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OVERVIEW OF REGULATED HYDROELECTRIC FACILITIES

1.0 PURPOSE

This evidence describes the regulated hydroelectric facilities. It also identifies the regulations, agreements and programs key to these facilities.

2.0 DESCRIPTION OF REGULATED HYDROELECTRIC FACILITIES

A total of fifty-four OPG hydroelectric generating stations are subject to OEB regulation. These facilities are operated and maintained by five Operations Groups: Niagara Operations (formerly Niagara Plant Group), Eastern Operations (formerly Ottawa/St. Lawrence Plant Group), Northeast Operations (formerly Northeast Plant Group), Northwest Operations (formerly Northwest Plant Group) and Central Operations (formerly Central Hydro Plant Group). The Operations Groups are responsible for operation and maintenance of regulated hydroelectric stations as well as OPG's thermal stations.

Hydroelectric facilities typically include: generating equipment (i.e., turbines, generators, transformers, protections and controls, etc.), related civil works (powerhouses, dams, headworks, spillways and water conveyance canals and tunnels), and the facilities required to operate and maintain the generating stations (control rooms, work centres, and headquarters).

Chart 1 presents information on OPG's regulated hydroelectric stations.

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Chart 1
Regulated Hydroelectric Facilities General Information

Plant Group	Generating Station	Number of In-Service Units	Net In-Service Capacity (MW)	Original Unit In-Service Dates	
Niagara Operations	Sir Adam Beck I	8	436	1922 – 1930	
	Sir Adam Beck II	16	1,499	1954 – 1958	
	Sir Adam Beck PGS	6	174	1957 – 1958	
	DeCew Falls I	4	23	1898	
	DeCew Falls II	2	144	1948	
Eastern Operations	R.H. Saunders	16	1,045	1958 – 1959	
	Arnprior	2	82	1976-1977	
	Barrett Chute	4	176	1942-1968	
	Calabogie	2	5	1917	
	Mountain Chute	2	170	1967	
	Stewartville	5	182	1948-1969	
	Chats Falls (OPG owns 4 of 8 units)	4	96	1931-1932	
	Chenaux	8	144	1950-1951	
	Des Joachims	8	429	1950-1951	
	Otto Holden	8	243	1952-1953	
	Central Operations	Auburn	3	2	1911-1912
		Big Chute	1	10	1909-1919 (rebuilt 1993)
		Big Eddy	2	8	1941
		Bingham Chute	2	1	1923-1924
		Coniston	3	4	1905-1915
Crystal Falls		4	8	1921	
Elliot Chute		1	2	1929	
Eugenia Falls		3	6	1915-1920	
Frankford		4	3	1913	
Hagues Reach		3	4	1925	
Hanna Chute		1	1	1926	
High Falls		3	3	1920	
Lakefield		1	2	1928	
McVittie		2	3	1912	
Merrickville		2	2	1915-1919	
Meyersberg	3	5	1924		

	Nipissing	2	0	1909
	Ragged Rapids	2	8	1938
	Ranney Falls	3	10	1922-1926
	Seymour	5	6	1909
	Sidney	4	4	1911
	Sills Island	2	2	1900
	South Falls	3	5	1916-1925
	Stinson	2	5	1925
	Trethewey Falls	1	2	1929
Northeast Operations	Abitibi Canyon	5	349	1933-1959
	Otter Rapids	4	182	1961-1963
	Lower Notch	2	274	1971
	Matabitchuan	4	10	1910
	Indian Chute	2	3	1923-1924
Northwest Operations	Aguasabon	2	47	1948
	Alexander	5	69	1930-1958
	Cameron Falls	7	92	1920-1958
	Caribou Falls	3	91	1958
	Kakabeka Falls	4	25	1906-1914
	Manitou Falls	5	73	1956-1958
	Pine Portage	4	145	1950-1954
	Silver Falls	1	48	1959
	Whitedog Falls	3	68	1958

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2.1 Niagara Operations

The Niagara Operations (“NAO”) includes three Sir Adam Beck facilities and two Decew Falls facilities. A map showing these facilities is provided as Attachment 1.

The Sir Adam Beck facilities include Sir Adam Beck I Generating Station (“Sir Adam Beck I”), Sir Adam Beck II (“Sir Adam Beck II”), Pump Generating Station (“PGS”) and associated structures such as tunnels, the open cut canal and the International Niagara Control Works structure (also known as International Control Dam), as well as the PGS Reservoir. Water conveyance structures (i.e., tunnels and canals) divert water from the upper Niagara River to the Sir Adam Beck plants. Water is discharged from the plants into the lower Niagara River. Under a Memorandum of Understanding between OPG and the New York Power Authority

1 (“NYPA”), OPG and NYPA equally share the costs associated with Joint Works at Niagara
2 (including the International Control Dam).

