DRAFT FINAL REPORT
City of Newark Water Distribution Network Model

"A water distribution model constructed using USEPA EPANET 2"

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Prepared for:

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Purpose of the Report

The purpose of this report is to document the preparation of a water distribution model for the City of Newark, Delaware. The University of Delaware, Water Resources Agency prepared this model for the City of Newark Water and Wastewater Department using USEPA EPANET 2 software.

Chapter 1: Introduction

This report documents the construction of a City of Newark, Delaware water distribution model using the United States Environmental Protection Agency EPANET 2 software. The University of Delaware, Institute for Public Administration – Water Resources Agency prepared the model for the City of Newark Water and Wastewater Department.

EPANET 2 Model

EPANET 2 is a computer simulation model designed to predict the hydraulics of pressurized water distribution pipe networks (Rossman, USEPA, 2000). The network consists of pipes (links), nodes (junctions), pumps, valves, storage tanks, and reservoirs. EPANET 2 models the flow and velocity in each pipe, the pressure at each node, and the height of water in each tank. EPANET 2 runs on a laptop or personal computer using Windows operating system which allows point and click entry of input data and color coded output maps, tables and graphs. EPANET 2 has the following hydraulic modeling capabilities:

- No limit on the number of pipes and nodes that can be modeled.
- Computes flow and friction headloss using the Hazen-Williams formulas.
- Includes minor head losses for bends and fittings.
- Models pumps and valves.
- Simulates multiple water levels in storage tanks.
- Consider multiple normal and peak demand categories.

Newark Water Distribution System

The City of Newark water system was formed around 1888 as a one-well system serving a small population in the downtown area (NWSAC, 1991). Today the City of Newark provides drinking water via a municipal system to about 33,000 people through about 9000 service connections within a 25 - square mile service area (Figure 1). Newark's daily water needs range from 4 million gallons per day for normal demands to 6.0 - 6.5 mgd for peak daily demands although peak demand has declined since the 1999's due to water conservation practiced by residential and industrial customers (Figure 2).

Newark draws water supply from two sources – surface water at the White Clay Creek Water Treatment Plant near Paper Mill Road (3 mgd) and the nearby Newark Reservoir, and groundwater from wells in the north wellfield near Creek Road and the south wellfield along South Chapel Street (3.5 mgd). The City is the only water purveyor in Delaware able to withdraw water conjunctively from both surface and ground water. Newark can also supplement supplies via interconnections from United Water Delaware, an investor owned purveyor. Table 1 summarizes the capacity and characteristics of the Newark wellfields.

The raw untreated water is withdrawn from the creek or the wells and treated at the White Clay Creek or South Wellfield water treatment plants (Figure 3). The treated water is then transported through a 100 mile pipe network to the custumers. A system of storage tanks and pumps provides pressure to the system. During dry years when the White Clay Creek declines to low levels below 14 mgd (an instream flow standard to protect the fishery), the City curtails withdrawals from the creek and pumps water from the Newark Reservoir (circa 2006) for treatment and delivery to the system. Table 2 summarizes the characteristics of the City of Newark Water Supply System.

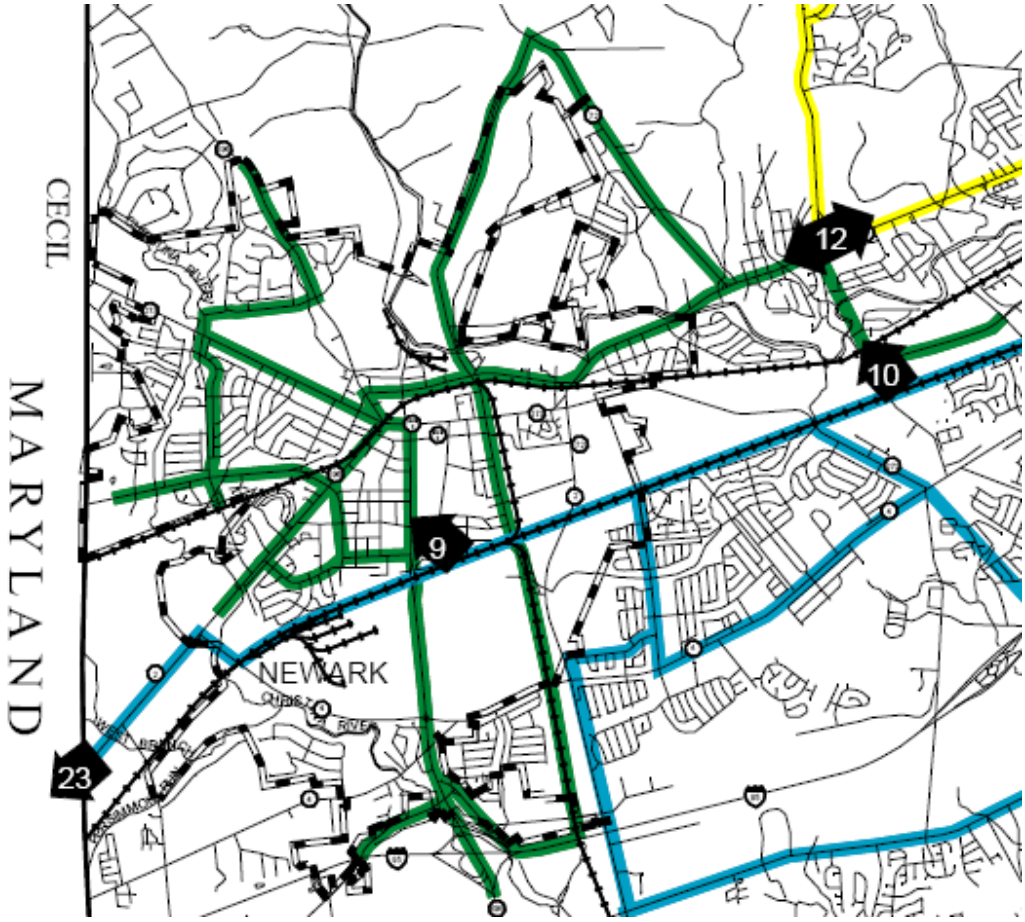


Figure 1. City of Newark water distribution mains.

Table 1. Wells in the City of Newark water system.

LOCAL ID	DNREC ID	DGS ID	Drilled	Capacity (gpm)	Diameter (in)	Screen (ft)	Aquifer
South Wellfield							
8	10001	Ca55-05	Jan-31	140	16	55-60	Columbia
10	10622		Jan-69	60	4	153	Columbia
11	10003	Db11-28	Jan-56	150	10	31-62	Columbia
12	10002	Db12-27	Jan-56	75	10	145-170	Potomac
13	10004	Db11-27	Jan-56	180	10	41-62	Columbia
14	10005	Db11-49	Jan-56	325	10	106-129	Potomac
15	00182	Db11-48	Jul-68	425	10	44-59	Columbia
16	00181	Db2-42	Jun-68	475	10	130-164	Potomac
17	01508	Db31-51	Jan-71	150	12	56-69	Columbia
19	31430	Db32-16	Jan-68	75	6	118-133	Potomac
				1915	3.0 mgd		
Laird Tract							
20	81438	Ca45-98	Feb-90	550	10	102-285	Wissahickon
21	81439	Cb41-14	Feb-90	200	10	55-400	Wissahickon
23	10006	Ca45-21	Jan-71	350	8	400	Wissahickon
25	10007	Ca45-23	Jan-71	150	8	419	Wissahickon
				1250	1.6 mgd		

Table 2. Characteristics of the City of Newark water supply system.

Characteristic	Description
System Circa	1888
Supply	White Clay Creek (3.0 mgd) South Wellfield (3.0 mgd) Laird Tract wells(1.6 mgd)
Water Treatment Facilities	White Clay Creek Filtration Plant : 3 mgd South Wellfield Iron Treatment Plant: 2 mgd
Treatment	Screening, Sedimentation, Flocculation, Sand Filtration, Fluoridation, pH adjustment, Chlorination
Storage	Raw Water: Newark Reservoir (317 mg) Finished Water: 7 Storage Tanks (8 mg)
Mains	100 miles
Service Population/Connections	33,000/9,000
Service Area	25 sq mi
Demand	Normal Demand: 4.0 mgd Maximum Monthly: 4.9 mgd Peak Demand: 6.5 mgd
Interconnections	United Water Delaware Academy Street: 3 mgd United Water Delaware Red Mill Rd: 1.4 mgd

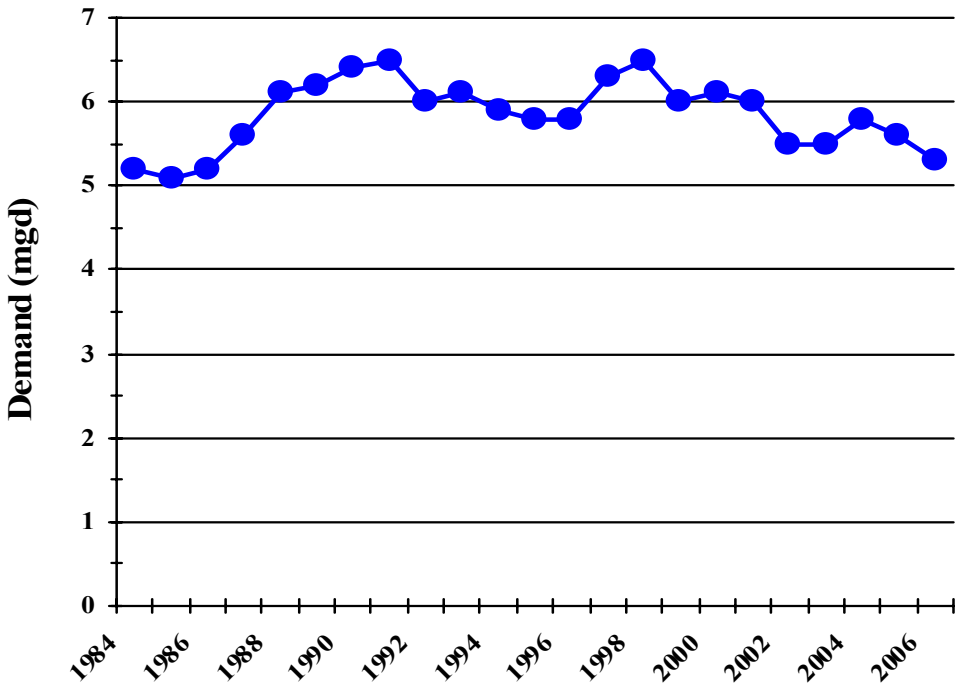


Figure 2. Peak daily water demand in the City of Newark.

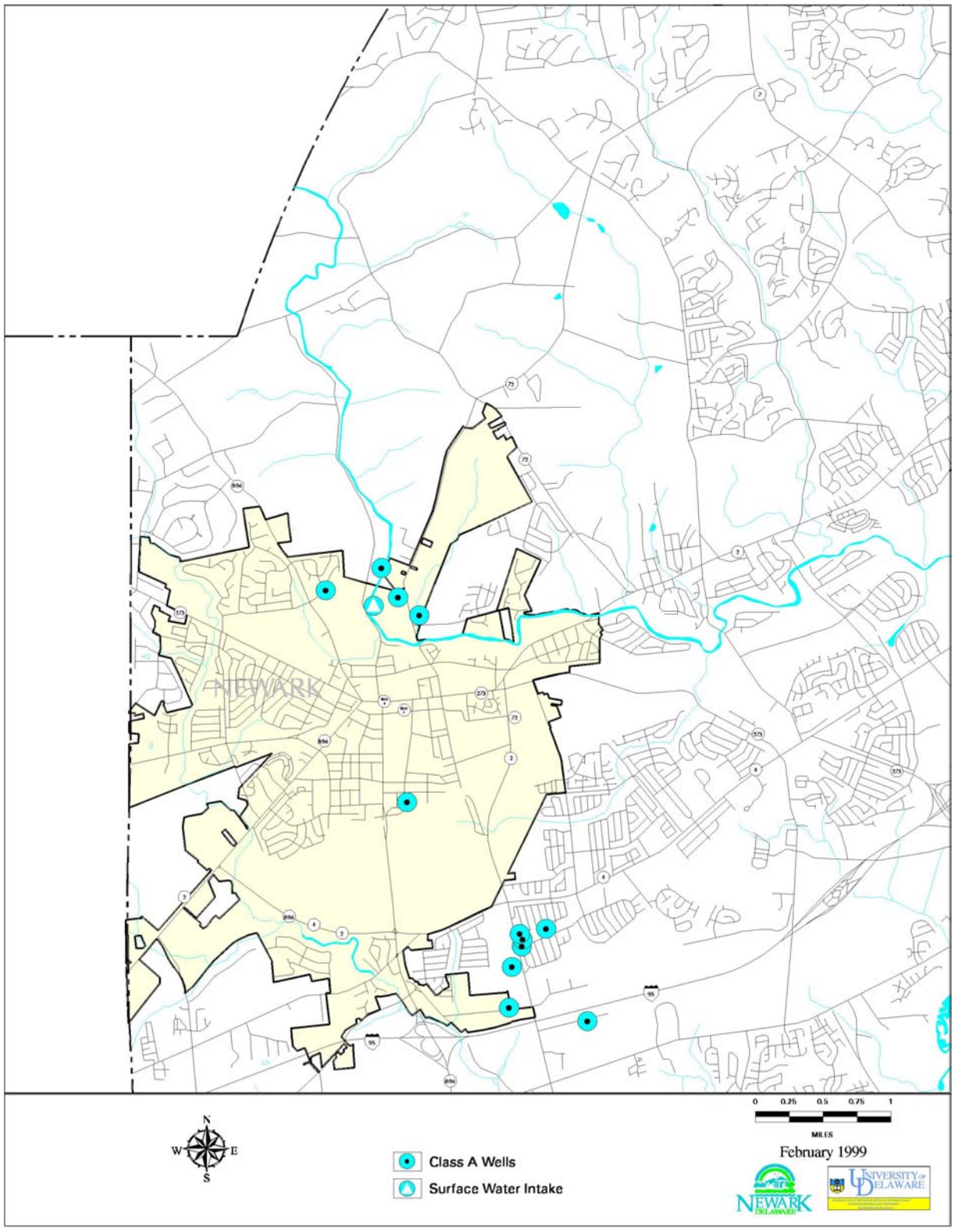


Figure 3. City of Newark water supply sources.

Chapter 2: EPANET 2 Model Development

Scope

The University of Delaware, Institute for Public Administration – Water Resources Agency developed the EPANET 2 water distribution model for the City of Newark according to the following scope:

1. ***Service Areas*** – Divide the City of Newark water distribution network into the following service areas:
   - North of Main Street and west of the White Clay Creek
   - North of Main Street and east of the White Clay Creek
   - Kirkwood Highway and eastward
   - South of Main Street, east of the state line and north of Elkton Road
   - South of Main Street, south of Elkton Road, and north of Chestnut Hill Road
   - South of Chestnut Hill Road

2. ***Nodes*** – Input data for the nodes (pipe junctions) including:
   - Vertical elevation (ft above msl datum) obtained from USGS topographic mapping and assuming the mains are constructed 5 feet below the ground surface.
   - Water demand (gpm)
   - Horizontal location from water supply mylar drawings provided by City of Newark

3. ***Pipes*** – Input data for the pipes including:
   - Connecting nodes
   - Length (ft)
   - Diameter (in)
   - Hazen Williams roughness coefficient for pipe material cast iron or ductile iron (C = 100).

