~~*Chapter Nine:*~~ UTILITIES

~~Utilities~~

~~I.~~ Utility Overview

Principles relating to utilities established as part of ~~the 1997~~previous Community Plan updates are still valid today, and the ~~City's~~city's existing utility infrastructure has been appropriately planned for the anticipated growth of the community. With Dublin's careful planning and forward thinking ~~in 1997~~, necessary upgrades to the existing system will be minimal despite continued growth. The utility systems can be modeled and analyzed to demonstrate that services are being provided safely, efficiently, and in a fiscally responsible manner. As the ~~City~~city continues to age, infrastructure installed in the early stages of Dublin's growth will require more preventative maintenance and improvements. Funding will be necessary for this maintenance effort to uphold the level of services currently provided.

~~II.~~ Municipal Service Agreements

The City of Dublin does not own or operate wastewater treatment facilities or a water treatment facility ~~and supplies~~instead supplying these basic public services through arrangements with other jurisdictions. The ~~City~~city provides water and sanitary sewer service primarily through contracts with the City of Columbus, as Central Ohio's regional service provider. These agreements are comprehensive in nature and ensure that the City of Dublin has the ability to provide sewer and water service as the community grows. Limited areas of the ~~City~~city are also provided with sanitary sewer service according to agreements with Delaware County, and Dublin has an additional agreement regarding conveyance of wastewater for the Village of Shawnee Hills. The City of Marysville also provides wastewater and water utilities within portions of Dublin's planning area.

The service area for the City of Dublin and City of Columbus ~~has been delineated as indicated on Map 9.1, defining~~defines specific geographic areas in which service is provided by the respective jurisdictions. Service delineation includes exclusive service areas for both Dublin and Columbus that ~~geographically~~

~~define areas that~~ may be annexed and served by each municipality. An additional Negotiated Service Area defines locations north and west of Dublin ~~considered to be~~where the specific municipality to provide service has not been determined. Agreements stipulate that neither Columbus nor Dublin will annex lands within the Negotiated ~~Expansion~~Service Area without mutual agreement of both representing City Councils.

~~A.~~ Existing Agreements

City of Columbus - Sanitary Sewer Service Agreement

The sanitary sewer service agreement approved on April 13, 1993, provides the City of Dublin ~~with~~ the ability to dispose of wastewater through the City of Columbus wastewater collection and treatment system until the contract's expiration in 2043. The agreement between the City of Dublin and the City of Columbus allows Dublin to construct sanitary sewers necessary to serve developing areas of the ~~City~~city. The operation and maintenance of the sanitary sewer collection system within the City of Dublin is the responsibility of the City of Dublin.

Either Dublin or Columbus is required to provide written notification, five years prior to the end of the contract period, to inform the other of its ~~intensions~~intentions regarding the contract. If written notification by either ~~city~~City does not occur, the contract is automatically extended for a period of three years. The sanitary sewer service agreement ~~ensures the City of Dublin will have~~ effectively provides for reliable wastewater disposal ~~for years to come~~.

City of Columbus – Water Service Agreement

Dublin's water service agreement, also entered into on April 13, 1993, provides the City of Dublin access to drinking water until the contract expires in 2043. ~~Under the water service agreement,~~Similar to wastewater provisions, Dublin is permitted to construct water distribution infrastructure and connect to City of Columbus infrastructure for the purpose of providing or improving water supply to Dublin. The City of Columbus is responsible for routine maintenance and operation of the water distribution system within ~~the City of~~ Dublin. The cost related to excessive maintenance, as defined by a formula within the contract, is the responsibility of the City of Dublin. The maintenance of fire hydrants, water storage facilities and vault structures for pressure reducing valves are also the responsibility of the City of Dublin.

Either Dublin or Columbus is required to provide written notification, ten years prior to the end of the contract period, to inform the other of its ~~intensions~~intentions regarding the contract. If written notification by either ~~city~~City does not occur, the contract is automatically extended for a period of three years. The water service agreement ~~ensures~~effectively provides the City of Dublin ~~will have~~with a reliable source of drinking water ~~for years to come.~~.

City of Columbus - Economic Development Agreement

The City of Dublin entered into an Economic Development Agreement (EDA) with the City of Columbus in 2009, including modifications to the existing water and sewer service agreements. The EDA applies to a 277-acre area within the Negotiated Expansion Area, as defined by the 1993 Columbus and Dublin Water and Sewer Service Agreements.

The EDA established the terms and conditions under which the 277-acre area will become part of the Exclusive Dublin Expansion Area. Dublin City Council formally adopted the EDA with Ordinance 43-09 on August 17, 2009. On July 13, 2009, Columbus City Council approved ordinances authorizing the proposed EDA and the associated modification to the existing water and sewer service agreements.

The EDA facilitates the orderly development of this area by:

- Allowing for the annexation of properties adjacent to, and part of, areas planned for substantial economic development investments.
- Providing the opportunity for greater influence over the development of properties located adjacent to both existing Dublin neighborhoods and a proposed major interchange improvement.
- Providing for the use of Dublin utility infrastructure, which has been sized and located to serve the area.

The key components of the EDA are:

- If annexation is requested by a property owner, the land will be annexed into Dublin
- Dublin will pay to Columbus an Equity Share for each annexation
- Dublin and Columbus will equally share in the net income tax revenues
- Dublin will provide utility services to the area
- Dublin will fund the necessary capital investments and other governmental services in the area and Columbus will return a portion of the tax revenues as reimbursement
- Non-compete clause

The initial term of this Agreement terminates on April 13, 2043, unless otherwise terminated prior to that date.

Shawnee Hills – Sanitary Sewer Agreement

On March 18, 2000, the City of Dublin entered into an agreement with the Village of Shawnee Hills located north of Dublin along the Scioto River to provide ~~Village~~village access to sanitary sewer service. Today, Dublin provides access to the ~~City's~~city's sewer system in order to transport sewage and other wastes from Shawnee Hills to the City of Columbus system for treatment and disposal.

As part of that agreement, the ~~Village~~village made a one-time payment for access to transport up to 120,000 gallons per day (gpd). Excess flows will result in ~~the entitlement to~~ additional payments based upon the level of flow. An odor control facility was also provided by the City of Columbus as part of the agreement ~~by the City of Columbus~~. The Shawnee Hills agreement will last until 2040, unless written notice is provided by either party at least five years in advance of the termination date. If notification does not occur, the agreement will remain in effect for successive three-year periods.

The Shawnee Hills agreement was amended in 2003 to consider sanitary sewer provision to the South Heidelberg Property (Bogey Inn site). As part of the approved contract amendments, the site is served by Shawnee Hills and is subject to Village regulations regarding sanitary sewer services. Flows from this site are not included in the 120,000 gpd contract cap, and the site has been annexed to the ~~City~~city and is subject to Dublin zoning regulations.