3
4 The DeCew Falls facilities include DeCew Falls I, DeCew Falls II and associated water
5 conveyance structures such as Intakes 1 and 2, and the Waterworks canal. Water
6 conveyance structures divert water from the Welland Ship Canal, through Lake Gibson and
7 Lake Moodie, to the DeCew generating stations. Water discharged from the plants flows
8 through the Twelve Mile Creek to Lake Ontario.

9
10 The Niagara Operations facilities (Sir Adam Beck and DeCew Falls) are controlled from a
11 single control centre located at Sir Adam Beck I.

12

13 **2.2 Eastern Operations**

14 Eastern Operations (“EO”) operates ten regulated hydroelectric generating stations. The EO
15 headquarters is located in Renfrew. The regulated stations include RH Saunders Generating
16 Station, and the Ottawa River and Madawaska River stations. A map showing the locations
17 of these facilities is provided as Attachment 2.

18

19 R.H. Saunders Generating Station (“R.H. Saunders”) is a 16-unit hydroelectric station on the
20 St. Lawrence River at Cornwall, Ontario. R.H. Saunders is connected to the 16-unit St.
21 Lawrence - Franklin D. Roosevelt Generating Station, which is owned and operated by the
22 New York Power Authority (“NYPA”). Together, the two stations span the entire St. Lawrence
23 River. Associated structures include: the powerhouse, dams, headworks, dykes, bridges, and
24 ice booms. Under a Memorandum of Understanding between OPG and NYPA, OPG and
25 NYPA equally share the costs associated with Joint Works at the St. Lawrence facilities
26 (including the Iroquois Control Dam and Long Sault Dam, headworks, dykes, and the
27 Barnhart Island bridge). The RH Saunders Generating Station has its own work centre and
28 control centre.

29

30 There are four generating stations on Ottawa River (Otto Holden, Des Joachims, Chenaux,
31 and Chats Falls) and there are five generating stations on the Madawaska River (Mountain

1 Chute, Barrett Chute, Calabogie, Stewartville, and Arnprior). The Ottawa River and
2 Madawaska River stations are maintained from six work centres, and are remotely operated
3 from a control centre located at Chenaux Generating Station.

4
5 The Chat Falls Generating Station on the Ottawa River is jointly owned with Hydro Quebec.
6 There eight units and joint works (dams, sluices and bridges) associated with the Chats Falls
7 Generating Station (“GS”). Four generating units are owned by OPG, and four are owned by
8 Hydro Quebec. OPG operates and maintains the entire station through an Operating
9 Services agreement with Hydro Quebec.

10 11 **2.3 Central Operations**

12 Central Operations (“CO”) operates twenty-five regulated hydroelectric generating stations.
13 The regulated CO stations are located on ten river systems in the centre of the Province
14 (Beaver River, Mississippi River, Muskoka River, Otonabee River, Rideau River, Severn
15 River, South River, Sturgeon River, Trent River, and Wanapitei River).

16
17 The CO headquarters is located in North Bay. The CO generating stations are maintained
18 from four work centres, and they are remotely operated from a control centre located at the
19 North Bay headquarters. A map showing the locations of these facilities is provided as
20 Attachment 3.

21 22 **2.4 Northeast Operations**

23 Northeast Operations (“NEO”) operates five regulated hydroelectric stations: two on the
24 Abitibi River (Abitibi Canyon and Otter Rapids); two on the Montreal River (Indian Chute and
25 Lower Notch); and one on the Matabitchuan River (Matabitchuan).

26
27 NEO headquarters is located in Timmins. The regulated NEO generating stations are
28 maintained from two work centres, and are remotely operated from a control centre located
29 in Timmins. A map showing the locations of these facilities is provided as Attachment 4.

30 31 **2.5 Northwest Operations**

1 Northwest Operations (“NWO”) operates nine regulated generating stations: one on the
2 Aquasabon River (Aguasabon); two on the English River (Manitou Falls and Caribou Falls);
3 two on the Kamanistikwia River (Silver Falls and Kakabeka Falls); three on the Nipigon River
4 (Pine Portage, Cameron Falls, and Alexander); and one on the Winnipeg River (Whitedog
5 Falls).

6
7 The NWO headquarters is located in Thunder Bay. The NWO generating stations are
8 maintained from four work centres and are remotely operated from a control centre located at
9 the Thunder Bay headquarters. A map showing the locations of the NWO facilities is
10 provided as Attachment 5.

11

12 **3.0 KEY HYDROELECTRIC REGULATIONS, AGREEMENTS AND PROGRAMS**

13 OPG’s regulated hydroelectric facilities are subject to international treaties between Canada
14 and the United States, federal and provincial legislation and regulatory requirements, as well
15 as several contractual arrangements with third parties. Collectively these regulations,
16 agreements and programs result in additional costs and program needs with respect to the
17 operation and management of the regulated facilities.

