MATTAGAMI REGION CONSERVATION AUTHORITY FLOOD CONTINGENCY PLAN 2024

Mattagami River Flood 1960

MATTAGAMI REGION CONSERVATION AUTHORITY

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FLOOD RESPONSE PROCEDURES SUMMARY

The following is a brief summary of the procedures and responsibilities of the Mattagami Region Conservation Authority (MRCA) under its Flood Contingency Plan.

1. Conservation Authority staff will continuously monitor watershed conditions throughout the year for the possibility of flooding. Monitoring includes the collection and analysis of snow courses, streamflow data, weather, and dam operations data as provided by various agencies within the Upper Mattagami River Watershed including Porcupine Lake, the Mattagami River, Town Creek and Kamiskotia Lake.
2. Depending on watershed conditions, the MRCA, in conjunction with the Timmins Flood Advisory Committee (TFAC), will issue flood messaging to the municipality, local media, and the Provincial Surface Water Monitoring Centre (SWMC) in Peterborough.
3. Authority staff will continuously monitor all flood damage centres. The Timmins Flood Advisory Committee will continue to meet and make recommendations to the Emergency Management Coordinator. Based on the level of threat, the Municipal Emergency Management Coordinator may, at their discretion, implement their Municipal Emergency Plan.
4. In the event of the declaration of a municipal emergency, Conservation Authority staff will continue to liaise with the Timmins Flood Advisory Committee, MNRF Timmins District office and the Municipal Emergency Management Coordinator.

Municipal or provincial personnel, who believe that flooding is occurring or is anticipated, should contact the Conservation Authority at the following numbers:

David Vallier, MRCA General Manager
705-360-2660 ext. 7482

Kevin Gagnon, MRCA Field Supervisor
705-360-2660 ext. 7464

If Conservation Authority staff is unavailable, the Municipal Emergency Management Coordinator should be contacted as per the Municipal Emergency Plan.

Berny Stansa, City of Timmins Fire Chief
705-360-2626

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1.0 INTRODUCTION

Historical records show that flooding within the City of Timmins has occurred regularly since the 1920's. The Mattagami River floods of 1960 and 1996 and the Town Creek flood of 1961 resulted in the loss of life and extensive property damage. It was soon after the two floods in 1960 and 1961 that the Mattagami Region Conservation Authority (MRCA) was established (originally the Mattagami Valley Conservation Authority) and a comprehensive program of water management was implemented. Although much effort has been put into the installation of flood control works and the regulation of new development in flood prone areas, flooding still poses a threat to life and property. Records indicate that a spring thaw combined with warm, wet weather is the leading cause of high water. However, intense summer storms with heavy, localized rainfall can also be very destructive, especially within the smaller waterbodies such as Crawford Creek and Town Creek.

The MRCA Flood Contingency Plan documents the responsibilities and procedures of the Conservation Authority before and during flood emergencies. It is revised, updated and distributed annually to the various agencies and individuals involved in an emergency response to flooding.

The Emergency Management and Civil Protection Act (R.S.O. 1990, c.E.9, amended 2009) in Ontario stipulates that the province and municipalities must develop and implement emergency management programs. A risk management approach is taken when dealing with emergency management, which includes prevention, mitigation, preparedness, response, and recovery (MCSCS, 2016). Some features of risk management include emergency plans, emergency operations centres, emergency information, training programs and exercises, public education, and Hazard Identification and Risk Assessments (HIRA). One of the natural hazards identified in Ontario through HIRA is flooding.

2.0 RESPONSIBILITIES

Conservation Authorities and the Ministry of Natural Resources and Forestry (MNRF) share the responsibility for flood warning and forecasting in Ontario. The MRCA fulfils this responsibility for their area of jurisdiction by maintaining and distributing the MRCA Flood Contingency Plan. The Conservation Authority forecasts flooding potential and issues flood messages to the City of Timmins and the province.

As with all emergencies, municipalities have the primary responsibility for the welfare of residents, and should incorporate flood emergency response into municipal emergency planning.

2.1 Mattagami Region Conservation Authority

- Monitor and collect data related to rainfall, snow depth/water equivalent and ice conditions.
- Inform the public of watershed conditions throughout the year and more specifically during the spring and fall.

- Provide technical advice to the City of Timmins related to preventing or reducing the effects of flooding.
- Provide planning support and advice to the City of Timmins with respect to minimizing the impact of flooding.
- Participate in the development of flood emergency plans with the City of Timmins.
- Maintain a Flood Contingency Plan to outline the responsibilities and procedures for information sharing before and during a flood.
- Issue Water Conditions Statements, Flood Watch / Warning messages to City of Timmins, partners and news media and issue notice of cancellations of flood messages when appropriate.
- When flooding is imminent for either the Mattagami River or Porcupine Lake flood centres, the MRCA will ensure that municipal emergency services are provided with a comprehensive listing of affected addresses within the flood centre as detailed in Appendix A.
- Maintain awareness of the status of a flood emergency response through consultation with the local OPG staff.
- Continue to update the City of Timmins and the MNRF of the current situation and outlook.
- Liaise with the City of Timmins in matters related to declaring a municipal emergency and securing provincial resources as necessary.
- Maintain awareness of the status of the provincial response to a flood emergency, through consultation with the MNRF Timmins District office.
- During flood emergencies, provide Conservation Authority staff 24/7 contact information to the MNRF and the City of Timmins.
- Designate personnel who will carry out the functions mentioned above and any other functions as are appropriate.

2.2 City of Timmins

- Maintain its own Municipal Emergency Plan (EMO, 2008).
- In the event of a flood, determine the appropriate response in accordance with their municipal emergency planning and dedicate resources to minimize personal risk, property damage and ensure the welfare of the residents.
- The MRCA Flood Contingency Plan will be posted in a convenient location so the municipality can contact appropriate agencies and individuals during a flood event. During a flood emergency, this will include 24/7 contact information for the Conservation Authority and Emergency Management Ontario (EMO). EMO will be able to reach out to other provincial agencies as appropriate.
- If municipal resources are fully committed and additional resources are required, the municipality should directly contact EMO through the Provincial Emergency Operation Centre (PEOC) Duty Officer.

2.3 Provincial Responsibilities

The MNRF Surface Water Monitoring Centre monitors weather forecasts and water levels across the province and provides that information to Conservation Authorities. They provide information to the MRCA through online databases that help with forecasting and minimizing flooding potential. If conditions indicate the potential for flooding, the local Conservation Authority is notified, confirms the local information, and issues Flood Messages as required.

The MNRF provides expertise in hazard management and response. MNRF owns and operates a variety of dams based on dam operations plans, including assessment of potential for exceeding design capacity. Where MNRF is aware that another dam owner is unavailable, MNRF has the authority to operate the dam in the absence of that dam owner.

The MRCA's watershed is located within the MNRF Timmins District. When provincial assistance is required outside the City of Timmins, the area in question should communicate directly with the MNRF Timmins District office who will assess the need and the province's capacity to respond to the event.

MNRF may support a municipal request for assistance during a flood emergency through the District when it activates its District Managers Emergency Response Plan and Response Team. Assistance is coordinated through the Ministry Emergency Operations Centre.

3.0 TIMMINS FLOOD ADVISORY COMMITTEE (TFAC)

The TFAC is comprised of Ontario Power Generation Inc. (OPG), Mattagami Region Conservation Authority (MRCA) and the Ministry of Natural Resources and Forestry (MNRF). The primary mandate of the Timmins Flood Advisory Committee (the "Committee") is to act as a vehicle for the exchange of information among all committee members about water management in the watershed. In consideration of this information, OPG, MNRF and MRCA, who are the primary members of the Committee, will make integrated water management decisions required to accommodate the numerous system uses and users. These decisions must respect the multitude of uses/users, and should use natural watershed boundaries, rather than political boundaries.

TFAC is committed to:

- open communication;
- achieving a balance between the needs and desires of all system users in an equitable manner;
- enhancing and refining the use of information management and technology to support decision-making; and
- supporting the management of flows, water levels (high and low) and dam operations as related to public safety, fisheries, recreation, waterpower generation and water supply.

A meeting of the Timmins Flood Advisory Committee shall be held each year between March 20 and March 31. The Committee shall maintain a liaison with its members throughout the spring runoff period until such time that any flood risk has passed. TFAC meets primarily throughout the spring freshet, but will reconvene at any time of the year where there is a higher risk of flooding.

