MARATHON PGM-Cu PROJECT
HYDROLOGY & WATER MANAGEMENT

MARATHON PGM CORPORATION
MARATHON, ONTARIO

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1.0 INTRODUCTION

Calder Engineering Ltd. (Calder) was retained by Marathon PGM Corporation (Marathon) to conduct a Baseline Hydrology and Water Balance Assessment associated with the Marathon PGM-Cu Project.

The main objectives of the study were: (i) to provide baseline information on drainage patterns, flow paths, and flow characteristics; (ii) to estimate hydrologic flow characteristics for areas which may be impacted by the project; (iii) to set-up and apply a mine water balance model to estimate water to be managed by the project and discharged to the environment; and (iv) to review effluent discharge scenarios.

2.0 SITE DESCRIPTION

The Marathon PGM-Cu project site is located approximately 10 km north of the Town of Marathon, Ontario (Figure 1). Marathon is situated adjacent to the Trans-Canada Highway No. 17 on the northeast shore of Lake Superior. The centre of project site is located at approximately 48°45' N latitude, 86°19' W longitude. The Town of Marathon is approximately 300 km east of Thunder Bay by highway and 400 km northwest of Sault Ste-Marie by highway. Primary industries supporting the Town of Marathon are pulp-and-paper and mining.

Local access to the property is by gravel from Highway 17, which lies just north of Marathon.

3.0 HYDROLOGY STUDY

The following sources of information were reviewed for climatic data:

- Climatic information available online at the Environmental Canada web site (http://www.climate.weatheroffice.gc.ca/)
- Water Survey of Canada streamflow (http://www.ec.gc.ca/rhc-wsc/)
- Hydrological Atlas of Canada
- Rainfall Frequency Atlas for Canada
- Flow Monitoring data and manual flow measurements from the project's baseline monitoring program.

3.1 Available Climatic Information

A summary of weather stations within a 35 kilometre radius of the project site is provided in Table 1. The locations are shown on Figure 1. Climate data is available for the weather stations at the Marathon (Station ID No. 6044959), Marathon Airport (Station ID No. 6044961), Pukaskwa Nat. Park (Station ID No. 6046770), and Hemlo Battle Mountain (Station ID No. 6043452). None of the climate stations are currently active.

TABLE 1
WEATHER STATIONS WITHIN 35 km OF THE MARATHON SITE

Station Name	Station ID	Years of Record	Distance from the Site (km)	Average Annual Precipitation (mm)
Marathon	6044959	1952 - 1983 (32 yrs.)	8 km (SW)	826.4
Marathon Airport	6044961	1989 - 1999 (11 yrs.)	4 km (SW)	847.9
Pukaskwa Nat. Park	6046770	1984 - 2004 (21 yrs.)	15 km (S)	737.3
Hemlo Battle Mountain	6043452	1986 – 2001 (16 yrs.)	30 km (E)	766.1

Note:
1. Units: km – kilometre, mm - millimetre.

FIGURE 1 - Marathon PGM-Cu Mining Project

The most proximate station to the project site is at Marathon Airport (Station ID No. 6044961) which is located about 4 km southwest of the site. Based on the information presented in Table 1, the average annual precipitation at the two closest stations (i.e., Marathon and Marathon Airport), are comparable. Since the Marathon station (Station ID No. 6044959) has the highest historical record of precipitation (32 years), therefore, it characterizes the annual precipitation variability better than other weather stations. Due to these factors, the Marathon station could be considered representative for the Marathon PGM Project study area. The data available for the climate stations includes wind speed and direction, air temperature and relative humidity, solar radiation, rain or snow water equivalent (SWE) precipitation (depending on the season), and barometric pressure.

Based on the climate normals for the Marathon weather station, the mean annual precipitation in the area is 826.4 millimetres (mm), which vary from a mean monthly low in February of 49.9 mm to a mean monthly high in September of 90.7 mm. Snowfall in the region has historically occurred as early as September, however, significant snow pack accumulation typically does not result until late November when mean daily temperatures are below freezing. Mean annual snowfall is approximately 238.2 centimetres (cm), representing approximately 29% of the annual precipitation. In the spring, the snowmelt tends to begin by mid-March with the majority of the accumulated snow pack depleting between April 1st and May 1st.

Mean daily temperatures vary from a low of -13.9^{o} Celsius in January to a high of 14.6^{o} Celsius in August. Since the pan evaporation data was not available near the Marathon project site, the estimates of annual evaporation and evapotranspiration were obtained from maps within the Hydrological Atlas of Canada, and average monthly potential and actual evapotranspiration for the period 1959-1981 were obtained from Environment Canada. Highest evapotranspiration were recorded as 104.1 mm and 100.8 mm in July and August months respectively. Mean annual evapotranspiration in the Marathon area was reported as 488.2 mm, by Environment Canada.

3.2 General Drainage Patterns

Most of the surface water from the project area drains either to the Pic River (to the east) or to Lake Superior (to the west). The Pic River forms the eastern boundary of the Marathon property. It is a large, low- to medium-gradient river, approximately 20 - 30 m wide. Water in the Pic River is highly turbid and carries a significant suspended sediment load. The Marathon project site has numerous small tributaries, lakes, and ponds. General drainage pattern in the study area are shown in Figure 2. The Figure is based on 5-metre contour interval data based on existing ALOS stereo coverage acquired on September 2nd, 2009. The data was obtained through True Grit Consulting Ltd. (TGCL), across the 17,500 ha study area. Further detailed information on topography is provided in Figure 2.

3.3 Runoff

Regional flow data are available from the four Water Survey of Canada (WSC) flow gauges located close to the project site. The locations of the flow gauges are illustrated in Figure 1, and the regional monthly flow summary for each station is provided in Table 2.

TABLE 2
REGIONAL MONTHLY FLOW SUMMARY

Month	Little Pic River near Coldwell			Pic River near Marathon			Black River near Marathon			Cedar Creek near Hemlo		
	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.
Jan.	4.99	8.19	2.14	14.6	23.7	4.64	7.47	13.4	2.75	0.83	2.27	0.33
Feb.	3.88	6.04	2.01	10.6	16.4	4.49	5.19	9.66	1.85	0.54	1.04	0.23
Mar.	4.23	18.4	2.18	11	51	4.33	6.08	17	1.35	0.55	1.81	0.32
Apr.	31.1	73.2	7.49	95.9	215	19.2	55.1	118	12.8	4.38	11.2	1.11
May	45.7	91.9	12.1	158	277	37.4	83.9	180	21.9	7.07	15.7	1.93
Jun.	21.6	61.4	7.05	73.4	175	15.1	33.9	80.4	11.5	2.49	5.71	0.79
Jul.	14	57.4	3.86	49.1	145	12.0	21.6	55.4	5.01	1.89	7.63	0.33
Aug.	9.19	33.3	2.73	32.5	110	5.07	14.7	40.4	1.14	1.00	2.93	0.08
Sep.	11.3	55.9	2.29	35.3	162	5.19	16.8	63.1	0.29	1.17	4.04	0.04

Oct.	18.8	44.4	1.85	61.6	167	6.62	29.5	78.1	1.23	2.94	6.30	0.15
Nov.	16.9	35.8	2.54	52.5	118	5.78	28.9	61.1	5.12	3.13	14.5	0.58
Dec.	8.17	20.2	2.41	28.3	92.1	5.06	14.5	30	4.09	1.65	4.20	0.40
Year	15.9	22.5	8.84	52.1	78.9	26.2	26.6	41.6	17.9	2.30	3.97	1.10

Note:
1. All flows are reported in cubic metre per second (cms).
2. Flow for Little Pic River near Coldwell from Water Survey of Canada (WSC) data at Station 02BA003 (Latitude 48°50'56" N, Longitude 86°36'25" W) are representative of flow records from 1972-2009. The drainage area to Station 02BA003 is 1,320 square kilometres.
3. Flows for Pic River near Marathon from WSC data at Station 02BB003 (Latitude 48°46'26" N, Longitude 86°17'47" W) are representative of flow records from 1970-2009. The drainage area to Station 02BB003 is 4,270 square kilometres.
4. Flows for Black River near Marathon from WSC data at Station 02BB002 (Latitude 48°41'20" N, Longitude 86°12'45" W) are representative of flow records from 1967-1990. The drainage area to Station 02BB002 is 1,980 square kilometres.
5. Flows for Cedar Creek near Hemlo from WSC data at Station 02BB004 (Latitude 48°42'22" N, Longitude 85°54'33" W) are representative of flow records from 1984-2009. The drainage area to Station 02BB004 is 201 square kilometres.

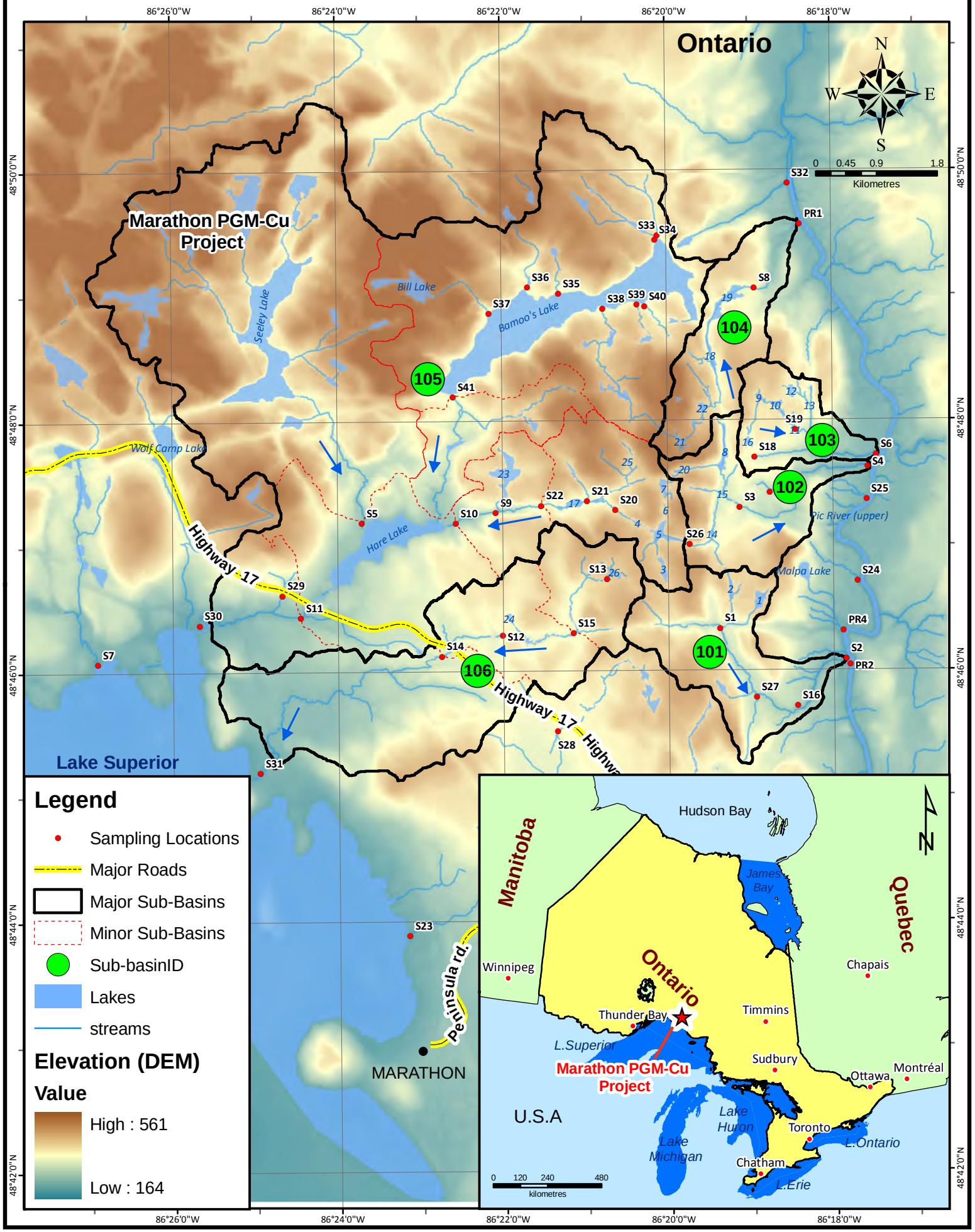
Peak flows typically occur in May and are due to either snowmelt or a combination of snowmelt and rainfall. Annual low flows can either occur in late winter (i.e., February and March) or in September and October.

3.4 Stream Flow Monitoring Data

An extensive stream flow monitoring network, comprising 41 individual stream monitoring stations, was established within the project area in 2007 (by True Grit Consulting Ltd., TGCL). Manual flow measurements were made at all the 41 stations (Appendix A). In 2008-2009, the water level data was collected at 6 stream monitoring locations (i.e., S10 (2009), S11 (2009), S14 (2009), S15 (2008), S22 (2008), and S41 (2009)). The water level data was collected during a relatively dry period from April to November. Calder Engineering Ltd. established Rating Curves for the 6 stations using manual flow measurements (completed by TGCL), and are provided in Appendix B. These Rating Curves were used for the conversion of water level data to mean monthly flows.

The location of all the 41 stream monitoring stations is shown in Figure 2. Summarized in Table 3 - 8 are monthly minimum, maximum, and mean flows for the 6 stream sampling locations (Appendix B).

FIGURE 2 - Marathon PGM-Cu Project - Drainage Patterns & Sub-Basins



3.5 Relationship between Drainage Area & Mean Monthly Flow Rate

The surface water drainage areas were delineating using the Digital Elevation Model (DEM), derived from the available contour and base map information. The drainage areas were computed corresponding to each stream flow monitoring location (i.e., S10, S11, S14, S15, S22, and S41) as provided in Table 3 - 8, and also according to surface water drainage patterns (i.e., Sub-Basins 101, 102, 103, 104, 105, and 106), as discussed in the next section. The delineated areas do not account for mine facilities.

The drainage areas for Marathon project site range from 2.11 square kilometre (km^2) for Sub-Basin 103 to 48.33 km^2 for Sub-Basin 105 (refer Section 3.2 for details). The Water Survey of Canada (WSC) stations, except Cedar Creek at Hemlo (Station ID No. 02BB004) drain larger areas, ranging from 1320 km^2 area at Little Pic River near Coldwell (Station ID No. 02BA003) to 4270 km^2 at Pic River near Marathon (Station ID No. 02BB003). In order to derive site representative Area-Flow relationships, flow data from 6 stream flow monitoring stations and Cedar Creek at Hemlo were used in the analysis. Flow data from Cedar Creek at Hemlo was only used if the stream monitoring flow information was not enough to derive the equations. The monitoring stations with more than 15 days of monthly data were used in the analysis. The derived relationships and graphs are provided in Table 9 and Appendix B. Table 9 summarizes the equations between mean monthly flow rates and drainage areas for respective months (May to November).

TABLE 9

RELATIONSHIP BETWEEN MEAN MONTHLY FLOW RATE & DRAINAGE AREA

Month[2]	Relationship between Q (m^3/day) and A (ha)	R-squared
May	$Q = (29.2913 \times A) + 30229.8265$	0.99
Jun.	$Q = (0.00033 \times A^2) + (3.8382 \times A) + 4636.7269$	1.00
Jul.	$Q = (15.4564 \times A) - 1657.1560$	0.99
Aug.	$Q = (31.7139 \times A) - 4231.2673$	0.99
Sep.	$Q = (10.6304 \times A) + 668.8742$	0.98
Oct.	$Q = (0.0007 \times A^2) - (0.7236 \times A) + 4632.5024$	1.00

Nov.	Q = (13.2197 x A) + 4693.1310	1.00

Note:
1. Q = Mean flow rate in cubic metre per day, and A = total drainage area in hectare, R-squared – Coefficient of determination.
2. The flow rate and area relationship for May month is based on flow data from S10, S11, and Cedar Creek at Hemlo ('Cedar Creek') stations; June is based on flow data from S10, S11, S14, and Cedar Creek; July is based on S10, S11, S14, S15, and S22; August is based on S10, S11, S14, S15, S22, and S41; September is based on S10, S11, S14, S15, S22, and S41; October is based on S10, S11, S14, S15, S22, S41, and Cedar Creek; and November is based on flow data from S15, S22, and Cedar Creek stations.

A good correlation of determination (R-squared) was obtained between flow rate (Q, in cubic metre per day) and drainage area (A, in hectare) for May to November months, ranging from a minimum R-square of 0.98 in September to a maximum value of 1.00 in June, October, and November. Using the above relationships, mean monthly flow rates were determined for each sub-basin in the Marathon PGM-Cu Project site, and are summarized in Table 11 and Section 3.6.

3.6 Surface Water Drainage Areas

The surface water drainage patterns in the vicinity of the Marathon Project site are shown in Figure 2. Six streams were identified to be impacted by the Marathon project. Stream 1 to 4 flows east and eventually drain into the Pic River. Stream 5 flows west into Hare Lake, and eventually into Lake Superior. Stream 6 flows southwest, crossing Highway 17 and discharges into Lake Superior at Sturdee Cove, approximately 4 km from the Marathon property.

Based on the surface water drainage patterns, the project area is divided into 6 major sub-basins (i.e., Sub-Basin 101, 102, 103, 104, 105 and 106). Sub-Basins 105 and 106 are further divided into 6 and 3 minor basins respectively, corresponding to respective stream monitoring locations. Summarized in Table 10 and in this section are characteristics of respective sub-basins.

TABLE 10
SUMMARY OF SUB-BASIN CHARACTERISTICS

Sub-Basin No.	Drainage Area (ha)	Drainage Area (km^2)	Lakes/ Major water bodies	Drainage Path/ Outlet
101	435.41	4.35	Lakes 1, 2	Pic River
102	346.52	3.47	Lakes 8, 14, 15, 20	Pic River
103	210.93	2.11	Lakes 9, 10, 11, 12, 13, 16	Pic River
104	339.21	3.39	Lakes 18, 19, 21, 22	Pic River
105[2]	4833.34	48.33	Lakes 3, 4, 5, 6, 7, 17, 23, 25, Bamoos Lake, Hare Lake, Seeley Lake, Bill Lake, and Hare Creek	Lake Superior at Port Munroe
106[3]	1098.49	10.98	Lakes 24 and 26	Lake Superior at Sturdee Cove

Note:
1. Refer to Figure 2 for sub-basin and Lake/water-bodies locations.
2. Sub-Basin 105 is divided into 6 minor basins at node locations; S5 (1808 ha), S5a (1671 ha), S10 (563 ha), S11 (4598 ha), S22 (352 ha), and S41 (1419 ha).
3. Sub-Basin 106 is divided into 3 minor basins at stream monitoring location: S12 (377 ha), S14 (489 ha), and S15 (205 ha).

Sub-Basin 101

The Sub-Basin 101 is situated immediately south of the Satellite Pit 2, and comprises approximately 435 hectares. It includes Stream 1 and Lakes 1 and 2, both of which are headwater lakes. Stream 1 flows in a southeast direction and empties into the Pic River at 551619.748 E, 5401907.181 N (at node S2).

Stream flow was measured at four monitoring locations (i.e., S1, S2, S16, and S27) in 2008-2009. S1 and S16 represent the upstream flow locations, and S2 is situated on the intersection of Stream 1 and Pic River. No flow measurement was made at S27 in 2008-2009. The flow measurements made at monitoring locations S1, S2 and S16 are provided in Appendix A. A total of 13 flow measurements were made in 2008-2009 at culvert location S2, and minimum discharge was recorded to be 0.0004 m^3/s on July 29th, 2008 and maximum to be 0.1299 m^3/s on November 3rd,

2009. Mean monthly flows in the sub-basin were estimated using the relationships from Table 9, and are summarized in Table 11. The mean flows ranged from a minimum of 2,826 m^3 per day in October to a maximum of 11,377 m^3 per day in November.

As part of the revised South PSMF (Process Solid Management Facility) option and Option 3 PSMF scenarios, a temporary process water pond would be created to the east of the process solids impoundment in the Stream 1 watershed (i.e., Sub-basin 101) during the later years of mine life. As documented in 'July 2010 Addendum to the Project Description' (Marathon PGM Corp., 2010), major changes in sub-basin 101 would include construction of process water pond, two impervious dams, and discharge channelsafter year 6 of mill operations. At mine closure the temporary process water pond will be decommissioned and dams will be removed or breached to restore the natural drainage patterns (Marathon PGM Corp., 2010).

TABLE 11

SUMMARY OF MEAN MONTHLY FLOW RATE FOR MAJOR SUB-BASINS

Sub-Basins	Node	Drainage Area (ha)	Mean Monthly Flow (m^3/day)						
			May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.
101	@ S2	435.41	42,984	6,370	5,073	9,577	5,297	4,450	10,449
102	@ S4	346.52	40,380	6,006	3,699	6,758	4,353	4,466	9,274
103	@ S6	210.93	36,408	5,461	1,603	2,458	2,911	4,511	7,482
104	@ outlet	339.21	40,166	5,977	3,586	6,526	4,275	4,468	9,177
105	@ S30	4833.34	171,805	30,897	73,049	149,053	52,049	17,488	68,588
	@ S5	1808.19	83,194	12,656	26,291	53,113	19,891	5,613	28,597
	@ S5a	1670.62	79,164	11,970	24,165	48,751	18,428	5,377	26,778
	@ S10	562.79	46,715	6,901	7,042	13,617	6,652	4,447	12,133
	@ S11	4598.15	164,916	29,263	69,414	141,594	49,549	16,105	65,479
	@ S22	352.13	40,544	6,029	3,786	6,936	4,412	4,464	9,348
	@ S41	1419.01	71,794	10,748	20,276	40,771	15,754	5,015	23,452
106	@ S31	1098.49	62,406	9,251	15,322	30,606	12,346	4,682	19,215
	@ S12	377.15	41,277	6,131	4,172	7,730	4,678	4,459	9,679
	@ S14	488.85	44,549	6,592	5,899	11,272	5,866	4,446	11,156
	@ S15	204.81	36,229	5,437	1,508	2,264	2,846	4,514	7,401

Note:
1. Units: m^3/day – cubic metre per day, ha – hectare.
2. Refer to Figure 2 for sub-basin and node locations.
3. Flow is based on the relationships developed between mean monthly flow rate and drainage area, as presented in Table 9.

Sub-Basin 102

The Sub-Basin 102 drains the proposed Open pit, satellite pits, and proposed tailings management areas, and comprises approximately 347 hectares. The stream 2 flows in an eastern direction, emptying into the Pic River approximately 2 km upstream of the mouth of Stream 1. Stream 2 empties into the Pic River at 551964.616 E, 5404755.763 N (at node S4). Major lakes and ponds in the sub-basin include, Lakes 8, 14, 15, and 20. There are two small ponds located directly west of and connected to Lake 15. There is also a small pond located directly north of and draining into Lake 8, which is also located in the proposed tailings management area.

Stream flow was measured at four monitoring locations (i.e., S3, S4, S17, and S26) in 2008-2009 as part of Stream 2 discharge measurement. No flow measurement was calculated at location S26 in 2008-2009. S4 represents the downstream flow location, at intersection of Stream 2 and Pic River. The flow measurements calculated at monitoring locations S3, S4 and S17 are provided in Appendix A. A total of 9 flow measurements were made in 2008-2009 at downstream location S4, and minimum discharge was recorded to be 0.0002 m^3/s on August 25th, 2008 and maximum to be 0.1554 m^3/s on May 5th, 2009. Mean monthly flows in the sub-basin were estimated using the relationships from Table 9, and are summarized in Table 11. The mean monthly flows ranged from a minimum of 2,574 m^3 per day in October to a maximum of 8,168 m^3 per day in November.

Sub-Basin 103

The Sub-Basin 103 drains the proposed Open pit, and East mine rock stockpile areas, and comprises approximately 211 hectares. The stream 3 flows in an eastern direction and empties into the Pic River approximately 150 m upstream of the mouth of Stream 2 at 552074.788 E, 5404966.443 N (at node S6). The sub-basin 103 comprises of Stream 3 and Lakes 9, 10, 11, 12, 13, and 16. All these water bodies, including stream reach and lakes will be impacted by excavation and operations of the proposed pit area.

Stream flow was measured at three monitoring locations (i.e., S6, S18, and S19) in 2008-2009. S6 represents the downstream stream flow location, at intersection of Stream 3 and Pic River. The flow measurements calculated at monitoring locations S6, S18, and S19 are provided in Appendix A. Due to series of beaver dams in the upstream locations of the Stream 3, the flows were relatively low. Eight flow measurements were made in 2008-2009 at downstream location S6, and minimum discharge was recorded to be 0.0045 m^3/s on July 14th, 2009 and maximum to be 0.0824 m^3/s on May 5th, 2009. Mean monthly flows in the sub-basin were estimated using the relationships from Table 9, and are summarized in Table 11. The mean monthly flows ranged from a minimum of 1,601 m^3 per day in July to a maximum of 4,993 m^3 per day in June.

Sub-Basin 104

The Sub-Basin 104 is a potential receiver for surface and ground water from the proposed pit area, and comprises approximately 339 hectares. The Stream 4 flows northeast and empties into the Pic River approximately 4 km upstream of the mouth of Stream 3 (at 550877.486 E, 5408429.376 E). The sub-basin 104 includes Stream 4 and Lakes 18, 19, 21 and 22. The sub-basin will be impacted by flows from proposed Primary Open pit and proposed East mine stockpile areas.

The stream flow measurements in Sub-Basin 104 are made at stream sampling location S8, Lake sampling location L19, and Pic river sampling location PR 1. The downstream flow location S8 is located immediately below Lake 19. Twelve discharge measurements were completed at the downstream location S8 in 2008-2009 (Appendix A). Minimum discharge was recorded to be 0.0014 m^3/s on July 15th, 2009 and maximum to be 0.1278 m^3/s on May 4th, 2009. Mean monthly flows in the sub-basin 104 were estimated using the relationships from Table 9, and are summarized in Table 11. The mean monthly flows ranged from a minimum of 2,553 m^3 per day in October to a maximum of 6,523 m^3 per day in August.

Sub-Basin 105 and Hare Creek

Sub-Basin 105 drains a total area of approximately 4833 hectares, including Stream 5, Bamoos Lake, Seeley Lake, Bill Lake, Hare Lake and Hare Creek, and smaller Lakes, such as; Lake 3, 4, 5, 6, 7, 17, 23, and 25. The Sub-Basin 105 is divided into 6 smaller basins, corresponding to nodes S5, S5a, S10, S11, S22, and S41. All the lakes, Stream 5, and major/minor sub-basins are shown in Figure 2. The Stream 5 flows southwest towards Hare Lake, and empties into Lake Superior at Port Munroe (or at node S30).

As part of North Process Solids Management Option, Bamoos Lake has been considered as a process solids storage option, which was later withdrawn from further consideration in July 2010 (Marathon PGM Corp., 2010). The flow measurements on Stream 5 are made at a number of monitoring locations, including S5, S8, S10, S11, S20, S21, S22, S29, S30, S33, S34, S35, S36, S37, S38, S39, S40, and S41. The flow from Seeley Lake meets Hare Lake at Stream monitoring location S5. Locations S11, and S41 are located immediately downstream of Hare Lake and Bamoos Lake respectively. The discharge measurements at different stream monitoring locations for the year 2008 and 2009 are provided in Appendix A. Eight discharge measurements were made in 2008-2009 at the downstream location S30 on Stream 5, with a minimum value of 0.0188 m^3/s on September 25th, 2008 and maximum of 0.3893 m^3/s on October 20th, 2008. Mean monthly flows in the Sub-Basin 105 were estimated using the relationships from Table 9, and are summarized in Table 11. The mean monthly flows in Stream 5 ranged from a minimum of 15,268 m^3 per day in October to a maximum of 213,984 m^3 per day in May.

Sub-Basin 106

Stream 6 flows south and discharges into Lake Superior at Sturdee Cove (at node S31). Sub-Basin 106 drains a total area of approximately 1098 hectares, including Stream 6 and Lakes 24 and 26. It can be divided into 3 minor basins at stream flow monitoring locations S12, S15, and S14, with corresponding drainage areas; 377, 205, and 489 hectares respectively. As documented in ‘July 2010 Addendum to the

Project Description' (Marathon PGM Corp., 2010), the flow in Stream 6 will be affected due to discharge from the mine project site, and process solid impoundments under South PSMF option and Option 3 PSMF will be stored in the Sub-basin 106The stream flow was measured at 5 monitoring location (i.e., S12, S13, S14, S15, and S31) in the Sub-Basin 106. No discharge measurement was made at the downstream location S31 (at 542939 E, 5400193 N) in 2008-2009. Thirteen discharge measurements were completed at the downstream location S14 in 2008-2009 (Appendix A). Minimum discharge was recorded to be 0.0043 m^3/s on November 21st, 2008 and maximum flow to be 0.2762 m^3/s on May 5th, 2009. Mean monthly flows in the sub-basin 106 were estimated using the flow and drainage area relationships from Table 9, and are summarized in Table 11. The mean monthly flows ranged from a minimum of 4,702 m^3 per day in October to a maximum of 40,448 m^3 per day in May. The flows in Stream 6 will be affected by the water released from the high sulphur process solid facility and water transferred from the temporary process water pond.

3.7 Receiving Water Flow Characteristics

A hydrological assessment was undertaken to estimate typical flow characteristics (i.e., mean monthly and low flows) for the main watercourses which could potentially receive drainage from waste stockpile(s) associated with the proposed pit areas. This included the following:

- *Lake Superior (Sub-basins 105 and 106);*
- *Pic River (Sub-basins 101, 102, 103 and 104).*

3.7.1 Lake Superior

The flows from Sub-basins 105 (corresponding to Stream 5 and Hare Creek) and sub-basin 106 (corresponding to Stream 6) drain into Lake Superior at Port Munroe and Sturdee Cove respectively. The flow characteristics of both streams, along with sub-basin flow patterns are discussed in Section 3.6).

3.7.2 Pic River

The Pic River forms the eastern boundary of the Marathon mine property. The Sub-basins 101, 102, 103 and 104 flows into the Pic River directly. It is a large, low- to medium-gradient river, approximately 20-30 m wide as it traverses the property. The water of the Pic River is extremely turbid and carries a significant suspended clay and silt. Extensive erosion of steep banks is taking place along much of the shoreline.

Pic River has a drainage area of approximately 4,270 square kilometres. The flow and level data are recorded by Water Survey of Canada (WSC) at Pic River near Marathon (Station ID No. 02BB003), and are available from 1970-2009. The discharge in Pic River is also monitored at four sampling locations (i.e., PR1, PR2, PR3, and PR4), as part of project's baseline monitoring program. The location of these sampling locations is shown on Figure 2.

Estimated Mean Monthly Flows

The mean monthly flow for the Pic River varies from 10.6 cubic metres per second (m^3/sec) to 158.0 m^3/sec. The mean annual flow is 52.1 m^3/sec. Peak flows typically occur in May and are due to either snowmelt or a combination of snowmelt and rainfall. As shown in Table 2, mean monthly flow varied from a low 4.33 cubic metres per second (m^3/sec) in March to a high of 277 m^3/sec in May.

Estimated Low Flows

Low flow conditions in the Pic River were determined by both review of available streamflow data for the Pic River *(i.e., Pic River near Marathon)* and use of regional low flow relationships. Low flows for the Pic River and regional low flow relationships have been reported by Cumming Cockburn Limited (1990). Based on this information, estimated return period low flows are summarized in Table 11. These represent 7 day duration low flows for 2 year (7Q2), 10 year (7Q10), and 20 year (7Q20) return periods.

TABLE 11
ESTIMATED LOW FLOWS FOR THE PIC RIVER

Return Period	Duration (days)	Pic River near Marathon (m^3/s)
2	7	7.12
2	30	7.73
10	7	4.90
10	30	5.14
20	7	4.52
20	30	4.67

Note:
1. Units: m^3/s – cubic metres per second (cms)..
2. Low flows for Pic River near Marathon based on data for station 02BB003 from Cumming Cockburn Limited (1995) report, "Regionalization of Low Flow Characteristics for North-eastern and North-western Ontario".

Review of Water Survey of Canada data indicates that annual low flows typically occur in the winter during the months of February and March but can also occur in the summer during the months of September and October.

4.0 MINE WATER BALANCE

4.1 Mine Characteristics

The mine water balance was prepared using information and data available from the following documents:

- Technical Report on the updated Feasibility Study for the Marathon PGM-Cu Project (prepared by Micon International Limited, January 2010);
- July Addendum to the Project Description (prepared by Ecometrix Incorporated and True Grit Consulting Ltd., July 2010);
- Tailings Feasibility Study (prepared by AMEC Earth and Environmental, December 2009).
- Groundwater Seepage Inflows provided by True Grit Consulting Ltd. (November, 2010)

The mine water balance assessment presented in this report represents the mine conditions at and after the end of year 6. This was undertaken as it represents the period whereby mine site development is advanced and water management facility substantially completed and operational. The following assumptions were used:

- Life of mine is 11.5 years.
- Tonnage milled = 22,000 dry tonnes/day
- Void ratio is 1.1.
- Process solids to ore ratio = 0.986.
- Dry density of deposited process solids = 1.48 t/m^3.
- Total volume of process solids = 60.73 Mm^3.
- Tails percent solids = 30%
- Groundwater Seepage Inflows= 389 US gal/min Reclaim = 100%
- Specific Gravity of tailings (process solids) = 3.1
- In-Place tailings porosity = 0.52377
- Tailings ~ 25% pond
- Waste Rock Area = 365.5 ha (e.g., West & East Mine Rock Stockpiles)
- Mean Climate Conditions

The other main assumption made was that there would be no change in net storage on a year to year basis in the site water management facilities. This assumption was made to estimate the net amount of water to be annually managed and discharged to the environment. Ultimately, the estimations made would be revised at the next stage to reflect further detailed process flow sheet and design information.

4.2 Process Solids Management Options

Three process solids storage options were reviewed for siting of 61 million tonne process solids (Marathon PGM Corp., 2010). The selection of process solids locations was based on basic design elements and criteria, preliminary analysis of potential sites, water assessments, evaluation of typical sections of dykes and dams, fill plans, material borrow areas and capital costs estimates (Micon, 2010). These were as follows:

- ***Option 1*** - Sub-aqueous storage of process solids in Bamoos Lake ('North PSMF Option');
- ***Option 2*** - Land-based separated low and high sulphur PSMF area with excess treated water discharge to the environment through the operational/emergency spillway of the high sulphur PSMA into Stream 6 ('South PSMF Option');
- ***Option 3*** – Multi-cell arrangement of low and high sulphur process solids with excess treated water discharge to the environment through the operational/emergency spillway of the high sulphur PSMA into Stream 6 ('Option 3 PSMF').

At this stage, it has been assumed that options 1 would not be feasible and the more viable options would be 2, and 3. According to the July addendum of Marathon PGM-Cu Mine project description, Marathon PGM Corp. withdrew the North Option after consultation with First Nations and stakeholders from further consideration (Marathon PGM Corp., 2010).

The other 2 viable options are shown in Figures 3(i) and 3(ii) respectively. An approximate foot-print has been provided for each option to identify potentially

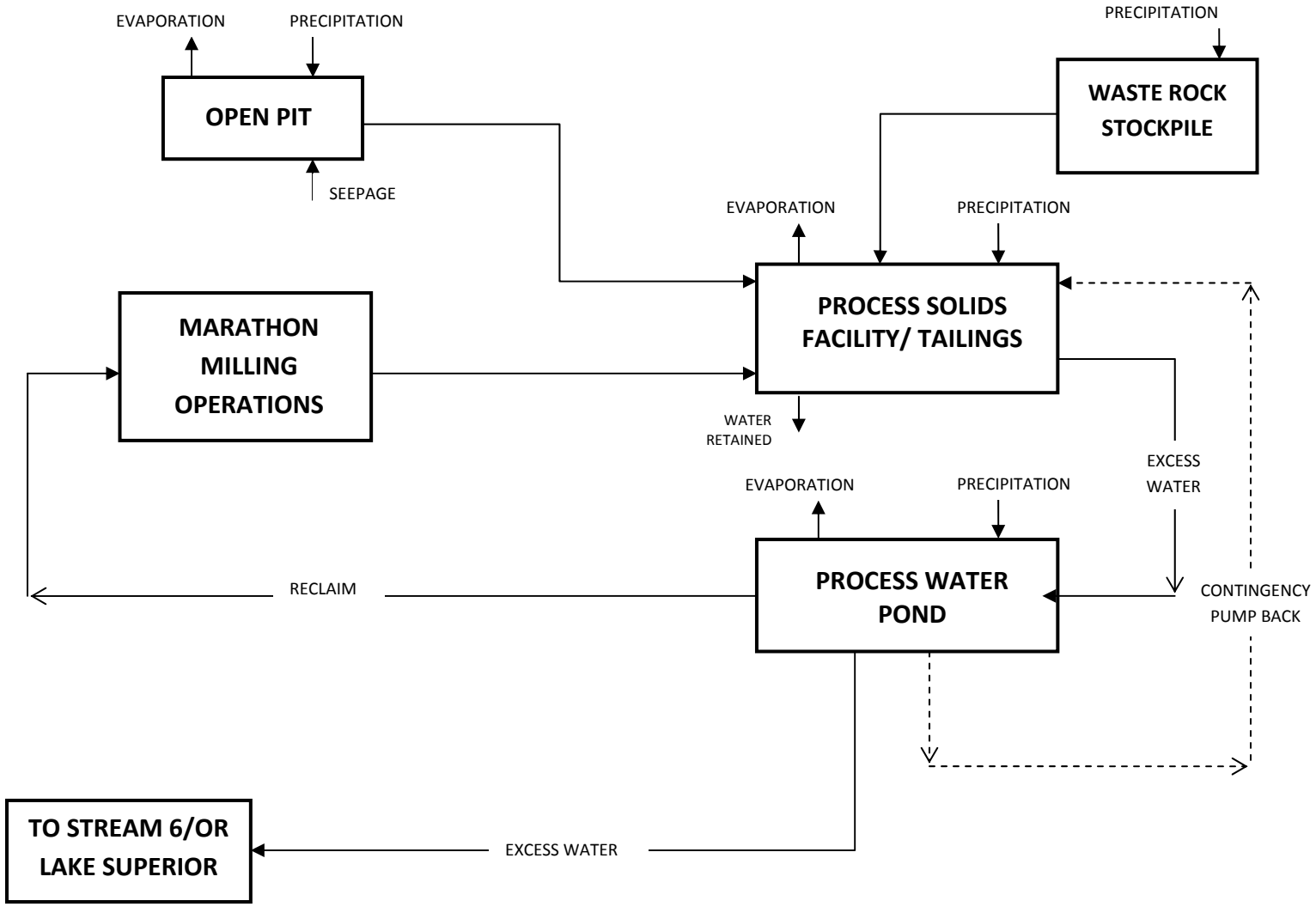


Figure 4. Marathon PGM-Cu Mine water management flowchart

impacted sub-basins. The foot-prints shown in Figures 3(i) and 3(ii) are prepared using information available from above mentioned documents and reports..

The review of 2 options from the water balancing and assessment point of view is provided in this section, along with operational water balance for each option.

Option 2 (South PSMF Option)

As documented in 'July 2010 Addendum to the Project Description' (Marathon PGM Corp., 2010), the low- and high-sulphur materials will be segregated via flotation and stored in respective storage areas. The low-sulphur process solid management facility (PSMF) will comprise a 145 ha area immediately west of the open pit, in the sub-basin 105. This area will be designed to hold approximately 54.7 Mm^3 process solids material. The high-sulphur storage area will be created to the southwest of the open pit, in the sub-basin 106. The area will have an approximate foot-print of 59.1 ha and a storage capacity of approximately 6.1 Mm^3. Due to acid generating characteristic of high-sulphur process solids, they will be stored under a 3-metre permanent water cover. A series of impervious dams will be created around these storage areas for containment of this material.

During the first 6 years of mill operation the process water will be stored and reclaimed from the high-sulphur PSMF. It is projected that by end of year 6 of mill operations, the storage capacity of high sulphur cell will shrink and alternate options will be required. At this time a temporary process water pond will be created in Sub-basin 101 by taking advantage of the natural topography of the area. The process water storage pond would hold approximately 6 Mm^3 of water, sufficient for the mill process purposes (Marathon PGM Corp., 2010).

From operational water balance point of view, the excess water from the low-sulphur storage area will drain to the southeast through a primary sedimentation pond to a process water pond after year 6 of mill operations. The process water pond will serve the needs of the milling operation with any excess water flowing to the west to the high-sulphur storage area. Subject to water quality considerations,

the receiving water body for any discharges to the environment would be the Stream 6 in sub-basin 106 and finally into Lake Superior at Sturdee Cove.

For the South PSMF option, the foot-print of mine operations would be approximately 1,562 ha (Table 12). Approximately 779 ha natural ground area would be influenced by the South PSMF foot-print. About 201 ha, 57 ha, 157 ha, and 366 ha would be characterized under tailings, pond, open pit and waste rock respectively under this option. This discretization of contributing areas is approximate to the accuracy of available information in the above mentioned documents, and represents the mine condition after year 6 of mill operations. Annual surface runoff from individual units is summarized in Table 12.

TABLE 12
SUMMARY OF ANNUAL SURFACE RUNOFF FOR SOUTH PSMF OPTION

Contributing Units	Contributing Area (ha)	Annual Surface Runoff (m^3)
Natural Ground	778.9	3,561,660
Tailings	204.1	1,437,067
Pond Area	57.2	472,800
Open Pit	156.5	1,293,614[2]
Waste Rock	365.5	2,011,642
Total Runoff	**1,562.2**	**8,776,783**

Note:
1. Units: ha – hectare, m^3 – cubic metres.

Flow in Open Pit represents only the surface runoff, and does not include groundwater seepage. The net annual runoff from the various contributing areas is computed to be approximately 8.8 Mm^3. The monthly runoff assessment is provided in the Appendix C. On an annual basis, the surface runoff from these contributing units would be collected in the high-sulphur PSMF for the first 6 years and into the process water pond after year 6 of mill operations. The annual inflows and losses from different mine components are summarized in Table 13.

FIGURE 3 (i) - Marathon PGM-Cu Project - South PSMF Option

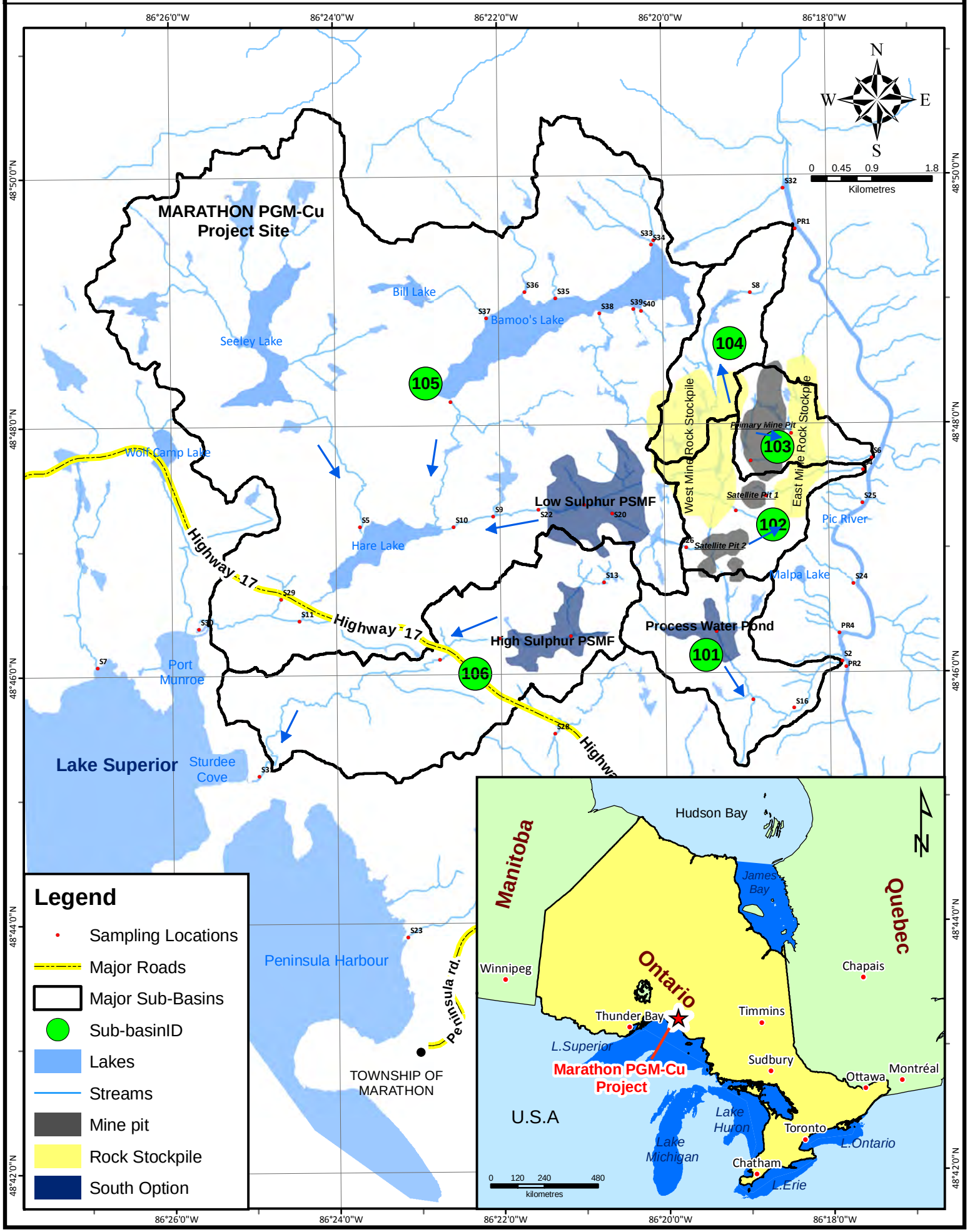


TABLE 13
ANNUAL INFLOWS AND LOSSES FOR SOUTH PSMF OPTION

Components	Annual Totals (m^3)
Inflows	
Tailings Water	18,788,000
Seepage Input	775,654
Runoff	8,776,783
Losses	
Retained Water	2,849,592
Net Evaporation[2]	555,223
Reclaim	18,788,000
Net Inflow	***6,147,622***

Note:
1. m^3 – cubic metres.
2. For computation of Net Evaporation, 100% of pond/lake area and 25% of tailings area were assumed.

