection (with discharge to a regional wastewater treatment provider)
- Storm Water Collection
- Natural Gas Distribution

Located at the Garfield Service Center, ComfortSystems is home to the Business Office, Gas and Water Supply, Distribution Operations, Home Energy Loan program, Inflow and Infiltration program, Storm Water Utility, Comfort Policy/Appliance Service, Waste Water Utility, Warehouse, Meter Shop, Regulator Shop, Paint Shop, and Welding Shop.

The Department is composed of five divisions: Customer Service, Gas and Water Supply, Engineering, Operations, Maintenance and Utility Operations.

ComfortSystems
Fueling the Flame of Life

Source: *ComfortSystems website*



Sanitary sewer, storm water sewer, and steam system in downtown

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Sanitary Sewerage System Facilities

The City provides services only within its boundaries, but not all residents within the City have access to the full range of Comfort Systems' services. A key aspect of the City of Duluth's public utility system is the unique geography of Duluth – with an area 25 miles long but only 3 miles wide and a steep sloping topography with difficult soil conditions. Some areas of the City are isolated from the existing network of services, and the cost of extending services can be higher than the revenue to be gained from utility bills. Consequently the number of households served by each of Comfort Systems' utilities is less than the total number of households in the City.

Sanitary Sewerage System Facilities

City of Duluth

The City of Duluth's collects and transports a daily volume of approximately 15.3 million gallons of wastewater to the Western Lake Superior Sanitary District (WLSSD) for treatment. Approximately 55% of the City of Duluth's sanitary sewer system was installed prior to 1950, with 35% of the system over 80 years old. Almost 65% of the system is vitrified clay pipe – which having served well for its expected life span, is also experiencing advanced deterioration and failure. The City's ongoing sanitary sewer inspection program, using internal closed-circuit television inspection techniques, provides an opportunity for system repairs prior to full failure.

The City sanitary sewer system consists of over 400 miles of system mains and over 40 lift/pumping stations serving approximately 27,000 connections. The City's sanitary sewer system is interconnected with WLSSD's interceptor system across the City. Duluth's topography requires an unusual number of lift stations for a city of 86,000 people, increasing operating costs and requiring substantial annual investment to keep the system operating. Just refurbishing or rebuilding lift stations costs the City approximately a quarter million dollars annually, in addition to other maintenance or replacement costs.¹

In a December 2002 report from the Mayor's task force, the City estimated that 30-year replacement costs could range from \$53.2 million to \$75.3 million.² These estimates assume replacement of the oldest portions of the existing sanitary sewer or approximately 35% to 50% of the entire sanitary sewer system. These costs are in addition to normal system repair

¹ Conversation with Glenn Strid, Department of Public Works

² Sewer and Water System Replacement and Repair Projections, Internal memo to Infrastructure Task Force meeting, June, 2002.

costs in the 30-year time period, such as the routine refurbishment of lift stations noted above. Based on the existing number of customers, the annual increase in rates to pay for the system improvements is \$75 - \$100 per customer per year.

Clear water inflow and infiltration (I/I) and associated sanitary sewer overflows (SSO's) are a major concern of the City of Duluth, as well as WLSSD and other users. The City of Duluth and the WLSSD are currently and jointly under an Environmental Protection Agency Order to eliminate all SSO's. Clear water can enter the sanitary sewer system in many ways including through cracked or leaking pipes and joints, building foundation drains, roof drains, and leaking manholes. Clear water can surcharge the sanitary sewer system during a rain event or spring thawing creating a sanitary sewer overflow (SSO) or combined sewer overflow (CSO). The City of Duluth and the Western Lake Superior Sanitary District (WLSSD) drafted a Plan of Action that outlines a twelve (12) year time schedule to meet the conditions in the EPA Order by 2016.³ The plan includes an expanded long-term capital improvement plan, enhanced I/I reduction program, and SSO storage facility construction.

Construction of overflow facilities at certain locations is underway to accomplish this task. In conjunction with the construction of storage facilities, an on-going commitment to remove home foundation drain connections to the sanitary sewer is continuing to reduce the amount of clear water entering the sanitary sewer system.

Several capital projects are now underway to increase storage facilities and reduce overflows. The accompanying text box details the I/I related storage facilities currently planned and their status.

The construction of these overflow facilities should eliminate the overflow problems at the above locations. The City has identified overflow problems at Fitgers and WLSSD's Endion pump station that are also to be mitigated with the construction of SSO storage facilities, although the locations of the proposed tanks has yet to be determined. The City will likely construct additional SSO facilities, but the location and size of additional storage facilities will be based on the success of the City's ongoing efforts to achieve significant I/I source reduction.

While the above projects are expected to eliminate a number of overflow problems, the overflow issue is widespread and difficult to predict. Significant investment in both I/I source reduction, and additional SSO facilities will likely be needed, although the long-term scope and ultimate costs cannot be identified. Eliminating wastewater overflows will continue to be a budgetary and environmental issue for some time.

Sanitary Sewer Overflow Facilities

Three overflow facilities are currently being built or planned. These facilities will reduce overflows of the sanitary sewer system into Lake Superior.

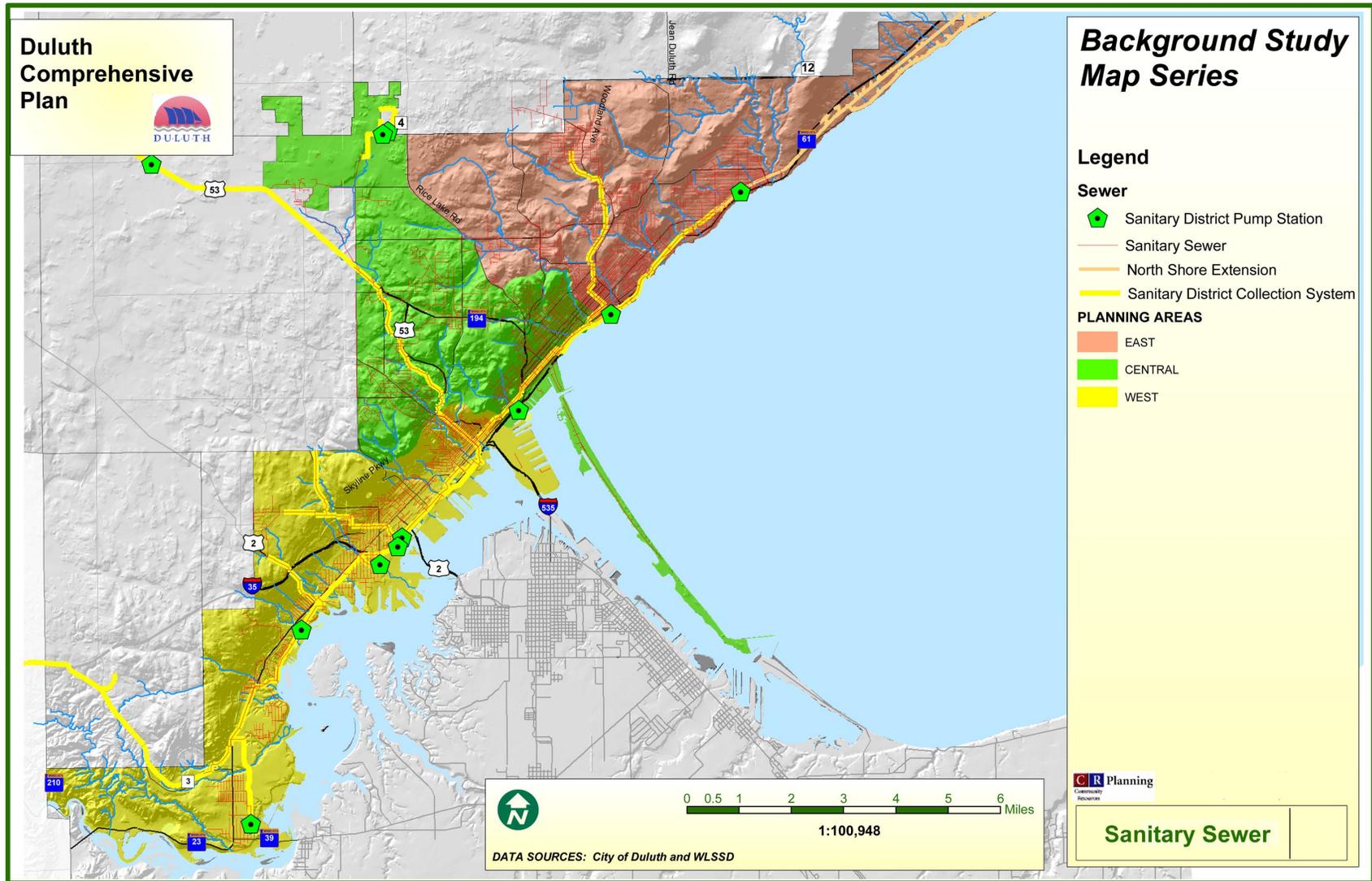
- Dodge Street Lift Station and Storage Facility: 1.9 million gallon concrete SSO tank located at 52nd Avenue East & Dodge Street with a construction cost of \$3.8 million, completed August, 2005.
- LS #1 & Storage Facility: 300,000 gallon concrete SSO tank located at 60th Avenue East and London Road. Estimated construction cost is \$1.5 million. Construction to begin October, 2005 and completed by July, 2006.
- Gary SSO Basin: 1 million earth bermed basin located at Goodhue Street along the St. Louis River. Construction Cost of \$420,000, completed May, 2005.