4. ***Tanks*** – Define the finished water storage tanks including:
   - Bottom elevation (ft above msl datum)
   - Diameter (ft)
   - Initial, minimum, and maximum water levels

5. ***Pumps*** – Define pump curves using:
   - Total dynamic head (ft)
   - Operating flow rate (gpm)

6. ***Valves –*** Input the locations of the following types of valves and designate as closed or open:
   - Pressure reducing valve (PRV)
   - Pressure Sustaining Valve (PSV)
   - Flow Control Valve (FCV)

7. ***Reservoirs*** – Define the raw water storage facilities such as the treatment plant lagoons and the Newark Reservoir including:
   - Bottom /full water levels (msl)
   - Volume (cf)

8. Water demands - Run the model for average daily (4 mgd) and peak daily (6.5 mgd) water demands. For a normal demand of 4 mgd or 2,800 gpm, if there are 683 junctions, then the mean demand per junction is 4 gpm. Using a peak demand multiplier of 1.5, then the demand at each node is 6 gpm. Compute the following output parameters in tabular and graphical views at each node in the system:

- Elevation (ft)
- Demand
- Head (ft)
- Pressure (psi)

Compute the following output parameters in each pipe (link) in the water system:

- Length (ft)
- Diameter (in)
- Flow (gpm)
- Velocity (fps)
- Status (open or closed

Figures 4, 5, 6, and 7 provide schematics of the City of Newark EPANET 2 water distribution model. The City of Newark water model has the following summary statistics:

Number of Junctions:	683
Number of Reservoirs:	1
Number of Tanks:	7
Number of Pipes:	925
Number of Pumps:	8
Number of Valves:	20
Flow Units:	GPM
Headloss Formula:	Hazen Williams

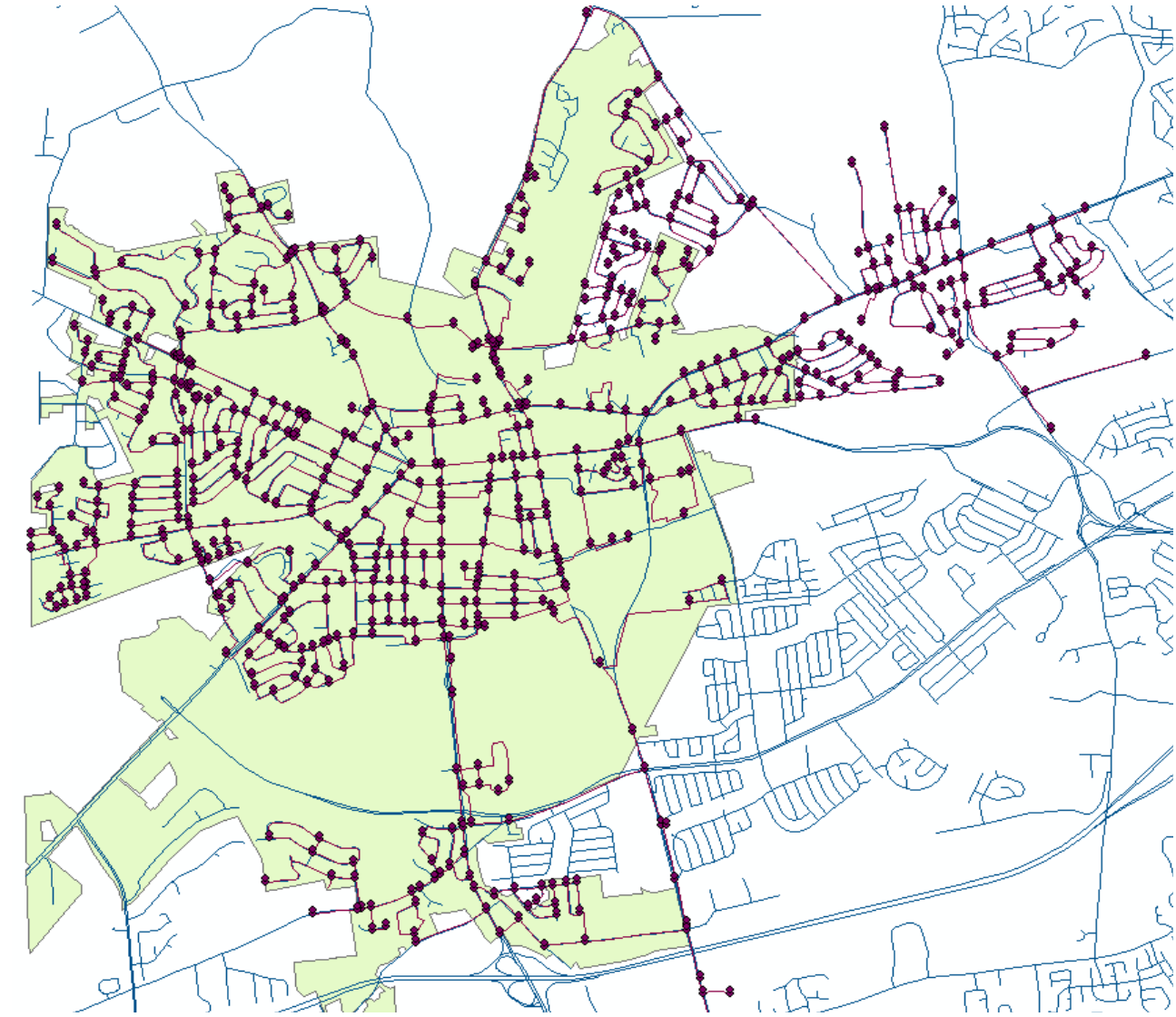


Figure 4. City of Newark EPANET 2 water distribution model.

Figure 5. City of Newark EPANET 2 water distribution model with wells and tanks.

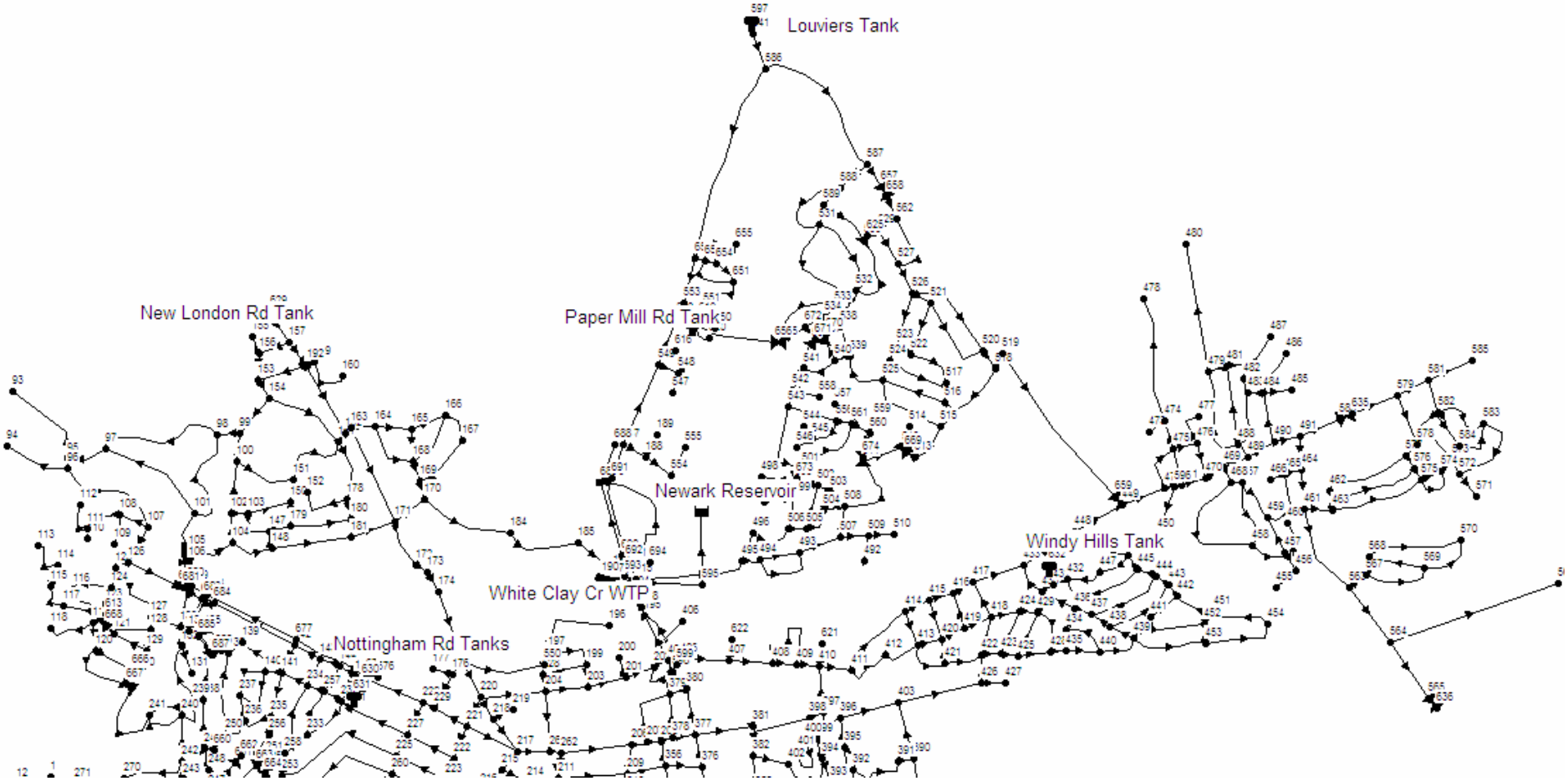


Figure 6. Northern service areas of the City of Newark water distribution model.

Figure 7. Southern service areas in the City of Newark water distribution model.

The following tables summarize input data for the City of Newark EPANET 2 water model:

Junctions (typical)

Junction 100

Property	Value
*Junction ID	100
X-Coordinate	2875.29
Y-Coordinate	8773.27
Description	
Tag	
*Elevation	205
Base Demand	4
Demand Pattern	
Demand Categories	1
Emitter Coeff.	
Initial Quality	
Source Quality	
Actual Demand	6
Total Head	311.68
Pressure	46.22
Quality	0.00

Pipes (typical)

Pipe 11

Property	Value
*Pipe ID	11
*Start Node	100
*End Node	102
Description	
Tag	
*Length	867.083
*Diameter	8
*Roughness	100
Loss Coeff.	0
Initial Status	Open
Bulk Coeff.	
Wall Coeff.	
Flow	-138
Velocity	0.88
Unit Headloss	0.76
Friction Factor	0.042
Reaction Rate	0.00

Newark Reservoir

Reservoir 594

Property	Value
*Reservoir ID	594
X-Coordinate	5156.64
Y-Coordinate	8524.05
Description	Newark Reservoir
Tag	
*Total Head	190
Head Pattern	
Initial Quality	
Source Quality	
Net Inflow	3595
Elevation	190.00
Pressure	0.00
Quality	0.00

Louviers Tank

Tank 597

Property	Value
*Tank ID	597
X-Coordinate	5410.71
Y-Coordinate	10937.10
Description	Louviers Tank
Tag	
*Elevation	340
*Initial Level	105
*Minimum Level	80
*Maximum Level	120
*Diameter	74
Minimum Volume	
Volume Curve	
Mixing Model	Mixed
Mixing Fraction	
Reaction Coeff.	
Initial Quality	
Source Quality	
Net Inflow	-3491
Elevation	445.00
Pressure	45.50
Quality	0.00

Paper Mill Rd Tank

Tank 198

Property	Value
*Tank ID	198
X-Coordinate	5116.98
Y-Coordinate	9436.86
Description	Paper Mill Rd Tank
Tag	
*Elevation	226
*Initial Level	28
*Minimum Level	0
*Maximum Level	30
*Diameter	140
Minimum Volume	
Volume Curve	
Mixing Model	Mixed
Mixing Fraction	
Reaction Coeff.	
Initial Quality	
Source Quality	
Net Inflow	3470
Elevation	254.00
Pressure	12.13
Quality	0.00

Windy Hills Tank

Tank 632

Property	Value
*Tank ID	632
X-Coordinate	6872.07
Y-Coordinate	8242.96
Description	Windy Hills Tank
Tag	
*Elevation	100
*Initial Level	140
*Minimum Level	120
*Maximum Level	150
*Diameter	43
Minimum Volume	
Volume Curve	
Mixing Model	Mixed
Mixing Fraction	
Reaction Coeff.	
Initial Quality	
Source Quality	
Net Inflow	574
Elevation	240.00
Pressure	60.66
Quality	0.00

New London Rd Tank

Tank 629

Property	Value
*Tank ID	629
X-Coordinate	3042.92
Y-Coordinate	9495.86
Description	New London Rd Tank
Tag	
*Elevation	264
*Initial Level	58
*Minimum Level	33
*Maximum Level	63
*Diameter	73.5
Minimum Volume	
Volume Curve	
Mixing Model	Mixed
Mixing Fraction	
Reaction Coeff.	
Initial Quality	
Source Quality	
Net Inflow	-4462
Elevation	322.00
Pressure	25.13
Quality	0.00

Nottingham Rd Tank 1

Tank 630

Property	Value
*Tank ID	630
X-Coordinate	3497.73
Y-Coordinate	7670.78
Description	Nottingham Rd. Tank 1
Tag	
*Elevation	197
*Initial Level	58
*Minimum Level	0
*Maximum Level	59.9
*Diameter	25
Minimum Volume	
Volume Curve	
Mixing Model	Mixed
Mixing Fraction	
Reaction Coeff.	
Initial Quality	
Source Quality	
Net Inflow	306
Elevation	255.00
Pressure	25.13
Quality	0.00

Dallam Rd Tank 2

Tank 631

Property	Value
*Tank ID	631
X-Coordinate	3453.71
Y-Coordinate	7597.43
Description	Nottingham Rd Tank 2
Tag	
*Elevation	197
*Initial Level	58
*Minimum Level	0
*Maximum Level	59.9
*Diameter	40
Minimum Volume	
Volume Curve	
Mixing Model	Mixed
Mixing Fraction	
Reaction Coeff.	
Initial Quality	
Source Quality	
Net Inflow	78
Elevation	255.00
Pressure	25.13
Quality	0.00

Arbour Park Tank

Tank 287

Property	Value
*Tank ID	287
X-Coordinate	3743.45
Y-Coordinate	4175.69
Description	Arbour Park Tank
Tag	
*Elevation	192
*Initial Level	63
*Minimum Level	40
*Maximum Level	64
*Diameter	37
Minimum Volume	
Volume Curve	
Mixing Model	Mixed
Mixing Fraction	
Reaction Coeff.	
Initial Quality	
Source Quality	
Net Inflow	180
Elevation	255.00
Pressure	27.30
Quality	0.00

Pumps

Pump 634

Property	Value
*Pump ID	634
*Start Node	639
*End Node	351
Description	South Wellfield Pump 1 (2 MGD)
Tag	
Pump Curve	7
Power	
Speed	
Pattern	
Initial Status	Open
Effic. Curve	
Energy Price	
Price Pattern	
Flow	1050
Headloss	-28.57
Quality	0.00
Status	Open

Pump 649

Property	Value
*Pump ID	649
*Start Node	637
*End Node	351
Description	South Wellfield Pump 2 (3 mgd)
Tag	
Pump Curve	6
Power	
Speed	
Pattern	
Initial Status	Open
Effic. Curve	
Energy Price	
Price Pattern	
Flow	1050
Headloss	-31.22
Quality	0.00
Status	Open

Pump 874

Property	Value
*Pump ID	874
*Start Node	106
*End Node	105
Description	Two 40 Hp pumps
Tag	
Pump Curve	3
Power	
Speed	
Pattern	
Initial Status	Open
Effic. Curve	
Energy Price	
Price Pattern	
Flow	1044
Headloss	-62.78
Quality	0.00
Status	Open

Pump 886

Property	Value
*Pump ID	886
*Start Node	287
*End Node	642
Description	Arbour Park Pump 1 (100 GPM)
Tag	
Pump Curve	1
Power	
Speed	
Pattern	
Initial Status	Open
Effic. Curve	
Energy Price	
Price Pattern	
Flow	12
Headloss	-66.43
Quality	0.00
Status	Open

Pump 438

Property	Value
*Pump ID	438
*Start Node	321
*End Node	644
Description	Arbour Park Pump 2
Tag	
Pump Curve	2
Power	
Speed	
Pattern	
Initial Status	Open
Effic. Curve	
Energy Price	
Price Pattern	
Flow	18
Headloss	-66.13
Quality	0.00
Status	Open

Pump 66

Property	Value
*Pump ID	66
*Start Node	696
*End Node	697
Description	White Clay WTP Pump
Tag	
Pump Curve	10
Power	
Speed	
Pattern	
Initial Status	Closed
Effic. Curve	
Energy Price	
Price Pattern	
Flow	0
Headloss	0.00
Quality	0.00
Status	Closed

Pump 119

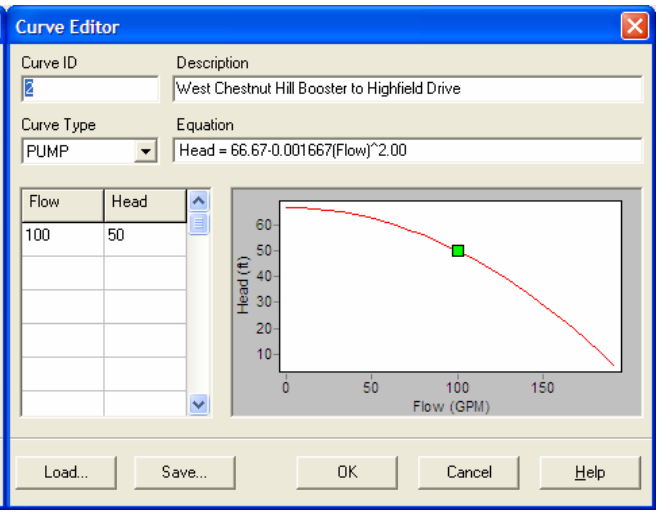
Property	Value
*Pump ID	119
*Start Node	158
*End Node	192
Description	New London Rd Pump
Tag	
Pump Curve	2
Power	
Speed	
Pattern	
Initial Status	Open
Effic. Curve	
Energy Price	
Price Pattern	
Flow	18
Headloss	-66.13
Quality	0.00
Status	Open