The tailings water was computed to be approximately 18.8 Mm^3 based on an average rate of 22,000 dry tonnes/day of tonnage and 30% solids. The potential groundwater seepage into the open pit was assumed to be approximately 389 US gal/min, or 0.78 Mm^3 annually. Major losses from the site are assumed to be due to water retained in the pore spaces of tailings (~2.8 Mm^3), evaporation from the pond and lakes (~0.56 Mm^3), and reclaim for the milling operations at 100% reclaim rate (~18.8 Mm^3). The net annual inflow based on the assumed mine conditions is computed to be approximately 6.2 Mm^3. Therefore, under assumed conditions for South PSMF option, approximately 6.2 Mm^3 of water will have to be managed on-site or discharged to the environment. This water balance assessment for South PSMF Option is conditioned to the existing assumptions, and would vary for changed mine conditions, and under different inflow or loss scenarios. The detailed water balance on monthly basis is provided in Appendix C.

Option 3 PSMF

As documented in 'July 2010 Addendum to the Project Description' (Marathon PGM Corp., 2010), 'Option 3 PSMF' was developed as an alternate option after the withdrawal of North PSMF option in July 2010. The low- and high-sulphur process solids will be segregated at the mill site via floatation, and stored in a multi-cell PSMF arrangement that will accommodate all of the life-of-mine low-sulphur process solids (~54.6 Mm3) and approximately half (~3 Mm3) of the life-of-mine high-sulphur process solids. The PSMF storage area is located in sub-basin 106 (Figure 3) and occupies an area of 181.2 ha. Approximately 291 ha area of sub-basin 106 will drain to the PSMF Option 3. The process material will be stored by a series of dykes and impermeable dams, developed largely by the natural containment offered by existing topography.

During the first 6 years of mine life, the low-sulphur material will be stored into the north cell, whereas high-sulphur will be deposited into the south cell of the multi-cell PSMF. It is documented (Marathon PGM Corp., 2010 that sufficient water will exist in the south cell (for the first 6 years) with a minimum of 3-metre water cover over the high-sulphur solids and provide sufficient recycle water for the mill. The mode of process solids deposition would be changed by end of year 6 of mine operations, due to saturation of high-sulphur in the Option 3 PSMF. Low-sulphur material will be stored in the south cell over the high-sulphur process solids, but high-sulphur material will be moved to one of the excavated satellite pits (e.g., Satellite Pit 1). Satellite Pit 1 has a storage capacity of 6 Mm^3 below the existing water level, and would be adequate to contain the 3.1 Mm^3 of high sulphur solids material that will be generated during the next 6 years of mill operations. A temporary process water pond will be constructed in the sub-basin 101, just east of process solids impoundment. Approximately 6 Mm^3 of water will be stored in this pond, which would be sufficient for mill process purposes.

From a water assessment perspective, water from the multi-cell PSMF impoundment will be transferred to the process water pond for storage, and subsequently recycled to the mill. Any excess water from the process water pond

will be released to Stream 6 in the sub-basin 106, and finally into Lake Superior at Sturdee Cove.

For the Option 3 PSMF, the foot-print of mine operations would be relatively less than the South PSMF option (e.g., approximately 1,326 ha) (Table 14). Approximately 469 ha natural ground area would be influenced by the Option 3 PSMF foot print. About 291 ha, 70 ha, 130 ha, and 366 ha would be characterized under tailings, pond, open pit and waste rock respectively. Under this option, the deposition of high-sulphur material in the Satellite Pit 1 location (after year 6) would result in increase in tailings area and decrease in open pit area. This discretization of contributing areas is approximate to the accuracy of available information in the above mentioned documents, and is representative of mine life after year 6 of mill operations. Surface runoff from individual contributing units is summarized in Table 14.

TABLE 14
SUMMARY OF ANNUAL SURFACE RUNOFF FOR OPTION 3 PSMF

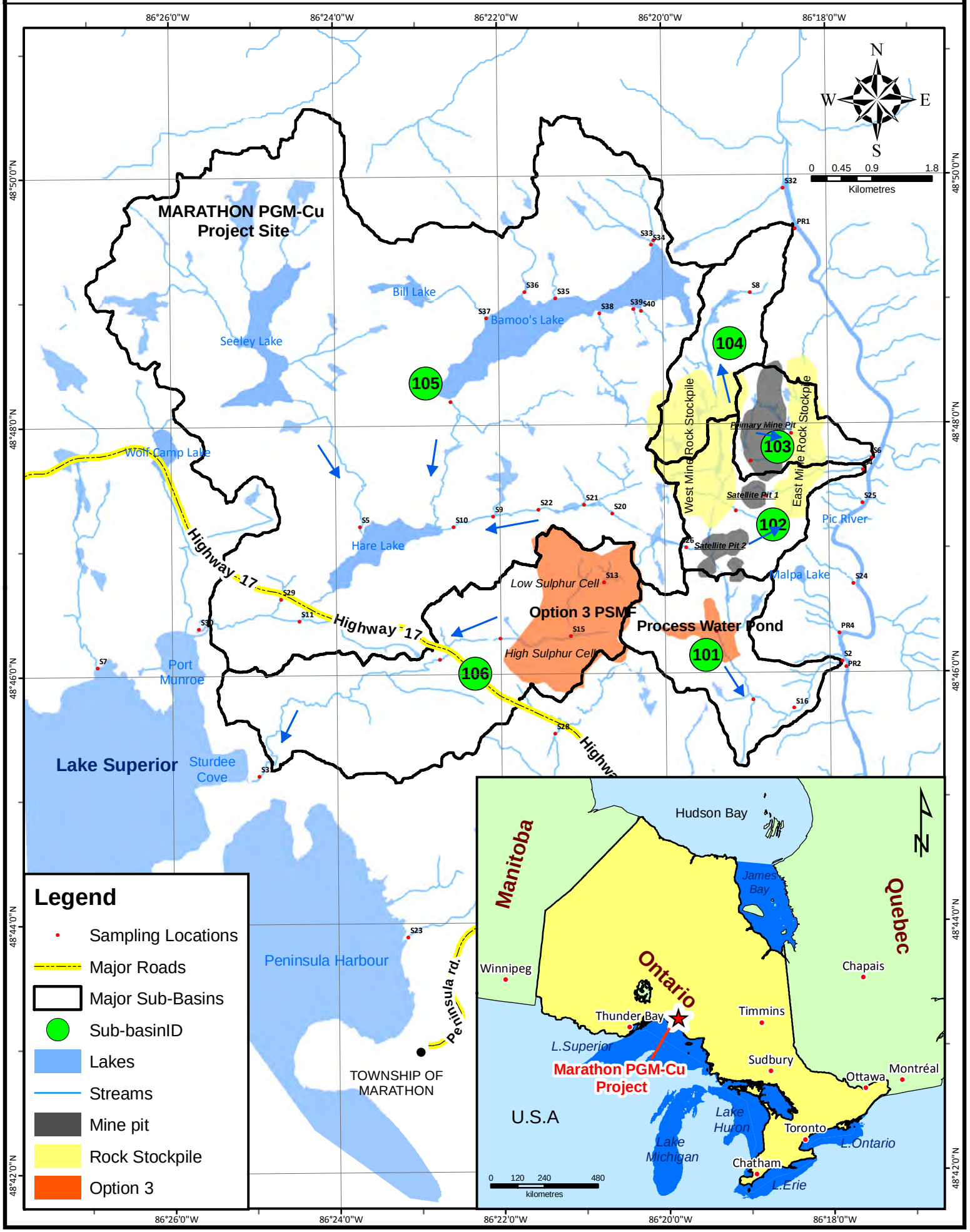
Contributing Units	Contributing Area (ha)	Annual Surface Runoff (m^3)
Natural Ground	468.6	2,142,782
Tailings	291.0	2,048,929
Pond Area	70.1	579,330
Open Pit	130.4	1,077,359[2]
Waste Rock	365.5	2,011,642
Total Runoff	**1,325.5**	**7,860,043**

Note:

1. Units: ha – hectare, m^3 – cubic metres.
2. Flow in Open Pit represents only the surface runoff, and does not include groundwater seepage.

The net annual runoff from the various contributing areas is computed to be approximately 7.9 Mm^3. The monthly runoff assessment is provided in the Appendix C. On an annual basis, the surface runoff from these contributing units would be collected in the multi-cell PSMF impoundment for the first 6 years and into the

FIGURE 3 (ii) - Marathon PGM-Cu Project - Option 3 Configuration



process water pond after year 6 of mill operations. The annual inflows and losses from different mine components are summarized in Table 15.

TABLE 15
ANNUAL INFLOWS AND LOSSES FOR OPTION 3 PSMF

Components	Annual Totals (m^3)
Inflows	
Tailings Water	18,788,000
Seepage Input	775,654
Runoff	7,860,043
Losses	
Retained Water	2,849,592
Net Evaporation	732,795
Reclaim	18,788,000
Net Inflow[2]	***5,053,309***

Note:
1. m^3 – cubic metres.
2. 'Net inflow' was computed as difference of total flow coming in the system and losses from the mine site.

The annual inflows from tailings water and potential groundwater seepage into the open pit are computed to be same, as in case of South PSMF Option. The losses due to water retained in tailings' pore spaces and reclaim to the mill are also same as in South PSMF option. Net annual evaporation from pond and lakes was computed to be 0.73 Mm^3, which is a bit higher than in South PSMF option. The net annual inflow after year 6 of mill operations would be approximately 5.1 Mm^3. Therefore, under assumed conditions for Option 3 PSMF, approximately 5.1 Mm^3 of process water will have to be managed on-site or discharged to the environment. The water balance assessment for Option 3 PSMF is conditioned to the existing assumptions, and would vary for changed mine conditions, and under different inflow or loss scenarios. The detailed water balance on monthly basis is provided in Appendix C.

4.3 Effluent Discharge Considerations

A preliminary water balance has been conducted by Calder Engineering Ltd. for the project site under operating conditions. Estimated water volumes that will have to be managed and discharged to the environment under annual mean conditions are as follows:

South PSMF Option - 6,147,622 cubic metres
Option 3 PSMF - 5,053,309 cubic metres

At this stage, not considered are "wetter" than normal conditions and design events, such as the Regional Storm or 100 year melt rain event. These type of conditions and design events will have to be accounted for at the design stage.

For the water balance assessment, it has been assumed that storm water from the mine site, waste rock stockpiles, and pit (inclusive of groundwater seepage) will be collected and managed prior to discharge to the environment.

At this stage, it has been assumed that effluent from the project site will be discharged from the Process Water Pond to Stream 6. Several potential effluent discharge options are as follows:

- discharge annually on a continuous basis at a continuous rate
- continuous discharge of net water from the site
- non-continuous discharge

Discharge Annually on a Continuous Basis at a Continuous Rate

With this option, effluent would discharge 365 days of the year at a continuous rate. If effluent treatment facilities were required for the project, effluent discharge would reflect the mean annual treatment rate. For the two respective options considered, the mean annual treatment rate would be 16,843 cubic metres per day (cu.m/day) for the South PSMF Option and 13,845 cu.m/day for Option 3 PSMF.

Summarized in Table 16 and Table 17 (Appendix C) are the mean monthly flow and volumes discharged to Stream 6 at Node S14 (Highway 17) and Node S31 (outlet to Lake Superior) respectively.

As shown, it is projected that flow volumes to Stream 6 at Node S14 will increase annually in the order of 181% for South PSMF Option and 141% for Option 3 PSMF. At Node S31, the flow volumes will increase annually in the order of 117% for South PSMF Option and 93% for Option 3 PSMF. In addition to water quality considerations, the hydrologic impact on watercourse crossings and instream geomorphology (e.g., erosion and sedimentation) would have to be assessed. Given the project flow volumes, with discharge to Stream 6, the mixing zone would extend from the point of effluent discharge to the respective outlet and into Lake Superior.

Continuous Discharge of Net Water from the Site

With this option, effluent would be discharged on a net basis from the site and would reflect seasonal weather conditions. Typically, the majority of effluent would be discharged in the spring in conjunction with the spring melt with minimal discharge during seasonal low flow conditions. Due to insufficient information for the winter months, this option will have to be accounted for at the later stage.

Non-Continuous Discharge

With this option, storage would be provided in the site water management facilities to store and discharge effluent to the environment during certain times of the year under typically specific flow conditions. These conditions would be determined in conjunction with a receiving water assessment. For the purpose of this study, it has been assumed that effluent would be discharged to the environment over a seven month period between May 1st and November 30th.

Summarized in Table 18 and Table 19 (Appendix C) are the mean monthly flows in Stream 6 and volumes discharged to Stream 6 at Node S14 (Highway 17) and Node S31 (outlet to Lake Superior) respectively.

As shown, it is projected that flow volumes to Stream 6 at Node S14 will increase annually in the order of 127% for South PSMF Option and 104% for Option 3 PSMF. At Node S31, the flow volumes will increase annually in the order of 93% for South PSMF Option and 76% for Option 3 PSMF. In addition to water quality considerations, the hydrologic impact on watercourse crossings and instream geomorphology (e.g., erosion and sedimentation) would have to be assessed. Given the project flow volumes, with discharge to Stream 6, the mixing zone would extend from the point of effluent discharge to the respective outlet and into Lake Superior.

REFERNCES

APPENDIX A

MARATHON PGM-Cu PROJECT SITE
MARATHON, ONTARIO

FLOW MONITORING DATA (S1 THROUGH S41)

Marathon PGM
Summary of Stream Field Data
Location S1

	03-Jul-08			29-Jul-08			26-Aug-07			25-Sep-08			24-Oct-08			18-Nov-08			07-May-09			11-Jun-09			6-Aug-09 (*2)			31-Aug-09			08-Oct-09			03-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Flow	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0										0	NA	0	0	NA	0																					
0.2	0	NM	-	0	NA	0				0.03	NA	0	0.03	NA	0	0	NA	0																	
0.3							0	NA	0										0	0.03	0	0	NA	0							0	NA				
0.4	0.22	NM	-	0.12	<0.01	0.00007	0.185	<0.01	0.00010	0.28	<0.01	0.00017	0.20	<0.01	0.00012	0.25	<0.01	0.00015	0.10	0.03	0.00020	0.20	NA	0				0	NA	0	0.02	NA	0	0.00	NA	0
0.45																									0	NA	0									
0.6	0.25	NM	-	0.36	<0.01	0.00022	0.35	<0.01	0.00021	0.40	<0.01	0.00024	0.32	<0.01	0.00020	0.40	<0.01	0.00034	0.36	0.36	0.01090	0.36	NA	0	0.01	NA	0	0.05	0.20	0.00084	0.05	0.07	0.00029	0.05	0.12	0.00050
0.8	0.30	NM	-	0.36	<0.01	0.00022	0.37	<0.01	0.00023	0.41	<0.01	0.00025	0.43	<0.01	0.00026	0.43	<0.01	0.00039	0.38	0.30	0.01027	0.42	0.07	0.00252	0.01	NA	0	0.05	0.92	0.00421	0.03	0.07	0.00019	0.06	0.60	0.00329
1.0	0.32	NM	-	0.38	<0.01	0.00023	0.38	<0.01	0.00023	0.43	<0.01	0.00026	0.36	<0.01	0.00022	0.36	<0.01	0.00033	0.39	0.05	0.00189	0.42	0.03	0.00126	0.02	NA	0	0.00	NA	0.00000	0.04	0.14	0.00064	0.03	0.70	0.00240
1.2	0.28	NM	-	0.34	<0.01	0.00021	0.34	<0.01	0.00021	0.40	<0.01	0.00024	0.41	<0.01	0.00025	0.50	<0.01	0.00046	0.35	0.56	0.01786	0.40	0.03	0.00120	0.09	0.67	0.00552	0.11	1.55	0.02080	0.08	0.27	0.00264	0.12	0.89	0.01303
1.4	0.28	NM	-	0.09	<0.01	0.00004	0.28	<0.01	0.00013	0.31	<0.01	0.00014	0.35	<0.01	0.00016	0.33	<0.01	0.00025	0.32	0.59	0.01441	0.36	0.10	0.00270	0.11	0.23	0.00193	0.13	0.70	0.00971	0.12	0.12	0.00154	0.14	1.28	0.01913
1.5				0	NA	0	0	NA	0	0.03	NA	0										0.00	NA	0	0	NA	0									0.00000
1.6	0	NA	-							0	NA	0	0.04	NA	0	0.05	NA	0	0	NA	0				0.05	0.19	0.00058	0.02	NA	0.00000	0.01	0.01	0.00001	0.00	0.52	0.00000
1.8													0	NA	0	0	NA	0							0.01	NA	0	0.05	0.38	0.00174	0.05	0.05	0.00023	0.09	0.92	0.00758
2.0																									0	NA	0	0.07	NA	0	0.02	0.02	0	0	NA	0
2.2																												0.03	NA	0	0	0	0			
2.4																												0	NA	0						
2.6																																				
2.8																																				
3.0																																				
3.2																																				
3.4																																				
3.6																																				
3.8																																				
4.0																																				
Total Stream Width (m)	1.4			1.3			1.3			1.6			1.8			1.6			1.4			1.3			1.6			2.0			2.0			1.6		
Stake Measurement (m)	-			-			0.624			0.580			0.583			0.580			0.615			0.580														
Total Discharge (m^3/s)	-			0.00099			0.00111			0.00131			0.00121			0.00192			0.05552			0.00769			0.00745			0.03556			0.00530			0.03836		
Field Chemistry																																				
Temp (^{0}C)	18.5			15.3			17.6			15.3			5.1			0			5.3			15.6			15.7			13.6			13.6			13.6		
pH	7.34			7.39			7.05			6.91			7.03			7.90			8.27			7.60			7.74			7.17			7.17			7.17		
EC (uS)	25			100			138			67			60			26			23			43			29			23			23			23		
DO (mg/L)	1.06			6.78			2.05			4.30			4.70			4.07			1.23			0.25			4.55			1.92			1.92			1.92		
Appearance	clear			cloudy brown			slightly tannic			slightly tannic			slightly tannic			tannic			clear yellow tinge			clear			clear slt. Yellow			clear slt. Yellow			clear slt. Yellow			clear slt. Yellow		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The interval that stake is located for increased precision in water height fluctuations is 1.0m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate
*[1]Downgradient beaver dam impeded the flow of water and flooded channel.
*[2]Stream section moved upstream due to beaver dam flooding at former location.

Marathon PGM
Summary of Stream Field Data
Location S2

Diameter of Culvert (m) 1.5	08-Jul-08	29-Jul-08	26-Aug-08	22-Sep-08	21-Oct-08	18-Nov-08	08-May-09	11-Jun-09	15-Jul-09	04-Aug-09	01-Sep-09	05-Oct-09	03-Nov-09
	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)
	0.13	0.01	0.04	0.02	0.04	0.11	0.11	0.11	0.04	0.09	0.12	0.03	0.15
Total Discharge (m^3/s)	0.09613	0.00039	0.00777	0.00174	0.00777	0.06752	0.06752	0.06752	0.00583	0.03903	0.08117	0.00418	0.12994
Field Chemistry													
Temp (^{o}C)	12.4	12.6	11.0	10.0	4.3	0.1	4.3	14.1	12.2	13.8	12.3	9.1	2.7
pH	8.05	7.78	7.89	7.59	8.06	8.13	7.64	7.05	8.33	8.24	8.05	8.07	7.23
EC (uS)	167	338	425	262	225	106	59	205	240	113	95	244	62
DO (mg/L)	4.05	2.80	6.55	5.30	3.48	4.20	3.19	0.53	4.06	4.09	2.75	2.02	1.66
Appearance	cloudy brown	cloudy brown	clear	clear	clear	slightly tannic	yellow tinge	clear	light brn	clear, slt. ylw	clear, slt. ylw	clear	sl. Tannic

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s

*Note: To get discharge, drag all formulas horizontal.

θ	1.19528	0.32696	0.65614	0.46291	0.65614	1.09690	1.09690	1.09690	0.61341	0.96142	1.14703	0.56759	1.28700
Area (Wet)	0.07452	0.00163	0.01296	0.00460	0.01296	0.05825	0.05825	0.05825	0.01062	0.03977	0.06623	0.00843	0.09197
P (Wet)	0.89646	0.24522	0.49210	0.34718	0.49210	0.82268	0.82268	0.82268	0.46006	0.72107	0.86027	0.42569	0.96525
Rd (Hydr. Rad)	0.08313	0.00665	0.02633	0.01325	0.02633	0.07080	0.07080	0.07080	0.02308	0.05516	0.07699	0.01981	0.09528
V	1.28998	0.23940	0.59946	0.37923	0.59946	1.15910	1.15910	1.15910	0.54898	0.98136	1.22564	0.49589	1.41283
Q	0.09613	0.00039	0.00777	0.00174	0.00777	0.06752	0.06752	0.06752	0.00583	0.03903	0.08117	0.00418	0.12994

Manning, n: 0.022
Slope, s: 0.0222

Marathon PGM
Summary of Stream Field Data
Location S3

Distance Panel	01-Jul-08			29-Jul-08			26-Aug-08			24-Sep-08			23-Oct-08			18-Nov-08			05-May-09			11-Jun-09			15-Jul-09			06-Aug-09			06-Aug-09			07-Oct-09			03-Nov-09		
	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0																																							
0.2																																							
0.3																															0	NA	0						
0.4	0	NA	-																0	0	0																		
0.45																												0	NA	0										
0.5																0	NA	0				0	NA	0													0	NA	0
0.6	0.07	NM	-													0.03	NA	0	0.09	0.85	0.00468	0.01	<0.01	0				0.01	<0.01	0	0.02	NA	0				0.06	0.24	0.000659
0.8	0.08	NM	-													0	NA	0	0.07	0.72	0.00308	0	NA	0				0	NA	0	0	NA	0				0.02	0.20	0.000244
1.0	0.15	NM	-													0	NA	0	0.07	NA	0	0	NA	0				0	NA	0	0	NA	0				0.04	0.97	0.002367
1.2	0.06	NM	-													0	NA	0	0.03	NA	0	0	NA	0				0	NA	0	0	NA	0				0.03	0.31	0.000567
1.4	0.055	NM	-													0.01	NA	0	0.03	NA	0	0	NA	0				0	NA	0	0	NA	0				0.03	0.26	0.000476
1.6	0.08	NM	-													0.05	0.31	0.00090	0.06	0.75	0.00276	0	NA	0	0.05	0.37	0.00113	0.01	<0.01	0	0.02	NA	0				0.05	0.6	0.001373
1.7				0	NA	0				0	NA	0	0	NA	0																							
1.78							0	NA	0																														
1.8	0.19	NM	-	0.04	NA	0	0.04	NA	0	0.06	<0.01	0.00003	0.06	<0.01	0.00003	0.05	0.52	0.00119	0.1	1.31	0.00801	0.03	0.07	0.00012	0	NA	0	0	NA	0	0.06	0.58	0	0.00	NA	0	0.03	1.05	0.00106
2.0	0.08	NM	-	0.04	NA	0	0.04	NA	0	0.05	<0.01	0.00003	0.09	<0.01	0.00005	0.15	0.78	0.00714	0.19	1.41	0.01635	0.01	<0.01	0.00001	0.03	<0.01	0.00002	0.05	0.36	0.00110	0.04	0.4	0.00098	0.02	NA	0	0.09	0.65	0.00357
2.2	0.17	NM	-	0.03	NA	0	0.02	NA	0	0.03	NA	0	0.04	NA	0	0.09	0.94	0.00516	0.12	0.69	0.00504	0.01	<0.01	0.00001	0.03	<0.01	0.00002	0.03	0.95	0.00174	0.05	0.92	0.00281	0.02	NA	0	0.10	0.19	0.00116
2.4	0.13	NM	-	0	NA	0	0.01	NA	0	0.01	NA	0	0.03	NA	0	0.09	0.75	0.00412	0.13	0.79	0.00624	0.02	<0.01	0.00001	0.02	<0.01	0.00001	0.02	<0.01	0.00001	0.01	NA	0.00000	0.01	NA	0	0.08	0.09	0.00044
2.6	0.22	NM	-	0.11	<0.01	0.00007	0.06	<0.01	0.00004	0.15	0.65	0.00595	0.15	0.31	0.00284	0.22	0.21	0.00282	0.21	1.15	0.01471	0.08	0.16	0.00080	0.09	0.11	0.00060	0.06	0.80	0.00293	0.10	1.56	0.00952	0.09	0.13	0.00071	0.15	1.50	0.01373
2.8	0.16	NM	-	0	NA	0	0	NA	0	0.04	1.07	0.00261	0.06	2.04	0.00747	0.12	1.8	0.01318	0.15	1.84	0.01681	0.06	1.05	0.00384	0.04	0.37	0.00090	0.09	0.63	0.00346	0.10	1.26	0.00769	0.03	1.02	0.00187	0.10	1.46	0.00891
3.0	0.05	NM	-	0	NA	0	0	NA	0	0.09	<0.01	0.00005	0	NA	0	0	NA	0	0.02	NA	0	0	NA	0	0	NA	0	0.14	1.88	0.01606	0.15	1.01	0.00924	0.00	NA	0	0.00	NA	0.00000
3.2	0.03	NM	-	0	NA	0	0	NA	0	0.22	<0.01	0.00013	0	NA	0	0	NA	0	0.03	NA	0	0	NA	0	0.02	<0.01	0.00001	0	NA	0	0	0.00	0.00000	0	NA	0	0	NA	0.00000
3.4	0.15	NM	-	0.20	0.59	0.00720	0.19	0.32	0.00371	0.24	0.29	0.00425	0.28	0.22	0.00376	0.31	1.26	0.02383	0.38	1.18	0.02738	0	NA	0	0.04	0.36	0.00088	0	NA	0	0	0.62	0.00189	0	NA	0	0	0.42	0.00128
3.6	0.42	NM	-	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0	NA	0.00000	0.07	0.23	0.00098	0	NA	0	0.01	<0.01	0.00001	0.21	0.02	0.00019	0.00	NA	0	0.06	0.65	0.00178
3.7																															0	NA	0						
3.8	0.32	NM	-	0.09	<0.01	0.00005													0.25	0.20	0.00300	0	NA	0	0	NA	0	0.08	0.33	0.00161							0	0	0
3.95																												0	NA	0									
4.0	0.09	NM	-	0	NA	0													0.05	0.03	0.00010																		
4.2	0	NA	-																0	0	0																		
Total Stream Width (m)	3.8			2.3			1.8			1.9			1.9			3.1			3.8			3.3			2.2			3.5			3.4			1.8			3.3		
Stake Measurement (m)	-			-			0.938			0.940			0.918			0.868			0.815			0.940			0.940														
Total Discharge (m^3/s)	-			0.00732			0.00375			0.01305			0.01414			0.05832			0.10817			0.00577			0.00357			0.02692			0.03443			0.00258			0.03760		
Field Chemistry																																							
Temp (°C)	14.8			17.7			17.4			14.6			4.9			0			10.5			15.4			14.6			14.1			12.3			10.4			3.4		
pH	7.28			7.50			7.10			7.40			7.42			7.46			7.34			7.06			7.36			7.49			7.76			7.34			6.94		
EC (uS)	29			73			97			54			41			42			30			61			72			47			43			69			29		
DO (mg/L)	2.11			5.96			4.96			3.52			4.43			3.71			1.6			0.19			3.21			3.89			4.1			2.2			1.89		
Appearance	clear			slightly tannic			clear			slightly tannic			clear			clear			clear			clear			clear			clear			clear slightly yellow			clear slightly tannic			clear slightly tannic		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The interval that stake is located for increased precision in water height fluctuations is 2.0m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Stream Field Data
Location S4

Distance Panel	08-Jul-08			30-Jul-08			25-Aug-08			22-Sep-08			21-Oct-08			19-Nov-08		
(m)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)
0																		
0.2																		
0.4																		
0.6																		
0.8	0	NA	-							*	*	*				**	**	**
1.0	0.09	NM	-							*	*	*				**	**	**
1.2	0.58	NM	-	0	NA	0				*	*	*				**	**	**
1.4	0.58	NM	-	0.01	NA	0	0	NA	0	*	*	*	0	NA	0	**	**	**
1.6	0.65	NM	-	0.08	<0.01	0.00005	0.01	NA	0	*	*	*	0.05	NA	0	**	**	**
1.8	0.66	NM	-	0.09	<0.01	0.00005	0.006	NA	0	*	*	*	0.11	<0.01	0.00007	**	**	**
2.0	0.63	NM	-	0.08	<0.01	0.00005	0	NA	0	*	*	*	0.07	<0.01	0.00004	**	**	**
2.2	0.66	NM	-	0.08	0.32	0.00156	0.01	NA	0	*	*	*	0.07	0.19	0.00081	**	**	**
2.4	0.67	NM	-	0.13	0.59	0.00468	0.015	NA	0	*	*	*	0.12	0.49	0.00359	**	**	**
2.6	0.69	NM	-	0.12	0.63	0.00461	0.13	<0.01	0.00008	*	*	*	0.19	0.46	0.00533	**	**	**
2.8	0.72	NM	-	0.20	0.58	0.00708	0.11	<0.01	0.00007	*	*	*	0.19	0.46	0.00533	**	**	**
3.0	0.65	NM	-	0.15	0.57	0.00522	0.125	<0.01	0.00008	*	*	*	0.18	0.35	0.00384	**	**	**
3.2	0.63	NM	-	0.05	0.57	0.00174	0	NA	0	*	*	*	0.06	0.39	0.00143	**	**	**
3.4	0.58	NM	-	0.04	<0.01	0.00002				*	*	*	0	NA	0	**	**	**
3.5				0	NA	0				*	*	*				**	**	**
3.6	0.55	NM	-							*	*	*				**	**	**
3.8	0.45	NM	-							*	*	*				**	**	**
4.0	0.35	NM	-							*	*	*				**	**	**
4.2	0.19	NM	-							*	*	*				**	**	**
4.4	0.07	NM	-							*	*	*				**	**	**
4.6	0	NA	-							*	*	*				**	**	**
4.8																		
5.0								`										
Total Stream Width (m)		3.8			2.3			1.6			*			2.0			**	
Stake Measurement (m)		-			-			0.755			*			0.685			**	
Total Discharge (m^3/s)		-			0.0250527			0.00022			*			0.02044			**	
Field Chemistry																		
Temp (°C)		14.5			14.1			12.8			*			4.3			**	
pH		8.03			7.99			8.01			*			8.05			**	
EC (uS)		165			170			277			*			230			**	
DO (mg/L)		4.15			5.12			6.55			*			3.93			**	
Appearance		cloudy brown			slightly tannic			clear			*			clear			**	

Distance Panel	05-May-09			10-Jun-09			14-Jul-09			04-Aug-09			01-Sep-09			08-Oct-09		
(m)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)
0																		
0.2																		
0.4																		
0.6																		
0.8																		
1.0																		
1.2																		
1.4	0	NA	0	0	NA	0	0	NA	0				0	NA	0	0	NA	0
1.6							0.02	<0.01	0.00001	0.16	0.13	0.00127	0.24	0.16	0.00234	0.1	0.04	0.00024
1.8	0.52	0.16	0.00520	0.08	0.07	0.00032	0.02	<0.01	0.00001	0.14	0.33	0.00282	0.19	0.52	0.00603	0.07	0.06	0.00026
2.0	0.51	0.30	0.00919	0.05	<0.01	0.00003	0.005	0.13	0.00004	0.14	0.51	0.00436	0.18	0.57	0.00626	0.11	0.03	0.00020
2.2	0.48	0.36	0.01057	0.07	0.33	0.00140	0.04	<0.01	0.00002	0.16	0.58	0.00566	0.21	0.58	0.00743	0.09	0.13	0.00071
2.4	0.57	0.46	0.01597	0.08	0.49	0.00240	0.03	0.27	0.00049	0.18	0.79	0.00867	0.22	0.67	0.00899	0.11	0.22	0.00148
2.6	0.53	0.59	0.01909	0.12	0.46	0.00336	0.10	0.43	0.00262	0.22	0.67	0.00899	0.25	0.64	0.00976	0.12	0.24	0.00176
2.8	0.52	0.56	0.01769	0.14	0.43	0.00364	0.11	0.46	0.00309	0.24	0.65	0.00952	0.27	0.71	0.01169	0.14	0.19	0.00162
3.0	0.49	0.56	0.01667	0.16	0.39	0.00384	0.11	0.38	0.00255	0.22	0.62	0.00832	0.22	0.72	0.00966	0.14	0.18	0.00154
3.2	0.51	0.56	0.01735	0.16	0.33	0.00320	0.04	<0.01	0.00002	0.14	0.62	0.00529	0.17	0.86	0.00892	0.1	0.16	0.00098
3.4	0.5	0.62	0.01901	0.12	0.26	0.00192	0	NA	0	0.10	0.38	0.00232	0.07	0.61	0.00195	0.03	0.09	0.00012
3.5																		
3.6	0.59	0.30	0.01063	0.02	NA	0				0	NA	0	0	NA	0	0	NA	0
3.8	0.58	0.20	0.00696	0	NA	0												
4.0	0.59	0.20	0.00708															
4.2	0	NA	0															
4.4																		
4.6																		
4.8																		
5.0																		
Total Stream Width (m)		2.8			2.4			2.0			2.0			2.2			#VALUE!	
Stake Measurement (m)																		
Total Discharge (m^3/s)		0.15542			0.02012			0.00887			0.05722			0.07304			0.00891	
Field Chemistry																		
Temp (°C)		6.0			10.8			16.0			13.4			12.0			6.5	
pH		8.06			7.31			8.32			8.25			8.11			8	
EC (uS)		113			204			230			127			116			209	
DO (mg/L)		2.23			0.55			0.19			5.85			3.61			1.74	
Appearance		cloudy turbid			slightly cloudy and turbid			cloudy slt. turbid			slt. grey, cloudy			slt. brown, cloudy			clear	

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
Interval that stake is located for increased precision in water height fluctuations is 3.0m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate
* Due to the low water conditions the Pic River was non navigatable by boat
** The upper portion of the Pic River was frozen and was non navigatable by boat

Marathon PGM
Summary of Stream Field Data
Location S5

	07-Jul-08			31-Jul-08			27-Aug-08			22-Sep-08			22-Oct-08			19-Nov-08			08-May-08			10-Jun-09			21-Jul-09			04-Aug-09			31-Aug-09			08-Oct-09			08-Oct-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0																															0	NA	0						
0.2																															0.03	NA	0						
0.4																																							
0.6																															0.05	NA	0						
0.8																																							
1.0																															0.28	0.01	0.00034						
1.2																			0	NA	0																		
1.3										0	NA	0	0	NA	0	*	*	*																		0	NA	0.00000
1.4	0	NA	-				0	NA	0	0.04	NA	0	0.07	<0.01	0.00003	*	*	*	0.24	0.03	0.00048				0	NA	0	0	NA	0	0.045	0.07	0.00038	0	NA	0			
1.6	0.12	NM	-	0	NA	0	0.05	<0.01	0.00003	0.11	<0.01	0.00007	0.12	<0.01	0.00007	*	*	*	0.41	0.03	0.00082	0	NA	0	0.05	0.09	0.00027	0.14	0.06	0.00051							0.22	NA	0.00000
1.8	0.15	NM	-	0.09	<0.01	0.00005	0.07	<0.01	0.00004	0.13	<0.01	0.00008	0.13	<0.01	0.00008	*	*	*	0.5	0.07	0.00200	0.04	0.00	0	0.07	0.26	0.00111	0.17	0.05	0.00052	0.50	0.78	0.04758	0.12	NA	0			
2.0	0.22	NM	-	0.09	<0.01	0.00005	0.09	<0.01	0.00005	0.16	<0.01	0.00010	0.16	<0.01	0.00010	*	*	*	0.57	0.13	0.00456	0.12	0.23	0.00168	0.06	0.31	0.00113	0.20	0.26	0.00317							0.28	0.24	0.00410
2.2	0.24	NM	-	0.14	<0.01	0.00009	0.10	<0.01	0.00006	0.16	0.19	0.00185	0.18	<0.01	0.00011	*	*	*	0.58	1.25	0.04411	0.14	0.26	0.00224	0.13	0.18	0.00143	0.23	0.44	0.00617	0.50	1.62	0.09882	0.16	0.52	0.01015			
2.4	0.25	NM	-	0.15	0.50	0.00458	0.09	0.31	0.00170	0.16	0.60	0.00586	0.20	0.45	0.00549	*	*	*	0.57	0.72	0.02510	0.16	0.20	0.00192	0.11	0.45	0.00302	0.24	1.22	0.01786							0.33	1.62	0.03261
2.6	0.21	NM	-	0.13	0.90	0.00714	0.10	0.36	0.00220	0.17	0.67	0.00695	0.20	0.66	0.00805	*	*	*	0.59	0.72	0.02598	0.17	0.85	0.00895	0.13	0.58	0.00460	0.25	1.15	0.01754	0.52	1.91	0.12117	0.16	0.44	0.00859			
2.8	0.25	NM	-	0.15	0.63	0.00576	0.10	0.32	0.00195	0.19	0.45	0.00522	0.22	1.06	0.01423	*	*	*	0.6	1.74	0.06364	0.16	0.85	0.00833	0.11	0.65	0.00436	0.24	1.16	0.01698							0.34	1.77	0.03671
3.0	0.25	NM	-	0.15	0.53	0.00485	0.10	0.59	0.00360	0.19	0.78	0.00904	0.21	0.84	0.01076	*	*	*	0.6	1.74	0.06364	0.18	0.56	0.00612	0.13	0.62	0.00492	0.23	1.02	0.01431	0.52	1.15	0.07296	0.18	0.49	0.01076			
3.2	0.27	NM	-	0.17	1.00	0.01037	0.12	0.29	0.00212	0.18	0.65	0.00714	0.22	1.28	0.01718	*	*	*	0.6	1.80	0.06604	0.20	0.72	0.00881	0.09	0.88	0.00483	0.24	1.35	0.01976				0.35	2.07	0.04419			
3.4	0.26	NM	-	0.16	0.66	0.00644	0.10	0.29	0.00177	0.20	0.32	0.00390	0.22	0.40	0.00537	*	*	*	0.6	1.44	0.05283	0.19	0.95	0.01103	0.14	0.32	0.00273	0.22	0.77	0.01033	0.50	1.32	0.08052	0.16	0.42	0.00820			
3.6	0.26	NM	-	0.15	0.27	0.00247	0.12	0.32	0.00234	0.18	0.83	0.00911	0.20	0.78	0.00952	*	*	*	0.59	1.08	0.03897	0.19	0.36	0.00418	0.14	0.35	0.00299	0.24	1.26	0.01845							0.34	1.25	0.02593
3.8	0.25	NM	-	0.16	0.59	0.00576	0.10	<0.01	0.00006	0.16	0.55	0.00537	0.19	0.90	0.01043	*	*	*	0.61	1.54	0.05738	0.17	0.59	0.00612	0.10	0.20	0.00122	0.24	0.63	0.00922	0.51	1.47	0.09146	0.19	0.28	0.00649			
4.0	0.25	NM	-	0.15	0.35	0.00320	0.10	0.36	0.00220	0.14	0.94	0.00803	0.16	0.38	0.00371	*	*	*	0.61	1.38	0.05127	0.14	0.75	0.00644	0.10	0.39	0.00238	0.23	0.60	0.00842							0.30	1.62	0.02965
4.2	0.22	NM	-	0.14	0.77	0.00658	0.10	0.32	0.00195	0.15	0.58	0.00531	0.18	0.55	0.00604	*	*	*	0.59	1.54	0.05550	0.15	0.66	0.00600	0.14	0.26	0.00222	0.24	0.92	0.01347	0.49	1.17	0.06994	0.18	0.18	0.00395			
4.4	0.25	NM	-	0.15	0.43	0.00393	0.09	<0.01	0.00005	0.16	0.67	0.00654	0.17	0.62	0.00643	*	*	*	0.62	1.41	0.05335	0.19	0.66	0.00760	0.13	0.61	0.00484	0.25	0.86	0.01312							0.32	0.68	0.01327
4.6	0.27	NM	-	0.15	0.65	0.00595	0.09	0.30	0.00165	0.15	0.58	0.00531	0.17	0.60	0.00622	*	*	*	0.62	1.48	0.05584	0.16	0.59	0.00576	0.12	0.53	0.00388	0.24	0.49	0.00717	0.42	1.29	0.06610	0.15	0.32	0.00586			
4.8	0.23	NM	-	0.11	0.31	0.00208	0.08	<0.01	0.00005	0.11	0.46	0.00309	0.09	0.56	0.00307	*	*	*	0.57	1.51	0.05247	0.15	0.72	0.00660	0.02	NA	0	0.14	0.50	0.00427							0.24	0.46	0.00673
5.0	0.23	NM	-	0.11	<0.01	0.00007	0.05	<0.01	0.00003	0.12	0.27	0.00198	0.14	0.53	0.00453	*	*	*	0.58	0.89	0.03134	0.04	0.46	0.00112	0.01	NA	0	0.12	0.45	0.00329	0.41	0.97	0.04852	0.09	0.25	0.00275			
5.2	0.21	NM	-	0.12	<0.01	0.00007	0.06	<0.01	0.00004	0.09	0.28	0.00154	0.12	0.60	0.00439	*	*	*	0.54	1.35	0.04431	0.03	0.07	0.00012	0.07	0.33	0.00141	0.18	0.29	0.00318							0.26	0.53	0.00841
5.4	0.22	NM	-	0.12	0.20	0.00146	0	NA	0	0.07	0.40	0.00171	0.11	0.72	0.00483	*	*	*	0.56	1.02	0.03474	0.08	0.39	0.00192	0.05	0.25	0.00076	0.14	0.27	0.00231	0.44	1.13	0.06066	0.08	0.45	0.00439			
5.6	0.15	NM	-	0.05	<0.01	0.00003	0.06	<0.01	0.00004	0.11	0.39	0.00262	0.14	0.69	0.00589	*	*	*	0.53	0.95	0.03076	0.07	0.49	0.00210	0.06	0.03	0.00011	0.16	0.26	0.00254							0.25	0.51	0.00778
5.8	0.20	NM	-	0.10	<0.01	0.00006	0.05	NA	0	0.12	0.35	0.00256	0.12	0.57	0.00417	*	*	*	0.56	1.41	0.04819	0.09	0.36	0.00198	0.06	0.10	0.00037	0.17	0.50	0.00519	0.44	1.01	0.05422	0.12	0.26	0.00381			
6.0	0.16	NM	-	0.09	0.36	0.00198	0.04	NA	0	0.1	0.47	0.00287	0.13	0.61	0.00484	*	*	*	0.57	1.12	0.03879	0.10	0.43	0.00260	0.06	0.31	0.00113	0.14	0.58	0.00495							0.21	0.82	0.01050
6.2	0.16	NM	-	0.06	0.65	0.00238	0.04	NA	0	0.11	1.05	0.00705	0.13	0.88	0.00698	*	*	*	0.54	1.21	0.03999	0.09	0.46	0.00252	0.07	0.62	0.00265	0.17	0.95	0.00985	0.45	1.36	0.07466	0.10	0.10	0.00122			
6.4	0.20	NM	-	0.06	1.46	0.00534	0.02	NA	0	0.11	1.12	0.00752	0.16	0.82	0.00800	*	*	*	0.54	1.57	0.05187	0.08	0.43	0.00208	0.05	0.35	0.00107	0.12	0.94	0.00688							0.28	1.17	0.01998
6.6	0.22	NM	-	0.10	1.36	0.00830	0.05	0.94	0.00287	0.16	1.01	0.00986	0.19	0.63	0.00730	*	*	*	0.58	1.05	0.03714	0.08	0.07	0.00032	0.07	1.07	0.00457	0.17	0.71	0.00736	0.55	1.09	0.07314	0.12	0.12	0.00176			
6.8	0.24	NM	-	0.14	1.05	0.00897	0.12	0.19	0.00139	0.21	0.45	0.00576	0.24	0.66	0.00966	*	*	*	0.61	1.48	0.05494	0.10	1.08	0.00660	0.06	0.10	0.00037	0.19	0.43	0.00498							0.28	1.25	0.02135
7.0	0.29	NM	-	0.19	<0.01	0.00012	0.14	<0.01	0.00009	0.22	0.73	0.00980	0.27	1.01	0.01663	*	*	*	0.67	1.48	0.06034	0.14	0.20	0.00168	0.16	0.15	0.00146	0.30	0.77	0.01409	0.56	1.53	0.10453	0.22	0.22	0.00590			
7.2	0.32	NM	-	0.21	0.96	0.01230	0.14	<0.01	0.00009	0.22	0.37	0.00497	0.27	0.32	0.00527	*	*	*	0.68	1.31	0.05444	0.22	0.33	0.00440	0.17	0.59	0.00612	0.29	1.09	0.01928							0.40	1.94	0.04734
7.4	0.31	NM	-	0.21	0.72	0.00922	0.14	0.65	0.00555	0.23	0.27	0.00379	0.24	0.23	0.00337	*	*	*	0.69	1.28	0.05386	0.22	1.08	0.01453	0.14	1.29	0.01102	0.30	0.88	0.01610	0.47	1.20	0.06881	0.22	0.22	0.00590			
7.6	0.31	NM	-	0.20	0.48	0.00586	0.11	0.49	0.00329	0.18	<0.01	0.00011	0.21	<0.01	0.00013	*	*	*	0.66	1.28	0.05151	0.21	1.18	0.01513	0.13	0.80	0.00634	0.29	1.05	0.01857							0.36	1.19	0.02613
7.8	0.29	NM	-	0.18	0.36	0.00395	0.07	0.19	0.00081	0.14	<0.01	0.00009	0.18	<0.01	0.00011	*	*	*	0.67	1.05	0.04291	0.19	0.59	0.00684	0.11	0.89	0.00597	0.23	1.00	0.01403				0.17	0.17	0.00353			
8.0	0.22	NM	-	0.13	0.33	0.00262	0.04	NA	0	0.13	<0.01	0.00008	0.13	<0.01	0.00008	*	*	*	0.63	1.08	0.04161	0.14	0.66	0.00560	0.08	0.32	0.00156	0.22	1.08	0.01449							0.28	0.68	0.01161
8.2	0.21	NM	-	0.11	0.17	0.00114	0.04	NA	0	0.12	<0.01	0.00007	0.16	<0.01	0.00010	*	*	*	0.6	0.85	0.03122	0.12	0.62	0.00456	0.03	NA	0	0.20	0.30	0.00366	0.00	NA	0.00000	0.11	0.11	0.00129			
8.4	0.18	NM	-	0.09	0.63	0.00259	0.02	NA	0	0.09	<0.01	0.00005	0.14	<0.01	0.00006	*	*	*	0.57	1.02	0.03536	0.08	0.66	0.00320	0.03	NA	0	0.16	0.59	0.00432							0.26	0.48	0.00571
8.5							0	NA	0							*	*	*							0	NA	0	0	NA	0									
8.6	0.15	NM	-	0.08	<0.01	0.00005				0	NA	0	0.08	<0.01	0.00004	*	*	*	0.55	0.03	0.00083	0	NA	0										0	0	0			
8.7													0	NA	0	*	*	*																				
8.8	0	NA	-	0	NA	0										*	*	*	0.03	NA	0																0	NA	0.00000
Total Stream Width (m)	7.4			7.2			7.1			7.3			7.4			*			7.6			7.0			7.1			7.1			8.0			7.2			7.5		
Stake Measurement (m)	-			-			0.755			0.695			0.663			*			0.275			0.700			0.700													
Total Discharge (m^3/s)	-			0.135805825			0.03601			0.14535			0.19327			*			1.49813			0.16903			0.09084			0.33637			1.13347			0.08454			0.35201		
Field Chemistry																																							
Temp (^{o}C)	17.4			19.7			16.0			12.5			7.2			*			3.8			11			17.7			16.6			16.1			9.2			4.2		
pH	7.49			7.91			8.01			7.52			7.98			*			8.30			6.87			7.48			7.73			6.86			7.40			5.49		
EC (uS)	21			34			42			23			20			*			15			27			31			20			14			26			13		
DO (mg/L)	1.84			7.26			6.61			3.70			3.59			*			0.9			0.45			1.76			4.03			2.77			1.76			1.54		
Appearance	clear			clear			clear			clear			clear			*			clear			clear			clear			clear			clear			clear slightly tannic			clear		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The interval that stake is located for increased precision in water height fluctuations is 3.4m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate
* The road was snowed in making access to Hare Lake unavailable.
Afterwards an aerial view determined that the adjacent bays to the discharge points were also frozen.