During those meetings specific to flood emergency planning, forecast and warning, weather information, snow course data and streamflow readings will be reviewed and flooding potential assessed. The Committee will ensure that those with delegated responsibilities throughout any period of flood threat maintain a high level of emergency preparedness. When conditions warrant, the MRCA will release Flood Messages on behalf of the Committee.

3.1 Committee Advisors

In addition to its primary members, the Committee shall also include community stakeholders from the City of Timmins in an advisory capacity as outlined in the Terms of Reference. The Committee Advisors:

- will have an opportunity to review information pertaining to water management in the watershed and provide comments to the three primary members;
- will assist the primary members in implementing public communication and consultation processes; and
- bring knowledge of and experience on the Upper Mattagami Watershed.

A list of members on the Timmins Flood Advisory Committee, including Committee Advisors, is found in Appendix B.

4.0 FLOOD WATCHES, WARNINGS AND STATEMENTS

The Surface Water Monitoring Centre (SWMC) issues provincial flood messages to the Conservation Authority, the MNRF districts and posts on the SWMC electronic bulletin board. A Provincial Flood Watch issued by the SWMC to the Authority provides information about the potential for flooding. Authority staff will assess local conditions and determine if a specific public announcement is warranted.

Messages issued by the SWMC are not to be confused with Conservation Authority messages that are issued locally to the City of Timmins, government agencies and the public.

Flood message terminology has been standardized across the province and is used by all Conservation Authorities, the MNRF as well as Environment Canada and the Weather Network. These announcements indicate the state of readiness needed to address potential flooding situations and are issued to the local media and the public. There are four levels of messaging used ranging from “normal” to “flood warning” with each having a specific colour code and graphic. The Mattagami Region Conservation Authority and the Timmins Flood Advisory Committee use these public flood messaging announcements as part of its communications system. Sample messages are found in Appendix H.

4.1 Terminology

Normal

There are no flood conditions.

Watershed Conditions Statement

A general notice of weather conditions that could pose a risk to personal safety or which have the potential to lead to flooding. There are two types of statements.

- **Watershed Conditions Statement—Water Safety**

A Water Safety Statement is a general notice of potential watershed conditions that pose a risk to personal safety such as high flows, unsafe ice, slippery banks or high lake levels. Flooding is not expected.

- **Watershed Conditions Statement—Flood Outlook**

A Flood Outlook Statement is an early notice of the potential for flooding based on weather forecasts calling for heavy rain, snow melt, high wind or other conditions that could lead to high runoff and unsafe river, lake or bank conditions. It is a general public information message to encourage awareness.

Flood Watch

A Flood Watch message serves as notification that flooding is possible in specific watercourses or municipalities. Municipalities, emergency services and individual landowners in flood-prone areas should prepare. It is usually issued following the onset of overbank flow or high lake levels. These messages do not require specific action but, having been advised of the potential flood conditions, municipal emergency personnel should initiate a review of their emergency plan and monitor potential problem areas. Flood Watches may be updated depending upon weather and runoff conditions, and will be followed by a notice of cancellation once the potential for flooding has passed.

The content of a standard Flood Watch consists of:

- watch number and sender
- date and time of issuance
- summary of weather forecast information
- description of potential flood magnitude
- assessment of flooding implications
- contact names and numbers for further information

Flood Warning

A Flood Warning is used to warn of impending flooding and should be taken very seriously. A Flood Warning provides notice to the municipality and emergency services that action is required on their part. Flood Warnings may be updated depending upon weather and runoff conditions, and will be followed by a notice of cancellation once the potential for flooding has passed.

The content of a standard Flood Warning consists of:

- warning number and sender including date and time of issuance
- period message is in effect
- general watershed conditions
- long range forecast
- implication of current conditions and long range forecast
- contact names and numbers for further information

Termination Message (Notice of Cancellation)

A termination message is issued when the event has concluded. Although it may be combined with an updated Watch or Warning message as described above.

Municipal Emergency Declaration

A declaration of a municipal emergency is made by an appropriate elected official, usually the Mayor. This municipal declaration would state that the flooding situation is critical and that a coordinated response by several agencies, both government and private, may be required.

Provincial Emergency

A declaration of a provincial emergency is made by the Premier of Ontario. It states that an urgent situation exists within all or part of the province that exceeds the capacity of the province with available resources or requires special measures to be implemented as per the Provincial Emergency Response Plan in accordance with the Emergency Management and Civil Protection Act (EMCPA).

5.0 COMMUNICATIONS AND RECORDS

The MRCA administers its Flood Contingency Plan through the Mattagami Region Conservation Authority office at 100 Lakeshore Road in Timmins. The Authority Coordinator shall be the General Manager in consultation with the Conservation Authority Chair. As such, it is the Coordinator's role to be the key contact person with the Surface Water Monitoring Centre, the MNRF District Coordinator and the Municipal Emergency Management Coordinator.

Communications from the Conservation Authority office will be via telephone, email, mobile phone and the internet.

Communication with the Surface Water Monitoring Centre can be directly by telephone or through the internet.

5.1 Record Keeping

The Conservation Authority collects and keeps all records including flow measurements, snow courses, water elevations and photographs. Ontario Power Generation and the MNRF also keep data on snow courses, weather and stream flows.

5.2 Floodplain Properties List

The MRCA will maintain a register of property addresses located within the floodplain (Appendix A). The list is based on information derived from flood plain mapping, property surveys and hydraulic models.

Once it has been determined that flooding is imminent for either the Mattagami River or Porcupine Lake flood centres, the Conservation Authority will provide municipal emergency services with the list of floodplain properties upon request.

6.0 WATERSHED MONITORING AND DATA ACQUISITION

The Upper Mattagami River Watershed is monitored through a system of streamflow gauges, snow courses and a weather forecasting network. The information is collected by several agencies including the Mattagami Region Conservation Authority, Ontario Power Generation, Environment Canada's Water Survey and Atmospheric Environment Services branches and the MNRF's Surface Water Monitoring Centre. Additional monitoring details are found in Appendix D.

7.0 WATERSHED CHARACTERISTICS

Flooding within the City of Timmins can be characterized as two main types; a spring freshet accompanied by warm, wet weather; and, an intense seasonal storm with heavy, localized rain over a short period of time. To a lesser degree, flooding can also result from beaver activity on the smaller watercourses and by ice damming within culverts and channels.

Several watercourses within the City of Timmins are regulated by a system of dams and control weirs. These are operated and managed by Ontario Power Generation, the MNRF and the Conservation Authority as multi-purpose structures, including flood control.

Information about MRCA Flood Damage Centres is found in Appendix E.

Information about MRCA Dam Operations and Management is found in Appendix F.

8.0 UPDATING AND DISTRIBUTION OF THE PLAN

The MRCA Flood Contingency Plan outlines the responsibilities of the Mattagami Region Conservation Authority prior to and during a flood emergency. The information contained herein is revised annually. Digital copies of this plan will be provided to:

- Chair and Vice-Chair of the Conservation Authority
- City of Timmins CAO
- Director of Public Works and Environmental Services or designate
- Municipal Emergency Management Coordinator
- Police Chief
- Fire Chief
- Local MNRF Response Coordinator - Timmins District
- Ontario Power Generation
- Ontario Provincial Police
- MNRF Regional Emergency Response Coordinator

A public facing version of this document will be made available on the MRCA website.

Appendix A: Floodplain Properties List

Properties in these lists are those most prone to flooding during high water events on the Mattagami River and Porcupine Lake. As part of the MRCA Flood Contingency Plan for the City of Timmins, this list will be made available by the Conservation Authority to municipal emergency services.

Mattagami River

There are approximately 400 residential and commercial properties located within the flood plain of the Mattagami River. These properties are distributed over seven flood stages and are listed in the following pages of this plan.

