REQUEST FOR COUNCIL ACTION

Date: 2/23/09
Item No.: 12.c

Department Approval

City Manager Approval

Item Description: Walsh Lake Watershed Drainage Analysis and Discussion

BACKGROUND

On March 24, 2008, the City Council authorized a study of the storm water hydrology of the Walsh Lake subwatershed located in the neighborhood southeast of Midland Hills Golf Course ("Rosewood Neighborhood") due to neighborhood concerns about localized street flooding and damage to property. This area includes the following streets: Midland Hills Road, Draper Avenue, Rosedale Drive, Westwood Circle, Hythe Street, Skillman Avenue, North Rosewood Lane, and South Rosewood Lane.

An XP-SWMM model was created for this area. The XP-SWMM analysis allows us to evaluate the performance of the system during intense rain events. The model predicts the elevation of flooding within wetlands, low areas and intersections in this neighborhood. A separate model was executed for the 2, 5, 10 and 100-year storm events. The storm events are 2.8", 3.6", 4.2", and 6" of rain in a 24-hour period, and have annual return probabilities of 50%, 20%, 10%, and 1%, respectively.

The existing storm sewer system in the Rosewood neighborhood consists of a network of pipes that lead to a manhole at Draper Avenue and Midland Hills Road. From this manhole, the storm water runoff flows through a dual pipe system west to Walsh Lake. Our current design standard for storm sewer is a 10-year event. The existing storm sewer system was built in the 1970s. Additional build-out of the neighborhood, which included the filling of wetlands, resulted in an under-sized storm sewer system for today's conditions.

The following areas of concern were identified in the analysis:

- The intersection of Draper Avenue and Midland Hills Road
- The wetland located between 2235 and 2211 Rosewood Lane North ("Rosewood Pond").
- The side yard at 2241 Rosewood Lane South

This pipe configuration at Draper Avenue and Midland Hills Road creates a bottleneck on the system, which causes localized street flooding in 100, 10, and 5-year events. Rosewood Pond and the side yard at 2241 Rosewood Lane South were identified as flood prone in the 100- and 10- year events. The following table shows the results of the modeling for the flood prone areas.

	2241 Rosewood	Rosewood Pond
Low building elevation	937.60	940.30
100-Year High Water Elevation	939.57	941.42
10- Year High Water Elevation	937.48	940.35
Approximate additional storage needed to accommodate 100-Year event	0.75 ac-ft	1.1 ac-ft

The streets in this neighborhood are in good condition; upsizing the entire storm sewer system would not be a cost-effective manner in which to improve the drainage conditions, as it would require significant pavement removal and excavation. In addition to costs, upsizing the pipe would increase flow rates into Walsh Lake. Since the outlet of Walsh Lake is controlled by a lift station, increased flow to Walsh Lake could cause significant problems downstream.

Creating additional storage possibilities throughout the existing storm sewer system, such as wetland enhancement/pond excavation, and rain garden construction, can alleviate the stress on the existing system, reduce the threat of flooding, while also improving water quality. By creating additional storage to reduce the risk of flooding, it is anticipated that the street flooding will also be reduced. Creating upstream storage will reduce the amount of water that reaches the dual pipe, and the timing of the water reaching the dual pipe will also be more staggered, alleviating street flooding even further.

In order to create the additional storage recommended in the report, a final project needs to be designed. WSB has submitted a proposal for this additional work. The scope of the work includes:

- Additional study. The pond that was constructed as a part of the Midland Hills Condominium development, which may have additional capacity than is currently being used. Analysis would be completed to determine how much storm water could be redirected to the pond, and what improvements would be needed to do so.
- Final design. Rain garden and other storm water Best Management Practice (BMP) locations will be finalized, and designs prepared for each site. Final design will also include the expansion of Rosewood Pond and improvements to the Midland Hills Condominium Pond, as determined by the additional study. Since Rosewood Pond is a delineated wetland, approval will be required from the Rice Creek Watershed District and the DNR for any improvements or enhancements. WSB will work through the required permitting process with all agencies involved.
- Public participation. Neighborhood meetings and individual meetings will be held with rain garden recipients during the design process to discuss the appropriate design for each site.