Marathon PGM
Summary of Stream Field Data
Location S6

	08-Jul-08			30-Jul-08			25-Aug-08			22-Sep-08			21-Oct-08			19-Nov-08			05-May-09			10-Jun-09			14-Jul-09			04-Aug-09			01-Sep-09			08-Oct-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0																																				
0.2																																				
0.4																																				
0.6																																				
0.8	0	NA	-							*	*	*	0	NA	0	**	**	**	0	NA											0	0	0			
0.9				0	NA	0				*	*	*				**	**	**				0	NA	0	0	NA	0	0	NA	0						
1.0	0.03	NM	-	0.02	NA	0				*	*	*	0.02	<0.01	0.00001	**	**	**	0.13	0.23	0.00091	0.11	0.03	0.00011	0.08	0.04	0.00020	0.10	<0.01	0.00006	0.10	0.01	0.00006	0.00	NA	0
1.1							0	NA	0	*	*	*				**	**	**																0.11	0.29	0.00243
1.2	0.10	NM	-	0.09	0.52	0.00285	0.01	NA	0	*	*	*	0.07	0.86	0.00367	**	**	**	0.15	0.36	0.00248	0.14	0.59	0.00378	0.11	0.47	0.00315	0.16	0.42	0.00410	0.19	0.65	0.00753	0.14	0.28	0.00359
1.4	0.095	NM	-	0.08	0.45	0.00220	0.03	NA	0	*	*	*	0.07	0.77	0.00329	**	**	**	0.21	0.75	0.00967	0.13	0.66	0.00520	0.11	0.15	0.00101	0.07	1.17	0.00500	0.18	0.92	0.01010	0.08	0.01	0.00007
1.6	0.095	NM	-	0.07	<0.01	0.00004	0.02	NA	0	*	*	*	0.05	<0.01	0.00003	**	**	**	0.17	0.95	0.00987	0.1	0.23	0.00105	0.04	0.04	0.00010	0.12	0.55	0.00403	0.14	0.55	0.00352	0.05	0.02	0.00009
1.7							0	NA	0	*	*	*				**	**	**														0.00000	0.02	NA	0
1.8	0.05	NM	-	0.05	NA	0				*	*	*	0.01	<0.01	0.00001	**	**	**	0.11	1.21	0.00815	0.02	NA	0	0.03	<0.01	0.00002	0.07	0.08	0.00034	0.12	0.56	0.00307	0.02	NA	0
2.0	0.04	NM	-	0.02	NA	0				*	*	*	0.04	<0.01	0.00002	**	**	**	0.08	0.23	0.00112	0.03	NA	0	0.01	<0.01	0.00001	0.04	0.16	0.00039	0.05	0.41	0.00125	0.01	NA	0
2.2	0.045	NM	-	0.02	NA	0				*	*	*	0.03	<0.01	0.00002	**	**	**	0.09	1.28	0.00702	0.02	NA	0	0.01	<0.01	0.00000	0.05	0.71	0.00217	0.05	1.08	0.00329	0.01	NA	0
2.4	0.04	NM	-	0.01	NA	0				*	*	*	0	<0.01	0	**	**	**	0.09	1.31	0.00720	0.01	NA	0	0.00	NA	0	0.05	0.27	0.00082	0.05	1.05	0.00320	0.01	NA	0
2.6	0.03	NM	-	0.02	NA	0				*	*	*	0.01	<0.01	0.00001	**	**	**	0.08	1.41	0.00688	0.01	NA	0	0.01	<0.01	0.00001	0.03	<0.01	0.00002	0.05	0.92	0.00281	0.01	NA	0
2.8	0.04	NM	-	0.02	NA	0				*	*	*	0.03	<0.01	0.00002	**	**	**	0.07	1.41	0.00602	0.01	NA	0	0.01	<0.01	0.00000	0.03	<0.01	0.00002	0.04	0.80	0.00195	0.01	NA	0
3.0	0.03	NM	-	0.03	NA	0				*	*	*	0.02	<0.01	0.00001	**	**	**	0.08	1.35	0.00656	0.005	NA	0	0.01	<0.01	0.00000	0.02	<0.01	0.00001	0.04	1.07	0.00261	0.01	NA	0
3.2	0.02	NM	-	0.01	NA	0				*	*	*	0.01	<0.01	0.00001	**	**	**	0.07	0.72	0.00308	0.01	NA	0	0	NA	0	0.03	<0.01	0.00002	0.05	0.89	0.00271	0.01	NA	0
3.4	0	NA	-	0	NA	0				*	*	*	0	NA	0	**	**	**	0.06	0.85	0.00312	0.01	NA	0				0.03	<0.01	0.00002	0.03	1.01	0.00185	0.01	NA	0
3.6																			0.06	0.95	0.00348	0.003	NA	0				0.03	<0.01	0.00002	0.04	0.89	0.00217	0.01	NA	0
3.8																			0.05	1.08	0.00330	0.02	NA	0				0.02	<0.01	0.00001	0.04	0.83	0.00203	0.02	NA	0
4.0																			0.07	0.82	0.00350	0.03	NA	0				0.05	0.33	0.00101	0.06	0.67	0.00245	0.02	0.08	0.00020
4.2																												0	NA	0	0	0	0	0	NA	0
4.4																																				
4.6																																				
4.8																																				
Total Stream Width (m)	2.6			2.5			0.6			*			2.6			**			3.2			3.1			2.3			3.3			3.4			3.2		
Total Discharge (m^3/s)	-			0.00509			0			*			0.00709			**			0.08238			0.01015			0.00449			0.01803			0.05062			0.00638		
Field Chemistry																																				
Temp (^oC)	14.9			14.1			14.9			*			4.0			**			4.2			11.2			19.5			13.1			13.2			7.2		
pH	7.93			8.09			8.00			*			8.03			**			7.84			7.28			8.29			8.19			8.40			8.08		
EC (uS)	113			174			390			*			320			**			88			156			216			6.07			89			168		
DO (mg/L)	3.47			6.15			6.82			*			3.75			**			1.14			0.39			0.25			108			3.23			1.92		
Appearance	slightly tannic			clear			clear			*			clear			**			slightly cloudy turbid			NA			NA			slightly cloud, light grey			clear			clear		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
Could not advance measuring stake through stream bed
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate
* Due to the low water conditions the Pic River was non navigatable by boat
** The upper portion of the Pic River was frozen and was non navigatable by boat

Marathon PGM
Summary of Hydrogeological Field Data
Location S7

	07-Jul-08			30-Jul-08			29-Aug-08			25-Sep-08			20-Oct-08			17-Nov-08			09-Jun-09			14-Jul-09			04-Aug-09			01-Sep-09			05-Oct-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0																																	
0.2																																	
0.4																																	
0.6																																	
0.8	0	NA	-	0	NA	0				0	NA	0				0	NA	0															
0.9							0	NA	0				0	NA	0				0	NA	0	0	NA	0	0	NA	0				0	NA	0
1.0	0.14	NM	-	0.05	NA	0.00000	0.02	NA	0	0.02	NA	0	0.06	<0.01	0.00003	0.23	0.45	0.00631	0.03	0.23	0.00032	0.06	0.29	0.00080	0.15	0.30	0.00206	0	NA	0	0.04	0.18	0
1.2	0.12	NM	-	0.08	<0.01	0.00005	0.02	NA	0	0.05	NA	0	0.09	0.60	0.00329	0.26	1.20	0.01903	0.06	0.62	0.00228	0.07	0.36	0.00154	0.07	1.70	0.00726	0.26	0.15	0.00238	0.00	NA	0.00000
1.4	0.24	NM	-	0.10	<0.01	0.00006	0.09	<0.01	0.00005	0.08	<0.01	0.00005	0.08	<0.01	0.00005	0.22	2.70	0.03623	0.07	0.75	0.00322	0.07	0.26	0.00111	0.14	1.46	0.01247	0.27	0.95	0.01565	0.01	NA	0.00000
1.6	0.26	NM	-	0.14	0.35	0.00299	0.06	<0.01	0.00004	0.13	0.28	0.00222	0.16	0.41	0.00400	0.29	1.83	0.03237	0.12	0.92	0.00672	0.10	0.53	0.00323	0.11	1.68	0.01127	0.26	1.56	0.02474	0.08	0.04	0.00017
1.8	0.23	NM	-	0.10	0.24	0.00146	0.08	<0.01	0.00005	0.18	<0.01	0.00011	0.12	1.23	0.00900	0.33	0.67	0.01349	0.13	0.10	0.00078	0.14	0.23	0.00196	0.20	NA	0	0.30	2.10	0.03843	0.12	0.18	0.00132
2.0	0.18	NM	-	0.19	0.80	0.00927	0.18	<0.01	0.00011	0.20	1.52	0.01854	0.17	0.40	0.00415	0.40	1.56	0.03806	0.18	0.03	0.00036	0.13	0.06	0.00048	0.25	0.25	0.00381	0.32	NA	0	0.16	0.07	0.00068
2.2	0.28	NM	-	0.22	<0.01	0.00013	0.17	0.16	0.00166	0.26	<0.01	0.00016	0.27	0.41	0.00675	0.34	2.31	0.04791	0.21	0.75	0.00967	0.20	0.51	0.00622	0.24	2.33	0.03411	0.35	2.80	0.05978	0.17	0.42	0.00436
2.4	0.30	NM	-	0.20	<0.01	0.00012	0.17	<0.01	0.00010	0.25	<0.01	0.00015	0.24	0.12	0.00176	0.40	0.25	0.00610	0.17	1.31	0.01361	0.16	1.86	0.01815	0.23	0.14	0.00196	0.37	2.65	0.05981	0.14	0.16	0.00137
2.6	0.22	NM	-	0.20	0.60	0.00732	0.12	0.21	0.00154	0.25	0.31	0.00473	0.23	0.57	0.00800	0.35	0.17	0.00363	0.19	0.62	0.00722	0.19	0.37	0.00429	0.26	0.01	0.00016	0.35	0.02	0.00043	0.19	0.72	0.00834
2.8	0.23	NM	-	0.17	0.61	0.00633	0.20	<0.01	0.00012	0.22	0.63	0.00845	0.19	0.59	0.00684	0.37	0.29	0.00655	0.19	0.03	0.00038	0.19	0.01	0.00012	0.26	NA	0	0.31	NA	0	0.15	0.05	0.00046
3.0	0.27	NM	-	0.20	0.53	0.00647	0.18	<0.01	0.00011	0.20	0.56	0.00683	0.22	0.57	0.00765	0.38	0.21	0.00487	0.18	0.00	0.00000	0.22	0.01	0.00013	0.26	0.15	0.00238	0.36	NA	0	0.20	0.04	0.00049
3.2	0.09	NM	-	0.02	<0.01*	0.00001	0.21	<0.01*	0.00013	0.16	<0.01*	0.00010	0.21	<0.01*	0.00013	0.14	<0.01*	0.00009	0.12	0.06	0.00043	0.19	0.01	0.00012	0.26	0.78	0.01237	0.37	NA	0	0.01	NA	0.00000
3.4	0.34	NM	-	0.26	0.31	0.00492	0.14	<0.01	0.00009	0.25	0.31	0.00473	0.22	0.06	0.00081	0.40	0.44	0.01074	0.22	0.82	0.01101	0.22	0.18	0.00242	0.27	1.61	0.02652	0.35	0.32	0	0.16	0.00	0.00000
3.6	0.30	NM	-	0.23	0.42	0.00589	0.15	<0.01	0.00009	0.20	0.32	0.00390	0.23	0.89	0.01249	0.41	1.60	0.04002	0.20	0.92	0.01121	0.20	0.54	0.00659	0.29	1.67	0.02954	0.36	1.34	0.02943	0.19	0.00	0.00000
3.8	0.28	NM	-	0.19	0.75	0.00869	0.23	<0.01	0.00014	0.20	0.41	0.00500	0.22	1.64	0.02201	0.36	2.18	0.04787	0.22	0.85	0.01145	0.19	0.35	0.00406	0.31	2.60	0.04917	0.34	2.52	0.05226	0.20	0.22	0.00268
4.0	0.30	NM	-	0.26	0.76	0.01205	0.09	0.30	0.00165	0.18	0.72	0.00791	0.27	0.83	0.01367	0.34	2.78	0.05766	0.19	1.18	0.01369	0.24	0.80	0.01171	0.30	2.65	0.04850	0.40	2.30	0.05612	0.22	0.52	0.00698
4.2	0.30	NM	-	0.23	0.85	0.01193	0.18	0.42	0.00461	0.22	1.14	0.01530	0.32	0.31	0.00605	0.35	1.80	0.03843	0.24	0.39	0.00576	0.26	1.01	0.01602	0.29	1.12	0.01981	0.42	2.78	0.07122	0.17	0.47	0.00487
4.4	0.27	NM	-	0.22	0.52	0.00698	0.07	0.20	0.00085	0.18	<0.01	0.00011	0.22	0.22	0.00295	0.35	0.30	0.00640	0.22	0.10	0.00132	0.22	0.81	0.01087	0.28	0.95	0.01623	0.38	2.35	0.05447	0.18	0.65	0.00714
4.6	0.19	NM	-	0.11	0.24	0.00161	0.02	<0.01	0.00001	0.14	<0.01	0.00009	0.23	<0.01	0.00014	0.23	0.21	0.00295	0.18	0.03	0.00036	0.19	0.57	0.00661	0.20	0.34	0.00415	0.40	0.85	0.02074	0.07	0.53	0.00226
4.8	0.13	NM	-	0.09	<0.01	0.00005	0.05	<0.01	0.00003	0.08	<0.01	0.00005	0.18	<0.01	0.00011	0.22	0.21	0.00282	0.07	<0.01	0.00004	0.13	0.02	0.00016	0.20	0.04	0.00049	0.36	0.32	0.00703	0.10	0.08	0.00049
5.0	0.16	NM	-	0.09	<0.01	0.00005	0.07	<0.01	0.00004	0.06	<0.01	0.00004	0.11	<0.01	0.00007	0.28	0.12	0.00205	0.15	<0.01	0.00009	0.16	0.00	0.00000	0.22	NA	0	0.35	0.01	0.00021	0.08	0.35	0.00171
5.2	0.19	NM	-	0.13	<0.01	0.00008	0.06	<0.01	0.00004	0.10	<0.01	0.00006	0.13	<0.01	0.00008	0.27	<0.01	0.00016	0.16	<0.01	0.00010	0.22	0.01	0.00013	0.21	0.01	0.00013	0.30	0.00	0	0.11	0.20	0.00134
5.4	0.19	NM	-	0.12	<0.01	0.00007	0.06	<0.01	0.00004	0.12	<0.01	0.00007	0.12	<0.01	0.00007	0.35	<0.01	0.00021	0.17	<0.01	0.00010	0.28	0.13	0.00222	0.23	NA	0	0.34	0.13	0.00270	0.15	0.11	0.00101
5.6	0.19	NM	-	0.13	<0.01	0.00008	0.28	<0.01	0.00017	0.28	<0.01	0.00017	0.15	<0.01	0.00009	0.35	<0.01	0.00021	0.26	<0.01	0.00016	0.29	0.10	0.00177	0.31	NA	0	0.34	0.15	0.00311	0.23	0.16	0.00224
5.8	0.31	NM	-	0.25	<0.01	0.00015	0.25	<0.01	0.00015	0.27	<0.01	0.00016	0.33	<0.01	0.00020	0.44	<0.01	0.00027	0.28	<0.01	0.00017	0.29	0.06	0.00106	0.32	NA	0	0.49	0.05	0.00149	0.23	0.06	0.00084
6.0	0.36	NM	-	0.30	<0.01	0.00018	0.26	<0.01	0.00016	0.25	<0.01	0.00015	0.32	<0.01	0.00020	0.47	<0.01	0.00029	0.27	<0.01	0.00016	0.34	0.03	0.00062	0.40	NA	0	0.40	0.06	0.00146	0.31	0.03	0.00057
6.2	0.29	NM	-	0.28	<0.01	0.00017	0.15	<0.01	0.00009	0.31	<0.01	0.00019	0.37	<0.01	0.00023	0.45	<0.01	0.00027	0.22	<0.01	0.00013	0.30	0.06	0.00110	0.35	NA	0	0.42	0.00	0.00000	0.31	0.02	0.00038
6.4	0.30	NM	-	0.24	<0.01	0.00015	0.005	<0.01	0.00000	0.23	<0.01	0.00014	0.31	<0.01	0.00019	0.22	<0.01	0.00013	0.31	0.10	0.00186	0.20	<0.01	0.00012	0.28	NA	0	0.49	0.01	0.00030	0.17	0.02	0.00021
6.6	0.13	NM	-	0.07	<0.01	0.00004	0	NA	0	0.06	<0.01	0.00004	0.07	<0.01	0.00004	0.23	<0.01	0.00014	0.19	0.03	0.00038	0	NA	0	0.12	NA	0	0.47	0.04	0.00115	0.10	NA	0.00000
6.8	0.14	NM	-	0.01	NA	0				0	NA	0	0	NA	0	0	NA	0	0	NA	0				0.06	NA	0	0.38	0.01	0.00023	0	NA	0.00000
7.0	0	NA	-	0	NA	0																			0	NA	0	0.28	0.04	0.00068			
7.2																												0.17	0.03	0.00031			
7.4																												0	NA	0			
Total Stream Width (m)	6.2			6.2			5.7			6.0			5.9			6.0			5.9			6.6			6.1			6.4			5.9		
Stake Measurement (m)	-			-			0.719			0.685			0.656			0.564																
Total Discharge (m^3/s)	-			0.08732			0.01207			0.07945			0.11104			0.42527			0.10300			0.10360			0.28238			0.51066			0.05023		
Field Chemistry																																	
Temp (^{o}C)	19.4			17.5			14.5			12.0			9.5			0.9			14.8			15.4			13.3			13.3			9.9		
pH	7.26			8.09			7.53			7.00			6.90			7.35			6.07			7.34			7.55			7.55			7.25		
EC (uS)	59			65			57			60			59			70			70			75			72			72			63		
DO (mg/L)	2.01			4.56			6.04			2.10			2.44			2.89			0.30			0.24			5.80			5.80			1.31		
Appearance	slightly tannic			clear			clear			clear			clear			slightly tannic			clear w/ yellow tinge			clear			clear			clear			slightly yellow		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The Interval that stake is located for increased precision in water height fluctuations is 5.6m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate
* Flow taken behind large rock

Marathon PGM
Summary of Stream Field Data
Location S8

	01-Jul-08			28-Jul-08			26-Aug-08			24-Sep-08			22-Oct-08			18-Nov-08			04-May-09			11-Jun-09			15-Jul-09			06-Aug-09			01-Sep-09			07-Oct-09			03-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0																																							
0.2																																							
0.4																																							
0.6	0	NA	-																																				
0.7										0	NA	0																											
0.8	0.03	NM	-							0.03	0.26	0.00036	0	NA	0				0	NA	0				0	NA	0													
0.9																0	NA	0																0	NA	0			
0.95				0	NA	0																0	NA	0															
0.98							0	NA	0																														
1.0	0.31	NM	-	0.14	0.60	0.00320	0.13	0.23	0.00100	0.10	0.18	0.00110	0.13	1.85	0.01467	0.24	1.98	0.02174	0.32	1.54	0.03010	0.14	1.21	0.00648	0.11	0.05	0.00034	0	NA	0	0	NA	0	0.15	0		0	NA	0
1.2	0.35	NM	-	0.16	0.20	0.00195	0.14	0.27	0.00231	0.13	<0.01	0.00008	0.16	0.23	0.00224	0.20	1.96	0.02690	0.32	3.38	0.06596	0.14	0.07	0.00056	0.12	0.09	0.00066	0.18	1.19	0.01307	0.21	2.34	0.02998	0.19	0.33	0.00382	0.25	2.21	0.03370
1.4	0.30	NM	-	0.06	<0.01	0.00004	0.07	<0.01	0.00004	0.09	<0.01	0.00005	0.13	<0.01	0.00008	0.17	1.30	0.02090	0.22	2.13	0.02862	0.11	0.07	0.00044	0.08	0.02	0.00010	0.12	0.20	0.00146	0.29	0.64	0.01132	0.20	0.11	0.00134	0.30	1.59	0.02910
1.6	0.29	NM	-	0.08	<0.01	0.00005	0.06	<0.01	0.00004	0	NA	0	0	NA	0	0.17	0.29	0.00601	0.21	0.20	0.00252	0	NA	0	0.05	0.09	0.00027	0.15	<0.01	0.00009	0.22	NA	0	0.14	0.14	0.00120	0.23	0.15	0.00210
1.8	0.23	NM	-	0.05	<0.01	0.00003	0	NA	0							0	NA	0	0.01	NA	0.00000				0	NA	0	0	NA	0	0	NA	0	0	0.00	0	0	NA	0
1.9																												0	NA	0							0.03	NA	0
2.0	0.09	NM	-	0	NA	0										0.01	NA	0	0.06	0.13	0.00048										0.02	NA	0				0	NA	0
2.2	0.10	NM	-													0	NA	0	0.08	0.03	0.00016										0	NA	0						
2.4	0.005	NM	-																																				
2.6	0	NA	-																																				
2.8																																							
3.0																																							
3.2																																							
3.4																																							
3.6																																							
3.8																																							
4.0																																							
Total Stream Width (m)	2.0			1.1			0.8			0.9			0.8			1.3			1.4			0.7			1.0			0.9			1.2			0.9			1.0		
Stake Measurement (m)	-			-			0.810			0.898			0.859			0.786						0.868																	
Total Discharge (m^3/s)	-			0.00527			0.00339			0.00159			0.01699			0.07555			0.12784			0.00748			0.00137			0.01462			0.04130			0.00636			0.06490		
Field Chemistry																																							
Temp (^{0}C)	15.6			24.3			20.3			14.6			5.2			1.3			9.0			11.9			17.7			16.8			19.7			19.7			4.3		
pH	7.17			6.91			7.34			7.73			7.52			7.78			6.9			6.65			7.43			7.61			7.59			7.59			6.56		
EC (uS)	26			29			33			33			29			34			24			32			46			36			16			16			37		
DO (mg/L)	0.81			4.64			5.75			2.27			5.03			2.26			N/A			0.57			0.47			5.52			2.3			2.3			1.53		
Appearance	slightly tannic			slightly tannic			tannic			slightly tannic			clear			clear			clear, slightly yellow			clear			clear			clear			clear slightly yellow			clear slightly yellow			slightly tannic		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The Interval that stake is located for increased precision in water height fluctuations is 1.2m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Stream Field Data
Location S9

	02-Jul-08			01-Jul-31			26-Aug-08			23-Sep-08			22-Oct-08			20-Nov-08			07-May-09			08-Jun-09			13-Jul-09			05-Aug-09			02-Sep-09			06-Oct-09			05-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0	0	NA	-																0	0	0																	
0.2	0.09	NM	-													0	NA	0	0.22	0.10	0.00099										0	NA	0.00000	0	NA	0.00000	0	NA	0.00000
0.25																												0	NA	0									
0.3				0	NA	0				0	NA	0	0	NA	0																							
0.4	0.12	NM	-	0.04	NA	0				0.02	NA	0	0.01	<0.01	0.00000	0.07	<0.01	0.00004	0.29	0.82	0.00725							0.06	NA	0	0.07	0.04	0	0.01	NA	0.00000	0.15	0.06	0.00055
0.5							0	NA	0													0	NA	0														
0.6	0.17	NM	-	0.05	NA	0	0.01	NA	0	0.06	<0.01	0.00004	0.10	<0.01	0.00006	0.15	<0.01	0.00009	0.35	0.69	0.01103	0.06	0.06	0.00016	0	NA	0	0.10	0.03	0.00018	0.11	0.10	0.00067	0.06	0.05	0.00018	0.18	0.16	0.00176
0.8	0.27	NM	-	0.16	<0.01	0.00010	0.07	<0.01	0.00004	0.13	<0.01	0.00008	0.11	<0.01	0.00007	0.22	<0.01	0.00013	0.40	0.56	0.01361	0.14	0.02	0.00017	0.13	0.01	0.00008	0.16	0.10	0.00098	0.18	0.21	0.00231	0.08	0.06	0.00037	0.25	0.44	0.00839
1.0	0.38	NM	-	0.22	<0.01	0.00013	0.18	<0.01	0.00011	0.33	<0.01	0.00020	0.26	<0.01	0.00016	0.30	<0.01	0.00018	0.54	0.59	0.01945	0.20	0.02	0.00024	0.18	0.01	0.00011	0.19	0.35	0.00406	0.29	0.39	0.00690	0.16	0.07	0.00102	0.29	0.55	0.01459
1.2	0.37	NM	-	0.25	<0.01	0.00015	0.16	<0.01	0.00010	0.19	<0.01	0.00012	0.21	<0.01	0.00013	0.26	<0.01	0.00016	0.53	1.18	0.03819	0.21	0.08	0.00102	0.20	0.03	0.00037	0.20	0.27	0.00329	0.32	0.15	0.00293	0.25	0.08	0.00183	0.36	0.38	0.01252
1.4	0.43	NM	-	0.29	<0.01	0.00018	0.23	<0.01	0.00014	0.29	<0.01	0.00018	0.29	0.12	0.00212	0.33	<0.01	0.00020	0.33	1.05	0.02113	0.18	0.01	0.00011	0.16	0.02	0.00020	0.26	<0.01	0.00016	0.34	0.06	0.00124	0.23	0.01	0.00021	0.28	0.23	0.00589
1.6	0.36	NM	-	0.28	<0.01	0.00017	0.19	<0.01	0.00012	0.22	<0.01	0.00013	0.22	0.38	0.00510	0.31	<0.01	0.00019	0.50	0.82	0.02502	0.26	0.01	0.00016	0.25	0.07	0.00107	0.28	0.04	0.00068	0.38	0.10	0.00232	0.25	0.03	0.00069	0.34	0.11	0.00342
1.8	0.40	NM	-	0.26	<0.01	0.00016	0.24	<0.01	0.00015	0.22	<0.01	0.00013	0.14	0.36	0.00307	0.29	<0.01	0.00018	0.48	0.56	0.01633	0.25	0.06	0.00092	0.22	0.03	0.00040	0.31	0.20	0.00378	0.32	0.01	0.00020	0.23	0.07	0.00147	0.34	0.21	0.00653
2.0	0.50	NM	-	0.38	0.31	0.00719	0.23	<0.01	0.00014	0.23	<0.01	0.00014	0.29	0.12	0.00212	0.27	<0.01	0.00016	0.47	1.57	0.04515	0.27	0.27	0.00445	0.25	0.05	0.00076	0.29	0.26	0.00460	0.29	0.22	0.00389	0.20	0.05	0.00092	0.25	0.32	0.00732
2.2	0.55	NM	-	0.33	0.30	0.00604	0.35	<0.01	0.00021	0.28	0.14	0.00239	0.38	0.38	0.00881	0.43	0.40	0.01049	0.56	1.38	0.04707	0.23	0.30	0.00421	0.21	0.03	0.00038	0.30	0.42	0.00769	0.45	0.31	0.00851	0.24	0.15	0.00329	0.37	0.31	0.01050
2.4	0.56	NM	-	0.30	0.21	0.00384	0.26	<0.01	0.00016	0.32	0.25	0.00488	0.32	0.36	0.00703	0.38	0.48	0.01113	0.51	2.00	0.06226	0.31	0.32	0.00605	0.30	0.20	0.00366	0.37	0.66	0.01490	0.45	0.60	0.01647	0.36	0.24	0.00791	0.49	0.82	0.03676
2.6	0.42	NM	-	0.34	0.26	0.00539	0.26	<0.01	0.00016	0.31	<0.01	0.00019	0.33	0.30	0.00604	0.36	0.57	0.01252	0.55	1.90	0.06384	0.26	0.17	0.00270	0.25	0.20	0.00305	0.34	0.56	0.01161	0.36	0.33	0.00725	0.32	0.08	0.00234	0.42	0.23	0.00884
2.8	0.48	NM	-	0.35	0.19	0.00406	0.24	<0.01	0.00015	0.31	<0.01	0.00019	0.31	<0.01	0.00019	0.39	0.35	0.00833	0.50	0.69	0.02101	0.26	0.18	0.00285	0.24	0.17	0.00249	0.32	0.45	0.00878	0.38	0.32	0.00742	0.30	0.14	0.00384	0.42	0.16	0.00615
3.0	0.46	NM	-	0.14	0.27	0.00231	0.13	<0.01	0.00008	0.32	<0.01	0.00020	0.34	<0.01	0.00021	0.35	0.21	0.00448	0.41	1.18	0.02954	0.24	0.13	0.00190	0.23	0.19	0.00267	0.30	0.28	0.00512	0.31	0.28	0.00529	0.28	0.08	0.00205	0.25	0.83	0.01899
3.2	0.36	NM	-	0.17	0.52	0.00539	0.07	<0.01	0.00004	0.12	<0.01	0.00007	0.12	0.38	0.00278	0.20	0.55	0.00671	0.46	1.18	0.03314	0.11	0.18	0.00121	0.08	0.01	0.00005	0.20	0.38	0.00464	0.21	0.66	0.00845	0.19	0.06	0.00104	0.25	1.45	0.03317
3.4	0.28	NM	-	0.10	0.21	0.00128	0	NA	0	0.16	<0.01	0.00010	0.16	<0.01	0.00010	0.19	0.50	0.00580	0.37	0.95	0.02147	0.16	0.12	0.00117	0.15	0.01	0.00009	0.21	0.50	0.00641	0.22	0.85	0.01141	0.15	0.06	0.00082	0.20	0.76	0.01391
3.6	0.24	NM	-	0.03	NA	0				0.13	<0.01	0.00008	0.11	<0.01	0.00007	0.20	0.30	0.00229	0.10	0.07	0.00025	0.08	0.13	0.00040	0.06	0.02	0.00005	0.16	0.35	0.00342	0.17	0.55	0.00356	0.11	0.09	0.00068	0.23	0.12	0.00189
3.65				0	NA	0																																	
3.8	0.20	NM	-							0.09	<0.01	0.00004	0.05	<0.01	0.00003	0	NA	0	0.03	NA	0	0.05	<0.01	0.00003	0.03	<0.01	0.00002	0.17	0.24	0.00187	0.21	0.07	0.00056	0.1	0.03	0.00014	0	NA	0.00000
3.9										0	NA	0													0	NA	0	0	NA	0	0	NA	0.00000	0	NA	0.00000			
4.0	0.09	NM	-										0	NA	0				0.04	NA	0	0	NA	0														
4.2	0	NA	-																0	NA	0																	
Total Stream Width (m)	4.2			3.4			2.9			3.6			3.7			3.6			4.2			3.5			3.3			3.7			3.7			3.7			3.6		
Total Discharge (m^3/s)	-			0.03639			0.00159			0.00915			0.03809			0.06308			0.47675			0.02776			0.01544			0.08216			0.08946			0.02881			0.19118		
Field Chemistry																																							
Temp (^{o}C)	14.7			16.7			14.9			12.9			3.5			0			7.4			15.6			17.3			14.9			13.6			7.8			2.1		
pH	5.36			7.49			6.63			6.21			6.58			6.96			8.52			8.95			8.83			6.64			5.83			7.11					
EC (uS)	8			10			15			11			10			3			10			14			12			10			8			12			9		
DO (mg/L)	1.37			6.03			6.47			5.48			4.33			2.76			2.6			0.31			0.23			4.2			3.5			1.39			1.07		
Appearance	slightly tannic			slightly tannic			tannic			slightly tannic			slightly tannic			slightly tannic			yellow tinge			clear			clear			clear, yellow			clear, yellow			clear, yellow			slightly tannic		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
Could not advance measuring stake through stream bed
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Stream Field Data
Location S10

Distance Panel	07-Jul-08			31-Jul-08			27-Aug-08			22-Sep-08			21-Oct-08			19-Nov-08			07-May-09			10-Jun-09			05-Aug-09			31-Aug-09			08-Oct-09			05-Nov-09		
	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0																																				
0.2										0	NA	0				*	*	*	0	NA	0													0	NA	)
0.4	0	NA	-	0	NA	0	0	NA	0	0.39	<0.01	0.00024	0	NA	0	*	*	*	0.14	0.10	0.00126				0	NA	0	0	NA	0	0	NA	0	0.07	0.09	0.00058
0.6	0.19	NM	-	0.36	<0.01	0.00022	0.33	<0.01	0.00020	0.43	<0.01	0.00026	0.33	<0.01	0.00020	*	*	*																		
0.8	0.33	NM	-	0.38	<0.01	0.00023	0.57	<0.01	0.00035	0.65	<0.01	0.00040	0.54	<0.01	0.00033	*	*	*	0.28	0.03	0.00112	0	NA	0	0.2	0.13	0.00317	0.22	0.03	0.00081	0.15	0.05	0.00092	0.21	0.03	0.00077
1.0	0.35	NM	-	0.46	<0.01	0.00028	0.58	<0.01	0.00035	0.63	<0.01	0.00038	0.58	<0.01	0.00035	*	*	*																		
1.2	0.38	NM	-	0.50	<0.01	0.00031	0.61	<0.01	0.00037	0.59	<0.01	0.00036	0.17	<0.01	0.00010	*	*	*	0.3	0.36	0.01321	0.02	NA	0	0.22	0.10	0.00268	0.25	0.01	0.00031	0.2	0.05	0.00122	0.25	0.02	0.00061
1.4	0.43	NM	-	0.47	<0.01	0.00029	0.57	<0.01	0.00035	0.59	<0.01	0.00036	0.60	<0.01	0.00037	*	*	*																		
1.6	0.43	NM	-	0.52	<0.01	0.00032	0.55	<0.01	0.00034	0.55	<0.01	0.00034	0.55	<0.01	0.00034	*	*	*	0.33	0.52	0.02113	0.06	0.07	0.00048	0.24	0.11	0.00322	0.28	0.08	0.00273	0.22	0.04	0.00107	0.28	0.07	0.00239
1.8	0.43	NM	-	0.52	<0.01	0.00032	0.51	<0.01	0.00031	0.55	<0.01	0.00034	0.52	<0.01	0.00032	*	*	*																		
2.0	0.43	NM	-	0.49	<0.01	0.00030	0.50	<0.01	0.00031	0.56	<0.01	0.00034	0.53	<0.01	0.00032	*	*	*	0.45	0.52	0.02882	0.12	0.10	0.00144	0.29	0.09	0.00318	0.33	0.22	0.00886	0.28	0.04	0.00137	0.33	0.18	0.00725
2.2	0.45	NM	-	0.49	<0.01	0.00030	0.50	<0.01	0.00031	0.59	<0.01	0.00036	0.55	<0.01	0.00034	*	*	*																		
2.4	0.47	NM	-	0.51	<0.01	0.00031	0.52	<0.01	0.00032	0.59	<0.01	0.00036	0.57	<0.01	0.00035	*	*	*	0.49	0.46	0.02746	0.19	0.10	0.00228	0.36	0.14	0.00615	0.38	0.17	0.00788	0.32	0.05	0.00195	0.38	0.23	0.01066
2.6	0.47	NM	-	0.53	<0.01	0.00032	0.55	<0.01	0.00034	0.61	<0.01	0.00037	0.57	<0.01	0.00035	*	*	*																		
2.8	0.47	NM	-	0.53	<0.01	0.00032	0.56	<0.01	0.00034	0.60	<0.01	0.00037	0.58	<0.01	0.00035	*	*	*	0.51	0.46	0.02858	0.19	0.10	0.00228	0.38	0.13	0.00603	0.39	0.22	0.01047	0.44	0.05	0.00268	0.39	0.32	0.01523
3.0	0.48	NM	-	0.52	<0.01	0.00032	0.55	<0.01	0.00034	0.59	<0.01	0.00036	0.59	<0.01	0.00036	*	*	*																		
3.2	0.47	NM	-	0.51	<0.01	0.00031	0.54	<0.01	0.00033	0.60	<0.01	0.00037	0.60	<0.01	0.00037	*	*	*	0.45	0.33	0.01801	0.13	0.03	0.00052	0.34	0.22	0.00913	0.34	0.26	0.01078	0.27	0.05	0.00165	0.33	0.31	0.01248
3.4	0.46	NM	-	0.50	<0.01	0.00031	0.54	<0.01	0.00033	0.59	<0.01	0.00036	0.59	<0.01	0.00036	*	*	*																		
3.6	0.44	NM	-	0.49	<0.01	0.00030	0.53	<0.01	0.00032	0.57	<0.01	0.00035	0.55	<0.01	0.00034	*	*	*	0.4	0.72	0.03522	0.12	NA	0	0.3	0.22	0.00805	0.3	0.34	0.01244	0.26	0.06	0.00190	0.29	0.4	0.01415
3.8	0.43	NM	-	0.48	<0.01	0.00029	0.50	<0.01	0.00031	0.55	<0.01	0.00034	0.55	<0.01	0.00034	*	*	*																		
4.0	0.40	NM	-	0.46	<0.01	0.00028	0.49	<0.01	0.00030	0.55	<0.01	0.00034	0.53	<0.01	0.00032	*	*	*	0.41	0.79	0.03939	0.12	0.03	0.00048	0.3	0.10	0.00366	0.3	0.37	0.01354	0.26	0.04	0.00127	0.31	0.37	0.01399
4.2	0.40	NM	-	0.46	<0.01	0.00028	0.49	<0.01	0.00030	0.58	<0.01	0.00035	0.55	<0.01	0.00034	*	*	*																		
4.4	0.42	NM	-	0.49	<0.01	0.00030	0.52	<0.01	0.00032	0.61	<0.01	0.00037	0.57	<0.01	0.00035	*	*	*	0.43	0.56	0.02926	0.13	NA	0	0.32	0.23	0.00898	0.34	0.26	0.01078	0.29	0.05	0.00177	0.32	0.41	0.01601
4.6	0.45	NM	-	0.51	<0.01	0.00031	0.56	<0.01	0.00034	0.66	<0.01	0.00040	0.60	<0.01	0.00037	*	*	*																		
4.8	0.50	NM	-	0.50	<0.01	0.00031	0.62	<0.01	0.00038	0.69	<0.01	0.00042	0.64	<0.01	0.00039	*	*	*	0.45	0.66	0.03602	0.17	0.10	0.00204	0.35	0.22	0.00939	0.4	0.35	0.01708	0.34	0.05	0.00207	0.38	0.36	0.01669
5.0	0.55	NM	-	0.51	<0.01	0.00031	0.64	<0.01	0.00039	0.72	<0.01	0.00044	0.67	<0.01	0.00041	*	*	*																		
5.2	0.56	NM	-	0.50	<0.01	0.00031	0.67	<0.01	0.00041	0.74	<0.01	0.00045	0.70	<0.01	0.00043	*	*	*	0.55	0.52	0.03522	0.23	0.10	0.00276	0.41	0.22	0.01100	0.45	0.35	0.01922	0.39	0.06	0.00285	0.43	0.31	0.01626
5.4	0.60	NM	-	0.56	0.14	0.00478	0.70	<0.01	0.00043	0.76	<0.01	0.00046	0.72	<0.01	0.00044	*	*	*																		
5.6	0.52	NM	-	0.66	<0.01	0.00040	0.72	<0.01	0.00044	0.77	<0.01	0.00047	0.74	<0.01	0.00045	*	*	*	0.59	0.98	0.07085	0.27	0.13	0.00324	0.46	0.22	0.00926	0.5	0.41	0.02501	0.45	0.04	0.00220	0.5	0.34	0.02074
5.8	0.61	NM	-	0.67	<0.01	0.00041	0.72	<0.01	0.00044	0.81	<0.01	0.00049	0.78	<0.01	0.00048	*	*	*				0.27	0.20	0.00324	0.47	0.17	0.00487	0.48	0.38	0.02225				0.47	0.17	0.00975
6.0	0.66	NM	-	0.71	0.28	0.01213	0.76	<0.01	0.00046	0.85	<0.01	0.00052	0.80	<0.01	0.00049	*	*	*	0.63	0.43	0.03278	0.27	0.13	0.00324	0.42	0.15	0.00576	0.5	0.39	0.02379	0.43	0.04	0.00210	0.49	0.27	0.01614
6.2	0.67	NM	-	0.72	<0.01	0.00044	0.77	<0.01	0.00047	0.89	<0.01	0.00054	0.82	<0.01	0.00050	*	*	*																		
6.4	0.72	NM	-	0.77	<0.01	0.00047	0.83	<0.01	0.00051	0.46	<0.01	0.00028	0.88	<0.01	0.00054	*	*	*	0.48	0.13	0.00769	0.26	0.13	0.00416	0.45	0.02	0.00110	0.45	0.17	0.00933	0.39	0.05	0.00238	0.42	0.06	0.00307
6.6	0.70	NM	-	0.18	<0.01	0.00011	0.44	<0.01	0.00027	0.10	<0.01	0.00006	0.28	<0.01	0.00017	*	*	*																		
6.8	0.03	NM	-	0.04	NA	0	0.09	<0.01	0.00005	0.08	<0.01	0.00005	0.13	<0.01	0.00008	*	*	*	0.25	0.30	0.00901	0.12	0.07	0.00096	0.29	0.05	0.00177	0.31	0.08	0.00303	0.28	0.05	0.00171	0.27	0.02	0.00066
7.0	0	NA	-	0	NA	0	0.03	NA	0	0.03	<0.01	0.00002	0.07	<0.01	0.00004	*	*	*																		
7.2							0	NA	0	0	NA	0	0.02	<0.01	0.00001	*	*	*	0.2	0.13	0.00320	0	NA	0	0.12	NA	0	0.14	0.01	0.00017	0.16	0.04	0.00078	0.14	0.03	0.00051
7.4													0	NA	0	*	*	*																		
7.6																			0.12	0.03	0.00048				0.08	NA	0	0.1	0.01	0	0.05	0.04	0.00031	0.11	0.04	0.00067
8.0																			0.08	0.07	0.00064				0.01	NA	0	0.04	0	0				0.02	NA	0.00000
8.2																															0	NA	0.00000			
8.4																			0.06	0.03	0.00018				0	NA	0	0	NA	0				0	NA	0.00000
8.55																																				
8.6																			0	NA	0															
Total Stream Width (m)	6.6			6.6			6.0			7.0			7.0			*			8.4			6.4			8.0			8.0			7.8			8.2		
Stake Measurement (m)	-			-			0.134			0.080			0.100			*			0.058									0.480			0.480			0.480		
Total Discharge (m^3/s)	-			0.02587			0.01100			0.01191			0.01127			*			0.43953			0.02714			0.09742			0.19848			0.03020			0.17861		
Field Chemistry																																				
Temp (^{o}C)	18.5			18.3			19.2			11.2			6.2			*			8.1			11.9			15.2			14.7			9.2			3		
pH	6.50			7.15			7.00			7.11			7.10			*			6.82			7.11			6.18			6.01			7.33			5.20		
EC (uS)	15			17			39			17			13			*			16			16			13			15			13			12		
DO (mg/L)	2.71			5.69			4.10			4.32			3.21			*			1.16			0.34			3.15			2.27			1.58			1.39		
Appearance	slightly tannic			slightly tannic			slightly tannic			slightly tannic			slightly tannic			*			clear w/ slt. yellow			slightly yellow, clear			clear slt. yellow			clear. yellow			clear slightly tannic			clear slightly tannic		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The interval that stake is located for increased precision in water height fluctuations is 1.6m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate
Downgradient beaver dam impeded the flow of water and flooded channel.
* The road was snowed in making access to Hare Lake unavailable.
Afterwards an aerial view determined that the adjacent bays to the discharge points were also frozen.