Delaware County – Sanitary Sewer Agreement

On August 22, 1994, the City of Dublin entered into an agreement with Delaware County to provide sanitary ~~sewerage~~sewer treatment for portions of land along Summit View Road. For designated areas north of Summit View Road, the ~~City~~city collects wastewater and discharges it to Delaware County for treatment and disposition. The ~~contracted area is now~~ fully developed ~~and~~contracted area includes the Wedgewood Hills, Campden Lakes and Wedgewood Glen subdivisions. These projects were developed in accordance with the agreement at prescribed densities of 1.25 units per acre. Dublin performed inspections on the installation of the sewer system and is required to maintain infrastructure. ~~-~~Capacity fees and ~~usage~~use charges are paid to Delaware County ~~in this area~~.

This agreement ~~also~~ included service agreements for Shawnee Hills with Delaware County; however, a subsequent 2000 agreement with the Village of Shawnee Hills and Columbus fulfills the requirements to provide the safe transportation of sewer flows as prescribed in the 1994 agreement. Delaware County is responsible to inspect and maintain the sewer collection system in these areas, and capacity fees and ~~usage~~use charges in Shawnee Hills are paid to the City of Columbus.

City of Marysville

Portions of Dublin's Negotiated Service Area as defined in the Columbus contracts currently obtain sanitary and water service through the City of Marysville. The area served is primarily located along Industrial Parkway through infrastructure originally installed under the jurisdiction of Union County. The ~~County~~county and City of Marysville entered into a contract on February 1, 2006, that transferred the operation and maintenance of the systems to the City of Marysville with defined areas of future municipal growth and additional areas of exclusive service provision within surrounding townships.

~~The~~In 2009, the City of Marysville ~~has begun~~completed the construction of a new wastewater treatment facility north of U.S. 42 adjacent to U.S. 33 on Beecher-Gamble Road~~. This facility is expected to become operational in late 2008. The new plant is projected to address existing~~.. The plant addresses capacity and environmental issues with the existing facility and will manage the treatment of up to eight million gallons

per day (MGD). While the City of Marysville is obligated to maintain service to existing county customers, coordination of services outside Marysville's expected growth area and aging infrastructure provides opportunity for regional dialogue and cooperation as development progresses in the Negotiated Service Area.

~~B.~~ *Ohio Environmental Protection Agency - Director's Final Findings and Orders*

In November of 2008, City Council approved Resolution 83-08, which authorized the City Manager to enter into an agreement with the Ohio Environmental Protection Agency (OEPA) regarding the Director's Final Finding and Orders (DFFO) related to sanitary sewer system discharge and storm water inflow and infiltration. The OEPA issued the final version of the DFFO on February 11, 2009.

The DFFO requires that the communities that discharge their wastewater into the Columbus system plan and implement practices to assist in minimizing illegal discharges from the Columbus system. The required implementation includes:

- Public Notification Program
- Sanitary Sewer Overflow (SSO) Emergency Response Plan
- Sanitary Sewer Evaluation Study (SSES)
- Capacity, Management, Operations and Maintenance (CMOM) program

All of the requirements listed above have been met. The SSES is an on-going project and is on an approved 15-year schedule.

Conclusions and Recommendations

As a governmental agency, the City of Dublin strives to provide its residents and businesses with the safe and efficient collection of wastewater and adequate distribution of potable water for consumption and fire protection. ~~Dublin's existing service agreements help provide a high quality of life and level of service within the community.~~ As Dublin continues to grow and further development occurs in the U.S. 33 Corridor Area and Northwest/Glacier Ridge Area ~~(refer to area plans in *Chapter 3 – Land Use* for more information~~), the presence of overlapping service areas provides an opportunity for coordinated water and sanitary sewer provision that can result in greater efficiency and benefit to the entire region. All potential options for water and sewer provision should be considered as growing development ~~impacts~~affects the capacities and operational function of the planning area; policies relating to these growth issues should be ~~further~~ examined with future development.

While the City has traditionally provided water and sewer service to areas only within municipal boundaries, the consideration for extending services outside the ~~City~~city should also be evaluated as a means to achieve economic development goals and other quality of life objectives. Existing or future

service agreements should be considered within the context of long-term maintenance and infrastructure viability for all remaining portions within the service area.

~~III.~~ Sanitary Sewer

~~A.~~ Existing Conditions

The sanitary sewer collection system for the City of Dublin contains seven major sanitary trunk sewers and seven sewer tributary areas. The sanitary sewer tributary areas ~~are represented on Map 9.2. The major trunk sewers are as follows~~include:

- Deer Run Sanitary Trunk Sewer
- North Fork Indian Run Sanitary Trunk Sewer
- South Fork Indian Run Sanitary Trunk Sewer
- Cosgray Sanitary Trunk Sewer
- North Cramer Sanitary Trunk Sewer
- South Cramer Sanitary Trunk Sewer
- Riverside Sanitary Trunk Sewer

The Riverside Sanitary Trunk Sewer serves those areas of Dublin on the east side of the Scioto River and drains into the City of Columbus sanitary sewer system through the Upper Scioto East Interceptor Sewer. The remaining six tributary areas located on the west side of the Scioto River drain to the Upper Scioto West Interceptor Sewer. The Upper Scioto West Interceptor is the latest major improvement to the sanitary sewer system. ~~Costing~~The $21.7 million ($18.7 million funded by the City of Dublin and $3.0 million by the City of Columbus~~), the~~) project was undertaken to relieve many system deficiencies and provide the sanitary sewer system adequate capacity necessary to meet ~~the~~future wastewater demands ~~associated with future growth. The debt incurred by Dublin to finance this project will be repaid by 2018.~~.

The sanitary sewer collection system consists of more than ~~212~~225 miles of sanitary sewers and 5,~~130~~537 sanitary sewer manholes. One sanitary sewer pump station along with approximately 3,500 feet of sanitary sewer force main ~~compliment~~complement the system to provide service to areas in the Riverside Sanitary Sewer Tributary areas where gravity service is not feasible. This pump station is located along the east side of Riverside Drive between Summit View Road and Wyandotte Woods Boulevard. The City of Dublin currently generates an average of approximately ~~six MGD~~6 mgd of wastewater that drains to the City of Columbus sanitary sewer system for ultimate treatment and disposal.

~~B.~~ Analysis and Future Projections

The existing and future conditions of utility infrastructure can be evaluated by applying the sanitary sewer flow and water demand estimates into hydraulic computer models. For each sanitary sewer tributary area,

a computer model was created and populated with information from documented as-built construction drawings.

Since the ~~1997~~2007 Community Plan was completed, ~~many~~additional improvements and additions to utility infrastructure have taken place. Improvements performed range from major capacity enhancements to repairs in aging infrastructure. These improvements and additions were researched and added to the ~~current~~ utility computer models.

Existing and future sanitary sewer flows were developed for input into the sanitary sewer model. Existing flows for the model were created using a combination of existing house counts and sanitary sewer flow meter data to establish a daily flow pattern. Using ~~the~~standard design criteria ~~in Table 9.1~~ and future uses discussed in the Land Use Chapter ~~3~~, the future flows were estimated and entered into the model. Existing and future impacts to the sanitary sewer system were then evaluated to ensure that necessary capacity is available to transport wastewater flows.

The OEPA DFFO requires that the City perform a Sewer System Evaluation Study (SSES). The City has opted to do this study in phases over a 15-year time frame. This study requires gathering field data and performing hydraulic analysis of the sewer system. Each of the existing sewer sheds models use updated data based on the schedule approved by the OEPA. The narrative for the watersheds is updated as continued modeling is performed.