³ City of Duluth and WLSSD Response to EPA Administrative Order, Docket No. V-W-04-AO-02, May 12, 2004

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Sanitary Sewerage System Facilities

Figure PU-1: Sanitary Sewer



Public Utilities Profile

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Regional Water and Wastewater System

Duluth's water and waste systems are not isolated from the region around the City. The municipal systems comprise the regional water and wastewater systems. System replacements and expansions cannot be considered in isolation without risking planning, financing, and management inefficiencies. While the City faces huge infrastructure repair costs on a population base that is 20% smaller than when the system was designed, growing communities outside Duluth are responding to calls for system expansion in relatively low-density areas, again spreading large costs out across relatively few households. The Metropolitan Interstate Commission's Draft Long Range Transportation Plan notes the following in regard to future issues for the regional water and wastewater systems:

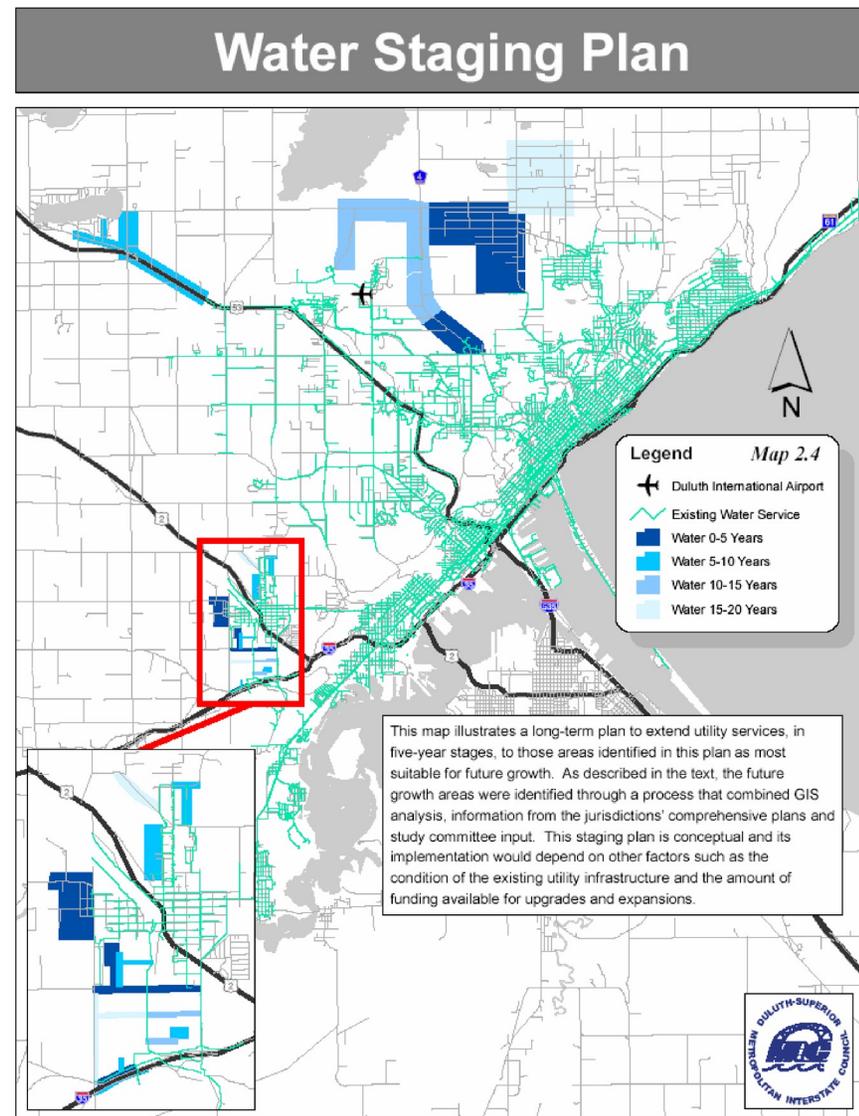
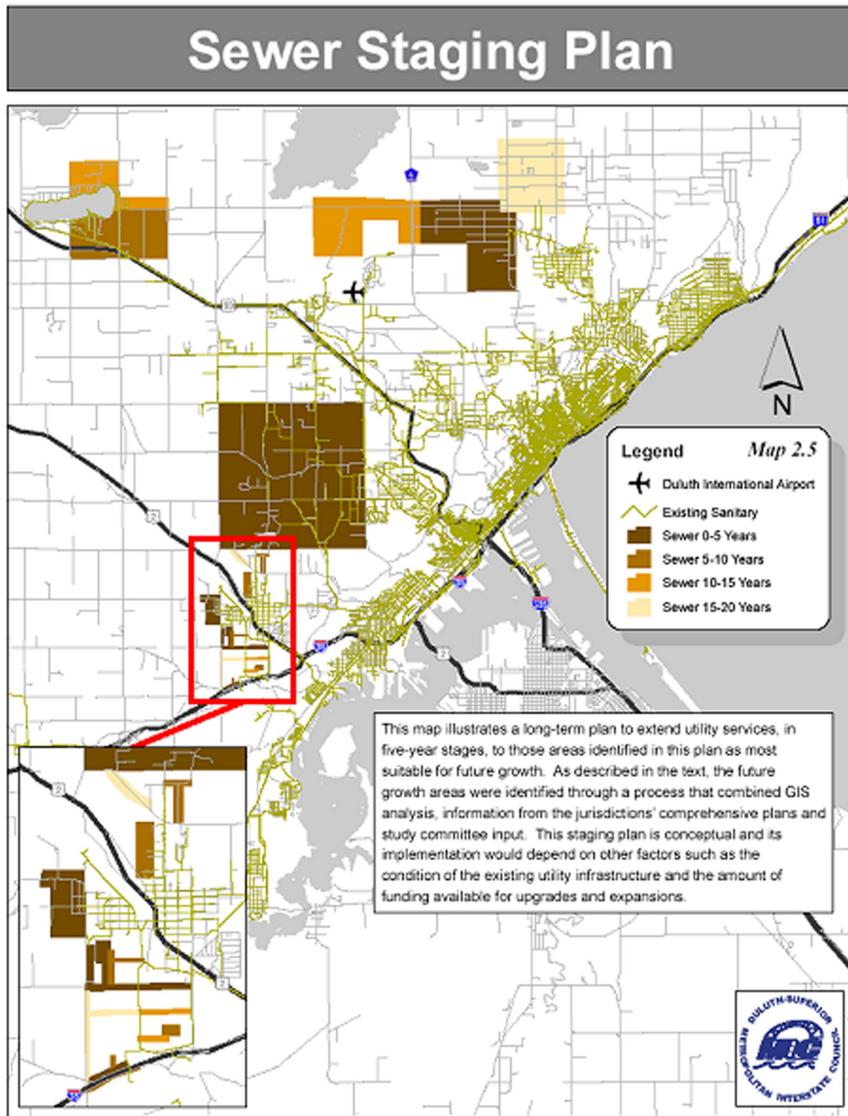
The increasingly dispersed population has brought an increased demand for infrastructure such as water and sewer. This increased demand has led to water service expansions in Proctor, Hermantown and Rice Lake Township. Sewer service has also expanded with new wastewater collections lines to the Pike Lake area in Canosia and Grand Lake Townships as well as extensions under construction along the North Shore of Lake Superior and the Fond du Lac neighborhood in the southwest area of Duluth. Much of the existing sewer and water systems within the City of Duluth are 50 –100 years old. There have been much-publicized incidents with wastewater overflows going into Lake Superior as well as numerous breaks in water mains over the past few years. The challenge facing this area is how to maintain and improve the current systems while looking at expansions in the future.⁴

The Metropolitan Interstate Commission completed a regional analysis of growth trends and the potential infrastructure needs associated with individual community's land use plans and long range goal goals. The maps on the following page illustrate some of the likely short and long term expansion plans of the regional system based on planned or expected growth patterns.

