

# Sanitary Sewer Service and City Growth

July 2018

If North Liberty is to continue to grow beyond its current boundaries into the future, sanitary sewer service must be extended beyond where it is today. Those extensions, because of the natural rise and fall of the land around and within the city, will dictate the use of new lift stations, and because the costs of lift stations is high it is important to make well-reasoned decisions. This report presents some very broad outlines for future expansions based on the *Sanitary Sewer Service Study Final Report* prepared for the City by Fox Engineering in 2011. Professional examination of engineering and cost estimate assumptions are necessary for refinement, and Fox Engineering is the logical consultant to perform that work both because of their satisfactory work in the past and because of their knowledge and experience with North Liberty through preparation of the 2011 study.

City growth depends largely on the ability of cities to provide important services that allow successful urban-scale development, mainly sanitary sewer, water, and streets and sidewalks/trails. Of the city services, sanitary sewer is the most challenging because the system works best when adequate slopes exist for wastewater to flow naturally downhill ultimately to the treatment facility. When the land area of a city does not all naturally slope toward the treatment facility, pumps must be used, and that is the case in North Liberty so any growth discussion must include planning for lift stations. At the time of this report, there are 10 lift stations with pumps at the periphery of the city. Lift stations are costly because they require more infrastructure and more maintenance than a gravity system, and so cities try to minimize the number in use.

In the 2011 study, basins and sub-basins for sewer service were identified and the existing system of pipes, pumps, and processing plant were modeled. From that work, plans to serve various growth areas surrounding North Liberty were developed but were not prioritized and optimized to provide a long-term plan for expansion of the overall system. This paper suggests a strategy to accomplish that, with some important goals in mind:

- Provide City Councils with budget information for programming of infrastructure projects. This point goes beyond just sanitary sewer, because once growth priorities are established by Council, resources can be focused most appropriately on near-term growth areas.
- Provide a more firm estimate for when city growth will occur at various locations. This is important for the City's relationship with our neighboring jurisdictions and with Johnson County. Especially for the County, being able to demonstrate an affirmative long-range plan for growth helps minimize the potential for rural subdivisions being approved in those growth areas and creating future problems.
- Provide a surer plan of growth for property owners in the growth areas. Growth always includes some owners who want to sell their land for development profit and some who want nothing to do with city growth. Having a more definitive plan will help both make decisions best for themselves.

For a full understanding of the following proposal, reference the accompanying map at the end of this proposal.

This document concentrates on growth of the municipal boundaries and sanitary sewer service. Other important considerations must be taken into account in any discussion about such growth, including

extension of other city services such as roads, trails, water, parks, staff to serve additional residents, and others. Also, it is certainly true that there is a significant amount of undeveloped land existing within the municipal limits with sewer and other services immediately available, but that land is held by a relatively few owners and has gone undeveloped up until now for various reasons that may or may not change in the near- to mid-term future. This document is not recommending growth and development in advance of development in those areas, but is offered with the understanding that they are beyond the City's control.

### **Phase 1: SW Service Area**

**2017 Estimate of Cost: \$3,000,000**

**Approximate Acreage: 592 Acres = \$5,000**

**Purpose and Extents.** The purpose of phase 1 is to provide services to an area largely surrounded by the current corporate limits. Most but not all the land has development potential in the near to mid-term future, enhanced by the Forevergreen interchange and by dramatic upgrades to Kansas Avenue and Forevergreen Road in the area. About 180 acres of land within the phase 1 area is already within the City's corporate limits, and another approximately 400 acres can eventually be annexed within the phase 1 area. Completion of this project will provide sanitary sewer service up to the common annexation agreement line with Tiffin in this area.

**Construction Basics.** The phase 1 project consists generally of installing a new lift station and pressure sewer line from west of I-380 extending east to the gravity section of the West Trunk Sewer at or near Jones Boulevard, and enough gravity sewer to provide hookup access to both sides of I-380.

**Pluses and Minuses.** Importantly this phase provides service to a large area already within the corporate limits with strong development potential. Unfortunately, several severe annexation challenges exist which may well delay buildout of the service area, so money spent up front by the City to install the infrastructure may not be recovered through development fees for many years.