An analysis of the sanitary sewer system based on the proposed greater densities within the Bridge Street District that were not considered in previous modeling found that the trunk sewers that serve this area (Deer Run, North Fork Indian Run, South Fork Indian Run and Riverside) were adequate to serve the proposed development plan. Only minor improvements to the rest of the system are otherwise required.

Deer Run Sanitary Sewer Tributary Area

The Deer Run Sanitary Sewer Tributary Area currently serves approximately 3,350 acres of developed land within the City of Dublin. Existing development within the Deer Run produces a peak daily sanitary sewer flow of approximately 5.60 MGD, and the main trunk sewer is experiencing problems under existing conditions. Currently there are two separate areas where the sewer has reached its hydraulic capacity: the Dublin Road Siphon and Kilbannan Court Capacity Constraint.

The Deer Run Trunk Sewer just north of the intersection of Dublin Road and Reserve Drive has reached its hydraulic capacity under existing conditions. The location of the capacity problem is the former site of the Deer Run Pump Station. Currently there are parallel 15-inch sewers acting as a siphon and emptying in a 36-inch sewer under Dublin Road. The majority of the flow from the Deer Run Sanitary Tributary Area passes through these parallel sewers. The 15-inch sewers are not capable of handling additional flow and improvements to this area are necessary ~~to accommodate additional growth.~~.

The Deer Run Trunk Sewer just south of Kilbannan Court is also exceeding its hydraulic capacity under existing conditions as it passes through the Muirfield Village Golf Course~~. The sanitary sewer upstream of~~

~~this area is 12 inches in diameter. At this location the sewer reduces down~~ where the 12 inch diameter pipe is reduced to an eight-inch sewer. This bottleneck may cause the sanitary sewer to surcharge during peak flows under existing development conditions.

Although the Deer Run tributary area is mostly developed, there are small areas that still have the capacity for development and/or redevelopment. Using the proposed future land uses, approximately 5.67 MGD of total peak sanitary flow will be generated in this watershed. No additional sections of the sanitary sewer system appear to be ~~impacted~~affected by this additional sanitary flow. However, additional growth in the Deer Run sanitary sewer system will worsen capacity problems at the Dublin Road Siphon and Kilbannan Court area. The current condition of the sanitary sewer system will prohibit additional growth in this area until the identified deficiencies are corrected.

As required by the OEPA DFFO, additional modeling has been done for this tributary area and upgraded to a dynamic model including all pipes, This new model validated the findings of previous work and provides additional insight for managing the identified issues. Proposed improvement projects will be carried into future capital improvement programs to resolve these issues.

In 2012, the City undertook a large sewer lining project within this tributary. The age and pipe material of the sewers in this area has allowed more than usual amounts of rainfall and groundwater to enter the system. The more durable pipe linings restore the structural integrity of the pipe and reduce the amount of inflow and infiltration of rainfall and groundwater. Additional reduction of inflow and infiltration from repair and maintenance of house services may be necessary to continue to further improve the conditions of this sewer tributary area.

North Fork Indian Run Sanitary Sewer Tributary Area

The North Fork Indian Run Sanitary Sewer Tributary Area ~~currently~~ serves approximately 3,030 acres of developed land within the ~~City of Dublin~~city. Existing development within the North Fork Indian Run produces a peak daily sanitary sewer flow of approximately 4.91 MGD. While there are no capacity issues under existing peak conditions, the sanitary sewer is gradually reaching its allowable capacity.

The North Fork Indian Run Sanitary Tributary Area has ~~a great deal of area left to be developed.~~significant undeveloped land. The previously defined tributary area encompasses a large portion of the Negotiated Service Area. ~~The future~~Future land uses produce sanitary sewer flow projections of approximately 10.09 MGD, and the service area for the North Fork Indian Run Sanitary Sewer System would ~~increase~~more than double in area, from 3,030 acres to 6,900 acres, ~~more than doubling in size. Under the future land uses, the North Fork sanitary sewer system experiences~~thus creating many capacity issues. The main trunk sewer exceeds capacity in the general area of Dublinshire Drive and Cashel Court to the trunk sewer's terminus near Dublin Road. This represents approximately 9,000 feet of 24-inch sanitary sewer. Major sanitary sewer improvements will be needed to serve expected build-out in the area.

South Fork Indian Run Sanitary Sewer Tributary Area

The South Fork Indian Run Sanitary Sewer Tributary Area currently serves approximately 2,300 acres of developed land within the ~~City of Dublin.~~city. Existing development within the South Fork Indian Run produces a peak daily sanitary sewer flow of approximately 3.91 MGD. Under existing peak conditions there appears to be no capacity issues ~~within the South Fork Indian Run Sewer System.~~.

The additional area to be served by the South Fork Indian Run Sanitary Sewer System is approximately 1,920 acres. The future land uses in this watershed are projected to produce sanitary sewer flows of approximately 8.56 MGD. ~~In order to~~To accommodate the additional flow, approximately 4,000 feet of sanitary sewer will need to be improved ~~within the South Fork Indian Run~~.

Cosgray Sanitary Sewer Tributary Area

The Cosgray Sanitary Sewer Tributary Area currently serves approximately 1,210 acres of developed land within the ~~City of Dublin.~~city. Existing development within the Cosgray produces a peak daily sanitary sewer flow of approximately 1.68 MGD. The trunk sewer under existing conditions appears to be performing well with additional capacity available throughout the system.

The future land use plan indicates an additional 530 acres of area that would be served through the Cosgray Sanitary Sewer System. These uses would produce approximately 3.24 MGD of sanitary sewer flows. The model results show the Cosgray Sanitary Trunk Sewer has sufficient capacity to serve the land uses as proposed.

Cramer North Sanitary Sewer Tributary Area

The Cramer North Sanitary Sewer Tributary Area currently serves approximately 1,175 acres of developed land within the City of Dublin. Existing development within the Cramer North produces a peak daily sanitary sewer flow of approximately 1.45 MGD. The trunk sewer under existing conditions appears to be performing well with additional capacity available throughout the system.

Based upon expected future development within the ~~City's~~city's planning area, an additional 675 acres of land is to be developed in the Cramer North Sanitary Sewer Tributary Area. The sanitary sewer flow produced would be approximately 3.43 MGD~~. The sanitary sewer appears to have sufficient~~ , within the capacity to accommodate ~~growth~~ proposed ~~on the Future Land Use Map.~~future land uses.

Cramer South Sanitary Sewer Tributary Area

The Cramer South Sanitary Sewer Tributary Area currently serves approximately 515 acres of developed land within the ~~City of Dublin.~~city. Existing development within the Cramer South Tributary produces a peak daily sanitary sewer flow of approximately 2.69 MGD. The trunk sewer under existing conditions appears to be performing well with additional capacity available throughout the system.

Under the Future Land Use Map, an additional 825 acres of land is to be developed in the Cramer South Sanitary Sewer Tributary Area. This would produce a sanitary sewer peak flow of approximately 3.20

MGD. Under these conditions the ~~sanitary sewer~~ system is capable of meeting the needs of future growth in this sanitary sewer tributary area.