⁴ *Draft Long Range Transportation Plan*, Metropolitan Interstate Commission, June, 2005, p. 87

Public Utilities and Services Profile
Regional Water and Wastewater System

Figure PU-2: Sewer and Water Staging Plan



Source: Metropolitan Interstate Commission

Western Lake Superior Sanitary District (WLSSD)

The regional wastewater system is owned and managed by the Western Lake Superior Sanitary District. The WLSSD operates advanced regional wastewater treatment and conveyance facilities supported by ongoing water quality and facility planning programs. Individual municipalities, including the City of Duluth, tie their systems into the trunk lines owned and managed by WLSSD.

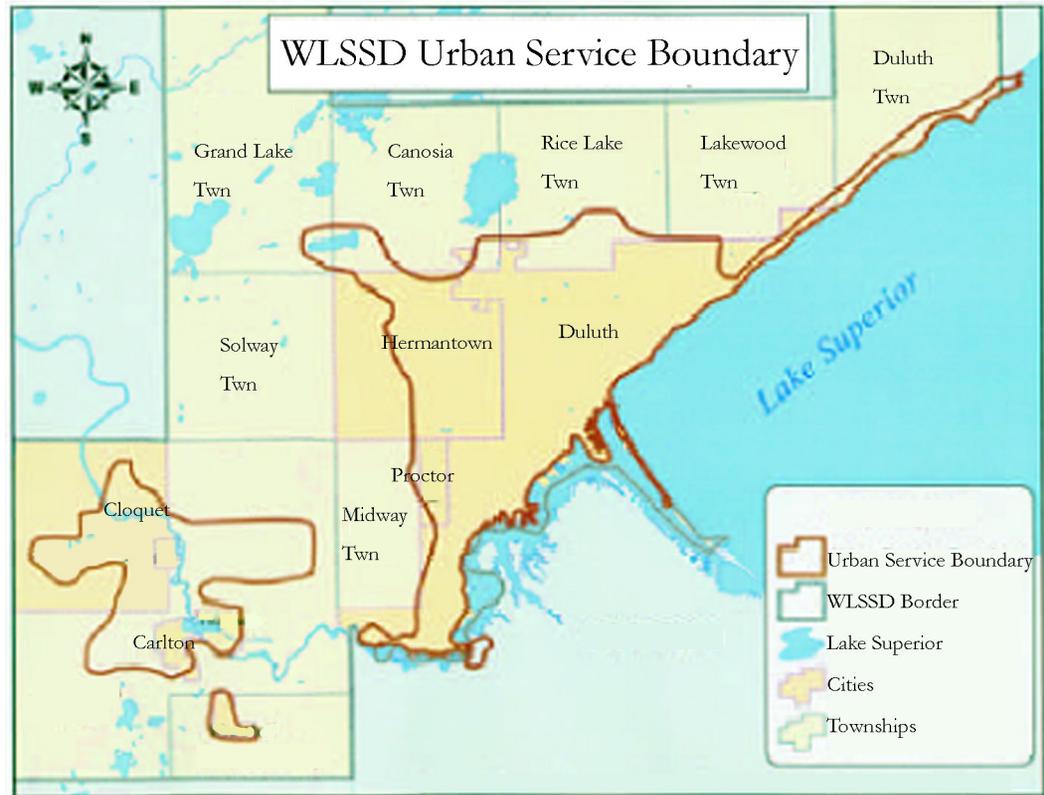
The WLSSD legislative boundaries include eight cities and ten townships. Included are the cities of Duluth, Cloquet, Carlton, Scanlon, Wrenshall, Hermantown, Proctor and Thomson; and the townships of Silver Brook, Thomson, Twin Lakes, Canosia, Duluth, Grand Lake, Lakewood, Midway, Rice Lake, and Solway.⁵ The WLSSD completed a comprehensive plan in 2002, including an urban service boundary for the areas that it serves (see Figure PU-3). The boundary defines the expansion limits that, for the term of the Plan, limit where the wastewater utility will plan and budget for new system capacity.

WLSSD Treatment Facility Capacity: The WLSSD wastewater treatment plant began operations in September of 1978 and was operated near design capacity at start-up. A trend of reduced flows and loadings occurred through the mid-1980's.

Duluth/North Shore Sanitary District (D/NSSD)

The D/NSSD owns and operates a pressure sewer collection system along the north shore of Lake Superior extending from the Lester River to the St. Louis/Lake County border. The D/NSSD pressure sewer collection system is 14 miles long and contains approximately 180,000 feet of piping. The system serves approximately 430 connections with approximately 150 connections within the City of Duluth. The system was designed for a minimum of 35% growth over a 20-year planning horizon.

Figure PU-3: Urban Service Boundary



Source: 2003 WLSSD Annual Report

⁵ WLSSD Comprehensive Services Wastewater Master Plan, 2002

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Water Treatment and Distribution System

The D/NSSD system provides a vivid anecdote for the difficult infrastructure issues facing the City of Duluth. The sewer line eliminated long-standing significant environmental problems with on-site wastewater systems, and improved wastewater treatment for unincorporated Knife River. The D/NSSD system was substantially subsidized by the State of Minnesota, as the low-density development along the North Shore (including that portion of D/NSSD service territory within the City of Duluth) could not support the cost of the sewer system. The alternatives to paying for the system included allowing the North Shore area to develop at a much higher density in order to distribute costs across a much larger number of users. Doing so would, however, dramatically alter the character of the North Shore, increase traffic congestion at the Highway 61 crossing at Lester River, and increase non-point pollution from storm water runoff. In this case the State of Minnesota offset a substantial portion of the project cost to bring the hookup and operating fees down to a reasonable level.

Water Treatment and Distribution System

The City of Duluth treats and distributes approximately 20 million gallons of water per day to the City constituents as well as the adjacent municipalities of Proctor, Hermantown and Rice Lake Township. The City water treatment facility has a capacity to treat 32 million gallons per day. The City water distribution system consists of almost 400 miles of system mains and 20 storage facilities serving approximately 27,000 connections in the City. The system continues to grow slowly, with almost 3 miles of new lines installed in 2004.⁶

Duluth has ten distinct pumping service areas that in 2004 pumped 12.5 billion gallons of water.⁷ The service areas serve widely differing numbers of accounts and geographic areas – the Lakewood service area (6.5 billion gallons of water annually) and the West Duluth area (2.5 billion gallons) serve almost 75% of the total water pumped in 2004. The Lakeside area, in contrast, accounted for only 62 million gallons.

