

STORMWATER UTILITY DEVELOPMENT REPORT

Prepared for:

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EXECUTIVE SUMMARY

The City of Avon is a growing suburban community with a strong agricultural history that still has a significant portion of undeveloped land. Being at the confluence of suburban growth and agricultural heritage brings both infrastructure challenges and opportunities. The community should undertake proper planning efforts and dedicate sufficient financial resources in order to meet these challenges and take advantage of the opportunities, while protecting its current land owners and preparing for the developments to come.

Suburban communities rely on a few key systems to provide modern conveniences, protect land values and promote the general welfare of the public. These systems include a potable water distribution system, a sanitary sewage collection system, general utility services (gas, electric, telephone, etc.), and a public system of drainage. It is an established practice that the potable water, sewer, and general utility services are paid for via user charges based upon the amount that a given resident utilizes those services. A resident's electric bill is based upon how much electricity he/she utilizes, and so forth. In contrast, the costs associated with the public drainage system have historically been paid for with tax revenues instead of being based upon how a property owner's use of his/her land contributes to the needs of the system.

Many municipalities in Ohio and across the nation have looked to a Stormwater Utility as an alternative way to equitably pay for the costs of providing and maintaining a modern public drainage system. Over 100 communities in Ohio currently have an established Stormwater Utility. Stormwater Utility charges are not taxes. The charges are fees for services provided, and are the same as charges for potable water or electricity. A Stormwater Utility is based on land usage, and as such will generate a consistent and equitable revenue stream to help maintain and improve existing drainage systems. Tax revenues, in contrast are less consistent and exhibit uneven periods of highs and lows in collections due to variations in tax rates, land values and other macro-economic forces.

There are several ways to generate a rate structure for a Stormwater Utility. After reviewing other utilities implemented communities in northeast Ohio, it is recommended that the Equivalent Residential Unit (ERU) method be adopted. The ERU method bills an amount proportionate to the impervious area on a parcel relative to the impervious area on an average single-family residence, regardless of the parcel's total area. Avon's Geographic Information System (GIS) was used to determine the average square footage of impervious surfaces found at a sampling of single family residential parcels throughout the City. The result of that sampling established that one Equivalent Residential Unit in the City of Avon is equivalent to 4,300 square feet of impervious surface.

The Stormwater Utility being considered by the City of Avon will charge each single family residential unit a fee of \$2.00 per month. Based upon a comprehensive study of impervious surfaces present on non-residential zoned parcels as well as the number of potable water accounts within the City, it has been calculated that the number of ERUs within the City totals approximately 17,670. Based on the per ERU rate noted above, this will result in a gross annual revenue stream of approximately \$424,080 per year. The Stormwater Utility Charge will be billed via the current water billing system and invoices.



1. Program Background

1.1 Introduction

The City of Avon is a growing suburban community with a strong agricultural history that still has a significant portion of undeveloped land. Being at the confluence of suburban growth and agricultural heritage brings both infrastructure challenges and opportunities. The challenges result from old infrastructure systems needing to be maintained, upgraded or retrofitted to work in new ways. One example of this is the use of field ditches and clay tiles for drainage as opposed to storm sewers and stormwater management basins. The opportunities come from the blank canvas of open land yet to be developed, preserved or utilized for the benefit of Avon's residents. The community should undertake proper planning efforts and dedicate sufficient financial resources in order to meet these challenges and take advantage of the opportunities, while protecting its current land owners and preparing for the developments to come.

Suburban communities rely on a few key systems to provide modern conveniences, protect land values and promote the general welfare of the public. These systems include a potable water distribution system, a sanitary sewage collection system, general utility services (gas, electric, telephone, etc.) and a public system of drainage. It is an established practice that the potable water, sewer, and general utility services are paid for via user charges based upon the amount that a given resident utilizes those services. A resident's electric bill is based upon how much electricity they utilize, their water bill is based upon how much water they consume and so forth. In contrast, the costs associated with the public drainage system have historically been paid for with tax revenues instead of being based upon how a property owner's use of his/her land contributes to the needs of the system. However, the intensity of development, the movement away from agricultural uses of land, regulatory burdens and higher service expectations relative to what makes up an acceptable drainage system have all dramatically driven up the costs to construct and maintain such systems.



Many municipalities in Ohio and across the nation have looked to a Stormwater Utility as an alternative way to equitably pay for the costs of providing and maintaining a modern public drainage system. Over 100 communities in Ohio currently have an established stormwater utility fee (Campbell, 2014). See the attached Exhibit "A" for the list of communities along with the monthly fee as of 2014.



Stormwater Utility charges are not taxes. The charges are fees for services provided, and are the same as charges for potable water, electricity and sanitary sewage collection. A Stormwater Utility is based on land usage and will generate a consistent and equitable revenue stream to help maintain and improve existing drainage systems as well as facilitate the planning for future expansions. Tax revenues, in contrast, are less consistent and exhibit uneven periods of highs and lows in amount and collections due to tax rates, success of renewals, politics, land values and other macro-economic forces. Due to the cyclical nature of tax based revenues, it is difficult to provide an efficient maintenance and improvement program with a tax based revenue stream.

Revenues from the operation of a Utility are required by Ohio Revised Code to be dedicated for the specific purpose for which they are collected. A Stormwater Utility is no different. In the case of a Stormwater Utility, the specific purpose is to pay for or offset the costs associated with the planning, operation, maintenance, and improvement of a Public System of Drainage.

The City of Avon is Lorain County's fastest growing community, both in residential and commercial development. The City's 2014 projected population is 22,302. The City boundary encompasses approximately 20.81 square miles.

Avon also has a diverse Public Drainage System that includes streams, storm sewers, roadside ditches, named ditches, roadway drainage systems, water quality features, detention/retention basins, swales and culverts. Each part of the Public Drainage System has unique characteristics, life cycles, and maintenance demands. Each part also relies on the proper operation of the next connected part. For example, roadway systems rely on culverts which rely on ditches which rely on streams. If any particular piece is neglected, the entire system runs the risk of failing and endangering the health, safety, and welfare of the residents and the traveling public.

In addition to the infrastructure demands, the City of Avon and other similar municipalities became subject to Ohio Environmental Protection Agency Phase II Permit requirements in 2002. Initially this permit required the City to strengthen stormwater related ordinances as well as establish comprehensive stormwater system maps and perform field inspections of system components. The associated permit requirements are set to continue into the foreseeable future and are an unfunded mandate that requires the City to absorb all related costs.

The City of Avon contains a comprehensive stormwater management system including storm sewers and structures, open ditches, detention basins, etc. The City is responsible for operation and



maintenance of these stormwater facilities within the City limits. Currently there is no dedicated funding source to specifically pay for necessary stormwater maintenance and improvements.

Additionally, the City is mandated to address and enforce the OEPA's National Pollution Discharge Elimination System (NPDES) Phase II stormwater regulations. This mandate is unfunded, and therefore puts additional strain on the existing City budget.

Stormwater is a significant concern for the City of Avon and its residents and property owners. The rapid rate of development and changes in land use results in changes to the rate and volume of stormwater runoff. If left unchecked, these changes put residents and property owners at risk of localized flooding, water quality degradation, stream bank erosion, and other negative impacts. Proper stormwater management and master planning are needed to protect homes, roadways, properties, the environment, streams, and rivers from damage due to flooding, pooling, erosion, and harmful pollutants. Stormwater runoff must be channeled through a system of pipes, culverts, ditches, swales, catch basins, and storm drains before being safely discharged into local streams and rivers. The City is responsible for the management, inspection, maintenance, and eventual replacement of the public parts of this system.

Stormwater runoff also picks up pollutants as it moves through the storm system, including fertilizers, pesticides, pet wastes, sediments, oils, salts, trace metals, grass clippings, leaves, and litter. Most stormwater is discharged directly to streams, lakes, and local water bodies without any treatment. Management of this stormwater pollution is critical to protecting water quality within the local watershed and beyond.