Stage ONE—10,000 TO 12,000—280 CMS to 340 CMS

Stage TWO—12,000 TO 14,000 CFS—341 CMS TO 395 CMS

Stage THREE—14,000 TO 16,000 CFS—396 CMS TO 455 CMS

Stage FOUR—16,000 TO 18,000 CFS—456 CMS TO 510 CMS

Stage FIVE—18,000 TO 24,000 CFS—511 CMS TO 680 CMS

Stage SIX—24,000 TO 28,000 CFS—681 CMS TO 790 CMS

Stage SEVEN—28,000+ CFS—791 CMS+

Porcupine Lake

There are approximately 160 residential and commercial properties located within the floodplain of Porcupine Lake and the Porcupine River. These properties are distributed over three flood stages and are listed in the following pages. The Design Flood Elevation for Porcupine Lake is 922.8 feet (281.27 m) C.G.D., based on a 1 in 100 year flood flow, with slightly higher elevations for those properties located adjacent the Upper Porcupine River and Evans Street.

Stage ONE—LAKE LEVEL 920' TO 921'—280.4 m TO 280.7 m

Stage TWO—LAKE LEVEL 921' TO 921'—280.7 m TO 281.0 m

Stage THREE—LAKE LEVEL 922' + — 281.0 m +

Note: This listing replaces the previous Flood Call-Out List. The change was made in 2024, when the MRCA met with stakeholders and it was determined that there was no longer a need to communicate directly with property owners. The challenge of maintaining current telephone numbers with the popularity of unlisted mobile phone numbers, along with the new means of public communication methods including website, social media, radio and the option for residents to sign up for flood notifications via email were deciding factors in this modification.

Appendix D: Monitoring and Data Acquisition

Snow courses are used to measure the depth and water content of the snow pack. Streamflow gauges are utilized to measure both the amount of water flowing past a particular point on a river as well as lake levels. Weather forecasts are obtained from a national monitoring network and provide short-range and long-range information on precipitation and temperature. This information is combined to provide an accurate picture of real-time watershed conditions and to predict future conditions. Readings in any given year are compared to past records to determine what percent of normal present conditions represent. Records are compiled and stored by all the agencies involved.

Snow Courses

At the present time there are a total of seven snow courses in the Upper Mattagami River Watershed:

- Porcupine (No. 7101) — monitored by the Conservation Authority
- Mountjoy (No. 7102) — monitored by the Conservation Authority
- Mattagami — monitored by Ontario Power Generation
- Shillington — monitored by Ontario Power Generation
- Shining Tree — monitored by Ontario Power Generation
- Timmins Airport — monitored by the MNRF
- Gogama MNRF — monitored by the MNRF

Snow pack conditions are monitored until the spring freshet is complete. The present snow course network covers most of the major sub watersheds of the Upper Mattagami River Watershed. The SWMC issues snow cover maps for the province identifying snow depth, water content, snow density and percent of normal.

Streamflow Gauges

A system of streamflow gauges maintained by Water Surveys of Canada monitors water surface elevations throughout the Upper Mattagami River Watershed. The following is a list of those facilities currently in operation. You can also access this information online - https://wateroffice.ec.gc.ca/mainmenu/real_time_data_index_e.html

Mattagami River—Federal gauge Station Number 04LA002 with formal records dating back to 1969. Maintained by Water Surveys of Canada and accessed off Dalton Road. Data Logger/DCP gauge reading is used with stage-discharge chart to obtain flow measurement.

Mountjoy River—Data Logger/DCP gauge (04LA004) keyed in to local datum (top of steel guard rail on the upstream side of the bridge) and with records dating back to 1992. Readings are all in metric. Bench mark is located adjacent building.

Tatachikapika River—Data Logger/DCP gauge (04LA003) keyed in to local datum (top of steel hand rail on the upstream side of the bridge) and with records dating back to 1992. Readings are all in metric. Bench mark is located on southeast corner of bridge in concrete.

Porcupine Lake—Data logger/phone line gauge (04MD005) is located on the south shore of Porcupine Lake and keyed into Canadian Geodetic Datum and in metric measurement. This gauge can be cross-checked with a staff gauge located on the north west side of the Highway 101 bridge at Shallow Lake.

Porcupine River at Hoyle—Data Logger/DCP gauge (04MD004) with records dating back to 2007. Readings are all in metric.

Minisinakwa Lake—Maintained by the MNRF under the Water Surveys of Canada cost-share agreement, this gauge station, number 04LA005, was activated in 2002. It is located immediately upstream of the MNRF's Minisinakwa Lake Dam.

Kamiskotia River—Data Logger/DCP gauge (04LB002) with records dating back to 2008. Readings are all in metric.

Mollie River—Data Logger/DCP gauge (04LA006) with records dating back to 2007. Readings are all in metric.

Weather Forecasts

The Conservation Authority accesses weather information through government sources and the private sector. The Surface Water Monitoring Centre of the MNRF in Peterborough is the primary source of information. During the spring runoff this information is supplemented with forecasts from Ontario Power Generation and, if available, the Regional Fire Centre of the Ministry of Natural Resources & Forestry. Real time weather data on temperature and rainfall is available through Environment Canada and Flight Services at the Timmins Airport.

Staff Gauges

As part of its overall monitoring system, staff gauges are maintained at various locations throughout the City of Timmins. On the Porcupine River system, gauges are located at Evans Street, Golden Avenue and the Highway 101 E bridge at the outlet to Porcupine Lake. On the Mattagami River, a staff gauge can be read at the bridge pier (west side) Highway 101 W (Mattagami bridge). Gauges are also installed in conjunction with the streamflow gauges at the Mountjoy and Tatachikapika Rivers. A staff gauge is also available on the Little Kamiskotia River at the outlet to Kamiskotia Lake.

Ice Monitoring

Ice thickness on major streams and lakes is not monitored on a regular basis. However, ice buildup is watched closely on Town Creek and Crawford Creek. Both locations are monitored starting in the early winter.

Appendix E: Flood Damage Centres

The following locations are considered the main flood damage centres within the City of Timmins.

Mattagami River—along its entire length from the Ogden-Mountjoy Township boundary to the Sandy Falls Dam. Structures include dwellings, commercial sites, accessory buildings and structures such as gazebos, docks, and storage yards containing vehicles and lumber. This flood damage centre is affected mainly by freshet flows with the highest threat occurring from mid-April to the end of May. High flows during the fall can result in some nuisance flooding. The first stage of flooding is considered to occur when river flows exceeds 280 m^3/s at Sandy Falls Dam.

Porcupine Lake and River—including the Upper Porcupine River at Quebec Avenue and Evans Street and the entire shoreline of Porcupine Lake. The latter includes the westerly end of the lake and the Bristol Road area. The highest flood threat occurs during the spring freshet from the beginning of April to the beginning of June although prolonged summer rains can raise lake levels substantially. A potential flood threat from the Newmont Goldcorp Mine Number Six tailings pond has also been identified. Porcupine Lake is in its first flood stage when the lake elevation exceeds 280.5 metres C.G.D.

Town Creek—from its headwaters at Murray Street to Rea Street North. Although all structures have been removed from the flood plain, high water as a result of ice blockages within channels and culverts remains a threat in the late winter and early spring. Intense summer storms will result in backup of storm and sanitary sewers throughout the Town Creek watershed. Some road flooding will also result.

Polaris Creek—several dwellings are at risk along Waterloo Road adjacent the Polaris Creek. Flooding is the result of either intense summer storms or a spring runoff combined with ice-blocked channels.

Frederick House Lake and River—the entire lake shoreline including the Frederick House River to Nighthawk Lake. The potential for flooding is the result of high water levels during the spring freshet. Several residences and accessory structures are affected.

Crawford Creek—that part of the watershed located within South Porcupine. Flooding may occur in the late spring as a result of an ice blockage within the culvert section of the creek either at the inlet on Crawford Street or at the outlet at Highway 101.

Kamiskotia Lake—the entire lake shoreline. The potential for flooding is the result of high water levels during the spring freshet and beaver activity downstream on the Little Kamiskotia River. Several residences and accessory structures are located within the flood plain.

Mountjoy Creek—the entire creek system from Riverside Drive north to Sandy Falls Road to the Mattagami River. The potential for flooding is the result of high water levels during the spring freshet and beaver activity.

In addition to these main flood centres, localized flooding may occur at various locations throughout the City of Timmins as a result of beaver activity. To address this problem, the Mattagami Region Conservation Authority works with the City, the MNRF and the local Fur Council to share information about beaver management strategies.

Appendix F: Dam Operations and Management

Several watercourses within the City are regulated by a system of dams and control weirs. These are operated and managed by Ontario Power Generation, the Ministry of Natural Resources & Forestry and the Conservation Authority as multi-purpose structures, including flood control.