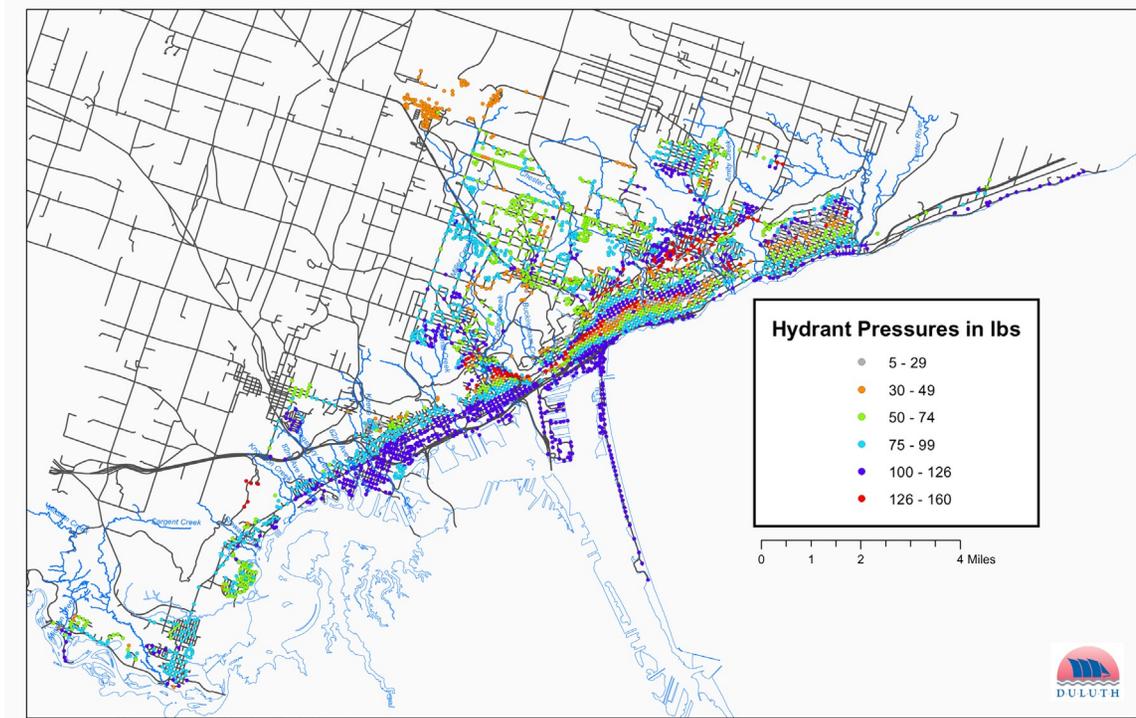
The entire City of Duluth's public water supply is drawn from Lake Superior. The intake pipes are located off the Lake Superior shoreline at the Lakewood Water Treatment Plant. Catastrophic events such as chemical spills or significant changes in stormwater runoff within these areas could potentially affect Duluth's drinking water supply.

⁶ City of Duluth Public Works and Utilities Department 2004 Annual Report, p. 8

⁷ Id.

Over 70% of the City of Duluth’s water system was installed prior to 1950, with almost 50% of the system over 80 years old. Over 85% of the system is cast iron pipe – which having proven to be an excellent piping material, now is experiencing more rapid deterioration and failure as it nears the end of its design life.⁸ The most compelling statistic that demonstrates this advanced deterioration is the average number of water main breaks per year – which has risen from 7 per year in the 1950’s to over 70 per year in the 1990’s and is currently averaging over 120 breaks per year.

The City estimated that 30-year replacement costs could range from \$49.9 million to \$78.4 million.⁹ These estimates assume replacement of the oldest portions of the existing water system or approximately 35% to 50% of the entire water system. These costs are in addition to system repair costs during the 30-year time period.



Source: City of Duluth Public Services

Storm Water Services

Duluth’s storm water infrastructure is built around Duluth many stream and creek corridors, incorporating the natural drainage patterns to convey stormwater from developed areas to an appropriate waterbody. The system is comprised of the major system (the system of creeks and streams) and the minor system (the pipes, ditches, swales, and other built infrastructure that carries storm water to Lake Superior, the St. Louis River, or other waterbody. The infrastructure is comprised of the following components:

- 256 miles of sewer pipes and tunnels
- 2 lift stations
- 4700 manholes
- 9000 catch basins
- 138 miles of ditching
- 14 sediment boxes and channels
- 42 creeks and streams
- 1200 storm aprons
- 93 miles of creeks, rivers, streams, wetlands and Lake Superior¹⁰

⁸ Public Works and Utilities Department 2004 Annual Report, p. 15

⁹ Sewer and Water System Replacement and Repair Projections memo, p. 2

¹⁰ Information from Comfort Systems website, www.comfortsystems.ws/storm

Public Utilities and Services Profile

Storm Water Services

Most of the minor system's piping connects several blocks of developed area to a creek or stream that then carries the water to the lake or river.

The Storm Water Utility has identified a number of infrastructure problems that are tied to Duluth's sometimes extreme topography.

- As Duluth developed, many of its streams were placed in culverts for at least portion of their path. The culverts cannot overflow or allow for any significant infiltration, limiting their water holding and conveying capacity. The culvert system has created flooding or nuisance ponding problems in recent years.¹¹
- The topography of Duluth creates problems as water coming over the top of the hill moves down the hillside at a rapid velocity. The energy in this velocity places extreme pressure on the infrastructure at the hill bottom. During intense rain events, infrastructure has been washed away by the force of water, and the pressure is great enough to pop manholes along Superior Street and London Road.
- Most of Duluth's wetlands are in the relatively level ground over the ridge. Wetlands serve a vital purpose in storm water management as retention and infiltration areas – in large (and sometime in small) storm events water will flow to the wetland areas where it can slowly infiltrate into the groundwater. Groundwater flows will continue to move the water, but at a slow rate, frequently helping to feed streams and rivers during dry times.

Over the ridge is also where most of Duluth's development is occurring. As development increases, so does the amount of impervious surface. Furthermore, the amount of wetlands decreases along with vegetated forest cover. Less infiltration of rain, and less water held back and filtered through wetland areas, increases the volume and velocity of water moving through Duluth's natural and built storm water system. New roads built to access rural homes and businesses also redirect and speed the flow of water increasing the risk of flooding and nuisance ponding throughout the city.

¹¹ Id

Storm water goals

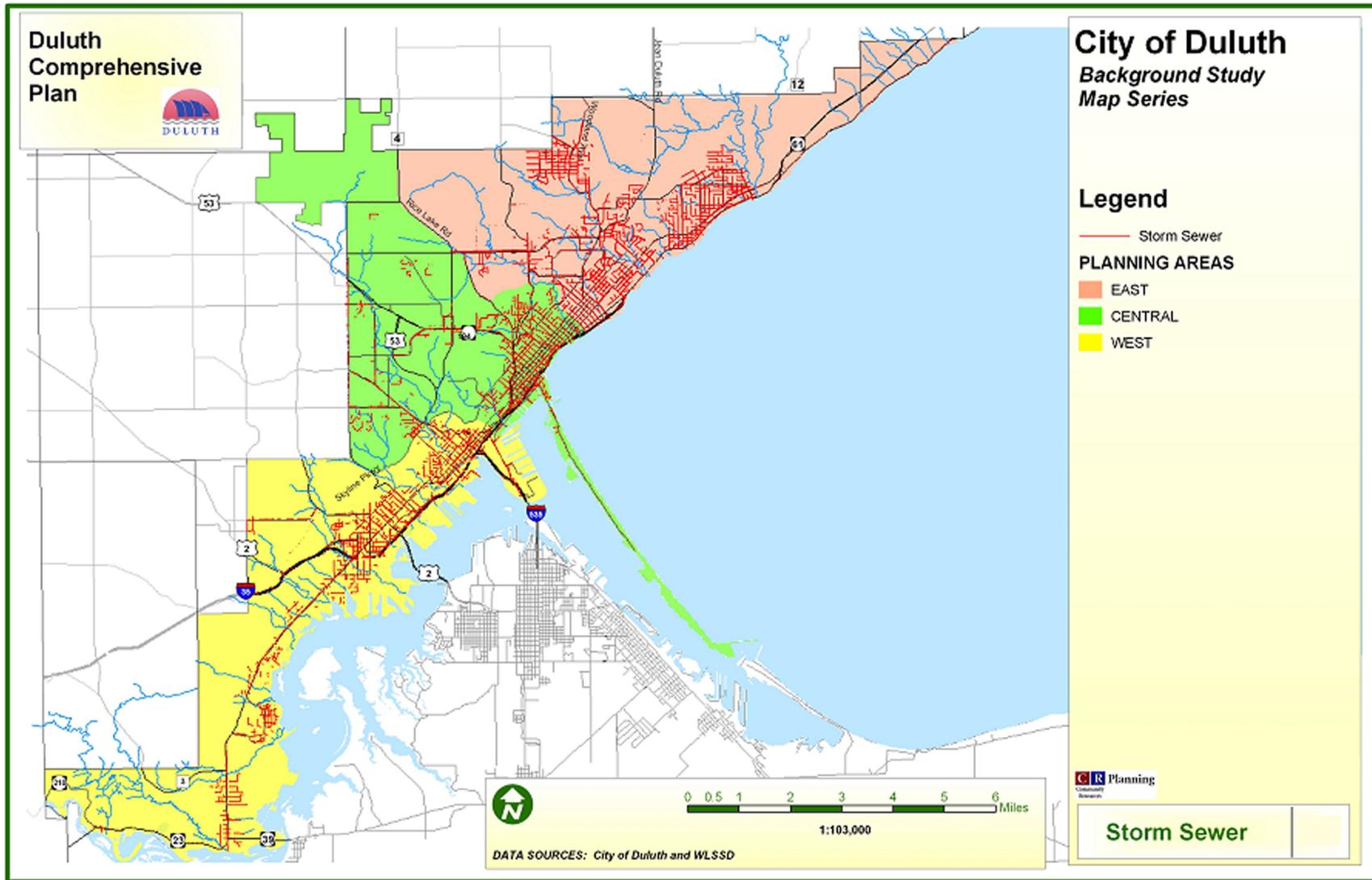
In response to these issues, and in response to new Federal regulation requiring better management, investment, and education around managing stormwater, the City of Duluth storm water utility has developed a document, Surface Water Management Goals and Policy Statements, to guide management and investment decisions. The goals are summarized below:

