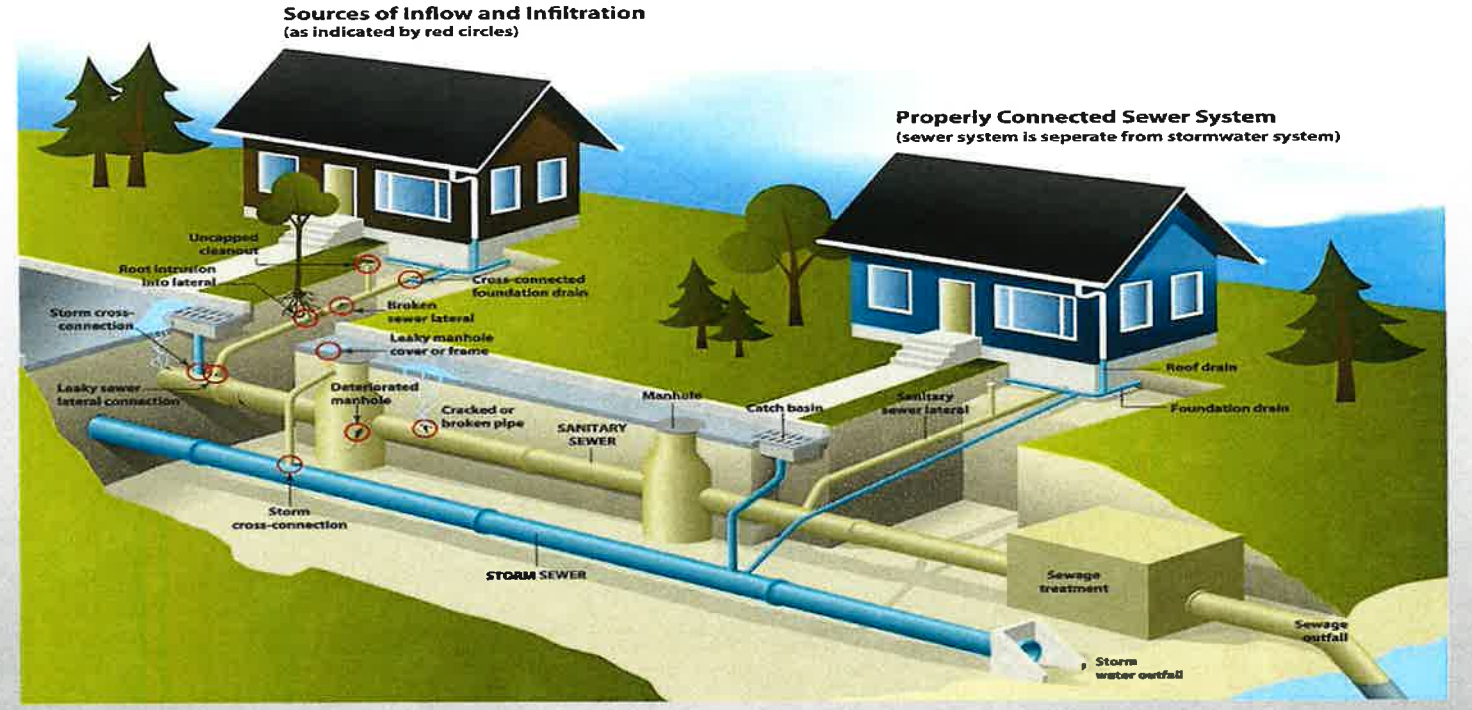
# INFLOW AND INFILTRATION

## A PRESENTATION ON THE PROBLEMS ASSOCIATED WITH EXCESS GROUNDWATER.

# WHAT IS INFLOW AND INFILTRATION?

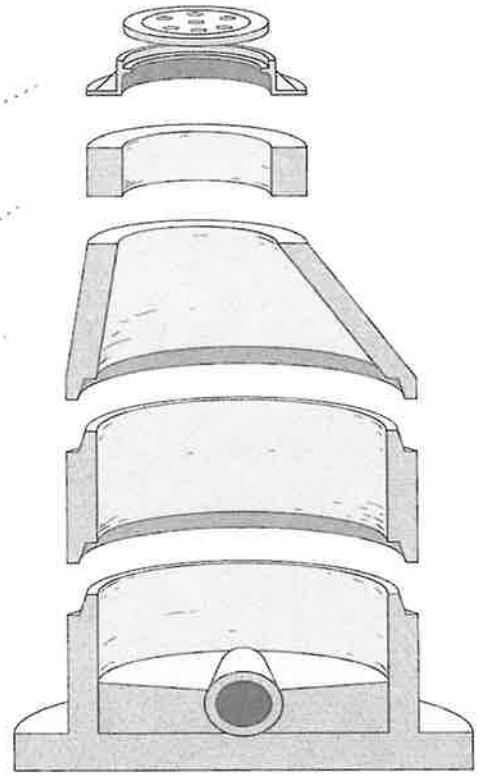
- INFLOW IS WHEN RAINWATER/GROUNDWATER ENTERS THE SYSTEM THROUGH OPEN CHANNELS, SUCH A COMBINED SEWERS, DOWNSPOUTS, AND SUMP PUMPS AND HAS DIRECT ACCESS TO OUR SEWER MAINS. (THIS IS A BIG PROBLEM, BUT NOT THE MAIN ISSUE)
- INFILTRATION IS WHEN GROUNDWATER FINDS ITS WAY INTO OUR COLLECTION SYSTEM THROUGH DEFECTS IN LATERALS, SEWER MAINS AND MANHOLES.
- THERE IS A DISTINCT DIFFERENCE, AND ONE PROBLEM IS MUCH EASIER TO FIX THAN THE OTHER.

# EXAMPLE #1


Sources of Inflow and Infiltration
(as indicated by red circles)
Properly Connected Sewer System
(sewer system is seperate from stormwater system)
Uncapped cleanout
Root intrusion into lateral
Cross-connected foundation drain
Broken sewer lateral
Storm cross-connection
Leaky manhole cover or frame
Leaky sewer lateral connection
Deteriorated manhole
Cracked or broken pipe
SANITARY SEWER
Manhole
Catch basin
Sanitary sewer lateral
Roof drain
Foundation drain
Storm cross-connection
STORM SEWER
Sewage treatment
Sewage outfall
Storm water outfall