Riverside Sanitary Sewer Tributary Area

The Riverside Sanitary Sewer Tributary Area currently serves approximately 1,320 acres of developed land within the ~~City of Dublin.~~city. Existing development within the Riverside Tributary produces a peak daily sanitary sewer flow of approximately 3.53 MGD. The trunk sewer under existing conditions appears to be performing well with additional capacity available throughout the system.

~~With the~~The future land use plan~~,~~ identifies an additional 716 acres of land ~~is~~ to be developed in the Riverside Sanitary Sewer Tributary Area. This produces a total sanitary sewer peak flow of approximately 6.27 MGD~~. Under these conditions~~, which is within the ~~sanitary sewer system is capable~~service capacities of ~~meeting the needs of future growth in~~ this ~~sanitary sewer~~ tributary ~~area~~.

~~C.~~ *Bridge Street District*

Four sewer tributary areas are used to provide sanitary services to the Bridge Street District: Deer Run, North Fork Indian Run, South Fork Indian Run and Riverside. The static models for these areas were updated in 2011 to reflect newer flow metering data, any new development not reflected appropriately in the previous model and the proposed densities for the Bridge Street District. No immediate operational issues were identified that were caused by the proposed level of development in the District. The estimated additional flows by the proposed land use will not change the performance of the existing system. Additional sewer infrastructure will be needed by proposed developments within the District to provide service to their buildings.

Conclusions and Recommendations

The additional area proposed to be serviced through the City of ~~Dublin~~Dublin's sanitary sewer system represents an additional 17.0 MGD in peak wastewater flow ~~that would be transported through the City's existing infrastructure.~~. Table 9.2 summarizes the peak sanitary sewer flows determined through modeling, ~~and a total of~~where three watersheds have limitations on their ability to serve additional growth.

- The Deer Run Sanitary Sewer System has reached its allowable capacity and will require sanitary sewer improvements to accommodate additional growth.
- The North Fork Indian Run Sanitary Sewer System is not capable of serving the ~~entire tributary area as it is~~ currently defined~~.~~ tributary area. Additional modeling and analysis will be needed to identify the maximum area that can be served ~~by the North Fork Sanitary Sewer System~~. Alternatives should ~~also~~ be ~~developed~~considered to identify ~~how~~options to provide sanitary sewer service to the remainder of the Negotiated Service Area ~~with access to sanitary sewer service~~.

- The South Fork Indian Run Sanitary Sewer System will require capacity improvements ~~in order to facilitate the transport of~~to handle wastewater flows expected by the Future Land Use Map. Alternatives should be developed to identify the level of improvements necessary to provide sewer service in this watershed.

All projections are based on the densities determined as part of the 2007 Future Land Use Map. Significant alterations to these densities could ~~impact~~affect the ability of the City to provide for ~~collection and transport of the~~ resulting wastewater flows. The above narratives for each watershed will be revised as updated modeling is performed, as required by the OEPA Director's Final Findings and Orders.

~~IV.~~ Water Supply

~~A.~~ Existing Conditions

The City of Columbus water supply is supported by both surface water and ~~ground water~~groundwater sources and is the primary source of drinking water for the ~~City of Dublin.~~city. The City of Columbus is currently in the process of ~~implementing~~ improvements to increase the system's water supply and safe yield (the amount of water that can be supplied during an extended period of drought). Columbus is planning to expand ~~ground water~~groundwater wells, and is constructing three additional reservoirs~~. The new reservoirs will be located~~ in Delaware County. The continued efforts to maintain adequate sources of drinking water will enable the ~~City of Dublin to support additional community growth~~Dublin to support additional community growth. The construction of the first (and largest) of the upground reservoirs and associated piping was started in 2011 and is expected to be complete in 2013. The need for the other two reservoirs will be determined in future years and no construction dates have been set.

The water distribution system supplying ~~the City of~~ Dublin provides an average of approximately 5.9 million gallons of domestic water on a daily basis. The distribution system consists of over ~~182~~227 miles of water distribution pipe ranging in size from two inches to 24 inches. The system contains 2,~~900~~997 public fire hydrants and ~~1,800~~2,346 water valves.

Water storage, necessary for fire protection and maintaining pressure in the system, is provided by ~~five~~six storage tanks ~~totaling 7.5~~with a combined capacity of 9 million gallons. The current active storage towers are ~~listed as follows.~~:

- Summit View Storage Tower (2 MG)
- Rings Road Storage Tower (2 MG)
- Avery Road Storage Tower (2 MG)
- ~~Post Road Storage Tower (1 MG)~~
- Tartan West Storage Tower (0.5 MG)
- Darree Fields Storage Tower (2 MG)

- Dublin Road Storage Tower (0.5 MG)

System water storage is maintained by four booster stations~~.~~ (Rings Road, Post Road, Brand Road, and Tartan). The storage towers control system hydraulics across four pressure districts~~. The four pressure districts~~ (Henderson, Smoky Row, Post and Tartan~~) and~~).

As part of the ~~storage tower locations are depicted~~analysis for the infrastructure to support the Bridge Street District, the water system model was upgraded to a dynamic model from a static model. The dynamic model provides information on ~~Map 9.3~~how the system operates over time. This is a more accurate way to examine how the water distribution system functions with varying demand level throughout the day and seasons.

~~B.~~ Analysis of Existing Conditions

The water transmission system was evaluated using a hydraulic model that simulates pressurized hydraulic systems. The ~~water distribution~~ model was created using ~~existing flow test information and water demand estimates, and~~ only transmission lines larger than 12 inches in diameter ~~were included in the model.~~and existing flow test information and water demand estimates. Using fire hydrant flow test data, the ~~water~~ model was calibrated to existing conditions. ~~After the~~Once existing conditions could be reliably reproduced ~~by the model, the~~, future demand was added ~~to the water model. By adding the future demands to the model, the effects~~allowing an evaluation of ~~future demands on~~ the existing transmission system ~~could be evaluated~~. Potential improvements necessary to provide capacity for future demand ~~could also be identified. Future demand projections were established~~ based on the proposed future land use scenario~~.~~ could also be identified.

The hydraulic model was ~~utilized~~used to determine the scope of improvements ~~necessary to improve~~to the existing water distribution system to meet pressure and fire flow requirements. For the purposes of this preliminary analysis, the alternatives analyzed ~~are~~were not ~~meant to be~~ exhaustive~~. The~~; the improvements described ~~below~~ are meant to provide an understanding for the level of improvements necessary to meet hydraulic requirements. Additional alternative studies should be performed to verify that the solution that is implemented is the best one for the ~~City~~city.

~~The existing~~Existing conditions were evaluated using a calibrated water distribution model to determine if the appropriate fire flows and minimum pressures ~~can~~could be maintained. Fire flows greater than 1,000 gallons per minute (gpm) are required, however ~~it is desired to have~~ greater ~~that~~than 2,500 gpm available at any location within the distribution system is most desirable. System pressures greater than 20 pounds per-square-inch (psi) are required during peak hourly demands; however, it ~~is desired to have~~ pressures greater than 35 psi during peak hourly demands are desired to ensure adequate system performance.