- 1) The surface water drainage system serving the City of Duluth should be maintained to ensure its effective operation.
- 2) Capital expenditures of public funds for surface water management should be made so that the highest priority concerns of the Storm Water System are addressed first.
- 3) Provide protection from storm water ponding with the public right-of-way for the 10-year design storm.
- 4) Provide protection from flooding for all residential and commercial structures for a 100-year design storm.
- 5) Minimize erosion and control sedimentation in the surface waters within the City's boundaries.
- 6) Surface water quality within the City's jurisdiction will be protected and improved.
- 7) Enhance water recreational facilities and fish and wildlife habitat.
- 8) Protect wetlands to maintain their functions and values.
- 9) Encourage protection of the quality of flows upstream of the City.
- 10) Encourage active community/citizen involvement and participation in water resource management.

The Storm Water utility has also created a City Storm Water Pollution Prevention Plan (SWPPP) as part of its responsibilities under Phase II of the National Pollution Discharge Elimination System (NPDES) program. The utility is implementing a series of programmatic activities, including stream monitoring, increasing oversight of construction activities, promoting homeowner solutions such as use of rain barrels and limiting fertilizer applications, and working to development regional solutions with other units of government through the Regional Stormwater Protection Team.

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Storm Water Services

Figure PU-5: Storm Sewer



Public Utilities Profile

Natural Gas Services

The City of Duluth entered the gas business in 1898 when it purchased the Duluth Gas and Water Company. The original system was supplied by a gas plant located in the central part of the early City. During the 1960's, supplies of high-pressure natural gas were introduced to Duluth via new pipelines, supplementing and eventually replacing locally manufactured gas. During the 1970's, the City converted its distribution system from low pressure cast iron to high pressure steel.

The City now has over 482 miles of gas mains, having added 45 miles of main since 1998.¹² The City purchases natural gas on the wholesale commodity market and distributes it to almost 25,000 locations in the City. Gas consumers in the City use over 6 billion cubic feet of gas per year, with 40 million cubic feet of maximum usage on a cold winter day. Annual revenues in 2004 were \$45 million, of which \$33 million covered the cost of gas.

The City gas utility charges its customers for two distinct components – a delivery charge for natural gas, and the cost of the gas itself. The utility acts as a wholesale market broker for its Duluth customers. Some customers have the option of purchasing their own gas and paying only a delivery charge (called transportation customers) but no customers are currently transporting their own gas. Revenue from the sale of gas does not contribute to the costs of maintaining the system.

Maps showing the 2002 extent of the natural gas delivery system in the City of Duluth are presented in Comprehensive Plan Component: Utilities Infrastructure compiled by the Duluth Planning & Development Department in April 2003.

Duluth Steam Cooperative Association

The City of Duluth owns all or parts of two district heating/cooling systems. District energy systems typically provide heat and cooling services more efficiently and offer greater opportunities for synergies in energy production than do stand-alone, building-based heating and cooling systems. The primary system (Steam District #1) is entirely owned by the City and operated by the Duluth Steam Cooperative Association under contract to the City. The system serves 226 buildings in the Duluth's downtown and medical district via approximately ten miles of steam pipe. The service area runs from approximately W 7th Avenue to E. 11th Avenue, and from Canal Park to 4th Street. The primary product is steam for space heating, water heating, and commercial and institutional uses, although the Cooperative also provides hot

¹² Public Works and Utilities Department 2004 Annual Report, p. 27

Public Utilities and Services Profile

Storm Water Services

water to several buildings, and the Cooperative owns a satellite steam-based chiller adjacent to the downtown government complex and provides County buildings and private buildings with chilled water for air conditioning.

The City has owned the steam plant and distribution system, originally built in 1932, since 1979, when the City purchased it from General Waterworks in order to keep the system from being decommissioned.¹³ The system is run by the Steam Cooperative Association, a cooperative made up of building owners who have long-term contracts for steam.

The steam production facility is composed of four coal-fired boilers with a total design capacity of 400 MMBtu/hr heat output. Coal is the primary fuel for the steam boilers, although two boilers are equipped to use natural gas as a backup. The facility produces only steam; it does not co-generate electricity. Electricity production would be justified if the steam plant had sufficient summer demand to allow the boilers to be run for both electricity and steam heat.¹⁴

A smaller district heat system (Steam District #2) is a cogeneration facility providing steam for the StorEnso paper mill and the adjacent recycling facility, while producing electric power for distribution on Minnesota Power's distribution system. The City purchased the steam plant (the M.L. Hibbard plant) in the 1980's, but the plant is operated and managed by Minnesota Power. The facility was originally a coal plant, but was converted to in 1991 to run on a variety of biomass types, primarily wood waste in addition to coal and natural gas.¹⁵ Minnesota Power reported in 2000 that the plant maximizes use of renewable waste wood as a fuel, such that 90% of the heat input is from wood waste.¹⁶

The Steam District #1 generation facilities produce fly ash as a byproduct of burning coal. Fly ash and other solid byproducts of combustion create landfill costs and sometimes require special handling and disposal. The Cooperative has started selling some of its fly ash for use in concrete manufacturing, thus avoiding the costs of landfilling the fly ash. The Coop is currently studying the beneficial reuse of ash that does not meet specifications for use in concrete, including use of non-spec ash as a soil stabilizer, as road base in transportation construction, and other uses to avoid landfilling the waste.¹⁷

¹³ Conversation with Gerry Pelofske, Manager, Duluth Steam Cooperative

¹⁴ Id.