The growth of the City in conjunction with the aging storm sewer infrastructure and OEPA requirements necessitates a dedicated funding source to adequately operate and maintain the public stormwater system. The implementation of a regular maintenance plan and capital improvements plan would place an insurmountable strain on the existing City budget without one.



1.2 Current Stormwater Management Program

Historically, the City has performed maintenance of the stormwater collection system, which includes cleaning, repair, and replacement of the City's stormwater infrastructure. As a result of Federal and State mandates, the City also regulates the effects of stormwater runoff from new development.



Stormwater services are currently funded from revenue derived from property taxes collected by the City. Stormwater must compete for these funds with other City services such as parks, roads, fire, police, etc. Due to the high demand on the General Fund over the past several years, the City has not been able to set aside sufficient funds to adequately address all the City's stormwater needs. The backlog of stormwater projects has grown and will continue to build as the City grows, unless a dedicated funding source is established.

2. Stormwater Utility

2.1 Definition

A stormwater utility is an organizational and financial entity that establishes a program and dedicated funding source specifically for stormwater management activities throughout the City of Avon. Businesses and residents within the City of Avon will pay a stormwater fee based on the stormwater runoff that their property contributes to the stormwater



management system. The revenue is exclusively used for maintenance and improvement of the City's stormwater system, including routine maintenance, development of drainage plans, implementation of flood control measures, funding of capital improvement projects, and enforcement of state mandated stormwater activities.

2.2 Justification and Benefits

The changing rate and volume of runoff, deterioration of existing storm sewers, and increasing levels of development within the City have had a direct effect on the City's stormwater drainage system. There is a demonstrated need for planning, design, construction, and maintenance of the existing and future stormwater drainage system.

Historically, the allocation of funds from property taxes within the General Fund has not been sufficient to address all of the City's stormwater service needs. The City has determined that it is necessary and appropriate to establish a dedicated avenue to support the costs associated with stormwater management. There is no relationship between property value and runoff, so property taxes are not the most equitable way to pay for stormwater services. For example, a high-rise building and a shopping mall may have similar value and pay similar property taxes. However, the shopping center would likely produce more stormwater runoff because of the amount of impervious area generated by larger parking lots and rooftops.

After careful consideration, it has been determined that the most equitable method of generating the needed revenue is a stormwater utility. The stormwater that leaves a property as runoff



ultimately drains into a City-maintained drainage facility. A fee is assessed because this runoff contributes to the need for operation, maintenance, and capital improvements of the stormwater management system to prevent and correct stormwater runoff problems.

The implementation of a stormwater fee will ensure Avon's stormwater programs are funded in a manner that is fair, equitable, understandable, implementable, and sustainable. The money generated will be proprietary funds which can only be spent on the infrastructure for which they were collected. The City is not permitted to spend the money received from the stormwater utility on anything unrelated to stormwater. The funds will help to address and enforce the unfunded mandate from the OEPA's NPDES Phase II stormwater regulations.



By establishing a dedicated funding source through stormwater utility fees, the City ensures that the revenue required to manage, maintain, and improve the stormwater system is available and does not detract from other vital City services. A stormwater utility program enables the City to take a proactive rather than reactive approach to stormwater management. The funds raised through the stormwater fee will allow the City to provide an increased level of system maintenance and repair that is necessary to support the aging infrastructure in the City. In addition, the utility fee enables the City to begin constructing the necessary capital improvement projects to reduce the risk to public health and safety that arise due to inadequate stormwater

management facilities. The fees will support the development of a comprehensive stormwater master plan that will guide future management of stormwater within the City limits.

3. Stormwater Utility Fee Structure

3.1 Establishing the Stormwater Utility Fee

The vast availability of existing stormwater utility programs provided the City with a well-established, reliable framework to use in development of the stormwater utility. A team of engineers, stormwater experts, and City Council members worked together to tailor the program to best meet the City of Avon's specific needs and goals. The City utilized the example of existing programs in conjunction with knowledge on the City's existing stormwater management system, population, land use, projected growth, etc., in order to create a program that will best serve the City and its property owners.

The proposed stormwater utility fees will be imposed on every developed parcel of land within the City. The fee has been designed to collect adequate funds to support the repair, replacement, planning, improvement, operation, regulation, and maintenance of the existing and future stormwater system. The fee has further been calculated so as to maintain adequate funds despite



reasonably expected variations in the collection of utility fee, cost of providing services, and demand for services. The City shall also periodically reassess the infrastructure needs and make any adjustments to the stormwater fee as needed.

The stormwater utility fee shall be justly and equitably imposed on all users of the system. The fee shall reflect the relative contribution of stormwater from a property, benefits received, and stormwater services received by each property. In order to accomplish this objective, the City shall calculate the average impervious surface area of a sampling of residential properties in the City, also known as an Equivalent Residential Unit (ERU.) The City shall impose a fee per month per ERU on all users of the stormwater utility. Collection of this fee constitutes the stormwater utility. Additional detail regarding calculation of the ERU and associated fee is provided below.

3.2 Rate Structure

A. Equivalent Residential Unit

As mentioned, the stormwater utility fee shall be based on the amount of impervious area on each parcel. An impervious surface is composed of any material that significantly impedes or prevents natural infiltration of water into the soil. Impervious surfaces include, but are not limited to, rooftops, streets, parking areas, and any concrete, asphalt, or compacted gravel surface. Impervious areas are used in calculation of the stormwater



fee because they create more runoff, increase the rate at which stormwater drains from an area, and contribute a significant amount of pollutants. A property's impervious area is the most significant factor affecting the quality and quantity of stormwater runoff.

In 2016, CVE conducted a study to calculate the statistical average amount of impervious area for residential properties within City limits. This value is the Equivalent Residential Unit (ERU) which the stormwater fee is based on. Calculation of this value was completed using computer mapping software and aerial photography. Detailed measurements of impervious surfaces were completed on a sufficient sampling of residential properties throughout the City. The ERU for the City of Avon was determined to be 4,300 square feet. On average, each residential property within the City contributes 1 ERU of runoff to the stormwater system, and therefore each residential property will be responsible for paying a fee of one ERU per month. Details of the ERU study completed by CVE can be found in Exhibit "B" herein.



B. Property Classification

All properties within the City will be classified as residential, nonresidential, or undeveloped property, and stormwater utility billing will be applied according to each classification.

Single family residential properties will be charged one (1) ERU per residence. This classification includes residential parcels within developments, such as condominiums and townhomes. Each residential parcel within a development will be charged 1 ERU. However, common areas within developments will be classified as nonresidential and will be analyzed and billed as described below. Vacant residential lots will not be assessed a stormwater fee.



Double or Multi-Family properties will be charged one (1) ERU per residential unit. The owner of the parcel shall be responsible for payment. This classification does NOT apply to apartment buildings. Apartment buildings are classified as a category of non-residential property, and will be billed as described below.

All non-residential properties within the City will be billed at a

rate based on their calculated number of ERUs. This is determined by dividing the total measured impervious area by the ERU value of 4,300 square feet and rounding down to the nearest whole number. For example, a commercial property with 12,000 square feet of impervious surface has a calculated ERU of 2.8, and would therefore be charged 2 ERUs. In other words, all non-residential parcels with impervious surface area between 8,600 square and 12,899 square feet will be charged 2 ERUs. The impervious areas for all non-residential properties were measured using aerial photography through Geographical Information System (GIS) computer mapping software. Areas are measured to the right-of-way. This means that publicly-owned impervious surfaces, such as roadway, sidewalk, drive aprons, etc. are not included in the calculation of impervious surface for private parcels. To determine the monthly fee, multiply the calculated number of ERUs by the base residential rate.

The responsibility for the stormwater bill on all properties is the owner of the parcel. This is the case regardless of the specific land use or the number/type of tenants on the property. There will be no exception to this rule, regardless of how the water service is billed on the property. If water service for an apartment building is currently billed to the tenants of the building, a separate stormwater-only account and associated bill will be generated and directed to the land owner. Alternatively, if the land owner currently pays the water bill for the property as a whole, the stormwater charge will be added to the water bill as a separate line item. There may also be instances where tenants pay individual water accounts, but the land owner also has a separate water account for an irrigation line



on the property. For these instances, the stormwater billing would be added as a line item on the irrigation line bill.