Under existing conditions the water system is generally capable of meeting average daily and maximum daily demands. Under peak hourly demands, the system is showing signs of ~~low~~lower pressures in the area of Rothesay Drive and Glick Road and in the vicinity of Memorial Drive and Gairloch Court, just east of Muirfield Drive. The pressure experienced in these areas is currently above 35 psi during peak hourly demands; however, these areas do represent the lowest pressures within the system.

While the results of hydraulic modeling indicated that all portions of the water distribution system are currently meeting *required* fire flows, large portions of the system were not able to provide levels that meet *desired* fire flows:

- Muirfield Village and areas generally bounded by Avery Road to the west and Brandon Park to the south experience fire flows less than 2,500 gpm at a residual pressure of 20 psi under existing conditions.
- Areas east of the Scioto River bounded by Riverside Drive to the west, Hard Road to the north and Bright Road to the south experience fire flows less than 2,500 gpm at a residual pressure of 20 psi under existing conditions.
- Other smaller areas not capable of delivering desired fire flows can also be found in the areas of Ballantrae Loop near the Southwest Area and Tuller Ridge Drive in the Sawmill/SR 161 Area.

~~In order to address issues identified in the Muirfield Area and to provide increased hydraulic capacity, an~~An elevated storage tower was added to the model in the vicinity of Muirfield Village to address issues identified in this area and to provide increased hydraulic capacity. The results of modeling showed that pressures experienced in the area during peak hourly demands improved greatly, and the area was able to meet fire flow requirements ~~with the inclusion of elevated storage~~.

Additional modeling ~~was performed, and results showed there are multiple~~ demonstrated several suitable locations ~~that would be suitable~~ for an elevated storage tower ~~as shown on Map 9.3.~~. In addition to elevated storage, an alternative was analyzed that would ~~entail increasing~~increase the capacity of water delivery to the affected area by constructing a large transmission line. While this alternative would resolve the existing deficiencies in the area, it would be more costly than elevated water storage and would be more disruptive ~~to the public during construction. In order to select the best alternative to improve this area, the City will continue to track the condition of the water system and develop a detailed capital improvement plan for addressing the hydraulic issues as well as determining the appropriate time to construct necessary improvements.~~during construction. A Preliminary Engineering Study was completed in 2010 to determine a site for the needed additional elevated water storage. The modeling done for the 2007 Community Plan was revisited including the previously proposed locations for the additional 500,000 gallon tower. Several public meetings were held to discuss the need and possible locations for the water tower. In May of 2010, Council approved the location at 10525 Dublin Road based on the modeling and public input. The land (approximately 3.8 acres) was purchased from the Muirfield Village Golf Club and the tank was constructed and became active in 2013.

Based upon analysis, portions of the water distribution system along Avery Road and Glick Road appear to experience problems meeting fire flow requirements. The area is within a different pressure district than the majority of the Muirfield area ~~mentioned above. In order to improve hydraulic capacity to this area, a~~. A 16-inch transmission line from the Tartan West Tank to the existing transmission line on Manley Road was added to the model~~. The results of the model analysis showed the improvement enabled the area to meet fire flow requirements~~ to improve hydraulic capacity, and demonstrated sufficient fire flow

requirements. A 12-inch transmission main was installed as part of the Tartan Ridge development project in 2010. This improvement was included in the modeling performed for the Dublin Road Water Tower and is sufficient to resolve the stated deficiencies in this area.

East of the Scioto River, the water distribution system east of Riverside Drive, south of Hard Road and north of Bright Road may not be able to meet fire flow requirements. To represent the additional hydraulic capacity to this area, the water main on Sawmill Road south of I-270 was modeled to connect with the water main on Sawmill Road north of I-270. This improvement would require crossing I-270 and may be costly. The area does contain smaller water mains that are currently not included in the ~~City of Dublin's~~ hydraulic model. While it is believed the looping of smaller mains in this area will provide sufficient fire flows, additional analyses will be performed to determine the specific impacts to this portion of the distribution system. The addition of hydraulic capacity to this area will improve the ability to meet fire flow requirements.

A localized area in the vicinity of Ballantrae Loop ~~area~~ experienced problems delivering the required fire flows under existing conditions. To provide additional hydraulic capacity to this area, a transmission line was added to the model in an effort to loop this dead end area with the existing water distribution system. In addition, a 2.0 MGD water storage tower was modeled in the Darree Field Park to improve system performance in the southwest area of the ~~City~~city. The results of the model analysis proved the addition of this transmission line and elevated storage will enable the water system in this area to meet fire flow requirements. ~~-~~Accordingly, the proposed water tower was constructed and put into operation in 2010. The transmission mains were installed along Cosgray Road (from north of Shier Rings Road to the future entrance into Ballantrae) and along the Darree Fields driveway to provide connection to the Darree Fields Water Tower. In 2011, the extension of the 12-inch waterline into Ballantrae to address the pressure issues on Ballantrae Loop was installed per an approved Infrastructure Agreement with developer of Ballantrae.

~~C.~~ Analysis of Future Conditions

Water demand design criteria were based on a combination of existing City of Dublin specific data and industry standard values. An average daily demand of 259 gpd/EDU was used for estimating existing and future water demands for residential land use throughout the system. This value was determined through investigation of existing water use records. Other land uses utilized the sanitary sewer flow projection criteria to estimate the water demand throughout the system. After calibrating the model to existing system data, the impact of average daily demands on the system could be evaluated.

Water demand projections were developed for the future land use plan ~~for the City of Dublin. Table 9.3~~. The table below represents the total water demands for the existing and future conditions. The ~~overall~~ increase in water ~~demands~~demand to serve all development scenarios represents an almost 100 percent increase over current ~~water~~ demands. ~~Due to these demands~~Accordingly, the existing system will not be able to meet hydraulic requirements ~~under future land uses~~ unless improvements are made ~~to the existing water distribution system.~~ . Areas identified with deficiencies under existing conditions exhibit further reductions in pressure and available fire flows.

The Muirfield Area in the location of Rothesay and Gairloch will gradually develop pressures that are below the required 20 psi standard. The larger Muirfield area will develop pressures that are below the desired minimum pressure of 35 psi. Portions of the Muirfield area affected by lower than desired available fire flows under existing conditions will also gradually increase in size. ~~Based upon modeling, however,~~Modeling shows that this ~~area of~~ lower than ~~desire~~desired pressure will remain confined to the Muirfield area.

Portions of the Southwest Area near the Ballantrae subdivision, particularly near Ballantrae Loop, will also exhibit signs of lower than desired pressure. Without additional improvements, this identified area will also eventually experience pressures lower than the required 20 psi ~~standard~~. This area of lower pressure will gradually expand to include much of the Southwest Area, including south to Rings Road and Tuttle Crossing. Other portions of the region along SR 161, Post Road and Emerald Parkway will also develop pressures that are less than the desired minimum pressure of 35 psi.

Areas east of the Scioto River, particularly those bounded by Riverside Drive to the west, Hard Road to the north and Bright Road to the south that currently exhibit lower than desired pressures will remain the same. However, the total available fire flow will continue to decrease in the area.