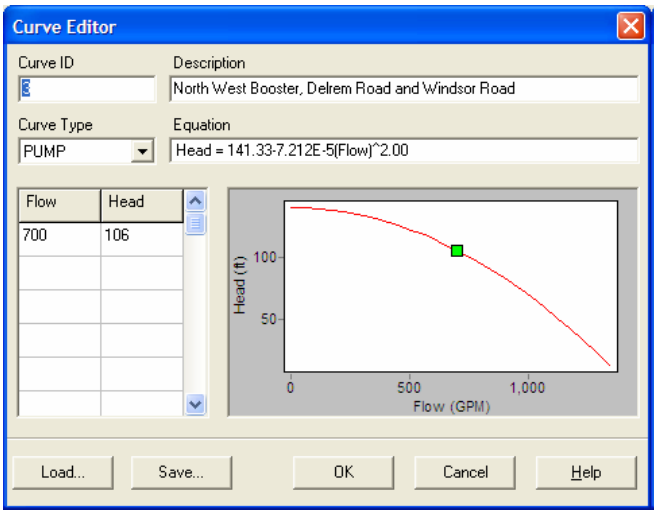
Pump 203

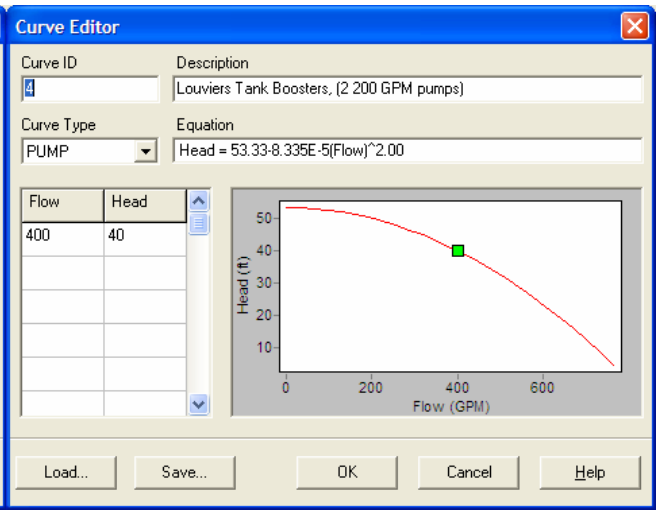
Property	Value
*Pump ID	203
*Start Node	190
*End Node	695
Description	Newark Reservoir Pump
Tag	
Pump Curve	10
Power	
Speed	
Pattern	
Initial Status	Open
Effic. Curve	
Energy Price	
Price Pattern	
Flow	3613
Headloss	-156.66
Quality	0.00
Status	Open

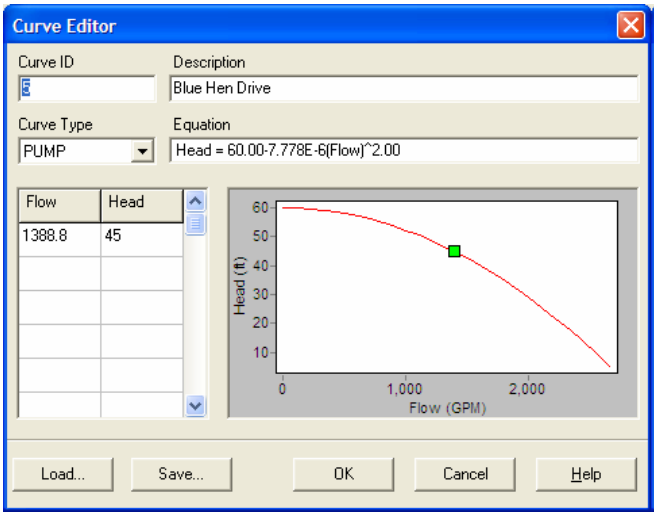
Pump Curves

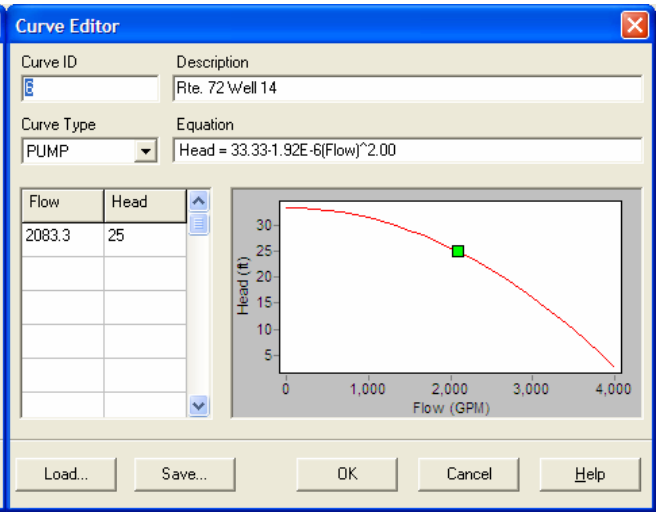
Curve Editor
Curve ID
1
Description
Arbour Park booster to dove dr.
Curve Type
PUMP
Equation
Head = 66.67-0.001667(Flow)^2.00
Flow
Head
100
50
Head (ft)
Flow (GPM)
Load...
Save...
OK
Cancel
Help


Curve Editor
Curve ID
2
Description
West Chestnut Hill Booster to Highfield Drive
Curve Type
PUMP
Equation
Head = 66.67-0.001667(Flow)^2.00
Flow
Head
100
50
Head (ft)
Flow (GPM)
Load...
Save...
OK
Cancel
Help

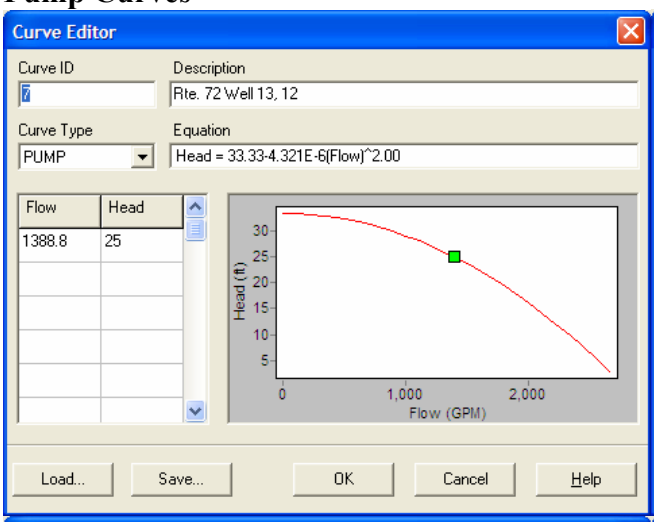

Curve Editor
Curve ID
3
Description
North West Booster, Delrem Road and Windsor Road
Curve Type
PUMP
Equation
Head = 141.33-7.212E-5(Flow)^2.00
Flow
Head
700
106
Head (ft)
Flow (GPM)
Load...
Save...
OK
Cancel
Help

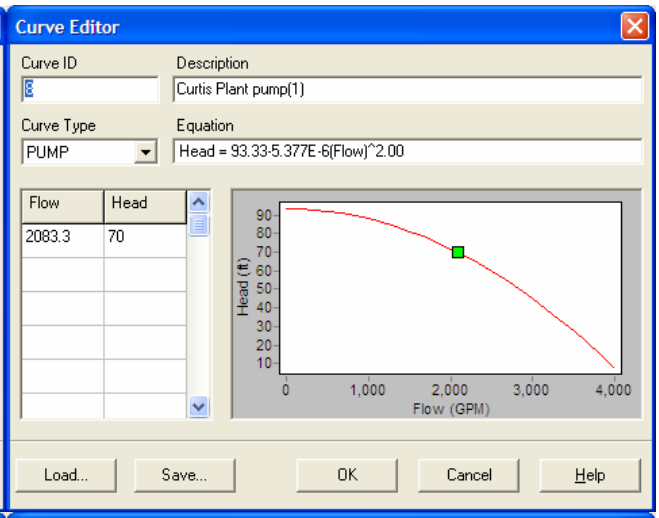

Curve Editor
Curve ID
4
Description
Louviers Tank Boosters, (2 200 GPM pumps)
Curve Type
PUMP
Equation
Head = 53.33-8.335E-5(Flow)^2.00
Flow
Head
400
40
Head (ft)
Flow (GPM)
Load...
Save...
OK
Cancel
Help

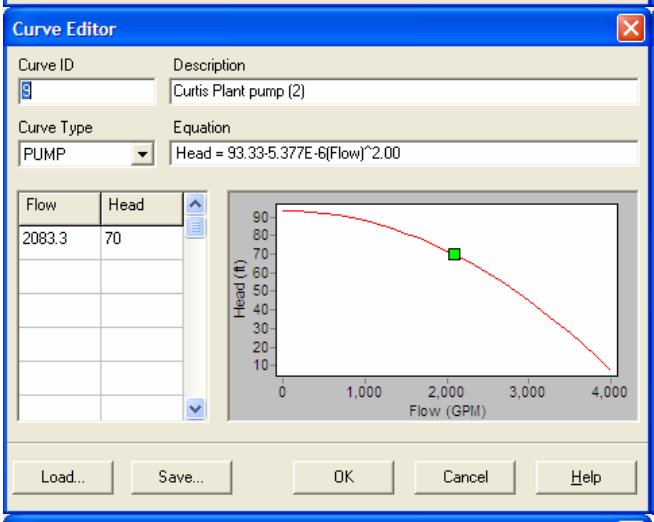

Curve Editor
Curve ID
5
Description
Blue Hen Drive
Curve Type
PUMP
Equation
Head = 60.00-7.778E-6(Flow)^2.00
Flow
Head
1388.8
45
Head (ft)
Flow (GPM)
Load...
Save...
OK
Cancel
Help

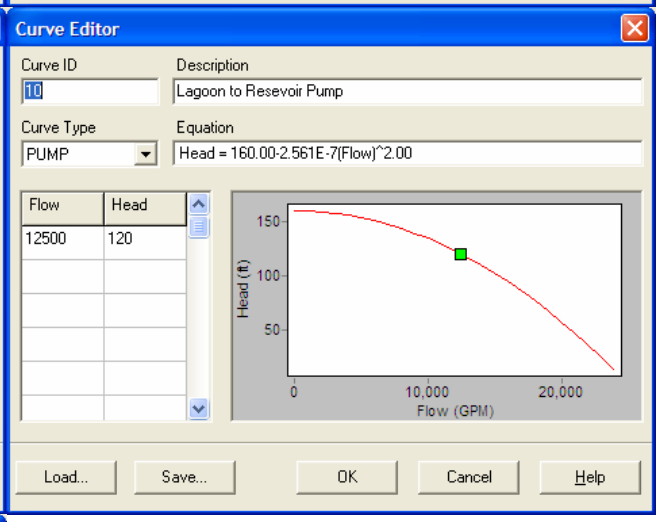

Curve Editor
Curve ID
6
Description
Rte. 72 Well 14
Curve Type
PUMP
Equation
Head = 33.33-1.92E-6(Flow)^2.00
Flow
Head
2083.3
25
Head (ft)
Flow (GPM)
Load...
Save...
OK
Cancel
Help

Pump Curves


Curve Editor
Curve ID
7
Description
Rte. 72 Well 13, 12
Curve Type
PUMP
Equation
Head = 33.33-4.321E-6(Flow)^2.00
Flow
Head
1388.8
25
Head (ft)
Flow (GPM)
Load...
Save...
OK
Cancel
Help


Curve Editor
Curve ID
8
Description
Curtis Plant pump(1)
Curve Type
PUMP
Equation
Head = 93.33-5.377E-6(Flow)^2.00
Flow
Head
2083.3
70
Head (ft)
Flow (GPM)
Load...
Save...
OK
Cancel
Help


Curve Editor
Curve ID
9
Description
Curtis Plant pump (2)
Curve Type
PUMP
Equation
Head = 93.33-5.377E-6(Flow)^2.00
Flow
Head
2083.3
70
Head (ft)
Flow (GPM)
Load...
Save...
OK
Cancel
Help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Curve ID
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Description
Lagoon to Resevoir Pump
Curve Type
PUMP
Equation
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Flow
Head
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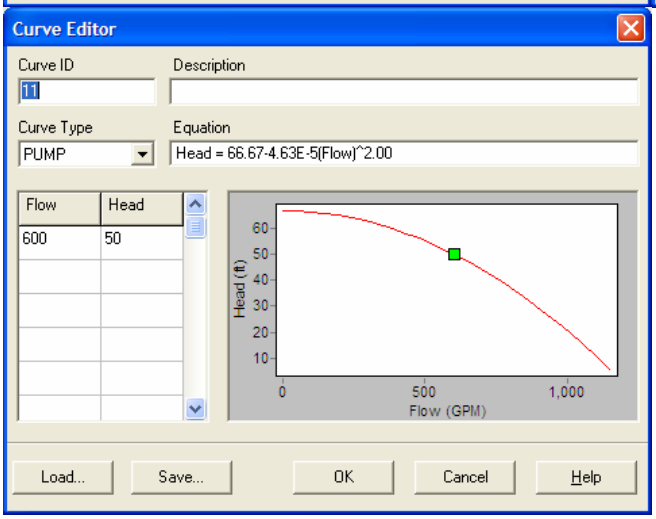
120
Head (ft)
Flow (GPM)
Load...
Save...
OK
Cancel
Help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Description
Curve Type
PUMP
Equation
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Head
600
50
Head (ft)
Flow (GPM)
Load...
Save...
OK
Cancel
Help

Chapter 3: Model Results

This chapter presents the results of the EPANET 2 water supply model run for peak daily water demands (6.0 mgd) in the City of Newark. The normal demand is 4 mgd or 2,800 gpm. If there are 638 junctions, then the mean normal demand per junction is 4 gpm. Using the demand multiplier of 1.5, the model estimates the peak demand at each node is 6 gpm or 6 mgd for the entire system. The appendix summarizes the following output tables for nodes (junctions) and pipes (links) in the water system assuming a peak water demand of 6 mgd (4,200 gpm):

Nodes
Elevation (ft) Head (ft)
Demand (gpm) Pressure (psi)

Pipes
Length (ft) Diameter (in)
Flow (gpm) Velocity (fps)
Status (open/ closed

Figure 8 shows the elevation gradient in the Newark water system. Elevations range from 50 to 80 ft above sea level in the flat coastal plain of the southeasterly portion of the City to over 200 ft in the northwesterly hilly Piedmont areas. Water tanks are situated on top of the hills to provide water pressure in the system. Neighborhoods with low water pressure are usually situated at high elevations.