Marathon PGM
Summary of Stream Field Data
Location S11

	03-Jul-08			28-Jul-08			25-Aug-08			22-Sep-08		
Distance Panel (m)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)
0												
0.7	0	NA	-	0	NA	0						
1.2										0	NA	0
1.3							0	NA	0			
1.4	0.43	NM	-	0.12	0.27	0.00445	0.07	<0.01	0.00009	0.12	<0.01	0.00016
2.1	0.40	NM	-	0.11	0.08	0.00188	0.06	0.49	0.00628	0.11	<0.01	0.00023
2.8	0.47	NM	-	0.10	1.09	0.02327	0.10	0.96	0.02050	0.12	0.88	0.02255
3.5	0.47	NM	-	0.10	0.34	0.00726	0.03	0.27	0.00173	0.14	0.43	0.01285
4.2	0.39	NM	-	0.08	0.62	0.01059	0.05	<0.01	0.00011	0.09	0.84	0.01614
4.9	0.39	NM	-	0.14	0.25	0.00747	0.08	<0.01	0.00017	0.14	0.46	0.01375
5.6	0.33	NM	-	0.13	0.79	0.02193	0.09	0.33	0.00634	0.16	1.01	0.03450
6.3	0.35	NM	-	0.08	0.52	0.00888	0.03	NA	0	0.19	0.43	0.01744
7.0	0.29	NM	-	0.02	NA	0	0	NA	0	0.03	NA	0
7.7	0.22	NM	-	0	NA	0	0	NA	0	0	NA	0
8.4	0.24	NM	-	0	NA	0	0	NA	0	0	NA	0
9.1	0.22	NM	-	0	NA	0	0	NA	0	0	NA	0
9.8	0.42	NM	-	0.04	NA	0	0	NA	0	0.05	NA	0
10.5	0.55	NM	-	0.12	0.25	0.00640	0.01	NA	0	0.16	<0.01	0.00034
11.2	0.68	NM	-	0.28	0.43	0.02571	0.19	<0.01	0.00041	0.31	0.53	0.03508
11.9	0.76	NM	-	0.42	0.88	0.07891	0.30	0.26	0.01665	0.45	0.90	0.08647
12.6	0.66	NM	-	0.30	0.66	0.03170	0.21	0.22	0.00740	0.32	0.65	0.03331
12.95				0	NA	0	0	NA	0			
13.3	0.26	NM	-							0	NA	0
13.6												
14.0	0	NA	-									
Total Stream Width (m)	13.3			12.3			11.7			12.1		
Stake Measurement (m)	-			-			0.837			0.796		
Total Discharge (m^3/s)	-			0.22845			0.05966			0.27283		
Field Chemistry												
Temp (^{o}C)	16.1			23.5			20.9			14.0		
pH	7.40			7.46			8.20			7.33		
EC (uS)	15			22			25			31		
DO (mg/L)	0.97			5.60			6.78			4.73		
Appearance	clear			clear			clear			clear		

	21-Oct-08			21-Nov-08			21-Nov-08			08-May-09			08-Jun-09		
Distance Panel (m)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)
0															
0.7															
1.2															
1.3	0	NA	0							0	NA	0	0	NA	0
1.4	0.14	<0.01	0.00017	0	NA	0	*	*	*	0.44	0.30	0.01585	0.60	0.30	0.02196
2.1	0.13	0.50	0.01388	0.22	0.92	0.04321	*	*	*	0.43	1.90	0.17469	0.15	0.42	0.01345
2.8	0.15	1.20	0.03843	0.24	1.95	0.09992	*	*	*	0.40	2.85	0.24376	0.19	1.22	0.04949
3.5	0.15	0.85	0.02722	0.20	2.39	0.10205	*	*	*	0.34	3.58	0.25959	0.06	1.14	0.01460
4.2	0.11	0.99	0.02325	0.20	1.97	0.08412	*	*	*	0.47	4.20	0.42140	0.12	0.85	0.02178
4.9	0.17	0.51	0.01851	0.23	2.06	0.10116	*	*	*	0.42	4.72	0.42364	0.08	0.49	0.00837
5.6	0.10	1.18	0.02519	0.15	2.31	0.07398	*	*	*	0.45	2.62	0.25217	0.12	0.51	0.01307
6.3	0.10	0.66	0.01409	0.60	1.53	0.19599	*	*	*	0.36	3.28	0.25217	0.07	0.49	0.00732
7.0	0.04	NA	0	0.12	0.98	0.02511	*	*	*	0.34	3.51	0.25483	0.02	0.17	0.00073
7.7	0	NA	0	0.03	NA	0	*	*	*	0.24	4.17	0.21350	0	NA	0.00000
8.4	0	NA	0	0.06	0.68	0.00871	*	*	*	0.24	4.33	0.22191	0	NA	0.00000
9.1	0	NA	0	0.05	NA	0	*	*	*	0.25	3.67	0.19613	0	NA	0.00000
9.8	0.10	<0.01	0.00021	0.21	0.35	0.01569	*	*	*	0.37	2.69	0.21252	0.05	0.03	0.00032
10.5	0.22	0.51	0.02395	0.28	1.14	0.06815	*	*	*	0.50	3.97	0.42378	0.15	0.02	0.00064
11.2	0.35	0.74	0.05530	0.47	1.62	0.16256	*	*	*	0.70	2.13	0.31871	0.32	0.82	0.05602
11.9	0.48	1.29	0.13220	0.57	1.37	0.16672	*	*	*	0.80	2.13	0.36424	0.48	1.12	0.11478
12.6	0.33	1.40	0.07398	0.54	1.60	0.18446	*	*	*	0.70	2.69	0.30155	0.02	0.70	0.00224
12.95							*	*	*						
13.3	0	NA	0	0.11	<0.01	0.00017	*	*	*	0.35	0.89	0.03073			
13.6				0	NA	0	*	*	*				0	NA	0
14.0										0	NA	0			
Total Stream Width (m)	12.0			12.2						12.7			12.3		
Stake Measurement (m)	0.778			0.704									0.789		
Total Discharge (m^3/s)	0.44639			1.33200						4.58115			0.32477		
Field Chemistry															
Temp (^{o}C)	9.0			2.3			3.3						10.0		
pH	7.60			7.68			7.86						6.76		
EC (uS)	23			27			0						16		
DO (mg/L)	3.84			3.87			0.64						0.29		
Appearance	clear			clear			clear						clear w/ slightly yellow		

	20-Jul-09			07-Aug-09			31-Aug-09			05-Oct-09			05-Nov-09		
Distance Panel (m)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)
0															
0.7															
1.2															
1.3							0	NA	0	0	NA	0			
1.4	0	NA	0	0	NA	0	0	0.20	0.01074	0	NA	0.00000	0	NA	0.00000
2.1	0.13	0.13	0.00361	0.21	0.77	0.03452	0.23	1.52	0.07464	0.12	0.39	0.00999	0.31	1.21	0.08008
2.8	0.08	0.29	0.00495	0.24	1.11	0.05688	0.43	3.15	0.28919	0.08	0.40	0.00683	0.23	2.13	0.10459
3.5	0.03	0.29	0.00186	0.09	1.48	0.02844	0.43	2.62	0.24053	0.03	NA	0.00000	0.17	2.30	0.08348
4.2	0.10	0.20	0.00427	0.21	1.15	0.05156	0.41	2.42	0.21183	0.09	0.45	0.00865	0.22	2.36	0.11085
4.9	0.11	0.30	0.00705	0.17	1.06	0.03847	0.35	2.76	0.20624	0.08	0.46	0.00786	0.21	1.96	0.08788
5.6	0.08	0.16	0.00273	0.12	0.98	0.02511	0.35	2.92	0.21820	0.06	0.10	0.00128	0.20	1.94	0.08284
6.3	0.09	0.15	0.00288	0.14	0.70	0.02092	0.38	3.13	0.25394	0.07	0.40	0.00598	0.20	1.48	0.06320
7.0	0.06	0.01	0.00013	0.10	0.16	0.00342	0.28	3.05	0.18233	0.00	NA	0.00000	0.17	1.32	0.04791
7.7	0	NA	0	0	NA	0	0	4.05	0.20752	0	NA	0.00000	0	1.00	0.02135
8.4	0	NA	0	0	NA	0	0	3.21	0.16448	0	NA	0.00000	0	NA	0.00000
9.1	0	NA	0	0	NA	0	0	1.60	0.06149	0	NA	0.00000	0	1.98	0.02959
9.8	0.03	NA	0	0.10	0.66	0.01409	0.42	3.02	0.27080	0.00	NA	0.00000	0.19	0.92	0.03732
10.5	0.08	0.02	0.00034	0.17	0.70	0.02541	0.53	2.25	0.25460	0.08	NA	0.00000	0.30	1.71	0.10953
11.2	0.30	0.14	0.00897	0.42	1.42	0.12733	0.64	2.30	0.31427	0.26	0.50	0.02776	0.47	2.31	0.23180
11.9	0.39	0.32	0.02664	0.50	1.65	0.17614	0.82	2.54	0.44468	0.30	0.74	0.04740	0.60	1.57	0.20112
12.6	0.02	<0.01	0.00003	0.02	<0.01	0.00003	0.83	1.32	0.17543	0.42	1.29	0.08676	0.54	3.50	0.30264
12.95															
13.3	0	NA	0	0.09	0.89	0.01710	0.30	1.20	0.03569	0.02	NA	0.00000	0.21	0.88	0.01832
13.6															
14.0				0	NA	0	0	NA	0.00000	0	NA	0.00000	0	0	0.00000
Total Stream Width (m)	11.9			12.6			12.7			12.7			12.6		
Stake Measurement (m)															
Total Discharge (m^3/s)	0.06346			0.61942			3.61659			0.20249			1.61248		
Field Chemistry															
Temp (^{o}C)	19.7			-			16.4			10.8			4.7		
pH	7.95			-			8.35			7.68			5.74		
EC (uS)	21			-			17			19			13		
DO (mg/L)	1.97			-			3.57			2.38			1.93		
Appearance	clear			-			clear			clear			clear		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The interval that stake is located for increased precision in water height fluctuations is 5.6m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate
* Lake still partially frozen cannot assess flow

Marathon PGM
Summary of Stream Field Data
Location S12

	03-Jul-08			28-Jul-08			28-Aug-08			24-Sep-08			23-Oct-08			20-Nov-08			28-May-09			10-Jun-09			20-Jul-09			05-Aug-09			01-Sep-09			06-Oct-09			04-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0																																							
0.2																																							
0.4	0	NA	-																0	NA	0	0	NA	0															
0.6	0.40	NM	-	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0.57	0.43	0.01483	0.19	0.16	0.00190	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0	NA	0
0.8	0.40	NM	-	0.16	0.32	0.00312	0.13	0.25	0.00198	0.19	0.38	0.00440	0.22	0.37	0.00497	0.27	0.35	0.00576	0.58	0.89	0.03134	0.22	0.23	0.00308	0.16	0.29	0.00283	0.24	0.40	0.00586	0.30	0.70	0.01281	0.21	0.30	0.00384	0.42	0.76	0.01947
1.0	0.37	NM	-	0.12	0.27	0.00198	0.11	<0.01	0.00007	0.17	0.56	0.00581	0.21	0.37	0.00474	0.25	0.55	0.00839	0.54	1.15	0.03782	0.19	0.30	0.00342	0.13	0.39	0.00309	0.21	0.56	0.00717	0.27	0.73	0.01202	0.18	0.32	0.00351	0.36	0.72	0.01581
1.2	0.36	NM	-	0.09	0.31	0.00170	0.06	<0.01	0.00004	0.11	0.50	0.00336	0.14	0.43	0.00367	0.20	0.50	0.00610	0.50	0.98	0.03002	0.17	0.33	0.00340	0.10	0.18	0.00110	0.19	0.56	0.00649	0.24	0.60	0.00878	0.14	0.36	0.00307	0.36	0.65	0.01427
1.4	0.29	NM	-	0.03	NA	0	0	NA	0	0.06	0.37	0.00135	0.09	0.38	0.00209	0.13	0.36	0.00285	0.48	1.28	0.03746	0.14	0.49	0.00420	0.04	0.08	0.00020	0.12	0.59	0.00432	0.19	0.77	0.00892	0.06	0.32	0.00117	0.29	0.62	0.01097
1.6	0.25	NM	-	0	NA	0				0.05	NA	0	0.07	0.39	0.00167	0.11	0.45	0.00302	0.44	0.92	0.02466	0.08	0.46	0.00224	0.01	<0.01	0.00001	0.10	0.62	0.00378	0.16	0.74	0.00722	0.06	0.35	0.00128	0.28	0.64	0.01093
1.8	0.22	NM	-							0.02	NA	0	0.03	NA	0	0.09	0.35	0.00192	0.46	1.12	0.03130	0.09	0.39	0.00216	0	NA	0	0.07	0.62	0.00265	0.12	0.62	0.00454	0.02	NA	0.00000	0.25	0.62	0.00946
2.0	0.20	NM	-							0	NA	0	0.02	NA	0	0.08	<0.01	0.00005	0.44	0.66	0.01761	0.03	<0.01	0.00002				0.06	0.50	0.00183	0.11	0.54	0.00362	0.00	NA	0.00000	0.23	0.60	0.00842
2.2	0.19	NM	-										0	NA	0	0.06	<0.01	0.00004	0.39	0.85	0.02029	0.01	<0.01	0.00001				0.02	<0.01	0.00001	0.08	0.60	0.00293				0.20	0.57	0.00695
2.4	0.15	NM	-													0.04	NA	0	0.36	0.72	0.01585	0	NA	0				0.01	<0.01	0.00001	0.06	0.44	0.00101				0.18	0.50	0.00343
2.45																												0	NA	0									
2.6	0.11	NM	-													0	NA	0	0.35	0.62	0.01331										0.04	NA	0.00000				0.16	0.40	0.00342
2.8	0.10	NM	-																0.30	0.46	0.00841										0.00	NA	0.00000				0.13	0.2	0.00159
3.0	0.01	NM	-																0.23	0.49	0.00690																0.00	NA	0
3.2	0	NA	-																0.16	0.16	0.00160																		
3.4																			0.15	0.30	0.00270																		
3.6																			0.14	0.10	0.00084																		
3.8																			0	NA	0																		
4.0																																							
Total Stream Width (m)	2.8			1.0			0.8			1.4			1.6			2.0			3.4			2.0			1.2			2.0			2.2			1.4			2.4		
Stake Measurement (m)	-			-			0.720			0.660			0.634			0.580			0.540			0.190																	
Total Discharge (m^3/s)	-			0.00680			0.00209			0.01492			0.01713			0.02813			0.29495			0.02044			0.00722			0.03212			0.06186			0.01288			0.10313		
Field Chemistry																																							
Temp (^oC)	16.9			23.8			16.1			16.9			3.7			0			7.8			11.4			16.6			17.1			15.6			15.6			2.2		
pH	6.65			7.25			7.43			7.40			7.32			7.67			7.45			7.23			7.25			7.56			7.23			7.23			6.67		
EC (uS)	27			49			57			22			25			24			17			62			38			19			16			16			12		
DO (mg/L)	1.19			5.12			5.75			3.44			4.54			5.04			1.3			0.37			1.55			5.23			2			2			1.31		
Appearance	slightly tannic			slightly tannic			slightly tannic			tannic			tannic			slightly tannic			slightly yellow			slightly yellow			slt. yellow, clear			clear, yellow			clear, yellow			clear, yellow			slight tannic		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The interval that stake is located for increased precision in water height fluctuations is 1.0m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Stream Field Data
Location S13

	02-Jul-08			31-Jul-08			27-Aug-08			23-Sep-08			22-Oct-08			20-Nov-08			06-May-09			09-Jun-09			21-Jul-09			06-Aug-09			02-Sep-09			06-Oct-09			03-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0																																							
0.2																																							
0.4																																							
0.6																																							
0.8	0	NA	-	0	NA	-	DRY	NA	-				0	NA	0		FROZEN																						
0.9										0	NA	0					FROZEN																						
1.0	0.04	NM	-	0.04	NA	-	DRY	NA	-	0.095	<0.01	0.00005	0.08	<0.01	0.00004		FROZEN																						
1.2	0.02	NM	-	0.04	NA	-	DRY	NA	-	0.065	<0.01	0.00002	0.07	<0.01	0.00003		FROZEN																						
1.3				0	NA	-	DRY	NA	-								FROZEN																						
1.4							DRY	NA	-	0	NA	0					FROZEN																						
1.4	0	NA	-				DRY	NA	-				0.01	NA	0		FROZEN																						
1.6													0	NA	0		FROZEN																						
1.8																																							
2.0																																							
Total Stream Width (m)	0.6			0.5			-			0.5			0.8			-			-			-			-			-			-			-			-		
Stake Measurement (m)	-			-			-			0.890			0.882			-			-			-			-			-			-			-			-		
Total Discharge (m^3/s)	-			-			-			0.00008			0.00007			-			-			-			-			-			-			-			-		
Field Chemistry																																							
Temp (^oC)	14.6			15.0			-			14.7			5.8			-			5.9			11.7			13.7			15.7			17.0			9.8			2.1		
pH	4.59			6.37			-			5.75			6.21			-			6.31			6.86			7.01			5.9			5.16			7.07			4.31		
EC (uS)	11			9			-			12			10			-			12			12			8			10			14			17			12		
DO (mg/L)	1.29			6.80			-			4.77			3.83			-			1.30			0.68			2.38			4.77			6.03			1.77			2.10		
Appearance	slightly tannic			slightly tannic			-			slightly tannic			clear			-			No Longer Representative			Clear			clear slt. Orange			clear, yellow			clear, yellow			clear, slt. Brn			sl. tannic		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
FROZEN - The stream channel was frozen right to the streambed
Upgradient beaver dam has diverted stream flow towards another channel leaving the target stream very low
The lower limit of the flow meter is 0.01ft/s
The interval that stake is located for increased precision in water height fluctuations is 1.2m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Stream Data
Location S14

	02-Jul-08			28-Jul-08			25-Aug-08			22-Sep-08			21-Oct-08			21-Nov-08			05-May-09			08-Jun-09			21-Jul-09			07-Aug-09			03-Sep-09			05-Oct-09			05-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0																																							
0.2																																							
0.4																																							
0.6																																							
0.8													0	NA	0																			0	NA	0			
1.0													0.28	<0.01	0.00017	0	NA	0				0	NA	0	0	NA	0							0.1	NA	0.00000			
1.15										0	NA	0																0	NA	0	0	NA	0						
1.2	0	NA	-	0	NA	0				0.14	<0.01	0.00005	0.35	<0.01	0.00021	0.02	NA	0	0	NA	0.00000	0.26	0.05	0.00000	0.17	0.03	0.00012	0.06	0.03	0.00011	0.06	0.03	0.00011	0.12	0.02	0.00011	0.00	NA	
1.3							0	NA	0																													
1.4	0.06	NM	-	0.09	<0.01	0.00005	0.12	<0.01	0.00005	0.29	<0.01	0.00018	0.42	<0.01	0.00026	0.09	<0.01	0.00005	0.03	NA	0.00000	0.33	0.04	0.00004	0.23	0.03	0.00032	0.22	0.04	0.00054	0.27	0.06	0.00099	0.15	0.03	0.00027	0.24	NA	0.00000
1.6	0.15	NM	-	0.19	<0.01	0.00012	0.65	<0.01	0.00040	0.78	<0.01	0.00048	0.47	<0.01	0.00029	0.14	<0.01	0.00009	0.12	0.79	0.00576	0.37	0.07	0.00009	0.66	0.02	0.00081	0.27	0.05	0.00082	0.30	0.03	0.00069	0.27	0.08	0.00132	0.32	0.04	0.00078
1.8	0.39	NM	-	0.66	<0.01	0.00040	0.63	<0.01	0.00038	0.77	<0.01	0.00047	0.89	<0.01	0.00054	0.56	<0.01	0.00034	0.56	0.46	0.01569	0.80	0.03	0.00034	0.60	0.03	0.00110	0.67	0.02	0.00082	0.49	0.06	0.00269	0.47	0.10	0.00430	0.61	0.15	0.00558
2.0	0.58	NM	-	0.60	<0.01	0.00037	0.46	<0.01	0.00028	0.76	<0.01	0.00046	0.82	<0.01	0.00050	0.49	<0.01	0.00030	0.52	0.10	0.00312	0.79	0.05	0.00030	0.52	0.06	0.00190	0.65	0.06	0.00238	0.70	0.07	0.00448	0.59	0.03	0.00162	0.76	0.03	0.00139
2.2	0.54	NM	-	0.56	<0.01	0.00034	0.55	<0.01	0.00034	0.68	<0.01	0.00041	0.74	<0.01	0.00045	0.41	<0.01	0.00025	0.50	0.07	0.00200	0.68	0.07	0.00025	0.58	0.04	0.00142	0.68	0.02	0.00083	0.65	0.08	0.00476	0.62	0.01	0.00057	0.69	0.11	0.00463
2.4	0.45	NM	-	0.49	<0.01	0.00030	0.53	<0.01	0.00032	0.53	<0.01	0.00032	0.75	<0.01	0.00046	0.42	<0.01	0.00026	0.40	1.25	0.03042	0.72	0.04	0.00026	0.61	0.07	0.00260	0.65	0.11	0.00436	0.66	0.18	0.01087	0.66	0.11	0.00664	0.73	0.34	0.01514
2.6	0.58	NM	-	0.63	<0.01	0.00038	0.62	<0.01	0.00038	0.77	<0.01	0.00047	0.92	<0.01	0.00056	0.59	<0.01	0.00036	0.48	1.12	0.03266	0.72	0.07	0.00036	0.54	0.06	0.00198	0.61	0.13	0.00484	0.65	0.19	0.01130	0.70	0.05	0.00320	0.71	0.22	0.00953
2.8	0.68	NM	-	0.66	<0.01	0.00040	0.71	<0.01	0.00043	0.84	<0.01	0.00051	0.94	<0.01	0.00057	0.61	<0.01	0.00037	0.57	0.69	0.02396	0.77	0.02	0.00037	0.61	0.08	0.00298	0.67	0.13	0.00531	0.70	0.17	0.01089	55.00	0.06	0.30195	0.76	0.21	0.00974
3.0	0.37	NM	-	0.69	<0.01	0.00042	0.67	<0.01	0.00041	0.69	<0.01	0.00042	0.96	<0.01	0.00059	0.63	<0.01	0.00038	0.56	1.02	0.03474	0.82	0.10	0.00038	0.64	0.10	0.00390	0.72	0.11	0.00483	0.70	0.09	0.00576	0.64	0.06	0.00351	0.76	0.47	0.02179
3.2	0.48	NM	-	0.66	<0.01	0.00040	0.45	<0.01	0.00027	0.80	<0.01	0.00049	0.93	<0.01	0.00057	0.60	<0.01	0.00037	0.53	1.18	0.03819	0.75	0.05	0.00037	0.69	0.10	0.00421	0.52	0.08	0.00254	0.62	0.11	0.00624	0.56	0.11	0.00564	0.63	0.28	0.01068
3.4	0.48	NM	-	0.51	<0.01	0.00031	0.51	<0.01	0.00031	0.77	<0.01	0.00047	0.94	<0.01	0.00057	0.61	<0.01	0.00037	0.59	1.02	0.03660	0.70	0.09	0.00037	0.61	0.04	0.00149	0.66	0.13	0.00523	0.67	0.09	0.00552	0.60	0.03	0.00165	0.75	0.25	0.01144
3.6	0.42	NM	-	0.57	<0.01	0.00035	0.49	<0.01	0.00030	0.64	<0.01	0.00039	0.80	<0.01	0.00049	0.47	<0.01	0.00029	0.54	0.92	0.03026	0.72	0.06	0.00029	0.55	0.03	0.00101	0.59	0.09	0.00324	0.60	0.09	0.00494	0.46	0.01	0.00042	0.68	0.05	0.00207
3.8	0.53	NM	-	0.37	<0.01	0.00023	0.30	<0.01	0.00018	0.68	<0.01	0.00041	0.83	<0.01	0.00051	0.50	<0.01	0.00031	0.43	0.07	0.00172	0.73	0.07	0.00031	0.60	0.03	0.00110	0.58	0.06	0.00212	0.42	0.08	0.00307	0.00	NA	0.00000	0.59	0.05	0.00180
4.0	0.31	NM	-	0.51	<0.01	0.00031	0.32	<0.01	0.00020	0.68	<0.01	0.00041	0.83	<0.01	0.00051	0.50	<0.01	0.00031	0.48	0.03	0.00096	0.69	0.02	0.00031	0.55	0.05	0.00168	0.60	0.03	0.00110	0.53	0.06	0.00291				0.69	0.06	0.00253
4.2	0.46	NM	-	0.33	<0.01	0.00020	0.52	<0.01	0.00020	0.66	<0.01	0.00040	0.78	<0.01	0.00048	0.45	<0.01	0.00027	0.26	0.56	0.00553	0.67	0.00	0.00027	0	NA	0	0.61	0.04	0.00093	0.09	0.02	0.00012				0.15	0.05	0.00029
4.25							0	NA	0																					0	NA	0						
4.3																												0	NA	0									
4.4	0	NA	-	0.21	<0.01	0.00013				0	NA	0	0.06	<0.01	0.00004	0	NA	0	0.41	0.79	0.01723	0.02	NA	0										0	NA	0.00000			
4.6				0	NA	0							0.02	<0.01	0.00001				0	0	0.00000	0	NA	0														
4.8													0	NA	0																							
Total Stream Width (m)	3.2			3.4			3.0			3.3			4.0			3.4			3.4			3.6			3.2			3.2			3.1			0.0			3.2		
Stake Measurement (m)	-			-			0.228			0.194			0.054			0.388			0.400			0.720																	
Total Discharge (m^3/s)	-			0.00472			0.00446			0.00636			0.00777			0.00431			0.27885			0.00430			0.02660			0.04000			0.07535			0.33120			0.09737		
Field Chemistry																																							
Temp (^{0}C)	12.8			20.3			18.5			11.6			5.7			0			11.6			15.2			19.6			15.6			14.4			9.8			2.1		
pH	6.71			7.27			7.67			7.33			7.45			7.30			7.02			7.33			7.20			7.98			7.73			8.17			6.31		
EC (uS)	17			69			87			50			45			47			18			35			56			28			29			49			15		
DO (mg/L)	1.77			4.82			5.21			4.45			4.19			4.21			0.73			0.27			3.22			5.90			4.86			1.80			1.56		
Appearance	slightly tannic			slightly tannic			slightly tannic			tannic			slightly tannic			slightly tannic			clear			clear slightly yellow tinge			clear slightly yellow			clear, slightly yellow			clear, slightly yellow			slightly yellow			slightly tannic		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
Downgradient beaver dam is impeding natural water flow
The interval that stake is located for increased precision in water height fluctuations is 2.6m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Stream Field Data
Location S15

	03-Jul-08			08-Jul-08			28-Jul-08			28-Aug-08			22-Sep-08			23-Oct-08			20-Nov-08			08-May-09			10-Jun-09			20-Jul-09			05-Aug-09			01-Sep-09			06-Oct-09			04-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0																																									
0.2																																									
0.4																																									
0.6	0	NA	-																																						
0.75																															0	NA	0									
0.8	0.09	NM	-	0	NA	-	0	NA	0	0	NA	0	0	NA	0	0	NA	0				0	NA	0							0.47	0.01	0.00029	0	NA	0.00000	0	NA	0.00000	0	NA	0
0.9																			0	NA	0																					
1.0	0.32	NM	-	0.14	NM	-	0.07	<0.01	0.00004	0.04	NA	0	0.05	NA	0	0.10	<0.01	0	0.16	<0.01	0.00007	0.32	0.03	0.00064	0.00	NA	0	0.00	NA	0	0.51	0.04	0.00124	0.53	0.02	0.00065	0.57	0.05	0.00174	0.61	0.08	0.00298
1.2	0.40	NM	-	0.25	NM	-	0.18	<0.01	0.00011	0.17	<0.01	0.00010	0.18	<0.01	0.00011	0.20	<0.01	0.00012	0.15	<0.01	0.00009	0.39	0.07	0.00156	0.07	0.20	0.00084	0.07	0.07	0.00030	0.60	0.06	0.00220	0.60	0.05	0.00183	0.63	0.06	0.00288	0.63	0.05	0.00240
1.4	0.41	NM	-	0.235	NM	-	0.08	<0.01	0.00005	0.17	<0.01	0.00010	0.20	<0.01	0.00012	0.22	<0.01	0.00013	0.18	0.35	0.00384	0.50	0.03	0.00100	0.10	0.39	0.00240	0.11	0.20	0.00134	0.69	0.06	0.00253	0.63	0.11	0.00423	0.69	0.06	0.00379	0.71	0.06	0.00390
1.6	0.43	NM	-	0.26	NM	-	0.185	<0.01	0.00011	0.18	<0.01	0.00011	0.23	0.39	0.00547	0.21	0.23	0.00295	0.19	0.26	0.00301	0.59	0.23	0.00827	0.13	0.36	0.00286	0.14	0.11	0.00094	0.78	0.01	0.00048	0.68	0.16	0.00664	0.72	0.05	0.00329	0.72	0.04	0.00264
1.8	0.42	NM	-	0.23	NM	-	0.07	<0.01	0.00004	0.13	<0.01	0.00008	0.15	<0.01	0.00009	0.15	<0.01	0.00009	0.21	<0.01	0.00013	0.47	0.89	0.02540	0.13	0.16	0.00130	0.16	0.12	0.00117	0.61	0.09	0.00335	0.53	0.18	0.00582	0.65	0.05	0.00297	0.65	0.05	0.00297
2.0	0.29	NM	-	0.09	NM	-	0.12	<0.01	0.00007	0.02	NA	0	0.05	NA	0	0.09	<0.01	0.00005	0.12	<0.01	0.00007	0.40	1.02	0.02482	0.16	0.26	0.00256	0.15	0.11	0.00101	0.69	0.05	0.00210	0.43	0.25	0.00656	0.63	0.05	0.00288	0.52	0.10	0.00476
2.2	0.20	NM	-	0.08	NM	-	0.005	NA	0	0	NA	0	0.05	NA	0	0.06	<0.01	0.00004	0.09	<0.01	0.00005	0.38	0.69	0.01597	0.08	0.56	0.00272	0.06	0.12	0.00044	0.64	0.06	0.00234	0.42	0.13	0.00333	0.61	0.06	0.00335	0.47	0.20	0.00860
2.4	0.22	NM	-	0.07	NM	-	0.003	NA	0				0.03	NA	0	0.04	<0.01	0.00002	0.07	<0.01	0.00004	0.36	0.92	0.02017	0.04	0.13	0.00032	0.07	0.02	0.00009	0.60	0.13	0.00476	0.46	0.17	0.00477	0.57	0.06	0.00313	0.50	0.16	0.00732
2.6	0.19	NM	-	0.06	NM	-	0.002	NA	0				0.02	NA	0	0.04	<0.01	0.00002	0.09	<0.01	0.00005	0.37	0.85	0.01925	0.06	NA	0	0.07	0.05	0.00021	0.60	0.04	0.00146	0.42	0.16	0.00410	0.58	0.05	0.00265	0.47	0.15	0.00645
2.8	0.21	NM	-	0.06	NM	-	0	NA	0				0.02	NA	0	0.03	<0.01	0.00002	0.06	<0.01	0.00004	0.35	0.72	0.01541	0.05	NA	0	0.05	<0.01	0.00003	0.58	0.08	0.00283	0.41	0.17	0.00425	0.55	0.06	0.00302	0.22	0.12	0.00242
3.0	0.18	NM	-	0.02	NM	-							0	NA	0	0	NA	0	0	NA	0	0.34	0.56	0.01157	0.00	NA	0	0.00	NA	0	0.54	0.06	0.00198	0.30	0.15	0.00275	0.42	0.05	0.00192	0.17	0.12	0.00187
3.2	0	NA	-	0	NA	-																0.03	NA	0							0.25	0.02	0.00031	0.09	0.03	0.00016	0.14	0.03	0.00038	0.11	0.05	0.00050
3.4																						0	NA	0							0.23	0.05	0.00070	0.07	0.03	0.00013	0.09	0.03	0.00025	0	NA	0.00000
3.6																															0.20	0.05	0.00061	0.02	NA	0.00000	0.07	NA	0.00000			
3.75																															0	NA	0	0	NA	0.00000						
3.8																																					0	NA	0.00000			
4.0																																										
Total Stream Width (m)	2.6			2.4			1.8			1.4			2.2			2.2			2.1			2.6			2.0			2.0			3.0			3.0			3.0			2.6		
Stake Measurement (m)	-			-			0.034			0.187			0.142			0.127			0.101																						
Total Discharge (m^3/s)							0.00043			0.00040			0.00580			0.00351			0.00741			0.14405			0.01301			0.00553			0.02717			0.04521			0.03226			0.04680		
Field Chemistry																																										
Temp (^{o}C)	13.0			23.1			23.1			15.6			15.8			4.2			0			5.6			11.1			18.0			15.0			13.8			13.8			1.7		
pH	6.35			7.02			7.02			7.28			7.19			7.06			7.10			6.69			8.65			6.97			7.83			7.67			7.67			8.27		
EC (uS)	12			50			50			53			23			20			23			10			35			39			20			17			17			13		
DO (mg/L)	1.31			5.19			5.19			5.58			3.34			3.96			5.17			1.99			38			1.45			5.27			1.73			1.73			1.18		
Appearance	slightly tannic			slightly tannic			clear			clear			slightly tannic			tannic			slightly tannic			clear to cloudy			slight yellow tinge			slightly yellow, clear			clear, yellow			clear, yellow			clear, yellow			slight tannic		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The interval that stake and data logger are located for increased precision in water height fluctuations is 1.6m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Stream Field Data
Location S16

	03-Jul-08			01-Aug-08			28-Aug-08			22-Sep-08			20-Oct-08			18-Nov-08			07-May-09			14-Jul-09			07-Aug-09			31-Aug-09			05-Oct-09			04-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0	0	NA	-										0	NA	0	0	NA	0							0	NA	0	0	NA	0	0	NA	0	0	NA	0
0.05										0	NA	0																							
0.1				0	NA	0	0	NA	0																										
0.2	0.15	NM	-	0.06	0.47	0.00129	0.03	NA	0	0.04	NA	0	0.08	<0.01	0.00005	0.28	<0.01	0.00017				0.10	0.24	0.00110	0.09	0.25	0.00137	0.16	0.56	0.00547	0.05	0.17	0.00052	0.17	0.84	0.00871
0.4	0.20	NM	-	0.08	<0.01	0.00005	0.09	<0.01	0.00005	0.05	0.28	0.00085	0.12	0.33	0.00242	0.28	0.24	0.00410	0	0	0	0.09	0.46	0.00253	0.09	0.62	0.00340	0.17	0.46	0.00656	0.07	0.11	0.00065	0.21	1.05	0.01849
0.6	0.19	NM	-	0.06	1.62	0.00593	0.06	0.43	0.00157	0.07	0.70	0.00299	0.11	1.05	0.00705	0.24	0.40	0.00586	0.29	0.79	0.01393	0.04	0.70	0.00171	0.12	0.80	0.00586	0.14	0.69	0.01031	0.05	0.22	0.00117	0.2	0.76	0.01623
0.8	0.13	NM	-	0.04	1.10	0.00268	0.04	0.74	0.00181	0.07	0.61	0.00260	0.10	1.20	0.00732	0.23	0.42	0.00589	0.33	0.95	0.01915	0.05	0.41	0.00125	0.1	1.15	0.00702	0.19	1.30	0.03013	0.06	1.25	0.00915	0.16	1.13	0.02206
1.0	0.18	NM	-	0.06	0.74	0.00271	0.05	0.47	0.00143	0.09	0.48	0.00264	0.09	0.37	0.00203	0.22	0.58	0.00778	0.37	0.69	0.01555	0.05	0.26	0.00079	0.13	1.10	0.00872	0.18	1.38	0.03030	0.07	0.96	0.00820	0.18	1.29	0.02833
1.2	0.19	NM	-	0.07	1.14	0.00487	0.04	0.71	0.00173	0.07	1.45	0.00619	0.08	1.63	0.00795	0.24	1.14	0.01669	0.39	1.05	0.02498	0.04	0.73	0.00178	0.09	1.78	0.00977	0.17	1.34	0.02779	0.06	0.84	0.00615	0.15	1.51	0.02763
1.4	0.15	NM	-	0.05	NA	0	0.02	NA	0	0.09	<0.01	0.00005	0.06	<0.01	0.00004	0.18	0.56	0.00615	0.34	1.08	0.02245	-	NA	0	0.13	1.34	0.01063	0.23	2.22	0.06229	0	NA	0.00000	0.14	1.07	0.01828
1.6	0.10	NM	-	0.04	NA	0	0	NA	0	0.02	NA	0	0	NA	0	0.18	1.29	0.01416	0.36	0.66	0.01441	-	NA	0	0.05	0.98	0.00299	0.12	1.84	0.02357				0.08	1.73	0.01477
1.7										0	NA	0																							
1.8	0.08	NM	-	0.03	NA	0										0.17	0.64	0.00664	0.39	0.69	0.01639	0.01	<0.01	0	0.05	0.66	0.00201	0.11	1.21	0.01218				0.13	0.69	0.00821
2.0	0.04	NM	-	0	NA	0										0.07	0.17	0.00045	0.39	1.05	0.02498	0	NA	0	0.05	0.41	0.00125	0.08	0.93	0.00511				0	NA	0.00000
2.05																0	NA	0							0	NA	0	0	NA	0.00000						
2.2	0	NA	-																0	0	0															
2.4																																				
2.6																																				
2.8																																				
3.0																																				
Total Stream Width (m)	2.2			1.9			1.5			1.7			1.6			2.1			1.8			1.8			2.1			2.1			1.4			2.0		
Stake Measurement (m)	-			-			0.912			0.945			0.917			0.760			0.745			0.940													
Total Discharge (m^3/s)	-			0.01753			0.00660			0.01533			0.02685			0.06790			0.15184			0.00916			0.05302			0.21372			0.02584			0.16271		
Field Chemistry																																				
Temp (^{0}C)	14.3			15.1			12.8			11.1			7.1			0.0			8.3			13.4			13.0			11.4			11.4			3.0		
pH	7.74			8.31			8.26			7.90			7.60			8.05			8.60			8.40			8.33			7.91			7.91			6.69		
EC (uS)	85			210			273			219			205			93			19			214			115			79			79			66		
DO (mg/L)	1.20			7.35			6.60			5.45			3.17			4.08			3.02			0.36			5.99			3.95			3.95			1.51		
Appearance	clear			clear			clear			clear			slightly tannic			clear			clear w/ slt. yellow tinge			clear			clear			slt. Yellow			slt. Yellow			clear		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The interval that stake is located for increased precision in water height fluctuations is 0.4m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Stream Field Data
Location S17

	01-Jul-08		29-Jul-08		26-Aug-08		24-Sep-08		23-Oct-08		18-Nov-08		05-May-09		11-Jun-09		15-Jul-09		06-Aug-09		02-Sep-09		OCT??		03-Nov-09	
Distance Panel (m)	Depth (m)	Velocity (ft/s)	Depth (m)	Velocity (ft/s)	Depth (m)	Velocity (ft/s)	Depth (m)	Velocity (ft/s)	Depth (m)	Velocity (ft/s)	Depth (m)	Velocity (ft/s)	Depth (m)	Velocity (ft/s)	Depth (m)	Velocity (ft/s)	Depth (m)	Velocity (ft/s)	Depth (m)	Velocity (ft/s)	Depth (m)	Velocity (ft/s)	Depth (m)	Velocity (ft/s)	Depth (m)	Velocity (ft/s)
0																										
0.2																										
0.4																										
0.6																										
0.8																										
1.0																										
1.2	0	NA			DRY	NA	DRY	NA	DRY	NA	DRY	NA			0	NA									0	NA
1.3			0	NA	DRY	NA	DRY	NA	DRY	NA	DRY	NA	0	NA			0	NA	0	NA						
1.35																					0	NA				
1.4	0.04	NM	0.01	NA	DRY	NA	DRY	NA	DRY	NA	DRY	NA	0.04	0.30	0.02	NA	0.02	NA	0.02	NA	0.02	NA			0.02	NA
1.55																					0	NA				
1.6	0.02	NM	0.01	NA	DRY	NA	DRY	NA	DRY	NA	DRY	NA	0.02	NA	0	NA	0	NA	0	NA					0	NA
1.8	0.01	NM	0	NA	DRY	NA	DRY	NA	DRY	NA	DRY	NA	0	NA			0.01	NA								
2.0	0.015	NM	0.01	NA	DRY	NA	DRY	NA	DRY	NA	DRY	NA	0.01	NA			0	NA								
2.05			0	NA	DRY	NA	DRY	NA	DRY	NA	DRY	NA	0	NA												
2.2	0	NA			DRY	NA	DRY	NA	DRY	NA	DRY	NA														
2.4																										
2.6																										
2.8																										
3.0																										
Total Stream Width (m)	1.0		0.75		-		-		-		-		-		-		-		-		0.20		0.00		0.00	
Total Discharge (m^3/s)	-		-		-		-		-		-		-		-		-		-		-		-		-	
Field Chemistry																										
Temp (^oC)	10.8		12.6		-		-		-		-		2.7		12.9		10.9		12.1		12.4				3.4	
pH	8.00		7.90		-		-		-		-		7.95		6.14		8.21		8.26		8.2				7.25	
EC (uS)	217		400		-		-		-		-		221		362		373		377		349				268	
DO (mg/L)	2.50		4.83		-		-		-		-		2.14		0.62		1.67		3.57		3.13				1.69	
Appearance	slightly cloudy brown		slightly cloudy brown		-		-		-		-		cloudy turbid silty		clear		light brown		clear		cloudy, grey				sl. tannic	