### **Phase 2: Penn Street West Service Area**

**2011 Estimate of Cost: \$1,100,000**

**2018 Estimate with CPI Adjustment: \$1,300,000**

**Approximate Acreage: 250 Acres = \$5,200/Acre**

**Purpose and Extents.** The purpose of phase 2 is to provide services to the critical northwestern quadrant of the Penn/I-380 interchange. This improvement is strategic, as only about 120 acres of new ground can be developed, but the City needs to protect its ability to grow west and northwest in the future and failure to serve this area could result in rural development that could have negative consequences for City services, land use, and connectivity.

**Construction Basics.** The phase 2 project consists generally of replacing the existing Herky Street lift station with a new lift station northwest of the current location, with attendant pressure and gravity sewer lines.

**Pluses and Minuses.** There is no known demand for development in this general area, but almost all of the I-380 Industrial Park lots have been sold and developed and with traffic volumes continuing to increase on I-380 demand seems inevitable; however, development fees to recover up front City costs

may lag here. Last, the cost of this lift station and pressure lines will eventually be a throw-away, when phase 3 is constructed, but because that cost is so high and the gravity line to replace this lift station is so far removed geographically from the large phase 3 lift station, service to the area through the phase 3 system will likely take quite some time to provide.

**Phase 3, Gateway to the North: Northwest Service Area**

**2011 Estimate of Cost: \$20,000,000 + \$3,200,000 gravity sewer = \$23,200,000**

**2018 Estimate with CPI Adjustment: \$27,000,000**

**Approximate Acreage: 913 Acres = \$29,600/Acre**

**Purpose and Extents.** The purpose of phase 3 is to both to open up large areas for future growth west of I-380, but also to install the large lift station necessary to provide sewer service in large areas east of I-380 (phases 4 and 12). None of the land in Phase 3 is developed other than individual large-acreage holdings. Phase 3 contains over 900 acres including I-380 right-of-way, but construction of the phase 3 lift station will allow gravity service to be provided to those 900 acres plus an additional 3,500 acres at build-out.

**Construction Basics.** The phase 3 project is large and expensive, featuring a new major lift station and a new large pressure sewer line that runs from this area south and east to the existing wastewater treatment plant, as well as gravity mains to serve the area and to serve Phase 4.

**Pluses and Minuses.** There is no immediate demand for development in this area, but it is well known that services are not available so that may be impacting demand. It is quite unfortunate that the logical lift station location is a long distance away from the current corporate limits, so for reasonable expansion of the City the gravity lines serving the area need to be lengthy right away. The 2011 study identified other means to serve large parts of the northwest and north basins, but those alternatives involve large costs for throw-away lift stations and pressure lines.

**Phase 4, North Service Area**

**2011 Estimate of Cost: \$1,600,000**

**2018 Estimate with CPI Adjustment: \$1,800,000**

**Approximate Acreage: 1,218 Acres = \$1,500/Acre**

**Purpose and Extents.** The purpose of phase 4 is to open up large areas for future growth north of the existing city and to retire two existing lift stations in the Deerfield and Progress Park neighborhoods. Phase 4 area includes 1,200 acres, with only about 120 currently developed.

**Construction Basics.** The phase 4 project consists of gravity sewer lines that all flow generally west and northwest and ultimately tie into the lift station constructed with Phase 3. Two lift stations at the edge of the Deerfield and Progress Park neighborhoods can be abandoned once these gravity lines extend south to the existing developed area.

**Pluses and Minuses.** The 2011 study proposes an alternative solution involving two phases and a temporary lift station and pressure line, which would all be throw-away costs. This proposed phasing eliminates that option so that the entire area is served by gravity and there are no throw-away costs. The downside to this proposal is that the phase 3 lift station needs to be built before service is available to this large basin north of existing corporate limits. There is some interest in development in this basin.

**Phase 5, West of I-380**

**2011 Estimate of Cost: \$4,300,000**

**2018 Estimate with CPI Adjustment: \$4,900,000**

**Approximate Acreage: 1,763 Acres = \$2,800/Acre**

Purpose and Extents. The purpose of Phase 5 is to expand the future westerly growth area by 1,760 acres farther west, in accordance with the annexation agreement with Tiffin. Demand for growth in this area is unlikely to be demanded until the mid to long-term future.