As mentioned previously, apartment buildings are classified as non-residential property, and a stormwater bill will be assessed to the property as a whole based on calculated ERU. The owner of the land on which the apartment building is located shall be responsible for the stormwater bill. This same standard applies for properties with multiple buildings, such as an office park or retail center. The ERU will be calculated for the property as a whole, and billed entirely to the parcel owner. The individual businesses occupying the parcel will not be assessed a stormwater fee directly by the City.

Agricultural properties will also be classified as non-residential properties, and billed accordingly. The calculation of ERUs for these properties will include impervious surfaces from paved areas and permanent structures only. This includes permanent buildings, concrete drives, parking areas, etc. Residential structures located on agricultural properties will also be included in the ERU calculation. Temporary structures such as greenhouses and gravel access drives will not be included, as these surfaces do not generate runoff at the same accelerated rate and elevated volume as permanent structures. It is also common for such operations to collect stormwater and hold it for irrigation activities. This would result in a somewhat lower amount of impact on the public drainage system.

Common areas within residential areas fall under the category of non-residential properties as well. These areas were analyzed for impervious surface and assigned ERUs accordingly. Common areas with less than 4,300 square feet of impervious surface have 0 ERUs and will not receive a stormwater bill. Further discussion of these properties is contained within the following section, as they do exist as a slight exception to the technical definition of “undeveloped” properties.



Undeveloped parcels will not be assessed a stormwater fee. To receive the classification as undeveloped, parcels must meet ALL of the following criteria:

1. The parcel must be unimproved with less than 4,300 square feet of impervious surface
2. The parcel must NOT have a water service account
3. The parcel must NOT share a use with an adjacent developed parcel

These parcels have less than 4,300 ft² of impervious surface area, and therefore by definition the calculated ERU will be zero. In addition, this policy simplifies billing as these parcels do not receive a water bill and would require additional processing to supply a stormwater bill alone. Undeveloped



parcels are not billed because this land produces significantly less volume of stormwater runoff than developed parcels, and the minimal generated runoff is at a lower rate and of higher quality.

The additional caveat that these properties do not have a water service account is necessary in the event of smaller lots which are fully developed with less than 4,300 square feet of impervious surface. By calculation these parcels have 0 ERUs and would not be billed; however, they are contributing to the stormwater system in a manner equitable to those residential homes that are



charged 1 ERU but may also have less than 4,300 square feet. The existence of water service generally implies the existence of structural impervious surface and development, and therefore commercial developed properties with less than 4,300 square feet impervious surface and a water service account servicing a structural improvement will be charged 1 ERU. The third criterion is in

reference to adjacent parcels with common ownership, where the parcels share a use but one property may contain the majority of the impervious surface. These parcels receive one stormwater bill, and combined impervious surface across all parcels is calculated and billed as non-residential property.

Isolated exceptions to this definition do exist. As was mentioned previously, there are privately owned common areas in developments throughout the City that have less than 4,300 square feet of impervious surface. These properties may also have a water service account for irrigation purposes, and therefore despite the minimal contribution to stormwater runoff from these areas, they would not meet all three criteria to be classified as undeveloped. In these cases, the water service does not indicate the existence of development or structural impervious surface, and therefore these properties will be classified as undeveloped. The same standard applies for vacant commercial grass lots without a shared use, that may have a water account solely for irrigation. These lots will not be assessed a stormwater fee until such a time as improvements are made on the lot and additional water service connections are made.

C. Base Rate

The City examined its Capital Improvement Project Plan (CIP) in order to identify the funds needed to maintain and improve the stormwater system. The projected total estimated cost for storm sewer projects in the City of Avon's nine-year Capital Improvement Project Plan (CIPP) is \$5,517,000.00 for the years from 2013 to 2021. The projected number of ERUs within the City, both residential and calculated non-residential, is 17,670 ERUs. The division of 17,670 ERUs times 12 months per year times nine-years into \$5,517,000.00 yields a per ERU per month rate of \$2.89. However, after



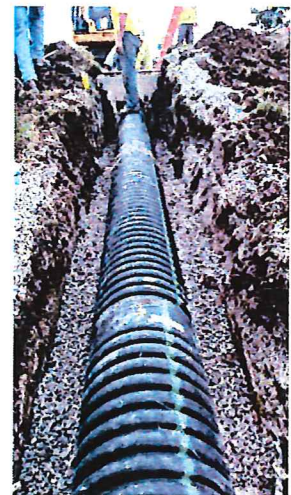
discussions amongst the City Administration and City Council, an initial fee of \$2.00 per ERU per month was established. This rate was determined as an equitable introductory rate which balances meeting the minimal necessary stormwater objectives of these two plans with preventing undue financial burden on users.

The initial rate of \$2.00 per ERU per month is an introductory rate and will be held for an indefinite period of time, as is deemed fit by the City Council. The fee will be evaluated on an annual basis to evaluate if increases are necessary based on inflation, unexpected costs, additional mandates, unanticipated increases in demand, etc. One potential avenue for making adjustments to the stormwater fee is to follow a set pricing index such as the Cleveland Construction Cost Index, which uses a combination of local and national average pricing for materials and labor to anticipate construction cost increases on an annual basis. This would allow the stormwater utility to unequivocally increase the fee while ensuring funding is available in accordance to the increasing cost of maintaining stormwater infrastructure. It is important to note that while such increases would account for inflation and changes in construction cost, additional increase may periodically be necessary based on City-specific factors that increase the cost of operating the stormwater management program. The title and summary pages only from the CIPP are included as Exhibit "C".

D. Billing

The stormwater fee will be billed monthly. The fee will be added to the water bill as a separate line item, and users will pay the fee along with the water bill. The funds collected from the fee will be accounted for in a Stormwater Utility Fund that is separate from other City revenues.

Placing the stormwater fee on the water service bill is the most economical mechanism for assessing this fee. The existence of a water service account naturally implies that the property falls within a billable classification of the stormwater utility program, and therefore the water utility provides a satisfactory database for billing users of the stormwater utility. The City will not need to expend resources in developing a new database, and billing in this fashion prevents the need to purchase, establish, and receive training on new software. There will be no additional cost to the City in generating the physical bill itself, as paper, envelope, postage, etc. will be the same as is currently needed. Utilizing the existing billing system and database simplifies the process and is the most fiscally responsible method for billing the stormwater services due to its minimization of administrative demands and costs.



For water service accounts which are finalized for any reason, whether change of ownership, delinquency, etc., the stormwater fee will be applied a final time for the month in which the water service account is closed. More clearly, if a water service account is finalized on any date between January 1 and January 31, the account holder will be responsible for paying the stormwater fee for the entire month of January. There will be no prorating of the stormwater fee.



E. New Development

As is the case with water, sewer, and other utilities, the City will frequently have new users added to the system. Residential properties will need to be assigned a stormwater bill at some point during the construction process of a new home. Non-residential property will also need to be billed, and the additional step of evaluating impervious surface and assigning an ERU for the property needs to be completed.

For new construction on residential properties, the first month for which a stormwater bill will be applied is the month in which the conditional occupancy permit is issued. Specifically, if the conditional occupancy permit is issued any date between January 1 and January 31, the resident will be responsible for paying 1 ERU for the month of January and continuing forward. This rule should allow for close coordination with the activation of the water usage, and therefore the first bill for newly constructed homes will likely contain billing for both water and stormwater.



As mentioned, non-residential properties have the additional step required during which the impervious surface must be determined. Once a conditional occupancy permit is granted for the non-residential property, the impervious surface for the property will be determined and stormwater billing will become active. Again, this should coordinate with the activation of the water service account so billing for both utilities will commence in the same month.

3.3 Credits/Exemptions

Education Credit for School Institutions

The only available credit offered through the program will be for K through 12 Educational Institutions. Elementary, middle, and high schools that provide approved educational activities to a specified portion of students will be eligible for a 50% reduction in the stormwater management utility fee. The benefits of this program will be both to the City and the School. The educational programs will assist the City of Avon in achieving public outreach and education as required by the NPDES permit. The credit will also reduce the financial burden on facilities that exist to provide the community an invaluable service. School facilities tend to have high calculated ERUs based on the necessary size of buildings and parking lots, and this credit program will prevent the fee from being an undue burden on area schools.