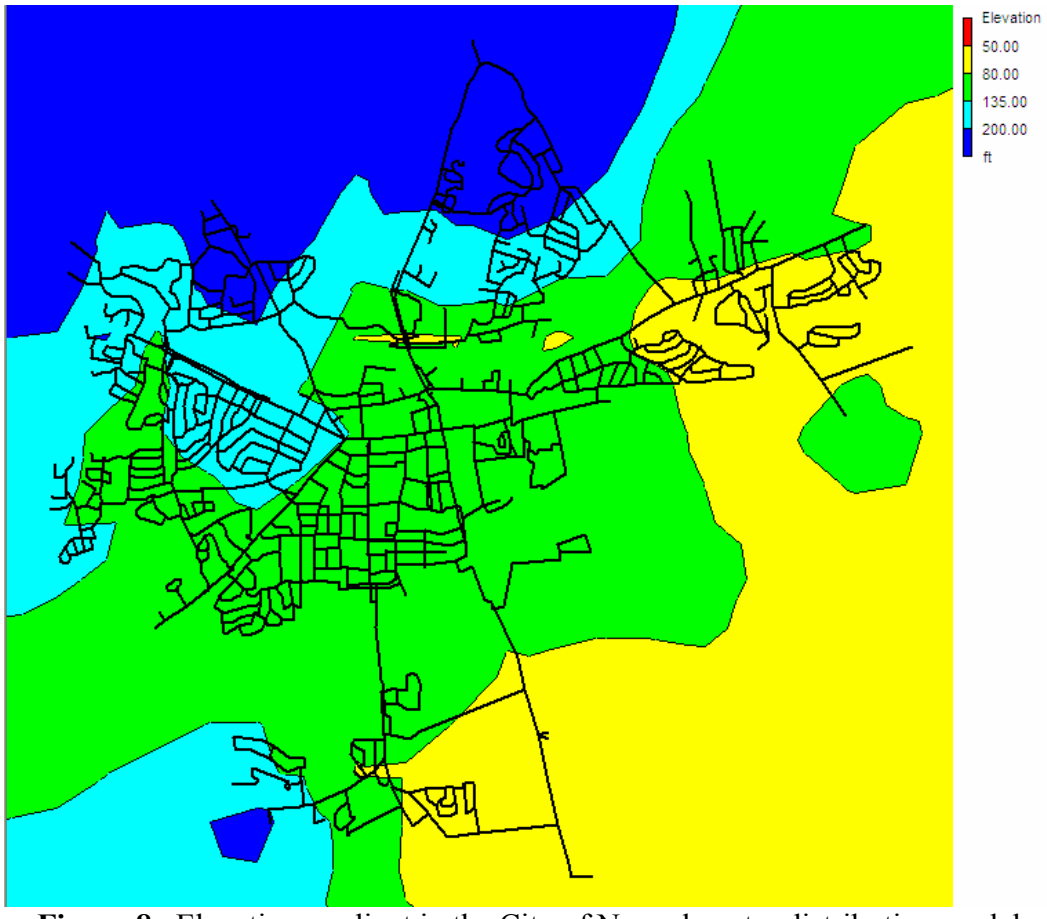

Figure 8. Elevation gradient in the City of Newark water distribution model.

Figure 9 depicts the pressure gradient imposed by water tanks and pumps in the City of Newark water system. Water pressures range from less than 25 psi along Paper Mill Road to more than 70 psi in the Chapel Hill neighborhood and south Newark along South Chapel Street and Route 4. Water distribution systems are designed for the following operating water pressures at the customers service connection:

Minimum: 25 psi (Delaware Public Service Commission, 1980)
Minimum: 35 psi (Ten States Standards, 2003)
Normal: 60 psi (Ten States Standards, 2003)
Maximum: 100 psi (Delaware Public Service Commission, 1980)

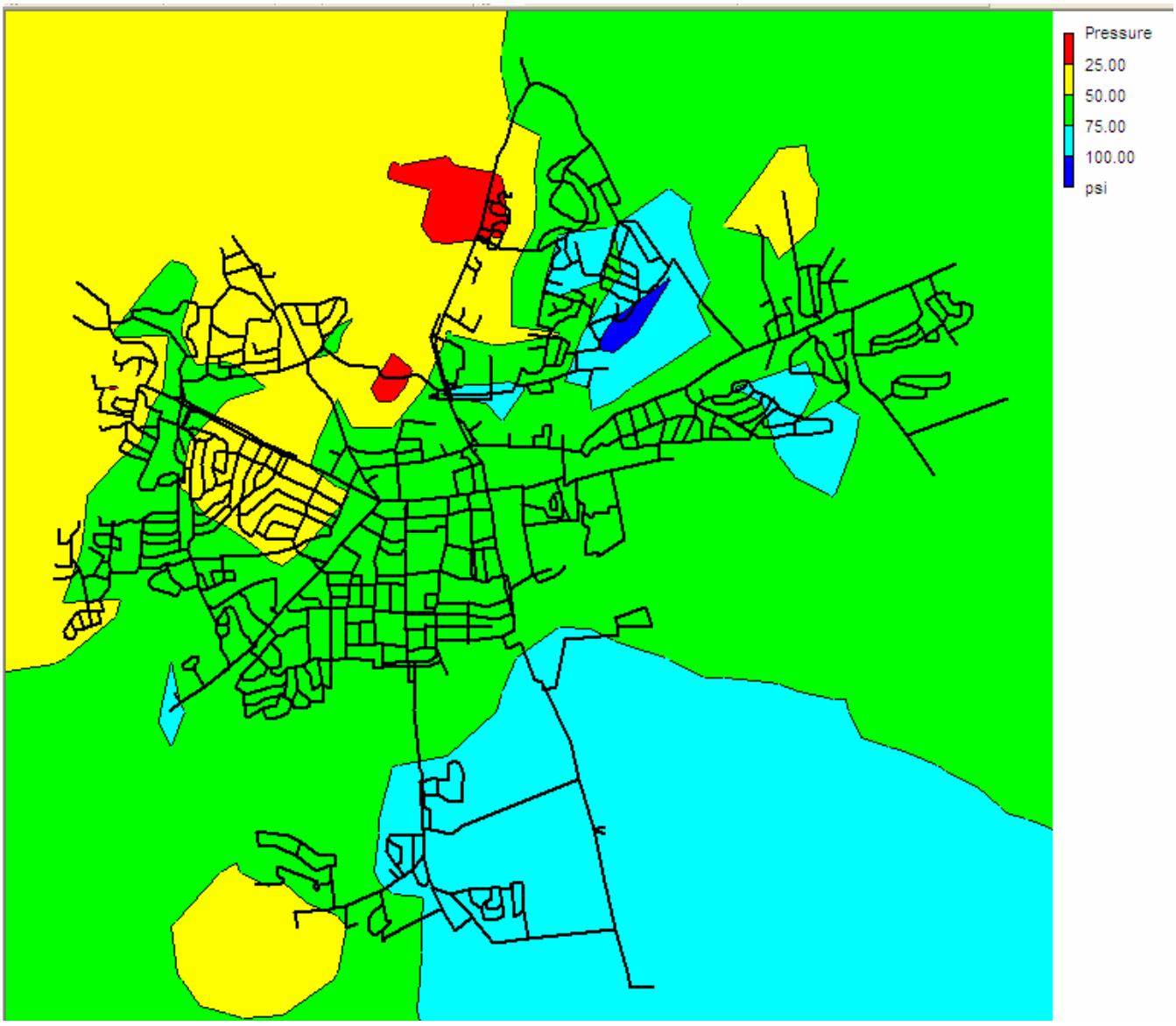

Figure 9. Pressure gradient for the City of Newark water distribution model.

Figure 10 indicates that 3 percent of the Newark water system has water pressure less than the Delaware PSC standard of 25 psi and 8 percent of the system is less than the Ten State Standard of 35 psi.

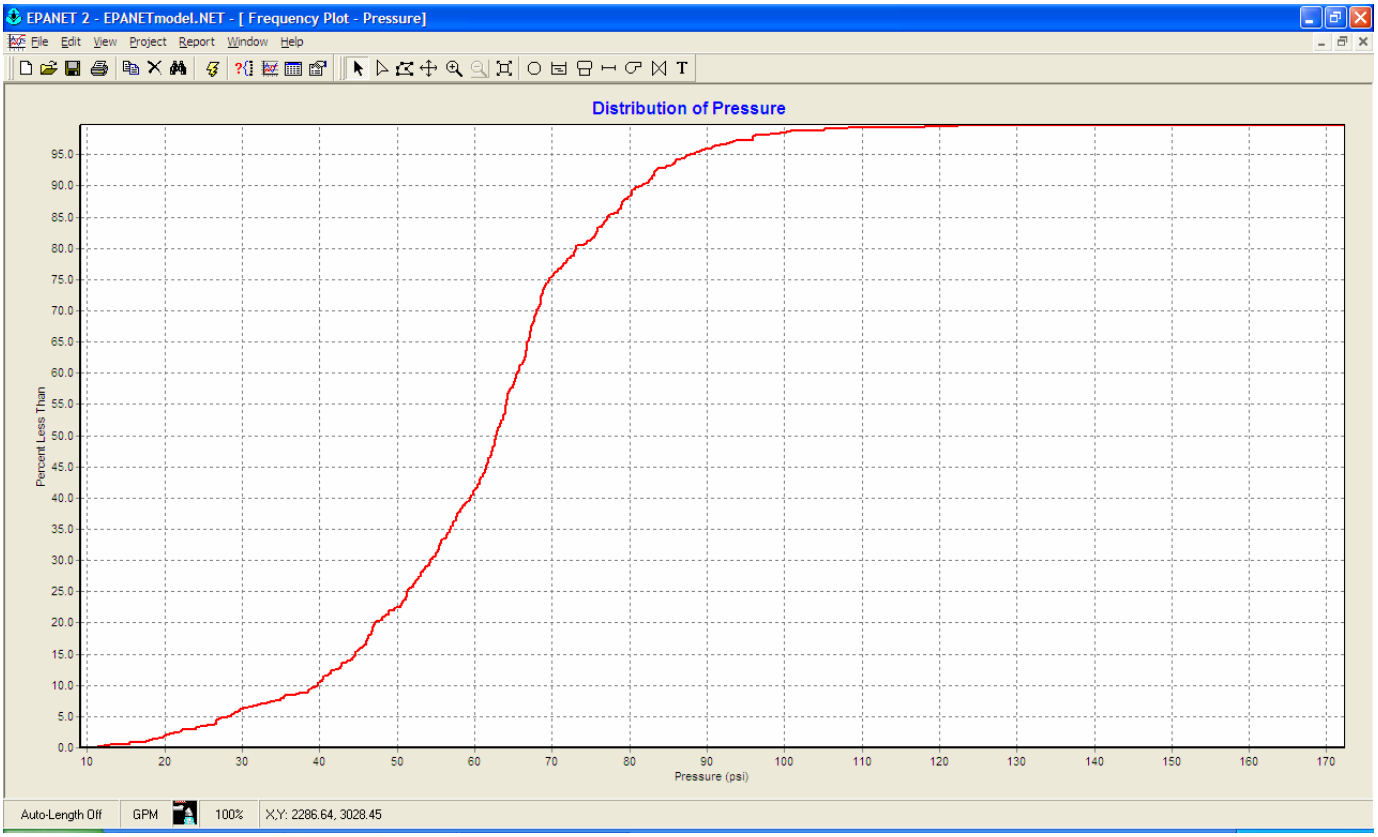

Figure 10. Distribution of water pressures in the City of Newark water distribution system.

Neighborhoods with water pressures less than 25 psi are along Paper Mill Road in the Woods at Louviers and Christiansted and Timber Creek along Nottingham Road (Figure 11). These neighborhoods have individual booster pumps to increase water pressure above the Delaware standard of 25 psi. Neighborhoods with water pressures less than the Ten State Standard of 35 psi but more than the Delaware PSC standard of 25 psi are in the Fairfield, Nottingham Green, and Arbour Park neighborhoods (Figure 12). Figure 13 depicts the range of water pressures at nodes in the City of Newark water system. Table 3 summarizes the neighborhoods with various water pressures ranging from 25 to 40 psi.

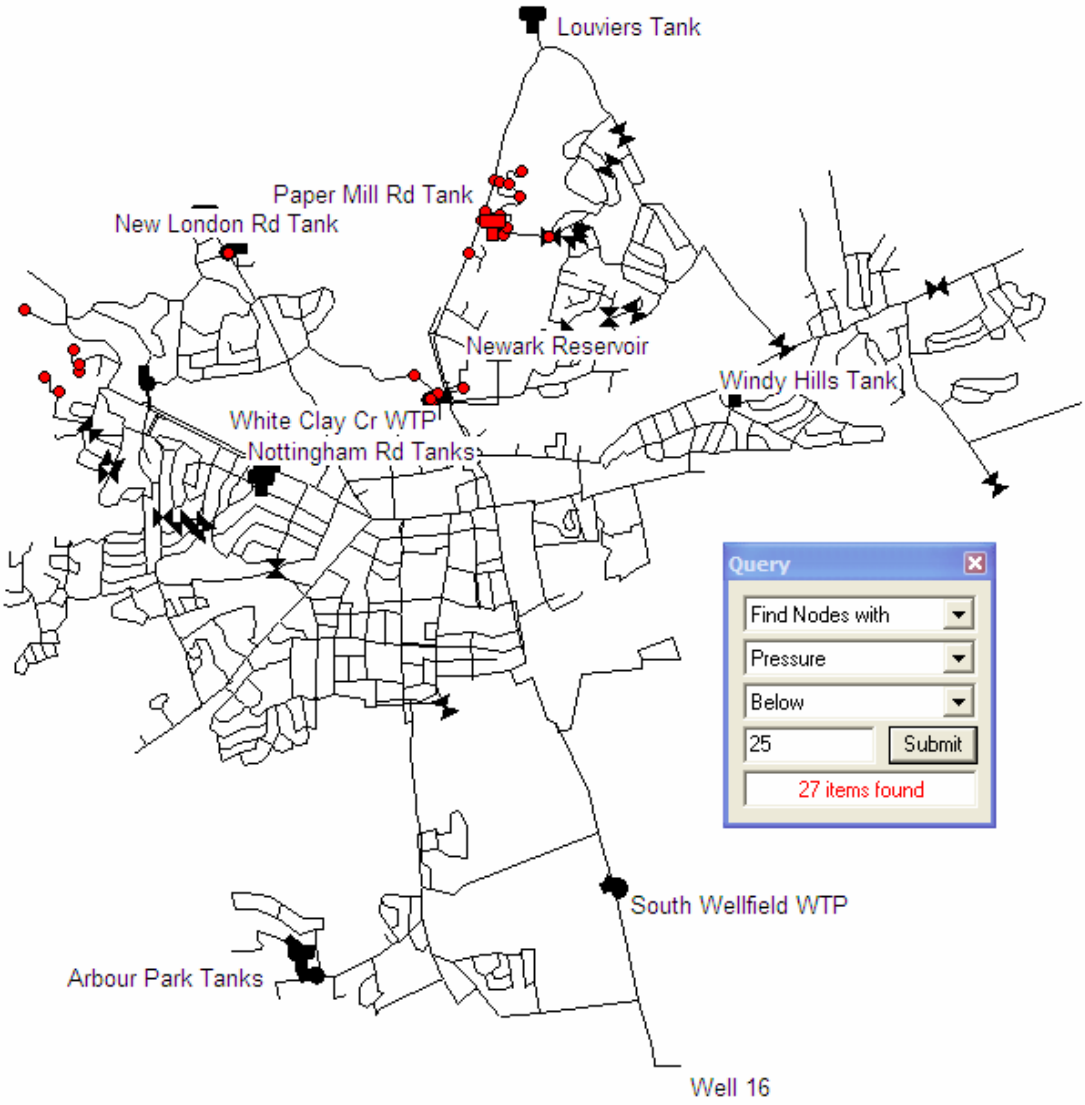

Figure 11. Nodes with pressure below 25 psi in the City of Newark water distribution model.