This project involves modeling and wetland permitting, which require software and expertise that City staff does not have. Also, City staff is currently working on final design for construction projects estimated at approximately $5 million for the 2009 construction season. As such, City staff does not have the capacity to complete final design for this project in 2009. Due to the nature of the project, and that homes have experienced flooding, staff recommends moving forward with this project at this time. Several neighborhood meetings have been held, and residents have indicated they are in favor of a project to improve drainage throughout their neighborhood.

Once final design is completed, staff will bring the project to the City Council for approval and request authorization to move forward into construction.

POLICY OBJECTIVE

In 2007, the Walsh Lake subwatershed was added as a problem area to the City's Comprehensive Surface Water Management Plan (CSWMP.) One of the goals from the City's CSWMP is to provide flood protection for all residents and structures as well as protect the integrity of conveyance channels and storm water detention areas.

FINANCIAL IMPACTS

WSB has provided a proposal for additional study and final design in an amount not to exceed $19,700. This project would be paid for using Storm sewer infrastructure funds. Staff is working with the Rice Creek Watershed District and Ramsey Conservation District on possible cost-sharing grants for this project.

STAFF RECOMMENDATION

Engage WSB and Associates, Inc. to complete additional study and final design for the Walsh Lake Subwatershed Drainage Improvements. They have completed the initial study, and are best suited to continue this work.

REQUESTED COUNCIL ACTION

A motion to authorize staff to engage WSB and Associates, Inc. to complete additional study and final design for the Walsh Lake Subwatershed Drainage Improvements.

Prepared by: **Kristine Giga, Civil Engineer;**
Attachments: A- WSB Memorandum

WSB & Associates, Inc.

Infrastructure ■ Engineering ■ Planning ■ Construction

701 Xenia Avenue South
Suite 300
Minneapolis, MN 55416
Tel: 763 541-4800
Fax: 763 541-1700

September 26, 2008

Ms. Deb Bloom, PE
City Engineer
City of Roseville
2660 Civic Center Drive
Roseville, MN 55113

Re: Walsh Lake Watershed Drainage Analysis
WSB Project No. 1797-00

Dear Ms. Bloom:

This letter is to provide you with a summary of our findings with respect to the analysis of the Rosewood neighborhood drainage system.

1.) Project Assumptions

The storm water model was created based on the following assumptions:

1. All pond normal water elevations are equal to the outlet invert elevations.
2. A 30-acre drainage area for the neighborhood in Lauderdale and a 90-acre drainage area for the U of M golf course were assumed, based on an estimation of the subwatersheds provided in the City's 1990 Surface Water Management Plan.
3. Drainage from the U of M Golf Course flows through a 6-inch draintile system.
4. Drainage from the Lauderdale neighborhood flows through a 12-inch culvert.
5. The north and south portions of Walsh Lake are equalized by the connecting culvert.

In addition to the above assumptions, the storm water model was constructed based on record drawings, contour data, and aerial photography provided by the City.

2.) Project Findings

The Rosewood Pond and the side yard depression in subwatershed 17 have been identified to be flood prone during the 100-year and 10-year storm events. The following is a summary of our findings with regard to existing conditions in these areas:

	Side yard 17	**Rosewood Pond**
Low Building Elev.	937.60	940.30
100-Year High Water Elev.	939.57	941.42
10-Year High Water Elev.	937.48	940.35
Approx. Additional Storage Needed to Accommodate 100-Year Event	0.75 ac-ft	1.10 ac-ft

To provide 1-foot of freeboard to the low building elevation in the vicinity of the side yard in subwatershed 17 and Rosewood Pond, it is recommended that a minimum of 0.75 ac-ft and 1.10 ac-ft of additional live storage be added in these locations within the upstream watershed areas, respectively.

The attached tables provide total runoff volumes produced in each subwatershed during a given storm event. The data indicates that local street flooding occurs during the 100-, 10-, and 5-year storm events. The tables also indicated the overflow volumes which are produced during street flooding. It is anticipated that creating the additional identified storage in these areas will reduce the likelihood of flooding, ease the burden of the downstream system and, ultimately, the amount of discharge into Walsh Lake.

The storm sewer pipes which carry drainage throughout the Rosewood neighborhood all converge on one point near the middle of Midland Hills Road. This manhole junction is an uncommon design which receives flow from three separate pipes and discharges to two separate pipes. Due to the large quantities of drainage and upstream flood flows being directed to this low area, it acts as a bottleneck on the system.