Mattagami River—The Mattagami River system is the largest watercourse flowing through the City of Timmins and is responsible for the most extensive flood damage centre in the community. Upstream of the City, the river is partially regulated by a series of five dams and reservoirs established primarily for power generation purposes. The ability of these dams to hold back and regulate flows in order to reduce downstream flooding during the spring freshet is limited. There is however some capacity to "shave peaks" of flood flows. This ability to reduce the severity of a particular flood event forms part of the Conservation Authority's overall flood management program. The Upper Mattagami River system is managed on the basis of a "water year". This "year" reflects not only when water is stored and released as a result of natural inflows and outflows, but also when the water is needed the most. Starting in late fall, all storages are brought up to maximum elevations in anticipation of peak winter power demands. By mid-April reservoir storages will have been lowered to a minimum, ready to be filled by the spring freshet. During the period of mid-April to mid-June, elevations and outflows are regulated to meet several water management goals including "peak shaving" of flood flows to reduce downstream flood damages, maintaining minimum elevations at pickerel spawning locations and ensuring minimum water requirements are met at the Timmins water filtration plant. After mid-June all reservoirs are kept at near full capacity to meet the recreational needs of cottagers and commercial operators. Through August and September, reservoirs are lowered to accommodate inflows associated with the fall rains. Once the reservoirs are again full in the late fall, the "water year" is repeated. Streamflow contributed by the Tatachikapika and Mountjoy Rivers is unregulated and contributes approximately one-third of the flow passing through Timmins.

Porcupine Lake—Unlike the Mattagami River system, the Porcupine River is largely an unregulated watercourse with only two minor water control structures located on it. Downstream at the Owl Creek mine site the Authority owns a low flow weir designed to maintain minimum summer water levels on Porcupine Lake. This weir however cannot be used for flood control purposes.

The other flow control structure on the Porcupine River is the Number Six Tailings Dam owned and operated by Newmont Goldcorp. Located upstream of Porcupine Lake, the dam is a large structure designed to hold tailings and to decant excess process water once this water has met provincial water quality guidelines. This tailings impoundment is able to contain substantial quantities of water and can have a significant downstream impact if water has to be released during the spring freshet. There is no capacity within the system to "shave peaks" as can be done on the Mattagami River. The Porcupine Lake and River system has a very flat gradient resulting in slow outflows and a high susceptibility to flooding.

Gillies Lake - Located within the Town Creek watershed, Gillies Lake is used during the winter months for low flow augmentation purposes. A gate and valve system permit the slow, continuous release of about 0.5 to 1.0 ft^3/sec into the Town Creek starting at freeze up around the middle of November. Flow augmentation, in conjunction with low flow channels, has helped control downstream ice build-up in the culverts between Vimy Avenue and Waterloo Road. During the spring freshet, lake levels are monitored and the outlet regulated to ensure no shoreline flooding occurs. Summer lake levels are kept at around 5 to 10 cm below the gravity overflow of the outlet.

Appendix G: Historic Snow Course Data Summary

The following charts summarize the historical snow course data collected by Ontario Power Generation and the Mattagami Region Conservation Authority.

HISTORIC SNOW COURSE DATA REPORT

MATTAGAMI

Year	1-Mar		15-Mar		1-Apr		15-Apr		1-May		15-May	
	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC
1948	-	-	-	-	-	-	-	-	-	-	-	-
1949	-	-	-	-	-	-	-	-	-	-	-	-
1950	-	-	-	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-
1953	86	170	102	216	86	229	66	185	42	127	-	-
1954	55	107	81	183	81	196	49	119	0	0	0	0
1955	56	104	73	119	69	140	10	15	0	0	0	0
1956	83	163	86	150	87	193	54	135	53	157	0	0
1957	74	122	80	168	72	168	66	145	0	0	0	0
1958	65	130	62	157	57	145	0	0	0	0	0	0
1959	61	122	78	152	71	137	-	-	8	25	-	-
1960	98	244	97	231	101	244	78	267	34	104	0	0
1961	54	89	61	112	49	130	42	119	-	-	-	-
1962	101	224	91	241	75	213	56	216	38	127	-	-
1963	68	137	78	157	70	188	58	178	10	28	-	-
1964	87	224	99	267	106	310	72	236	0	0	0	0
1965	79	155	78	173	82	193	62	168	44	145	0	0
1966	63	145	72	157	71	191	65	188	22	69	-	-
1967	100	221	110	262	94	226	75	216	41	157	-	-
1968	72	175	69	175	38	147	11	46	0	0	0	0
1969	84	218	82	203	91	277	85	241	24	84	-	-
1970	70	163	71	163	75	198	47	157	3	8	0	0
1971	89	203	83	203	94	246	66	221	29	112	0	0
1972	83	178	98	234	101	302	73	229	26	91	0	0
1973	80	170	45	112	27	97	22	71	-	-	-	-
1974	84	211	81	208	84	226	75	224	29	97	15	61
1975	-	-	81	251	82	203	85	236	30	102	0	0
1976	70	152	75	152	45	168	39	160	0	0	0	0
1977	86	178	53	155	66	168	15	58	0	0	0	0
1978	73	167	77	179	79	231	79	232	38	165	-	-
1979	77	168	86	251	78	233	66	299	29	115	0	0
1980	43	75	52	92	50	117	36	78	3	9	-	-
1981	47	139	62	151	36	136	6	31	0	0	0	0
1982	73	163	66	192	55	135	53	177	0	0	0	0
1983	57	114	42	130	69	166	47	151	23	134	0	0
1984	49	152	53	134	41	131	0	0	0	0	0	0
1985	67	134	83	159	70	193	69	205	0	0	0	0
1986	63	138	75	165	60	164	42	134	0	0	0	0
1987	55	112	49	124	30	61	0	0	0	0	0	0
1988	88	193	91	226	91	220	49	180	33	119	0	0
1989	57	104	85	155	48	206	49	193	44	170	0	0
1990	102	246	83	211	56	173	49	150	27	119	0	0
1991	56	94	65	132	61	114	29	64	0	0	0	0
1992	74	152	75	150	75	173	51	117	14	38	0	0
1993	53	91	65	137	44	96	0	0	0	0	0	0
1994	48	83	52	107	58	124	42	86	24	58	0	0
1995	53	102	49	119	38	130	35	41	31	119	0	0
1996	106	193	101	206	-	-	100	246	79	175	73	229
1997	95	234	97	264	105	285	61	224	38	102	-	-
1998	65	173	83	183	42	109	23	99	-	-	-	-
1999	66	114	61	155	54	109	22	61	-	-	-	-
2000	42	127	51	160	33	134	25	91	-	-	-	-
2001	72	70	75	140	66	140	44	168	0	0	0	0
2002	98	203	92	221	101	272	89	282	37	140	0	0
2003	72	173	70	155	59	168	46	165	24	114	0	0
2004	76	178	76	198	53	147	49	165	19	86	0	0
2005	81	146	87	177	77	146	31	102	0	0	0	0
2006	71	165	51	162	59	163	46	152	0	0	0	0
2007	48	99	48	124	30	84	30	114	0	0	0	0
2008	64	134	74	162	84	187	55	200	0	0	0	0
2009	72	127	68	117	62	142	69	175	27	84	0	0
2010	20	36	23	30	0	0	0	0	0	0	0	0
2011	39	61	49	58	39	66	27	69	14	43	0	0
2012	62	125	51	119	0	0	0	0	0	0	0	0
2013	60	137	74	157	71	160	79	208	53	155	0	0
2014	60	107	74	147	78	165	73	135	29	99	0	0
2015	76	152	71	155	83	152	64	174	24	62	0	0
2016	62	155	61	168	39	137	62	155	8	36	0	0
2017	46	137	51	130	45	152	32	119	2	10	0	0
2018	59	89	67	119	58.4	119	63	137	26	58	0	0
2019	101	178	88	231	75.9	228.4	74.2	200.7	42.9	139.7	8.13	27.9
2020	89	188	83	198	74.9	203.2	59	127	31	89	16	53
2021	39	43	30	84	9	36	0	0	0	0	0	0
2022	93	226	98	246	96	244	71	142	49	137	0	0
2023	60	102	56	117	55	160	46	96	0	0	0	0