Notes
NM - Not Measured
DRY - Dry steambed
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
Could not advance measuring stake through stream bed

Marathon PGM
Summary of Stream Field Data
Location S18

	1-Jul-08			29-Jul-08			26-Aug-08			24-Sep-08			23-Oct-08			18-Nov-08			04-May-09			11-Jun-09			14-Jul-09			06-Aug-09			06-Aug-09			07-Oct-09			08-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0																																							
0.2																																							
0.4																																							
0.6	0	NA	-																																				
0.7																																					0	NA	
0.8	0.005	NM	-	0	NA	-				0	NA	-	0	NA	-	0	NA	0	0	NA	0									0	NA	0	0	NA	0	0.05	0.08	0
0.85																												0	NA	0									
1.0	0.06	NM	-	0.01	NA	-				0.01	NA	-	0.01	NA	-	0.04	<0.01	0.00002	0.02	<0.01	0.00001	0	NA	0	0	NA	0	0.02	<0.01	0.00001	0.03	0.36	0.00066	0.03	NA	0	0.06	0.23	0.00084
1.1							0	NA	-																														
1.2	0.06	NM	-	0.02	NA	-	0.01	NA	-	0.01	NA	-	0.03	NA	-	0.04	0.70	0.00171	0.05	<0.01	0.00003	0.01	<0.01	0.00001	0.005	<0.01	0	0.01	<0.01	0.00001	0.02	NA	0.00000	0.03	NA	0	0.06	0.61	0.00223
1.4	0.08	NM	-	0.02	NA	-	0.01	NA	-	0.02	NA	-	0.03	NA	-	0.06	0.93	0.00340	0.06	0.75	0.00276	0.02	<0.01	0.00001	0.02	<0.01	0.00001	0.03	0.69	0.00126	0.03	0.88	0.00161	0.03	NA	0	0.07	0.60	0.00320
1.6	0.10	NM	-	0.03	NA	-	0.02	NA	-	0.03	NA	-	0.04	NA	-	0.05	0.56	0.00171	0.08	1.31	0.00640	0.02	<0.01	0.00001	0.03	<0.01	0.00002	0.03	0.44	0.00081	0.03	0.68	0.00124	0.02	NA	0	0.07	0.58	0.00371
1.8	0.08	NM	-	0.01	NA	-	0.01	NA	-	0.02	NA	-	0.03	NA	-	0.06	0.40	0.00146	0.07	0.92	0.00392	0.02	<0.01	0.00001	0.02	<0.01	0.00001	0.03	0.42	0.00077	0.05	0.23	0.00070	0.03	0.13	0.00024	0.07	0.64	0.00410
2.0	0.09	NM	-	0.03	NA	-	0.02	NA	-	0.02	NA	-	0.03	NA	-	0.06	0.43	0.00157	0.08	0.72	0.00352	0.02	<0.01	0.00001	0.03	<0.01	0.00002	0.05	0.37	0.00113	0.05	0.36	0.00110	0.04	0.05	0.00012	0.09	0.36	0.00296
2.2	0.085	NM	-	0	NA	-	0	NA	-	0	NA	-	0	NA	-	0	NA	0	0.01	NA	0	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0	NA	0
2.4	0	NA	-																																				
2.6																																							
2.8																																							
3.0																																							
3.2																																							
3.4																																							
3.6																																							
3.8																																							
4.0																																							
Total Stream Width (m)	1.8			1.4			1.1			1.4			1.4			1.4			1.4			1.2			1.2			1.4			1.4			1.4			1.5		
Stake Measurement (m)	-			-			0.887			0.875			0.866			0.847			0.835			0.880																	
Total Discharge (m^3/s)	-			-			-			-			-			0.00988			0.01665			0.00005			0.00006			0.00398			0.00531			0.00036			0.01730		
Field Chemistry																																								
Temp (^oC)	12.5			14.0			14.3			13.0			5.2			0.2			8.4			11.0			12.0			13.5			14.8			7.4			3.5		
pH	7.05			7.12			6.66			7.22			6.82			7.50			6.27			6.46			7.27			7.29			7.42			7.30			6.63		
EC (uS)	33			60			113			88			78			48			39			63			84			59			46			81			43		
DO (mg/L)	2.55			6.81			4.63			2.97			4.70			3.52			0.97			0.52			1.41			4.08			5.70			2.08			1.62		
Appearance	clear			slightly tannic			clear			slightly tannic			slightly tannic			clear			clear			clear			clear			clear, slt. ylw			clear, slt. ylw			clear, slightly tannic			slt. tannic		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The interval that stake is located for increased precision in water height fluctuations is 2.0m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Stream Field Data
Location S19

	01-Jul-08			29-Jul-08			26-Aug-08			24-Sep-08			23-Oct-08			18-Nov-08			05-May-09			11-Jun-09			15-Jul-09			06-Aug-09			02-Sep-09			07-Oct-09			03-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0.0	0	NA	-																																				
0.2	0.03	NM	-										0	NA	-																								
0.3																0	NA	0				0	NA	0										0.00	NA	0	0.00		0
0.35										0	NA	-							0	NA	0				0	NA	0	0	NA	0									
0.37				0	NA	-	0	NA	-																														
0.4	0.17	NM	-	0.02	NA	-	0.01	NA	-	0.02	NA	-	0.04	NA	-	0.10	<0.01	0.00005	0.09	0.10	0.00034	0.02	<0.01	0.00001	0.03	<0.01	0.00001	0.05	0.04	0.00008	0.00	NA	0	0.07	0.09	0.00024	0.07	0.11	0.00029
0.6	0.17	NM	-	0.01	NA	-	0.01	NA	-	0.03	NA	-	0.05	NA	-	0.10	0.88	0.00537	0.11	1.12	0.00468	0.03	0.26	0.00048	0.02	<0.01	0.00001	0.05	0.14	0.00043	0.09	0.55	0.00302	0.07	0.14	0.00042	0.90	0.25	0.00961
0.65							0	NA	-																														
0.8	0.18	NM	-	0.01	NA	-				0.01	NA	-	0.02	NA	-	0.10	0.61	0.00372	0.12	0.46	0.00336	0.02	<0.01	0.00001	0.02	<0.01	0.00001	0.06	0.93	0.00340	0.10	0.34	0.00181	0.08	0.15	0.00046	0.80	0.27	0.00824
0.85				0	NA	-				0	NA	-																											
1.0	0.16	NM	-										0.01	NA	-	0.08	0.3	0.00146	0.11	0.10	0.00066	0.02	<0.01	0.00001	0.02	<0.01	0.00001	0.05	0.24	0.00073	0.08	0.27	0.00181	0.07	0.07	0.00030	0.80	0.48	0.02342
1.2	0.14	NM	-										0	NA	-	0.07	<0.01	0.00004	0.11	0.92	0.00616	0.01	<0.01	0.00001	0.01	<0.01	0.00001	0.03	<0.01	0.00002	0.07	0.09	0.00058	0.06	0.05	0.00025	0.06	0.20	0.00101
1.4	0.14	NM	-													0.06	<0.01	0.00004	0.10	0.23	0.00140	0.01	<0.01	0.00001	0	NA	0	0.02	<0.01	0.00001	0.07	0.20	0.00107	0.06	0.07	0.00038	0.06	0.02	0.00011
1.6	0.13	NM	-													0.07	<0.01	0.00004	0.16	0.07	0.00064	0	NA	0				0.02	<0.01	0.00001	0.06	0.22	0.00081	0.04	NA	0	0.05	NA	0
1.7																												0	NA	0				0.00	NA	0	0.00	NA	0
1.8	0.01	NM	-													0	NA	0	0	NA	0										0	NA	0						
2.0	0	NA	-																																				
2.2																																							
2.4																																							
2.6																																							
2.8																																							
3.0																																							
Total Stream Width (m)	2.0			0.5			0.3			0.5			1.0			1.5			1.5			1.3			1.1			1.4			1.4			1.4			1.4		
Stake Measurement (m)	-			-			0.900			0.890			0.869			0.812			0.782			0.870			0.840														
Total Discharge (m^3/s)	-			-			-			-			-			0.01072			0.01724			0.00053			0.00005			0.00468			0.00910			0.00205			0.04268		
Field Chemistry																																							
Temp (^{o}C)	15.4			14.2			13.8			13.0			6.2			0			7.2			13.7			13			14.6			14.6			14.6			3.6		
pH	7.20			7.56			6.81			7.27			7.22			6.96			6.84			6.48			6.75			7.47			7.47			7.47			5.93		
EC (uS)	29			30			27			16			18			39			NA			29			62			27			27			27			14		
DO (mg/L)	2.02			4.48			4.74			2.84			4.49			3.10			0.64			0.24			1.53			5.51			5.51			5.51			1.48		
Appearance	clear			clear			clear			clear			clear			clear			slightly yellow tinge			clear			clear			clear, slt. ylw			clear, slt. ylw			clear, slt. ylw			slt. tannic		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The interval that stake is located for increased precision in water height fluctuations is 0.6m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Stream Field Data
Location S20

	2-Jul-08			31-Jul-08			26-Aug-08			23-Sep-08			22-Oct-08			20-Nov-08			06-May-09			08-Jun-09			13-Jul-09			05-Aug-09			02-Sep-09			06-Oct-09			05-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0	0	NA	-										0	NA	0				0	NA	0													0	NA	0	0	NA	0.00000
0.2	0.30	NM	-	0	NA	0				0	NA	0	0.03	NA	0	0	NA	0	0.12	0.13	0.00091	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0.02	NA	0	0.09	0.02	0.00010
0.38							0	NA	-																														
0.4	0.15	NM	-	0.02	NA	0	0.01	NA	-	0.001	NA	0	0.02	NA	0	0.05	0.83	0.00253	0.14	2.30	0.01079	0.02	NA	0	0.01	<0.01	0	0.05	0.39	0.00119	0.06	0.78	0.00285	0.09	0.15	0.00082	0.09	0.82	0.00450
0.6	0.18	NM	-	0.09	0.44	0.00242	0.05	NA	-	0.07	<0.01	0.00004	0.10	<0.01	0.00006	0.12	1.02	0.00747	0.19	0.69	0.00799	0.08	0.40	0.00195	0.09	0.53	0.00291	0.11	1.70	0.01141	0.12	1.35	0.00988	0.08	0.35	0.00179	0.15	0.96	0.00922
0.8	0.15	NM	-	0.04	<0.01	0.00002	0.02	NA	-	0.06	<0.01	0.00004	0.05	NA	0	0.08	0.64	0.00312	0.16	0.89	0.00865	0.05	0.23	0.00070	0.04	0.23	0.00056	0.1	0.22	0.00134	0.11	0.16	0.00107	0.06	0.33	0.00181	0.12	0.22	0.00242
1.0	0.11	NM	-	0.05	0.66	0.00201	0.02	NA	-	0.04	NA	0	0.25	0.56	0.00854	0.09	0.78	0.00428	0.23	0.79	0.01105	0.04	0.45	0.00110	0.08	NA	0	0.09	0.50	0.00275	0.1	0.40	0.00244	0	NA	0.00000	0.11	0.18	0.00181
1.2	0.10	NM	-	0.06	<0.01	0.00004	0.05	NA	-	0.08	<0.01	0.00005	0.06	<0.01	0.00004	0.07	0.06	0.00026	0.20	0.89	0.01081	0.01	NA	0	0.01	NA	0	0.12	0.94	0.00688	0.07	0.72	0.00307				0.05	0.80	0.00366
1.4	0.10	NM	-	0.03	<0.01	0.00002	0	NA	-	0	NA	0	0.02	NA	0	0.07	<0.01	0.00004	0.18	1.05	0.01153	0.005	NA	0	0.09	NA	0	0.06	0.43	0.00157	0.12	0.02	0.00015				0.05	0.65	0.00297
1.6	0.08	NM	-	0.03	<0.01	0.00002							0	NA	0	0.03	NA	0	0.1	0.89	0.00540	0.01	NA	0	0	NA	0	0.04	0.05	0.00012	0.04	0.24	0.00059				0.07	0.07	0.00045
1.8	0.01	NM	-	0	NA	0										0.02	NA	0	0.07	0.07	0.00028	0	NA	0				0	NA	0	0.01	NA	0				0	NA	0
1.9																														0	NA	0						
2.0	0	NA	-													0	NA	0	0	NA	0																		
2.2																																						
2.4																																						
2.6																																						
2.8																																						
3.0																																						
3.2																																						
3.4																																						
3.6																																						
3.8																																						
4.0																																						
Total Stream Width (m)	2.0			1.6			1.0			1.2			1.6			1.8			2.0			1.6			1.4			1.6			1.7			1.0			1.8		
Stake Measurement (m)	-			-			0.964			0.938			0.916			0.908						0.600																	
Total Discharge (m^3/s)	-			0.00453			-			0.00013			0.00864			0.01770			0.06740			0.00375			0.00347			0.02526			0.02006			0.00443			0.02514		
Field Chemistry																																						
Temp (^oC)	16.4			16.6			13.6			12.7			4.0			0.1			4.8			15.4			16.9			16.0			14.9			14.9			2.4		
pH	5.19			6.88			5.84			4.92			5.40			7.84			4.75			7.53			7.63			6.25			6.32			6.32			4.24		
EC (uS)	8			6			8			9			7			11			8			9			9			9			8			8			7		
DO (mg/L)	1.17			5.60			5.25			4.79			3.66			5.08			0.53			0.21			0.02			3.63			3.53			3.53			2.07		
Appearance	clear			slightly tannic			clear			slightly tannic			clear			slightly tannic			clear slight orange tinge			clear			clear with floating particles			clear, slt. Yellow			clear, slt. Yellow			clear, slt. Yellow			slightly tannic		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The interval that stake is located for increased precision in water height fluctuations is 0.6m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Stream Field Data
Location S21

	02-Jul-08	31-Jul-08	27-Aug-08	23-Sep-08	22-Oct-08	20-Nov-08	06-May-09	08-Jun-09	13-Jul-09	05-Aug-09	21-Sep-09	06-Oct-09	05-Nov-09
Field Chemistry													
Temp (^{o}C)	19.3	20.5	22.8	17	3.3	0	8.3	20.2	20.4	17.3	15.5	10	1.5
pH	5.21	5.94	6.64	6.14	6	7.08	6.09	7.19	6.8	7.51	7.43	5.57	5.05
EC (uS)	13	27	9	11	9	2	13	16	53	15	14	8	10
DO (mg/L)	1.4	2.06	3.7	1.35	2.21	3.75	1.53	0.24	0.08	4.64	5.47	2.38	2.36
Appearance	slightly tannic	tannic	tannic	tannic	tannic	cloudy brown	yellow tinge	yellow tinge		clear slt. brn	clear	slt. brn	slt. tannic
Notes Downgradient beaver dam flooded the channel and made it impossible to do a reasonable cross-section.													

Marathon PGM
Summary of Stream Field Data
Location S22

	02-Jul-08			08-Jul-08			31-Jul-08			26-Aug-08			23-Sep-08			22-Oct-08			20-Nov-08			06-May-09			08-Jun-09			13-Jul-09			05-Aug-09			02-Sep-09			06-Oct-09			05-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0	0	NA	-																			0	NA	0																		
0.2	0.15	NM	-	0	NA	-	0	NA	0							0	NA	0	0	NA	0	0.05	0.82	0.00250															0	NA	0
0.25													0	NA	0																										
0.3																															0	NA	0	0	NA	0						
0.4	0.12	NM	-	0.01	NM	-	0.02	NA	0				0.01	NA	0	0.05	<0.01	0.00003	0.08	<0.01	0.00005	0.21	1.12	0.01429							0.06	0.08	0.00022	0.08	0.08	0.00029				0.15	0.13	0.00089
0.6	0.11	NM	-	0.01	NM	-	0	NA	0				0	NA	0	0.04	<0.01	0.00002	0.05	NA	0	0.07	1.28	0.00546							0	NA	0	0	NA	0				0	0.39	0.00143
0.8	0.04	NM	-	0	NM	-	0	NA	0				0	NA	0	0	<0.01	0.00000	0.03	NA	0	0.20	0.16	0.00200							0.01	<0.01	0.00001	0.02	NA	0				0.07	0.00	0.00000
1.0	0.10	NM	-	0	NM	-	0	NA	0				0	NA	0	0.03	<0.01	0.00002	0.06	<0.01	0.00004	0.19	0.20	0.00228							0.08	<0.01	0.00005	0.03	NA	0				0.08	0.00	0.00000
1.2	0.11	NM	-	0.01	NM	-	0.04	NA	0	0	NA	0	0.04	NA	0	0.08	<0.01	0.00005	0.10	<0.01	0.00006	0.18	0.07	0.00072	0	NA	0	0	NA	0	0.13	0.11	0.00087	0.09	0.16	0.00088	0.00	NA	0.00000	0.06	0.05	0.00018
1.4	0.17	NM	-	0.04	NM	-	0.06	<0.01	0.00004	0.01	NA	0	0.04	NA	0	0.09	<0.01	0.00005	0.08	<0.01	0.00005	0.26	0.30	0.00468	0.07	0.06	0.00026	0.05	0.05	0.00015	0.12	0.06	0.00044	0.09	0.11	0.00060	0.01	NA	0.00000	0.18	0.12	0.00132
1.6	0.27	NM	-	0.16	NM	-	0.16	<0.01	0.00010	0.09	<0.01	0.00005	0.16	<0.01	0.00010	0.19	<0.01	0.00012	0.21	<0.01	0.00013	0.33	0.82	0.01651	0.14	0.01	0.00009	0.17	0.05	0.00052	0.23	0.06	0.00084	0.21	0.20	0.00256	0.14	0.01	0.00009	0.26	0.35	0.00555
1.8	0.28	NM	-	0.16	NM	-	0.21	<0.01	0.00013	0.10	<0.01	0.00006	0.17	<0.01	0.00010	0.20	<0.01	0.00012	0.24	<0.01	0.00015	0.34	0.16	0.00340	0.18	0.06	0.00066	0.22	0.01	0.00013	0.31	0.07	0.00132	0.15	0.06	0.00055	0.10	0.03	0.00018	0.33	0.35	0.00705
2.0	0.46	NM	-	0.31	NM	-	0.35	<0.01	0.00021	0.16	<0.01	0.00010	0.32	<0.01	0.00020	0.34	<0.01	0.00021	0.36	<0.01	0.00022	0.50	0.43	0.01301	0.28	0.06	0.00102	0.28	0.11	0.00188	0.31	0.19	0.00359	0.30	0.30	0.00549	0.23	0.07	0.00098	0.39	0.41	0.00975
2.2	0.36	NM	-	0.31	NM	-	0.36	<0.01	0.00022	0.23	<0.01	0.00014	0.26	<0.01	0.00016	0.29	<0.01	0.00018	0.33	<0.01	0.00020	0.53	0.62	0.02015	0.24	0.05	0.00073	0.28	0.02	0.00034	0.30	0.21	0.00384	0.35	0.07	0.00149	0.21	0.12	0.00154	0.28	0.61	0.01042
2.4	0.34	NM	-	0.26	NM	-	0.35	<0.01	0.00021	0.28	<0.01	0.00017	0.26	<0.01	0.00016	0.29	<0.01	0.00018	0.32	<0.01	0.00020	0.55	0.85	0.02862	0.27	0.17	0.00280	0.30	0.06	0.00110	0.34	0.48	0.00996	0.32	0.33	0.00644	0.19	0.14	0.00162	0.46	0.60	0.01684
2.6	0.49	NM	-	0.29	NM	-	0.38	0.15	0.00348	0.34	<0.01	0.00021	0.37	<0.01	0.00023	0.35	<0.01	0.00021	0.37	0.34	0.00767	0.50	1.15	0.03502	0.27	0.19	0.00313	0.29	0.02	0.00035	0.38	0.48	0.01113	0.36	0.44	0.00966	0.30	0.20	0.00366	0.53	0.60	0.01940
2.8	0.43	NM	-	0.33	NM	-	0.34	0.17	0.00353	0.27	<0.01	0.00016	0.33	<0.01	0.00020	0.36	0.32	0.00703	0.39	0.44	0.01047	0.58	1.12	0.03947	0.33	0.18	0.00362	0.37	0.03	0.00068	0.48	0.51	0.01493	0.38	0.55	0.01275	0.37	0.18	0.00406	0.45	0.52	0.01427
3.0	0.45	NM	-	0.444	NM	-	0.36	0.18	0.00395	0.29	<0.01	0.00018	0.34	0.14	0.00290	0.39	0.20	0.00476	0.41	0.45	0.01125	0.60	1.12	0.040827	0.40	0.18	0.00439	0.45	0.08	0.00220	0.46	0.50	0.01403	0.48	0.55	0.01610	0.42	0.17	0.00436	0.46	0.48	0.01347
3.2	0.33	NM	-	0.24	NM	-	0.33	0.13	0.00262	0.36	<0.01	0.00022	0.37	<0.01	0.00023	0.35	<0.01	0.00021	0.35	0.17	0.00363	0.46	0.85	0.02394	0.28	0.21	0.00359	0.41	0.04	0.00100	0.32	0.42	0.00820	0.40	0.52	0.01269	0.35	0.14	0.00299	0.27	0.20	0.00329
3.4	0.35	NM	-	0.34	NM	-	0.33	<0.01	0.00020	0.29	<0.01	0.00018	0.37	<0.01	0.00023	0.23	<0.01	0.00014	0.28	<0.01	0.00017	0.61	0.62	0.02320	0.28	0.10	0.00171	0.38	0.02	0.00046	0.37	0.34	0.00767	0.33	0.22	0.00443	0.29	0.09	0.00159	0.39	0.35	0.00833
3.6	0.49	NM	-	0.38	NM	-	0.39	<0.01	0.00024	0.23	<0.01	0.00014	0.38	<0.01	0.00023	0.33	<0.01	0.00020	0.36	<0.01	0.00022	0.62	0.43	0.01613	0.32	0.05	0.00098	0.35	0.05	0.00107	0.39	0.06	0.00143	0.40	0.01	0.00024	0.32	0.06	0.00117	0.36	0.27	0.00593
3.8	0.46	NM	-	0.27	NM	-	0.35	<0.01	0.00021	0.29	<0.01	0.00018	0.35	<0.01	0.00021	0.34	<0.01	0.00021	0.39	<0.01	0.00024	0.58	0.72	0.02554	0.36	0.05	0.00110	0.39	0.06	0.00143	0.28	0.05	0.00085	0.40	0.02	0.00049	0.36	0.05	0.00110	0.34	0.33	0.00684
4.0	0.45	NM	-	0.25	NM	-	0.26	<0.01	0.00016	0.19	<0.01	0.00012	0.36	<0.01	0.00022	0.29	<0.01	0.00018	0.31	<0.01	0.00019	0.44	0.43	0.01145	0.22	0.04	0.00054	0.26	0.03	0.00048	0.31	0.02	0.00038	0.30	0.11	0.00201	0.23	0.07	0.00098	0.37	0.30	0.00677
4.2	0.40	NM	-	0.31	NM	-	0.32	<0.01	0.00020	0.29	<0.01	0.00018	0.31	<0.01	0.00019	0.34	<0.01	0.00021	0.37	<0.01	0.00023	0.51	0.10	0.00306	0.33	0.05	0.00101	0.32	0.03	0.00059	0.21	0.08	0.00102	0.35	0.15	0.00320	0.28	0.05	0.00085	0.29	0.05	0.00088
4.4	0.33	NM	-	0.23	NM	-	0.24	<0.01	0.00015	0.15	<0.01	0.00009	0.23	<0.01	0.00014	0.24	<0.01	0.00015	0.24	<0.01	0.00015	0.39	0.03	0.00078	0.18	0.01	0.00011	0.15	0.03	0.00027	0.18	0.02	0.00022	0.19	0.02	0.00023	0.15	0.00	0.00000	0.22	NA	0.00000
4.6	0.22	NM	-	0.16	NM	-	0.15	<0.01	0.00009	0.07	<0.01	0.00004	0.13	<0.01	0.00008	0.17	<0.01	0.00010	0.18	<0.01	0.00011	0.33	<0.01	0	0.12	<0.01	0.00007	0.16	0.06	0.00059	0	NA	0	0	0	0	0.13	0	0.00000	0.00	NA	0.00000
4.8	0	NA	-	0.08	NM	-	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0.12	<0.01	0.00007	0	NA	0	0	NA	0	0	NA	0				0	0	0	0	NA	0.00000			
5.0				0	NA	-													0	NA	0												0	NA	0						
Total Stream Width (m)	4.4			5.4			4.6			3.6			4.55			4.6			4.8			4.8			3.6			3.6			4.3			4.7			3.6			4.4		
Stake Measurement (m)	-			-						0.348			0.290			0.267			0.240			0.105			0.400			0.220													
Total Discharge (m^3/s)	-			-			0.01573			0.00221			0.00557			0.01437			0.03548			0.33324			0.02580			0.01323			0.08101			0.08012			0.02517			0.13262		
Field Chemistry																																										
Temp (^{o}C)	15.2			-			18.3			14.5			13.4			4.4			0			7.3			17.5			9.5			15.2			14.4			14.4			2.7		
pH	5.53			-			7.71			7.96			6.84			7.20			7.50			4.17			8.11			7.99			6.30			6.76			6.76			4.23		
EC (uS)	9			-			8			13			9			7			18			10			14			12			13			11			11			10		
DO (mg/L)	1.34			-			6.28			4.93			5.74			4.28			2.23			0.52			0.28			0.06			6.66			3.71			3.71			2.23		
Appearance	slightly tannic			-			slightly tannic			tannic			tannic			slightly tannic			slightly tannic			clear slight yellow tinge			clear			clear tr. floating particulate			clear slt. Yellow			clear slt. Yellow			clear slt. Yellow			slt. Tannic		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The Interval that stake and data logger are located for increased precision in water height fluctuations is 3.0m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Stream Field Data
Location S23

	07-Jul-08			31-Jul-08			28-Aug-08			25-Sep-08			20-Oct-08			17-Nov-08			09-Jun-09			14-Jul-09			04-Aug-09			01-Sep-09			05-Oct-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0																																	
0.2	0	NA	-										0	NA	0	0	NA	0															
0.3				0	NA	0	0	NA	0	0	NA	0							0	NA	0	0	NA	0	0	NA	0	0	NA	0			
0.4	0.09	NM	-	0.03	0.35	0.00048	0.06	<0.01	0.00003	0.10	<0.01	0.00005	0.12	<0.01	0.00007	0.11	0.30	0.00201	0.02	NA	0	0.07	0.18	0.00058	0.04	0.20	0.00049	0.06	0.01	0.00004			
0.5																															0.00	NA	0.00000
0.6	0.13	NM	-	0.10	0.75	0.00458	0.08	0.31	0.00151	0.13	0.39	0.00309	0.12	0.24	0.00176	0.12	0.11	0.00081	0.05	0.43	0.00130	0.08	0.24	0.00117	0.05	0.17	0.00052	0.13	0.13	0.00129	0.05	NA	0.00000
0.8	0.15	NM	-	0.12	1.03	0.00754	0.10	0.93	0.00567	0.12	0.50	0.00366	0.21	0.61	0.00781	0.17	0.83	0.00861	0.10	0.72	0.00440	0.10	0.36	0.00220	0.11	0.49	0.00329	0.15	0.66	0.00906	0.12	0.04	0.00044
1.0	0.16	NM	-	0.14	0.74	0.00632	0.13	0.85	0.00674	0.10	0.97	0.00592	0.20	0.73	0.00891	0.20	0.91	0.01110	0.10	0.72	0.00440	0.10	0.19	0.00116	0.13	0.82	0.00650	0.17	1.08	0.01680	0.44	0.32	0.01503
1.2	0.18	NM	-	0.17	1.57	0.01628	0.16	1.40	0.01366	0.16	1.36	0.01327	0.18	1.33	0.01460	0.17	1.14	0.01182	0.11	1.18	0.00793	0.11	0.67	0.00450	0.13	0.78	0.00619	0.18	1.35	0.02223	0.07	0.78	0.00666
1.4	0.20	NM	-	0.21	1.45	0.01857	0.20	0.95	0.01159	0.18	0.88	0.00966	0.17	1.45	0.01504	0.19	1.22	0.01414	0.13	1.12	0.00885	0.13	0.92	0.00730	0.14	1.27	0.01085	0.18	1.77	0.02915	0.10	1.05	0.01281
1.6	0.21	NM	-	0.20	1.68	0.02050	0.18	1.40	0.01537	0.13	1.44	0.01142	0.16	1.50	0.01464	0.16	1.88	0.01835	0.15	1.28	0.01171	0.14	0.83	0.00709	0.17	1.19	0.01234	0.19	1.45	0.02521	0.09	1.33	0.01460
1.8	0.10	NM	-	0.10	2.00	0.01220	0.12	1.65	0.01208	0.11	1.77	0.01188	0.15	1.75	0.01601	0.17	2.02	0.02095	0.11	1.54	0.01035	0.13	1.06	0.00841	0.12	1.40	0.01025	0.18	1.65	0.02718	0.09	0.73	0.00802
2.0	0.18	NM	-	0.19	2.29	0.02654	0.13	1.69	0.01340	0.11	2.16	0.01449	0.15	1.38	0.01263	0.12	1.87	0.01369	0.13	1.74	0.01379	0.12	1.06	0.00776	0.14	1.28	0.01093	0.19	1.70	0.02955	0.09	0.91	0.00999
2.2	0.15	NM	-	0.12	2.23	0.01632	0.12	1.60	0.01171	0.09	1.86	0.01021	0.15	1.74	0.01592	0.17	2.18	0.02261	0.08	1.51	0.00736	0.13	0.13	0.00099	0.15	1.35	0.01235	0.19	2.22	0.03859	0.08	1.15	0.01122
2.4	0.14	NM	-	0.10	0.27*	0.00165	0.09	0.06*	0.00033	0.10	<0.01*	0.00006	0.12	<0.01*	0.00007	0.17	0.38*	0.00394	0.11	0.85	0.00572	0.13	0.15	0.00119	0.16	1.12	0.01093	0.20	1.97	0.03605	0.07	1.38	0.01179
2.6	0.14	NM	-	0.11	2.35	0.01577	0.15	2.01	0.01839	0.14	0.96	0.00820	0.15	1.56	0.01427	0.16	1.67	0.01630	0.10	0.43	0.00260	0.11	0.18	0.00121	0.13	1.68	0.01332	0.21	1.97	0.03785	0.08	1.10	0.01074
2.8	0.19	NM	-	0.17	1.93	0.02001	0.14	1.66	0.01418	0.13	0.89	0.00706	0.15	1.12	0.01025	0.18	1.46	0.01603	0.12	1.08	0.00793	0.11	0.11	0.00074	0.15	1.38	0.01263	0.21	1.40	0.02690	0.06	1.30	0.00952
3.0	0.18	NM	-	0.16	1.45	0.01415	0.14	1.34	0.01144	0.11	1.15	0.00772	0.16	1.07	0.01044	0.16	1.28	0.01249	0.12	1.31	0.00961	0.13	0.93	0.00737	0.17	1.63	0.01690	0.18	1.65	0.02718	0.07	1.04	0.00888
3.2	0.18	NM	-	0.15	1.60	0.01464	0.15	1.58	0.01446	0.12	1.26	0.00922	0.16	1.32	0.01288	0.18	1.40	0.01537	0.13	1.02	0.00807	0.14	0.83	0.00709	0.13	1.27	0.01007	0.16	1.46	0.02137	0.09	0.65	0.00714
3.4	0.20	NM	-	0.18	1.15	0.01263	0.14	1.01	0.00863	0.12	0.82	0.00600	0.15	0.80	0.00732	0.17	1.43	0.01483	0.11	0.85	0.00572	0.11	0.61	0.00409	0.13	1.11	0.00880	0.17	1.25	0.01944	0.09	0.55	0.00604
3.6	0.17	NM	-	0.15	0.67	0.00613	0.12	0.53	0.00388	0.13	0.23	0.00182	0.15	<0.01	0.00009	0.19	<0.01	0.00012	0.10	0.46	0.00280	0.10	0.40	0.00244	0.09	0.77	0.00423	0.13	0.83	0.00987	0.05	0.25	0.00133
3.7																															0.00	NA	0.00000
3.8	0.11	NM	-	0.14	0.26	0.00222	0.11	<0.01	0.00007	0.07	<0.01	0.00004	0.10	<0.01	0.00006	0.15	<0.01	0.00009	0.04	0.33	0.00080	0.07	0.22	0.00094	0.07	0.50	0.00214	0.10	0.83	0.00759			
4.0	0.04	NM	-	0.02	NA	0	0	NA	0	0	NA	0	0	NA	0	0.11	<0.01	0.00007	0.00	NA	0	0.01	NA	0	0.02	NA	0.00000	0.05	0.38	0.00130			
4.05																									0	NA	0			0.00000			
4.1				0	NA	0																0	NA	0						0.00000			
4.2	0	NA	-													0.03	NA	0										0.02	NA	0.00000			
4.4																0	NA	0										0	NA	0.00000			
Total Stream Width (m)	4.0			3.7			3.7			3.7			3.8			4.2			3.7			3.8			3.8			3.9			3.2		
Stake Measurement (m)	-			-			0.842			0.872			0.812			0.792																
Total Discharge (m^3/s)	-			0.21653			0.16314			0.12378			0.16278			0.20332			0.11333			0.06621			0.15272			0.38667			0.13420		
Field Chemistry																																	
Temp (^{0}C)	15.6			15.7			15.0			12.0			7.8			0.2			13.5			14.4			13.1			12.8			9.1		
pH	8.07			8.32			8.17			7.99			7.40			7.93			6.57			8.46			8.43			8.20			8.19		
EC (uS)	204			305			338			371			366			289			308			410			285			200			352		
DO (mg/L)	4.07			3.46			7.40			3.56			3.25			3.64			0.57			0.32			5.53			3.13			1.24		
Appearance	slightly tannic			slightly tannic			clear			clear			clear			clear			clear			clear			clear slightly yellow			clear slightly yellow			clear		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The interval that stake is located for increased precision in water height fluctuations is 2.2m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate
* Flow taken behind large rock

Marathon PGM
Summary of Stream Field Data
Location S24

	08-Jul-08			30-Jul-08			25-Aug-08			22-Sep-08			21-Oct-08			19-Nov-08			05-May-09			10-Jun-09			14-Jul-09			04-Aug-09			01-Sep-09			08-Oct-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0																																				
0.2																																				
0.4																																				
0.6																																				
0.8																																				
0.95							0	NA	-	*	*	*				**	**	**																		
1.0				0	NA	0	0.01	NA	-	*	*	*				**	**	**	0	NA	0	0	NA	0	0	NA	0				0			0	NA	0
1.1										*	*	*	0	NA	-	**	**	**																		
1.15																												0	NA	0			0			
1.2	0	NA	-	0.04	NA	0	0.01	NA	-	*	*	*	0.02	NA	-	**	**	**	0.05	1.18	0.00360	0.01	<0.01	0.00001	0.03	<0.01	0.00001	0.02	<0.01	0.00225	0.09	0.14	0.00048	0.05	1.10	0.00210
1.4	0.03	NM	-	0.06	0.41	0.00150	0.04	NA	-	*	*	*	0.05	NA	-	**	**	**	0.04	0.95	0.00232	0.01	<0.01	0.00001	0.02	<0.01	0.00002	0.03	<0.01	0.00232	0.07	0.22	0.00094	0.06	0.08	0.00029
1.6	0.1	NM	-	0.04	NA	0	0	NA	-	*	*	*	0	NA	-	**	**	**	0.03	NA	0	0	NA	0				0.03	<0.01	0.00000	0.12	0.26	0.00167	0.07	0.08	0.00030
1.75																												0	NA	0	0		0	0	NA	0
1.8	0	NA	-	0	NA	0				*	*	*				**	**	**	0.05	0.36	0.00110				0.03	NA	0									
2.0																									0	NA	0									
2.2																																				
2.4																																				
2.6																																				
2.8																																				
3.0																																				
3.2																																				
3.4																																				
3.6																																				
3.8																																				
4.0																																				
Total Stream Width (m)	0.6			0.8			0.65			*			0.5			**			0.8			0.6			1.0			0.6			0.5			0.8		
Stake Measurement (m)	-			-			0.742			*			0.699			0.675			0.694																	
Total Discharge (m^3/s)	-			0.00150			-			*			-			**			0.00702			-			-			0.00457			0.00309			0.00269		
Field Chemistry																																				
Temp (^{0}C)	10.9			12.0			11.7			*			4.4			0.9			2.4			8.7			11.9			11.0			11.9			6.8		
pH	8.21			8.19			8.23			*			8.18			8.16			7.93			6.03			8.28			8.47			8.35			8.38		
EC (uS)	405			369			415			*			410			408			273			436			-			366			349			457		
DO (mg/L)	4.19			5.27			8.10			*			3.95			4.76			2.31			0.92			0.47			6.32			1.96			2.20		
Appearance	cloudy white			slightly tannic			clear			*			clear			cloudy white			light brown cloudy turbid			slightly cloudy turbid			light brown cloudy turbid			slt. cloudy/grey			slt. cloudy/grey			clear		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The interval that stake is located for increased precision in water height fluctuations 1.4m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate
* Due to the low water conditions the Pic River was non navigatable by boat
** The stream was frozen and completely drifted in with snow making a stream profile very inaccurate and difficult

Marathon PGM
Summary of Stream Field Data
Location S25

	08-Jul-08			30-Jul-08			25-Aug-08			22-Sep-08			21-Oct-08			19-Nov-08			05-May-09			10-Jun-09			14-Jul-09			04-Aug-09			01-Sep-09			08-Oct-09		
Distance Panel (m)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)	Depth (m)	Velocity (ft/s)	Flow (m^3/s)
0.0																																				
0.2																																				
0.4																																				
0.6																						0	NA	0												
0.8	0	NA	-	0	NA	0	DRY	NA	-	*	*	*	0	NA	0	**	**	**	0	NA	0	0.1	0.26	0.00160	0	NA	0				0	NA	0	0	NA	0
0.95																												0	NA	0						
1.0	0.10	NM	-	0.04	0.61	0.00149	DRY	NA	-	*	*	*	0.07	<0.01	0.00004	**	**	**	0.1	0.62	0.00380	0.02	NA	0	0.03	<0.01	0.00002	0.01	<0.01	0.00001	0.08	0.44	0.00268	0.02	NA	0
1.2	0.06	NM	-	0.08	<0.01	0.00004	DRY	NA	-	*	*	*	0	NA	0	**	**	**	0.1	0.46	0.00210	0	NA	0	0.03	<0.01	0.00001	0.05	<0.01	0.00003	0.14	0.21	0.00157	0.09	0.53	0.00255
1.3				0	NA	0	DRY	NA	-	*	*	*				**	**	**	0	NA	0				0	NA	0							0.09	0.02	0.00005
1.35																												0	NA	0						
1.4	0	NA	-				DRY	NA	-	*	*	*				**	**	**													0.1	0.04	0.00024	0.09	0.03	0.00019
1.6																															0	NA	0	0.03	NA	0
1.8																																		0	NA	0
2.0																																				
Total Stream Width (m)	0.6			0.5			-			*			0.4			**			0.5			0.6			0.5			0.4			0.8			1.0		
Total Discharge (m^3/s)	-			0.00153			-			*			0.00004			**			0.00590			0.00160			0.00003			0.00003			0.00450			0.00279		
Field Chemistry																																				
Temp (^oC)	11.2			12.4			-			*			4.2			**			1.7			7.7			11.4			12.0			10.3			6.6		
pH	8.02			8.04			-			*			8.08			**			7.94			7.24			8.3			8.35			8.03			8.18		
EC (uS)	363			343			-			*			320			**			281			380			471			385			377			432		
DO (mg/L)	3.65			5.80			-			*			3.87			**			3.40			0.74			0.27			6.30			1.94			2.36		
Appearance	clear			clear			-			*			clear			**			light brown turbid silty			cloudy turbid			light grey cloudy			slt. cloudy, lt. grey			slt. cloudy, lt. grey			slt. cloudy, lt. grey		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
DRY-Streambed is dry
The lower limit of the flow meter is 0.01ft/s
Could not advance measuring stake through stream bed
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate
* Due to the low water conditions the Pic River was non navigatable by boat
** The upper portion of the Pic River was frozen and was non navigatable by boat

Marathon PGM
Summary of Stream Field Data
Location S26

	01-Jul-08			29-Jul-08			27-Aug-08			24-Sep-08			23-Oct-08			18-Nov-08			08-May-09			09-Jun-09			20-Jul-09			06-Aug-09			03-Sep-09			06-Oct-09			05-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0																																							
0.2																																							
0.4																																							
0.6																																							
0.8																																							
1.0																																							
1.1																																				0	NA	0			
1.2	0	NA	-																																	0.06	0.06		0	NA	0
1.3				0	NA	0	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0	NA	0																
1.4	0.06	NM	-	0.05	NA	0	0.06	<0.01	0.00003	0.06	<0.01	0.00003	0.07	<0.01	0.00003	0.07	<0.01	0.00003	0.16	0.07	0.00048	0.03	0.03	0.00005	0	NA	0	0	NA	0	0	NA	0	0	0.08	#VALUE!	0.16	NA	0.00000
1.6	0.08	NM	-	0.10	0.30	0.00183	0.06	<0.01	0.00004	0.07	0.19	0.00081	0.08	0.36	0.00176	0.10	0.25	0.00153	0.18	0.07	0.00072	0.06	0.07	0.00024	0.06	0.01	0.00004	0.08	0.21	0.00102	0.09	0.06	0.00033	0.13	0.20	#VALUE!	0.19	0.03	0.00035
1.8	0.10	NM	-	0.15	<0.01	0.00009	0.10	<0.01	0.00006	0.12	<0.01	0.00007	0.14	<0.01	0.00009	0.12	<0.01	0.00007	0.22	0.26	0.00352	0.13	0.03	0.00026	0.11	0.02	0.00013	0.13	0.06	0.00048	0.11	0.11	0.00074	0.12	0.07	#VALUE!	0.23	0.02	0.00028
2.0	0.12	NM	-	0.13	<0.01	0.00008	0.08	<0.01	0.00005	0.11	<0.01	0.00007	0.13	<0.01	0.00008	0.16	<0.01	0.00010	0.26	2.23	0.03538	0.14	0.03	0.00028	0.12	0.03	0.00022	0.14	0.01	0.00009	0.15	0.03	0.00027	0.09	0.05	#VALUE!	0.25	0.18	0.00206
2.1																																		0.00	NA				
2.2	0.07	NM	-	0.08	<0.01	0.00003	0.04	<0.01	0.00002	0.09	<0.01	0.00003	0.11	<0.01	0.00005	0.12	<0.01	0.00007	0.16	0.98	0.00720	0.06	0.03	0.00008	0.04	0.01	0.00002	0.05	<0.01	0.00002	0.06	0.01	0.00002				0.19	0.32	0.00139
2.25				0	NA	0				0	NA	0										0	NA	0	0	NA	0	0	NA	0	0	NA	0.00000				0	NA	
2.3							0	NA	0				0	NA	0				0	NA	0																	
2.4	0	NA	-													0	NA	0																				
2.6																																							
2.8																																							
3.0																																							
3.2																																							
3.4																																							
3.6																																							
3.8																																							
4.0																																							
Total Stream Width (m)	1.2			1.0			1.0			1.0			1.0			1.1			1.0			1.0			0.9			0.9			0.9			#VALUE!			0.0		
Stake Measurement (m)	-			-			0.985			0.968			0.650			0.954			0.850			0.969																	
Total Discharge (m^3/s)	-			0.00203			0.00019			0.00101			0.00200			0.00180			0.04731			0.00090			0.00041			0.00161			0.00136			#VALUE!			0.00408		
Field Chemistry																																							
Temp (^oC)	11.4			15.3			14.6			12.6			5.7			0.5			4.9			9.8			13.3			12.3			11.3			8.5			8.5		
pH	6.10			6.90			7.22			6.80			6.60			6.74			7.34			7.98			6.45			6.97			6.76			7.97			7.97		
EC (uS)	9			12			11			10			9			16			10			11			16			14			15			12			12		
DO (mg/L)	2.28			5.64			5.98			3.78			4.48			3.80			1.21			0.32			1.85			3.31			4.81			3.48			3.48		
Appearance	clear			orangish			clear			clear			clear			clear			clear w/ yellow tinge			clear			clear			clear			clear			clear			clear		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The interval that stake is located for increased precision in water height fluctuations is 2.0m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Stream Field Data
Location S27