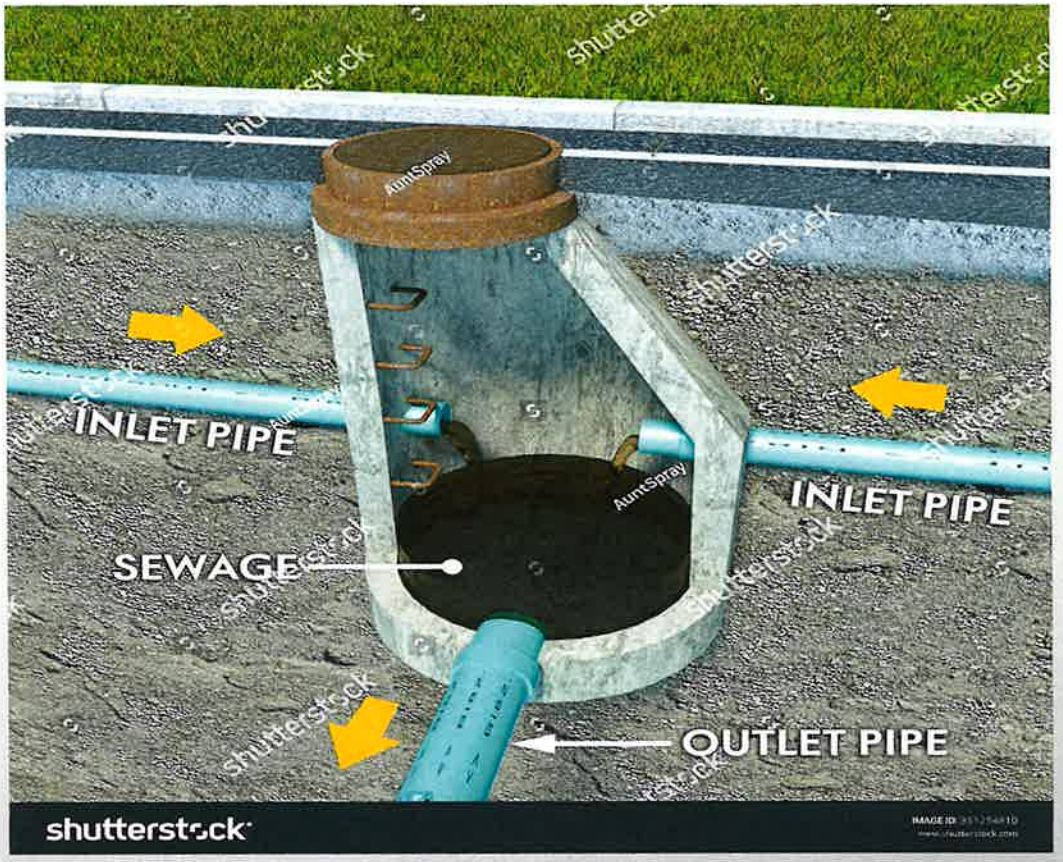
# EXAMPLE #2

- Frame and cover (the manhole lid and other parts, typically iron)
- Grade adjusting rings or risers (used to match pavement grade)
- Cone (top tapered section)
- Wall or barrel (main cylinder, typically 4-foot diameter)
- Bench and channel (the invert, or bottom flow areas)



# EXAMPLE #3

# EXAMPLE # 4



# MEADOWS SUBDIVISION

- 53% OF THE MANHOLES IN THIS SUBDIVISION ARE COMPROMISED. EVERYTHING FROM MINOR ISSUES TO MAJOR LEAKS.
- MAIN LINES-------
- AT THIS TIME SMOKE TESTING HAS NOT BEEN DONE TO DETERMINE FURTHER DEFICIENCIES.
- THE AVERAGE METERED WATER USAGE FOR THIS SUBDIVISION IS 390,000 GALLONS A MONTH.

# VILLA PARK SUBDIVISION

- 28.5% OF THE MANHOLES IN THIS SUBDIVISION ARE COMPROMISED EVERYTHING FROM MINOR ISSUES TO MAJOR DEFECTS.
- 90% OF THE MAIN LINES HAVE BEEN LOOKED AT AND HAVE A SIGNIFICANT NUMBER OF DEFICIENCIES.
- AT THIS TIME SMOKE TESTING HAS NOT BEEN DONE TO DETERMINE FURTHER DEFICIENCIES.
- THE AVERAGE METERED WATER USAGE FOR THIS SUBDIVISION IS 597,000 GALLONS A MONTH.

# ENGINEERS REPORT

- ON PAGE 23 OF THE ENGINEERING REPORT IN TABLE V-6 ARE THE FLOW MONITORING RESULTS FOR THE MEADOWS AND VILLA PARK SUBDIVISIONS COMBINED.