¹⁵ Minnesota Power Mercury Voluntary Agreement Submitted To The MPCA July 6, 2000, <http://www.pca.state.mn.us/publications/mercury-va-mnpower.pdf>

¹⁶ <http://www.mnpower.com/environment/pahlmanite.htm>

¹⁷ Conversation with Gerry Pelofske

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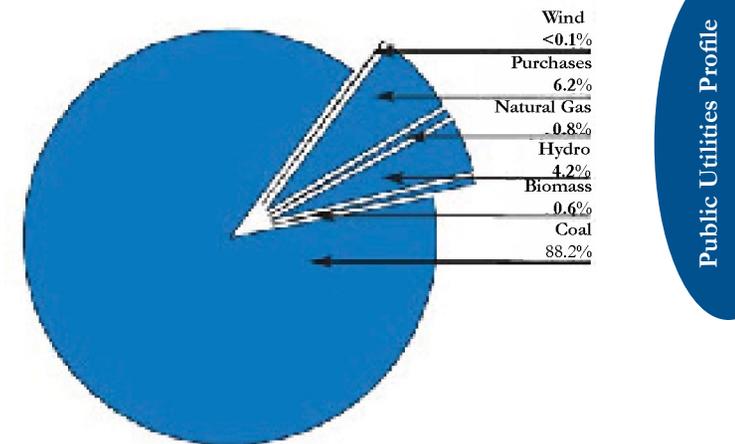
Electric Transmission and Distribution System

Other by-products of combustion are air-borne, including mercury, particulates, air toxics, and greenhouse gases. The City's purchase of the district steam system in 1979 was attributable in large part to a decision by the previous owner not to shut down the system rather than make air quality investments required under the Federal Clean Air Act (investments that the City did make, and recovered the costs through user fees). Downtown and medical district businesses were threatened by the prospect of having to make large investments in individual space heating and process heating systems. Since that time new regulation and new understanding of environmental tradeoffs raise questions about how to sustain the district heating system and the downtown and medical district businesses that depend on the system. Duluth's "Cities for Climate Protection" plan identified the steam plant as the largest emitter of greenhouse gases in Duluth.¹ How the City and the Cooperative address these risks will affect the economic and environmental sustainability of the district heating and cooling systems and may affect the long-term viability of businesses and buildings on the system.

Electric Transmission and Distribution System

Duluth's electric infrastructure is owned and managed by Minnesota Power, an investor-owned rate-regulated electric utility. The local distribution is connected to a wide range of supply sources via 115, 230, and 345 KiloVolt (KV) transmission lines. The regional transmission system is shown in Figure PU-6.

Once power reaches Duluth, it is stepped down in voltage to distribution system levels at one of eight transmission-to-distribution substations. Voltage is stepped down to 14KV from the transmission substations. As most of the distribution system is 14KV lines, very few additional substations are needed. The City does have some older 4KV lines (primarily in the downtown area and in eastern Duluth). Some 4 KV lines are in the process of being replaced.² The company is considering upgrading some distribution lines to 34 KV in order to ensure long-term service quality in the face of growing demand for high quality power.



Source: Minnesota Power website

¹⁸ Greenhouse Gas Inventory and Forecast, Duluth Cities for Climate Protection Program, 2001

¹⁹ Conversation with Mike Klopp, Minnesota Power

Emergency Services

The emergency services that Duluth provides to its residents and businesses are also affected by land use and infrastructure decisions. Police, paramedic, fire, and other emergency response times are dependent upon matching the spatial distribution of homes and business to locations of emergency responders, and upon ensuring adequate connectivity for emergency vehicles. Figure PU-7 shows the locations of police precincts, police stations, and fire stations.

Duluth has unique challenges when it comes to emergency preparedness. The elongated shape, topography, port protection, aging infrastructure, industrial base, older housing and commercial buildings, and lack of building separation and sprinkler systems all affect the level of service provided by emergency services.

Much of Duluth is built on a hill. This increases response time and the need to have more stations – some located on the bottom of the hill and some on top. With Duluth’s long winter road conditions, it is difficult to get to and work around buildings. While nothing can be done to change the terrain, recognizing the challenges and adjusting station districting allows for the best response time and protection of all areas of the city.

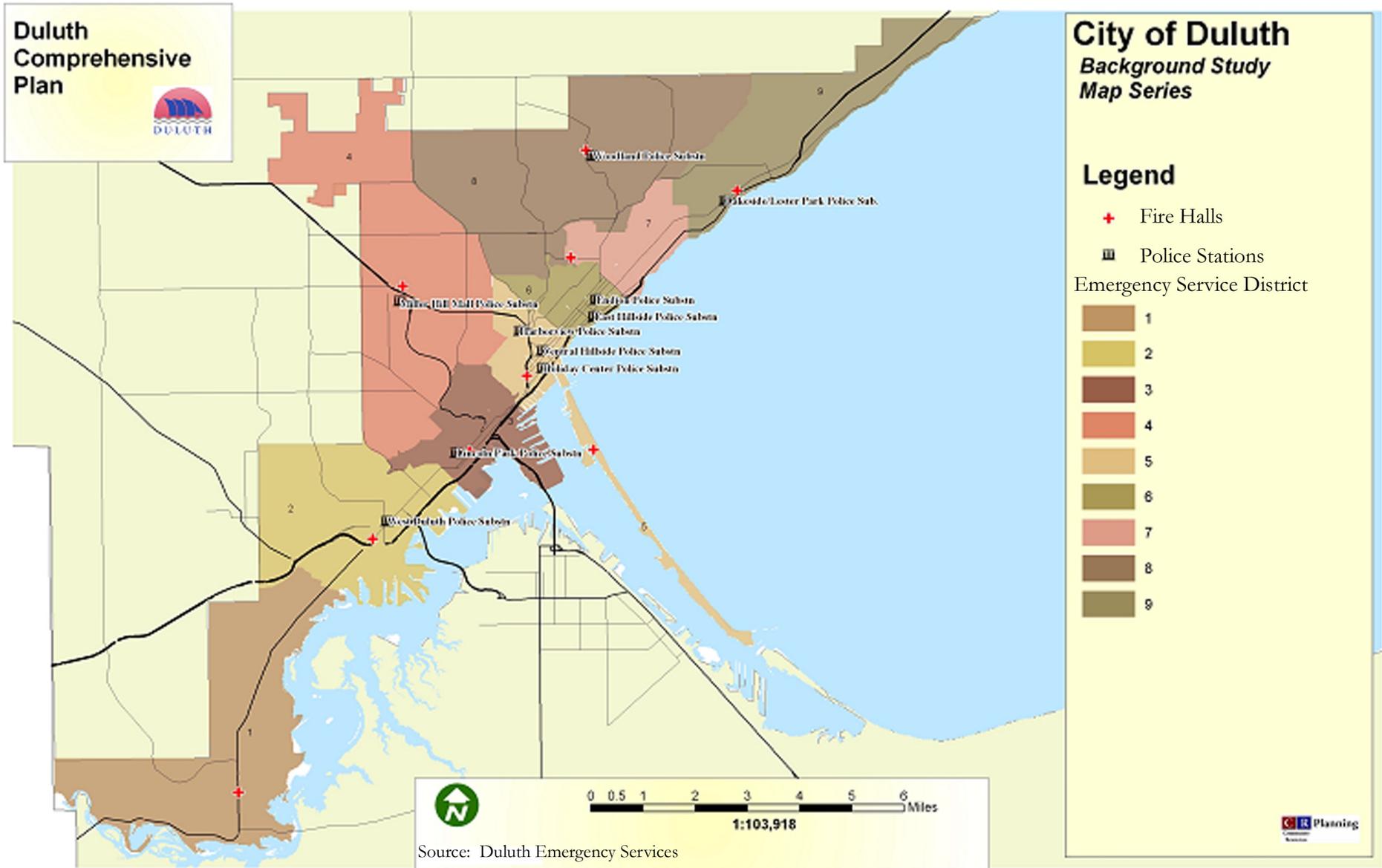
Weather is also a factor in Duluth. Emergency service providers must contend with demands due to heavy snowfall and extreme temperature conditions. Equipment can freeze or fail altogether. Ice on the ground and deep snow increases the potential for and accelerates the rate of exhaustion when fighting fires. Winter conditions make negotiating otherwise routine streets difficult for all emergency service vehicles.

Most modern cities are relatively square with streets and utilities in a grid pattern. Duluth’s shape not only increases the cost of infrastructure, it also increases the number of fire and police stations necessary to provide a timely response to all areas of the city.

Duluth’s housing stock is generally between 50 and 100 years old. Many of these houses are built within inches of each other with areas of town where one can walk from one roof to another for an entire block. With an older downtown area, many of the buildings the skywalk system passes through do not have sprinkler systems requiring aggressive fire prevention management. Quick response and understanding of the skywalk system has saved many buildings and reduced loss. More personnel and larger equipment is required for firefighting in high rises. The potential of a major loss of life or property is possible if these fires are not extinguished immediately.

Public Utilities and Services Profile
Electric Transmission and Distribution System

Figure PU-7: Emergency Services



Public Utilities Profile

Duluth's port facilities are a boon to the economy, but also present unique emergency service hazards. The storage of products and fueling stations for the ships increase the potential for fire. The fire department trains with the Coast Guard and shipping companies concerning shipboard fires, confined space rescue, hazardous materials response, and emergency medicals aboard ships.