~~D.~~ Bridge Street District

The proposed future lands uses in the Bridge Street District will require approximately 2.11 million gallons per day as their water demand. The water system modeling performed for the existing conditions did not identify any immediate operational issues requiring system improvements. The area system consists primarily of 12-inch mains and their connectivity must remain throughout the development of the District. Due to the proposed density and mixed use nature of the District, a higher level of fire flow demand was analyzed. The system will need three improvements to deliver the needs water for the proposed development levels (in addition to the infrastructure needed for individual projects):

- Upsize the existing 8-inch line in Kilgour Place to a 12-inch line
- Create a 12-inch loop from Dublin Road to Kilgour Place
- Install a 12-inch line on Riverside Drive to connect to the existing 12-inch lines on Dale Drive and Tuller Road

Conclusions and Recommendations

Improvements to the water distribution system will be necessary to meet future peak hourly demands. The improvements to the existing distribution system~~,~~ necessary to meet acceptable peak hourly demand pressures and maximum daily fire flow requirements~~,~~ were included in the future conditions model. The results of the model showed the improvements were able to correct all of the problems in areas that were not able to meet pressure and fire flow requirements under future conditions.

The expansion of development into Dublin's planning area in the Negotiated Water and Sewer Service Area north of SR 161 will require additional storage capacity. While the ~~proposed~~ Darree Fields water tower can meet initial storage requirements for short-term development potential, it is expected that future water demand will require the need for storage along the U.S. 33/Industrial Parkway corridor. A 2.0

MG elevated water storage tank may be necessary between U.S. 33 and Industrial Parkway, depending upon a determination of future service provision within the area. A site just north of Corporate Boulevard will provide a centralized location and can serve the Negotiated Area.

The additional area proposed to be serviced by the water distribution system represents an additional 5.89 MGD in average water demand and an additional 27.0 MGD of peak hourly demand. To facilitate the growing demand on the system, a number of improvements ~~will need to be~~have been implemented that will increase the system's ability to provide adequate pressures and fire flow capacity. While it has been shown the improvements listed below will resolve many system constraints, it may be possible to reduce the scope of improvements through more detailed analysis.

- ~~Muirfield Area~~Dublin Road Water ~~Storage Improvements~~Tower
- ~~•~~ Darree Fields Water Tower
- Tartan West Transmission Line Improvements - Completed within Tartan Ridge development
- ~~Sawmill Road Water Line Improvements~~
- ~~•~~ Cosgray Transmission Line Improvements - Completed as a Capital Improvement project associated with the Darree Fields Water Tower construction
- Tuller Ridge Drive Water Line Improvements - Completed within Greystone Mews development
- ~~Cosgray Elevated Water Storage Improvements~~

These projections and proposed improvements are based on the mix of land uses and densities as expressed by the preferred land use scenario. Significant alterations to these densities could ~~impact~~affect the ability of the City to provide required water system pressure and fire flows.

~~V.~~ Stormwater Management

~~A.~~ Existing Conditions

Unlike sanitary sewer and water systems~~, the major conveyance system for~~ stormwater flow is naturally ~~occurring via the~~ occurs by way of swales, creeks, and rivers ~~in the~~, each of which contributes to a larger drainage area called watersheds. This means that the City cannot impair, and needs to ~~continue~~ proactively ~~maintaining~~maintain the integrity and capacity of these naturally occurring features.~~-~~ While storm sewers and stormwater management will not limit the intensity of development, the allowance for appropriately sized facilities on each ~~project~~development is important. The creation of the Stormwater Master Plan and its recommendations for the 1997 Community Plan gave the City a strong base for managing stormwater.

The Stormwater Master Plan was created based on models of each stream that flows through the ~~City~~city to the Scioto River. ~~These streams are within the watershed areas listed in Table 9.4 and are depicted graphically on Map 9.5.~~

The results of the 1997 modeling identified deficiencies in the system ~~at that time. Through the~~many of which have been addressed through the City's Capitol Improvements Program~~, the City has undertaken many of these improvement projects.~~. These projects have included two phases of storm sewer installation in Historic Dublin, channel improvements along Clover Court and Shier Rings Road, the Aryshire Drive culvert replacement, and bank stabilization of the North Fork Indian Run along Brand Road. An audit of the North Fork Indian Run watershed showed that the regulations are controlling the runoff from developed sites at rates so that stream levels have not increased since the initial model was performed.

~~An additional~~Another result of the previous modeling and investigation efforts was the ~~implementation~~identification of the need to implement new stormwater management regulations. The initial version resulted in Chapter 53 of the Codified Ordinances passed by City Council ~~on June 8,~~in 1998. These regulations included the first codified requirements for control of both quantity and quality of stormwater runoff in Central Ohio. This practice has subsequently been incorporated into the Ohio Environmental Protection Agency's (OEPA) General Construction Permit with some minor variations. To comply with the state regulations, City Council adopted a revised version of the Stormwater Regulations ~~on September 6,~~in 2005. This version of Chapter 53 also contains Stream Corridor Protection Zone ~~Regulations~~regulations.

The regulations implemented since 1998 have required conservative allowable stormwater runoff from development sites. There were five watersheds where the significant development occurred: North Fork Indian Run, South Fork Indian Run, Cosgray Creek, Cramer Creek and Billingsley Creek. The Stormwater Master Plan contains predetermined release rates for each watershed. ~~An audit of the North Fork Indian Run watershed showed that the regulations are controlling the runoff from developed sites at rates so that stream levels have not increased since the initial model was performed. The Stormwater Master Plan will be updated in 2008, and new~~New modeling will aid in identifying any additional deficiencies for ~~programming~~inclusion within the Capital Improvement Program.

The Stormwater Master Plan Update, completed in 2009, had three primary goals: (1) update the modeling for the watersheds that experienced the most significant development growth; (2) update the capital improvement program projects recommended by the 1999 plan; and (3) forecast future regulatory impacts on the City's stormwater management program.

To update the modeling, stormwater management plans on file were reviewed for all previous developments that were not part of the initial modeling, field visits were made to verify the infrastructure, and the computer model was updated and the results analyzed. This review noted 165 new stormwater management facilities that were added to the system, only 30 of these were not constructed per the approved construction drawings. The analysis and findings of this portion of the update included:

- Wright's Run (Billingsley Creek): no new locations of stream bank erosion, deficient storm sewers, culver overtoppings or structural flooding.
- Cosgray Creek: two new locations of stream bank erosion, no deficient storm sewers, and two culverts that overtop in the 100 year event (under Shier-Rings Road (previously identified) and a driveway near Wilcox Road).
- Creamer Creek: three new locations of stream bank erosion, a section of deficient storm sewer in the Heather Glen subdivision, and no new culvert overtoppings or structural flooding.
- North Fork Indian Run: three new locations of stream bank erosion, no new pipes identified as deficient, and no new culvert overtoppings or structural flooding.
- South Fork Indian Run: one new locations of stream bank erosion, no new pipes identified as deficient, and one culvert overtoppings was identified.

These model results confirm that the City's current stormwater release rate policy provides consistent and accepted criteria throughout the city and has had a significant impact on minimizing effects of development to the receiving streams.

Three new capital improvement projects were identified through the modeling work: Hawk's Nest Improvements (storm sewer installation to alleviate standing water), Heather Glen Improvements (increase pipe size or add detention), and Glencree Place Improvements (storm sewer installation to alleviate standing water).