3.4 Usage of Funds

Monies collected from the stormwater utility fees are to be utilized solely for the following objectives, all for the protection and betterment of the public health, welfare, and safety:

- To allow for operation, maintenance, repair, improvement, and extension of the stormwater utility
- To provide for the safe and efficient capture and conveyance of stormwater
- To mitigate the damaging effects of stormwater runoff and the correction of stormwater problems
- To fund activities of stormwater management, including, but not limited to, design, planning, regulation, education, coordination, inspection, and enforcement

Stormwater infrastructure will receive improved routine maintenance as a result of the dedicated funding, which will allow the stormwater system to convey runoff as effectively as possible. The City will have the resources needed to take a more proactive approach to stormwater management, which includes preventing risks



to public safety by making necessary repairs before failures occur. This preventative maintenance includes street sweeping, leaf pickup programs, catch basin and pipe cleaning, maintenance of flood control facilities such as residential detention and retention basins, monitoring of streams and ditches for obstructions, etc. An initial five-year capital improvement plan for upgrading existing systems and installing new systems where needed has been developed, and more projects will likely be identified in the future.

The City shall operate its stormwater drainage facilities as a public utility. The service provided shall be the provision and maintenance of a complete and adequate system of stormwater drainage for the City and its inhabitants. The City will utilize the stormwater fees for the following items:

- 1) The City shall maintain all public stormwater drainage facilities located on City-owned land and in public rights-of-way and easements. Public facilities include but are not limited to:
 - a) Open drainageways owned by the City or located in public rights-of-way or drainage easements in the City
 - b) Piped drainage systems and its related appurtenances which have been designed and constructed expressly for use by the general public



- c) Bridges on public streets
 - d) Roadside drainage ditches within the public right-of-way along streets
 - e) Flood control facilities (levees, dikes, overflow channels, residential detention and retention basins, groundwater recharging basins, etc.) that have been designed and constructed expressly for use by the general public
 - f) Residential Stormwater retention or detention facilities located on private property
- 2) The improvement of both public and private stormwater drainage facilities through and immediately adjacent to new developments shall remain the responsibility of the developers. Facilities not qualifying as public facilities include but are not limited to:
- a) Private parking lot storm drains
 - b) Commercial stormwater retention or detention facilities located on private property
 - c) Roof, footing, and area drains
 - d) Drains not designed and constructed for use by the general public
 - e) Open drainage swales or ditches on private property for which no public easement of record has been granted
 - f) Access drives culverts

4. Recommendations

The implementation of a stormwater utility within the City of Avon will provide a much-needed dedicated source of funding to a vital public service. The collected funds will allow the City to adequately address the stormwater system's needs for ongoing inspection, maintenance, and improvements. In order to implement the program in a fair and equitable fashion, the following recommended future actions are presented at this time:

- Adopt an ordinance establishing the stormwater utility, including the fee system
- Mail a brochure explaining the stormwater utility to all property owners within Avon, including residential and non-residential users
- Hold an open house to present the stormwater utility to the public
- Finalize billing procedure, entailing adding the stormwater utility line item to the water billing and adding accounts which will require a stormwater only bill.
- Establish Stormwater Utility Fund and collect the user fee revenues
- Ongoing:
 - Add new parcels to system and calculate ERUs as development occurs
 - Respond to appeals and applications for credits
 - Annually review the charge rate and update as needed
 - Annually update the CIPP as it pertains to stormwater

References

Campbell, C. Warren (2014). *The Western Kentucky University Stormwater Utility Survey 2014*. Retrieved from:
https://www.wku.edu/engineering/civil/fpm/swsurvey/wku_swu_survey_2014_incorporating_rd_comments.pdf



EXHIBIT A

Western Kentucky University Stormwater Utility Survey 2013



C. Warren Campbell

No.	Community	State	ERU	Fee	Date	Population	Ann Rev
798	Minot	ND	x	\$2.60	1998	36,567	
799	Sante Fe	NM			2003	62,203	
800	Carson City	NV	x	\$3.38	2003	52,457	
801	Sparks	NV				66,346	
802	Ada	OH	x	\$1.50	2004	5,952	
803	Amberley	OH	R	\$6.25	2003	3,585	
804	Ashland	OH	3,052	\$3.50	2006	20,367	
805	Ashville	OH	2530		2006	4120	
806	Barberton	OH	8,668	\$5.00	2006	26,455	
807	Bellefontaine	OH	2,400		2001	13,322	
808	Broadview Heights	OH	4,000	\$4.00	2007	19,247	
809	Brunswick	OH	3,500	\$4.95	2011	34,441	
810	Bucyrus	OH	2,506	\$4.00	2000	12,253	
811	Butler County	OH	4,000	\$1.08	2004	369,999	
812	Campbell	OH	f	\$3.00	2007	8,235	
813	Canal Winchester	OH	3,001	\$3.00	2010	7,191	
814	Canfield	OH	3,050	\$3.00	1992	7,464	
815	Celina	OH	3,083	\$2.00	2008	10,406	
816	Chillicothe	OH		\$1.00	1997	21,955	
817	Cincinnati	OH	t	\$3.16	1984	296,223	
818	Columbus	OH	2,000	\$3.32	1994	797,434	
819	Cortland	OH	x	\$1.50	2007	7,069	
820	Coshocton	OH	x	\$0.25	2010	11,231	
821	Cuyahoga Falls	OH	3,000	\$3.00	1992	49,473	\$600,000
822	Dayton	OH	x	\$4.28	1997	142,148	
823	Deerfield Regional Stormwater District	OH	3,407	\$1.92	2006		
824	Delaware	OH	2,773	\$2.50	1998	35,541	
825	Findlay	OH	x	\$3.00	1999	41,202	
826	Forest Park	OH		\$3.00	1988	19,463	
827	Fostoria	OH	R	\$6.79	2006	13,411	
828	Franklin	OH		\$3.50		11,771	\$469,218
829	Gahanna	OH	3,064	\$3.42	2004	32,636	
830	Galion	OH	2,650	\$3.00	2001	10,416	
831	Gambier	OH	3,000	\$4.00		2,396	
832	Greenville	OH	2,800	\$2.95	2007	13,189	
833	Groveport	OH	2,760	\$2.00	2008	5,363	
834	Hamilton	OH	2,536	\$3.60	2002	62,795	
835	Hamilton County	OH				800,362	
836	Harrison	OH	IDF	\$4.00	2007	9,871	
837	Hilliard	OH	2,000	\$1.95	2009	28,435	