Duluth has an international airport, private airport, Air Guard base, and growing aeronautics industry with special fire protection needs. Recent expansions in aircraft manufacturing and increased commercial travel have made fire protection critical to the stability of the local economy as well as public safety near the airport. The fire department trains with the Air National Guard Fire Department in large scale disaster drills and provides structural fire protection for the Duluth International Airport. The Sky Harbor Airport, on the other hand, is solely protected by Duluth fire.

With tourism on the rise, additional demands are placed on emergency services. A larger transient population increases fire protection demands for hotels, restaurants, and tourist-based businesses. The summer months bring an upswing in vehicle accidents, fires, medical responses, and rescues as people unfamiliar with the area explore the city and Lake Superior.

Many of Duluth's streets were built a century ago. Older streets can be as narrow as 20 feet wide with parking. Getting to the location of an emergency can be difficult when the road is narrow, cars are parked, and/or snowdrifts occur. Fire fighting apparatuses, furthermore, have increased in size since the neighborhoods were originally platted and streets built. While a grid-style street pattern mitigates for narrow streets (by allowing more than one route to access a single site) but Duluth's topography sometimes limits the use of a grid pattern. The Duluth Street Improvement Program is widening the streets as they are reconstructed, but it will be decades, if ever, that all streets will be widened.

Fire Protection

The fire department has four divisions: administration, fire operations, fire prevention, and building safety. The four divisions offer the services discussed below.²¹

Fire Suppression - Fire suppression was the first emergency service offered by the department. Volunteer companies formed in the late 1800's, followed by paid firefighters as the city matured. In the early 1900's, the department switched from horse-drawn steamers to

²¹ Information is from Fire Department's Service Review for the City Council, June 2004. Some other components were from the City's website and discussions with Fire Chief, John Strongitharm.

Public Utilities and Services Profile

Fire Protection

Fire Department Planning Recommendations

The following recommendations come from the Fire Department's Service Review Report dated June 2004:

1. Perform a comprehensive analysis identifying all issues surrounding the Duluth Fire Department providing advance life support and patient transportation. This service will generate revenue to help offset the cost of fire department operations.
2. Work towards compliance with NFPA 1710 by securing support from citizens, city council, and city administration.
3. Provide adequate resources to support emergency management duties and update the Emergency Operation Center.
4. Monitor community development for planning future station replacement and and/or relocation.
5. Expand mutual aid agreements and establish a cost basis for mutual aid response to meet FEMA reimbursement requirements.
6. Restore apparatus replacement program.
7. Update software and equipment for building safety employees that will allow them to increase field time and better track/process permits and licenses.
8. Upgrade radios/tactical frequencies to facilitate interoperability between different agencies.
9. Research vehicle and/or equipment lease programs and determine cost effectiveness.
10. Continue with the re-organization of building safety to facilitate efficiency and provide a user-friendly service to the public.

motorized fire engines. The dramatic decrease in response time expanded coverage areas and eliminated stations #3 and #9. In the 1950's, the department peaked at 163 personnel, still well below the level recommended by Duluth Underwriters. Since that time, the department has been repeatedly cut to offset budget shortfalls. When the economy rebounds, staffing was not replenished. The current staffing level is 132 personnel. While firefighters are better trained and equipped with better tools than at anytime in history, the dangers of fire have also increased. Modern construction materials collapse sooner, toxics in the materials increase heat and toxic smoke, more chemicals are in our homes and industry, and fire is still used as a weapon to hurt or kill and destroy property.

Emergency Medical Services (EMS) - Preserving life has been part of the fire department's mission since inception. First aid training is documented as early as the 1920's. Rescue squads followed, and in the mid-1970's, as the importance of pre-hospital care took hold in Minnesota, the fire department began exploring EMS as a formal function and in 1976 the department began responding to medical incidents. Instead of waiting for an ambulance for eight minutes for defibrillation, CPR, breathing assistance, oxygen, first aid, etc., firefighters were on the scene within four minutes. Unfortunately the department's emergency medical service still faces some restrictions in providing basic emergency care. Unlike their rural EMT counterparts, Duluth firefighters are not allowed to offer simple drug interventions – nitro-glycerin or aspirin for angina (chest pain), EpiPens (adrenaline) for allergic reactions, or inhalers for asthma.

Hazardous Materials - By definition, a hazardous material emergency is an accidental release of a toxic substance from a stationary site or transport vehicle (i.e. boat, rail car, or semi-truck/trailer). Congress enacted the Superfund Amendments and Reauthorization Act of 1986 (SARA). Within SARA is Title III: The Emergency Planning and Community Right-to-Know Act (EPCRA). EPCRA requires state and local governments and industries to inform citizens about chemical hazards in their communities and to develop emergency plans. The Duluth-based Haz-Mat Team began ongoing training in the late 1980's. The team's mission is to respond to hazardous material emergencies, analyze the threat, and recommend appropriate action. With chemicals being so ubiquitous, a well trained response team is an asset to our citizens, port, industry, and transportation hub. In response to Minnesota's recent budget deficit, hazardous material program funding was cut. In Duluth, the team was reduced from 60 active and trained members to approximately 30. The team continues to train monthly and works closely with regional industry, hospitals, transportation, and emergency management agencies.

Specialized Rescue and the Golden Hour - The golden hour is the first hour after a victim is severely injured and when a hospital can do the most good. The goal is to provide citizens and visitors with the best chance for survival in any emergency. Rescue operations that the fire department is specially trained for include ice, confined spaces, high angle (steep, rocky ledges), water, auto extrication, etc.

Fire Prevention - The fire prevention/building safety responsibilities include the following services: fire investigations, fire code enforcement, public fire education, exit drills in the home, Twin Ports safe kids organization, car seat clinics, juvenile fire setter program, and senior education.

Building Safety Division - The building safety division promotes the health, safety and welfare of Duluth's citizens through enforcement of standards established in the state and municipal law for land use, building construction and property maintenance. All sections within the building safety division perform construction inspections, plan review and permitting, and housing inspections work together to ensure structures are built and maintained to meet code and local ordinances. Over the last five years, the division has seen incredible growth with more construction in the last few years than it has seen in the previous 50 years increasing the demand for services.

Emergency Management - In 1997, the fire department took over Duluth's emergency management responsibilities. This includes maintenance of an emergency operation plan, coordination and planning of community exercises, grant application and administration, liaison with local, state and federal agencies and coordination of the outdoor warning siren system.

Non-Emergency Activities - During non-emergency periods, firefighters are busy training and providing fire station maintenance, fire inspection/code enforcement, equipment maintenance, public education, and hydrant maintenance. In addition, they work on cost saving activities by performing duties and maintenance activities that would otherwise be contracted out.

Fire department statistics

Unless otherwise stated, all information in this section is based on data from 2003 or later.

Average Response Time - The amount of time it takes for firefighters to get to the scene of an emergency is critical. While some Duluth stations have response times less than three minutes, stations with much larger/rural districts or steep hills were near 4 minutes. Other factors that affect response time are the city's shape, narrow streets, winter driving condition, and traffic congestion.

Station Locations – There are nine fire stations at the following locations:

- Fire Station 1 Headquarters - 602 W Street
- Fire Station 2 - 2627 W Superior St
- Fire Station 4 - 425 W College Street
- Fire Station 5 - 2138 Minnesota Avenue
- Fire Station 6 - 1031 N 51st Ave E
- Fire Station 7 - 1419 Maple Grove Rd
- Fire Station 8 - 5830 Grand Avenue
- Fire Station 10 - 1106 Commonwealth Avenue
- Fire Station 11 - 3501 Woodland Ave

Public Utilities and Services Profile

Police

In 2003, Duluth responded to 7015 runs. Fire Runs by Type	
583 Fires	158 Hazardous Material Releases
5 Explosions	487 Misc. Calls
4545 Medical	178 Investigate Hazard
219 Motor Vehicle Accidents	755 Automatic Alarms
85 Rescues	

One of the more important planning related elements for the fire department is response time in relation to up and coming growth areas. Some areas such as Parkwood, Fond du Lac and the North Shore are growing in population, and yet, the response time to reach these areas is much longer than the average. Long term development patterns have a distinct effect on the level of service that emergency services can provide. The existing emergency service infrastructure cannot provide equivalent response time to all areas of the City without additional public investment in stations and equipment.