18

19 This section provides an overview of:

- 20 • Regulations, treaties and agreements with regard to water rights for the regulated
21 hydroelectric facilities.
- 22 • Agreements with other utilities/generators related to operational
23 requirements/guidelines, joint works, water sharing, water diversions, and
24 compensation settlements.
- 25 • Dam and public safety governance and programs.
- 26 • First Nations and Metis Relations.

27

28 A summary of the legislative and regulatory framework applicable to OPG’s regulated
29 facilities is provided at Ex. A1-6-1.

30

31 **3.1 Water Rights**

1 3.1.1 Regulation of Water Rights

2 Rights to and restrictions on the use of water are determined by international treaties
3 between Canada and the United States, together with the application of interprovincial
4 agreements, federal and provincial legislation, common law as it pertains to real property and
5 riparian rights, as well as the terms and conditions of certain leases and permits with and
6 from the Government of Canada and the Province of Ontario. Water management plans
7 authorized by the Ontario Ministry of Natural Resources and Forestry prescribe water
8 elevation and flow limits for many of Ontario's major rivers.

9
10 3.1.2 International Boundary Rivers

11 Through a series of agreements between the Government of Canada and the Province of
12 Ontario, OPG has been granted the right to exercise Canada's rights with respect to the
13 construction, maintenance, and operation of hydroelectric generating facilities on the Niagara
14 and St. Lawrence Rivers under the *Boundary Waters Treaty of 1909*, the *Niagara Diversion*
15 *Treaty of 1950*, the *Niagara Development Act of 1951*, and the *International Rapids Power*
16 *Development Agreement Act of 1952*.

17
18 The *Boundary Waters Treaty of 1909* governs all boundary waters between Canada and the
19 United States. Water rights on both the Niagara and St. Lawrence Rivers are subject to this
20 treaty. The Treaty created the International Joint Commission ("IJC") to help prevent and
21 resolve disputes over the use of boundary waters between Canada and the United States.
22 The IJC established the International Niagara Board of Control to oversee water level
23 regulation on the Niagara River, and the International St. Lawrence River Board of Control to
24 ensure Lake Ontario outflows meet IJC requirements, including dependable flow for
25 hydropower and adequate depths for navigation on the St. Lawrence River.

26
27 The *Niagara Diversion Treaty of 1950* between Canada and the United States, among other
28 things, determines the priority of use for the waters flowing out of Lake Erie (Niagara River
29 and Welland Canal), sets minimum flow requirements over Niagara Falls, and provides for
30 the allotment of the waters available for power generation. It also recognizes that certain

1 diversion waters are to be excluded from determination of the power generation water
2 allotment.

3
4 The International Niagara Committee (“INC”) was created by the Governments of Canada
5 and the United States pursuant to the *Niagara Diversion Treaty of 1950* to determine and
6 report the amounts of water available for purposes of the Treaty, including water used for
7 power diversions at Niagara. The INC is independent of the IJC, but works in collaboration
8 with the IJC’s International Niagara Board of Control.

9
10 The *Niagara Parks Act* (Ontario) provides the Niagara Parks Commission with the authority
11 to grant certain rights to use the waters of the Niagara River for purposes of power
12 generation. By agreement executed February 2005, the Niagara Parks Commission granted
13 OPG sole rights to take water from the Niagara and Welland Rivers for purposes of power
14 generation until December 31, 2056.

15
16 The DeCew Falls stations use water that is conveyed through the Welland Canal from Lake
17 Erie under an agreement between OPG and the St. Lawrence Seaway Management
18 Corporation that has been renewed through June 30, 2038.

19
20 3.1.3 Interprovincial Rivers

21 Four of OPG’s hydroelectric generating stations are located on the Ottawa River which
22 forms the provincial boundary between Ontario and Quebec. The *Ottawa River Water*
23 *Powers Act, 1943*, (concurrent legislation, Ontario and Quebec) authorized the water power
24 developments at OPG’s Otto Holden GS, Des Joachims GS, and Chenaux GS sites on the
25 Ottawa River. The fourth station, Chats Falls GS, is owned jointly by OPG and Hydro
26 Quebec. The four generating stations are subject to water power lease agreements with the
27 Ontario Ministry of Natural Resources and Forestry.

28
29 “An Agreement Respecting Ottawa River Basin Regulation” dated March 2, 1983, between
30 the Governments of Canada, Ontario, and Quebec, established the Ottawa River Regulation

1 Planning Board and Secretariat to oversee the integrated management of the waters within
2 the Ottawa River basin. OPG participates as a member of the Board.

3
4 Whitedog Falls GS is located on the Winnipeg River which flows from the Lake of the Woods
5 in northwestern Ontario to Lake Winnipeg in Manitoba. Manitou Falls GS and Caribou Falls
6 GS are located on the English River which is a major tributary to the Winnipeg River just east
7 of the Manitoba-Ontario provincial border. These three generating stations are subject to
8 water power lease agreements with the Ontario Ministry of Natural Resources and Forestry.