No.	Community	State	ERU	Fee	Date	Population	Ann Rev
838	Hubbard	OH	x	\$3.00	2007	8,284	
839	Huber Heights	OH	3,431	\$2.00	2002	38,278	
840	Hudson	OH	x	\$3.00		22,182	
841	Ironton	OH	3,000	\$14.55	2005	11,211	
842	Kent	OH	1,963	\$2.30	2001	28,935	
843	Lake County	OH	3,050	\$2.50	2003	229,885	
844	Lancaster	OH	2,600	\$7.50	2004	39,026	
845	Lebanon	OH	2,615	\$3.50	2003	20,242	
846	Lexington	OH	5,000	\$1.50	2004	4,784	
847	Lima	OH	2,600			38,693	
848	London	OH	2,766	\$4.00		9,896	
849	Louisville	OH	t	\$2.00	2005	9,186	
850	Loveland	OH	2,500	\$4.50	2003	12,082	
851	Lowellville	OH		\$2.00	2007	1,148	
852	Lucas County	OH	5,500	\$4.06	2011	440,005	
853	Marion	OH	2,778	\$4.16	1997	36,689	
854	Marysville	OH	2,700	\$2.75	2004	22,288	
855	Mason	OH		\$3.52	2001	31,039	
856	Massillon	OH	f	\$1.00	2010	32,106	
857	Medina	OH	2,716	\$2.25	2003	26,822	
858	Middletown	OH	2,814	\$3.25	2005	48,962	
859	Milford	OH	2,400	\$5.50	2004	6,768	
860	Monroe	OH	x	\$3.00	2003	12,509	
861	Monroeville	OH	4,200		2009	1,400	
862	Montpelier	OH	t	\$3.00	1986	4,067	
863	Muskingum Watershed Conservancy District	OH	3,300	\$1.00		2,000,000	\$12,600,000
864	New Lexington	OH	f	\$2.25	2005	4,689	
865	New London	OH	f	\$4.00	2005	2,455	
866	Newark	OH	2,600	\$4.50	2005	47,790	\$38,000,000
867	Northeast Ohio Regional Sewer District	OH	3,000	\$4.75	2010		
868	Northwood	OH	2,500	\$3.16	2001	5,265	
869	Norwalk	OH			2011	16,977	
870	Oak Harbor	OH	4,200	\$11.00	2007	2,758	
871	Painesville	OH	2,500	\$2.75	2002	19,549	
872	Pickerington	OH	2,530	\$1.50	2001	18,408	
873	Piqua	OH		\$4.70	2009	20,592	\$70,000
874	Poland	OH	2,500	\$3.50	2010	2537	
875	Ravenna	OH	2,750	\$3.00	2007	11,739	
876	Reynoldsburg	OH	2,530	\$1.25	1996	36,293	

No.	Community	State	ERU	Fee	Date	Population	Ann Rev
877	Sebring	OH	f	\$3.00		4,391	
878	Sheffield	OH	2,500	\$2.50	2004	3,986	
879	Sheffield Lake	OH	2,275	\$4.85	1999	9,145	
880	Sidney	OH	2,752	\$0.86	1994	21,178	
881	Silver Lake	OH	f	\$3.00	2003	2,510	
882	Spencerville	OH			2008	2,218	
883	Springboro	OH	f	\$3.00	2003	17,588	
884	Springfield	OH	x	\$0.60	2011	60,333	
885	Stow	OH	3,060	\$3.00		34,711	
886	Struthers	OH	3,500		2007	10,640	
887	Tallmadge	OH		\$2.00		17,473	
888	Toledo	OH	2,500	\$3.47	1999	286,038	
889	Trenton	OH	x	\$2.60	2003	11,931	
890	Trotwood	OH	4,020	\$3.75		2,455	
891	Troy	OH	3,000	\$4.65	2007	25,143	\$72,000
892	Union	OH	f	\$4.00	1987	6,448	
893	Upper Arlington	OH	x	\$3.75	1991	34,223	
894	J\	OH	4,431	\$2.00	2004	15,317	
895	Wadsworth	OH		\$4.50	2005	21,683	
896	Wapakoneta	OH	t	\$2.00	1994	9,843	
897	Warren	OH	648	\$2.92		41,358	
898	Wellington	OH	2,900	\$3.50	2010	4,806	
899	Wooster	OH		\$4.80	1985	26,139	
900	Xenia	OH	f	\$2.50		25,925	
901	Zanesville	OH			1987	25,531	
902	Bixby	OK	2,650	\$2.00		21,137	
903	Broken Arrow	OK	2,650	\$4.50	2002	100,073	
904	Catoosa	OK	x	\$2.50		7,226	
905	Choctaw	OK		\$3.00	2005	11,364	
906	Edmond	OK	4,860	\$3.00	1994	82,963	
907	Enid	OK	5,000		2009	49,451	
908	Jenks	OK	x	\$2.00		17,130	
909	Lawton	OK		\$1.00		98,177	
910	Miami	OK	x	\$2.00		13,577	
911	Midwest City	OK	x	\$2.25		55,427	
912	Muskogee	OK		\$2.00	2005	39,231	
913	Oklahoma City	OK	wm	\$5.32	1995	591,967	
914	Owasso	OK	3,000	\$3.00		29,854	
915	Ponca City	OK	x	\$1.00		25,168	
916	Sand Springs	OK	2,650	\$3.50		19,140	



EXHIBIT B



AVON STORMWATER UTILITY PROGRAM – GIS SETUP & PROCESS

OVERVIEW

GIS was used to determine areas of impervious surface in the City of Avon. The impervious surface on residential properties was calculated and averaged to determine an Equivalent Residential Unit (ERU). The impervious surface on all non-residential properties was divided by the ERU to determine values for assigning stormwater utility fees. Non-residential properties include agricultural, industrial, commercial, and tax exempt properties (excluding properties owned by the City of Avon). That information was then attached to the correlating water account for each property to create an inventory.

PROCESS

The initial information used in all calculations was obtained from the Lorain County Auditor's GIS Department. The County updates GIS information, such as parcel polygons periodically throughout the year. New data was incorporated into the project whenever it became available. The most recent parcel dataset is current through June 2017. On occasion, CVE GIS Staff manually updated parcels to reflect changes not yet apparent in the Auditor's parcel dataset. The public right-of-way shapefile made available by the County was modified by CVE GIS Staff to increase accuracy. This right-of-way feature was used to determine the cut-off for calculating impervious surfaces; compensating for the fact that many of Avon's parcel boundaries extend to the centerline. Impervious surfaces in the public right-of-way were not included in calculations. The digitizing of impervious surfaces throughout the City was based on high-resolution orthoimagery, which was also provided by the Auditor's GIS Department. The primary aerial used was from spring of 2015 and has a resolution of 4" (every pixel represents 4"). A summer aerial from 2015 was available, but exists at a lower quality and was not sufficient for digitizing. The summer aerial also contains tree cover, which would have made identifying surfaces much more difficult. New spring and summer aerials of the same resolution became available in 2017. Any new development or changes made since June 2017 were done so using those newer images.

Several additional sources were used as reference alongside the aerial imagery. The parcel information downloaded from the Lorain County Auditor's GIS Department is also available for viewing on their GIS web-map site. That web-map contains additional information such as property transfers, floor plans, and more recent changes that the downloaded dataset does not represent yet. The site also provides pictometry, which shows the same aerial imagery, but at an oblique angle. Pictometry was used to determine impervious surfaces in areas that were obstructed by trees or other cover. Imagery from the last fifteen years was available, which allows the viewer to see changes in structures/surfaces over time. Google Street View was used to reference areas visible from the street, as well as to confirm address numbers and occupying businesses. The County Recorder's site was used to find the most recent parcel ownership information.

In order to determine which properties were commercial, land use codes (LUC) found within the parcel dataset were used as the main indicator of use. Land use codes have

several broad designations, such as residential, commercial, or industrial. Every designation other than residential was counted as a commercial property (except for Avon-owned properties). Land use codes were compared against the aerial imagery, which in most cases clearly indicated land use already. There were a number of parcels in the city that had land use codes that did not correlate to the apparent use. Further investigation was done for these parcels. As an example, a property may be coded residential, but has a parking lot, indicating commercial use. A Google search of the address typically indicates if a business is located at that property. Using several methods of determining which category properties fell into allowed CVE GIS Staff to work around the inaccuracies and limitations presented by land use codes. There are still several properties in which land use is not particularly clear. These parcels have been flagged for further review (see ACTIONS section).

Once all of the impervious surfaces throughout the city were digitized, the metadata was transferred to the parcel dataset. The parcel set was then geometrically converted from polygons to points. Once that was complete, the list of water accounts provided by Avon's Finance Department was linked to the parcel points. Points were added for any additional accounts beyond the initial join (joins only support one-to-one relationships). The combination of the three datasets allows each point to contain information regarding accounts, parcels, and impervious surfaces. By using accounts as a spatial reference opposed to parcel polygons, the limitations posed by new parcel datasets can be bypassed.

The impervious surfaces of each property were split into two categories: buildings and surfaces. Buildings include any built structure with a roof; including sheds, gazebos, and garages. Surfaces include all other surfaces; including decks, patios, and in-ground pools. The surfaces were separated to allow for better interpretation of each property's impervious surface composition.