Construction Basics. The Phase 5 project includes a new gravity system extending generally north to the lift station installed as part of Phase 3. Once completed, all sewer west of I-380 and north of about St. Andrews Road will be served by gravity lines up to the large Swan Lake Road lift station. It also allows for the abandonment of the lift station installed as part of Phase 2. A more modest option was examined to reduce costs for this phase, but throw-away costs associated with it were high.

Pluses and Minuses. This basin is fairly close to the city and serving it is necessary to expand the I-380 Industrial Park area farther west.

**Phase 11, Long Term, East Side North of Penn Street**

**2011 Estimate of Cost: \$1,200,000**

**2018 Estimate with CPI Adjustment: \$1,400,000**

**Approximate Acreage: 173 Acres = \$8,100/Acre**

Purpose and Extents. The purpose of Phase 11 is to fill in a planned growth area of about 125 acres between E Penn Street and Mehaffey Bridge Road, north and east of the Penn Meadows neighborhood. Improvements will not be feasible until gravity sewer collectors are extended northwest from the newest lift station, on North Liberty Road north of the high school.

Construction Basics. The Phase 11 project includes moving an existing lift station to service a larger area, which is pumped southeast into the larger lift station north of the high school. Phase 11 is the last build-out area east of the city.

**Phase 12, Long Term, Far North Basin**

**2011 Estimate of Cost: \$1,500,000**

**2018 Estimate with CPI Adjustment: \$1,700,000**

**Approximate Acreage: 313 Acres = \$5,500/Acre**

Purpose and Extents. The purpose of Phase 12 is to provide service to the farthest northern extents possible east of 965, including about 300 acres. Improvements will not be feasible until service is extended to and through basins 3 and 4.

Construction Basics. The Phase 12 project includes construction of a new lift station which is pumped south into the gravity feeder line that runs west to the large lift station built as part of Phase 3, and gravity collection lines to the lift station. Phase 12 is the northernmost build-out area outside of the city.