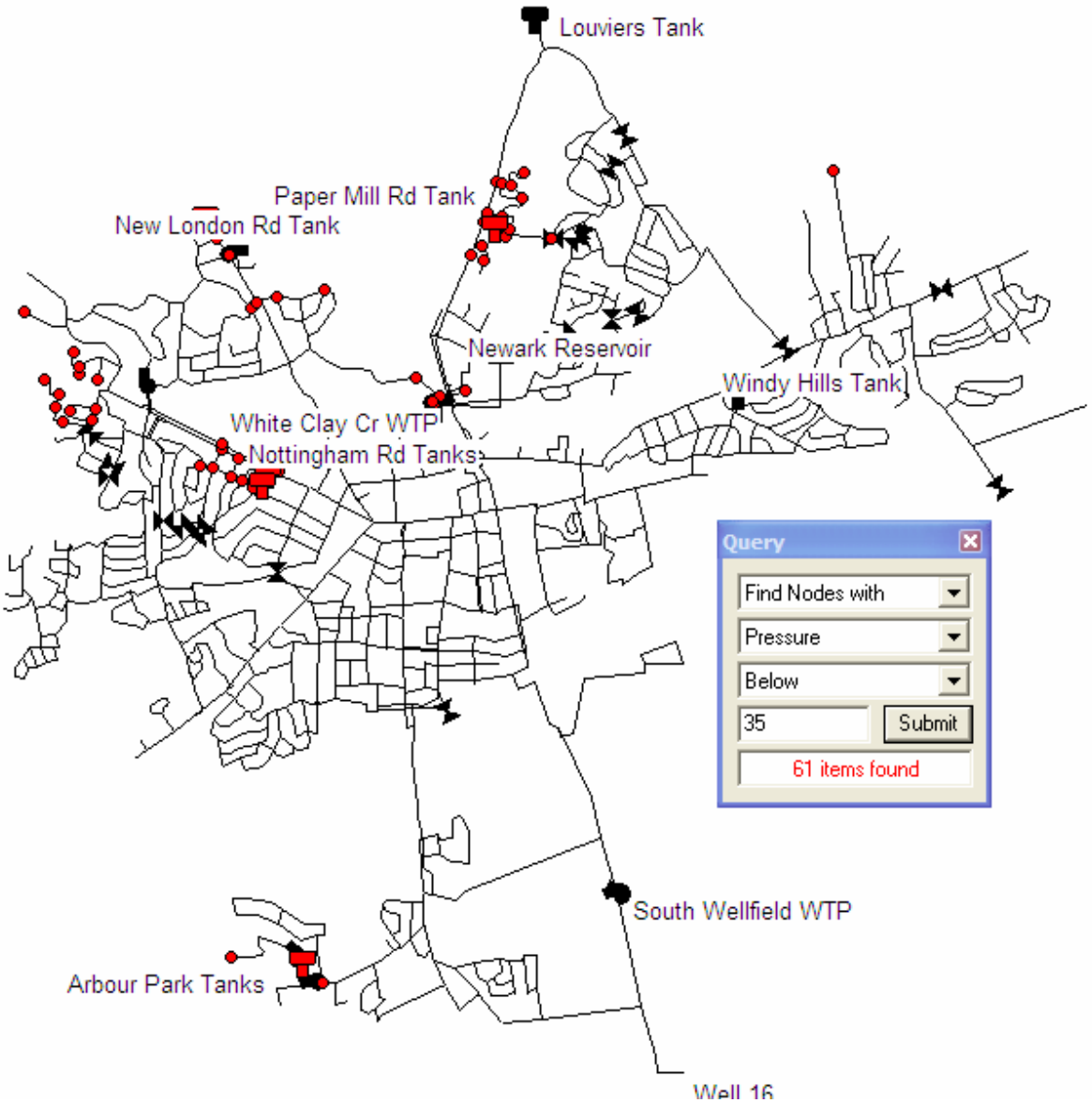

Figure 12. Nodes with pressure below 35 psi in the City of Newark Water distribution model.

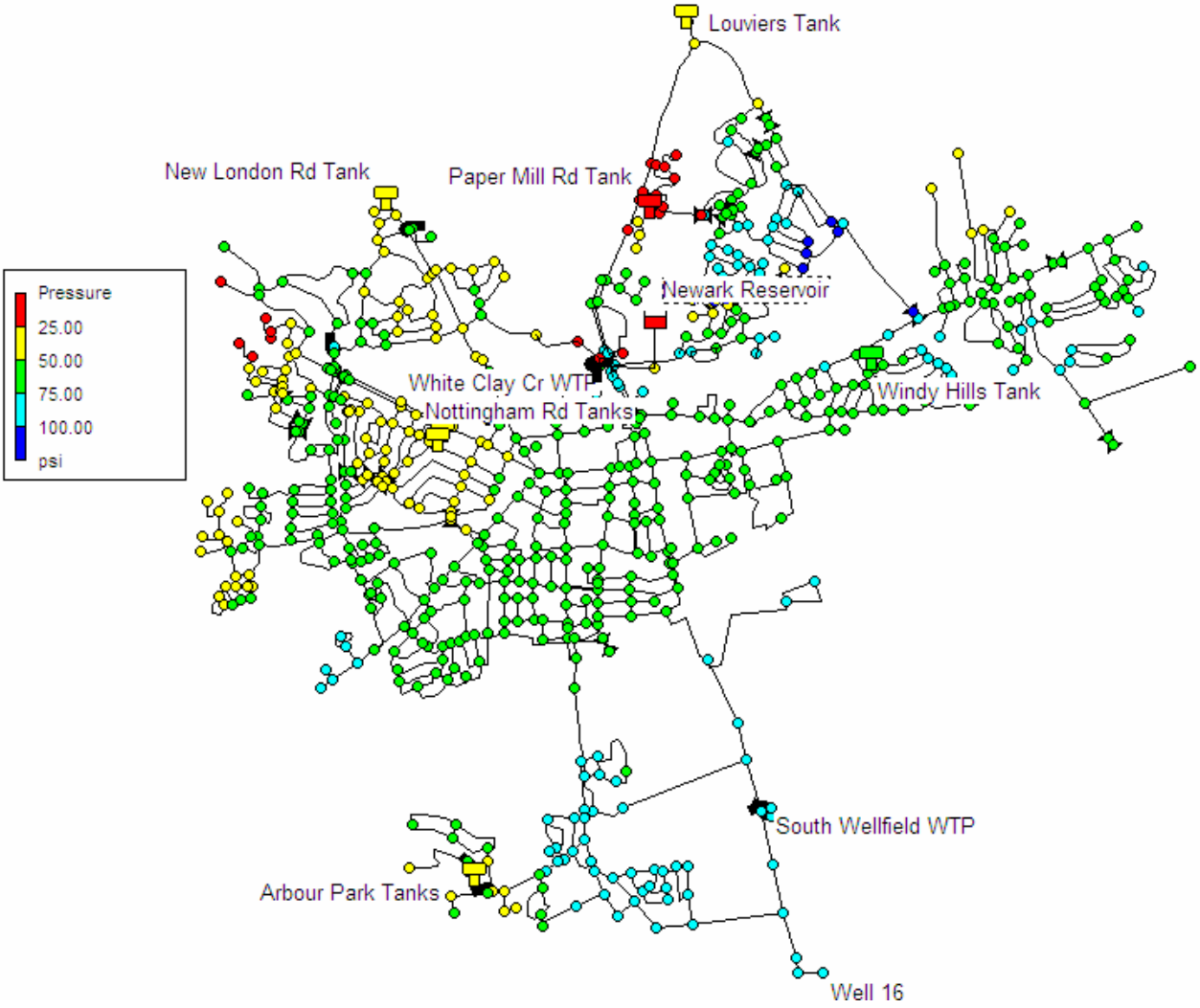

Figure 13. Pressure distribution in the City of Newark Water distribution model.

Table 3. Number of nodes at various system pressures in City of Newark neighborhoods.

Neighborhood	25 psi	30 psi	35 psi	40 psi	High Pressure psi
New London Rd		2	6	10	67
Louviers	11	13	12	13	61
Nottingham Rd	6	13	20	27	83
Chapel Hill				4	122
Windy Hills					85
Arbour Park		1	2	4	72
Total	17	29	38	58	

Total finished water storage provided by 7 tanks in the City of Newark is 8 mg (Table 4).

Table 4. Water tanks in the City of Newark water system.

Tank	Type	Base Elevation (ft)	Overflow Elevation (ft)	Diameter (ft)	Height (ft)	Capacity (gal)
Arbour Park	Standpipe	192.0	256.0	37	64	514,000
Nottingham Rd No. 1	Standpipe	197.0	257.0	25	60	220,000
Dallam Rd.	Standpipe	197.0	257.0	40	60	563,000
Paper Mill Rd	Reservoir	226.8	256.0	140	30	3,453,000
New London Rd	Reservoir	264.0	327.0	74	63	1,998,000
Louviers	Elevated	340.0	460.0	74	120	1,000,000
Windy Hills	Elevated	95.0	250.5	43	150	300,000
						8,048,000

Table 5 summarizes water tank operating criteria compared to water pressures in the service areas of the Newark water system. Based on the operating tank water levels assumed in the model, several junctions in the Nottingham Rd/Dallam Rd and Paper Mill service areas have water pressure less than the Delaware PSC standard of 25 psi. These neighborhoods have individual booster pumps to increase water pressure above the 25 psi standard at the service connection. All of the service areas have several junctions with water pressures less than the Ten State Standard of 35 psi. These areas may boost water pressure above 35 psi by:

- Installing individual booster pumps
- Installing pressure reducing valves
- Increase minimum operating take water levels.

Individual booster pumps have been installed by homeowners. The City has installed pressure reducing valves. If the City increases minimum tank water levels, it would reduce the reserve tank water storage capacity for emergencies and fire fighting.

Table 5. Water tank operating criteria in the City of Newark water system.

	Arbour Park	Nottingham Rd	Dallam Rd	Paper Mill Rd	New London	Louviers	Windy Hills
Tank Water Elevation (ft)							
Overflow	256	257	257	256	327	460	250
Low	232	197	197	226	297	420	220
Customer Elevation (ft)							
High	245	205	192	241	262	295	165
Low	64	118	118	65	125	145	38
Pressure (psi)							
Max	92	65	65	78	82	109	85
Min	30	24	24	17	25	28	25

References

Delaware Public Service Commission, 1980. Minimum Standards Governing Service Provided by Public Water Companies.

Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 2003. Recommended Standards for Water Works (Ten State Standards).

Newark Water System Advisory Committee, 1991. City of Newark Water System Analysis Report.

Rossman, L. A., September 2000. EPANET 2 Users Manual. EPA/600/R-00/057. United States Environmental Protection Agency. Water Supply and Water Resources Division. National Risk Management Research Laboratory. Cincinnati, OH 45268.

City of Newark Water Distribution Network
Network Table - Nodes

Node ID	Elevation ft	Demand GPM	Head ft	Pressure psi
Junc 93	165	6	292	55
Junc 94	235	6	291	24
Junc 95	155	6	292	60
Junc 96	165	6	291	54
Junc 97	155	6	302	64
Junc 98	165	6	310	63
Junc 99	175	6	312	59
Junc 100	205	6	312	46
Junc 101	155	6	311	67
Junc 102	195	6	312	51
Junc 103	195	6	311	50
Junc 104	165	6	314	64
Junc 105	125	6	315	82
Junc 106	129	6	252	53
Junc 107	140	6	266	55
Junc 108	175	6	266	39
Junc 109	195	6	266	31
Junc 110	222	6	266	19
Junc 111	215	6	266	22
Junc 112	220	6	266	20
Junc 113	200	6	256	24
Junc 114	205	6	256	22
Junc 115	195	6	256	27
Junc 116	195	6	257	27
Junc 117	185	6	257	31
Junc 118	140	6	257	50
Junc 119	145	6	257	48
Junc 120	155	6	257	44
Junc 121	132	6	253	53
Junc 122	150	6	257	46
Junc 123	179	6	257	34
Junc 124	182	6	257	32
Junc 125	175	6	257	35
Junc 126	165	6	257	40
Junc 127	139	6	253	50
Junc 128	135	6	253	51
Junc 129	135	6	253	51
Junc 130	125	6	253	56
Junc 131	130	6	253	53
Junc 132	120	6	253	58
Junc 133	118	6	253	59
Junc 134	123	6	253	57
Junc 135	145	6	253	47
Junc 136	135	6	253	51
Junc 137	145	6	253	47
Junc 138	160	6	254	41
Junc 139	160	6	254	41
Junc 140	175	6	254	34

Junc 141	175	6	254	34
Junc 142	192	6	254	27
Junc 143	185	6	255	30
Junc 144	192	6	255	27
Junc 145	190	6	255	28
Junc 146	189	6	255	29
Junc 147	185	6	311	55
Junc 148	185	6	311	55
Junc 150	215	6	311	42
Junc 151	215	6	311	42
Junc 152	222	6	308	37
Junc 153	212	6	316	45
Junc 154	210	6	313	45
Junc 155	225	6	317	40
Junc 156	205	6	317	48
Junc 157	245	6	319	32
Junc 158	259	6	316	25
Junc 159	260	6	383	53
Junc 160	262	6	383	52
Junc 161	230	6	311	35
Junc 162	230	6	311	35
Junc 163	225	6	310	37
Junc 164	235	6	303	30
Junc 165	205	6	298	40
Junc 166	235	6	296	26
Junc 167	205	6	294	39
Junc 168	175	6	295	52
Junc 169	160	6	285	54
Junc 170	145	6	281	59
Junc 171	188	6	296	47
Junc 172	180	6	289	47
Junc 173	180	6	288	47
Junc 174	165	6	285	52
Junc 175	120	6	274	67
Junc 176	121	6	271	65
Junc 177	140	6	271	57
Junc 178	202	6	308	46
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Junc 212	125	6	263	60
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Junc 231	187	6	255	29
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Junc 234	182	6	255	31
Junc 235	165	6	254	39
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Junc 332	68	6	274	89
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Junc 406	85	6	259	75
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Junc 409	98	6	257	69
Junc 410	95	6	257	70
Junc 411	93	6	252	69
Junc 412	85	6	251	72
Junc 413	99	6	247	64
Junc 414	100	6	248	64
Junc 415	99	6	247	64
Junc 416	85	6	246	70
Junc 417	70	6	245	76
Junc 418	88	6	246	68
Junc 419	95	6	246	65
Junc 420	105	6	247	61
Junc 421	102	6	247	63
Junc 422	98	6	246	64
Junc 423	101	6	245	62

Junc 424	92	6	244	66
Junc 425	101	6	243	62
Junc 426	101	6	248	64
Junc 427	103	6	248	63
Junc 428	95	6	242	64
Junc 429	96	0	242	63
Junc 430	92	6	240	64
Junc 431	95	6	240	63
Junc 432	91	6	240	65
Junc 433	75	6	240	72
Junc 434	88	6	241	66
Junc 435	93	6	241	64
Junc 436	85	6	241	67
Junc 437	85	6	241	67
Junc 438	89	6	241	66
Junc 439	85	6	241	67
Junc 440	92	6	241	65
Junc 441	72	6	240	73
Junc 442	58	6	240	79
Junc 443	55	6	240	80
Junc 444	45	6	240	85
Junc 445	59	6	240	79
Junc 446	55	6	240	80
Junc 447	86	6	240	67
Junc 448	55	6	235	78
Junc 449	48	6	231	79
Junc 450	45	6	227	79
Junc 451	55	6	240	80
Junc 452	65	6	240	76
Junc 453	80	6	241	70
Junc 454	55	6	241	80
Junc 455	45	6	224	77
Junc 456	55	6	224	73
Junc 457	55	6	224	73
Junc 458	55	6	224	73
Junc 459	55	6	224	73
Junc 460	45	6	224	77
Junc 461	48	6	223	76
Junc 462	65	6	223	69
Junc 463	55	6	223	73
Junc 464	68	6	223	67
Junc 465	63	6	223	69
Junc 466	59	6	223	71
Junc 467	65	6	224	69
Junc 468	65	6	224	69
Junc 469	73	6	224	65
Junc 470	75	6	225	65
Junc 471	72	6	226	67
Junc 472	70	6	227	68
Junc 473	85	6	226	61
Junc 474	106	6	226	52
Junc 475	105	6	226	53
Junc 476	89	6	226	59
Junc 477	92	6	226	58
Junc 478	120	6	226	46
Junc 479	125	6	224	43
Junc 480	165	6	224	25
Junc 481	118	6	224	46
Junc 482	100	6	224	54
Junc 483	90	6	223	58
Junc 484	89	6	223	58
Junc 485	98	6	223	54
Junc 486	105	6	223	51
Junc 487	115	6	224	47
Junc 488	80	6	224	62
Junc 489	73	6	224	65
Junc 490	73	6	223	65
Junc 491	83	6	223	61
Junc 492	65	6	257	83
Junc 493	85	6	257	75
Junc 494	75	6	257	79
Junc 495	72	6	257	80
Junc 496	130	6	257	55

Junc 497	159	6	257	42
Junc 498	175	6	257	36
Junc 499	150	6	257	46
Junc 500	165	6	257	40
Junc 501	175	6	396	96
Junc 502	155	6	257	44
Junc 503	140	6	257	51
Junc 504	132	6	257	54
Junc 505	105	6	257	66
Junc 506	105	6	257	66
Junc 507	95	6	257	70
Junc 508	115	6	257	62
Junc 509	65	6	257	83
Junc 510	65	6	257	83
Junc 511	167	6	257	39
Junc 512	125	6	257	57
Junc 513	115	6	397	122
Junc 514	155	6	257	44
Junc 515	148	6	397	108
Junc 516	145	6	398	109
Junc 517	155	6	398	105
Junc 518	165	6	398	101
Junc 519	170	6	398	99
Junc 520	155	6	398	105
Junc 521	205	6	398	84
Junc 522	195	6	398	88
Junc 523	215	6	398	79
Junc 524	220	6	398	77
Junc 525	215	6	397	79
Junc 526	225	6	398	75
Junc 527	245	0	399	67
Junc 529	265	0	400	58
Junc 530	268	0	400	57
Junc 531	225	0	400	76
Junc 532	245	6	400	67
Junc 533	255	6	400	63
Junc 534	245	6	400	67
Junc 535	225	6	400	76
Junc 536	242	6	397	67
Junc 537	245	6	397	66
Junc 538	245	6	397	66
Junc 539	222	6	397	76
Junc 540	220	6	397	77
Junc 541	225	6	397	74
Junc 542	215	6	397	79
Junc 543	185	6	397	92
Junc 544	206	6	396	83
Junc 545	205	6	396	83
Junc 546	205	6	396	83
Junc 547	175	0	257	35
Junc 548	195	6	257	27
Junc 549	208	6	257	21
Junc 552	215	6	257	18
Junc 553	235	6	265	13
Junc 554	125	6	257	57
Junc 555	115	6	257	61
Junc 556	205	6	396	83
Junc 557	205	6	396	83
Junc 558	208	6	397	82
Junc 559	175	6	396	96
Junc 560	175	6	396	96
Junc 561	199	6	396	86
Junc 562	255	6	400	63
Junc 563	38	6	223	80
Junc 564	65	6	223	69
Junc 565	85	6	223	60
Junc 566	68	6	223	67
Junc 567	49	6	223	75
Junc 568	45	6	223	77
Junc 569	65	6	223	69
Junc 570	52	6	223	74
Junc 571	35	6	223	82
Junc 572	55	6	223	73