The fire department's 2003 average response time was 3 minutes 36 seconds

Types of Runs - The fire department has increased services due to increased hazards and expectations. It now provides emergency medical response, hazardous materials response, and other specialized responses. As such, service calls have nearly tripled in the last twenty years.

As the city grows, industry and population changes must be considered when identifying the location of fire stations or the need for additional stations. In 2003, a map was created plotting every call for the year. Not surprisingly, the vast majority of calls were located in areas surrounding fire stations. This indicates that past administrations were accurate in site selection of the stations. When planning station locations and the resources assigned to each station the following issues must be considered: complete coverage of the City, high risk areas (e.g., Duluth are the business districts of downtown and Spirit Valley), and changing land uses and development patterns. The fire department has placed fire stations in neighborhoods where historically there have been the most runs, while still insuring an adequate response to the entire city.

Police

The Duluth Police Department is composed of about 140 community-oriented officers and 25 support staff. The Duluth Police Department values community partnerships that are vital to maintaining a safe, peaceful and vital community. Neighborhood stations exist to help with chronic, on-going problems, whether or not they are of a criminal nature. They work with the community and individuals to solve little problems before they become big problems and to help communicate more effectively with other city departments. There is a list of the neighborhood stations on the next page.

West Area – Fond du Lac, Gary, New-Duluth, Smithville, Morgan Park, Riverside, Norton Park, Spirit Valley, Denfeld, Oneota, Merritt, Wade, Lincoln Park, West End, Piedmont, Parkwood, Duluth Heights, Airport.

Central Area - Downtown, Canal Park, Park Point, Observation Hill, Central Hillside, Central and Marshall High Schools, Harborview, St. Mary's, Piedmont, Duluth Heights, Airport.

East Area - Endion, Chester Park, East Hillside, Kenwood, Aspenwood, St. Scholastica, UMD, Congdon, Hidden Valley, Lakeside, Lester Park, Woodland, Hunters Park, Morley Heights, Spring Hill, North Shore.

Issues Facing Duluth

The Comprehensive Plan can help direct the City's decisions on land use, economic development, and capital improvements. Many infrastructure decisions have historically been made reactively:

- How to extend utilities in response to housing development;
- Where to run energy utilities to allow for industrial or large commercial development;
- Addressing system failures stemming from unanticipated consequences including infiltration into the wastewater system and loss of wetland buffers for the stormwater system;
- How to pay for large-scale system investments as environmental risks are better understood;
- Attempting to keeping the level of service in City services from declining as development re-shapes the landscape.

Water, wastewater, stormwater

The City of Duluth, like many other older cities in America, is experiencing a marked deterioration of the public utilities infrastructure, with system failures occurring at an ever-increasing rate. The dilemma of how to maintain the aging system in a City where new development cannot bear the costs of system improvements is one facing many urban areas. The Comprehensive Plan can help define issues surrounding the utility infrastructure and provide guidance for balancing the management of existing utility systems and planning for expansion or reinvestment.

Public Utilities and Services Profile

Issues Facing Duluth

The majority of the City's systems were built during the City growth periods prior to 1940, and were therefore built to meet the needs of an expected growing population. However, today these systems – while covering the same overall geographic area – serve a substantially smaller population than was originally projected. For a utility to be self-sufficient, the revenues from customer bills must pay not only the ongoing operating costs of the utility, but the ever increasing costs of rebuilding the system. System expansions and upgrades are typically paid for by new development – the costs of running new water, sewer, or gas lines is absorbed in the sale price of new homes and commercial properties. Duluth's challenging topography and soils make some extensions quite expensive, and therefore preclude the infusion of revenues that new development could otherwise bring.

- Utility infrastructure maintenance - Consequently, the costs of operating and maintaining the public utility systems falls on a fixed geographic area with a limited customer base. The original system was constructed under aggressive assumed build-out assumptions. Today, system maintenance and replacement costs are being distributed on a smaller customer base, increasing costs on a per connection basis. As Duluth faces substantial costs of rebuilding its aging systems, the utility faces compromises such as trading decreased level of service or limited potential to allow new development with avoiding price shocks to customers. The Comprehensive Plan can guide utility expansion and reinvestment decisions to leverage private investment, minimize long-term maintenance costs, and set reasonable expectations for the level of service on Duluth's utility network.
- Utility infrastructure expansion – The feasibility of expanding the utility infrastructure plays a large role in identifying potential areas of growth within the City of Duluth. The Comprehensive Plan can identify the utility expansion restrictions for certain areas as well as those areas that are more available than others.
- Water Distribution – With the amount of consideration being given to Duluth's sanitary sewer system, specifically the inflow and infiltration component, the water distribution system is not far behind. The number of water main repairs is rising exponentially aligned with the age and condition of much of the water distribution system. Additional issues include the condition of water storage reservoirs and availability of required water pressure in certain areas experiencing growth demands.
- Stormwater System – Much of Duluth's natural stormwater system, sometimes called 'green infrastructure' and including wetlands, stream corridors, and natural drainage-ways, is over capacity. The built stormwater system similarly has capacity limitations. The growing recognition that stormwater is a primary culprit in degraded water quality

and compromised fisheries makes for difficult choices in regard to managing stormwater from both existing and proposed development. The Comprehensive Plan can suggest both land use solutions and performance standard strategies that can minimize the impact of stormwater on stream, river, and lake water quality.

Energy infrastructure

Duluth has a variety of energy infrastructure systems including electric transmission and distribution, natural gas, steam, and district cooling. Some energy utilities are accessible virtually city-wide, while others are quite limited in scope. Except for the electric utility system, the City has an ownership and investment responsibility that is affected by land use choices and must recognize that investment decisions have an effect on land use and development opportunities. While the electric utility is not a publicly owned system, the distribution system uses City right-of-ways and requires City policy decisions for system expansions or extensions. Increasing risk from environmental consequences of fuel and waste disposal choices challenges the City to make informed forward-looking investments that minimize risk. The Comprehensive Plan can help link land use and infrastructure choices, and minimize long-term financial risk to City-owned infrastructure.

City emergency services

A primary function of City government is providing emergency services to residents and businesses. Access and connectivity investments, location of new development relative to existing emergency service centers, and continuous improvements in emergency services to respond to changing conditions are all connected to public and private land use decisions. Budgetary considerations across City departments must also be evaluated, such as the cost of widening streets to accommodate larger emergency service vehicles. The Comprehensive Plan can connect land use priorities, public investments, and private development to maintain an appropriate level of service at a reasonable public cost for emergency response.

Public Utilities and Services Profile

Information Sources

Information Sources

Additional detail on the regional infrastructure systems and growth issues facing the region may be found in several existing planning documents, including the following:

- 1) Final Report and Recommendations of Mayor's Task Force on Water and Sewer Infrastructure
- 2) Water System 20-Year Potential Growth Plan
- 3) City of Duluth Comprehensive Sewer Plan (1996)
- 4) WLSSD Effluent Quality Plan (April 2001)
- 5) Summary Report WLSSD/City of Duluth Overflow Reduction Plan
- 6) City of Duluth Plan of Action to EPA Administrative Order Docket No.: V-W-04-AO-02, May 12, 2004
- 7) Draft Duluth-Superior Long Range Transportation Plan, Duluth-Superior Metropolitan Interstate Commission, June, 2005
- 8) Duluth Urbanized Area Growth Impact Study, Duluth-Superior Metropolitan Interstate Commission, October, 2004
- 9) WLSSD Comprehensive Wastewater Services Master Plan, August 2003
- 10) Comprehensive Plan Component, Utilities Infrastructure, Planning and Development Department, April, 2003
- 11) Duluth Public Works and Utilities 2004 Annual Report
- 12) Greenhouse Gas Inventory & Forecast, Cities for Climate Protection Program, 2001
- 13) Duluth Steam Cooperative Association 2004 Annual Report