9
10 Concurrent Federal and Provincial (Ontario and Manitoba) legislation, authorized regulation
11 of the waters of the Lake of the Woods, Lac Seul, the English and Winnipeg Rivers, control
12 of flows, and utilization of water diverted from the Lake St. Joseph. The Lake of the Woods
13 Control Board is the regulating authority for managing these waters.

14 15 3.1.4 Provincial Rivers

16 Forty-one of OPG's regulated hydroelectric generating stations are located on seventeen
17 interior Ontario rivers (see sections 2.3 to 2.6). Tenure at thirty-one of these sites is
18 authorized by water power lease agreements with the Ontario Ministry of Natural Resources
19 and Forestry, or licence agreements with Parks Canada. The remaining ten of these sites are
20 owned by OPG.

21
22 In addition, OPG holds eight Crown Leases and twenty-seven Licences of Occupation,
23 issued by the Ontario Ministry of Natural Resources and Forestry, that provide additional
24 land tenure and flooding rights for facilities associated with the regulated hydroelectric
25 generating stations.

26
27 Water management plans, authorized by the Ontario Ministry of Natural Resources and
28 Forestry, exist for fourteen of the seventeen interior rivers and prescribe flow and water level
29 elevation limits. The other three rivers (Rideau, Trent, and Severn) fall under federal
30 jurisdiction and are not subject to Ontario Water Management Plans.

31

1 **3.2 Agreements with Other Utilities**

2 OPG also has agreements with the New York Power Authority, Hydro Quebec, Manitoba
3 Hydro, and H2O Power LP to address issues such as operational requirements/guidelines,
4 cost sharing and management of joint works, water utilization, and settlement of
5 water/energy transactions.

6

7 **3.3 Dam Safety and Waterways Public Safety**

8 3.3.1 Dam Safety

9 There are 202 dams and special hydraulic structures associated with OPG's regulated
10 hydroelectric stations. Of these, 25 dams are associated with OPG's stations in the Niagara
11 Plant Group and two dams are associated with R.H. Saunders. A further 175 dams are in the
12 Eastern Operations, Central Operations, Northeast Operations, and Northwest Operations.

13

14 In Canada, dams come under provincial jurisdiction, with the exception of dams situated in
15 boundary waters, on canals (i.e., Trent-Severn Waterway ("TSW") and the Rideau Canal),
16 and those owned by the Government of Canada. The majority of OPG's dams fall within the
17 jurisdiction of the Province of Ontario, or through Parks Canada for dams located on the
18 TSW or Rideau Canal however the structures on the Ottawa River are also regulated by the
19 Province of Quebec. OPG provides regular submissions to the Province of Quebec to
20 demonstrate that these structures remain in compliance with the Act and Regulation.

21

22 The Province of Ontario currently governs dams under the *Lakes and Rivers Improvement*
23 *Act* ("LRIA"), administered by the Ministry of Natural Resources and Forestry ("MNRF").
24 Sections 14 and 16 of the Act require MNRF's approval for activities such as the
25 construction, alteration, improvement, or repair of dams. In August 2011, the Province of
26 Ontario issued new Technical Guidelines for Approval under the LRIA. These Guidelines are
27 not formal regulations. However, they do form the standards to which dams in Ontario are
28 expected to comply. Transport Canada also has regulatory approval authority over OPG
29 dams under the Navigation Protection Act as they may relate to alternations of the dams or
30 approved works (e.g. safety booms, buoys etc.)

31

1 For dams located on the Trent Severn Waterway and the Rideau Canal system, OPG is
2 required to meet Parks Canada dam safety criteria issues in 2010, primarily as it applies to
3 upgrading structures.

4
5 While the regulatory regime in Ontario continues to develop, OPG has well-established
6 programs based on the Canadian Dam Association (“CDA”) – Dam Safety Guidelines (2013)
7 and the CDA Guidelines for Public Safety Around Dams (2011), as well as other industry
8 guidelines that are, in many respects, a model for emerging standards and regulatory
9 requirements. OPG’s Safe Operations Policy, approved by the OPG Board, and associated
10 Dam Safety Program Management Document directs that dams be designed, constructed,
11 operated and maintained in a manner that meets all regulatory requirements or, in the
12 absence of regulations, the safety guidelines published by the CDA or other industry best
13 practice.

14
15 Pursuant to OPG’s dam safety program, dam safety reviews are completed periodically for
16 all dams owned and operated by OPG.