Junc 573	65	6	223	69
Junc 574	68	6	223	67
Junc 575	55	6	223	73
Junc 576	75	6	223	64
Junc 577	85	6	223	60
Junc 578	81	6	223	62
Junc 579	93	6	223	56
Junc 580	90	6	223	58
Junc 581	89	0	223	58
Junc 582	83	6	223	61
Junc 583	45	6	223	77
Junc 584	65	6	223	69
Junc 585	69	6	223	67
Junc 586	295	6	401	46
Junc 587	295	6	400	46
Junc 588	275	6	400	54
Junc 589	255	6	400	63
Junc 590	127	6	259	57
Junc 591	130	6	258	56
Junc 592	125	6	258	58
Junc 593	145	6	258	49
Junc 596	72	6	227	67
Junc 598	120	6	259	60
Junc 599	115	6	259	62
Junc 600	115	6	263	64
Junc 601	85	6	269	80
Junc 602	85	6	269	80
Junc 604	113	6	258	63
Junc 605	112	6	257	63
Junc 606	111	6	255	62
Junc 607	115	6	255	61
Junc 608	142	6	253	48
Junc 609	145	6	253	47
Junc 15	129	6	254	54
Junc 611	149	6	257	47
Junc 612	125	6	253	55
Junc 613	165	6	257	40
Junc 615	65	6	257	83
Junc 616	195	6	257	27
Junc 617	62	6	258	85
Junc 618	60	0	258	86
Junc 149	115	6	263	64
Junc 230	110	6	263	66
Junc 288	105	6	263	68
Junc 528	133	6	265	57
Junc 550	135	6	265	56
Junc 621	96	6	257	70
Junc 622	104	6	258	67
Junc 623	99	6	262	71
Junc 624	98	6	262	71
Junc 626	79	6	268	82
Junc 627	93	6	271	77
Junc 634	106	-6	263	68
Junc 635	90	-6	223	58
Junc 636	85	6	223	60
Junc 637	75	-1050	257	79
Junc 639	74	-1050	260	81
Junc 641	340	6	443	45
Junc 642	193	6	321	56
Junc 643	194	6	323	56
Junc 603	105	6	263	69
Junc 610	71	6	192	52
Junc 595	90	6	190	43
Junc 628	83	6	257	75
Junc 645	82	6	257	76
Junc 646	82	6	257	76
Junc 647	80	6	257	76
Junc 648	79	6	257	77
Junc 649	80	6	257	76
Junc 551	230	6	270	17
Junc 619	223	6	270	21
Junc 620	215	6	270	24
Junc 650	220	6	270	22

Junc 651	231	6	282	22
Junc 652	240	6	287	20
Junc 653	239	6	284	20
Junc 654	238	6	283	20
Junc 655	241	6	283	18
Junc 656	225	6	257	14
Junc 644	188	6	323	58
Junc 657	275	6	400	54
Junc 658	275	6	400	54
Junc 659	0	6	398	172
Junc 660	135	6	254	51
Junc 661	155	6	254	43
Junc 662	155	6	254	43
Junc 663	152	6	254	44
Junc 664	148	6	254	46
Junc 665	149	6	257	47
Junc 666	125	6	256	57
Junc 667	129	6	256	55
Junc 668	150	6	253	45
Junc 669	125	6	397	118
Junc 670	245	6	400	67
Junc 671	243	6	400	68
Junc 672	235	6	400	71
Junc 673	165	6	396	100
Junc 625	268	0	400	57
Junc 674	167	6	396	99
Junc 675	189	6	255	29
Junc 676	188	6	255	29
Junc 677	192.5	6	254	27
Junc 678	136.5	6	253	51
Junc 679	123	6	253	56
Junc 680	122	6	253	57
Junc 681	122	6	253	57
Junc 682	135	6	253	51
Junc 683	136	6	253	51
Junc 684	136	6	253	51
Junc 685	135	6	253	51
Junc 686	149	6	253	45
Junc 687	145	6	253	47
Junc 688	139	6	257	51
Junc 689	112	6	257	63
Junc 690	76	6	257	78
Junc 691	111	6	257	63
Junc 692	76	6	257	79
Junc 693	70	6	257	81
Junc 694	75	0	47	-12
Junc 695	71	6	192	52
Junc 696	71	-6	35	-16
Junc 697	71	6	257	81
Junc 192	260	6	383	53
Junc 190	71	-2100	35	-16
Resvr 594	190	3595	190	0
Tank 198	226	3470	254	12
Tank 287	192	180	255	27
Tank 629	264	-4462	322	25
Tank 630	197	306	255	25
Tank 631	197	78	255	25
Tank 632	100	574	240	61
Tank 597	340	-3491	445	45

City of Newark Water Distribution Network
Network Table - Links

Link ID	Length ft	Diameter in	Flow gpm	Velocity fps	Status
Pipe 1	1631	8	-6	0	Open
Pipe 4	139	8	659	4	Open
Pipe 5	672	8	-671	4	Open
Pipe 7	2016	8	-353	2	Open
Pipe 9	389	8	-281	2	Open
Pipe 10	517	8	-64	0	Open
Pipe 11	867	8	-138	1	Open

Pipe 12	304	6	139	2	Open
Pipe 13	498	8	-283	2	Open
Pipe 14	525	6	68	1	Open
Pipe 15	296	8	-17	0	Open
Pipe 16	702	8	-339	2	Open
Pipe 17	779	12	-629	2	Open
Pipe 19	784	8	409	3	Open
Pipe 21	800	8	-223	1	Open
Pipe 22	391	8	-442	3	Open
Pipe 23	439	8	-284	2	Open
Pipe 24	304	6	6	0	Open
Pipe 25	582	8	-296	2	Open
Pipe 26	467	20	4159	4	Open
Pipe 27	812	8	-164	1	Open
Pipe 29	1333	20	3972	4	Open
Pipe 30	219	8	-16	0	Open
Pipe 31	70	20	3982	4	Open
Pipe 32	404	8	737	5	Open
Pipe 34	1071	8	250	2	Open
Pipe 36	1045	6	6	0	Open
Pipe 37	399	6	3	0	Open
Pipe 38	752	6	-66	1	Open
Pipe 42	320	8	-238	2	Open
Pipe 43	299	8	367	2	Open
Pipe 44	1372	8	-317	2	Open
Pipe 45	708	8	678	4	Open
Pipe 46	1609	16	3239	5	Open
Pipe 47	714	8	830	5	Open
Pipe 48	289	8	-701	4	Open
Pipe 49	1036	6	-244	3	Open
Pipe 50	342	6	-463	5	Open
Pipe 51	605	6	-182	2	Open
Pipe 52	1076	6	-226	3	Open
Pipe 53	692	8	317	2	Open
Pipe 54	973	6	-61	1	Open
Pipe 55	614	8	250	2	Open
Pipe 56	823	16	3081	5	Open
Pipe 57	202	16	3075	5	Open
Pipe 58	344	16	3069	5	Open
Pipe 59	1359	16	3063	5	Open
Pipe 60	207	6	287	3	Open
Pipe 61	373	6	6	0	Open
Pipe 62	1056	6	68	1	Open
Pipe 63	617	8	505	3	Open
Pipe 67	519	6	-69	1	Open
Pipe 68	332	6	-61	1	Open
Pipe 69	332	6	-55	1	Open
Pipe 70	204	6	-72	1	Open
Pipe 71	556	6	8	0	Open
Pipe 72	308	6	61	1	Open
Pipe 74	750	6	31	0	Open
Pipe 75	82	6	-57	1	Open
Pipe 78	337	6	-13	0	Open
Pipe 79	197	12	47	0	Open
Pipe 80	189	12	-3	0	Open
Pipe 81	639	8	121	1	Open
Pipe 82	301	8	-14	0	Open
Pipe 83	505	6	6	0	Open
Pipe 84	540	12	-117	0	Open
Pipe 86	294	8	84	1	Open
Pipe 87	831	6	16	0	Open
Pipe 88	630	8	10	0	Open
Pipe 90	159	6	30	0	Open
Pipe 92	609	6	-6	0	Open
Pipe 93	358	8	4	0	Open
Pipe 94	128	8	-8	0	Open
Pipe 95	444	8	-16	0	Open
Pipe 98	529	6	18	0	Open
Pipe 99	306	8	12	0	Open
Pipe 100	579	8	6	0	Open
Pipe 101	719	8	611	4	Open
Pipe 102	340	8	221	1	Open
Pipe 103	428	8	30	0	Open

Pipe 104	498	8	6	0	Open
Pipe 105	705	8	18	0	Open
Pipe 106	162	8	6	0	Open
Pipe 107	518	8	6	0	Open
Pipe 108	472	6	18	0	Open
Pipe 109	673	6	-6	0	Open
Pipe 110	2310	8	-324	2	Open
Pipe 111	1849	8	647	4	Open
Pipe 112	1818	8	-49	0	Open
Pipe 113	647	8	6	0	Open
Pipe 114	614	6	-50	1	Open
Pipe 115	1179	6	131	1	Open
Pipe 117	781	8	6	0	Open
Pipe 118	1305	8	-59	0	Open
Pipe 120	1648	8	1525	10	Open
Pipe 121	1209	8	1519	10	Open
Pipe 127	437	8	24	0	Open
Pipe 128	473	8	6	0	Open
Pipe 134	1627	6	6	0	Open
Pipe 135	963	6	83	1	Open
Pipe 137	335	6	108	1	Open
Pipe 138	612	12	783	2	Open
Pipe 139	296	8	6	0	Open
Pipe 140	528	12	771	2	Open
Pipe 141	751	12	-681	2	Open
Pipe 142	1121	12	-1051	3	Open
Pipe 144	429	6	181	2	Open
Pipe 145	359	8	6	0	Open
Pipe 146	572	12	1332	4	Open
Pipe 147	597	10	644	3	Open
Pipe 148	276	10	913	4	Open
Pipe 149	733	6	275	3	Open
Pipe 152	170	6	59	1	Open
Pipe 154	517	6	-14	0	Open
Pipe 155	540	6	-12	0	Open
Pipe 156	330	6	49	1	Open
Pipe 157	352	6	58	1	Open
Pipe 158	484	6	74	1	Open
Pipe 159	820	6	15	0	Open
Pipe 160	1377	6	-37	0	Open
Pipe 161	539	6	18	0	Open
Pipe 162	321	6	-139	2	Open
Pipe 163	733	6	-80	1	Open
Pipe 164	298	6	-44	1	Open
Pipe 165	279	6	37	0	Open
Pipe 166	837	6	25	0	Open
Pipe 167	1338	6	-26	0	Open
Pipe 168	1086	6	141	2	Open
Pipe 169	594	6	-160	2	Open
Pipe 170	408	6	104	1	Open
Pipe 171	2401	6	65	1	Open
Pipe 172	1959	6	-42	0	Open
Pipe 173	447	6	68	1	Open
Pipe 174	911	6	-36	0	Open
Pipe 175	867	6	-47	1	Open
Pipe 176	880	6	-91	1	Open
Pipe 177	601	6	263	3	Open
Pipe 178	378	6	166	2	Open
Pipe 179	225	6	113	1	Open
Pipe 180	895	10	419	2	Open
Pipe 181	370	12	455	1	Open
Pipe 183	510	12	324	1	Open
Pipe 184	488	12	188	1	Open
Pipe 185	340	6	97	1	Open
Pipe 186	241	6	60	1	Open
Pipe 187	1016	12	425	1	Open
Pipe 188	626	10	-126	1	Open
Pipe 190	490	6	40	0	Open
Pipe 191	1217	10	253	1	Open
Pipe 192	260	10	299	1	Open
Pipe 193	266	10	198	1	Open
Pipe 194	503	10	-52	0	Open
Pipe 195	281	10	37	0	Open

Pipe 199	1169	6	-26	0	Open
Pipe 200	167	8	-42	0	Open
Pipe 201	840	12	181	1	Open
Pipe 202	1493	6	-25	0	Open
Pipe 204	401	6	1	0	Open
Pipe 205	889	6	-3	0	Open
Pipe 206	878	6	3	0	Open
Pipe 207	466	6	44	0	Open
Pipe 208	422	6	37	0	Open
Pipe 210	835	12	-229	1	Open
Pipe 211	450	8	11	0	Open
Pipe 212	853	6	15	0	Open
Pipe 213	581	6	-19	0	Open
Pipe 215	885	8	-29	0	Open
Pipe 216	246	8	-48	0	Open
Pipe 217	324	8	-71	0	Open
Pipe 218	279	8	-96	1	Open
Pipe 219	300	6	-35	0	Open
Pipe 220	384	6	-66	1	Open
Pipe 221	192	6	-72	1	Open
Pipe 222	311	6	-78	1	Open
Pipe 225	408	12	-235	1	Open
Pipe 227	252	12	240	1	Open
Pipe 228	326	12	-228	1	Open
Pipe 230	906	12	411	1	Open
Pipe 231	215	12	434	1	Open
Pipe 232	536	12	252	1	Open
Pipe 233	213	8	177	1	Open
Pipe 234	1165	6	41	0	Open
Pipe 235	413	6	-7	0	Open
Pipe 236	1114	6	-28	0	Open
Pipe 237	290	6	-15	0	Open
Pipe 238	1078	6	-19	0	Open
Pipe 239	328	6	-28	0	Open
Pipe 240	1165	6	12	0	Open
Pipe 241	922	6	52	1	Open
Pipe 242	392	8	40	0	Open
Pipe 243	846	6	6	0	Open
Pipe 244	491	8	28	0	Open
Pipe 245	165	8	33	0	Open
Pipe 246	647	6	21	0	Open
Pipe 2	887	8	116	1	Open
Pipe 6	297	8	-11	0	Open
Pipe 8	981	8	41	0	Open
Pipe 35	297	8	5	0	Open
Pipe 73	323	8	9	0	Open
Pipe 85	220	8	6	0	Open
Pipe 189	329	8	2	0	Open
Pipe 247	350	8	-6	0	Open
Pipe 248	410	8	3	0	Open
Pipe 249	274	8	-15	0	Open
Pipe 250	329	8	10	0	Open
Pipe 252	267	8	-29	0	Open
Pipe 253	1151	8	-25	0	Open
Pipe 254	295	10	-73	0	Open
Pipe 255	545	8	-21	0	Open
Pipe 256	460	10	-58	0	Open
Pipe 257	226	10	42	0	Open
Pipe 258	259	10	30	0	Open
Pipe 259	657	10	18	0	Open
Pipe 260	591	8	6	0	Open
Pipe 261	589	8	6	0	Open
Pipe 262	525	8	6	0	Open
Pipe 263	701	8	6	0	Open
Pipe 264	644	8	6	0	Open
Pipe 265	292	8	-22	0	Open
Pipe 266	1279	6	-6	0	Open
Pipe 267	378	8	6	0	Open
Pipe 268	747	6	-81	1	Open
Pipe 269	169	6	-66	1	Open
Pipe 270	1666	8	-28	0	Open
Pipe 271	725	8	44	0	Open
Pipe 274	558	6	51	1	Open