SD - Snow Depth in cm — **Metric** — **WC - Water Content in mm**

Mean	69.7	147.2	71.9	166.2	63.7	166.4	47.3	139.6	18.2	60.7	2.0	6.6
Maximum	106.0	246.0	110.0	267.0	106.0	310.0	100.0	299.0	79.0	175.0	73.0	229.0
Minimum	20.0	36.0	23.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SD - Snow Depth in inches — **Imperial** — **WC - Water Content in inches**

Normal	27.4	5.8	28.3	6.5	25.1	6.6	18.6	5.5	7.2	2.4	0.8	0.3
Maximum	41.7	9.7	43.3	10.5	41.7	12.2	39.4	11.8	31.1	6.9	28.7	9.0
Minimum	7.9	1.4	9.1	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

HISTORIC SNOW COURSE DATA REPORT

MOUNTJOY

Year	1-Mar		15-Mar		1-Apr		15-Apr		1-May		15-May	
	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC
1948	-	-	-	-	-	-	-	-	-	-	-	-
1949	-	-	-	-	-	-	-	-	-	-	-	-
1950	-	-	-	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-
1955	-	-	-	-	-	-	-	-	-	-	-	-
1956	-	-	-	-	-	-	-	-	-	-	-	-
1957	-	-	-	-	-	-	-	-	-	-	-	-
1958	-	-	-	-	-	-	-	-	-	-	-	-
1959	-	-	-	-	-	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-	-	-	-	-	-
1961	-	-	-	-	-	-	-	-	-	-	-	-
1962	-	-	-	-	-	-	-	-	-	-	-	-
1963	-	-	-	-	-	-	-	-	-	-	-	-
1964	-	-	-	-	-	-	-	-	-	-	-	-
1965	-	-	-	-	-	-	-	-	-	-	-	-
1966	-	-	-	-	-	-	-	-	-	-	-	-
1967	-	-	-	-	-	-	-	-	-	-	-	-
1968	-	-	-	-	-	-	-	-	-	-	-	-
1969	-	-	-	-	-	-	-	-	-	-	-	-
1970	-	-	-	-	-	-	-	-	-	-	-	-
1971	-	-	-	-	-	-	-	-	-	-	-	-
1972	-	-	-	-	-	-	-	-	-	-	-	-
1973	-	-	-	-	-	-	-	-	-	-	-	-
1974	-	-	-	-	-	-	-	-	-	-	-	-
1975	-	-	-	-	-	-	-	-	-	-	-	-
1976	-	-	-	-	-	-	-	-	-	-	-	-
1977	-	-	-	-	-	-	-	-	-	-	-	-
1978	-	-	-	-	-	-	-	-	-	-	-	-
1979	-	-	-	-	-	-	-	-	-	-	-	-
1980	-	-	-	-	-	-	-	-	-	-	-	-
1981	-	-	-	-	-	-	-	-	-	-	-	-
1982	-	-	-	-	-	-	-	-	-	-	-	-
1983	-	-	-	-	-	-	-	-	-	-	-	-
1984	-	-	-	-	-	-	-	-	-	-	-	-
1985	-	-	-	-	-	-	-	-	-	-	-	-
1986	-	-	-	-	-	-	-	-	-	-	-	-
1987	-	-	-	-	-	-	-	-	-	-	-	-
1988	-	-	-	-	-	-	-	-	-	-	-	-
1989	-	-	-	-	-	-	-	-	-	-	-	-
1990	-	-	-	-	-	-	-	-	-	-	-	-
1991	-	-	-	-	-	-	-	-	-	-	-	-
1992	-	-	-	-	-	-	-	-	-	-	-	-
1993	-	-	-	-	-	-	-	-	-	-	-	-
1994	40	86	48	111	53	121	20	61	0	0	0	0
1995	72	112	26	76	32	79	27	89	0	0	0	0
1996	-	-	86	130	91	183	85	140	-	-	59	91
1997	95	243	110	267	92	231	59	246	24	78	0	0
1998	74	119	75	135	41	117	15	42	0	0	0	0
1999	70	109	64	116	-	-	25	69	0	0	0	0
2000	39	127	37	91	23	66	18	55	-	-	-	-
2001	73	137	85	135	66	137	29	86	0	0	0	0
2002	95	180	111	206	93	188	63	140	15	46	0	0
2003	76	137	72	132	63	142	43	127	18	41	0	0
2004	72	140	82	173	52	145	46	155	16	53	0	0
2005	59	114	77	162	49	69	18	41	0	0	0	0
2006	70	173	69	157	54	119	41	101	0	0	0	0
2007	54	89	50	102	27	81	42	127	0	0	0	0
2008	65	134	78	124	89	150	61	155	0	0	0	0
2009	87	147	84	165	81	160	88	188	31	51	0	0
2010	45	76	21	41	4	12	0	0	0	0	0	0
2011	46	71	54	99	52	86	25	46	9	28	0	0
2012	71	142	57	94	5	11	0	0	0	0	0	0
2013	65	130	81	157	73	168	86	193	50	132	0	0
2014	62	109	80	135	81	137	80	114	25	53	3	5
2015	81	152	83	142	83.8	180.3	55	114	16	46	0	0
2016	77	189	60.3	136	60	172	49.5	176	13.6	56.4	0	0
2017	55.1	116.6	52.2	146.3	49.4	123.7	31.9	77.22	3.6	4.8	0	0
2018	60.8	113.8	64.1	126	59.5	119.9	62.9	132.85	29.4	62.8	0	0
2019	97.8	219	99.8	190	77.2	209	82.3	221	58.2	160	19	39.4
2020	81.6	170.4	82.3	188	81.2	166.6	68.7	182.4	49.9	148.6	25.4	81.5
2021	37.1	73.4	35.2	83	12.7	39.1	0	0	0	0	0	0
2022	95.4	190	97.5	203	95.5	221	75.9	178	43.5	109	0	0
2023	57	98	52.9	97	71.8	132	-	-	0	0	0	0
SD - Snow Depth in cm						Metric					WC - Water Content in mm	
Normal	68.0	134.4	69.1	137.3	59.0	129.8	44.7	112.3	14.4	38.2	3.7	7.5
Maximum	97.8	243.0	111.0	267.0	95.5	231.0	88.0	246.0	58.2	160.0	59.0	91.0
Minimum	37.1	71.0	21.0	41.0	4.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0
SD - Snow Depth in inches						Imperial					WC - Water Content in inches	
Normal	26.8	5.3	27.2	5.4	23.2	5.1	17.6	4.4	5.7	1.5	1.4	0.3
Maximum	38.5	9.6	43.7	10.5	37.6	9.1	34.6	9.7	22.9	6.3	23.2	3.6
Minimum	14.6	2.8	8.3	1.6	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0