The storm sewer system within the Rosewood neighborhood is also affected by the downstream system, which discharges into Walsh Lake. As a part of the modeling and analysis, the elevation of Walsh Lake was raised to an initial elevation of 930 to simulate back-to-back storms. This procedure did not result in increased flooding to the neighborhood. Therefore, the flooding in the Rosewood neighborhood is not impacted by the tailwater conditions of Walsh Lake. The storm sewer west of the Rosewood neighborhood, which consists of two parallel pipes connecting the junction in subwatershed 7 to Walsh Lake, was observed to be at full capacity in most storm events. Both the 36-inch and 18-inch pipes are at full capacity during the 100-, 10-, and 5-year storm events.

The construction of rain gardens receiving runoff from the street, side and backyard areas may provide the additional storage volume needed in the neighborhood to reduce the likelihood for flooding. The following list and attached figure illustrate those properties within the neighborhood that have expressed interest in working with the City to construct a rain garden on their property. A visual field survey was conducted identifying the feasibility of each location. The results of this visual survey are listed below and presented in Figure 1.

Address	Feasibility Rating	Potential Rain Garden Volume (cu ft)
2155 Draper Ave	Good Location	1,635
2175 Draper Ave	Fair Location	1,635
1954 Hythe St	Good Location	1,200
1955 Hythe St	Good Location	2,520
1944 Midland Hills Rd	Good Location	1,200
1952 Midland Hills Rd	Good Location	1,170
1960 Midland Hills Rd	Good Location	1,200
1961 Midland Hills Rd	Fair Location	1,275
1974 Midland Hills Rd	Fair Location	1,965
2139 N Rosewood Ln	Good Location	1,125
2142 N Rosewood Ln	Fair Location	2,100
2152 N Rosewood Ln	Good Location	1,560
2177 N Rosewood Ln	Fair Location	1,650
2192 N Rosewood Ln	Fair Location	1,590
2200 N Rosewood Ln	Fair Location	1,575
2201 N Rosewood Ln	Fair Location	*Pond Improvements
2211 N Rosewood Ln	Fair Location	*Pond Improvements
2183 Roselawn Ave	Excellent Location	2,250
2191 Roselawn Ave	Excellent Location	2,250
2241 Roselawn Ave	Excellent Location	*Existing 600 sq ft rain garden
2096 S Rosewood Ln	Fair Location	1,395
2097 S Rosewood Ln	Excellent Location	1,650
2126 S Rosewood Ln	Fair Location	1,920
2191 S Rosewood Ln	Good Location	1,500
2241 S Rosewood Ln	Excellent Location	1,600
1937 Westwood Cir	Good Location	950
1947 Westwood Cir	Excellent Location	800
	TOTAL	**37,715**

3.) Project Options

The options evaluated as part of our analysis include the following:

Option #1: Storm Sewer Improvements:

The first option for reducing flooding in the Rosewood neighborhood area is to increase the storm sewer system conveyance capacity to Walsh Lake. This would require upsizing the 18-inch pipe, which is part of the parallel pipe system carrying drainage to Walsh Lake, to a 60-inch pipe. Other improvements would include pipe modifications to lower the normal water level of Rosewood Pond and the depression in subwatershed 17 to eliminate flooding of nearby homes. These improvements may be completed at a cost of $700,000 to $800,000.

In addition to capital costs incurred by this project, permits may be required from RCWD, MDNR and US Army Corps of Engineers. This option will increase flow rates into Walsh Lake from the Rosewood neighborhood, which may result in increasing the flood elevation adjacent to Walsh Lake. These concerns are such that additional study and coordination with the reviewing agencies would be necessary to ensure feasibility of this option. For this reason, we are not confident that the required permits would be granted from these agencies.

Option #2: Increase Storage and Infiltration:

The second option for reducing flooding is to increase storage and infiltration in and around the Rosewood neighborhood. This option is composed of two parts. The first part involves the cooperation of local residents who have shown interest in maintaining rain gardens on their properties. The second part involves improvements to Rosewood Pond to increase the storage capacity.

The approach to retain storm water runoff through rain gardens has the potential to significantly reduce the risk of house flooding. Street flooding will still occur, but less frequently and at shallower depths. An estimated storage volume for each property is shown in the above table based on a 1-foot depth, 20-foot width, and a length approximately 75% of the parcel frontage length. A cost based on square footage has also been estimated for each rain garden. We estimate the cost for individual rain gardens will range from $5,400 to $7,100. The cost for the expansion of the pond in subwatershed 23 is estimated to be $40,000 to $70,000.