- WE SEE RANGES FROM 735,460 TO 5,255,830.
- KEEPING IN MIND THAT IN A SEALED SYSTEM (NO I&I) THE CURRENT FLOW SHOULD BE 987,000 – 10% = 888,300 GAL
- WE ALSO SEE THAT RAINFALL HAS A DIRECT CORRELATION TO FLOW DATA.

# WHAT DOES THIS MEAN IN DOLLARS

- IN A WORST-CASE SCENARIO I&I COULD ADD AN ADDITIONAL $18,212 DOLLARS TO THE MONTHLY CHARGE FOR BOTH SUBDIVISIONS.
- 5,255,830 – 888,300 = 4,367,530 ÷ 1,000 = 4,367.53 X 4.17 = $18,212.60
- AVERAGE FLOWS WITH I&I FIGURED IN FOR BOTH SUBDIVISIONS ARE 83,269 GPD X 30 = 2,498,070 ÷ 1,000 = 2498.07 X 4.17 = $10,416.95
- A SEALED SYSTEM FOR BOTH SUBDIVISIONS WOULD RESULT IN A BILL OF $3,704.21 PER MONTH EXCLUDING OTHER FEES.
- AVERAGE PER YEAR IF WE DO NOTHING $125,003.40

# 50 GALLONS A MINUTE

- AN I&I LEAK OF 50 GALLONS A MINUTE WILL RESULT IN A BILL TO THE CITY OF AN EXTRA $9000.00 PER MONTH
- 50 ONE GALLON A MINUTE LEAKS WILL RESULT IN THE SAME BILL.
- IT IS IMPORTANT TO REMEMBER THAT GROUNDWATER RISES AND FALLS, IN A DROUGHT BILLS WILL BE LOW AND IN RAINY TIMES THE BILL WILL BE HIGHER.
- I&I DOES NOT GET BETTER IT ONLY GETS WORSE IF LEFT ALONE.