HISTORIC SNOW COURSE DATA REPORT

SHILLINGTON

Year	1-Mar		15-Mar		1-Apr		15-Apr		1-May		15-May	
	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC
1948	75	160	71	137	61	152	32	107	-	-	-	-
1949	89	135	82	135	89	193	49	122	-	-	-	-
1950	106	191	104	183	103	206	-	-	67	155	20	64
1951	97	178	96	208	94	224	37	114	-	-	-	-
1952	62	79	80	142	84	163	61	142	22	66	-	-
1953	88	160	-	-	52	168	41	130	24	69	-	-
1954	53	89	71	127	85	165	51	127	0	0	0	0
1955	62	119	67	137	74	165	18	69	0	0	0	0
1956	81	142	93	180	86	196	56	155	62	203	0	0
1957	76	140	87	203	73	168	71	140	-	-	-	-
1958	66	112	57	130	41	109	0	0	0	0	0	0
1959	68	132	78	155	78	173	57	150	16	56	0	-
1960	102	239	97	226	101	246	83	236	45	157	27	99
1961	57	81	59	84	39	79	37	99	-	-	-	-
1962	97	185	83	193	66	183	48	132	31	109	-	-
1963	67	137	78	165	74	185	69	185	26	79	-	-
1964	85	229	99	264	99	195	108	323	23	104	-	-
1965	102	173	88	170	90	196	68	158	38	142	0	0
1966	60	140	71	173	70	201	62	191	15	36	-	-
1967	112	277	122	320	101	295	80	284	63	236	-	-
1968	76	180	73	180	54	160	0	0	0	0	0	0
1969	82	206	82	211	89	244	86	259	-	-	-	-
1970	72	165	75	168	71	188	59	160	19	84	-	-
1971	86	178	80	178	100	244	70	203	40	168	-	-
1972	-	-	-	-	-	-	-	-	-	-	-	-
1973	56	104	44	124	36	97	24	81	-	-	-	-
1974	82	208	81	208	80	218	89	251	41	137	22	89
1975	56	157	69	198	76	168	57	173	14	51	-	-
1976	87	185	99	231	79	259	73	290	0	0	0	0
1977	92	175	85	201	55	157	38	114	0	0	0	0
1978	74	165	82	194	93	231	81	282	52	226	-	-
1979	77	171	103	252	105	298	72	233	42	170	0	0
1980	54	84	58	104	75	150	57	115	5	15	0	0
1981	44	138	53	157	36	152	13	63	0	0	0	0
1982	77	180	74	211	64	168	65	201	47	150	0	0
1983	69	115	51	116	87	171	54	127	31	88	0	0
1984	50	176	61	186	57	221	46	183	9	25	0	0
1985	69	142	71	170	76	188	69	209	5	25	0	0
1986	64	127	73	141	70	178	51	164	9	8	0	0
1987	64	131	54	124	28	88	0	0	0	0	0	0
1988	-	-	103	305	91	264	54	226	48	188	0	0
1989	70	137	78	152	61	213	62	218	36	160	0	0
1990	99	264	80	226	56	203	48	145	15	51	0	0
1991	62	127	73	119	67	132	58	191	0	0	0	0
1992	78	168	80	178	76	180	61	178	22	56	0	0
1993	61	127	60	140	37	91	26	71	0	0	0	0
1994	44	145	54	114	61	190	34	81	0	0	0	0
1995	62	152	47	142	34	147	39	145	27	112	0	0
1996	-	-	94	211	-	-	83	198	69	211	30	117
1997	102	196	103	302	116	312	61	262	-	-	-	-
1998	62	152	78	231	42	158	7	38	-	-	-	-
1999	70	172	62	140	52	124	27	89	-	-	-	-
2000	43	127	45	168	26	104	14	6	-	-	-	-
2001	78	135	90	165	70	201	35	124	0	0	0	0
2002	95	188	110	251	99	239	79	262	25	132	0	0
2003	66	135	75	168	55	168	40	132	11	46	0	0
2004	71	183	76	173	36	99	37	127	0	0	0	0
2005	69	91	77	180	46	117	24	89	0	0	0	0
2006	73	178	71	155	54	152	18	89	0	0	0	0
2007	31	64	33	79	14	46	21	66	0	0	0	0
2008	71	175	74	162	84	187	55	200	0	0	0	0
2009	93	145	88	180	90	244	90	244	28	86	0	0
2010	46	58	25	33	18	36	0	0	0	0	0	0
2011	49	99	60	140	57	137	31	99	51	18	0	0
2012	77	147	62	140	0	0	0	0	0	0	0	0
2013	77	170	83	206	82	196	81	231	25	114	0	0
2014	75	155	80	145	99	203	81	150	13	48	0	0
2015	87	190	83	160	86	234	51	114	11	36	0	0
2016	76	234	61	208	60	152	76	234	18	69	0	0
2017	55	163	50	142	54	180	33	127	0	0	0	0
2018	60	147	64	163	57.4	116	61	114	19	53	0	0
2019	99	264	96	221	80.8	213.4	80.7	238.8	57.9	157.5	9.65	35.56
2020	80	165	72	163	57.9	127	57	170	31.1	109	14	46
2021	50	79	40	109	19	58	0	0	0	0	0	0
2022	96.4	241	96	216	94	173	69	216	49	165	0	0
2023	55	114	47	170	63	137	34	75	0	0	0	0
SD - Snow Depth in cm						Metric				WC - Water Content in mm		
Normal	72.9	155.8	74.6	173.6	67.4	172.6	49.5	147.6	20.3	68.3	2.3	8.7
Maximum	112.0	277.0	122.0	320.0	116.0	312.0	108.0	323.0	69.0	236.0	30.0	117.0
Minimum	31.0	58.0	25.0	33.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SD - Snow Depth in inches						Imperial				WC - Water Content in inches		
Normal	28.7	6.1	29.4	6.8	26.5	6.8	19.5	5.8	8.0	2.7	0.9	0.3
Maximum	44.1	10.9	48.0	12.6	45.7	12.3	42.5	12.7	27.2	9.3	11.8	4.6
Minimum	12.2	2.3	9.8	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

HISTORIC SNOW COURSE DATA REPORT

SHINING TREE

Year	1-Mar		15-Mar		1-Apr		15-Apr		1-May		15-May	
	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC
1948	-	-	-	-	-	-	-	-	-	-	-	-
1949	-	-	-	-	-	-	-	-	-	-	-	-
1950	-	-	-	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-
1955	-	-	-	-	-	-	-	-	-	-	-	-
1956	-	-	-	-	-	-	-	-	-	-	-	-
1957	64	114	69	127	57	114	67	132	0	0	0	0
1958	55	97	59	107	53	124	0	0	0	0	0	0
1959	58	104	88	135	71	145	49	84	24	51	-	-
1960	88	178	85	183	82	185	69	185	40	91	0	0
1961	40	56	51	104	39	79	43	97	-	-	-	-
1962	92	163	-	-	72	170	53	109	20	43	-	-
1963	59	91	66	91	55	124	47	124	21	46	-	-
1964	68	130	74	140	93	158	69	114	22	53	-	-
1965	77	107	67	107	70	112	56	86	34	66	0	0
1966	58	112	72	99	74	178	71	170	33	79	-	-
1967	91	163	91	188	81	173	61	145	43	122	-	-
1968	66	122	60	81	34	79	-	-	-	-	-	-
1969	72	135	69	137	71	152	71	135	8	33	-	-
1970	63	94	64	117	-	-	52	104	0	0	0	0
1971	75	142	78	142	81	185	59	132	-	-	-	-
1972	70	94	87	142	-	-	68	176	44	119	-	-
1973	-	-	50	84	43	104	30	69	-	-	-	-
1974	84	152	75	152	77	163	72	183	27	58	0	0
1975	63	107	69	107	78	155	69	163	29	69	-	-
1976	70	102	86	150	52	130	17	43	-	-	-	-
1977	86	137	62	163	55	117	49	135	-	-	-	-
1978	69	137	74	133	73	157	73	159	48	124	-	-
1979	79	161	91	199	74	220	73	221	41	119	-	-
1980	46	84	55	84	60	140	53	104	-	-	-	-
1981	55	130	61	150	53	168	0	0	0	0	0	0
1982	65	61	62	66	60	140	55	155	0	0	0	0
1983	48	105	36	110	50	127	41	124	0	0	0	0
1984	50	139	53	135	46	144	28	109	0	0	0	0
1985	64	123	75	157	82	202	84	207	-	-	-	-
1986	58	108	76	149	51	128	39	118	0	0	0	0
1987	53	86	52	124	32	46	0	0	0	0	0	0
1988	76	123	108	239	65	132	39	102	33	97	0	0
1989	57	79	83	135	52	180	50	170	39	150	0	0
1990	89	196	70	147	48	135	40	132	28	97	0	0
1991	47	66	63	91	62	104	23	74	0	0	0	0
1992	61	102	69	117	63	104	53	107	0	0	0	0
1993	49	71	56	104	26	48	0	0	0	0	0	0
1994	51	86	53	102	54	124	35	53	12	28	0	0
1995	45	69	46	124	37	104	30	53	21	69	0	0
1996	95	182	-	-	87	208	94	173	70	117	40	104
1997	86	147	79	178	89	221	50	165	19	36	-	-
1998	53	89	67	125	23	41	6	15	-	-	-	-
1999	70	96	46	89	37	66	0	0	0	0	-	-
2000	43	127	45	145	38	119	29	89	0	0	-	-
2001	78	114	80	160	74	180	46	185	0	0	0	0
2002	74	140	76	178	86	234	81	236	19	63	0	0
2003	56	117	61	114	45	114	32	109	6	23	0	0
2004	64	129	64	145	51	147	30	99	4	18	0	0
2005	48	71	55	104	38	78	10	30	0	0	0	0
2006	57	114	51	114	59	117	26	81	0	0	0	0
2007	35	69	27	56	11	22	11	31	0	0	0	0
2008	52	104	55	114	68	145	44	145	0	0	0	0
2009	73	132	63	135	60	150	62	160	21	91	0	0
2010	20	38	19	28	0	0	0	0	0	0	0	0
2011	45	64	45	66	40	76	20	59	5	5	0	0
2012	47	69	35	76	0	0	0	0	0	0	0	0
2013	56	104	63	119	59	109	65	155	34	99	0	0
2014	62	114	72	122	74	152	59	122	21	46	0	0
2015	70	99	64	112	73	135	49	86	9	25	0	0
2016	69	158	45	160	45	132	52	170	9	41	0	0
2017	42	112	45	132	43	112	29	104	0	0	0	0
2018	42	51	51	81	45.7	86.4	50	130	19	51	0	0
2019	82.8	190	79	208	69.9	170.2	65	147.3	36.1	83.8	0	0
2020	78	201	74	132	64	127	49	124	19	76	14	41
2021	30	53	19	51	1	3	0	0	0	0	0	0
2022	78	183	77	165	75	147	48	94	28	56	0	0
2023	43	76	41	71	40	114	20	49	0	0	0	0