Pipe 276	369	6	-20	0	Open
Pipe 277	315	8	-26	0	Open
Pipe 278	461	8	-58	0	Open
Pipe 279	301	6	-20	0	Open
Pipe 280	284	6	-16	0	Open
Pipe 281	502	6	-119	1	Open
Pipe 282	1126	6	-70	1	Open
Pipe 283	1211	6	-33	0	Open
Pipe 284	1082	6	-39	0	Open
Pipe 285	1303	6	-43	0	Open
Pipe 286	384	8	-80	1	Open
Pipe 287	273	8	-125	1	Open
Pipe 288	479	6	-40	0	Open
Pipe 289	599	8	-91	1	Open
Pipe 290	463	6	40	0	Open
Pipe 291	925	6	44	0	Open
Pipe 293	270	8	20	0	Open
Pipe 294	447	6	-55	1	Open
Pipe 296	434	6	22	0	Open
Pipe 297	511	6	-1	0	Open
Pipe 298	400	6	23	0	Open
Pipe 300	1805	6	-55	1	Open
Pipe 301	890	8	51	0	Open
Pipe 302	1354	12	-29	0	Open
Pipe 303	1161	6	71	1	Open
Pipe 304	306	8	-82	1	Open
Pipe 305	537	8	-28	0	Open
Pipe 307	688	8	-23	0	Open
Pipe 308	607	8	-30	0	Open
Pipe 309	322	6	-21	0	Open
Pipe 310	680	6	-16	0	Open
Pipe 311	658	8	4	0	Open
Pipe 312	318	6	-24	0	Open
Pipe 313	1141	8	25	0	Open
Pipe 314	1100	6	-12	0	Open
Pipe 315	1327	6	-15	0	Open
Pipe 316	345	8	-11	0	Open
Pipe 317	438	8	64	0	Open
Pipe 320	981	8	16	0	Open
Pipe 321	383	8	-35	0	Open
Pipe 322	424	6	-16	0	Open
Pipe 323	553	6	20	0	Open
Pipe 324	602	8	-25	0	Open
Pipe 325	282	8	81	1	Open
Pipe 326	285	8	-112	1	Open
Pipe 327	128	8	-97	1	Open
Pipe 328	220	8	-114	1	Open
Pipe 329	407	8	-142	1	Open
Pipe 331	964	6	47	1	Open
Pipe 332	948	6	21	0	Open
Pipe 333	663	6	-42	0	Open
Pipe 334	1038	6	-10	0	Open
Pipe 335	777	6	22	0	Open
Pipe 336	1680	12	106	0	Open
Pipe 337	396	8	-137	1	Open
Pipe 338	970	6	44	0	Open
Pipe 339	486	8	-187	1	Open
Pipe 340	441	8	-301	2	Open
Pipe 341	312	6	-45	1	Open
Pipe 342	391	6	-75	1	Open
Pipe 343	590	6	24	0	Open
Pipe 344	374	6	-79	1	Open
Pipe 345	520	6	98	1	Open
Pipe 346	271	6	58	1	Open
Pipe 347	521	6	78	1	Open
Pipe 348	361	6	-27	0	Open
Pipe 349	582	6	81	1	Open
Pipe 350	308	12	253	1	Open
Pipe 351	776	6	-77	1	Open
Pipe 352	318	6	24	0	Open
Pipe 353	322	6	-90	1	Open
Pipe 354	640	6	10	0	Open
Pipe 355	349	8	153	1	Open

Pipe 356	351	6	-149	2	Open
Pipe 357	640	6	-53	1	Open
Pipe 358	351	6	168	2	Open
Pipe 359	347	6	-139	2	Open
Pipe 360	464	6	-88	1	Open
Pipe 361	732	6	-0	0	Open
Pipe 362	434	6	-94	1	Open
Pipe 363	458	6	8	0	Open
Pipe 364	382	6	65	1	Open
Pipe 365	581	6	-20	0	Open
Pipe 366	386	6	-102	1	Open
Pipe 367	232	6	-171	2	Open
Pipe 368	432	6	-101	1	Open
Pipe 369	1209	8	262	2	Open
Pipe 372	670	6	76	1	Open
Pipe 373	442	6	17	0	Open
Pipe 374	388	6	53	1	Open
Pipe 375	442	6	116	1	Open
Pipe 376	473	6	110	1	Open
Pipe 377	824	6	46	1	Open
Pipe 378	852	8	-78	0	Open
Pipe 380	177	10	133	1	Open
Pipe 381	370	6	-26	0	Open
Pipe 383	392	10	224	1	Open
Pipe 384	304	6	36	0	Open
Pipe 385	549	6	42	0	Open
Pipe 386	563	4	13	0	Open
Pipe 387	322	6	-53	1	Open
Pipe 391	849	6	-37	0	Open
Pipe 392	388	6	-33	0	Open
Pipe 393	342	6	-44	0	Open
Pipe 394	353	6	-81	1	Open
Pipe 395	876	12	249	1	Open
Pipe 396	345	10	240	1	Open
Pipe 397	249	12	3	0	Open
Pipe 399	864	12	-513	1	Open
Pipe 401	535	4	33	1	Open
Pipe 402	476	4	19	0	Open
Pipe 403	404	12	9	0	Open
Pipe 405	2244	4	8	0	Open
Pipe 406	427	8	2	0	Open
Pipe 407	567	12	-4	0	Open
Pipe 408	995	12	-516	1	Open
Pipe 412	832	6	46	1	Open
Pipe 413	983	6	19	0	Open
Pipe 414	817	6	-21	0	Open
Pipe 415	393	6	34	0	Open
Pipe 416	332	6	-108	1	Open
Pipe 417	937	6	27	0	Open
Pipe 418	519	6	-27	0	Open
Pipe 420	171	8	136	1	Open
Pipe 421	413	6	124	1	Open
Pipe 422	220	6	118	1	Open
Pipe 423	313	6	-140	2	Open
Pipe 424	941	6	-81	1	Open
Pipe 425	207	6	-152	2	Open
Pipe 426	1381	6	65	1	Open
Pipe 427	1053	6	252	3	Open
Pipe 428	579	8	12	0	Open
Pipe 429	334	4	6	0	Open
Pipe 430	296	8	234	1	Open
Pipe 432	411	8	12	0	Open
Pipe 433	1398	6	3	0	Open
Pipe 434	384	6	2	0	Open
Pipe 435	1016	6	-3	0	Open
Pipe 437	2367	6	0	0	Open
Pipe 439	1714	6	1	0	Open
Pipe 440	1187	6	1	0	Open
Pipe 441	743	6	-114	1	Open
Pipe 442	611	6	123	1	Open
Pipe 443	314	6	-243	3	Open
Pipe 444	662	6	3	0	Open
Pipe 445	568	8	-246	2	Open

Pipe 446	510	8	-182	1	Open
Pipe 447	583	6	-55	1	Open
Pipe 448	283	6	-39	0	Open
Pipe 449	420	6	-25	0	Open
Pipe 450	671	8	133	1	Open
Pipe 451	251	8	-164	1	Open
Pipe 452	504	6	54	1	Open
Pipe 453	514	6	20	0	Open
Pipe 454	277	6	28	0	Open
Pipe 455	805	6	22	0	Open
Pipe 456	846	8	-70	0	Open
Pipe 457	933	8	-243	2	Open
Pipe 458	605	8	173	1	Open
Pipe 459	695	8	167	1	Open
Pipe 461	342	8	-224	1	Open
Pipe 462	271	8	-117	1	Open
Pipe 463	716	8	-123	1	Open
Pipe 464	850	8	-242	2	Open
Pipe 465	1127	8	-113	1	Open
Pipe 466	990	8	249	2	Open
Pipe 467	2469	10	-497	2	Open
Pipe 468	1296	12	18	0	Open
Pipe 469	358	12	12	0	Open
Pipe 470	1187	12	-521	1	Open
Pipe 471	1438	14	-527	1	Open
Pipe 472	1480	12	1567	4	Open
Pipe 473	1017	14	1047	2	Open
Pipe 474	1844	14	1041	2	Open
Pipe 475	3518	12	514	1	Open
Pipe 476	905	12	508	1	Open
Pipe 477	666	6	6	0	Open
Pipe 478	1188	12	371	1	Open
Pipe 479	1280	6	31	0	Open
Pipe 480	592	10	62	0	Open
Pipe 481	789	10	30	0	Open
Pipe 482	1008	10	67	0	Open
Pipe 483	572	6	-39	0	Open
Pipe 484	376	6	-19	0	Open
Pipe 485	657	6	35	0	Open
Pipe 486	788	4	25	1	Open
Pipe 487	822	12	-130	0	Open
Pipe 488	768	6	99	1	Open
Pipe 489	568	6	-63	1	Open
Pipe 490	892	6	-46	1	Open
Pipe 491	615	10	-158	1	Open
Pipe 492	1006	12	115	0	Open
Pipe 493	318	12	19	0	Open
Pipe 495	905	6	42	0	Open
Pipe 496	246	6	28	0	Open
Pipe 497	767	6	24	0	Open
Pipe 498	548	6	117	1	Open
Pipe 499	795	6	65	1	Open
Pipe 500	319	6	14	0	Open
Pipe 501	769	6	-94	1	Open
Pipe 502	341	10	372	2	Open
Pipe 503	215	10	-472	2	Open
Pipe 504	497	12	-280	1	Open
Pipe 505	584	12	99	0	Open
Pipe 506	629	12	-276	1	Open
Pipe 507	558	12	-110	0	Open
Pipe 508	247	12	-116	0	Open
Pipe 509	292	12	-123	0	Open
Pipe 510	247	6	-12	0	Open
Pipe 511	414	6	-8	0	Open
Pipe 512	642	6	2	0	Open
Pipe 513	813	6	26	0	Open
Pipe 514	770	12	-78	0	Open
Pipe 515	918	6	-11	0	Open
Pipe 516	341	6	-48	1	Open
Pipe 517	261	6	-54	1	Open
Pipe 518	1162	6	10	0	Open
Pipe 519	344	6	-70	1	Open
Pipe 520	1242	6	32	0	Open

Pipe 521	881	6	37	0	Open
Pipe 522	888	6	-25	0	Open
Pipe 523	676	6	6	0	Open
Pipe 525	2101	14	-1023	2	Open
Pipe 526	925	12	-336	1	Open
Pipe 527	1188	6	95	1	Open
Pipe 528	824	14	-680	1	Open
Pipe 530	1356	12	545	2	Open
Pipe 531	587	6	51	1	Open
Pipe 532	487	6	-25	0	Open
Pipe 533	986	10	-418	2	Open
Pipe 534	665	6	70	1	Open
Pipe 536	322	6	-4	0	Open
Pipe 537	153	6	-12	0	Open
Pipe 538	425	6	-48	1	Open
Pipe 539	674	6	-64	1	Open
Pipe 540	627	6	2	0	Open
Pipe 541	1020	10	387	2	Open
Pipe 542	312	4	-30	1	Open
Pipe 543	310	12	411	1	Open
Pipe 544	448	12	207	1	Open
Pipe 545	568	12	-262	1	Open
Pipe 547	1286	12	487	1	Open
Pipe 548	422	6	-10	0	Open
Pipe 549	670	12	491	1	Open
Pipe 550	537	12	223	1	Open
Pipe 551	2072	8	75	0	Open
Pipe 552	1363	8	69	0	Open
Pipe 553	193	8	-136	1	Open
Pipe 554	824	8	-142	1	Open
Pipe 555	1165	8	199	1	Open
Pipe 556	1030	10	-463	2	Open
Pipe 557	450	12	6	0	Open
Pipe 559	3360	12	12	0	Open
Pipe 560	1363	8	2	0	Open
Pipe 561	1114	12	-4	0	Open
Pipe 562	325	12	962	3	Open
Pipe 565	612	12	197	1	Open
Pipe 566	761	6	82	1	Open
Pipe 569	819	12	374	1	Open
Pipe 570	702	12	362	1	Open
Pipe 571	1860	6	25	0	Open
Pipe 572	447	12	-331	1	Open
Pipe 573	405	12	350	1	Open
Pipe 574	678	12	-199	1	Open
Pipe 575	481	8	536	3	Open
Pipe 577	1459	16	369	1	Open
Pipe 578	361	8	12	0	Open
Pipe 579	419	8	0	0	Open
Pipe 585	241	12	3131	9	Open
Pipe 586	569	8	12	0	Open
Pipe 587	537	8	6	0	Open
Pipe 589	325	12	77	0	Open
Pipe 590	653	12	63	0	Open
Pipe 591	1041	6	-8	0	Open
Pipe 592	515	8	43	0	Open
Pipe 593	636	8	37	0	Open
Pipe 594	284	8	16	0	Open
Pipe 595	517	8	1	0	Open
Pipe 596	405	8	-17	0	Open
Pipe 597	244	8	12	0	Open
Pipe 598	503	8	-41	0	Open
Pipe 599	522	12	18	0	Open
Pipe 600	701	12	65	0	Open
Pipe 601	437	8	6	0	Open
Pipe 602	425	12	6	0	Open
Pipe 603	672	8	8	0	Open
Pipe 604	302	8	8	0	Open
Pipe 605	277	8	-4	0	Open
Pipe 606	580	8	-16	0	Open
Pipe 607	525	8	6	0	Open
Pipe 608	623	8	6	0	Open
Pipe 610	1378	8	-27	0	Open

Pipe 611	257	8	-72	0	Open
Pipe 612	449	8	6	0	Open
Pipe 613	826	8	-39	0	Open
Pipe 614	562	8	18	0	Open
Pipe 615	305	8	6	0	Open
Pipe 616	214	8	6	0	Open
Pipe 617	632	8	-6	0	Open
Pipe 618	1172	8	-15	0	Open
Pipe 619	1411	8	18	0	Open
Pipe 620	729	8	12	0	Open
Pipe 622	165	8	6	0	Open
Pipe 623	379	8	-18	0	Open
Pipe 624	325	8	6	0	Open
Pipe 626	656	6	-12	0	Open
Pipe 627	1349	6	5	0	Open
Pipe 628	525	8	-84	1	Open
Pipe 629	569	8	-96	1	Open
Pipe 630	262	8	-108	1	Open
Pipe 631	730	8	-120	1	Open
Pipe 632	345	8	-89	1	Open
Pipe 633	295	8	-101	1	Open
Pipe 635	911	6	27	0	Open
Pipe 636	1050	6	-5	0	Open
Pipe 637	362	6	26	0	Open
Pipe 638	446	6	23	0	Open
Pipe 639	1126	8	-35	0	Open
Pipe 640	162	8	12	0	Open
Pipe 641	269	6	-53	1	Open
Pipe 642	1743	6	-34	0	Open
Pipe 643	312	6	64	1	Open
Pipe 644	1367	6	24	0	Open
Pipe 645	835	6	34	0	Open
Pipe 646	295	6	1	0	Open
Pipe 647	926	8	-105	1	Open
Pipe 648	534	8	-210	1	Open
Pipe 650	335	8	142	1	Open
Pipe 651	706	8	142	1	Open
Pipe 653	1332	8	13	0	Open
Pipe 654	440	8	36	0	Open
Pipe 655	1466	8	9	0	Open
Pipe 657	253	8	-21	0	Open
Pipe 659	482	8	6	0	Open
Pipe 660	464	8	6	0	Open
Pipe 661	531	8	6	0	Open
Pipe 662	1466	8	-15	0	Open
Pipe 663	1787	8	14	0	Open
Pipe 664	1141	8	-32	0	Open
Pipe 666	924	8	-372	2	Open
Pipe 667	1121	8	-378	2	Open
Pipe 668	868	8	-372	2	Open
Pipe 669	440	8	-273	2	Open
Pipe 670	419	8	-240	2	Open
Pipe 671	447	8	-251	2	Open
Pipe 672	587	6	56	1	Open
Pipe 673	1382	8	-312	2	Open
Pipe 674	689	8	-218	1	Open
Pipe 675	566	6	212	2	Open
Pipe 676	437	6	96	1	Open
Pipe 677	567	6	-4	0	Open
Pipe 678	440	6	97	1	Open
Pipe 679	609	6	39	0	Open
Pipe 680	457	6	52	1	Open
Pipe 681	618	6	104	1	Open
Pipe 682	500	6	152	2	Open
Pipe 683	415	8	326	2	Open
Pipe 684	317	8	419	3	Open
Pipe 686	191	12	537	2	Open
Pipe 687	227	12	-43	0	Open
Pipe 688	608	8	-31	0	Open
Pipe 689	812	6	-18	0	Open
Pipe 690	598	12	-136	0	Open
Pipe 691	286	12	16	0	Open
Pipe 692	402	12	-12	0	Open