# WHAT CAN BE DONE ?

- SOME WORK MUST AND SHOULD BE HANDLED IN HOUSE.
- LOGISTICS
- SUMP PUMPS
- CERTIFIED RATES
- IT IS VERY IMPORTANT TO NOT THROW MONEY AT THIS ISSUE AND END UP UNSATISFIED WITH THE RESULTS.
- FOR EVERY MEANINGFUL DOLLAR SPENT ON I&I REDUCTION A THREE-TO-FIVE-FOLD PAYBACK SHOULD BE EXPECTED.

# LOOKING BACK AND LOOKING TO THE FUTURE

- IN HINDSIGHT THE PROBLEMS IN THE MEADOWS AND VILLA PARK SHOULD HAVE BEEN A GREATER CONCERN; SO NOW AS A CITY WE FIND OURSELVES HAVING TO DEAL WITH THESE ISSUES WHILE HAVING TO ALSO DEAL WITH A LOOMING MONETARY SITUATION.
- AT SOME POINT TO REMAIN A SOVRAN ENTITY IT MAY BE NECESSARY TO START PLANNING TO BUILD A WASTEWATER TREATMENT FACILITY.

# IN CONCLUSION

- WE HAVE A LOT PROBLEMS TO DEAL WITH, BUT WE ARE DEFINITELY NOT THE ONLY CITY IN THIS SITUATION.
- THE PROBLEMS THAT WE HAVE ARE NOT INSURMOUNTABLE AS LONG AS WE WORK TOGETHER.
- QUESTIONS?
- MORE QUESTIONS?

The pump control panel is housed in a concrete masonry electrical control building located northwest of the wetwell and includes a wireless monitoring and telemetry system to notify City personnel of high-level and pump failure alarms. The control panel is upgradable from duplex to triplex operation. Other electrical gear contained in the building includes a fused main-disconnect switch, automatic transfer switch, 3-phase distribution panel, 480-120/240 1-phase transformer, and 1-phase distribution panel. The electromagnetic flow meter transmitter which displays flow rate and totalizes flow is also located in the electrical control building. The building is equipped with an active ventilation system, unit heater, lighting, and shop sink.

Also located at the site is a 50-foot diameter cast-in-place concrete flow equalization (EQ) basin that provides approximately 100,000 gallons of temporary storage capacity. The EQ basin is connected to the wetwell with a 12-inch common bypass and return line. The top of the basin is approximately 1-foot above ground level and provided with metal hand-railing around the perimeter for safety.

The station is provided with a backup power source consisting of stationary, diesel fueled generator set mounted on a concrete pad located adjacent to and northwest of the electrical control building. The automatic transfer switch in the control building provides for switching of load between the normal and backup power sources.

The lift station site is enclosed with a 6-foot-high chain link security fence and two locking gates all with privacy screening slats. The site is provided with water service from a post hydrant for washdowns. An electric motor operated stationary davit crane is located adjacent to the east side of the wetwell for removal of pumps. An active ventilation/odor control system is provided for the wetwell for odor control at the site. A passive odor control unit is provided on the manhole that receives flow from Regional and "D" Station force mains.

3. *Treatment*: Currently, the City of Willard does not operate a wastewater treatment facility for processing of collection system flows from Willard Proper. Treatment is provided by the City of Springfield at their Northwest Wastewater Treatment Plant (NWTP), located approximately 4-miles east of downtown Willard. Willard Proper's wastewater flows are conveyed to Springfield through nearly 3.5 miles of force main from the "94" Lift Station to a gravity sewer manhole located near the intersection of West Kearney Street and Old Willard Road. The combined Springfield and Willard Proper flows then travel through gravity sewers to the NWTP.

Willard and Springfield cooperate through a contractual agreement in which Willard currently monitors, reports, and pays for flows delivered to Springfield based on metered water usage. The City of Springfield has created a new, uniform contract for all regional communities that contribute flow to Springfield for treatment. A copy of the new contract is included in **Appendix D-1**. Under the new contract, regional communities will pay for actual wastewater flows delivered to Springfield for treatment based on a wholesale rate structure. To monitor and report flow volumes transported to Springfield, the City of Springfield has installed and maintains a flow meter in the Regional Force Main north of the gravity sewer manhole that receives flow from Willard.