SD - Snow Depth in cm — **Metric** — **WC - Water Content in mm**

Normal	62.3	113.2	63.1	124.6	55.7	127.0	42.7	106.6	15.3	40.4	1.2	3.3
Maximum	95.0	201.0	108.0	239.0	93.0	234.0	94.0	236.0	70.0	150.0	40.0	104.0
Minimum	20.0	38.0	19.0	28.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SD - Snow Depth in inches — **Imperial** — **WC - Water Content in inches**

Normal	24.5	4.5	24.9	4.9	21.9	5.0	16.8	4.2	6.0	1.6	0.5	0.1
Maximum	37.4	7.9	42.5	9.4	36.6	9.2	37.0	9.3	27.6	5.9	15.7	4.1
Minimum	7.9	1.5	7.5	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

HISTORIC SNOW COURSE DATA REPORT

PORCUPINE

Year	1-Mar		15-Mar		1-Apr		15-Apr		1-May		15-May	
	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC
1948	67	140	65	135	50	155	12	41	-	-	-	-
1949	88	122	81	152	84	201	41	114	-	-	-	-
1950	92	165	96	201	88	198	-	-	-	-	-	-
1951	95	185	96	241	88	259	44	99	-	-	-	-
1952	58	89	73	122	74	145	52	127	6	15	-	-
1953	87	157	-	-	53	157	37	104	0	0	0	0
1954	50	94	70	142	79	183	42	97	0	0	0	0
1955	58	109	65	119	71	163	12	33	0	0	0	0
1956	80	137	89	147	88	160	55	152	58	175	-	-
1957	79	196	83	206	73	170	70	142	0	0	0	0
1958	69	124	61	150	49	127	0	0	0	0	0	0
1959	66	132	75	147	75	170	54	147	10	28	0	0
1960	101	236	97	229	104	264	84	241	44	135	19	61
1961	60	89	66	130	42	102	41	122	4	10	-	-
1962	100	211	86	201	70	196	51	157	37	114	-	-
1963	63	135	72	152	56	178	65	180	13	33	-	-
1964	85	229	97	272	105	318	104	333	11	46	-	-
1965	89	160	80	152	84	183	70	157	36	119	0	0
1966	60	150	72	180	69	201	62	185	20	51	-	-
1967	110	279	120	335	101	312	73	262	50	188	-	-
1968	75	185	74	183	45	152	0	0	0	0	0	0
1969	86	216	87	231	95	251	91	246	-	-	-	-
1970	71	157	72	163	69	173	53	163	0	0	0	0
1971	85	170	82	183	104	267	72	224	34	137	-	-
1972	81	185	95	267	118	257	73	231	30	112	0	0
1973	69	137	43	122	33	119	21	66	-	-	-	-
1974	79	198	-	-	80	208	86	257	27	109	17	65
1975	60	160	86	244	-	-	-	-	37	127	0	0
1976	82	180	97	211	67	249	62	254	0	0	0	0
1977	89	188	67	178	67	165	30	99	0	0	0	0
1978	81	191	88	211	103	282	84	279	49	155	-	-
1979	-	-	165	277	101	335	71	239	46	149	0	0
1980	48	76	50	87	62	122	45	89	2	5	-	-
1981	44	118	52	139	23	84	14	59	0	0	0	0
1982	73	170	68	170	64	174	50	170	34	94	-	-
1983	68	102	60	117	82	177	58	135	38	116	0	0
1984	51	158	62	177	53	174	51	177	0	0	0	0
1985	66	145	68	157	69	169	66	176	8	33	0	0
1986	68	137	80	161	74	183	58	168	8	8	0	0
1987	58	137	43	96	35	108	0	0	0	0	0	0
1988	90	230	94	272	102	251	58	201	48	188	0	0
1989	72	137	50	140	64	213	69	218	48	178	0	0
1990	109	292	82	241	74	292	57	198	29	109	0	0
1991	70	119	84	155	65	137	59	117	0	0	0	0
1992	85	191	83	201	81	206	73	201	29	83	0	0
1993	-	-	-	-	-	-	-	-	-	-	-	-
1994	-	-	-	-	52	114	75	40	-	-	-	-
1995	77	127	89	147	52	127	44	155	-	-	-	-
1996	111	156	101	184	-	-	100	147	92	167	-	-
1997	107	277	121	310	99	284	76	264	40	137	-	-
1998	87	152	88	179	54	170	24	79	-	-	-	-
1999	58	81	69	112	-	-	37	101	-	-	-	-
2000	37	137	42	132	24	81	21	71	-	-	-	-
2001	76	165	94	185	83	175	39	99	0	0	0	0
2002	99	198	111	239	108	274	72	236	32	86	0	0
2003	80	163	75	145	69	188	52	160	30	79	0	0
2004	74	155	89	188	60	168	47	175	17	63	0	0
2005	66	109	74	94	50	76	25	74	0	0	0	0
2006	75	184	77	193	65	147	48	106	0	0	0	0
2007	57	122	53	109	38	79	53	162	0	0	0	0
2008	71	147	84	175	96	193	67	178	0	0	0	0
2009	96	163	92	180	91	216	99	241	48	119	0	0
2010	51	91	28	61	19	53	0	0	0	0	0	0
2011	57	109	65	109	60	122	37	48	33	99	0	0
2012	80	152	65	107	12	31	0	0	0	0	0	0
2013	70	152	88	170	85	218	95	236	57	162	0	0
2014	72	132	83	127	87	150	86	91	33	86	4	15
2015	89	201	90	175	93	210.8	68	145	23	69	0	0
2016	79.8	201.9	63	132	64.5	169.4	61.4	204.7	27.1	95	0	0
2017	60.4	134.4	58	152.9	55.6	142	40.5	93.2	2	3.1	0	0
2018	66.2	118.6	72.1	131.6	66.5	139.4	68.1	151.4	34.4	75.2	0	0
2019	104.2	222	105.2	197	86.9	240	88.5	242	60.4	188	19.2	50.6
2020	84	190	86.3	206.8	84	180.9	74.3	212.6	48.1	159	23.2	76.2
2021	39	85	37.8	100.6	17	46.2	0	0	0	0	0	0
2022	105.1	230	107.2	258	102.6	224	85.4	183	52.3	138	0	0
2023	67.8	124	65.8	115	87.2	136	34.6	114	0	0	0	0
SD - Snow Depth in cm						**Metric**					**WC - Water Content in mm**	
Normal	75.5	158.9	78.5	172.4	70.8	179.8	53.3	146.1	21.6	66.3	1.6	5.4
Maximum	111.0	292.0	165.0	335.0	118.0	335.0	104.0	333.0	92.0	188.0	23.2	76.2
Minimum	37.0	76.0	28.0	61.0	12.0	31.0	0.0	0.0	0.0	0.0	0.0	0.0
SD - Snow Depth in inches						**Imperial**					**WC - Water Content in inches**	
Normal	29.7	6.3	30.9	6.8	27.9	7.1	21.0	5.8	8.5	2.6	0.6	0.2
Maximum	43.7	11.5	65.0	13.2	46.5	13.2	40.9	13.1	36.2	7.4	9.1	3.0
Minimum	14.6	3.0	11.0	2.4	4.7	1.2	0.0	0.0	0.0	0.0	0.0	0.0