The future of stormwater regulations will evolve to include more prescriptive requirements for specific watersheds, numeric effluent limits, minimum control measures, encouragement of low-impact development design and retrofits to restore urban hydrology. While Dublin has required stormwater controls for quantity and quality since 1998, the City should consider changes to promote retrofits and low impact developments and should continue to coordinate with the OEPA on proposed changes to the statewide regulations for stormwater and erosion control.

Stream Corridor Protection Zones have ~~been established to add~~added a layer of protection for stream corridors that may have otherwise been adversely ~~impacted~~effected by development and where no other regulations provided for the preservation of the riparian buffers. These zones apply to streams within Dublin that do not have federally designated floodways or floodplains. These zones will also aid to protect residents from impacts of flooding and land loss through erosion.

~~Map 9.5~~ The map above depicts the locations where a Stream Corridor Protection Zone may apply. The exact location and width is determined by specific criteria in the Code.

Crossing of a Stream Corridor Protection Zone for roadways is restricted. Crossings can be permitted if alternative roadway locations are demonstrated to be infeasible and disturbances within the Stream Corridor Protection Zone will be minimized and mitigated.

A limited number of uses are allowed within a Stream Corridor Protection Zone. These include recreational activity, removal of damaged or diseased trees, and establishment of new vegetation or reforestation. Other projects or work can be considered where an environmental and public benefit is demonstrated. Disturbance of the Stream Corridor Protection Zone for these activities can be mitigated through ~~revegetation~~re-vegetation or reforestation.

~~Crossing of a Stream Corridor Protection Zone for roadways is restricted. Crossings will be reviewed if alternative roadway locations are demonstrated to be infeasible and disturbances within the Stream Corridor Protection Zone will be minimized and mitigated.~~

The following activities are prohibited in a Stream Corridor Protection Zone per the City Code: construction, dredging or dumping, disturbance of natural non-invasive vegetation, parking, new surface and/or subsurface sewage disposal or treatment areas, fences, walls, new agricultural activities, industrial or commercial businesses, ditching/diking, changes in topography, removal of topsoil or use of herbicides and pesticides.

The following facilities are prohibited in a Stream Corridor Protection Zone: buildings/structures, swimming pools, signs, billboards, utility lines or pipes (except as approved by the City), electric lines (with the exception of transmission lines), telecommunications lines (with the exception of transmission lines), cable TV lines and stormwater management facilities.

~~B.~~ Analysis and Future Projections

Each state is required by Section 303(d) of the Clean Water Act (33 U.S.C. 1313), to submit a prioritized list of impaired waters to the U.S. Environmental Protection Agency (EPA) for approval. The list indicates the waters of Ohio that are currently impaired and may require total maximum daily load (TMDL) development in order to meet water quality standards.

TMDL reports identify and evaluate water quality problems in impaired water bodies and propose solutions to bring those waters ~~into attainment with~~to attain water quality standards. TMDLs are established for phosphorus, sediment, fecal coliform bacteria, dissolved oxygen, ammonia, floodplain capacity, bed load, and habitat. Some of the recommended solutions to address the impairments include storm water controls, point source controls, manure management, and habitat improvements. As part of the federal Clean Water Act, the U.S. EPA must review and approve each TMDL.

Ohio's 2006 TMDL priority list was approved by the U.S. EPA on May 1, 2006. The list and schedule are contained in Appendix D.2 of the 2006 Integrated Water Quality Monitoring and Assessment Report and contains both the Scioto River and the Big Darby Creek. Prepared in accordance with federal guidance issued in July 2005, the Integrated Report satisfies the Clean Water Act requirements for both Section 305(b) water quality reports and Section 303(d) lists. The report describes the procedure that OEPA used to develop the list and indicates which areas have been selected for TMDL development during FFY 2007 through 2008. The Ohio EPA is moving forward on many TMDL projects, and a map of Ohio TMDLs in progress is also available from the Ohio EPA.

Currently, the land use planning boundary coincides with the limits of the watersheds that drain to the Scioto River. ~~If development~~Development within the corporate limits of the ~~City extends~~city farther west or north of the current planning boundary~~, this growth~~ could occur within the Big Darby and Little Darby Creek watersheds. Specifically, areas west of Dublin's current service area drain to Sugar Run, which is a tributary to the Big Darby Creek.

The Big Darby Creek Watershed TMDL Report that was approved by the U.S. EPA on March 31, 2006, states:

> "*The Darby Creek watershed, including Big and Little Darby creeks, is an important water resource in Central Ohio. Natural resource professionals from private, public and academic institutions are unanimous in citing these streams as among the most biologically diverse streams of their size in the Midwest. Big and Little Darby creeks have been designated as State and National Scenic Rivers, and the watershed is known to provide habitat for several state and federally listed endangered species.*"

The Ohio EPA has created specific regulations for stormwater management of this creek. Any regulations that are more stringent than Dublin's municipal regulations must be adhered to by development projects in the future. ~~The Scioto River is also scheduled for quality monitoring by the Ohio EPA in 2009, and a TMDL is expected to follow in 2011.~~

~~C.~~ Water quality assessments were performed by the OEPA in 2010 for their two assessment units that cover the City of Dublin: Indian Run (North and South Fork) watershed and Hayden Run – Scioto River watershed. The assessment placed these watersheds in Reporting Category 5 which means that the water quality is impaired and a TMDL is needed. A technical support document (TSD) is scheduled to be available by the OEPA for viewing by late 2012 or early 2013. The TSD contains the results of the initial survey, including presentation of raw data, as well as some synthesis and interpretation of the results. A TMDL report is likely to be completed by the end of 2013 by the OEPA. This will report the results of a follow-up study to quantify the magnitude of the pollution problem from all of the relevant sources and prescriptions for a reduction in pollutant loading from those identified sources.

In 2008 and 2009, the OEPA issued renewal permits for both the General Construction Permit and the Small Municipal Separate Storm Sewer Systems, respectively. Dublin is required to adhere to the requirements of both of these permits. Fortunately, the renewals did not contain any new requirements that necessitated changes to our practices or regulations.

Bridge Street District

Existing modeling was used to determine the impact on the stormwater system from the proposed development of the Bridge Street District. The impacts to the system will be minimal and can be best managed with an integrated approach when development occurs. An integrated approach will include stormwater management within the site by way alternatives to traditional ponding of stormwater, and will include the use of green roofs, permeable pavement, bio-retention facilities, rain barrels, planter boxes, etc. These practices demonstrate the future of stormwater management and will allow for optimizing the land for creating the urban and walkable community desired. A revision to the Stormwater Design

Manual has been completed to facilitate and guide the use of these types of stormwater management facilities.

Conclusions and Recommendations

Stormwater ~~conveyance~~flow and management continues to be an important part of the City's infrastructure system. Further investigation is recommended into a ~~usage~~user fee to provide for maintenance and work that may be needed to meet state and federal regulations. Also, the City's regulations regarding water quality, the management of stormwater, and the preservation of the natural stream corridors should be periodically reviewed and updated to comply with state and federal regulations as well as best management practices~~, including water quality~~.