	01-Aug-08	28-Aug-08	24-Sep-08	23-Oct-08	18-Nov-08	08-May-09	09-Jun-09	07-Aug-09	03-Sep-09	07-Oct-09	04-Nov-09
Field Chemistry											
Temp (^{o}C)	13.4	11.6	11.8	3.5	0	3.6	9.2	8.6	9.6	7.4	3.3
pH	8.07	7.94	7.84	7.87	8.03	8.78	6.63	8.34	8.24	7.36	6.76
EC (uS)	264	310	325	310	90	73	188	183	139	294	105
DO (mg/L)	8.63	7.14	4.73	4.60	4.38	3.31	0.71	4.30	5.10	1.65	1.92
Appearance	clear	clear	clear	clear		clear	clear	clear	clear	clear	clear
Stake Measurement (m)	-	0.65	0.648	0.734	0.59	0.574	-	-	-	-	-

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
Stake measurements are taken from the top of the stake to the surface of the water
The total height of the stake above the streambed is 0.705m

Marathon PGM
Summary of Stream Field Data
Location S28

	01-Jul-08			28-Jul-08			25-Aug-08			22-Sep-08			21-Oct-08			17-Nov-08			10-Jun-09			15-Jul-09			05-Aug-09			02-Sep-09			05-Oct-09			03-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0																																				
0.2																																				
0.4	0	NA	-	DRY	NA	-	DRY	NA	-	DRY	NA	-	0	NA	0	0	NA	0													0	NA	0	0	NA	0
0.6	0.25	NM	-	DRY	NA	-	DRY	NA	-	DRY	NA	-	0.07	<0.01	0.00004	0.11	0.56	0.00376							0	NA	0	0	NA	0	0.01	NA	0	0.12	0.03	0.00022
0.8	0.28	NM	-	DRY	NA	-	DRY	NA	-	DRY	NA	-	0.06	<0.01	0.00004	0.11	0.60	0.00403				0	NA	0	0.03	<0.01	0.00002	0.04	0.64	0.00156	0.02	NA	0.00000	0.13	0.24	0.00190
1.0	0.29	NM	-	DRY	NA	-	DRY	NA	-	DRY	NA	-	0.05	<0.01	0.00003	0.08	0.50	0.00244	0	NA	0	0.01	<0.01	0.00001	0.04	0.35	0.00085	0.03	0.45	0.00082	0.02	NA	0.00000	0.18	0.66	0.00725
1.2	0.24	NM	-	DRY	NA	-	DRY	NA	-	DRY	NA	-	0.05	<0.01	0.00003	0.06	0.25	0.00092	0.04	0.33	0.00080	0.01	<0.01	0.00001	0.05	0.45	0.00137	0.05	0.46	0.00140	0.02	NA	0.00000	0.18	0.75	0.00824
1.4	0.17	NM	-	DRY	NA	-	DRY	NA	-	DRY	NA	-	0.06	<0.01	0.00004	0.06	0.27	0.00099	0.03	0.26	0.00048	0.02	<0.01	0.00001	0.05	0.26	0.00079	0.03	0.22	0.00040	0.03	0.36	0.00066	0.2	0.49	0.00598
1.6	0.17	NM	-	DRY	NA	-	DRY	NA	-	DRY	NA	-	0.07	<0.01	0.00004	0.14	0.15	0.00128	0.04	0.26	0.00064	0.03	<0.01	0.00002	0.07	0.36	0.00154	0.04	0.25	0.00061	0.05	0.15	0.00046	0.25	0.51	0.00778
1.8	0.23	NM	-	DRY	NA	-	DRY	NA	-	DRY	NA	-	0.08	<0.01	0.00005	0.12	<0.01	0.00007	0.05	0.30	0.00090	0.005	<0.01	0	0.09	0.35	0.00192	0.05	0.21	0.00064	0.04	0.05	0.00012	0.3	0.51	0.00933
2.0	0.23	NM	-	DRY	NA	-	DRY	NA	-	DRY	NA	-	0.07	<0.01	0.00004	0.11	<0.01	0.00007	0	NA	0	0	NA	0	0.07	0.16	0.00068	0.01	NA	0.00000	0.05	0.06	0.00011	0.16	0.24	0.00146
2.05																									0	NA	0	0	NA	0	0	NA	0			
2.1																																				
2.2	0	NA	-	DRY	NA	-	DRY	NA	-	DRY	NA	-	0	NA	0	0	NA	0													0			0	NA	0
2.4																																				
2.6																																				
2.8																																				
3.0																																				
Total Stream Width (m)	1.4			-			-			-			1.8			1.8			1.0			1.2			1.5			1.5			1.5			1.8		
Total Discharge (m^3/s)	-			-			-			-			0.00031			0.01355			0.00282			0.00005			0.00718			0.00544			0.00135			0.04216		
Field Chemistry																																				
Temp (°C)	12.8			-			-			-			4.1			0.5			11.5			13.8			15.0			13.4			8.7			3.5		
pH	7.15			-			-			-			7.20			7.52			7.35			7.96			8.14			7.65			7.94			7.37		
EC (uS)	28			-			-			-			30			26			70			71			40			50			100			17		
DO (mg/L)	1.60			-			-			-			4.02			3.67			0.66			8.02			5.87			4.34			1.74			1.60		
Appearance	slightly tannic			-			-			-			slightly tannic			tannic			slightly yellow tinge			clear, yellow tinge			clear, yellow			clear, yellow			clear, yellow			slight tannic		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
DRY - Dry steambed
The lower limit of the flow meter is 0.01ft/s
Could not advance measuring stake through stream bed
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Stream Field Data
Location S29

	30-Jun-08			28-Jul-08			25-Aug-08			24-Sep-08			21-Oct-08			17-Nov-08			05-May-09			11-Jun-09			15-Jul-09			05-Aug-09			31-Aug-09			08-Oct-09			05-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0.0																																							
0.2																																							
0.4																																							
0.6																																							
0.8																																							
1.0																																							
1.2																																							
1.4																																							
1.6																																							
1.8																																							
2.0																																							
2.2																																					0	NA	0
2.4	0	NA	-																																		0.04	0.02	0.00007
2.6	0.018	NM	-										0	NA	0	0	NA	0	0	NA	0										0			0	NA	0	0.05	0.77	0.00235
2.8	0.055	NM	-										0.01	NA	0	0.03	NA	0	0.01	NA	0										0.06	0.26	0.00095	0.02	NA	0.00000	0.09	1.31	0.00719
2.85				0	NA	0																																	
2.90							0	NA	0	0	NA	0										0	NA	0	0	NA	0												
3.0	0.03	NM	-	0.05	<0.01	0.00003	0.03	NA	0	0.05	<0.01	0.00002	0.11	0.32	0.00215	0.12	0.33	0.00242	0.05	0.69	0.00158	0.03	0.328084	0.00045	0.01	NA	0	0.07	0.63	0.00202	0.07	0.55	0.00235	0.07	0.21	0.00090	0.14	0.29	0.00248
3.2	0.145	NM	-	0.07	<0.01	0.00004	0.03	NA	0	0.06	<0.01	0.00004	0.30	<0.01	0.00018	0.15	0.32	0.00293	0.13	1.18	0.00937	0.05	0.492126	0.00150	0.02	NA	0	0.10	0.77	0.00470	0.08	0.93	0.00454	0.08	0.06	0.00040	0.15	0.2	0.00252
3.4	0.17	NM	-	0.09	<0.01	0.00005	0.05	NA	0	0.07	<0.01	0.00004	0.13	<0.01	0.00008	0.15	<0.01	0.00009	0.11	0.72	0.00484	0.08	0.393701	0.00192	0.07	0.14	0.00060	0.07	0.31	0.00132	0.12	0.62	0.00454	0.10	0.04	0.00043	0.08	0.02	0.00017
3.6	0.20	NM	-	0.09	<0.01	0.00005	0.06	<0.01	0.00004	0.09	<0.01	0.00005	0.16	<0.01	0.00010	0.16	<0.01	0.00010	0.13	0.36	0.00286	0.06	0.328084	0.00120	0.06	0.31	0.00113	0.07	0.15	0.00064	0.12	0.4	0.00293	0.10	0.17	0.00207	0.00	NA	0.00000
3.8	0.16	NM	-	0.06	0.65	0.00238	0.015	NA	0	0.05	NA	0	0.12	<0.01	0.00007	0.13	<0.01	0.00008	0.11	0.30	0.00198	0.06	0.164042	0.00060	0.06	0.18	0.00066	0.09	0.20	0.00110	0.07	0.18	0.00048	0.05	0.01	0.00005			
3.85																												0	NA	0			0.00000						
4.0	0.13	NM	-	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0.10	0.16	0.00100	0.05	0.164042	0.00050	0.05	0.06	0.00018				0	NA	0.00000	0	NA	0.00000			
4.2	0	NA	-																0	NA	0	0	NA	0	0	NA	0				0	NA	#VALUE!						
Total Stream Width (m)	1.8			1.2			1.1			1.1			1.4			1.4			1.6			1.3			1.3			0.9			1.8			-1.4			1.6		
Stake Measurement (m)	-			-			0.608			0.582			0.512			0.497			0.490			0.545																	
Total Discharge (m^3/s)	-			0.00256			0.00004			0.00016			0.00258			0.00561			0.02163			0.00617			0.00257			0.00978			0.01483			0.00385			0.00516		
Field Chemistry																																							
Temp (^{o}C)	10.0			11.9			12.5			10.0			5.6			0.9			6.6			9.7			9.9			10.0			11.1			8.0			3.1		
pH	7.26			7.68			7.67			7.23			7.25			7.70			7.45			7.52			8.15			7.46			7.16			7.46			6.28		
EC (uS)	46			94			96			69			60			37			64			71			53			47			44			68			24		
DO (mg/L)	1.50			3.64			6.43			4.55			3.61			3.75			1.11			0.74			6.47			3.90			1.96			2.00			1.83		
Appearance	clear			clear			clear			clear			clear			clear			clear			clear			clear			clear			clear			clear			clear		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
The lower limit of the flow meter is 0.01ft/s
The interval that stake is located for increased precision in water height fluctuations is 3.4m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Stream Field Data
Location S30

	07-Jul-08	30-Jul-08	29-Aug-08	25-Sep-08	20-Oct-08	17-Nov-08	09-Jun-09	14-Jul-09	04-Aug-09	01-Sep-09	05-Oct-09
Field Chemistry											
Temp (^{o}C)	18.6	17.2	15.1	12.3	10.7	4.1	13.5	15.9	15.6	14.7	11.3
pH	7.54	8.14	7.55	7.49	7.20	7.67	6.40	7.40	7.86	7.54	7.30
EC (uS)	43	373	115	55	46	27	57	47	39	27	64
DO (mg/L)	2.88	3.73	6.09	3.12	2.85	3.00	0.40	0.27	5.96	2.65	1.24
Appearance	clear	clear	clear	clear	clear	clear	yellow tinge	clear	clear	clear	Slt. Yellow
Stake Measurement (m)	-	-	0.206	0.39	0.449	0.478	-	-	-		-

Notes
Section of stream is too wide and deep for a stream crossing.
Stake measurements are taken from the top of the stake to the surface of the water
The total height of the stake above the streambed is 0.579m

Marathon PGM
Summary of Hydrogeological Field Data
Location S31

	07-Jul-08			30-Jul-08			29-Aug-08			25-Sep-08			20-Oct-08			17-Nov-08			09-Jun-09			04-Aug-09			01-Sep-09			05-Oct-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0																														
0.2	0	NA	-																											
0.4	0.26	NM	-	0	NA	0	0	NA	0	0	NA	0	0	NA	0		FROZEN		0	NA	0							0	NA	0
0.45																						0	NA	0	0	NA	0			
0.6	0.29	NM	-	0.40	0.38	0.00927	0.38	<0.01	0.00023	0.25	0.14	0.00214	0.54	0.85	0.02800		FROZEN		0.16	0.33	0.00320	0.36	0.18	0.00395	0.38	0.37	0.00858	0.22	0.03	0.00040
0.8	0.36	NM	-	0.41	0.16	0.00400	0.40	<0.01	0.00024	0.27	<0.01	0.00016	0.47	0.52	0.01491		FROZEN		0.29	0.30	0.00522	0.41	0.32	0.00800	0.48	0.48	0.01932	0.31	0.02	0.00052
1.0	0.41	NM	-	0.39	0.29	0.00690	0.40	<0.01	0.00024	0.28	0.32	0.00547	0.44	1.45	0.03892		FROZEN		0.22	0.13	0.00176	0.33	0.66	0.01329	0.45	0.25	0.01029	0.31	0.05	0.00142
1.2	0.37	NM	-	0.38	<0.01	0.00023	0.33	<0.01	0.00020	0.26	<0.01	0.00016	0.51	1.30	0.04044		FROZEN		0.22	0.07	0.00088	0.33	0.40	0.00805	0.46	0.26	0.01094	0.30	0.26	0.00714
1.4	0.36	NM	-	0.35	0.51	0.01089	0.19	0.24	0.00278	0.20	0.11	0.00134	0.53	1.19	0.03847		FROZEN		0.26	0.16	0.00260	0.30	0.62	0.01135	0.53	0.25	0.01212	0.28	0.20	0.00512
1.6	0.31	NM	-	0.34	0.56	0.01161	0.29	0.15	0.00265	0.22	0.22	0.00295	0.58	1.12	0.03963		FROZEN		0.30	0.16	0.00300	0.31	0.68	0.01286	0.45	0.40	0.01647	0.29	0.20	0.00531
1.8	0.33	NM	-	0.39	0.50	0.01190	0.32	<0.01	0.00020	0.24	0.20	0.00293	0.57	1.08	0.03755		FROZEN		0.42	0.39	0.01009	0.35	0.64	0.01366	0.52	0.69	0.03283	0.35	0.28	0.00897
2.0	0.42	NM	-	0.44	0.61	0.01637	0.37	<0.01	0.00023	0.35	<0.01	0.00021	0.53	1.06	0.03427		FROZEN		0.48	0.59	0.01729	0.40	0.56	0.01366	0.55	0.49	0.02466	0.40	0.31	0.01135
2.2	0.37	NM	-	0.40	0.90	0.02196	0.34	0.20	0.00415	0.31	<0.01	0.00019	0.55	0.62	0.02080		FROZEN		0.44	0.43	0.01145	0.42	0.70	0.01793	0.58	0.47	0.02494	0.43	0.27	0.01062
2.4	0.31	NM	-	0.33	0.82	0.01651	0.29	0.36	0.00637	0.28	0.19	0.00325	0.52	1.30	0.04124		FROZEN		0.40	0.39	0.00961	0.28	0.85	0.01452	0.54	0.48	0.02372	0.38	0.28	0.00974
2.6	0.25	NM	-	0.29	0.40	0.00708	0.29	0.13	0.00230	0.12	<0.01	0.00007	0.38	1.10	0.02550		FROZEN		0.30	0.30	0.00540	0.25	0.25	0.00381	0.47	0.15	0.00645	0.27	0.08	0.00198
2.8	0.16	NM	-	0.22	<0.01	0.00013	0.23	<0.01	0.00014	0.03	NA	0	0.24	0.93	0.01021		FROZEN		0.20	0.30	0.00360	0.24	0.24	0.00351	0.40	0.38	0.01159	0.22	0.15	0.00252
2.9										0	NA	0	0.22	<0.01	0.00013		FROZEN										0.00000			
3.0	0.10	NM	-	0.16	<0.01	0.00010	0.13	<0.01	0.00008								FROZEN		0.09	0.16	0.00088	0.12	0.08	0.00059	0.28	0.49	0.00837	0.03	NA	0.00000
3.2	0.04	NM	-	0.09	NA	0	0.05	<0.01	0.00003				0.17	<0.01	0.00013		FROZEN		0	NA	0	0.08	0.02	0.00010	0.18	0.15	0.00206	0.00	NA	0.00000
3.4	0	NA	-	0.03	NA	0	0	NA	0				0.11	<0.01	0.00007		FROZEN					0.01	<0.01	0.00001	0.08	0.00				
3.6				0	NA	0							0.12	0.44	0.00322		FROZEN					0	NA	0	0.02	0.00				
3.8				0.02	NA	0							0.15	1.06	0.00970		FROZEN					0	NA	0	0.03	0.03	0.00008			
4.0				0.02	NA	0							0.13	0.75	0.00595		FROZEN					0.02	<0.01	0	0.06	0.37	0.00203			
4.2				0.01	NA	0							0.16	<0.01	0.00010		FROZEN					0	NA	0	0.06	0.53	0.00291			
4.4				0.04	NA	0							0.18	<0.01	0.00011		FROZEN					0	NA	0	0.08	0.03	0.00022			
4.6				0.05	NA	0							0	NA	0		FROZEN					0.03	<0.01	0	0.15	0.00				
4.65																						0	NA	0						
4.70																									0	NA	0			
4.8				0	NA	0																								
5.0																														
Total Stream Width (m)	3.2			4.4			3.0			2.5			4.2			-			2.8			4.2			4.3			0.0		
Stake Measurement (m)	-			-			0.356			0.414			0.214			-			0.200											
Total Discharge (m^3/s)	-			0.11695			0.01984			0.01887			0.38934			-			0.07499			0.12532			0.21759			0.06507		
Field Chemistry																														
Temp (^{o}C)	15.3			14.8			12.2			10.5			8.1			-			13.4			12.9			10.3			8.7		
pH	7.62			7.87			7.69			7.48			7.10			-			6.63			7.65			7.17			7.50		
EC (uS)	100			155			261			168			143			-			171			99			59			164		
DO (mg/L)	2.30			4.63			6.35			3.40			3.21			-			0.50			6.13			2.72			1.77		
Appearance	slightly tannic			slightly tannic			clear			slightly tannic			tannic			-			clear w/ yellow tinge			clear w/ yellow tinge			clear w/ yellow tinge			clear w/ yellow tinge		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
FROZEN - The stream channel was frozen which made the sampling location unaccessable.
The lower limit of the flow meter is 0.01ft/s
The iInterval that stake is located for increased precision in water height fluctuations is 2.8m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Hydrogeological Field Data
Location S32

	14-Jul-09			04-Aug-09			01-Sep-09			08-Oct-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0												
0.2												
0.4												
0.6												
0.8	0	NA	0				0.00	0.00	0.00000	0.00	NA	0.00000
1.0	0.03	0.43	0.00079	0	NA*	0	0.12	0.51	0.00373	0.17	0.10	0.00104
1.2	0.02	<0.01	0.00001	0.08	0.74*	0.00361	0.23	0.65	0.01038	0.14	0.14	0.00120
1.4	0.01	<0.01	0.00001	0.05	1.14*	0.00348	0.21	0.73	0.00948	0.15	0.20	0.00183
1.6	0.01	<0.01	0.00001	0.05	1.25*	0.00381	0.12	0.37	0.00542	0.06	0.09	0.00033
1.8	0.01	<0.01	0.00001	0.07	1.36*	0.00581	0.09	0.04	0.00406	0.00	NA	0.00000
2.0	0	NA	0	0	NA*	0	0.12	0.00	0.00542	0.07	NA	0.00000
2.2							0.12	0.00	0.00542	0.00	NA	0.00000
2.4							0.13	0.00	0.00587			
2.6							0.03	0.00	0.00135			
2.8							0.00	0.00	0			
2.9												
3.0												
Total Stream Width (m)	1.2			1.0			2.0			1.4		
Stake Measurement (m)												
Total Discharge (m^3/s)	0.00082			0.01671			0.05113			0.00439		
Field Chemistry												
Temp (^oC)	20.7			12.6			14.2			6.6		
pH	8.67			8.38			7.74			8.17		
EC (uS)	237			146			54			214		
DO (mg/L)	0.17			6.40			1.65			2.02		
Appearance	clear			clear, brown			clear, slt. Yellow					

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
FROZEN - The stream channel was frozen which made the sampling location unaccessable.
The lower limit of the flow meter is 0.01ft/s
The iInterval that stake is located for increased precision in water height fluctuations is 2.8m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate
*Moved stream crossing upstream because of influence from Pic River (last round data may be suspect)

Marathon PGM
Summary of Hydrogeological Field Data
Location S33

	03-Aug-09			02-Sep-09			07-Oct-09			04-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
-0.2										0	NA	0
0				0	NA	0				0.08	0.36	0.00132
0.1	0	NA	0	0.005	0.36	0.00005				0.05	0.73	0.00111
0.2	0.01	<0.01	0.00000	0.05	0.47	0.00108	0	NA	0	0.2	0.49	0.00448
0.4	0.09	0.51	0.00280	0.15	0.38	0.00348	0.05	0.27	0.00082	0.26	1.55	0.02458
0.6	0.22	0.34	0.00456	0.19	1.08	0.01252	0.18	0.30	0.00329	0.26	0.91	0.01443
0.8	0.19	0.08	0.00093	0.21	1.01	0.01294	0.16	0.16	0.00156	0.05	0.42	0.00128
1.0	0.09	0.61	0.00335	0.15	0.66	0.00604	0.05	0.30	0.00092	0.00	NA	0.00000
1.2	0	NA	0	0.04	0.51	0.00124	0.00	NA	0.00000			
1.4				0.00	NA	0						
1.6												
1.8												
2.0												
2.2												
2.4												
2.6												
2.8												
2.9												
3.0												
Total Stream Width (m)	1.1			1.4			1.0			1.2		
Stake Measurement (m)												
Total Discharge (m^3/s)	0.01164			0.03735			0.00659			0.04721		
Field Chemistry												
Temp (^{o}C)	14.4			14.6			6.2					
pH	7.41			7.44			7.2					
EC (uS)	31			27			36					
DO (mg/L)	1.65			2.05			2.16					
Appearance	clear			clear			clear					

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
FROZEN - The stream channel was frozen which made the sampling location unaccessable.
The lower limit of the flow meter is 0.01ft/s
The iInterval that stake is located for increased precision in water height fluctuations is 2.8m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Hydrogeological Field Data
Location S34

	03-Aug-09			02-Sep-09			07-Oct-09			04-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0												
0.2												
0.4												
0.6												
0.8							0	NA	0	0.00	NA	0
0.9	0	NA	0	0	NA	0						
1.0	0.13	0.25	0.00198	0.19	0.23	0.00267	0.01	NA	0.00000	0.28	0.09	0.00154
1.2	0.12	0.24	0.00176	0.16	0.15	0.00183	0.07	0.21	0.00112	0.27	0.16	0.00329
1.4	0.08	0.28	0.00137	0.26	0.05	0.00119	0.06	0.16	0.00088	0.19	0.73	0.01269
1.6	0.09	0.34	0.00187	0.12	0.27	0.00247	0.04	0.03	0.00009	0.15	0.47	0.00538
1.7	0	NA	0	0	NA	0	0	NA	0			
1.8										0.00	NA	0
2.0												
2.2												
2.4												
2.6												
2.8												
2.9												
3.0												
Total Stream Width (m)	0.8			0.8			0.9			1.0		
Stake Measurement (m)												
Total Discharge (m^3/s)	0.00697											
Field Chemistry												
Temp (^{o}C)				16.9			7.1			2.3		
pH	7.28			7.48			7.55			6.62		
EC (uS)	15			14			17			12		
DO (mg/L)	1.64			2.15			2.25			1.40		
Appearance	clear slight yellow			clear, slight yellow			clear			slight tannic		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
FROZEN - The stream channel was frozen which made the sampling location unaccessable.
The lower limit of the flow meter is 0.01ft/s
The iInterval that stake is located for increased precision in water height fluctuations is 2.8m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Hydrogeological Field Data
Location S35

	03-Aug-09			02-Sep-09			07-Oct-09			04-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0												
0.2										0	NA	0
0.4										0.12	0.5	0.00549
0.6										0.04	1.37	0.00501
0.8										0.07	0.38	0.00223
0.95	0	NA	0									
1.0	0.06	0.65	0.00238							0.13	0.65	0.00515
1.2	0.08	0.85	0.00415	0.00	NA	0	0.00	NA	0	0.19	0.82	0.00832
1.3										0.00	NA	0
1.4	0.02	NA	0	0.07	1.52	0.00649	0.06	0.55	0.00201			
1.6	0.01	NA	0	0.01	NA	0	0.01	NA	0			
1.8	0.12	0.37	0.00271	0.07	0.52	0.00222	0.03	NA	0			
2.0	0.07	0.01	0.00004	0.03	NA	0	0.05	NA	0			
2.1	0	NA	0	0.00	NA	0	0.00	NA	0			
2.2												
2.4												
2.6												
2.8												
2.9												
3.0												
Total Stream Width (m)	1.2			0.9			0.9			1.1		
Stake Measurement (m)												
Total Discharge (m^3/s)	0.00928			0.00871			0.00201			0.02621		
Field Chemistry												
Temp (^{o}C)	13.2			12.8			6.2			2.6		
pH	7.35			7.47			6.98			6.47		
EC (uS)	16			15			17			13		
DO (mg/L)	0.72			2.27			2.16			1.76		
Appearance	clear			clear, sl. yellow			clear			clear		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
FROZEN - The stream channel was frozen which made the sampling location unaccessable.
The lower limit of the flow meter is 0.01ft/s
The iInterval that stake is located for increased precision in water height fluctuations is 2.8m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Hydrogeological Field Data
Location S36

	03-Aug-09			02-Sep-09			07-Oct-09			04-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0												
0.2												
0.4												
0.6												
0.8												
1.0												
1.2												
1.4												
1.6										0.00	NA	0
1.8	0	NA	0	0.00	NA	0	0.00	NA	0	0.06	NA	0
2.0	0.12	0.01	0.00007	0.09	0.20	0.00110	0.09	0.07	0.00038	0.16	0.08	0.00078
2.2	0.09	1.16	0.00637	0.13	1.92	0.01523	0.08	0.43	0.00210	0.17	0.13	0.00130
2.4	0.09	1.68	0.00922	0.07	1.63	0.00696	0.01	NA	0.00000	0.12	2.42	0.01771
2.6	0.12	1.55	0.01135	0.17	0.08	0.00083	0.10	0.82	0.00500	0.14	2.05	0.01751
2.8	0.13	1.30	0.01031	0.10	0.38	0.00232	0.05	0.19	0.00058	0.14	0.49	0.00418
3.0	0.09	0.20	0.00110	0.03	0.39	0.00071	0.00	NA	0.00000	0.09	0.12	0.00066
3.2	0.13	0.26	0.00206	0.11	0.35	0.00147	0.07	0.10	0.00027	0.11	0.59	0.00247
3.25	0	NA	0	0.00	0.00	0	0.00	0.00	0			
3.4										0	NA	0
3.6												
3.8												
4.0												
Total Stream Width (m)	1.5			1.5			1.5			1.8		
Stake Measurement (m)												
Total Discharge (m^3/s)	0.04048			0.02861			0.00833			0.04462		
Field Chemistry												
Temp (^{o}C)	13.6			15.5			7.2			2.8		
pH	6.80			6.68			7.10			6.29		
EC (uS)	12			12			12			9		
DO (mg/L)	1.76			5.87			2.41			1.24		
Appearance	clear slight yellow											

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
FROZEN - The stream channel was frozen which made the sampling location unaccessable.
The lower limit of the flow meter is 0.01ft/s
The iInterval that stake is located for increased precision in water height fluctuations is 2.8m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Hydrogeological Field Data
Location S37

	03-Aug-09			02-Sep-09			07-Oct-09			04-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0												
0.2												
0.3				0	NA	0						
0.4				0.04	0.15	0.00027				0	NA	0.00000
0.6				0.01	NA	0.00000				0.05	0.45	0.00137
0.8				0.01	NA	0.00000				0.04	0.35	0.00085
1.0				0.09	0.02	0.00011	0.00	NA	0.00000	0.02	NA	0.00000
1.2	0	NA	0	0.11	0.54	0.00362	0.07	NA	0.00000	0.08	0.28	0.00137
1.4	0.10	0.02	0.00012	0.21	0.43	0.00551	0.13	0.15	0.00119	0.16	0.80	0.00781
1.6	0.18	0.16	0.00176	0.20	1.02	0.01244	0.19	0.06	0.00070	0.23	0.94	0.01319
1.8	0.23	0.97	0.01361	0.28	0.65	0.01110	0.29	0.32	0.00566	0.34	0.83	0.01721
2.0	0.22	0.60	0.00805	0.31	0.25	0.00473	0.28	0.12	0.00205	0.35	0.20	0.00427
2.2	0.28	0.54	0.00922	0.28	0.10	0.00171	0.19	0.11	0.00127	0.29	0.11	0.00195
2.4	0.21	0.18	0.00231	0.15	0.14	0.00128	0.13	0.07	0.00056	0.04	NA	0.00000
2.6	0.11	0.01	0.00007	0.12	0.00	0.00000	0.08	NA	0.00000	0	NA	0.00000
2.8	0.08	NA	0	0.00	NA	0.00000	0.00	NA	0.00000			
2.85	0	NA	0									
3.0												
3.2												
3.4												
3.6												
3.8												
Total Stream Width (m)	1.8			2.5			2.0			2.2		
Stake Measurement (m)												
Total Discharge (m^3/s)	0.03514			0.04078			0.01143			0.04802		
Field Chemistry												
Temp (^{o}C)	14.8			15.6			6.3			2.3		
pH	6.79			7.57			6.94			6.40		
EC (uS)	8			7			6			6		
DO (mg/L)	1.62			5.78			1.70			1.53		
Appearance	clear									clear		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
FROZEN - The stream channel was frozen which made the sampling location unaccessable.
The lower limit of the flow meter is 0.01ft/s
The iInterval that stake is located for increased precision in water height fluctuations is 2.8m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Hydrogeological Field Data
Location S38

	03-Aug-09			02-Sep-09			07-Oct-09			04-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0												
0.2							0	NA	0	0	NA	0
0.25	0	NA	0	0.00	NA	0						
0.4	0.13	0.66	0.00523	0.22	0.45	0.00604	0.11	0.24	0.00161	0.24	0.72	0.01054
0.6	0.20	0.3	0.00366	0.19	0.18	0.00287	0.16	0.05	0.00067	0.23	0.85	0.01640
0.8	0.13	0.01	0.00008	0.10	0.00	0.00000	0.00	NA	0.00000	0.17	NA	0
1.0	0.12	0.01	0.00007	0.14	0.04	0.00051	0.10	NA	0.00000	0.16	NA	0
1.2	0.13	0.47	0.00373	0.13	0.33	0.00393	0.12	0.02	0.00022	0.20	0.95	0.01739
1.4	0.21	0.40	0.00512	0.25	0.07	0.00160	0.25	0.03	0.00069	0.29	0.97	0.02574
1.6	0.28	0.35	0.00598	0.34	0.25	0.00778	0.32	0.25	0.00732	0.36	0.25	0.00824
1.8	0	NA	0	0.03	0.24	0.00066	0.00	NA	0.00000	0.03	NA	0
2.0	0.23	0.25	0.00351	0.24	0.39	0.00856	0.12	0.09	0.00099	0.25	0.14	0.00320
2.2	0.28	0.07	0.00120	0.24	0.03	0.00066	0.18	0.15	0.00247	0.28	0.62	0.01588
2.4	0	NA	0	0.00	0.00	0	0.00	NA	0	0.00	NA	0
2.6												
2.8												
2.9												
3.0												
Total Stream Width (m)	2.2			2.2			2.2					
Stake Measurement (m)												
Total Discharge (m^3/s)	0.02858			0.03261			0.01397					
Field Chemistry												
Temp (^{o}C)	17.5			16.1			7.3					
pH	5.64			6.81			7.00					
EC (uS)	9			10			6					
DO (mg/L)	1.62			3.77			2.54					
Appearance	clear slightly yellow						slightly yellow					

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
FROZEN - The stream channel was frozen which made the sampling location unaccessable.
The lower limit of the flow meter is 0.01ft/s
The iInterval that stake is located for increased precision in water height fluctuations is 2.8m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Hydrogeological Field Data
Location S39

	03-Aug-09	02-Sep-09	07-Oct-09	04-Nov-09							
Field Chemistry											
Temp (^{o}C)	17.3	15.1	7.2	3.2							
pH	6.36	5.97	7.24	4.53							
EC (uS)	7	7	8	7							
DO (mg/L)	1.87	4.50	2.90	1.51							
Appearance	clear, yellow	clear, yellow	clear, yellow	sl. tannic							
Notes Water fall and water disipates through blast rock. Impossible to do crossing.											

Marathon PGM
Summary of Hydrogeological Field Data
Location S40

	03-Aug-09			02-Sep-09			07-Oct-09			04-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0												
0.2												
0.4												
0.6												
0.8												
1.0												
1.2												
1.4												
1.6												
1.8												
2.0												
2.1	0	NA	0	0.00	NA	0	0.00	NA	0	0.00	NA	0
2.2	0.11	0.14	0.00094	0.09	0.15	0.00082	0.09	0.09	0.00049	0.13	0.50	0.00397
2.4	0.09	0.07	0.00038	0.08	0.08	0.00049	0.08	0.07	0.00043	0.14	0.63	0.00673
2.6	0.02	NA	0	0.00	NA	0.00000	0.09	0.04	0.00033	0.11	0.07	0.00070
2.8	0.16	0.24	0.00234	0.17	0.29	0.00451	0.16	0.11	0.00161	0.17	0.07	0.00109
3.0	0.17	0.11	0.00114	0.14	0.18	0.00231	0.13	0.05	0.00059	0.17	0.13	0.00202
3.2	0.13	0.06	0.00048	0.09	0.06	0.00041	0.10	0.04	0.00031	0.15	0.13	0.00149
3.3	0	NA	0	0.00	NA	0	0.00	NA	0			
3.4										0	NA	0
3.6												
3.8												
4.0												
Total Stream Width (m)	1.2			1.2			1.2					
Stake Measurement (m)												
Total Discharge (m^3/s)	0.00528			0.00854			0.00376					
Field Chemistry												
Temp (^oC)	18.1			17.7			7					
pH	6.67			6.94			7.00					
EC (uS)	14			17			20					
DO (mg/L)	5.40			3.93			1.59					
Appearance	clear slightly yellow			clear, slightly yellow			clear, slightly yellow					

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
FROZEN - The stream channel was frozen which made the sampling location unaccessable.
The lower limit of the flow meter is 0.01ft/s
The iInterval that stake is located for increased precision in water height fluctuations is 2.8m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

Marathon PGM
Summary of Hydrogeological Field Data
Location S41

	03-Aug-09			02-Sep-09			07-Oct-09			04-Nov-09		
Distance Panel	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow	Depth	Velocity	Flow
(m)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)	(m)	(ft/s)	(m^3/s)
0												
0.2												
0.4												
0.6												
0.8												
1.0												
1.2												
1.4	0	NA	0	0.00	NA	0	0.00	NA	0.0000	0.00	NA	0
1.6	0.30	0.78	0.01427	0.38	1.70	0.039406	0.14	0.20	0.0001	0.35	0.97	0.02071
1.8	0.37	0.69	0.01557	0.44	1.80	0.048312						
2.0	0.42	0.68	0.01742	0.50	1.51	0.046055	0.25	0.13	0.0020	0.47	0.85	0.02437
2.2	0.43	0.21	0.00551	0.52	0.02	0.000634						
2.4	0.40	<0.01	0.000244	0.49	0.00	0	0.18	0.23	0.0025	0.42	0.25	0.006405
2.6	0.28	0.72	0.01230	0.42	0.04	0.001025						
2.8	0.24	0.86	0.01259	0.36	0.00	0	0.09	0.73	0.0040	0.33	0.58	0.011675
3.0	0.26	1.87	0.02966	0.25	1.06	0.016165						
3.2	0.22	2.05	0.02751	0.32	2.75	0.05368	0.08	0.18	0.0009	0.3	3.12	0.057096
3.4	0.50	1.81	0.05521	0.44	2.80	0.075152						
3.6	0.90	1.02	0.05600	0.47	2.58	0.073969	0.19	1.16	0.0134	0.43	1.22	0.032001
3.8	0.47	0.28	0.00803	0.56	2.48	0.084717						
4.0	0.42	<0.01	0.00026	0.56	0.52	0.017763	0.23	0.07	0.0010	0.5	0.2	0.0061
4.2	0.40	<0.01	0.00024	0.50	0.30	0.00915						
4.4	0	NA	0	0.00	NA	0	0.00	NA	0.0000	0	NA	0
4.6	0	NA	0	0.00	NA	0						
4.8	0	NA	0	0.00	NA	0	0.00	NA	0.0000	0	NA	0
5.0	0	NA	0	0.00	NA	0						
5.2	0	NA	0	0.01	NA	0	0.00	NA	0.0000	0	NA	0
5.4	0.13	3.42	0.02712	0.21	2.40	0.030744						
5.6	0.30	0.40	0.00732	0.33	3.10	0.062403	0.00	NA	0.0000	0.21	2.44	0.031256
5.8	0.26	0.20	0.00317	0.40	2.04	0.049776						
6.0	0.24	2.51	0.03675	0.35	2.66	0.056791	0.14	0.32	0.0027	0.32	2.95	0.057584
6.2	0.29	0.33	0.00584	0.38	1.80	0.041724						
6.4	0.37	4.72	0.10653	0.44	2.43	0.065221	0.17	1.36	0.0141	0.38	2.41	0.055864
6.6	0.20	0.06	0.00073	0.30	1.28	0.023424						
6.8	0.36	1.15	0.02525	0.32	1.54	0.030061	0.06	0.45	0.0016	0.26	2.14	0.03394
7.0	0.25	0.12	0.00183	0.37	0.72	0.01625						
7.2	0.22	0.01	0.00013	0.37	0.14	0.00316	0.00	NA	0.0000	0.32	0.04	0.000781
7.4	0.10	<0.01	6.1E-05	0.24	0.19	0.002782						
7.6	0.05	<0.01	0.00003	0.15	0.35	0.002002				0.11	0.28	0.001174
7.65	0	NA	0	0.00	NA	0						
7.8										0	NA	0
8.0												
Total Stream Width (m)	6.3			6.3			0.0			6.4		
Stake Measurement (m)												
Total Discharge (m^3/s)	0.46958			0.850365163			0.042369998			0.33896		
Field Chemistry												
Temp (^oC)	18.1			15.9			15.9			5.8		
pH	7.63			7.62			7.62			6.49		
EC (uS)	16			15			15			13		
DO (mg/L)	4.62			3.33			3.33			1.29		
Appearance	clear			clear			clear			clear		

Notes
NM - Not Measured
NA - Water is too shallow to activate flow meter
FROZEN - The stream channel was frozen which made the sampling location unaccessable.
The lower limit of the flow meter is 0.01ft/s
The iInterval that stake is located for increased precision in water height fluctuations is 2.8m
Stake measurements are taken from the top of the stake to the surface of the water
Flow measurements <0.01ft/s are taken as 0.01ft/s to approximate a total flow rate