RULES

A number of situational rules were established before digitizing began. Many properties, primarily commercial, exhibit a large degree of variation in the structures and surfaces they contain. A set of standards was determined to keep digitizing consistent throughout the process. Applicable rules for each account's impervious surfaces are noted in the inventory with the designations listed below. The description of each of these rules below can be used to interpret the process used for any property subject to that specific rule.

GENERAL RULES

- Decks were included under the surface designation. This is mainly applicable to residential properties in the ERU study, as only a few commercial properties have decks.
- Sidewalks were not included. Sidewalks generally exist in the right-of-way, and therefore were not included because the right-of-way was used as the cutoff for digitizing surfaces.

- Tax-exempt properties such as cemeteries, churches, and schools, were included as commercial properties. The stormwater fee is not a tax, and therefore those properties are not exempt. Properties owned by the city or state, as well as all public right-of-ways, were considered exempt.
- Undeveloped parcels, common space, green space, and other parcels that do not include impervious surfaces, were not included.

SPECIFIC RULES

- **Apartment/Condominium** – This designation covers apartments, condominiums, and townhomes. Apartments are buildings part of a larger complex that have multiple units in each building available to rent or sell. The building is owned by the overall property owner, and each building has a single water account, which is charged to that owner. Parcels on the property either encompass the entire property, or sometimes each building. Apartments are considered commercial properties. Condominiums also have multiple units per building, and often multiple buildings per complex. However, individual units have accompanying parcels, as well as a permanent owner. These units are considered residential properties. For information regarding condominiums used for commercial means, see the rule “Proportional Division”.
 - Example 1 (Apartment) – Timber Lake Townhomes on Chester Rd.
 - Example 2 (Condominium) – Windmill Village on the northeast corner of Moore Rd and Colorado Ave.
- **Gravel** – Unpaved gravel surfaces are considered impervious. Gravel drives to houses or buildings, as well as parking lots and storage/stockpile areas were included during digitization. Access roads, such as those found on large agricultural properties, were not included. Gravel areas between greenhouses were also not included. Gravel paths, such as trails or golf course cart paths, were not included. Areas on industrial properties used for driving, storage, or excavation, were all included as an impervious surface. If a surface could not be distinguished as gravel from dirt, it was not included.
 - Example 1 (Gravel drive, lot, or stockpile) – PP#s 0400009000024 & 0400009000025.
 - Example 2 (Access road, greenhouse) – Willoway Nurseries.
 - Example 3 (Trail, cart path) – Bob-O-Link Golf Course.
 - Example 4 (Industrial surfaces) – Miller Rd businesses.
- **Greenhouse** – Greenhouses were only included as an impervious structure if it is permanently erect. Temporary greenhouses, not erect the entire year, were not included. The permanency of each greenhouse was determined using pictometry images captured in ten different instances throughout the past fifteen years. Greenhouses were only designated as permanent if erect in all ten instances (fewer if built more recently).

- Example 1 – Willoway Nurseries.
- **House on Agricultural/Commercial** – Dwellings found on properties used for agricultural or commercial means are included in that property's impervious surface. The commercial nature of the property supersedes a residential structure. The dwelling is not charged for one ERU as other residential structures are.
 - Example 1 – PP# 0400001101004.
- **Multi-Family** – Parcels that include a building with two dwellings is considered a double or multi-family property. Each dwelling has its own water account, and each dwelling is charged one ERU.
 - Example 1 – PP# 0400002102058.
- **Multi-Parcel** – Parcels owned by the same entity in proximity of each other were considered one property. Many commercial businesses span over several parcels. Residential dwellings also will often consist of two or more parcels. For commercial properties, the digitized impervious surface is the only determiner of ERU. The ERU value is not changed based on the number of parcels a property consists of. For residential properties, the account owner is only charged one ERU for the main parcel with the dwelling. The owner is not charged for additional parcels, which generally include storage structures or landscaped area. The main parcel is generally the parcel where the billed account is located. Additional parcels are noted in the inventory.
 - Example 1 (Commercial) – Wal-mart.
 - Example 2 (Residential) – Houses on Evergreen Dr (off Case Rd).
- **Pool** – In-ground pools were considered to be an impervious surface. Any rainwater entering the pool can only exit onto the surrounding pavement. Above-ground pools were not included.
 - Example 1 – PP# 0400013000240.
- **Private Infrastructure** – Private streets, drives, and other transportation infrastructure outside of the public right-of-way, was included as a commercial impervious surface. These features generally exist on apartment complexes or common area parcels managed by condo or homeowners associations. Drives and walks for individual units were not included. Paved paths on common areas were also not included.
 - Example 1 (Apartment streets) – Avon Village Apartments.
 - Example 2 (Private street) – Pond View Ct & Brook Ct (off Stream View Dr).
 - Example 3 (Common area paths) – PP# 0400013000395.

RESIDENTIAL ERU STUDY

Note: see tables for specific statistical breakdowns.

Note: A previous study calculated the ERU value to be roughly 3,800 ft².

A study to determine what value one ERU represents was conducted in GIS. Two sample groups were used for this study. The first sample group served as the control group. The city was divided into four areas based on the wards. 120 parcels were used as the sample size to allow division by ward, and subsequent division into subdivision/non-subdivision houses. The 30 parcels in each ward were divided somewhat proportionately to reflect more houses are in subdivisions. It was necessary to separate the two entities because of their different sizes. Houses located in subdivisions are generally more uniform in size across their respective subdivision. Non-subdivision houses throughout the city are often quite large, and vary in size. The parcels in each ward were randomly selected with a random number generator. Once the study was complete, it became apparent that the randomness of the sample was distorting the calculations. The ERU value based off the first sample was 4,677ft². The non-subdivision houses were skewing the results; especially in Ward 4. There were several properties included in the first samples that were over 12,000 ft², and even one over 30,000ft². Accounting for the disparity between house sizes, a reasonable standard deviation is 1,500ft². Many of the standard deviations in the first sample group are 2-4 times that; solidifying that the outliers were too frequent and weighing too heavily.

With the first attempt now serving as a control group, the second sample included parcels to be as proportionate as possible. A sample size of 100 parcels was selected because it is the simplest and most intuitive number for dealing with percentages. The study sample was split into the four wards, and further by subdivision/non-subdivision; as the first sample was. An approximate count of houses was conducted for each ward. The approximate house count was 7,368 (this number did not include houses built after the spring of 2015). The number of entries included in the residential list in the accompanying spreadsheet is 7,575 (this number includes houses built since spring of 2015); a discrepancy of less than 3%. Accounting for houses built after the spring of 2015, the discrepancy was 1%. The house counts were split into subdivision/non-subdivision for each ward. Counts were further divided into size approximations based off the first study sample. Sizes were split into houses those less than 2,500ft², 2,500-5,000ft², and those greater than 5,000ft². The breaks were chosen based off the statistics from the first study sample. The sizes were then used to create groupings to determine where samples should be placed. For example, if Camelot Estates Subdivision (2,500-5,000ft²) contains a total of 214 houses and Zone 1's 1,506 houses of that size account for 21% of the total, there would need to be 3 samples. Once the general areas for samples were determined, a random number generator was used to pick which houses were selected. This randomness prevented any bias of picking houses that may be anomalies in their respective subdivision; houses with large patios, in-ground pools, additions, etc. There are still houses containing these features sporadically included in the overall study sample. Combining these three factors (wards, subdivision/non-subdivision, and impervious surface area) made it possible to create an

accurate representation of the city. The ERU value based off the second sample was 4,321ft².