The basis for the wholesale rate structure that will be applicable to Willard and other regional communities was developed in a rate analysis prepared for the City of Springfield by Black & Veatch Corporation dated April 20, 2020. A copy of the rate analysis is included in **Appendix D-2**. It is expected that this rate analysis will be updated in 2022.

The current wholesale rate structure applicable to Willard consists of two rate components, a fixed billing/metering charge of $3,450 per quarter plus a volume charge of $2.48 per 100 cubic feet (Ccf) which equates to a billing/metering charge of $1,150 per month plus a volume charge of $3.32 per 1000 gallons. Applying this rate structure to the Willard Proper 2020 average wastewater flows presented in **Table V-1** results in an average monthly charge of $49,769.

It is expected that the wholesale rate structure volume component will be updated from time to time consistent with the City of Springfield's retail rates, which are currently on a 3-year cycle. It is also expected that the wholesale rate structure billing/metering component will be updated annually consistent with other City fees. The volume component of Springfield's retail rate structure increased by 5% this year and is scheduled to increase by an additional 5% next year. On this basis, the wholesale volume component can be expected to increase from $2.48 per 100 Ccf to $2.73 per Ccf ($3.65 per 1000 gallons) in 2023. Subsequent increases are anticipated to be about 2.5% each year thereafter.

## B. THE MEADOWS SEWER SYSTEM

1. *Collection System*: The Meadows residential area is located approximately 2.5-miles south of Willard Proper. Development of the area began in the late 1970s and is divided into two drainage basins, Meadows East, and Meadows West. Meadows East includes a single residential development, Meadow Lake Subdivision, located north of State Highway EE between Farm Road 101 and Farm Road 103. Meadows West includes three residential developments, Villa Park Meadows, Villa Park Heights, and Prairie View Subdivisions, all of which are located north of State Highway EE, east of State Highway AB, and west of Farm Road 101. Meadows West also includes a small commercial area located at the northeast corner of the intersection of State Highways AB and EE. The gravity collection system consists of primarily 8-inch and 6-inch PVC with some VCP that was installed in the early years of development. **Exhibit No. 2** illustrates The Meadows collection system basins and **Table IV-4** summarizes gravity sewer pipe lengths within each basin as well as the trunk sewer to the lagoon.

**Table IV-4: Summary of The Meadows Gravity Sewers**

| Basin | Approximate Length (ft,) |
|---|---|
| Meadows East | 7,342 |
| Meadows West | 11,397 |
| Trunk Sewer | 4,787 |

Each basin collection system flows to its corresponding lift station where sewage is then pumped to a common manhole on the trunk sewer that flows by gravity to The Meadows treatment lagoon system. A summary of the two force mains is provided in **Table IV-5**.

**Table IV-5: Summary of The Meadows Force Mains**

| Lift Station | Force Main Diameter (in.) | Length (ft.) | ARV |
|---|---|---|---|
| Meadows East | 4 | 4,161 | 1 |
| Meadows West | 6 | 4,121 | 0 |

2. *Lift Stations*: The Meadows collection system includes two lift stations, Meadows East and West, that pump sewage to a manhole on the gravity trunk sewer that flows to the lagoon treatment system. **Table IV- 6** provides a summary of the two lift stations.

pump #1 and #2, respectively, the station will need to be upgraded in the near future to handle projected average daily flows going forward. Options for upgrading "D" Station are discussed in **Section VI.A.3** of this Report.

8. *Willard Proper Total Flows*: The projected average daily wastewater flows for Willard Proper presented in **Table V-5** were derived by multiplying the projected population values presented in **Table III-1** by 76 gallons per person per day with additional allowances included for non-resident population presented in **Table III-3**. On this basis, the 2026 projected average daily flow for Willard Proper is 658,600 gpd which equates to a required pumping rate of approximately 1,830 gpm when pumped over 6-hour pump operating time. The 2041 projected average daily flow is 1,069,200 gpd which equates to a pumping rate of approximately 2,970 gpm when pumped over a 6-hour pump operating time. With the station pump tests indicating current pumping rates of 1,500 gpm for both Pumps No. 1 & 2, station capacity will need to be upgraded in the near future for it to be capable of handling projected future flows. Options for upgrading the "94" Station are discussed in **Section VI.A.4** of this Report.