The total cost to increase storage and infiltration is estimated to be $190,000 to $280,000.

If you have any questions or concerns, please feel free to contact me at 763-287-7182. Thank you.

Sincerely,

WSB & Associates, Inc.

Todd E. Hubmer, PE

City of Roseville
Walsh Lake Watershed
Drainage Analysis
Figure 1

N
W E
S

0 100 200 400 Feet

Legend

- Subwatersheds
- **Feasibility of Raingardens**
  - Excellent Location
  - Good Location
  - Fair Location
  - Limited Benefit
- **Storm Sewer**
  - Other Values
  - 12 inch
  - 18 inch
  - 30 inch
  - 15 inch
  - 21 inch
  - 22 inch
  - 24 inch
  - 27 inch
  - 33 inch
  - 36 inch
  - 42 inch

DT-1
5.90 ac.

DT-2
4.89 ac.

23
19.33 ac.

Potential Pond Expansion

18
2.60 ac.

21
1.20 ac.

24
4.72 ac.

84
7.34 ac.

17
2.50 ac.

37.70 ac.

30
1.48 ac.

Potential Rain Garden

7B
1.68 ac.

1
1.29 ac.

11
6.88 ac.

33
3.31 ac.

35
7.29 ac.

8
1.06 ac.

7
1.01 ac.

45
3.20 ac.

32
6.84 ac.

Existing 600 sq ft Rain Garden

28
6.64 ac.

53
3.79 ac.

66
2.75 ac.

61
2.89 ac.

44
3.92 ac.

69
5.01 ac.

74
5.49 ac.

31
2.78 ac.

105
0.65 ac.

48A
1.22 ac.

51
2.07 ac.

58
1.14 ac.

63
1.50 ac.

67
0.66 ac.

71
6.46 ac.

101
3.04 ac.

U of M GC
90.09 ac.

62
18.00 ac.

Unknown-1
3.63 ac.

ROSEWOOD LN N
ROSEWOOD LN S
ROSELAWN AVE W
ELDRIDGE AVE W
SKILLMAN AVE W
DRAPER AVE
LOREN RD
CLEVELAND AVE N
HYTHE ST
WESTWOOD CIR
ROSEDALE DR
MIDLAND HILLS RD
FULHAM ST
LAKE ST

Walsh Lake Watershed
Drainage Analysis
City of Roseville

Flooding Overflow Volumes					
Subwatershed		100 Year Event	10 Year Event	5 Year Event	2 Year Event
From	To	Volume (acre-ft)	Volume (acre-ft)	Volume (acre-ft)	Volume (acre-ft)
7	28	1.15	0.00	0.00	0.00
8	7	5.12	0.38	0.00	0.00
11	7	4.91	0.39	0.00	0.00
17	11	-0.08	0.00	0.00	0.00
18	11	3.07	0.19	0.00	0.00
21	18	2.90	0.49	0.01	0.00
24	21	1.16	0.24	0.03	0.00
30	24	0.71	0.10	0.00	0.00
33	30	0.86	0.24	0.03	0.00
35	33	0.68	0.24	0.10	0.00
44	8	5.55	1.05	0.16	0.00
45	44	0.50	0.20	0.10	0.00
51	48A	0.69	0.00	0.00	0.00
53	48A	1.03	0.12	0.00	0.00
58	51	1.26	0.00	0.00	0.00
61	51	0.88	0.23	0.00	0.00
62	58	1.28	0.07	0.00	0.00
63	58	0.00	0.00	0.00	0.00
66	63	0.44	0.10	0.01	0.00
71	69	0.26	0.00	0.00	0.00
74	71	0.23	0.01	0.00	0.00
48A	44	2.52	0.31	0.05	0.00
7B	7	0.18	0.03	0.00	0.00