HISTORIC SNOW COURSE DATA SUMMARY

SD - Snow Depth

IMPERIAL

WC - Water Content

MATTAGAMI

DATE	1-Mar		15-Mar		1-Apr		15-Apr		1-May		15-May	
	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC
Normal	27.4	5.8	28.3	6.5	25.1	6.6	18.6	5.5	7.2	2.4	0.8	0.3
Maximum	41.7	9.7	43.3	10.5	41.7	12.2	39.4	11.8	31.1	6.9	28.7	9.0
Minimum	7.9	1.4	9.1	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

MOUNTJOY

DATE	1-Mar		15-Mar		1-Apr		15-Apr		1-May		15-May	
	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC
Normal	26.8	5.3	27.2	5.4	23.2	5.1	17.6	4.4	5.7	1.5	1.4	0.3
Maximum	38.5	9.6	43.7	10.5	37.6	9.1	34.6	9.7	22.9	6.3	23.2	3.6
Minimum	14.6	2.8	8.3	1.6	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0

SHILLINGTON

DATE	1-Mar		15-Mar		1-Apr		15-Apr		1-May		15-May	
	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC
Normal	28.7	6.1	29.4	6.8	26.5	6.8	19.5	5.8	8.0	2.7	0.9	0.3
Maximum	44.1	10.9	48.0	12.6	45.7	12.3	42.5	12.7	27.2	9.3	11.8	4.6
Minimum	12.2	2.3	9.8	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SHINING TREE

DATE	1-Mar		15-Mar		1-Apr		15-Apr		1-May		15-May	
	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC
Normal	24.5	4.5	24.9	4.9	21.9	5.0	16.8	4.2	6.0	1.6	0.5	0.1
Maximum	37.4	7.9	42.5	9.4	36.6	9.2	37.0	9.3	27.6	5.9	15.7	4.1
Minimum	7.9	1.5	7.5	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PORCUPINE

DATE	1-Mar		15-Mar		1-Apr		15-Apr		1-May		15-May	
	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC
Normal	29.7	6.3	30.9	6.8	27.9	7.1	21.0	5.8	8.5	2.6	0.6	0.2
Maximum	43.7	11.5	65.0	13.2	46.5	13.2	40.9	13.1	36.2	7.4	9.1	3.0
Minimum	14.6	3.0	11.0	2.4	4.7	1.2	0.0	0.0	0.0	0.0	0.0	0.0

SD - Snow Depth

METRIC

WC - Water Content

MATTAGAMI

DATE	1-Mar		15-Mar		1-Apr		15-Apr		1-May		15-May	
	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC
Normal	69.7	147.2	71.9	166.2	63.7	166.4	47.3	139.6	18.2	60.7	2.0	6.6
Maximum	106.0	246.0	110.0	267.0	106.0	310.0	100.0	299.0	79.0	175.0	73.0	229.0
Minimum	20.0	36.0	23.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

MOUNTJOY

DATE	1-Mar		15-Mar		1-Apr		15-Apr		1-May		15-May	
	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC
Normal	68.0	134.4	69.1	137.3	59.0	129.8	44.7	112.3	14.4	38.2	3.7	7.5
Maximum	97.8	243.0	111.0	267.0	95.5	231.0	88.0	246.0	58.2	160.0	59.0	91.0
Minimum	37.1	71.0	21.0	41.0	4.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0

SHILLINGTON

DATE	1-Mar		15-Mar		1-Apr		15-Apr		1-May		15-May	
	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC
Normal	72.9	155.8	74.6	173.6	67.4	172.6	49.5	147.6	20.3	68.3	2.3	8.7
Maximum	112.0	277.0	122.0	320.0	116.0	312.0	108.0	323.0	69.0	236.0	30.0	117.0
Minimum	31.0	58.0	25.0	33.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SHINING TREE

DATE	1-Mar		15-Mar		1-Apr		15-Apr		1-May		15-May	
	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC
Normal	62.3	113.2	63.1	124.6	55.7	127.0	42.7	106.6	15.3	40.4	1.2	3.3
Maximum	95.0	201.0	108.0	239.0	93.0	234.0	94.0	236.0	70.0	150.0	40.0	104.0
Minimum	20.0	38.0	19.0	28.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PORCUPINE

DATE	1-Mar		15-Mar		1-Apr		15-Apr		1-May		15-May	
	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC	SD	WC
Normal	75.5	158.9	78.5	172.4	70.8	179.8	53.3	146.1	21.6	66.3	1.6	5.4
Maximum	111.0	292.0	165.0	335.0	118.0	335.0	104.0	333.0	92.0	188.0	23.2	76.2
Minimum	37.0	76.0	28.0	61.0	12.0	31.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix H – Sample Messages

SAMPLE WATERSHED CONDITIONS STATEMENT

XX CA WATERSHED CONDITIONS STATEMENT-WATER SAFETY
TO: AFFECTED MUNICIPALITY, MNRF, OTHERS
CA MESSAGE NO. ##
DATE:MM/DD/YYYY

With the arrival of warmer temperatures, the spring melt is getting underway. As a result, there may be a water safety risk throughout the area including XX Lake, XX River, XX Creek, and XX Lake.

Water levels in local rivers, creeks and lakes are currently not a concern and flooding is not anticipated at this time, but conditions are subject to change. As the melt continues, local rivers, streams and the flood control channels will experience a rise in water levels and flows. Water levels and weather forecasts will be monitored on a daily basis. Updates will be issued as more information is made available, or if water conditions change.

City residents are cautioned against venturing out on lakes, rivers and small streams where slippery stream banks, thin ice, dangerous currents and fast moving cold water will make all waterways very hazardous. Parents especially, are urged to warn their children of these dangers.

Residents can visit the XX website for the latest information on watershed conditions and public advisories.

This message will be in effect until (or updated before) MM/DD/YYYY.

SAMPLE WATERSHED CONDITIONS STATEMENT

XX CA WATERSHED CONDITIONS STATEMENT-FLOOD OUTLOOK
TO: AFFECTED MUNICIPALITY, MNRF, OTHERS
CA MESSAGE NO. ##
DATE:MM/DD/YYYY

A disturbance out of the U.S. south east will bring rain over the next 48 hours. Rainfall amounts over this period could total 50(mm).

Given the above forecast, we expect a significant rise in rivers and streams throughout the watershed. No flooding is currently expected.

Although no flooding is anticipated area residents and businesses are asked to be prepared. These preparations would include moving any unsecured items from along the shore to higher ground as well as preparing a Household Emergency Plan that outlines what you need to do should you be asked to leave your home. City residents, especially children, are cautioned against venturing out on lakes, rivers and small streams. Thin ice, slippery stream banks, dangerous currents and fast moving cold water will make all waterways very hazardous.

This safety watch is in effect until MM/DD/YYYY.

Sample FLOOD WATCH

XX CA FLOOD WATCH
TO: AFFECTED MUNICIPALITY, MNRF, OTHERS
CA MESSAGE NO. ##
DATE: MM/DD/YYYY

The most recent streamflow information for the XX River watershed shows that the elevation of area rivers and streams are rising in response to the recent precipitation and continued snowmelt.

A Flood Watch message serves as notification to the general public that the potential for flooding exists. On the XX River system, water elevations are continuing to rise and could reach the critical first stage flood level over the coming days. At this point in time, residents may experience some flooding of low lying areas.

Residents living near lakes and rivers are reminded to remove unsecured material and equipment from shoreline areas as water elevations continue to rise. They should also be prepared with a household emergency plan should a flood emergency be declared. Parents are asked to let their children know about the dangers of playing in and around lakes, rivers and streams.

This watch is in effect until 08:00 MM/DD/YYYY at which time it will either be updated or cancelled.

Sample FLOOD WARNING

XX CA FLOOD WARNING
TO: AFFECTED MUNICIPALITIES, MNRF, OTHERS
CA MESSAGE NO: ##
DATE: MM/DD/YYYY

The current Flood Watch for XX River has been upgraded to a Flood Warning. A Flood Warning message serves as notification to the general public that flooding is about to occur.

- Heavy rain overnight has resulted in a significant rise in river and stream levels.
- Water levels are continuing to rise in response to the warm weather, precipitation and associated snow melt. Everyone living near the XX River is encouraged to monitor the conditions that are developing.
- Based on the current forecast flooding is expected to occur in the following areas:

This message will be updated at 12:00 on MM/DD/YYYY.