## E. THE MEADOWS COLLECTION SYSTEM BASIN FLOWS

The Meadows collection system is divided into two basins, Meadows East, and Meadows West, which correspond with the two lift station service areas. Both lift stations contribute flow to a gravity sewer that empties into the Meadows lagoon system. Available flow metering data for the Meadows basin was analyzed to estimate current average daily and peak day flow rates. These analyses provided a basis for projecting future wastewater flows for each basin over this Report's 20-year planning period.

1. *Flow Metering*: The City of Springfield Sewer Maintenance Department installed a temporary flow meter in a manhole on the trunk sewer upstream of The Meadows lagoon system which monitored the combined wastewater flows contributed by Meadows East and Meadows West for an extended period from November 2017 thru September 2018. Adjusting for missing data due to meter fouling or other unknown causes, total monthly flows conveyed to the lagoon treatment system during the monitoring period are summarized in **Table V-6** along with monthly rainfall totals.

**Table V-6: The Meadows Wastewater Flows – Nov. 2017 thru Sept. 2018**

| Month | Wastewater Flow (gal.) | Rainfall (in.) |
|---|---|---|
| November 2017 | 1,023,400 | 0.46 |
| December 2017 | 735,460 | 1.74 |
| January 2018 | 2,030,230 | 1.91 |
| February 2018 | 4,792,280 | 6.99 |
| March 2018 | 4,019,140 | 4.11 |
| April 2018 | 5,255,830 | 2.68 |
| May 2018 | 3,487,650 | 3.21 |
| June 2018 | 1,767,380 | 5.09 |
| July 2018 | 1,178,540 | 0.96 |
| August 2018 | 1,258,840 | 5.70 |
| September 2018 | 1,626,360 | 4.78 |
| Total Flow & Rainfall | 27,811,880 | 37.63 |
| **Average Daily Flow*** | **83,269 gpd** | - |

*334 days of data

Currently, there are approximately 274 sewer service connections in Meadows East and West combined. At 3.0 people per household, this equates to an estimated population equivalent of 822. Dividing the average daily flow shown in **Table V-6** by 822 calculates to a per capita flow rate of 101 gallons per person per day which is somewhat high for a residential community such as the Meadows and indicative of above normal I&I. Per capita flow rates from new developments are expected to be less and more indicative of what is considered normal I&I. For purposes of this Report, a per capita flow allowance of 100 gallons per person per day has been used for projecting future wastewater flow contributions for the Meadows service area.

2. *Infiltration and Inflow (I&I)*: Water sales to users of the Meadows sewer system for the months of November 2017 thru September 2018 are shown in **Table V-7**. The difference between metered wastewater flows and metered water sales, assuming 90% of metered water sales enters the sewer system, represents the average daily amount of I&I that enters the sewer system.

**Table V-7: The Meadows Water Usage vs. Wastewater Flows**

| Year | Average Water Sales (gpd) | Estimated* Average Daily Wastewater Flow (gpd) | Metered Average Daily Wastewater Flow (gpd) | Estimated Average Daily I&I (gpd) | Estimated I&I % |
|---|---|---|---|---|---|
| 2017-18 | 39,918 | 35,926 | 83,269 | 47,343 | 57% |

*Assuming 90% of Water Sales

Referencing the flow meter data summarized in **Table V-6**, a peak day flow of 1,078,000 gpd was recorded February 24, 2018. However, this figure exceeds the combined capacity of the Meadows East & West lift stations, assuming both stations pumping continuously for 24-hours, and is therefore suspect. The next highest peak day flow of 526,000 gpd was recorded on March 3, 2018. Dividing this value by the average daily flow results in a peaking factor of 6.32 which is consistent with the peaking factors derived for the Willard Proper basins.

## F. FUTURE MEADOWS BASIN FLOWS

Estimated future flows for the Meadows collection system basins are presented in **Table V-8**. The basis for which the estimates of future flows were derived are discussed in the paragraphs that follow **Table V-8**.