Walsh Lake Watershed
Drainage Analysis
City of Roseville

Depth of Local Flooding
2 Year Storm Event

Subwatershed/Node	Total Runoff Volume (ac-ft)	Rim or Overflow Elev.	Highest Water Elev.	Depth of Flooding (ft)
1	0.10	933.97	927.36	N/A
4		939.80	928.82	N/A
7	0.03	935.20	932.62	N/A
8	0.04	937.90	933.55	N/A
11	0.24	937.40	933.81	N/A
17*	0.09	938.00	935.62	N/A
18	0.07	939.20	934.96	N/A
21	0.05	940.00	936.59	N/A
23*	0.61	941.50	938.90	N/A
24	0.18	945.00	939.63	N/A
28*	0.27	936.00	932.06	N/A
30	0.06	961.75	955.25	N/A
31	0.12	936.50	928.98	N/A
32*	0.30	936.00	929.56	N/A
33	0.13	963.14	958.65	N/A
35	0.28	965.50	963.57	N/A
44	0.14	937.90	935.52	N/A
45	0.13	936.99	936.08	N/A
51	0.08	953.50	947.57	N/A
53	0.14	951.40	949.15	N/A
58	0.04	965.80	958.92	N/A
61	0.10	964.50	962.14	N/A
62	0.40	965.00	961.86	N/A
63	0.06	973.00	968.15	N/A
66	0.10	971.61	969.06	N/A
67	0.07	980.00	975.19	N/A
69*	0.26	980.00	977.71	N/A
71	0.23	983.00	980.00	N/A
74	0.18	986.30	982.47	N/A
84*	0.24	963.00	961.78	N/A
101*	0.09	935.00	929.04	N/A
104		935.50	929.08	N/A
105	0.05	935.00	930.41	N/A
103A		936.75	928.93	N/A
2A		932.20	927.82	N/A
3A		931.97	928.42	N/A
48A	0.05	943.90	939.56	N/A
7B	0.05	936.60	932.49	N/A
DT-1	0.13	948.00	943.91	N/A
DT-2*	0.17	965.00	963.68	N/A
Unknown-1*	0.11	980.00	977.32	N/A
Walsh Lake	1.62	934.00	926.16	N/A

=Indicates a hydraulic intersection, not a subwatershed. Does not produce runoff.

* =Indicates a pond or basin

Walsh Lake Watershed
Drainage Analysis
City of Roseville

Depth of Local Flooding 5 Year Storm Event				
Subwatershed/Node	Total Runoff Volume (ac-ft)	Rim or Overflow Elev.	Highest Water Elev.	Depth of Flooding (ft)
1	0.21	933.97	928.35	N/A
4		939.80	931.27	N/A
7	0.09	935.20	934.59	N/A
8	0.11	937.90	936.86	N/A
11	0.66	937.40	936.29	N/A
17*	0.25	938.00	936.36	N/A
18	0.21	939.20	938.07	N/A
21	0.13	940.00	940.07	0.07
23*	1.74	941.50	939.72	N/A
24	0.48	945.00	945.10	0.10
28*	0.72	936.00	932.30	N/A
30	0.16	961.75	960.70	N/A
31	0.31	936.50	931.24	N/A
32*	0.78	936.00	930.06	N/A
33	0.35	963.14	963.27	0.13
35	0.76	965.50	965.68	0.18
44	0.37	937.90	938.17	0.27
45	0.34	936.99	938.18	1.19
51	0.21	953.50	950.73	N/A
53	0.38	951.40	951.39	N/A
58	0.11	965.80	964.13	N/A
61	0.28	964.50	964.58	0.08
62	1.22	965.00	964.77	N/A
63	0.17	973.00	971.37	N/A
66	0.27	971.61	971.67	0.06
67	0.13	980.00	975.63	N/A
69*	0.64	980.00	977.84	N/A
71	0.62	983.00	981.27	N/A
74	0.50	986.30	984.72	N/A
84*	0.14	963.00	962.01	N/A
101*	0.25	935.00	930.85	N/A
104		935.50	930.91	N/A
105	0.11	935.00	931.44	N/A
103A		936.75	931.28	N/A
2A		932.20	928.65	N/A
3A		931.97	929.29	N/A
48A	0.13	943.90	944.01	0.11
7B	0.14	936.60	934.70	N/A
DT-1	0.40	948.00	944.37	N/A
DT-2*	0.45	965.00	963.81	N/A
Unknown-1*	0.30	980.00	977.54	N/A
Walsh Lake	3.92	934.00	926.88	N/A

=Indicates a hydraulic intersection, not a subwatershed. Does not produce runoff.