Pipe 693	380	12	-36	0	Open
Pipe 694	422	6	22	0	Open
Pipe 695	583	6	16	0	Open
Pipe 696	239	8	39	0	Open
Pipe 697	319	8	51	0	Open
Pipe 698	363	8	67	0	Open
Pipe 699	275	8	43	0	Open
Pipe 700	1438	6	-19	0	Open
Pipe 701	1268	6	22	0	Open
Pipe 702	1155	6	19	0	Open
Pipe 703	832	8	165	1	Open
Pipe 704	779	8	180	1	Open
Pipe 705	701	10	210	1	Open
Pipe 706	465	8	2	0	Open
Pipe 708	339	10	585	2	Open
Pipe 709	302	8	399	3	Open
Pipe 710	560	8	227	1	Open
Pipe 711	297	8	293	2	Open
Pipe 712	349	8	160	1	Open
Pipe 713	379	8	158	1	Open
Pipe 714	626	8	-4	0	Open
Pipe 715	530	8	-127	1	Open
Pipe 716	661	8	117	1	Open
Pipe 717	1223	12	53	0	Open
Pipe 718	1108	12	26	0	Open
Pipe 719	1157	8	20	0	Open
Pipe 720	167	6	-15	0	Open
Pipe 721	237	6	-21	0	Open
Pipe 722	955	6	-0	0	Open
Pipe 723	575	8	29	0	Open
Pipe 724	415	10	-644	3	Open
Pipe 725	429	6	6	0	Open
Pipe 726	1430	10	656	3	Open
Pipe 727	652	8	-165	1	Open
Pipe 728	748	8	366	2	Open
Pipe 731	616	6	21	0	Open
Pipe 732	467	6	18	0	Open
Pipe 733	320	6	6	0	Open
Pipe 734	2226	6	6	0	Open
Pipe 735	938	6	-76	1	Open
Pipe 736	348	6	73	1	Open
Pipe 737	697	8	6	0	Open
Pipe 738	588	6	-61	1	Open
Pipe 739	363	8	-245	2	Open
Pipe 740	419	8	300	2	Open
Pipe 741	278	8	134	1	Open
Pipe 742	2213	8	37	0	Open
Pipe 743	1138	6	-17	0	Open
Pipe 744	208	8	-91	1	Open
Pipe 745	766	8	68	0	Open
Pipe 746	623	8	-24	0	Open
Pipe 747	599	8	-48	0	Open
Pipe 748	347	8	18	0	Open
Pipe 749	428	8	6	0	Open
Pipe 750	851	8	6	0	Open
Pipe 753	259	6	6	0	Open
Pipe 754	321	8	74	0	Open
Pipe 755	734	12	104	0	Open
Pipe 756	409	8	44	0	Open
Pipe 757	258	8	28	0	Open
Pipe 758	565	12	-36	0	Open
Pipe 759	377	8	-88	1	Open
Pipe 760	532	8	-118	1	Open
Pipe 761	245	8	36	0	Open
Pipe 762	386	8	-160	1	Open
Pipe 763	1638	6	9	0	Open
Pipe 764	2166	8	6	0	Open
Pipe 765	270	6	-3	0	Open
Pipe 766	1402	6	-9	0	Open
Pipe 767	681	6	0	0	Open
Pipe 768	960	6	-12	0	Open
Pipe 769	318	8	-6	0	Open
Pipe 770	867	6	6	0	Open

Pipe 771	765	6	6	0	Open
Pipe 772	376	8	6	0	Open
Pipe 773	874	8	-24	0	Open
Pipe 774	1525	12	54	0	Open
Pipe 775	350	8	24	0	Open
Pipe 776	334	4	7	0	Open
Pipe 777	1646	6	2	0	Open
Pipe 778	793	6	-4	0	Open
Pipe 779	1000	6	1	0	Open
Pipe 780	1001	6	-11	0	Open
Pipe 781	1139	12	24	0	Open
Pipe 782	1136	12	12	0	Open
Pipe 783	3052	12	6	0	Open
Pipe 784	1556	8	14	0	Open
Pipe 785	218	6	10	0	Open
Pipe 786	279	6	12	0	Open
Pipe 787	1586	6	-10	0	Open
Pipe 788	1471	6	8	0	Open
Pipe 789	251	8	-2	0	Open
Pipe 790	853	8	-8	0	Open
Pipe 792	801	8	-46	0	Open
Pipe 793	572	10	32	0	Open
Pipe 794	831	10	6	0	Open
Pipe 795	480	8	26	0	Open
Pipe 796	1153	6	4	0	Open
Pipe 797	249	6	9	0	Open
Pipe 798	428	6	6	0	Open
Pipe 799	1359	6	-3	0	Open
Pipe 800	645	6	-4	0	Open
Pipe 801	301	6	1	0	Open
Pipe 802	770	8	-11	0	Open
Pipe 803	1006	6	-5	0	Open
Pipe 804	385	6	9	0	Open
Pipe 805	792	6	-6	0	Open
Pipe 807	2804	12	288	1	Open
Pipe 808	659	8	54	0	Open
Pipe 809	1547	8	16	0	Open
Pipe 810	302	8	-13	0	Open
Pipe 811	885	8	13	0	Open
Pipe 812	368	8	-32	0	Open
Pipe 815	811	6	154	2	Open
Pipe 816	1047	6	43	0	Open
Pipe 817	674	6	105	1	Open
Pipe 818	206	6	38	0	Open
Pipe 819	245	12	-324	1	Open
Pipe 820	935	6	2	0	Open
Pipe 821	412	12	354	1	Open
Pipe 822	453	6	61	1	Open
Pipe 824	1012	6	17	0	Open
Pipe 826	675	16	-2570	4	Open
Pipe 828	323	12	178	1	Open
Pipe 829	601	6	63	1	Open
Pipe 330	673	8	2	0	Open
Pipe 546	281	6	-10	0	Open
Pipe 751	958	8	-86	1	Open
Pipe 752	109	8	-272	2	Open
Pipe 823	996	6	6	0	Open
Pipe 830	210	8	-284	2	Open
Pipe 831	825	8	72	0	Open
Pipe 832	565	8	-157	1	Open
Pipe 535	975	8	6	0	Open
Pipe 558	486	4	45	1	Open
Pipe 563	74	12	6	0	Open
Pipe 564	91	6	-33	0	Open
Pipe 707	194	12	901	3	Open
Pipe 729	128	10	545	2	Open
Pipe 730	333	6	53	1	Open
Pipe 833	538	6	35	0	Open
Pipe 835	114	6	98	1	Open
Pipe 837	2406	12	-519	1	Open
Pipe 838	222	12	-14	0	Open
Pipe 839	1399	8	-39	0	Open
Pipe 840	93	8	59	0	Open

Pipe 841	615	8	90	1	Open
Pipe 842	291	8	25	0	Open
Pipe 844	892	8	1	0	Open
Pipe 845	302	8	-36	0	Open
Pipe 846	205	8	41	0	Open
Pipe 847	397	8	10	0	Open
Pipe 848	322	6	16	0	Open
Pipe 849	89	6	-38	0	Open
Pipe 850	396	6	28	0	Open
Pipe 851	168	6	23	0	Open
Pipe 852	271	6	-34	0	Open
Pipe 853	569	6	51	1	Open
Pipe 854	213	6	90	1	Open
Pipe 855	191	6	6	0	Open
Pipe 856	506	8	78	0	Open
Pipe 857	781	6	-9	0	Open
Pipe 858	281	8	130	1	Open
Pipe 859	293	6	-41	0	Open
Pipe 860	324	8	-10	0	Open
Pipe 861	341	8	25	0	Open
Pipe 862	116	8	19	0	Open
Pipe 863	243	8	2	0	Open
Pipe 864	242	8	11	0	Open
Pipe 20	1534	8	28	0	Open
Pipe 28	231	8	22	0	Open
Pipe 196	276	8	-62	0	Open
Pipe 197	820	6	26	0	Open
Pipe 275	537	6	44	1	Open
Pipe 295	780	6	-14	0	Open
Pipe 318	576	6	-11	0	Open
Pipe 319	987	10	-748	3	Open
Pipe 404	1208	8	71	0	Open
Pipe 410	2075	12	-474	1	Open
Pipe 411	649	12	409	1	Open
Pipe 419	295	6	-81	1	Open
Pipe 834	121	6	-36	0	Open
Pipe 865	723	6	24	0	Open
Pipe 866	198	8	-66	0	Open
Pipe 867	1130	8	6	0	Open
Pipe 868	1461	8	213	1	Open
Pipe 869	768	8	1513	10	Open
Pipe 870	258	12	218	1	Open
Pipe 875	1821	12	126	0	Open
Pipe 876	2194	6	20	0	Open
Pipe 879	532	8	6	0	Open
Pipe 880	941	16	351	1	Open
Pipe 881	200	8	15	0	Open
Pipe 882	273	8	-6	0	Open
Pipe 883	118	12	597	2	Open
Pipe 884	305	12	597	2	Open
Pipe 885	149	12	591	2	Open
Pipe 888	468	6	-126	1	Open
Pipe 890	1035	6	-135	2	Open
Pipe 891	338	6	-63	1	Open
Pipe 892	362	6	-78	1	Open
Pipe 893	292	12	-18	0	Open
Pipe 3	304	6	-70	1	Open
Pipe 33	708	12	-332	1	Open
Pipe 39	143	12	-339	1	Open
Pipe 40	872	12	94	0	Open
Pipe 41	594	12	-439	1	Open
Pipe 64	724	6	-69	1	Open
Pipe 76	636	10	-32	0	Open
Pipe 77	132	10	102	0	Open
Pipe 89	209	10	139	1	Open
Pipe 97	1001	6	68	1	Open
Pipe 122	330	6	-60	1	Open
Pipe 126	103	6	-98	1	Open
Pipe 130	276	8	95	1	Open
Pipe 131	733	4	32	1	Open
Pipe 132	1425	6	-199	2	Open
Pipe 143	250	16	-3470	6	Open
Pipe 182	702	6	-19	0	Open

Pipe 198	785	16	-521	1	Open
Pipe 229	895	6	-6	0	Open
Pipe 292	426	8	6	0	Open
Pipe 306	416	8	6	0	Open
Pipe 370	803	6	-169	2	Open
Pipe 371	496	12	-246	1	Open
Pipe 379	850	6	37	0	Open
Pipe 382	771	6	13	0	Open
Pipe 390	491	12	2	0	Open
Pipe 398	360	12	-4	0	Open
Pipe 494	921	12	563	2	Open
Pipe 529	601	12	-573	2	Open
Pipe 580	353	10	-192	1	Open
Pipe 581	405	6	6	0	Open
Pipe 582	1266	8	-158	1	Open
Pipe 583	621	6	-164	2	Open
Pipe 388	605	20	-4462	5	Open
Pipe 389	74	10	76	0	Open
Pipe 400	89	10	309	1	Open
Pipe 436	1000	10	2	0	Open
Pipe 460	150	12	574	2	Open
Pipe 685	850	8	385	2	Open
Pipe 814	614	12	-12	0	Open
Pipe 836	1014	10	46	0	Open
Pipe 299	1000	12	3485	10	Open
Pipe 576	321	6	-6	0	Open
Pipe 827	500	8	6	0	Open
Pipe 18	152	12	-38	0	Open
Pipe 431	1464	6	38	0	Open
Pipe 568	500	30	-3595	2	Open
Pipe 895	3000	30	-3601	2	Open
Pipe 897	1124	12	36	0	Open
Pipe 898	652	8	12	0	Open
Pipe 899	702	8	3	0	Open
Pipe 900	623	8	-3	0	Open
Pipe 901	948	12	18	0	Open
Pipe 902	322	12	6	0	Open
Pipe 903	565	12	6	0	Open
Pipe 904	50	12	3491	10	Open
Pipe 150	388	8	-678	4	Open
Pipe 151	457	8	9	0	Open
Pipe 153	476	8	3	0	Open
Pipe 877	364	8	-3	0	Open
Pipe 905	524	8	-9	0	Open
Pipe 906	742	8	-702	4	Open
Pipe 908	1000	12	-2459	7	Open
Pipe 909	3247	12	-3191	9	Open
Pipe 910	367	8	-359	2	Open
Pipe 911	564	8	-349	2	Open
Pipe 912	399	8	6	0	Open
Pipe 913	145	8	726	5	Open
Pipe 914	160	8	-371	2	Open
Pipe 915	1623	12	-6	0	Open
Pipe 887	770	8	-210	1	Open
Pipe 894	1122	8	12	0	Open
Pipe 907	572	12	228	1	Open
Pipe 916	570	12	-216	1	Open
Pipe 919	3250	8	6	0	Open
Pipe 920	423	6	-6	0	Open
Pipe 922	643	6	-26	0	Open
Pipe 923	642	6	-14	0	Open
Pipe 926	1203	6	-6	0	Open
Pipe 928	1291	6	-6	0	Open
Pipe 930	117	6	-6	0	Open
Pipe 932	811	6	6	0	Open
Pipe 934	1169	6	-6	0	Open
Pipe 936	328	6	6	0	Open
Pipe 938	171	8	6	0	Open
Pipe 941	424	8	-6	0	Open
Pipe 942	392	8	-6	0	Open
Pipe 943	392	8	3	0	Open
Pipe 944	391	8	-9	0	Open
Pipe 946	244	8	-6	0	Open

Pipe 96	296	8	0	0	Open
Pipe 133	642	8	-6	0	Open
Pipe 136	1386	12	349	1	Open
Pipe 209	126	12	-6	0	Open
Pipe 223	1669	12	343	1	Open
Pipe 224	441	12	312	1	Open
Pipe 226	541	12	531	2	Open
Pipe 409	546	12	-519	1	Open
Pipe 621	65	12	-109	0	Open
Pipe 625	55	12	115	0	Open
Pipe 652	169	12	-263	1	Open
Pipe 656	114	12	-225	1	Open
Pipe 825	281	12	-262	1	Open
Pipe 917	44	12	25	0	Open
Pipe 918	26	12	-38	0	Open
Pipe 947	310	12	-107	0	Open
Pipe 948	186	6	-58	1	Open
Pipe 949	1648	6	-55	1	Open
Pipe 950	56	10	361	1	Open
Pipe 951	990	12	-161	0	Open
Pipe 952	125	6	-83	1	Open
Pipe 953	386	12	-110	0	Open
Pipe 954	398	12	-84	0	Open
Pipe 955	90	12	65	0	Open
Pipe 956	315	6	-31	0	Open
Pipe 957	147	6	90	1	Open
Pipe 958	651	8	-6	0	Open
Pipe 959	1267	8	-48	0	Open
Pipe 960	1000	12	-36	0	Open
Pipe 961	548	16	-399	1	Open
Pipe 962	20	16	-50	0	Open
Pipe 963	358	12	86	0	Open
Pipe 964	216	8	60	0	Open
Pipe 966	384	16	-367	1	Open
Pipe 967	246	8	6	0	Open
Pipe 968	643	8	0	0	Closed
Pipe 971	89	30	3607	2	Open
Pipe 973	758	16	-6	0	Open
Pipe 974	1350	16	-355	1	Open
Pipe 124	193	8	12	0	Open
Pipe 65	185	8	-1507	10	Open
Pipe 125	25	16	6	0	Open
Pump 634	#N/A	#N/A	1050	0	Open
Pump 649	#N/A	#N/A	1050	0	Open
Pump 874	#N/A	#N/A	1044	0	Open
Pump 886	#N/A	#N/A	12	0	Open
Pump 438	#N/A	#N/A	18	0	Open
Pump 66	#N/A	#N/A	0	0	Closed
Pump 119	#N/A	#N/A	18	0	Open
Pump 203	#N/A	#N/A	3613	0	Open
Valve 665	#N/A	10	40	0	Open
Valve 791	#N/A	12	-6	0	Open
Valve 567	#N/A	10	6	0	Open
Valve 806	#N/A	12	0	0	Closed
Valve 889	#N/A	12	222	1	Open
Valve 896	#N/A	8	0	0	Closed
Valve 921	#N/A	6	0	0	Closed
Valve 924	#N/A	6	-20	0	Open
Valve 925	#N/A	6	0	0	Closed
Valve 927	#N/A	6	0	0	Closed
Valve 929	#N/A	6	0	0	Closed
Valve 931	#N/A	6	0	0	Closed
Valve 933	#N/A	6	0	0	Closed
Valve 935	#N/A	6	0	0	Active
Valve 937	#N/A	8	0	0	Closed
Valve 939	#N/A	8	0	0	Closed
Valve 940	#N/A	8	0	0	Closed
Valve 945	#N/A	8	0	0	Closed
Valve 91	#N/A	8	0	0	Closed
Valve 116	#N/A	8	0	0	Closed

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