**Table V-8: Future Basin Flows – Meadows Collection System**

| Basin Identification | 2020 Average Daily Flows (gpd) | 2026 Average Daily Flows (gpd) | 2031 Average Daily Flows (gpd) | 2041 Average Daily Flows (gpd) |
|---|---|---|---|---|
| Meadows East | 31,000 | 51,000 | 62,300 | 93,200 |
| Meadows West | 52,300 | 60,000 | 68,400 | 87,800 |
| Meadows North | - | - | - | 60,000 |
| Meadows Total | 83,300 | 111,000 | 130,700 | 241,000 |

Note: All Flows Rounded to Nearest 100-gallons

1. *Meadows East Basin*: The Meadows Total current average daily flow of 83,269 gpd is based on the flow metering effort discussed in the previous section and summarized **Table V-6**. The current population within the Meadows East Basin was estimated by visually counting the number of residences within the

| TOTAL USAGE (in gallons) | THE MEADOWS STS |
|---|---|
| 25,000 | W. MEADOW DR |
| 90,000 | N. MEADOWLAKE |
| 53,000 | W. COTTONWOOD |
| 25,000 | WILDBERRY CT |
| 154,000 | HONEYSUCKLE WAY |
| 26,000 | HAWTHORN CT |
| 17,000 | DOGWOOD |
| 390,000 | MEADOWS TOTAL |

| TOTAL USAGE (in gallons) | VILLA PARK STS | |
|---|---|---|
| 53,000 | PINE | |
| 14,000 | GARRY | |
| 27,000 | PRIMROSE | |
| 23,000 | ASH AVE | |
| 138,000 | LONE OAK | |
| 171,000 | DOGWOOD | |
| 68,000 | COTTONWOOD | |
| 45,000 | CEDAR | |
| 5,000 | WOODLAWN | |
| 40,000 | POPLAR | |
| 0 | SPRUCE | (NO SEWER) |
| 13,000 | N. PINE | |
| 597,000 | VILLA PARK TOTAL | |

Total usage (in gallons) : 987,000

# VILLA PARK

| CACTUS | GARRY | PRIMROSE | ASH | LONE OAK | DOGWOOD (7036-6705) | COTTONWOOD (7015-6914) | CEDAR AVE | WOODLAWN | POPLAR AVE | SPRUCE | N. PINE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,000 | 1,000 | 6,000 | 4,000 | 4,000 | 3,000 | 5,000 | 5,000 | 3,000 | 3,000 | 0 | 12,000 |
| 3,000 | 3,000 | 5,000 | 5,000 | 7,000 | 3,000 | 2,000 | 7,000 | 2,000 | 1,000 | | 1,000 |
| 1,000 | 4,000 | 2,000 | 3,000 | 2,000 | 2,000 | 5,000 | 1,000 | | 4,000 | | |
| 4,000 | 4,000 | 4,000 | 3,000 | 4,000 | 2,000 | 1,000 | 6,000 | 5,000 | 3,000 | | 13,000 |
| 1,000 | 2,000 | 5,000 | 3,000 | 2,000 | 4,000 | 2,000 | 7,000 | | 3,000 | | |
| 10,000 | | 5,000 | 5,000 | 6,000 | 3,000 | 1,000 | 5,000 | | 3,000 | | |
| 2,000 | 14,000 | | | 4,000 | 5,000 | 2,000 | 4,000 | | 6,000 | | |
| 4,000 | | 27,000 | 23,000 | 2,000 | 10,000 | 2,000 | 7,000 | | 2,000 | | |
| 6,000 | | | | 3,000 | 2,000 | 2,000 | 1,000 | | 4,000 | | |
| 1,000 | | | | 4,000 | 5,000 | 6,000 | 2,000 | | 2,000 | | |
| 9,000 | | | | 4,000 | 3,000 | 1,000 | | | 4,000 | | |
| 1,000 | | | | 3,000 | 3,000 | 2,000 | 45,000 | | 1,000 | | |
| 4,000 | | | | 4,000 | 3,000 | 3,000 | | | 2,000 | | |
| 1,000 | | | | 4,000 | 3,000 | 7,000 | | | 2,000 | | |
| 5,000 | | | | 3,000 | 2,000 | 4,000 | | | | | |
| | | | | 6,000 | 4,000 | 9,000 | | | 40,000 | | |
| 53,000 | | | | 7,000 | 2,000 | 3,000 | | | | | |
| | | | | 5,000 | 2,000 | 4,000 | | | | | |
| | | | | 1,000 | 4,000 | 7,000 | | | | | |
| | | | | 2,000 | 7,000 | | | | | | |
| | | | | 5,000 | 2,000 | 68,000 | | | | | |
| | | | | 3,000 | 3,000 | | | | | | |
| | | | | 2,000 | 1,000 | | | | | | |
| | | | | 3,000 | 5,000 | | | | | | |
| | | | | 1,000 | 3,000 | | | | | | |
| | | | | 3,000 | 5,000 | | | | | | |
| | | | | 3,000 | 6,000 | | | | | | |
| | | | | 9,000 | 1,000 | | | | | | |
| | | | | 2,000 | 1,000 | | | | | | |
| | | | | 2,000 | 3,000 | | | | | | |
| | | | | 2,000 | 3,000 | | | | | | |
| | | | | 5,000 | 2,000 | | | | | | |
| | | | | 2,000 | 2,000 | | | | | | |
| | | | | 4,000 | 1,000 | | | | | | |
| | | | | 6,000 | 2,000 | | | | | | |
| | | | | 3,000 | 2,000 | | | | | | |
| | | | | 6,000 | 6,000 | | | | | | |
| | | | | | 2,000 | | | | | | |
| | | | | 138,000 | 5,000 | | | | | | |
| | | | | | 3,000 | | | | | | |
| | | | | | 4,000 | | | | | | |
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| | | | | | 3,000 | | | | | | |
| | | | | | 2,000 | | | | | | |
| | | | | | 2,000 | | | | | | |
| | | | | | 4,000 | | | | | | |
| | | | | | 171,000 | | | | | | |