* =Indicates a pond or basin

Walsh Lake Watershed
Drainage Analysis
City of Roseville

Depth of Local Flooding 10 Year Storm Event				
Subwatershed/Node	Total Runoff Volume (ac-ft)	Rim or Overflow Elev.	Highest Water Elev.	Depth of Flooding (ft)
1	0.26	933.97	929.03	N/A
4		939.80	932.63	N/A
7	0.12	935.20	937.24	2.04
8	0.15	937.90	938.26	0.36
11	0.91	937.40	937.76	0.36
17*	0.34	938.00	937.49	N/A
18	0.29	939.20	939.46	0.26
21	0.17	940.00	940.36	0.36
23*	2.44	941.50	940.35	N/A
24	0.66	945.00	945.32	0.32
28*	0.99	936.00	932.68	N/A
30	0.22	961.75	961.97	0.22
31	0.42	936.50	932.52	N/A
32*	1.06	936.00	930.47	N/A
33	0.48	963.14	963.45	0.31
35	1.04	965.50	965.75	0.25
44	0.51	937.90	938.46	0.56
45	0.46	936.99	938.47	1.48
51	0.29	953.50	951.62	N/A
53	0.52	951.40	951.59	0.19
58	0.15	965.80	965.22	N/A
61	0.39	964.50	964.72	0.22
62	1.75	965.00	966.11	1.11
63	0.23	973.00	971.81	N/A
66	0.38	971.61	971.76	0.15
67	0.17	980.00	976.80	N/A
69*	0.86	980.00	977.96	N/A
71	0.85	983.00	982.60	N/A
74	0.69	986.30	986.36	0.06
84*	0.92	963.00	962.30	N/A
101*	0.34	935.00	931.96	N/A
104		935.50	932.06	N/A
105	0.14	935.00	932.58	N/A
103A		936.75	932.57	N/A
2A		932.20	929.46	N/A
3A		931.97	930.30	N/A
48A	0.18	943.90	944.17	0.27
7B	0.20	936.60	937.24	0.64
DT-1	0.57	948.00	944.74	N/A
DT-2*	0.61	965.00	963.96	N/A
Unknown-1*	0.42	980.00	977.84	N/A
Walsh Lake	5.27	934.00	927.39	N/A

=Indicates a hydraulic intersection, not a subwatershed. Does not produce runoff.

* =Indicates a pond or basin

Walsh Lake Watershed
Drainage Analysis
City of Roseville

Depth of Local Flooding 100 Year Storm Event				
Subwatershed/Node	Total Runoff Volume (ac-ft)	Rim or Overflow Elev.	Highest Water Elev.	Depth of Flooding (ft)
1	0.43	933.97	929.82	N/A
4		939.80	934.07	N/A
7	0.23	935.20	939.54	4.34
8	0.27	937.90	939.60	1.70
11	1.68	937.40	939.57	2.17
17*	0.63	938.00	939.57	1.57
18	0.56	939.20	939.95	0.75
21	0.31	940.00	940.75	0.75
23*	4.71	941.50	941.43	N/A
24	1.21	945.00	945.67	0.67
28*	1.78	936.00	935.15	N/A
30	0.39	961.75	962.26	0.51
31	0.76	936.50	934.24	N/A
32*	1.90	936.00	931.63	N/A
33	0.87	963.14	963.67	0.53
35	1.90	965.50	965.93	0.42
44	0.95	937.90	939.66	1.76
45	0.84	936.99	939.66	2.67
51	0.54	953.50	953.99	0.49
53	0.96	951.40	951.80	0.40
58	0.28	965.80	966.37	0.57
61	0.72	964.50	964.84	0.34
62	3.46	965.00	966.55	1.55
63	0.41	973.00	973.01	0.01
66	0.69	971.61	971.89	0.28
67	0.26	980.00	978.00	N/A
69*	1.50	980.00	978.45	N/A
71	1.58	983.00	983.31	0.31
74	1.29	986.30	986.54	0.24
84*	1.72	963.00	963.03	0.03
101*	0.66	935.00	934.34	N/A
104		935.50	934.31	N/A
105	0.23	935.00	934.47	N/A
103A		936.75	934.22	N/A
2A		932.20	930.29	N/A
3A		931.97	931.23	N/A
48A	0.32	943.90	944.63	0.73
7B	0.38	936.60	939.54	2.94
DT-1	1.13	948.00	945.64	N/A
DT-2*	1.13	965.00	964.43	N/A
Unknown-1*	0.80	980.00	978.86	N/A
Walsh Lake	9.45	934.00	928.51	N/A

=Indicates a hydraulic intersection, not a subwatershed. Does not produce runoff.

* =Indicates a pond or basin