The possible limitations involved in the study were:

- Roofs of residential buildings can cause an increase (generally small) to the building surface area. There is not an easily-implemented method of avoiding the overhang. Other methods were not available because Lorain County does not offer color infrared imagery or LIDAR datasets.
- Similar to the issue regarding roofs, the angle at which the aerial imagery was taken can affect the digitizing process. The aerial was flown via plane or drone and not satellite, causing some areas to be at a noticeable angle. This can account for increases or decreases in the size of buildings in those areas.
- Outdated or wrong LUCs can account for discrepancies between agricultural and residential properties. There are residential parcels clearly being used for agricultural purposes and vice versa. There are also instances of farms and the accompanying house being on adjacent properties. The features on the properties may overlap the boundary, creating issues for delineating what features belong to what property.
- The Lorain County Auditor's site has floor plans available for most houses. Idealistically, that floor plan should be able to serve as a reference number for the building surface value. Several problems with these sketches became quickly evident:
 - Outdated sketches. There were instances where additions were added to houses that were not reflected in the floor plan.
 - Inconsistent Features. There were many instances where some sketches included features like pools, sheds, and patios. Other sketches wouldn't include any of those features.
 - The digitized building area including the roof would make it difficult to determine how close the numbers should be. Without knowing the floor plan is completely correct, even a one room difference could account for several hundred square feet.
- Vegetation and tree cover can provide issues identifying the edges of surfaces. This was compensated for by referencing multiple sources for each parcel. By using different aerials and especially in conjunction with pictometry, it was not a significant issue. Without infrared imagery, this is an inevitable source of opposition.
- Despite the high-quality of the aerial photography, there were still instances where it was difficult to determine the composition of unpaved surfaces; particularly between gravel and dirt. The pictometry was helpful in resolving some of these situations.

- **ESIDENTIAL ERU STUDY SAMPLE 1 TABLES**
- **STUDY SAMPLE 1 BY SURFACE TYPE**

WARD	SUBDIVISION BUILDING(ft²) SURFACE(ft²)		NON-SUBDIVISION BUILDING(ft²) SURFACE(ft²)		BUILDING TOTAL(ft²)	SURFACE TOTAL(ft²)
1	2,543	1,608	3,042	2,538	2,709	1,918
2	2,196	1,086	3,181	3,127	2,361	1,426
3	2,273	1,702	2,928	2,230	2,491	1,878
4	2,815	2,148	3,263	3,622	3,039	2,885
TOTAL:	2,418	1,570	3,114	2,941	2,650	2,027

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- **STUDY SAMPLE 1 BY SUBDIVISION/NON-SUBDIVISION**

WARD	SUBDIVISION TOTAL(ft²)	NON-SUBDIVISION TOTAL(ft²)	TOTAL(ft²)
1	4,150	5,580	4,627
2	3,283	6,308	3,787
3	3,975	5,158	4,369
4	4,963	6,885	5,924
TOTAL:	3,988	6,055	4,677

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- **STUDY SAMPLE 1 ADDITIONAL STATISTICS**

WARD	COUNT	MINIMUM SURFACE(ft²)	MAXIMUM SURFACE(ft²)	STANDARD DEVIATION(ft²)
1 – SUBD.	20	2,109	9,143	1,657
1 – NON-SUBD.	10	3,964	8,489	1,412
1 – TOTAL	30	2,109	9,143	1,717
2 – SUBD.	25	1,304	4,918	922
2 – NON-SUBD.	5	3,790	8,372	1,522
2 – TOTAL	30	1,304	8,372	1,538
3 – SUBD.	20	797	12,895	2,405
3 – NON-SUBD.	10	3,427	7,570	1,221
3 – TOTAL	30	797	12,895	2,159
4 – SUBD.	15	3,325	10,662	1,829
4 – NON-SUBD.	15	3,368	30,382	6,403
4 – TOTAL	30	3,325	30,382	4,806
TOTAL	120	797	30,382	2,980

- RESIDENTIAL ERU STUDY SAMPLE 2 TABLES**
STUDY SAMPLE 2 BY SURFACE TYPE

WARD	SUBDIVISION BUILDING(ft ²) SURFACE(ft ²)		NON-SUBDIVISION BUILDING(ft ²) SURFACE(ft ²)		BUILDING TOTAL(ft ²)	SURFACE TOTAL(ft ²)
1	2,617	1,601	3,482	2,843	2,765	1,814
2	2,273	1,120	4,279	2,753	2,464	1,275
3	2,205	1,408	3,156	2,333	2,355	1,554
4	2,679	1,799	3,064	3,164	2,741	2,018
TOTAL:	2,478	1,506	3,412	2,815	2,618	1,702

- STUDY SAMPLE 2 BY SUBDIVISION/NON-SUBDIVISION**

WARD	SUBDIVISION TOTAL(ft ²)	NON-SUBDIVISION TOTAL(ft ²)	TOTAL(ft ²)
1	4,218	6,325	4,579
2	3,394	7,032	3,741
3	3,612	5,489	3,909
4	4,478	6,228	4,758
TOTAL:	3,984	6,226	4,321

- STUDY SAMPLE 2 ADDITIONAL STATISTICS**

WARD	COUNT	MINIMUM SURFACE(ft ²)	MAXIMUM SURFACE(ft ²)	STANDARD DEVIATION(ft ²)
1 – SUBD.	29	2,109	9,143	1,444
1 – NON-SUBD.	6	4,422	8,489	1,355
1 – TOTAL	35	2,109	9,143	1,635
2 – SUBD.	19	1,411	4,918	888
2 – NON-SUBD.	2	5,691	8,372	1,341
2 – TOTAL	21	1,411	8,372	1,423
3 – SUBD.	16	1,366	6,677	1,221
3 – NON-SUBD.	3	3,427	7,570	1,691
3 – TOTAL	19	1,366	7,570	1,475
4 – SUBD.	21	3,200	6,708	1,028
4 – NON-SUBD.	4	4,363	9,860	1,448
4 – TOTAL	25	3,200	9,860	1,448
SUBD. TOTAL	85	1,366	9,143	1,270
NON-SUBD. TOTAL	15	3,427	9,860	1,754
TOTAL	100	1,366	9,860	1,572

- **CITY-WIDE HOUSE STATISTICS BY SUBDIVISION/NON-SUBDIVISION**

Percent of total listed in parenthesis.

WARD	SUBDIVISION	NON-SUBDIVISION	TOTAL
1	2,114 (29%)	457 (6%)	2,571 (35%)
2	1,422 (19%)	134 (2%)	1,556 (21%)
3	1,154 (16%)	211 (3%)	1,365 (19%)
4	1,560 (21%)	316 (4%)	1,876 (25%)
TOTAL:	6,250 (85%)	1,118 (15%)	7,368 (100%)

- **CITY-WIDE HOUSE STATISTICS BY SIZE** Percent of total listed in parenthesis.

WARD	<2,500ft ²	2,500-5,000ft ²	>5,000ft ²
1 – SUBD.	27 (0%)	1,506 (21%)	581 (8%)
1 – NON-SUBD.	0 (0%)	165 (2%)	292 (4%)
2 – SUBD.	176 (2%)	1,238 (17%)	8 (0%)
2 – NON-SUBD.	0 (0%)	45 (0%)	89 (2%)
3 – SUBD.	222 (3%)	886 (12%)	46 (1%)
3 – NON-SUBD.	0 (0%)	123 (2%)	88 (1%)
4 – SUBD.	0 (0%)	1,360 (18%)	200 (3%)
4 – NON-SUBD.	0 (0%)	179 (2%)	137 (2%)
SUBD. TOTAL	425 (5%)	4,990 (68%)	835 (12%)
NON-SUBD. TOTAL	0 (0%)	512 (6%)	606 (9%)
TOTAL	425 (5%)	5,502 (74%)	1,441 (21%)

STATISTICAL ANALYSIS

- The size breaks used in the second study allow for easily-comprehended comparison to the previous ERU value of 3,800ft². The range of 2,500-5,000ft² is roughly even from 3,800ft² compared to the other breaks (1,300ft² and 1,200ft²). If the mean is disregarded for the purposes of this explanation, the median size would be 3,750ft² (rounded to 3,800ft²). The remaining two breaks of <2,500ft² and >5,000ft² can be used to determine whether the actual ERU is higher or lower than the current value. There are over four times as many >5,000ft² values than <2,500ft² values, making it impossible for the value to be below 3,800ft², while proving that the actual ERU is probably significantly higher than that current value. The only value that resembles 3,800ft² is the average subdivision size in both study samples of about 4,000ft².
- The averages for the first and second study groups were very similar. The subdivision total was only 4ft² different. The non-subdivision total was actually higher in the second study, but the overall total was lower because the number



of those houses included was reduced. There is one group of condominiums that are below 1,000ft² that was not included in the study because their total is not high enough to merit inclusion. On the other side of the size-spectrum, there are a number of very large houses that were also not included in the study. The first study sample revealed that there are a number of houses with impervious surface area exceeding 20,000-30,000ft². The inclusion of these parcels would skew the values more than the inclusion of the smaller condominiums. Standard Deviation was included to serve as a rough indicator of outliers. The first study sample deviated twice as much as the second sample which indicates the increased accuracy of the latter numbers.