| TOTAL USAGE | VILLA PARK STS |
|---|---|
| 53,000 | PINE |
| 14,000 | GARRY |
| 27,000 | PRIMROSE |
| 23,000 | ASH AVE |
| 138,000 | LONE OAK |
| 171,000 | DOGWOOD |
| 68,000 | COTTONWOOD |
| 45,000 | CEDAR |
| 5,000 | WOODLAWN |
| 40,000 | POPLAR |
| 0 | SPRuCE |
| 13,000 | N. PINE |
| 597,000 | VILLA PARK TOTAL |

THE MEADOWS

| W. MEADOW DR | N MEADOW LAKE | W COTTONWOOD (6441-6307) | WILDBERRY CT | HONEYSUCKLE WAY | HAWTHORN CT | DOGWOOD (6333-6358) |
|---|---|---|---|---|---|---|
| 3000 | 5000 | 3000 | 1000 | 6000 | 4000 | 3000 |
| 2000 | 2000 | 4000 | 5000 | 5000 | 2000 | 4000 |
| 3000 | 2000 | 3000 | 1000 | 3000 | 2000 | 4000 |
| 3000 | 5000 | 1000 | 1000 | 2000 | 5000 | 2000 |
| 4000 | 1000 | 3000 | 5000 | 1000 | 6000 | 4000 |
| 4000 | 5000 | 3000 | 5000 | 1000 | 1000 | |
| 3000 | 3000 | 6000 | 3000 | 7000 | 1000 | |
| 3000 | 5000 | 2000 | 4000 | 1000 | 5000 | |
| | 2000 | 4000 | | 2000 | | |
| | 7000 | 3000 | | 3000 | | |
| | 1000 | 4000 | | 2000 | | |
| | 1000 | 3000 | | 1000 | | |
| | 1000 | 4000 | | 6000 | | |
| | 6000 | 5000 | | 8000 | | |
| | 1000 | 3000 | | 2000 | | |
| | 4000 | 2000 | | 1000 | | |
| | 1000 | | | 6000 | | |
| | 2000 | | | 5000 | | |
| | 3000 | | | 3000 | | |
| | 4000 | | | 4000 | | |
| | 7000 | | | 5000 | | |
| | 4000 | | | 3000 | | |
| | 4000 | | | 4000 | | |
| | 3000 | | | 2000 | | |
| | 2000 | | | 1000 | | |
| | 2000 | | | 3000 | | |
| | 2000 | | | 11000 | | |
| | 5000 | | | 6000 | | |
| | | | | 50000 | | |

| | | | | | | | TOTAL |
|---|---|---|---|---|---|---|---|
| 25000 | 90000 | 53000 | 25000 | 154000 | 26000 | 17000 | 390000 |

| TOTAL USAGE | THE MEADOWS ST |
|---|---|
| 25000 | W. MEADOW DR |
| 90000 | N. MEADOWLAKE |
| 53000 | W. COTTONWOOD |
| 25000 | WILDBERRY CT |
| 154000 | HONEYSUCKLE WAY |
| 26000 | HAWTHORN CT |
| 17000 | DOGWOOD |
| 390000 | THE MEADOWS TOTAL |