17
18 **3.3.2 Waterways Public Safety**

19 Since 2002, OPG has developed a number of technical documents concerning public safety
20 around dams, as well as materials to educate the public and raise awareness of the hazards
21 associated with dams and hydroelectric facilities. Currently there are no regulations covering
22 public safety around dams, beyond the federal requirements administered by Transport
23 Canada under the *Navigation Protection Act* (2014) or *Canada Shipping Act* (2001) and the
24 associated regulations. Transport Canada’s involvement in public safety is primarily the
25 installation of safety measures (e.g. safety booms, buoys) and enforcement of restrictions to
26 navigation. However, the Province of Ontario has issued a Best Management Practice
27 document in August 2011 to guide owners on improvements to safety around dams. In
28 addition the Canadian Dam Association issued Guidelines for Public Safety Around Dams in
29 October 2011.

1 In the absence of government regulations, OPG has developed a Waterways Public Safety
2 Program to guard the public from risks associated with its dams and hydroelectric stations.
3 The program includes: installation of physical control measures (e.g., booms, buoys, fencing,
4 signage, audible alerts), operating procedures, and employee training requirements. A major
5 element of the program is public education. For example, OPG has worked diligently to
6 establish a “Stay Clear - Stay Safe” message. OPG actively engages other agencies such as
7 the MNRF, Ontario Provincial Police, St. John’s Ambulance, Life Saving Society, the Ontario
8 Waterpower Association, and numerous other stakeholders in water safety education to
9 partner in delivering the message to the public.

10

11 **3.4 Indigenous Relations**

12 Ontario Power Generation’s hydroelectric assets are widely dispersed throughout Ontario.
13 Many of the stations and dams are in close proximity to various Aboriginal communities. This
14 proximity to dams and generating stations has had direct and indirect effects on some First
15 Nations communities during initial construction and from on-going operations.

16

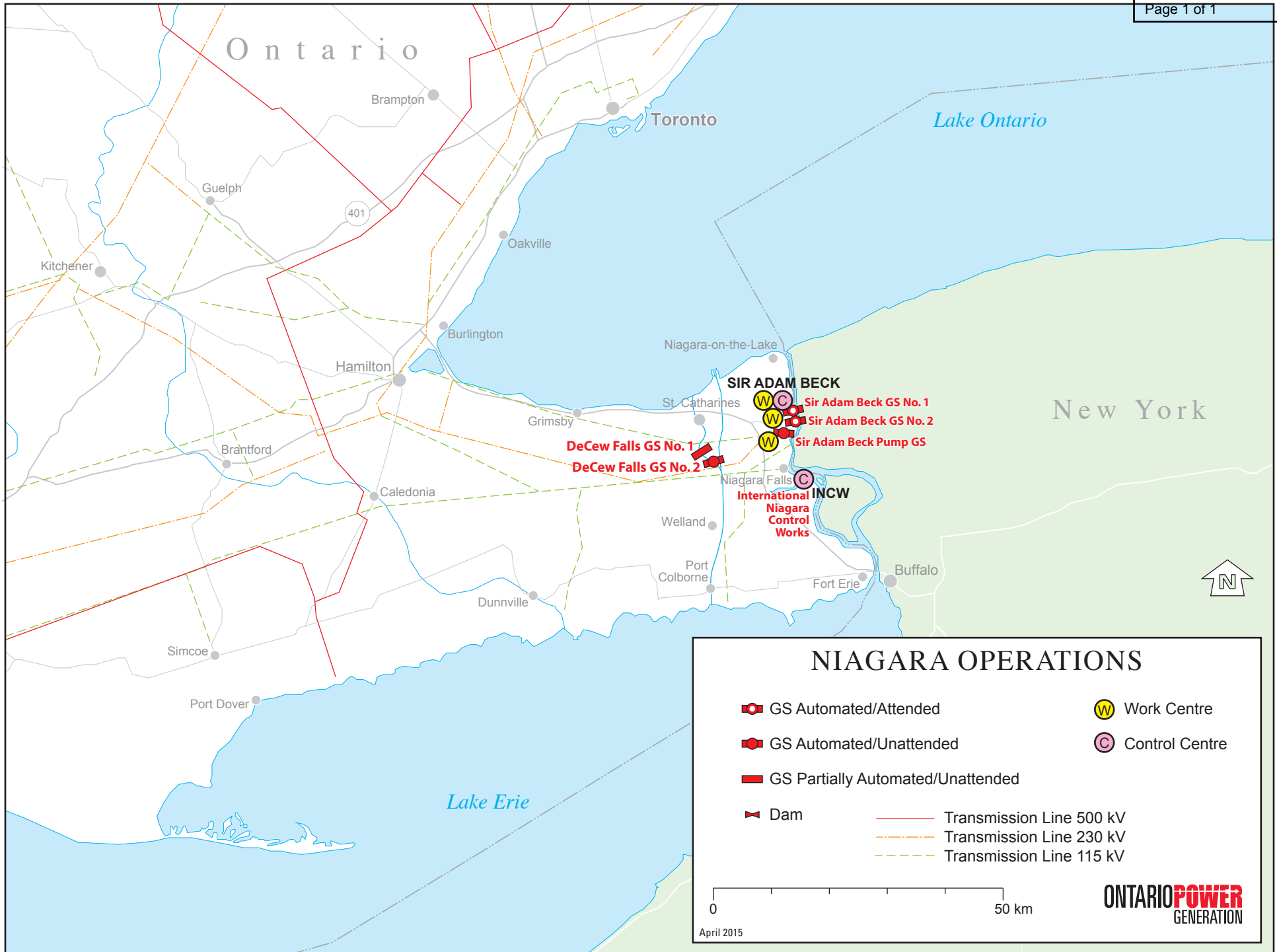
17 OPG has engaged in a past grievance settlement program since 1992 to address some of
18 these effects on Aboriginal Communities. The program is voluntary and non-adversarial. The
19 successful outcome is a negotiated settlement acceptable to both parties. Within OPG,
20 executive approval is required to enter into a settlement agreement. The program is backed
21 by the OPG Board level Policy on First Nations and Metis Relations.