APPENDIX B

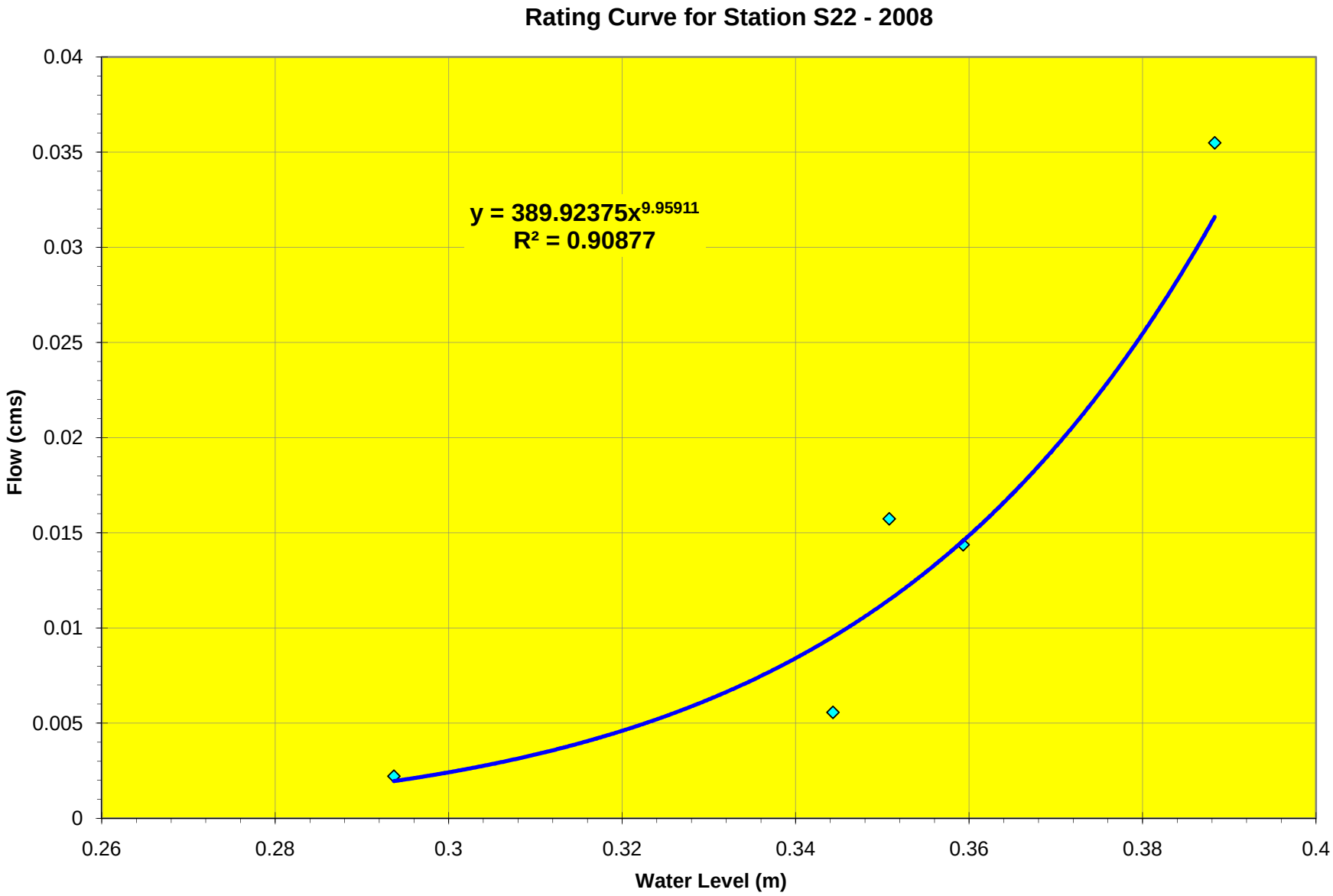
MARATHON PGM-Cu PROJECT SITE
MARATHON, ONTARIO

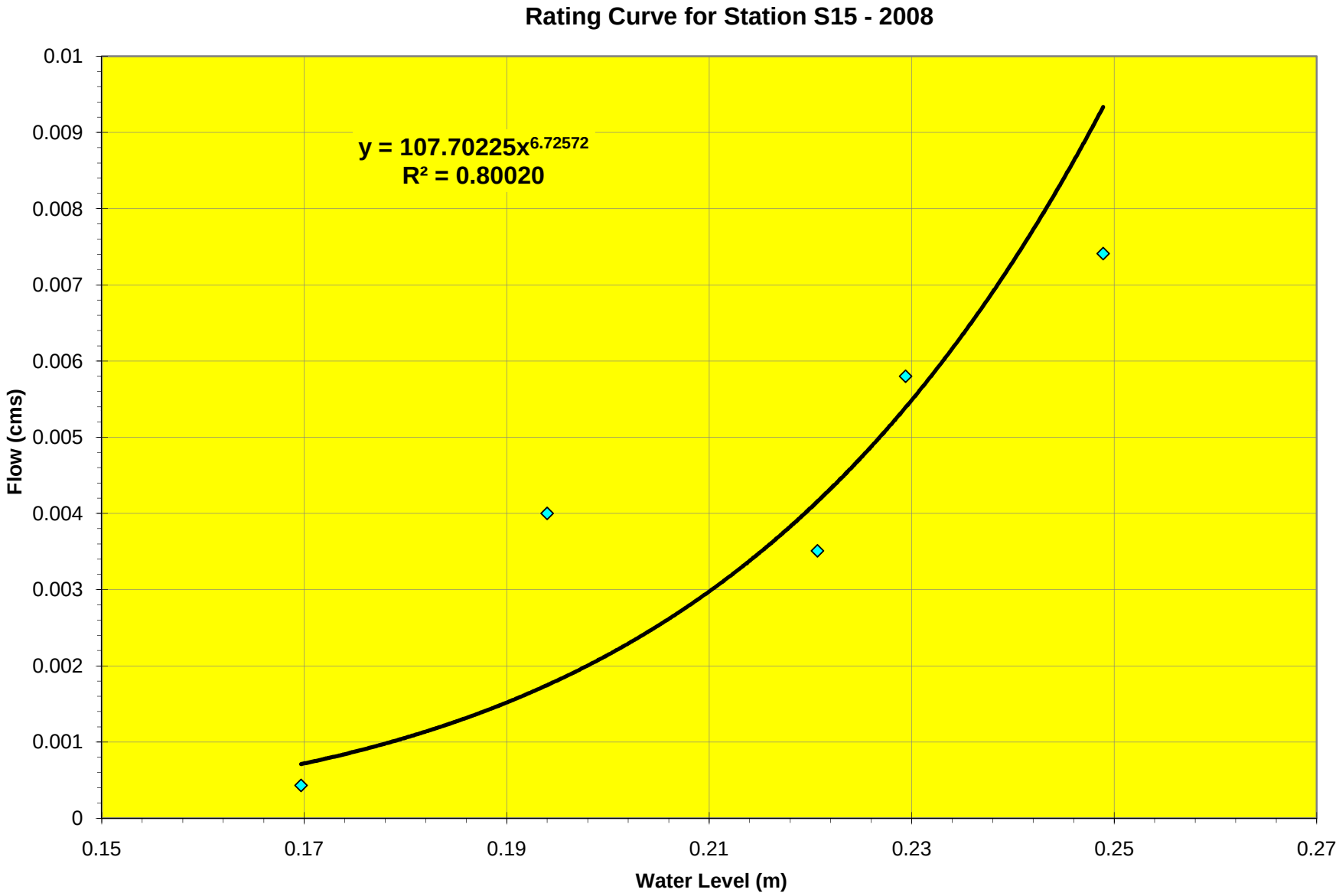
RATING CURVES FOR 6 FLOW MONITORING STATIONS

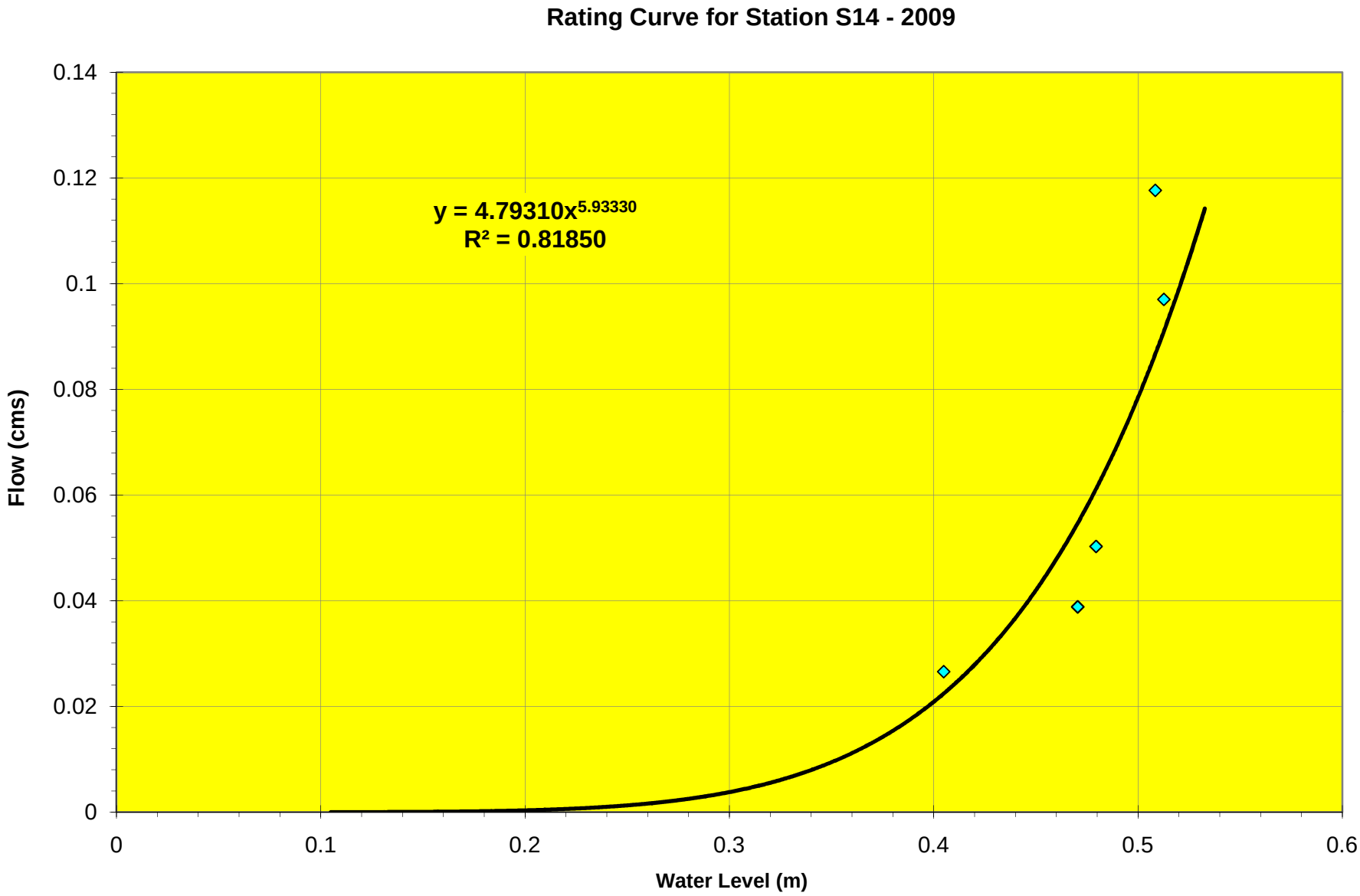
FLOW AND LEVEL GRAPHS FOR 6 FLOW MONITORING STATIONS

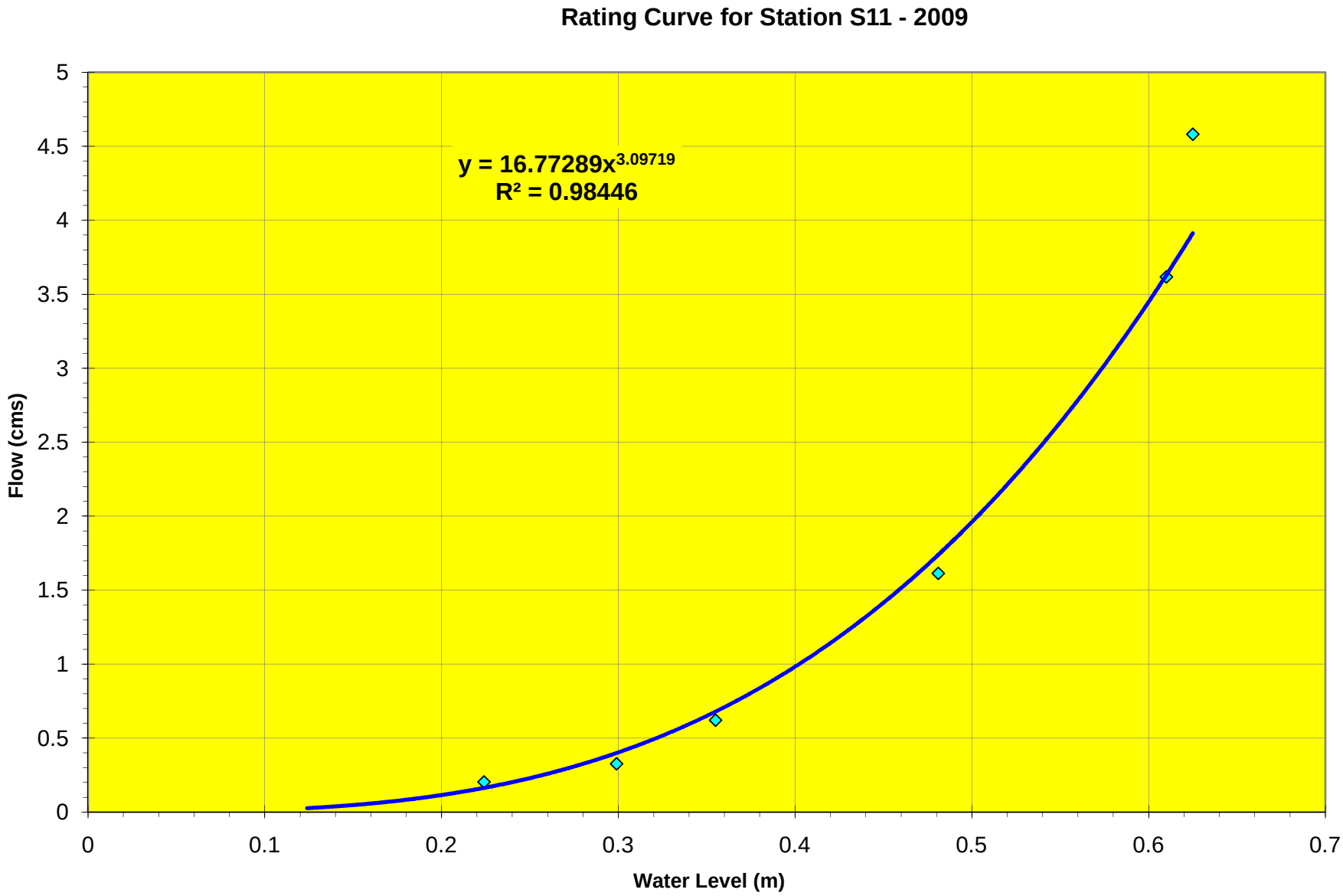
SUMMARY OF FLOW MONITORING DATA AT 6 STATIONS (TABLE 3 – 8)

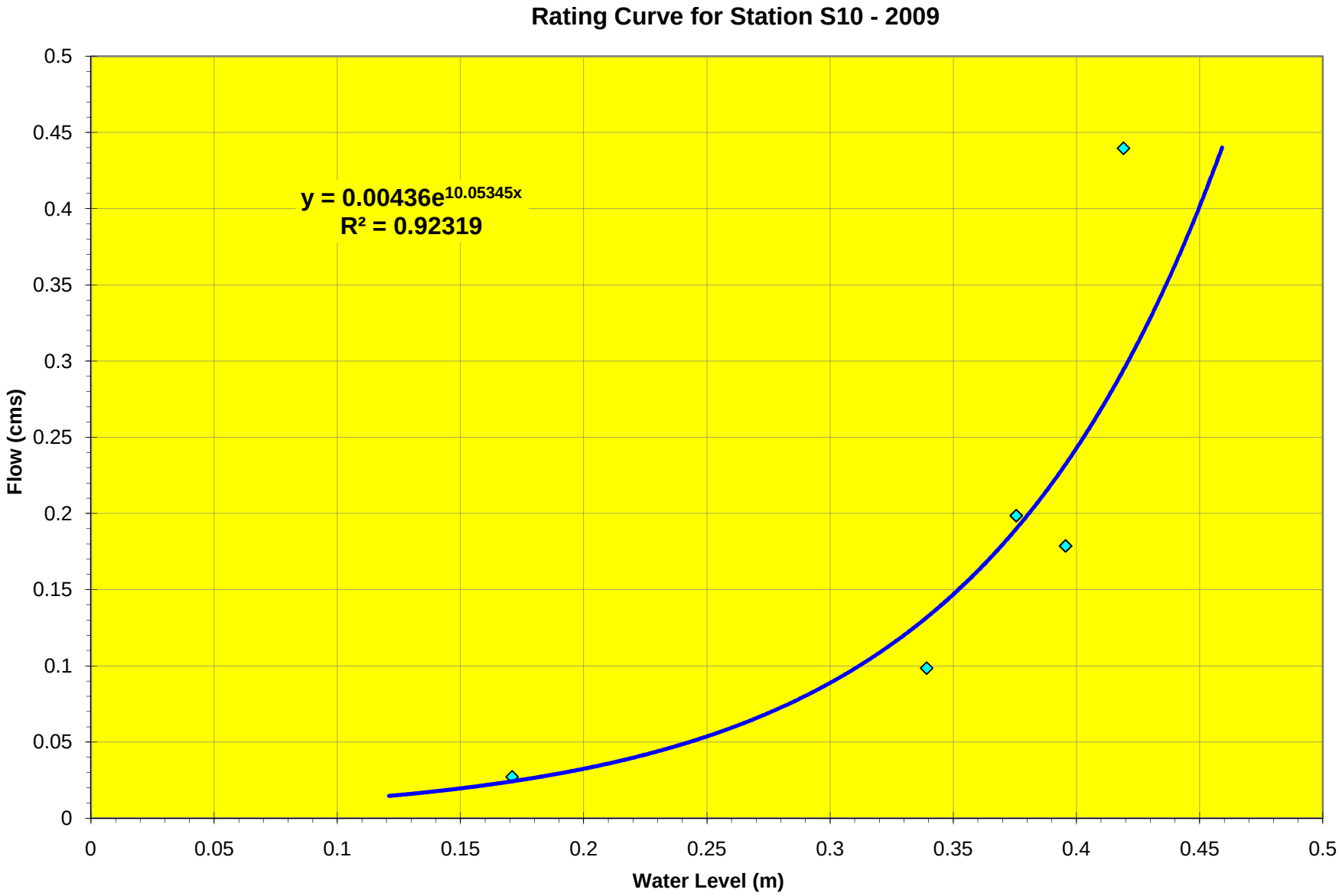
AREA – FLOW RELATIONSHIPS/GRAPHS

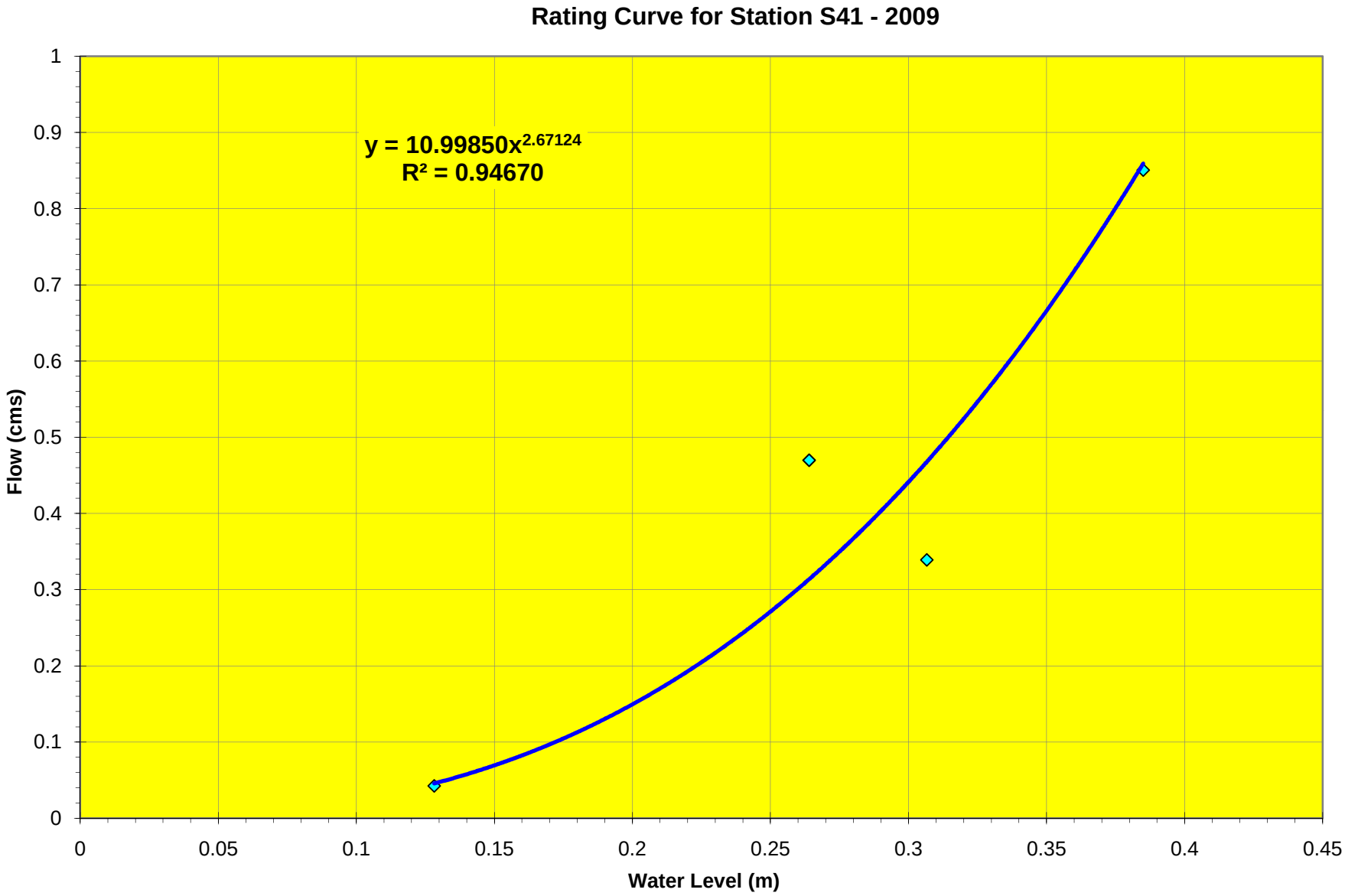

Rating Curve for Station S22 - 2008
y = 389.92375x^9.95911
R² = 0.90877
Flow (cms)
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
Water Level (m)

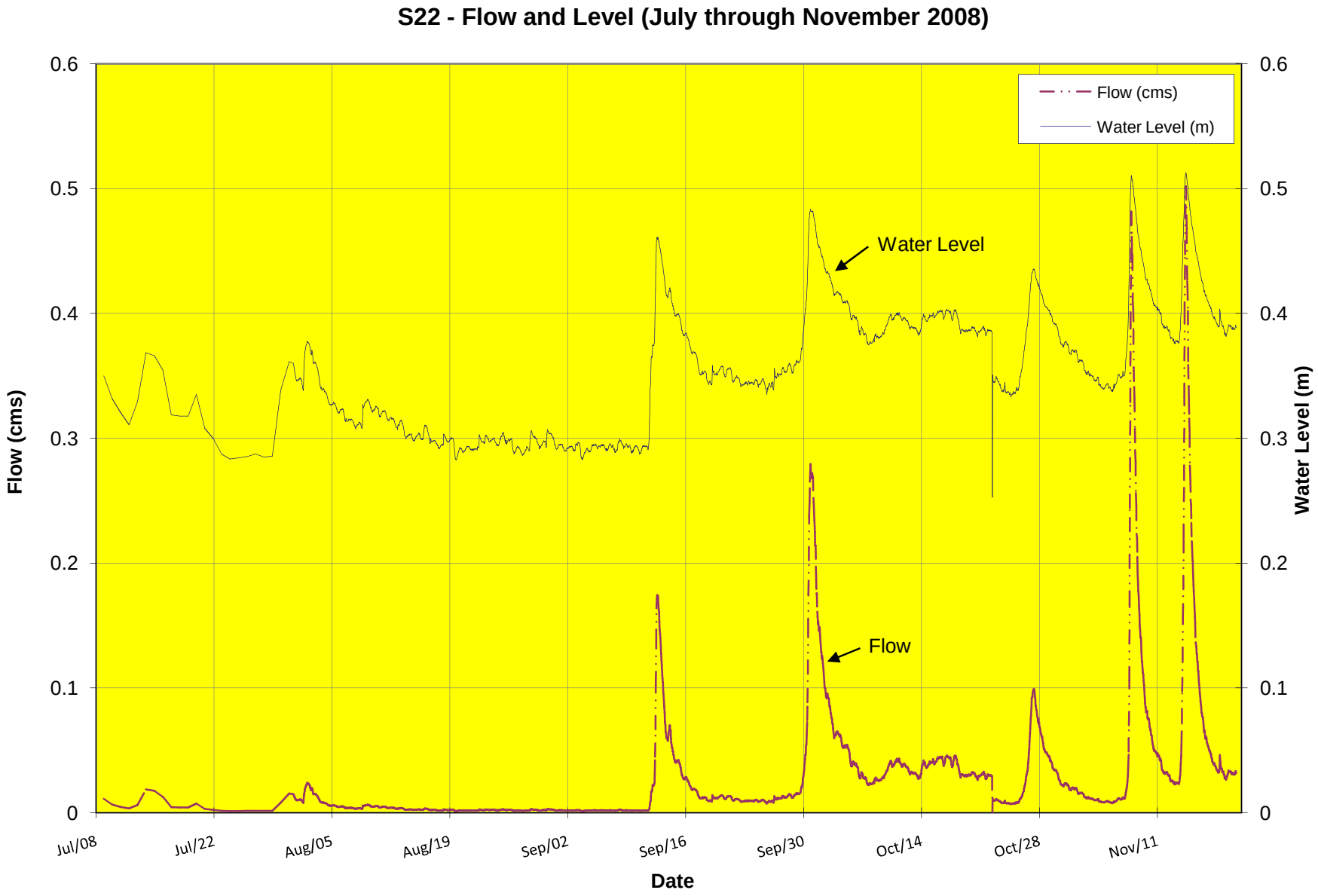

Rating Curve for Station S15 - 2008
y = 107.70225x^6.72572
R² = 0.80020
Flow (cms)
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
0.15
0.17
0.19
0.21
0.23
0.25
0.27
Water Level (m)

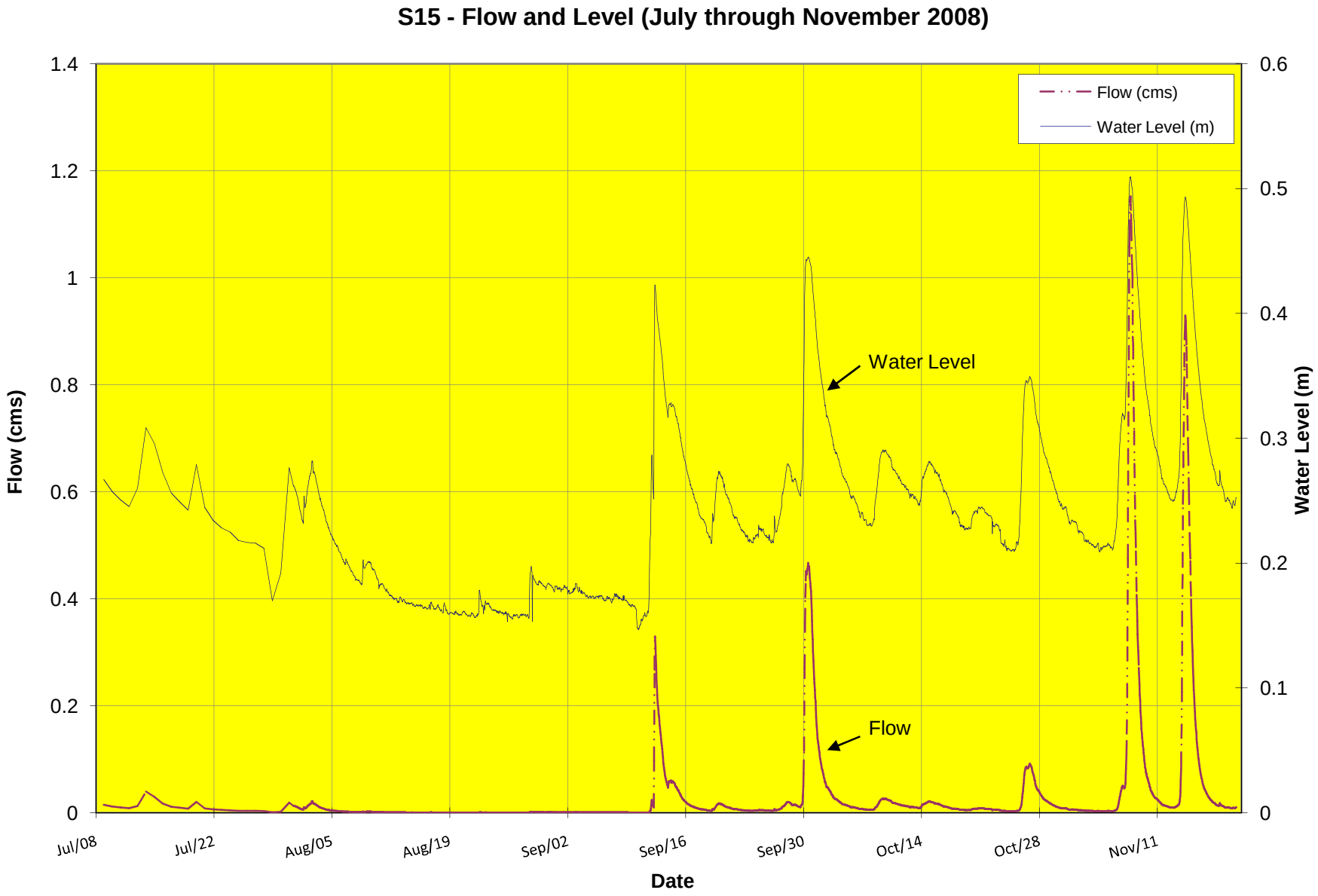

Rating Curve for Station S14 - 2009
y = 4.79310x5.93330
R² = 0.81850
Flow (cms)
Water Level (m)
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
0.1
0.2
0.3
0.4
0.5
0.6

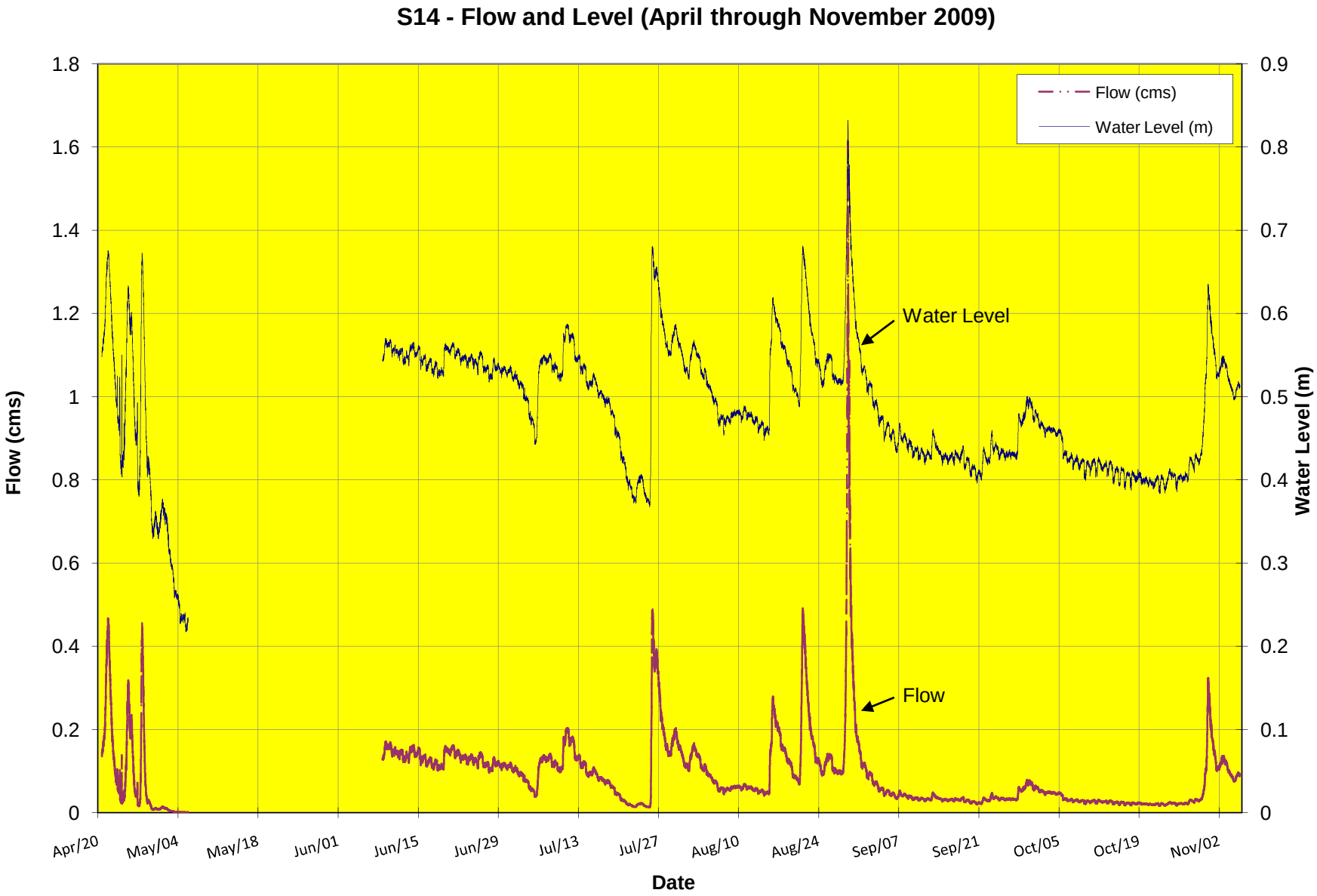

Rating Curve for Station S11 - 2009
y = 16.77289x3.09719
R² = 0.98446
Flow (cms)
Water Level (m)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7

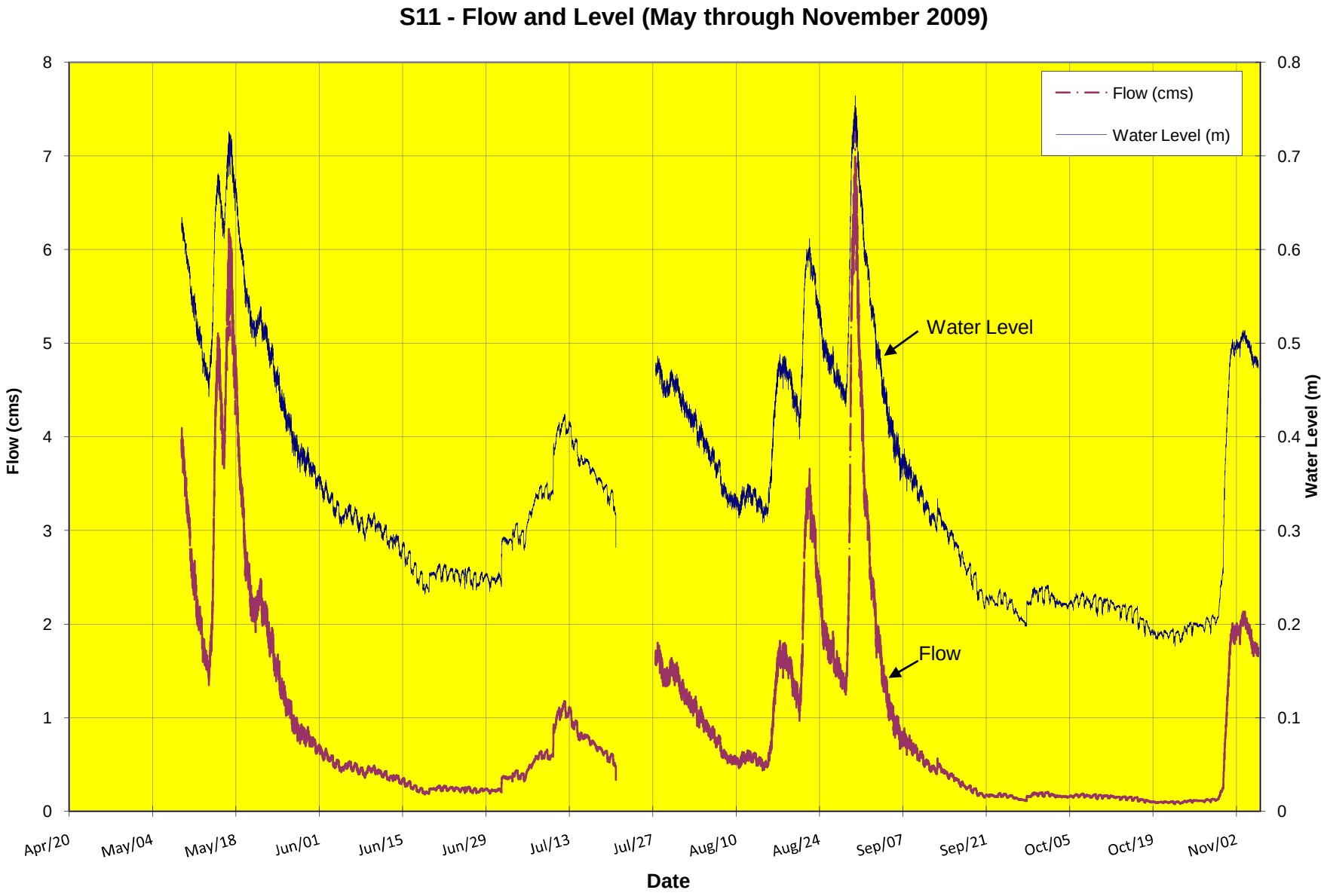

Rating Curve for Station S10 - 2009
y = 0.00436e10.05345x
R² = 0.92319
Flow (cms)
Water Level (m)
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5

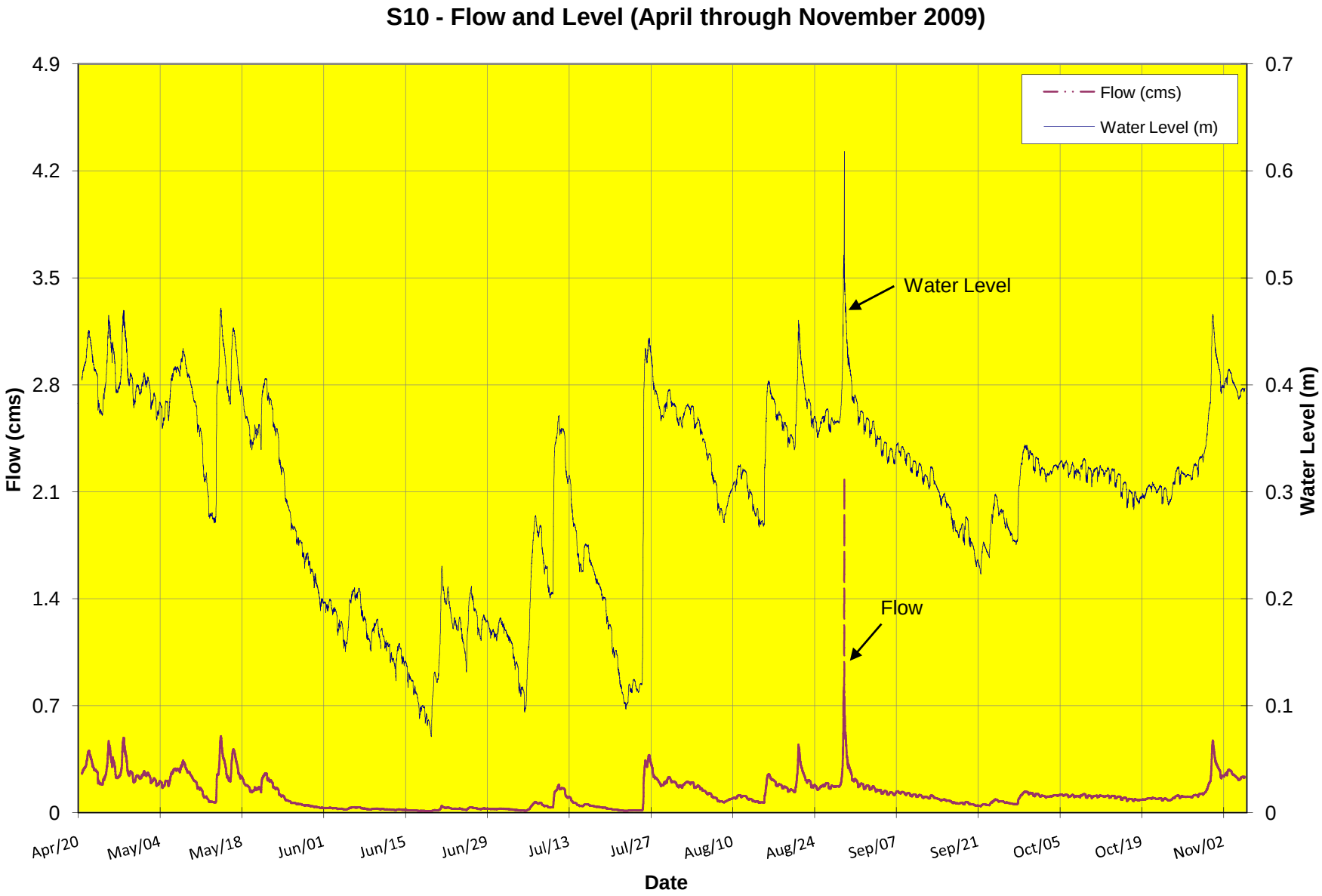

Rating Curve for Station S41 - 2009
y = 10.99850x^2.67124
R² = 0.94670
Flow (cms)
Water Level (m)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45

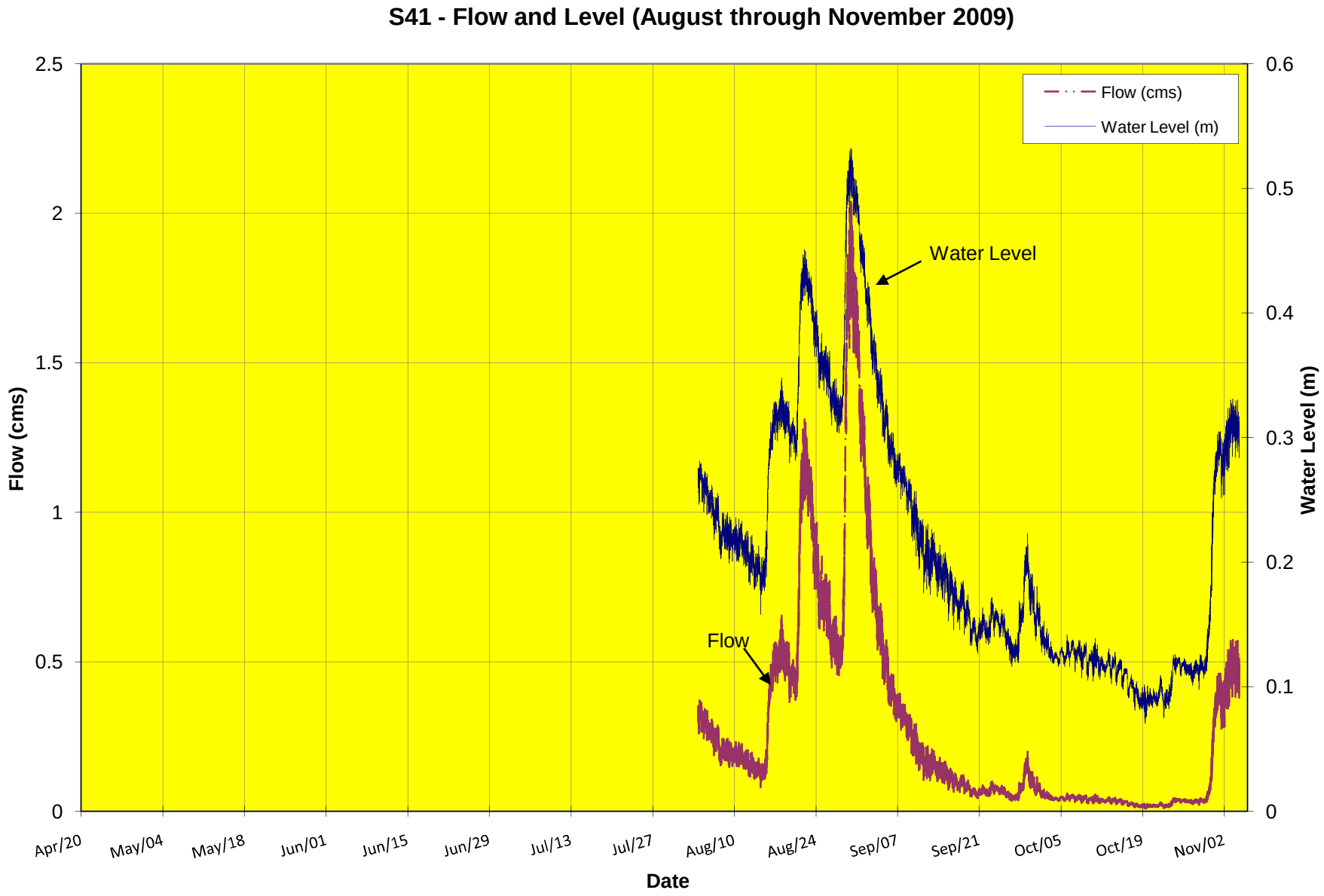

S22 - Flow and Level (July through November 2008)
Flow (cms)
Water Level (m)
Water Level
Flow
0.6
0.5
0.4
0.3
0.2
0.1
0
Jul/08
Jul/22
Aug/05
Aug/19
Sep/02
Sep/16
Sep/30
Oct/14
Oct/28
Nov/11
Date

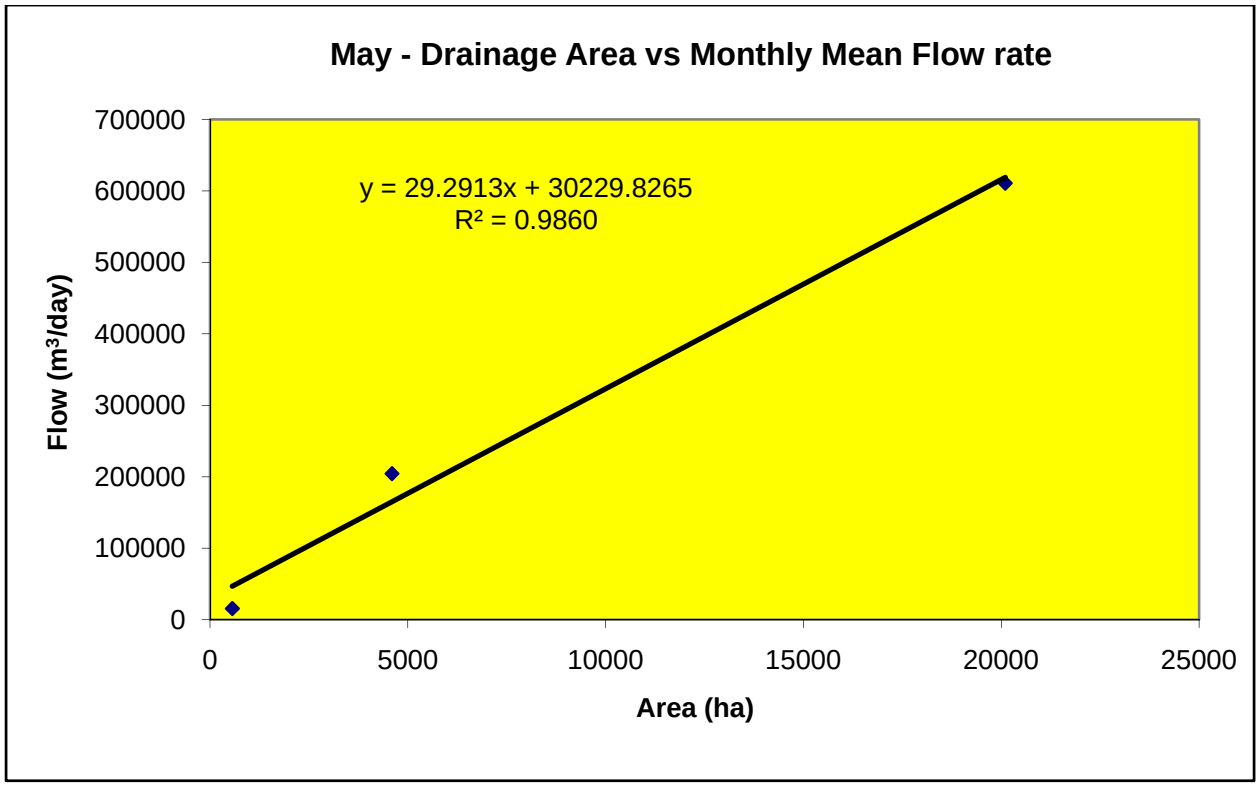

S15 - Flow and Level (July through November 2008)
Flow (cms)
Water Level (m)
Water Level
Flow
Flow (cms)
Water Level (m)
Date
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.6
0.5
0.4
0.3
0.2
0.1
0
Jul/08
Jul/22
Aug/05
Aug/19
Sep/02
Sep/16
Sep/30
Oct/14
Oct/28
Nov/11