**Phase 13, Long Term, Extension North of Aspen Ridge Area Basin**

**2011 Estimate of Cost: \$1,200,000**

**2018 Estimate with CPI Adjustment: \$1,400,000**

**Approximate Acreage: 189 Acres = \$7,400/Acre**

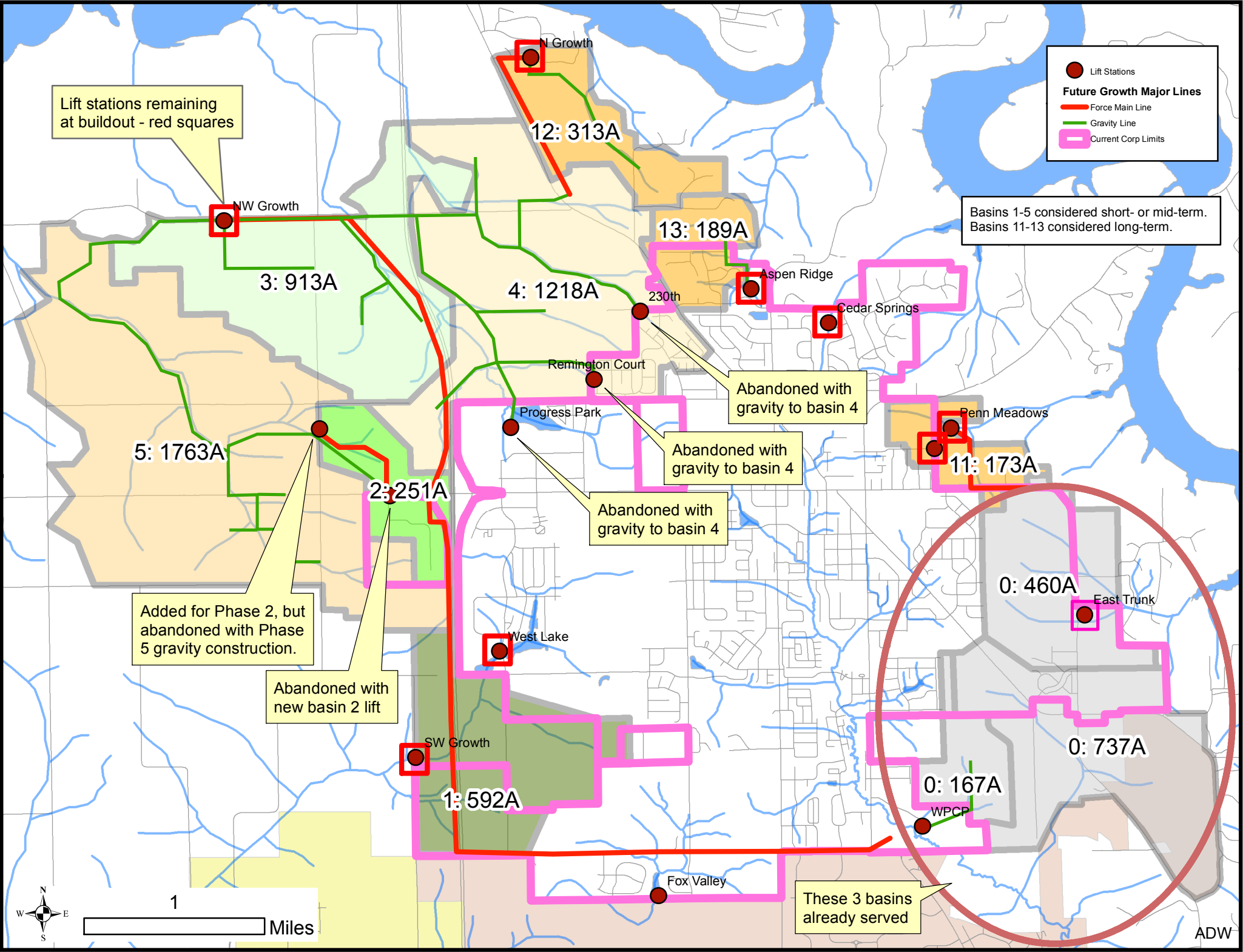
Purpose and Extents. The purpose of Phase 13 is to fill in a gap in sewer service of only about 90 new acres by moving an existing lift station. Improvements can be made at any time and may be moved forward in priority if demand warrants, but are expensive for the small area served.

Construction Basics. The Phase 13 project includes increasing the size of an existing lift station and extending gravity collection lines to the north from the site.

Conclusion. Once a preliminary priority of projects is established by Planning Commission and Council, Fox Engineering should be retained to perform more detailed analyses and cost projections, which could result in modifications to the projects. This would also be the right time to include water service planning for each of the basins so that the full picture of future expansion can be known and planned for.

**Notes:**

1. CPI Adjustment: 12.55%, 2011 to 2018. Source: Bureau of Labor Statistics.
2. Phases 2, 3, 4, 5, and 12 all depend on construction of the major lift station included only in the Phase 3 estimated cost. The total numbers for those phases, which may be a more balanced way to view them, are:  
2018 Estimate with CPI Adjustment: \$36,700,000  
Approximate Acreage: 4,458 Acres = \$8,300/Acre  
  
For comparison, the East Trunk Sewer fees are \$3,676/Acre
3. Not a suggested comparable or equivalence, but a point of information: if the entire 4,458 acres developed with low density residential uses similar to the Broadmoor neighborhood, it might be expect to generate, very conservatively, \$39.55m annually in property taxes (2018 property values, tax rate, rollback).



Lift stations remaining at buildout - red squares

**Legend**

- Lift Stations
- Future Growth Major Lines**
  - Force Main Line
  - Gravity Line
  - Current Corp Limits

Basins 1-5 considered short- or mid-term. Basins 11-13 considered long-term.

Added for Phase 2, but abandoned with Phase 5 gravity construction.

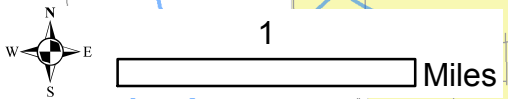
Abandoned with new basin 2 lift

Abandoned with gravity to basin 4

Abandoned with gravity to basin 4

Abandoned with gravity to basin 4

These 3 basins already served



ADW