22

23 To date, OPG (and formerly Ontario Hydro) has completed 23 settlements with First Nation
24 communities across Ontario.

ATTACHMENTS

- 1
- 2
- 3 Attachment 1: Niagara Operations - Overview
- 4
- 5 Attachment 2: Eastern Operations - Overview
- 6
- 7 Attachment 3: Central Operations - Overview
- 8
- 9 Attachment 4: Northeast Operations - Overview
- 10
- 11 Attachment 5: Northwest Operations - Overview



Ontario

Lake Ontario

New York

Lake Erie

SIR ADAM BECK

Sir Adam Beck GS No. 1

Sir Adam Beck GS No. 2

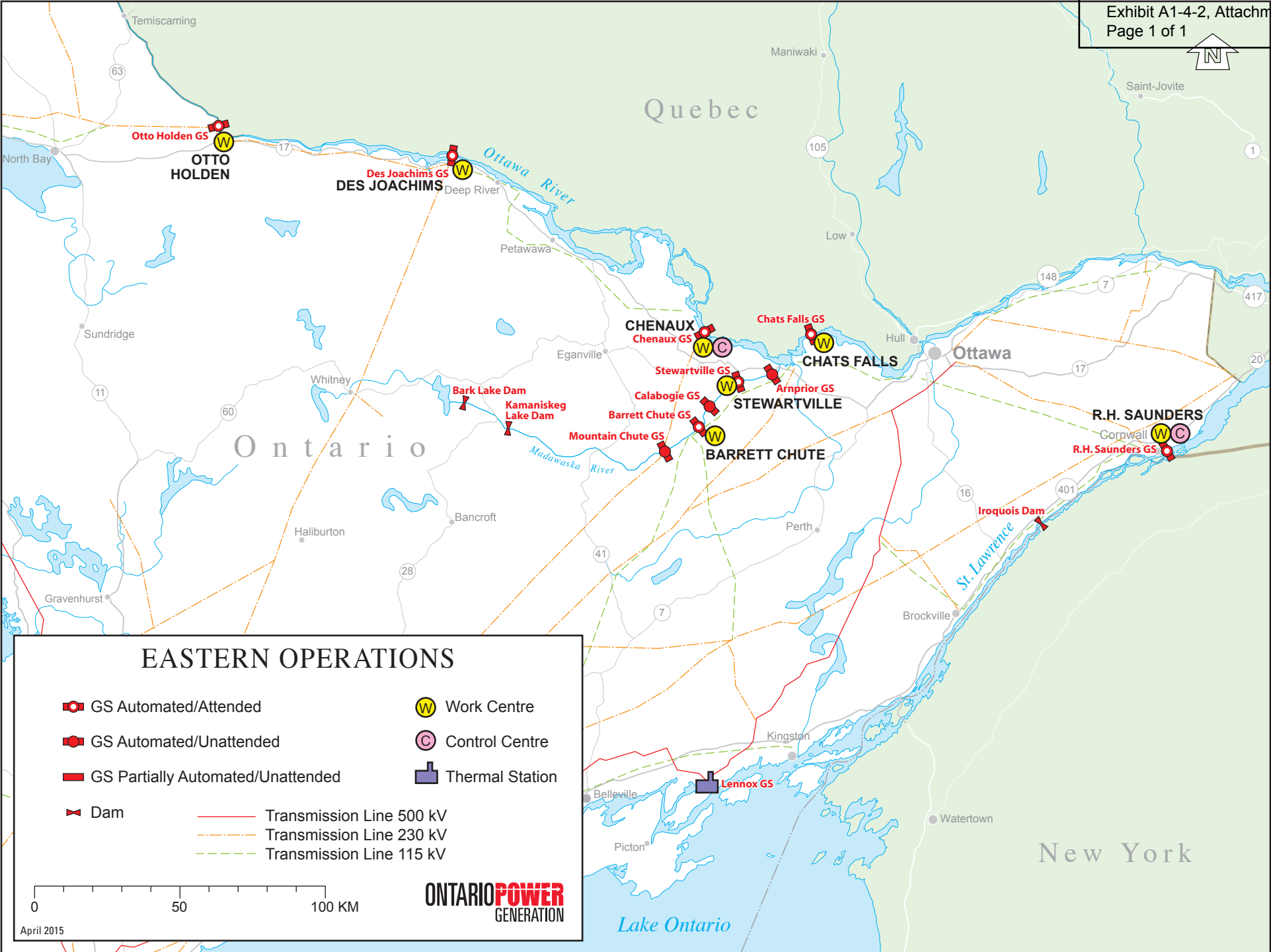
Sir Adam Beck Pump GS

DeCew Falls GS No. 1

DeCew Falls GS No. 2

International
Niagara
Control
Works





EASTERN OPERATIONS










- GS Automated/Attended
- GS Automated/Unattended
- GS Partially Automated/Unattended
- Dam
- Work Centre
- Control Centre
- Thermal Station
- Transmission Line 500 kV
- Transmission Line 230 kV
- Transmission Line 115 kV