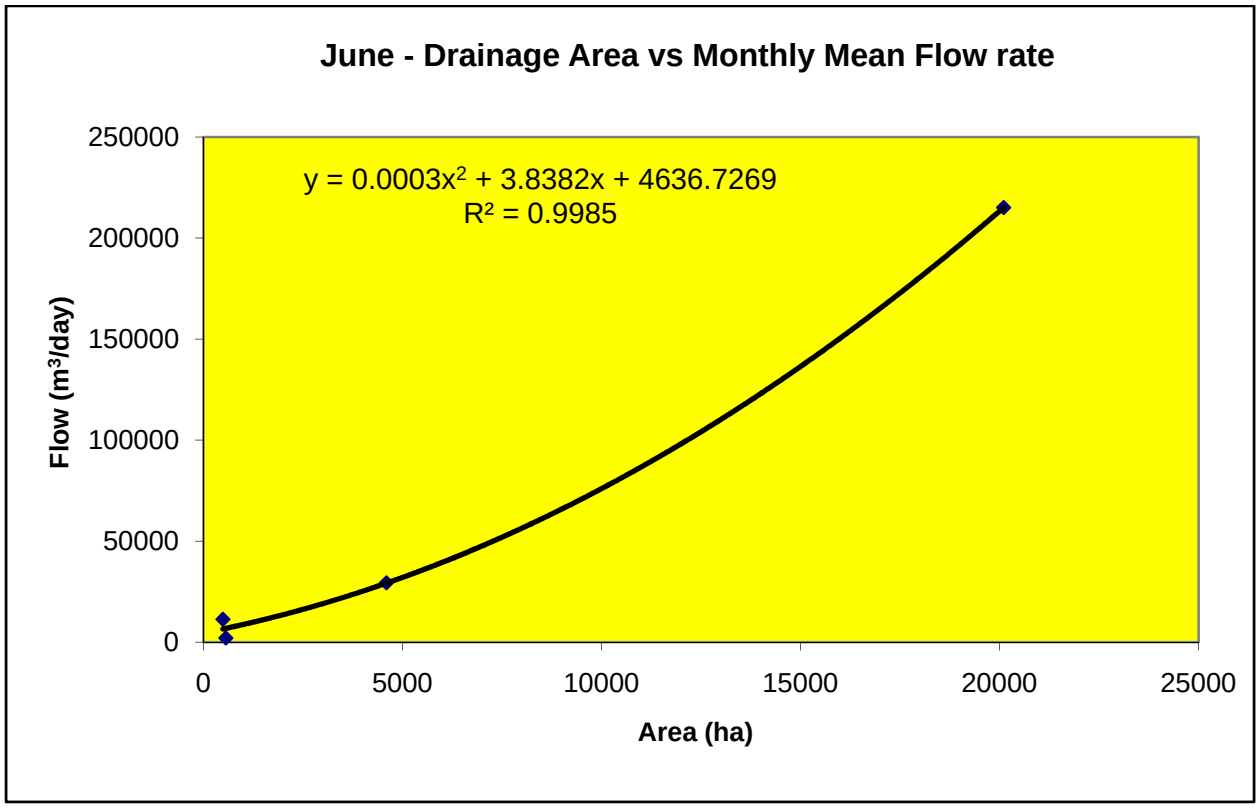

S14 - Flow and Level (April through November 2009)
Flow (cms)
Water Level (m)
Water Level
Flow
Flow (cms)
Water Level (m)
Date
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Apr/20
May/04
May/18
Jun/01
Jun/15
Jun/29
Jul/13
Jul/27
Aug/10
Aug/24
Sep/07
Sep/21
Oct/05
Oct/19
Nov/02

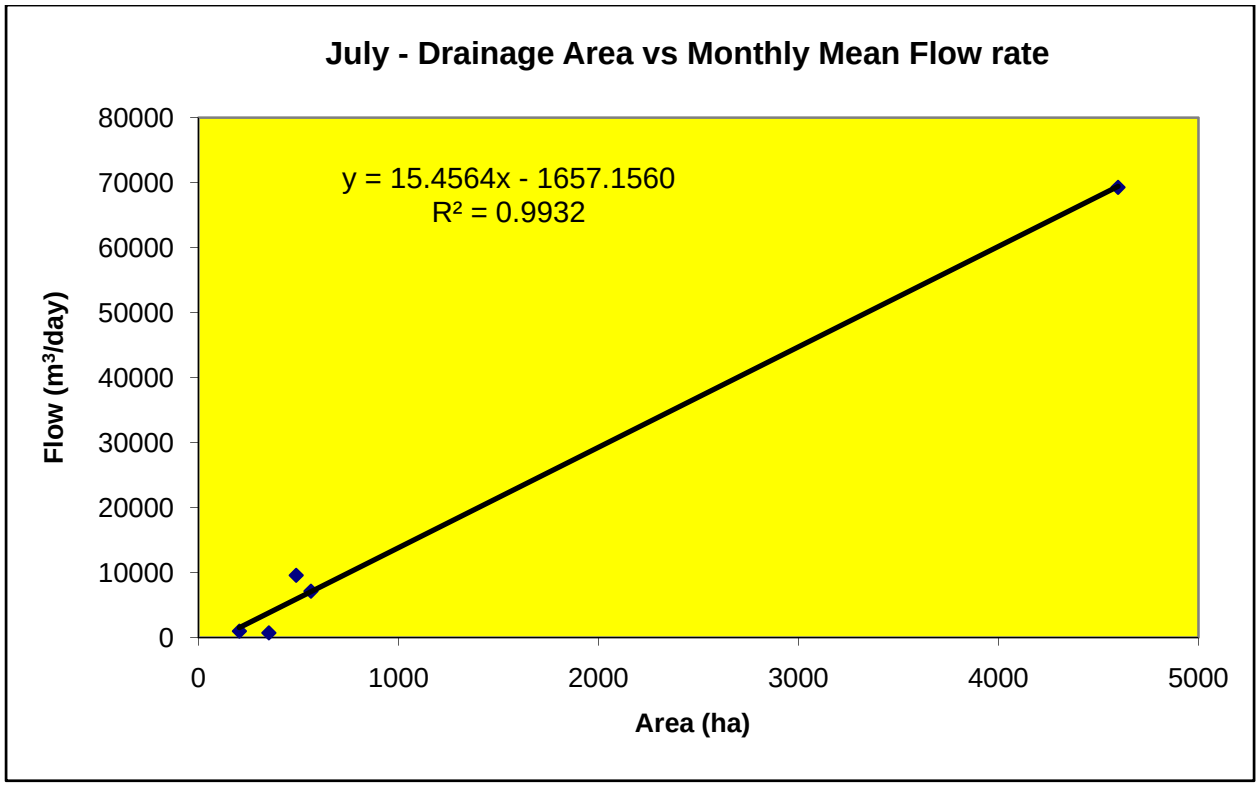

S11 - Flow and Level (May through November 2009)
Flow (cms)
Water Level (m)
Water Level
Flow
Flow (cms)
Water Level (m)
Date
0
1
2
3
4
5
6
7
8
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Apr/20
May/04
May/18
Jun/01
Jun/15
Jun/29
Jul/13
Jul/27
Aug/10
Aug/24
Sep/07
Sep/21
Oct/05
Oct/19
Nov/02

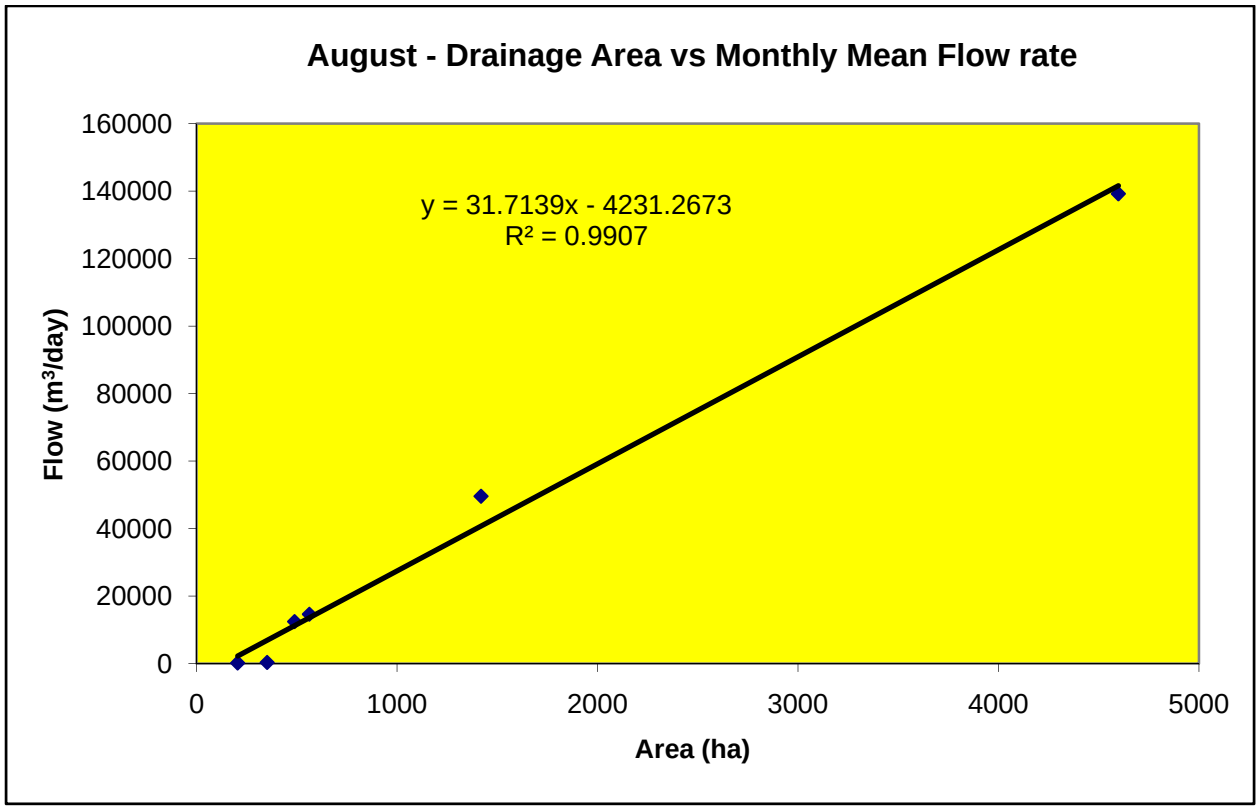

S10 - Flow and Level (April through November 2009)
Flow (cms)
Water Level (m)
Water Level
Flow
Flow (cms)
Water Level (m)
Date
4.9
4.2
3.5
2.8
2.1
1.4
0.7
0
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Apr/20
May/04
May/18
Jun/01
Jun/15
Jun/29
Jul/13
Jul/27
Aug/10
Aug/24
Sep/07
Sep/21
Oct/05
Oct/19
Nov/02

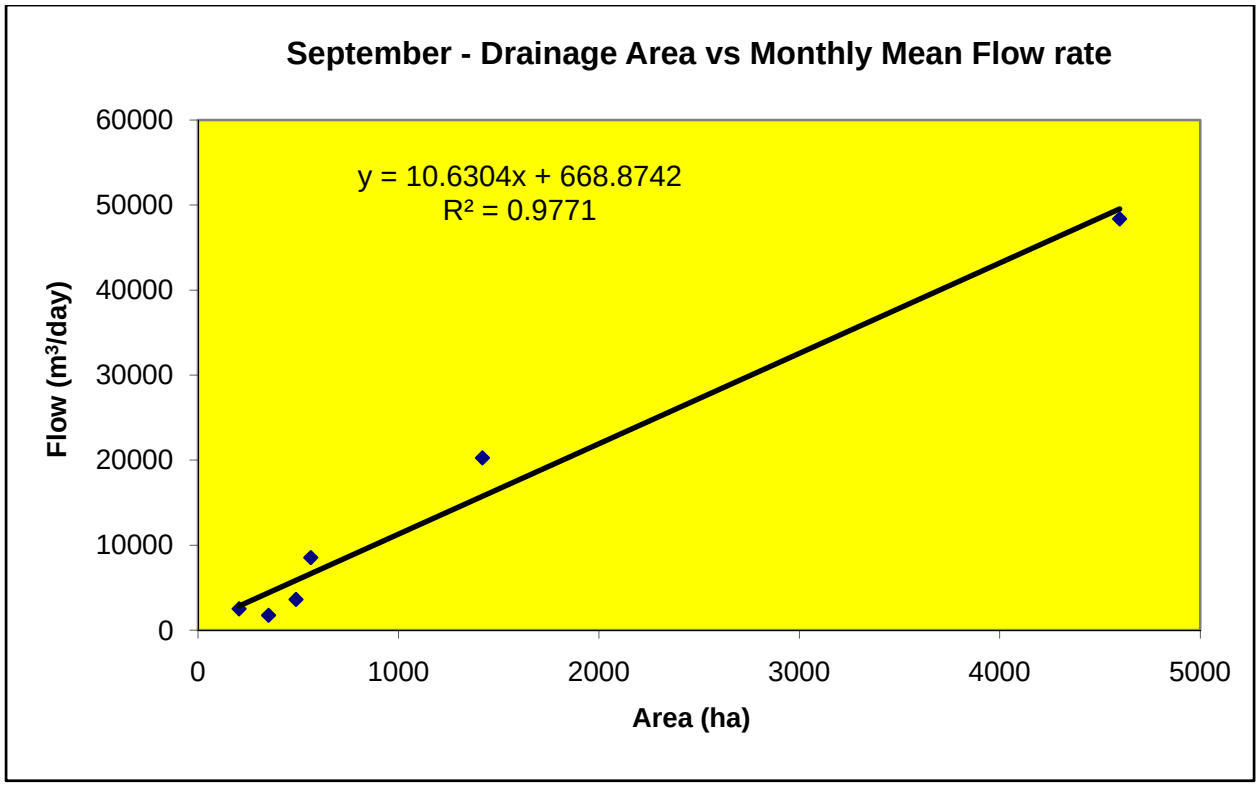

S41 - Flow and Level (August through November 2009)
Flow (cms)
Water Level (m)
Water Level
Flow
2.5
2
1.5
1
0.5
0
0.6
0.5
0.4
0.3
0.2
0.1
0
Apr/20
May/04
May/18
Jun/01
Jun/15
Jun/29
Jul/13
Jul/27
Aug/10
Aug/24
Sep/07
Sep/21
Oct/05
Oct/19
Nov/02
Date

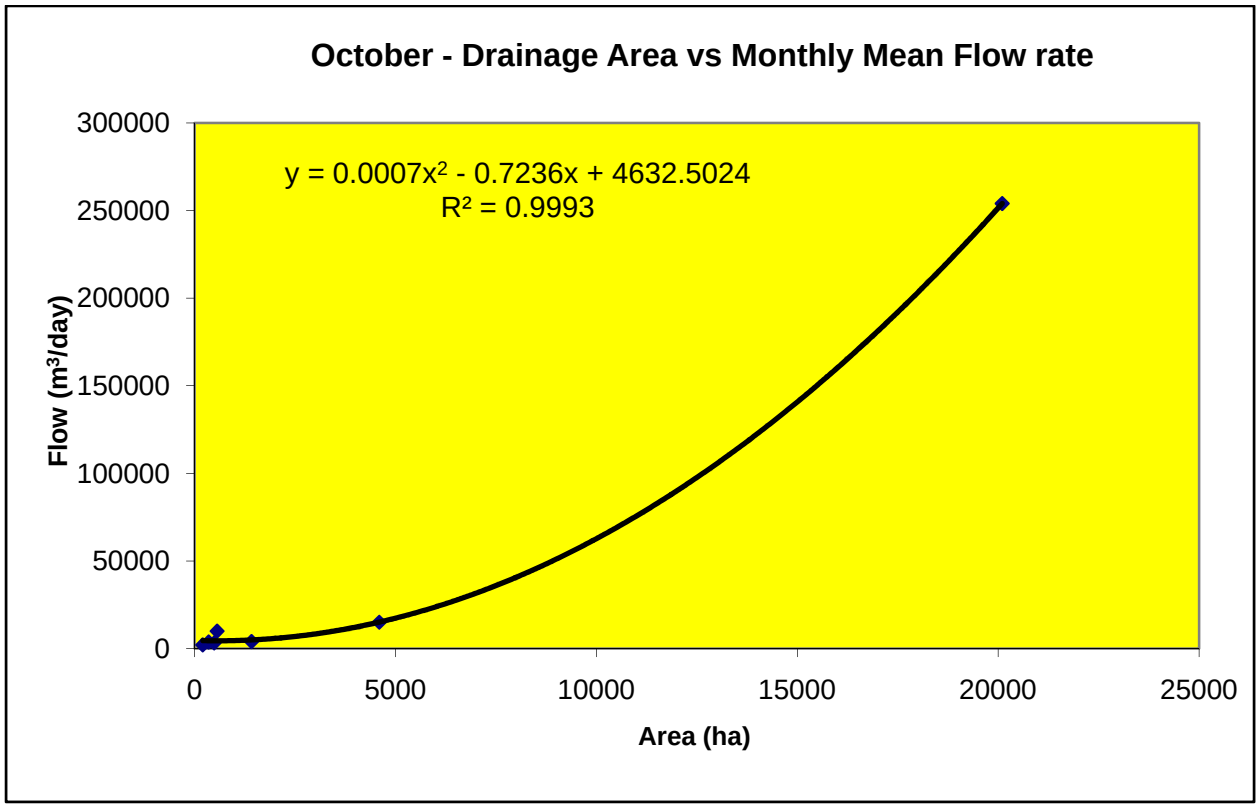

May - Drainage Area vs Monthly Mean Flow rate
y = 29.2913x + 30229.8265
R² = 0.9860
Flow (m³/day)
700000
600000
500000
400000
300000
200000
100000
0
0
5000
10000
15000
20000
25000
Area (ha)

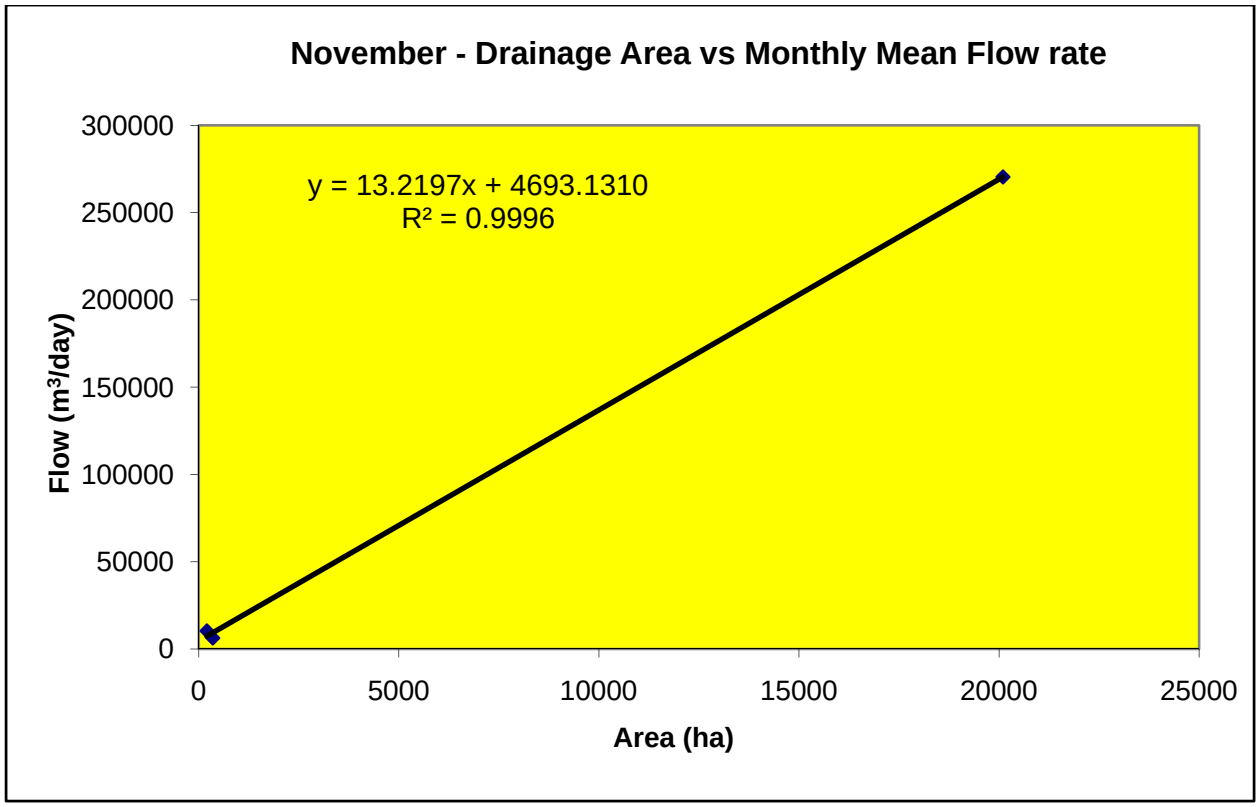

June - Drainage Area vs Monthly Mean Flow rate
y = 0.0003x² + 3.8382x + 4636.7269
R² = 0.9985
Flow (m³/day)
250000
200000
150000
100000
50000
0
0
5000
10000
15000
20000
25000
Area (ha)


July - Drainage Area vs Monthly Mean Flow rate
y = 15.4564x - 1657.1560
R² = 0.9932
Flow (m³/day)
80000
70000
60000
50000
40000
30000
20000
10000
0
0
1000
2000
3000
4000
5000
Area (ha)


August - Drainage Area vs Monthly Mean Flow rate
y = 31.7139x - 4231.2673
R² = 0.9907
Flow (m³/day)
160000
140000
120000
100000
80000
60000
40000
20000
0
0
1000
2000
3000
4000
5000
Area (ha)


September - Drainage Area vs Monthly Mean Flow rate
y = 10.6304x + 668.8742
R² = 0.9771
Flow (m³/day)
60000
50000
40000
30000
20000
10000
0
0
1000
2000
3000
4000
5000
Area (ha)


October - Drainage Area vs Monthly Mean Flow rate
y = 0.0007x² - 0.7236x + 4632.5024
R² = 0.9993
Flow (m³/day)
300000
250000
200000
150000
100000
50000
0
0
5000
10000
15000
20000
25000
Area (ha)


November - Drainage Area vs Monthly Mean Flow rate
y = 13.2197x + 4693.1310
R² = 0.9996
Flow (m³/day)
300000
250000
200000
150000
100000
50000
0
0
5000
10000
15000
20000
25000
Area (ha)

APPENDIX C

MARATHON PGM-Cu PROJECT SITE
MARATHON, ONTARIO

SOUTH PSMF OPTION - MINE WATER BALANCE

OPTION 3 PSMF - MINE WATER BALANCE

EFFLUENT DISCHARGE CONSIDERATIONS (TABLE 16 – 19)

MARATHON PGM-Cu MINE PROJECT
WATER BALANCE (South PSMF Option)

Operation: Marathon PGM-Cu Mine Water Balance
Condition: Mean Annual Conditions

Calder Engineering Ltd.

Mine, Mill, & Tailings Parameters

Tonnage Milled:	22,000	dry tonnes/day	8,030,000 t/year
Tails % Solids:	30	%	
Seepage Loss:	2,119	cu.m/day	389 US gal/min
Recirculation:	100	%	
Specifc Gravity of Tailings:	3.1		
In-Place Dry Density of Tailings:	1.48	tonnnes/cu.m	
In-Place Tailings Porosity:	0.52377		

Basin Characteristics

Natural Ground:	778.9 ha
Tailings:	204.1 ha
Pond Area:	57.2 ha
Pit:	156.5 ha
Waste Rock:	365.5 ha
Total:	1,562.2 ha

Process Water Pond Characteristics

Initial Capacity:	0 cu.m
Struck Capacity:	6,000,000 cu.m
Surface Area:	43.6 ha

High Sulphur PSMF Characterstics

Initial Capacity:	1,773,000 cu.m
Struck Capacity:	6,000,000 cu.m
Surface Area:	59.1 ha

YEAR	MONTH	CASE	INFLOWS (cu.m/mth)										LOSSES (cu.m/mth)						Net Inflow
			Tailings Water	TW Net	Seepage Input	RUNOFF						Subtotal	Retained Water	EVAPORATION			Reclaim	Subtotal	
						Natural Ground	Tailings	Pond	Pit	Waste Rock	NET			Tailings	Pond	NET			
2010	Oct.	Normal	1,591,333	1,591,333	65,697	353,535	138,959	43,275	118,404	138,240	792,412	2,449,443	241,359	13,777	15,446	29,222	1,591,333	1,861,914	587,529
2010	Nov.	Normal	1,540,000	1,540,000	63,578	230,025	66,972	18,771	51,359	119,926	487,053	2,090,631	233,573	2,551	2,860	5,412	1,540,000	1,778,985	311,646
2010	Dec.	Normal	1,591,333	1,591,333	65,697	0	0	0	0	0	0	1,657,031	241,359	0	0	0	1,591,333	1,832,692	-175,661
2010	Jan.	Normal	1,591,333	1,591,333	65,697	0	0	0	0	0	0	1,657,031	241,359	0	0	0	1,591,333	1,832,692	-175,661
2010	Feb.	Normal	1,488,667	1,488,667	61,459	0	0	0	0	0	0	1,550,126	225,787	0	0	0	1,488,667	1,714,454	-164,328
2010	Mar.	Normal	1,591,333	1,591,333	65,697	0	0	0	0	0	0	1,657,031	241,359	1,531	1,716	3,247	1,591,333	1,835,939	-178,908
2010	Apr.	Normal	1,540,000	1,540,000	63,578	2,292,220	600,645	187,056	511,797	956,060	4,547,776	6,151,355	233,573	10,205	11,441	21,646	1,540,000	1,795,219	4,356,135
2010	May	Normal	1,591,333	1,591,333	65,697	178,997	113,909	37,561	102,769	119,986	553,222	2,210,253	241,359	34,187	38,328	72,515	1,591,333	1,905,207	305,046
2010	Jun.	Normal	1,540,000	1,540,000	63,578	124,534	122,371	45,731	125,124	146,086	563,845	2,167,424	233,573	53,066	59,494	112,560	1,540,000	1,886,133	281,291
2010	Jul.	Normal	1,591,333	1,591,333	65,697	116,362	114,342	42,731	116,914	136,501	526,850	2,183,880	241,359	62,761	70,363	133,124	1,591,333	1,965,816	218,065
2010	Aug.	Normal	1,591,333	1,591,333	65,697	124,775	122,608	45,820	125,366	146,369	564,938	2,221,968	241,359	52,556	58,922	111,478	1,591,333	1,944,170	277,799
2010	Sept.	Normal	1,540,000	1,540,000	63,578	141,212	157,261	51,856	141,881	248,476	740,687	2,344,265	233,573	31,125	34,895	66,021	1,540,000	1,839,594	504,671
2010	Oct.	Normal	1,591,333	1,591,333	65,697	353,535	138,959	43,275	118,404	138,240	792,412	2,449,443	241,359	13,777	15,446	29,222	1,591,333	1,861,914	587,529
2010	Nov.	Normal	1,540,000	1,540,000	63,578	230,025	66,972	18,771	51,359	119,926	487,053	2,090,631	233,573	2,551	2,860	5,412	1,540,000	1,778,985	311,646
2010	Dec.	Normal	1,591,333	1,591,333	65,697	0	0	0	0	0	0	1,657,031	241,359	0	0	0	1,591,333	1,832,692	-175,661
			18,788,000		775,654	3,561,660	1,437,067	472,800	1,293,614	2,011,642	8,776,783	28,340,437	2,849,592			555,223	18,788,000	22,192,815	6,147,622

Climate Variables (mm)

Year	%	Total Precip.	Effect. Precip.	Evap.	
Normal	October	75.6	75.6	27.0	31
Normal	November	65.6	32.8	5.0	30
Normal	December	62.0	0.0	0.0	31
Normal	January	67.3	0.0	0.0	31
Normal	February	49.9	0.0	0.0	29
Normal	March	59.3	0.0	3.0	31
Normal	April	55.7	327.0	20.0	30
Normal	May	65.7	65.7	67.0	31
Normal	June	79.9	79.9	104.0	30
Normal	July	74.7	74.7	123.0	31
Normal	August	80.1	80.1	103.0	31
Normal	September	90.6	90.6	61.0	30
Normal	October	75.6	75.6	27.0	31
Normal	November	65.6	32.8	5.0	30
Normal	December	62.0	0.0	0.0	31
	Subtotal:	826.5	826.5	513.0	

Runoff Coefficients

Natural Ground	Tailings Surface	Pond	Waste Rock	Open Pit	TW Factor
0.60	0.90	1.00	0.50	1.00	1.00
0.90	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00
0.90	0.90	1.00	0.80	1.00	1.00
0.35	0.85	1.00	0.50	1.00	1.00
0.20	0.75	1.00	0.50	1.00	1.00
0.20	0.75	1.00	0.50	1.00	1.00
0.20	0.75	1.00	0.50	1.00	1.00
0.20	0.85	1.00	0.75	1.00	1.00
0.60	0.90	1.00	0.50	1.00	1.00
0.90	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00

Annual Totals

Tailings Water:	18,788,000 cu.m
Seepage Input:	775,654 cu.m
Net Runoff:	8,776,783 cu.m
Retained Water:	2,849,592 cu.m
Net Evaporation:	555,223 cu.m
Reclaim	18,788,000 cu.m
Net Inflow:	6,147,622 cu.m

MARATHON PGM-Cu MINE PROJECT
WATER BALANCE (Option 3 PSMF)

Operation: Marathon PGM-Cu Mine Water Balance
Condition: Mean Annual Conditions

Calder Engineering Ltd.

Mine, Mill, & Tailings Parameters

Tonnage Milled:	**22,000**	dry tonnes/day	8,030,000 t/year
Tails % Solids:	30	%	
Seepage Loss:	2,119	cu.m/day	389 US gal/min
Recirculation:	100	%	
Specifc Gravity of Tailings:	3.1		
In-Place Dry Density of Tailings:	1.48	tonnnes/cu.m	
In-Place Tailings Porosity:	0.52377		

Basin Characteristics

Natural Ground:	468.6 ha
Tailings:	291.0 ha
Pond Area:	70.1 ha
Pit:	130.4 ha
Waste Rock:	365.5 ha
Total:	1,325.5 ha

Process Water Pond Characteristics

Initial Capacity:	0 cu.m
Struck Capacity:	6,000,000 cu.m
Surface Area:	43.6 ha

High Sulphur PSMF Characterstics

Initial Capacity:	1,773,000 cu.m
Struck Capacity:	6,000,000 cu.m
Surface Area:	59.1 ha

YEAR	MONTH	CASE	INFLOWS (cu.m/mth)										LOSSES (cu.m/mth)						
			Tailings Water	TW Net	Seepage Input	RUNOFF						Subtotal	Retained Water	EVAPORATION			Reclaim	Subtotal	Net Inflow
						Natural Ground	Tailings	Pond	Pit	Waste Rock	NET			Tailings	Pond	NET			
2010	Oct.	Normal	1,591,333	1,591,333	65,697	*212,695*	*198,123*	*53,026*	*98,610*	*138,240*	700,694	2,357,725	241,359	*19,643*	*18,926*	38,568	1,591,333	1,871,260	486,464
2010	Nov.	Normal	1,540,000	1,540,000	63,578	*138,389*	*95,487*	*23,001*	*42,773*	*119,926*	419,575	2,023,153	233,573	*3,638*	*3,505*	7,142	1,540,000	1,780,715	242,438
2010	Dec.	Normal	1,591,333	1,591,333	65,697	*0*	*0*	*0*	*0*	*0*	0	1,657,031	241,359	*0*	*0*	0	1,591,333	1,832,692	-175,661
2010	Jan.	Normal	1,591,333	1,591,333	65,697	*0*	*0*	*0*	*0*	*0*	0	1,657,031	241,359	*0*	*0*	0	1,591,333	1,832,692	-175,661
2010	Feb.	Normal	1,488,667	1,488,667	61,459	*0*	*0*	*0*	*0*	*0*	0	1,550,126	225,787	*0*	*0*	0	1,488,667	1,714,454	-164,328
2010	Mar.	Normal	1,591,333	1,591,333	65,697	*0*	*0*	*0*	*0*	*0*	0	1,657,031	241,359	*2,183*	*2,103*	4,285	1,591,333	1,836,978	-179,947
2010	Apr.	Normal	1,540,000	1,540,000	63,578	*1,379,056*	*856,382*	*229,202*	*426,239*	*956,060*	3,846,939	5,450,517	233,573	*14,550*	*14,019*	28,569	1,540,000	1,802,142	3,648,375
2010	May	Normal	1,591,333	1,591,333	65,697	*107,689*	*162,408*	*46,024*	*85,589*	*119,986*	521,696	2,178,727	241,359	*48,743*	*46,964*	95,706	1,591,333	1,928,398	250,329
2010	Jun.	Normal	1,540,000	1,540,000	63,578	*74,922*	*174,473*	*56,035*	*104,207*	*146,086*	555,724	2,159,302	233,573	*75,660*	*72,899*	148,559	1,540,000	1,922,132	237,170
2010	Jul.	Normal	1,591,333	1,591,333	65,697	*70,007*	*163,025*	*52,359*	*97,369*	*136,501*	519,261	2,176,291	241,359	*89,483*	*86,217*	175,699	1,591,333	2,008,392	167,900
2010	Aug.	Normal	1,591,333	1,591,333	65,697	*75,068*	*174,811*	*56,144*	*104,409*	*146,369*	556,800	2,213,831	241,359	*74,933*	*72,198*	147,130	1,591,333	1,979,823	234,008
2010	Sept.	Normal	1,540,000	1,540,000	63,578	*84,957*	*224,219*	*63,540*	*118,163*	*248,476*	739,354	2,342,933	233,573	*44,378*	*42,758*	87,135	1,540,000	1,860,709	482,224
2010	Oct.	Normal	1,591,333	1,591,333	65,697	*212,695*	*198,123*	*53,026*	*98,610*	*138,240*	700,694	2,357,725	241,359	*19,643*	*18,926*	38,568	1,591,333	1,871,260	486,464
2010	Nov.	Normal	1,540,000	1,540,000	63,578	*138,389*	*95,487*	*23,001*	*42,773*	*119,926*	419,575	2,023,153	233,573	*3,638*	*3,505*	7,142	1,540,000	1,780,715	242,438
2010	Dec.	Normal	1,591,333	1,591,333	65,697	*0*	*0*	*0*	*0*	*0*	0	1,657,031	241,359	*0*	*0*	0	1,591,333	1,832,692	-175,661
			18,788,000		775,654	2,142,782	2,048,929	579,330	1,077,359	2,011,642	7,860,043	27,423,696	2,849,592			732,795	18,788,000	22,370,387	5,053,309

Climate Variables (mm)

Year	%	Total Precip.	Effect. Precip.	Evap.	
Normal	October	75.6	75.6	27.0	31
Normal	November	65.6	32.8	5.0	30
Normal	December	62.0	0.0	0.0	31
Normal	January	67.3	0.0	0.0	31
Normal	February	49.9	0.0	0.0	29
Normal	March	59.3	0.0	3.0	31
Normal	April	55.7	327.0	20.0	30
Normal	May	65.7	65.7	67.0	31
Normal	June	79.9	79.9	104.0	30
Normal	July	74.7	74.7	123.0	31
Normal	August	80.1	80.1	103.0	31
Normal	September	90.6	90.6	61.0	30
Normal	October	75.6	75.6	27.0	31
Normal	November	65.6	32.8	5.0	30
Normal	December	62.0	0.0	0.0	31
	Subtotal:	826.5	826.5	513.0	

Runoff Coefficients

Natural Ground	Tailings Surface	Pond	Waste Rock	Open Pit	TW Factor
0.60	0.90	1.00	0.50	1.00	1.00
0.90	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00
0.90	0.90	1.00	0.80	1.00	1.00
0.35	0.85	1.00	0.50	1.00	1.00
0.20	0.75	1.00	0.50	1.00	1.00
0.20	0.75	1.00	0.50	1.00	1.00
0.20	0.75	1.00	0.50	1.00	1.00
0.20	0.85	1.00	0.75	1.00	1.00
0.60	0.90	1.00	0.50	1.00	1.00
0.90	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00

Annual Totals

Tailings Water:	18,788,000 cu.m
Seepage Input:	775,654 cu.m
Net Runoff:	7,860,043 cu.m
Retained Water:	2,849,592 cu.m
Net Evaporation:	732,795 cu.m
Reclaim	18,788,000 cu.m
Net Inflow:	5,053,309 cu.m

Calder Engineering Ltd.

TABLE 16

MEAN MONTHLY FLOWS IN STREAM 6 AND VOLUME DISCHARGED TO STREAM 6 FOR NODE S14

Month	Baseline Conditions	SOUTH PSMF OPTION				OPTION 3 PSMF			
		Natural Flow	Effluent Discharge	Total Flow	% Increase In Flow[3]	Natural Flow	Effluent Discharge	Total Flow	% Increase In Flow[3]
STREAM 6 @ S14 (Highway 17)									
Jan.	-[4]	-[4]	522,133	-[4]	-[4]	-[4]	429,195	-[4]	-[4]
Feb	-[4]	-[4]	471,604	-[4]	-[4]	-[4]	387,660	-[4]	-[4]
Mar	-[4]	-[4]	522,133	-[4]	-[4]	-[4]	429,195	-[4]	-[4]
Apr	-[4]	-[4]	505,290	-[4]	-[4]	-[4]	415,350	-[4]	-[4]
May	1,381,015	1,116,778	522,133	1,638,911	19	1,116,778	429,195	1,545,973	12
Jun	197,757	162,271	505,290	667,561	238	162,271	415,350	577,621	192
Jul	182,860	43,428	522,133	565,561	209	43,428	429,195	472,623	158
Aug	349,434	63,343	522,133	585,476	68	63,343	429,195	492,538	41
Sep	175,966	83,163	505,290	588,453	234	83,163	415,350	498,513	183
Oct	137,828	140,019	522,133	662,152	380	140,019	429,195	569,214	313
Nov	334,667	219,259	505,290	724,549	116	219,259	415,350	634,609	90
Dec	-[4]	-[4]	522,133	-[4]	-[4]	-[4]	429,195	-[4]	-[4]
					181				141

Note:

1. All the flows are in cubic metres per month.
2. Total flow represents the sum of natural flow in Stream 6 after year 6 of mine operation and effluent discharge from the mine.
3. Percent increase in flow represents the increase in Stream 6 flow after the effluent was discharged into the Stream, compared to the baseline conditions.
4. Insufficient data to provide information.

Calder Engineering Ltd.

TABLE 17

MEAN MONTHLY FLOWS IN STREAM 6 AND VOLUME DISCHARGED TO STREAM 6 FOR NODE S31

Month	Baseline Conditions	SOUTH PSMF OPTION				OPTION 3 PSMF			
		Natural Flow	Effluent Discharge	Total Flow	% Increase In Flow[3]	Natural Flow	Effluent Discharge	Total Flow	% Increase In Flow[3]
STREAM 6 @ S31 (outlet to Lake Superior)									
Jan.	-[4]	-[4]	522,133	-[4]	-[4]	-[4]	429,195	-[4]	-[4]
Feb	-[4]	-[4]	471,604	-[4]	-[4]	-[4]	387,660	-[4]	-[4]
Mar	-[4]	-[4]	522,133	-[4]	-[4]	-[4]	429,195	-[4]	-[4]
Apr	-[4]	-[4]	505,290	-[4]	-[4]	-[4]	415,350	-[4]	-[4]
May	1,934,586	1,670,350	522,133	2,192,483	13	1,670,350	429,195	2,099,545	9
Jun	277,530	238,536	505,290	743,826	168	238,536	415,350	653,886	136
Jul	474,982	335,536	522,133	857,669	81	335,536	429,195	764,731	61
Aug	948,786	662,699	522,133	1,184,832	25	662,699	429,195	1,091,894	15
Sep	370,380	277,584	505,290	782,874	111	277,584	415,350	692,934	87
Oct	145,142	139,644	522,133	661,777	356	139,644	429,195	568,839	292
Nov	576,450	461,037	505,290	966,327	68	461,037	415,350	876,387	52
Dec	-[4]	-[4]	522,133	-[4]	-[4]	-[4]	429,195	-[4]	-[4]
					117				93

Note:
1. All the flows are in cubic metres per month.
2. Total flow represents the sum of natural flow in Stream 6 after year 6 of mine operation and effluent discharge from the mine.
3. Percent increase in flow represents the increase in Stream 6 flow after the effluent was discharged into the Stream, compared to the baseline conditions.
4. Insufficient data to provide information.

Calder Engineering Ltd.

TABLE 18

MEAN MONTHLY FLOWS IN STREAM 6 AND VOLUME DISCHARGED TO STREAM 6 FOR NODE S14

Month	Baseline Conditions	SOUTH PSMF OPTION				OPTION 3 PSMF			
		Natural Flow	Effluent Discharge	Total Flow	% Increase In Flow[3]	Natural Flow	Effluent Discharge	Total Flow	% Increase In Flow[3]
STREAM 6 @ S14 (Highway 17)									
Jan.	-[4]	-[4]	0	-[4]	-[4]	-[4]	0	-[4]	-[4]
Feb	-[4]	-[4]	0	-[4]	-[4]	-[4]	0	-[4]	-[4]
Mar	-[4]	-[4]	0	-[4]	-[4]	-[4]	0	-[4]	-[4]
Apr	-[4]	-[4]	4,356,135	-[4]	-[4]	-[4]	4,356,135	-[4]	-[4]
May	1,381,015	1,116,778	305,046	1,421,825	3	1,116,778	250,329	1,367,107	0
Jun	197,757	162,271	281,291	443,562	124	162,271	237,170	399,441	102
Jul	182,860	43,428	218,065	261,492	43	43,428	167,900	211,327	16
Aug	349,434	63,343	277,799	341,142	0	63,343	234,008	297,351	0
Sep	175,966	83,163	504,671	587,834	234	83,163	482,224	565,387	221
Oct	137,828	140,019	587,529	727,547	428	140,019	486,464	626,483	355
Nov	334,667	219,259	311,646	530,906	59	219,259	242,438	461,697	38
Dec	-[4]	-[4]	0	-[4]	-[4]	-[4]	0	-[4]	-[4]
					127				104

Note:

1. All the flows are in cubic metres per month.
2. Total flow represents the sum of natural flow in Stream 6 after year 6 of mine operation and effluent discharge from the mine.
3. Percent increase in flow represents the increase in Stream 6 flow after the effluent was discharged into the Stream, compared to the baseline conditions.
4. Insufficient data to provide information.

Calder Engineering Ltd.

TABLE 19

MEAN MONTHLY FLOWS IN STREAM 6 AND VOLUME DISCHARGED TO STREAM 6 FOR NODE S31

Month	Baseline Conditions	SOUTH PSMF OPTION				OPTION 3 PSMF			
		Natural Flow	Effluent Discharge	Total Flow	% Increase In Flow[3]	Natural Flow	Effluent Discharge	Total Flow	% Increase In Flow[3]
STREAM 6 @ S31 (outlet to Lake Superior)									
Jan.	-[4]	-[4]	0	-[4]	-[4]	-[4]	0	-[4]	-[4]
Feb	-[4]	-[4]	0	-[4]	-[4]	-[4]	0	-[4]	-[4]
Mar	-[4]	-[4]	0	-[4]	-[4]	-[4]	0	-[4]	-[4]
Apr	-[4]	-[4]	4,356,135	-[4]	-[4]	-[4]	4,356,135	-[4]	-[4]
May	1,934,586	1,670,350	305,046	1,975,396	2	1,670,350	250,329	1,920,679	-1
Jun	277,530	238,536	281,291	519,827	87	238,536	237,170	475,706	71
Jul	474,982	335,536	218,065	553,600	17	335,536	167,900	503,435	6
Aug	948,786	662,699	277,799	940,498	-1	662,699	234,008	896,707	-5
Sep	370,380	277,584	504,671	782,256	111	277,584	482,224	759,808	105
Oct	145,142	139,644	587,529	727,172	401	139,644	486,464	626,108	331
Nov	576,450	461,037	311,646	772,684	34	461,037	242,438	703,475	22
Dec	-[4]	-[4]	0	-[4]	-[4]	-[4]	0	-[4]	-[4]
					93				76

Note:

1. All the flows are in cubic metres per month.
2. Total flow represents the sum of natural flow in Stream 6 after year 6 of mine operation and effluent discharge from the mine.
3. Percent increase in flow represents the increase in Stream 6 flow after the effluent was discharged into the Stream, compared to the baseline conditions.
4. Insufficient data to provide information.