Objectives and Strategies (Utilities)

Objective 1: Provide for the safe and efficient collection of wastewater generated by the community.

Dublin's current sewer contract specifies that sanitary sewage generated within the City of Dublin service area and collected by Dublin's sewer system is transported to Columbus' interceptor system. The agreement specifies that the sewage will be treated by Columbus through February 1, 2043. Significant efforts have been made to upgrade Dublin's system, and those efforts should continue to comply with all regulatory requirements.

A. *Continue Cooperative Efforts*… between the Cities of Dublin and Columbus to ensure that wastewater receives treatment in accordance with all regulatory requirements.

Objective 2: Continue efforts to remove inflow and infiltration sources within the existing sanitary sewer system.

Significant quantities of infiltration and inflow (I & I) can enter the sanitary sewer system via illegal clean water connections or as the condition of the sewer deteriorates due to age. As a result, the carrying capacity of the sanitary sewer system can be dramatically reduced. System efficiency and addressing long-term maintenance should be an important component to effective service provision.

A. *Continue Flow Monitoring…* to identify areas where significant quantities of I & I are entering the collection system.

B. *Maintain Adequate Carrying Capacity…* as sewer extensions are installed by reducing I & I from mainline sewers and continuing the program to eliminate clean water connections from private property on a voluntary basis.

C. *Continue compliance with the OEPA…* Director's Final Findings and Orders as this will document the efforts to achieve this objective.

Objective 3: Implement sanitary sewer extensions to growth areas consistent with the recommendations of the Community Plan in order to provide adequate service for the entire tributary service area.

Consistency in the design criteria for sizing sanitary sewer extensions is necessary to ensure that adequate capacity for future flows is provided. Oversizing of a sanitary sewer when installed as part of a development project, if appropriate, helps ensure that sewer capacity for the entire tributary service area is provided and costly future upgrades are minimized.

A. *Design Sewers Appropriately* … to flow at 75 percent of the full flow capacity, using the design criteria established to forecast future peak flows, and an I & I allowance of 1,000 gallons per day per acre of tributary service area.

B. *Create Developer Reimbursement Policies…* for the incremental costs of oversizing sanitary sewers to address compensation appropriately that is consistent, equitable, and manageable.

C. *Develop a Service Extension Policy …* to provide for effective sanitary service extension to currently unserved but occupied properties.

Objective 4: Ensure that on-site sewage disposal systems are properly designed, installed and maintained.

Section 51.02 of the Dublin Codified Ordinances currently allows for private on-site sewage disposal in the event that public sewage systems are not available. On-site sanitary system design criteria vary from county to county, and portions of the City lie within Franklin, Delaware and Union Counties. As a result, clarification regarding design and installation requirements for systems is needed within Dublin.

A. *Amend the City Code…* relating to on-site systems to incorporate appropriate criteria for system design and installation.

Objective 5: Provide for the safe and efficient delivery of high quality potable water to the community for consumption and fire protection.

Dublin's current water contract specifies that the City of Columbus is to supply potable water to the City of Dublin through February 1, 2043.

A. *Continue Cooperative Efforts* … between Dublin and the City of Columbus to ensure that an adequate supply of quality drinking water, meeting current and future regulatory standards, is provided.

B. *Develop a Service Extension Policy …* to provide for effective water service extension to currently unserved but occupied properties.

Objective 6: Implement waterline extensions to growth areas consistent with the Community Plan.

As waterlines have been extended north of Glick Road and west of Avery Road, a new pressure district and additional infrastructure have been and will be needed for areas higher than the 950-foot ground elevations to maintain adequate system pressure. An adequate supply of water is needed for domestic use and fire

protection. The oversizing of waterlines should be required as part of a development project to support further system expansion for the area. There is currently no means of reimbursing the developer for oversizing costs.

A. *Design Waterline Extensions And Storage Facilities Appropriately…* to provide adequate delivery rates and system pressures to meet the forecasted peak day demands and applicable fire flow requirements.

B. *Create Developer Reimbursement Policies…* for the incremental costs of oversizing waterlines to address compensation appropriately that is consistent, equitable, and manageable.

Objective 7: Provide consistency between the water and sewer system service areas.

Creation of pressure districts in the northwest quadrant of the City can allow the Dublin water distribution system to be extended well beyond the limits of the sanitary sewer service area (Hyland-Croy Road). However, costly sewer extensions, relief sewers and pumping stations would be necessary to provide the desired full range of utility services to areas west of Hyland-Croy Road.

A. *Provide Waterline Extensions…* from the City of Dublin distribution system only to those areas which can also receive sanitary sewer service from the City.

~~Objective 8: Determine future water tower sites appropriately to blend with the adjacent environment.~~

~~Water towers are needed at various locations throughout the City to meet future demands. Care is needed during the design phase to preserve/enhance the physical appearance of areas where elevated water storage facilities are needed. The potential impact on adjacent residences should be taken into consideration when establishing future locations.~~

~~A. *Identify Appropriate Tower Sites…* while considering impacts on adjacent development.~~

~~B. *Provide Public Notice…* of potential water tower sites.~~

~~Objective 9~~Objective 8: Provide for the safe and efficient collection of stormwater and continue to maintain and improve the water quality of Dublin's tributaries and the Scioto River corridor.

Though Dublin's Codified Ordinances have been updated to include stormwater regulations, the continued management of stormwater flow with development is important to the health, safety and welfare of Dublin residents. In addition, ~~-~~the ~~new~~ ordinance is necessary to prevent loss of life and property due to flooding; to protect the quality of ground and surface water; to maintain wildlife habitat; and to encourage the use of natural drainage systems.

A. *Enforce New Standards…* and requirements and update municipal regulations as necessary.

Objective ~~10~~9: Continue implementation of the Dublin Stormwater Master Plan to provide adequate stormwater management in tributary areas consistent with the recommendations of the Community Plan.

Development of land has significant impact on stormwater runoff, and most developable land (particularly in the Southwest Area) is flat with few natural drainageways. Detention facilities are needed to meet regional needs, and potential sites may be available in the expansion areas.

A. *Ensure Adequate Stormwater Facility Design*… that will meet performance criteria established in Section 53 of the Codified Ordinances.

B. *Identify and Implement Sites*… for locating regional detention facilities as development occurs.

Objective ~~11~~10: Design future stormwater ~~retention ponds and detention basins~~management facilities to blend with surrounding development as an attractive amenity and landscape feature.

As a means to control stormwater, ~~retention basins~~best management practices are often integrated into development plans as amenities. The design of facilities, however, can often result in unattractive ~~erosion control measures.~~aesthetics.

A. *Design Future Basins*… to provide required holding area, while creating an aesthetically pleasing feature with softened shapes and landforms. Designs should also incorporate measures to limit impacts by geese.

B. *Focus on Edge Treatments*… and minimize the use of rough rock and stone applications to line basins or ponds.

C. *Integrate Alternative Facility Designs*…to optimize the developable area of sites with limited space, such as in the Bridge Street District. Integrated stormwater management solutions may include green roofs, permeable pavement, bio-retention facilities, rain barrels, planter boxes, etc. These options can be used to reduce the required size of the facility in a manner that is consistent with the surrounding development character.