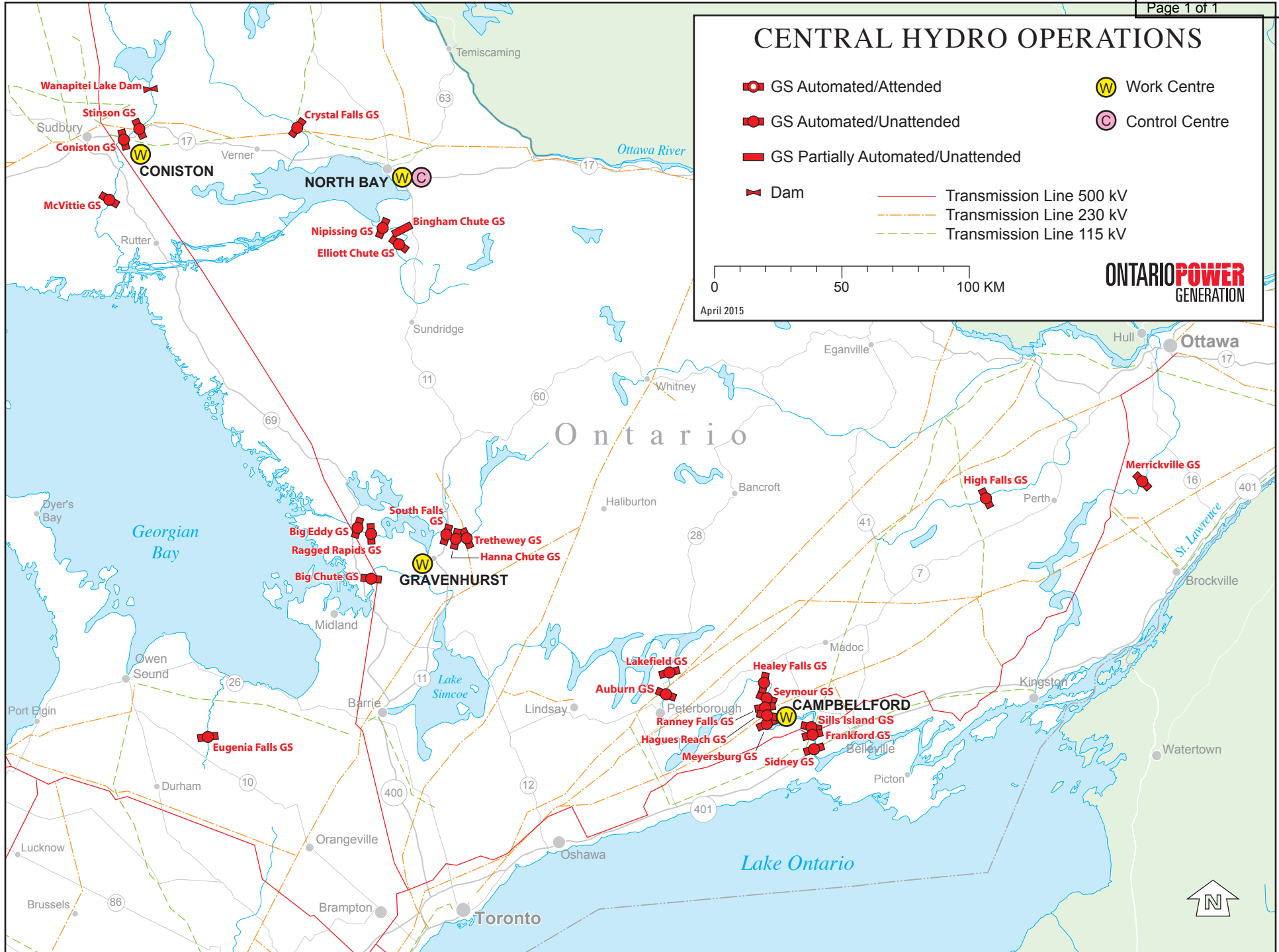
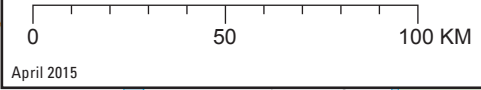
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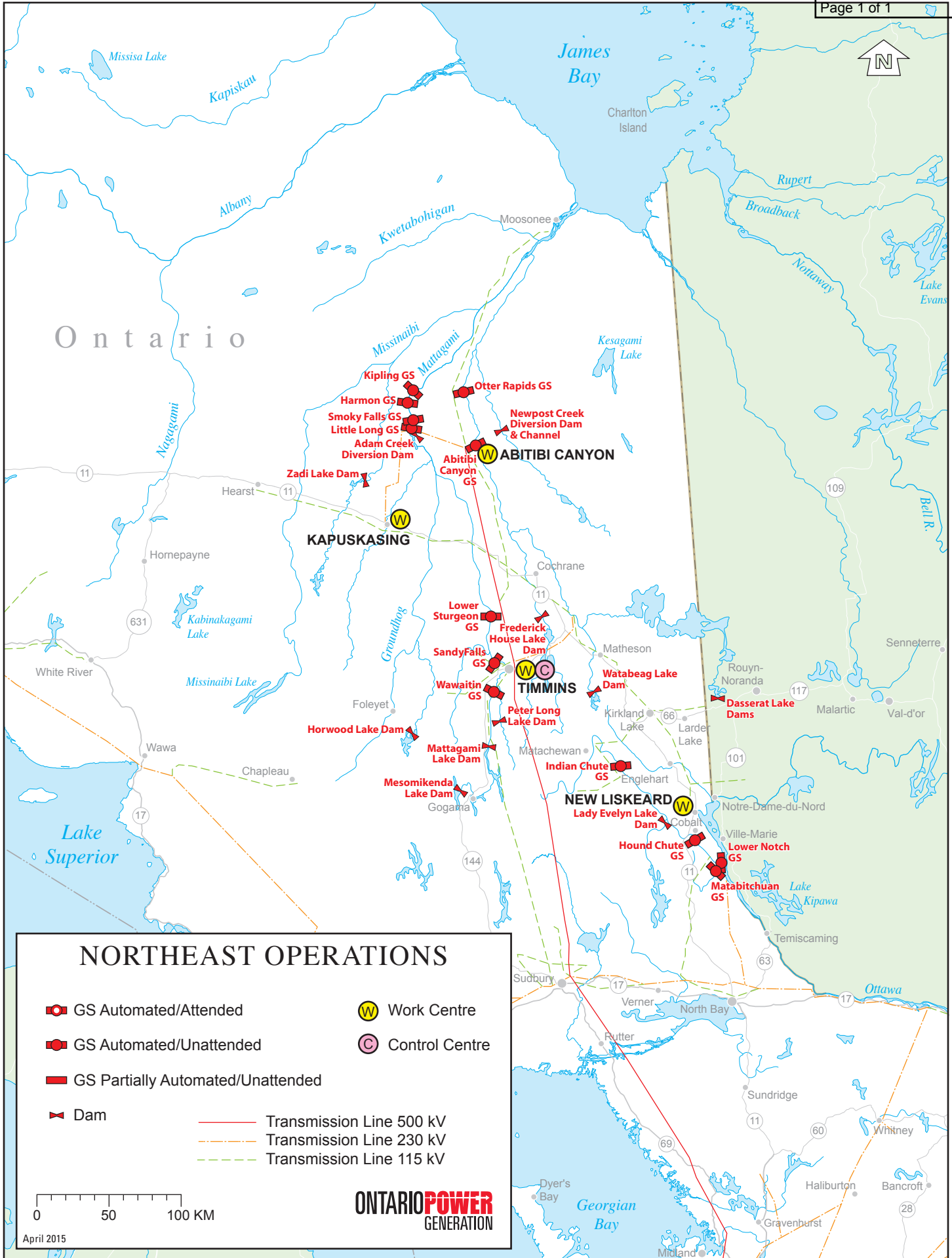


April 2015

CENTRAL HYDRO OPERATIONS

-  GS Automated/Attended
-  GS Automated/Unattended
-  GS Partially Automated/Unattended
-  Dam
-  Work Centre
-  Control Centre
-  Transmission Line 500 kV
-  Transmission Line 230 kV
-  Transmission Line 115 kV





NORTHEAST OPERATIONS

- GS Automated/Attended
- GS Automated/Unattended
- GS Partially Automated/Unattended
- Dam
- Work Centre
- Control Centre
- Transmission Line 500 kV
- Transmission Line 230 kV
- Transmission Line 115 kV

0 50 100 KM

April 2015

ONTARIO POWER
GENERATION