• **TABLE METADATA**

FIELD NAME	TYPE	DESCRIPTION
ACCOUNT_CLASS_CODE	TEXT	Account type. This field has not been modified by CVE.
ACCOUNT_ERU	NUMBER	ERU value assigned to the account, rounded down.
ACCOUNT_ERU_STD	NUMBER	ERU value assigned to the account, standard rounding.
ACCOUNT_ID	TEXT	Account number. Placeholder points are described as "N/A". This field has not been modified by CVE.
ACCOUNT_IMPERV_BUILDING	NUMBER	The amount of impervious surface from buildings assigned to the account, rounded to the nearest square foot.
ACCOUNT_IMPERV_SURFACE	NUMBER	The amount of impervious surface from non-building surfaces assigned to the account, rounded to the nearest square foot.
ACCOUNT_IMPERV_TOTAL	NUMBER	The amount of total impervious surface assigned to the account, rounded to the nearest square foot.
ACCOUNT_PERCENT	NUMBER	Percentage of total ERUs assigned to the account. This value is generally either 0 or 100.
ACTION_NEEDED	TEXT	Actions required to resolve issues with the account.
ADDITIONAL_PARCELS	TEXT	Additional parcel numbers associated with the primary parcel. These parcels give an indication to the extent total ownership when spanning across several adjacent parcels.
ADDRESS	TEXT	Concatenation of "ADDRESS_NUMBER+UNIT_NUMBER+STREET_NAME".
ADDRESS_NUMBER	TEXT	The address number for the location of the account. This number was generated by cross-referencing the parcel and address point features with the account number table.
COMMENTS	TEXT	Any additional information relating to "ACTION_NEEDED" or other miscellaneous information.
CORRECTIONS	TEXT	Corrections made to table for city to review and correct in billing software.
Table Continued on Next Page		



CUSTOMER_ADDRESS	TEXT	Billing street address for customer. This field has not been modified by CVE.
CUSTOMER_BUSINESS_PHONE	NUMBER	Customer contact business phone number. This field has not been modified by CVE.
CUSTOMER_CITY	TEXT	City of billing for customer address. This field has not been modified by CVE.
CUSTOMER_EMAIL	TEXT	Customer contact email. This field has not been modified by CVE.
CUSTOMER_NAME	TEXT	Name assigned to customer's account. This field has not been modified by CVE.
CUSTOMER_PERSONAL_PHONE	NUMBER	Customer contact personal phone number. This field has not been modified by CVE.
CUSTOMER_STATE	TEXT	State of billing for customer address. This field has not been modified by CVE.
CUSTOMER_ZIP	TEXT	Zip code of billing for customer address. This field has not been modified by CVE.
ERU_CATEGORY	TEXT	General category of ERU type. See "ERU CATEGORIES" table below for descriptions.
ERU_SUB_CATEGORY	TEXT	Sub-categories of ERU type. See "ERU SUB CATEGORIES" table below for descriptions.
GPS	TEXT	Field indicating whether an account's associated meter has been located via GPS. The location of account points does not necessarily depict the exact GPS'd location.
LIFECYCLE	TEXT	Field indicating the lifecycle status of an account. Accounts are either listed as "ACTIVE" or "NOT ACTIVE".
LOT_NUMBER	NUMBER	Indexing number assigned to lot when new account is added to the billing system. The numbers are strictly chronological, having no spatial meaning.
MULTI_ACCOUNT	TEXT	Field indicating whether an account is one of multiple accounts associated with the property. The "ACCOUNT_PERCENT" field can be used to determine an account's role in ERU billing.
Table Continued on Next Page		

OWNER_MATCH	TEXT	Field describing the relationship between "CUSTOMER_NAME" & "PARCEL_OWNER". The value "YES" describes instances in which the customer's name and/or address correlate with the parcel owner. Instances in which that information does not correlate are described with the value "NO".
PARCEL_JOIN	TEXT	Field indicating whether or not a parcel can be used to join in a 1:1 relationship.
PARCEL_OWNER	TEXT	The owner listed by the Auditor of the parcel where the account is located. Ownership information is current through December 31, 2016.
PRIMARY_PARCEL	TEXT	The parcel number associated with the location of the account. Because several accounts can be located on the same parcel, it is possible for multiple accounts to have the same parcel number.
RULES_APPLIED	TEXT	Rule(s) applicable to the account. Descriptions of rules can be found in the "RULES" section.
SERVICE_ADDRESS	TEXT	Address for the location of service. Can be a general description or street address. This field has not been modified by CVE.
SERVICE_TYPE	TEXT	The type of service being provided by the water connection. These types are "DOMESTIC, FIRE, IRRIGATION". The default for an account is "DOMESTIC".
STREET_NAME	TEXT	The street name associated with "ADDRESS_NUMBER". In instances where properties do not have an address number, the street name was populated by the existing parcel data.
TOTAL_ERU	NUMBER	ERU value associated with entirety of property where account is located, rounded down.
TOTAL_ERU_STD	NUMBER	ERU value associated with entirety of property where account is located, standard rounding.
TOTAL_IMPERV_AREA	NUMBER	The amount of impervious surface associated with the entirety of the property where the account is located, rounded to the nearest square foot.
Table Continued on Next Page		

TOTAL_IMPERV_BUILDING	NUMBER	The amount of impervious surface from buildings associated with the entirety of the property where the account is located, rounded to the nearest square foot.
TOTAL_IMPERV_SURFACE	NUMBER	The amount of impervious surface from non-building surfaces associated with the entirety of the property where the account is located, rounded to the nearest square foot.
UNIT_NUMBER	TEXT	The unit number associated with an address number. This number was generated by cross-referencing the parcel and address point features with the account number table.
VACANT	TEXT	Field indicating whether the property an account is located on is vacant or not. A vacant property is any parcel without any permanent improvements.

ERU CATEGORIES

CATEGORY	DESCRIPTION
EXEMPT	Property is exempt from ERU billing. These are government-owned properties.
NON-RESIDENTIAL	Property billed by number of ERUs. These properties include but are not limited to agricultural, commercial, industrial, institutional, or religious uses.
RESIDENTIAL	Property billed a single ERU. Residential properties were used to determine one ERU.
UNDEVELOPED	Property exempt from ERU billing because of lack of impervious surface.

ERU SUB-CATEGORIES

SUB-CATEGORY	DESCRIPTION
AGRICULTURAL	Property with significant or total agricultural use.
AVON	Property owned by the City of Avon. Exempt from billing.
COMMERCIAL	Property with any commercial use. Includes businesses operated from residential dwellings.
COMMERCIAL OPEN SPACE	Dedicated open space located in a commercial subdivision.
CONDOMINIUM	Single-family dwelling part of a multi-family or commercial building/complex.
HOA OPEN SPACE	Dedicated open space located in a residential subdivision.
LORAIN	Property owned by Lorain County. Exempt from billing.
MULTI-FAMILY	Residential dwelling occupied by multiple families.
OHIO	Property owned by the State of Ohio. Exempt from billing.
SINGLE-FAMILY	Residential dwelling occupied by a single family.
SINGLE-FAMILY YARD	Open space parcel part of a single-family residential property.



EXHIBIT C



CITY OF AVON

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CITY OF AVON

9-YEAR

CAPITAL IMPROVEMENT PROJECT PLAN

SUBMITTED BY

UTILITIES DEPARTMENT AND ENGINEERING DEPARTMENT

