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Environmental Impact Assessment Study for the proposed Wuskwatim GS

Nick Barnes
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Manitoba Hydro

Water Management Process to meet, regulators and Environmental Objectives

November 02-03/2004 Vancouver BC

Part 1

Project overview

Regulatory Liaison

Public Participation

Internal Communication

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Project Location

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Potential Major Generation Projects

Generating Stations:

- Wuskwatim

  200 MW, 2010 ISD

- Gull/Keeyask

  625 MW, 2012 ISD

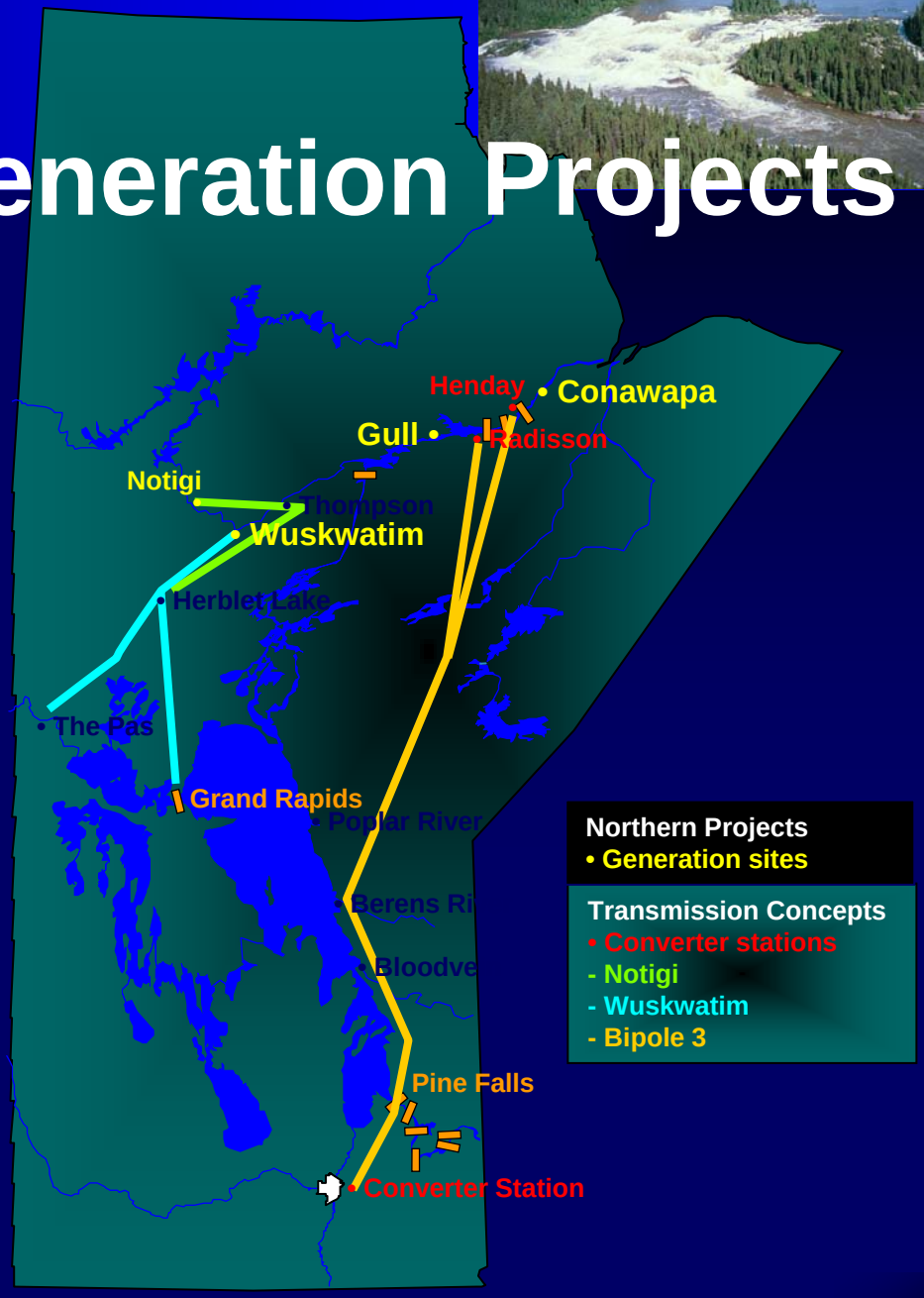
- Conawapa

  1250 MW, 2017 ISD

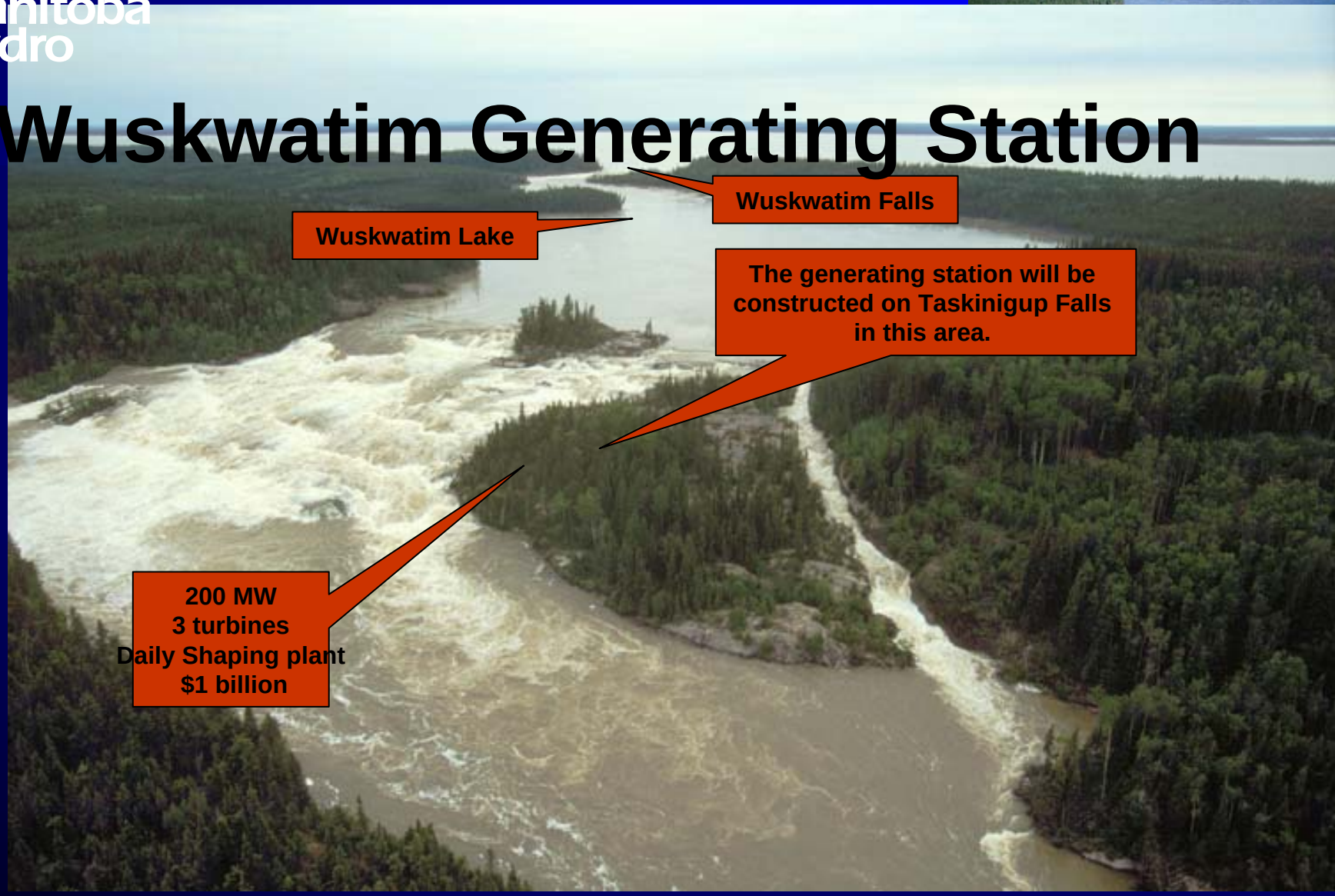
- Notigi (on hold)|

Related Transmission:

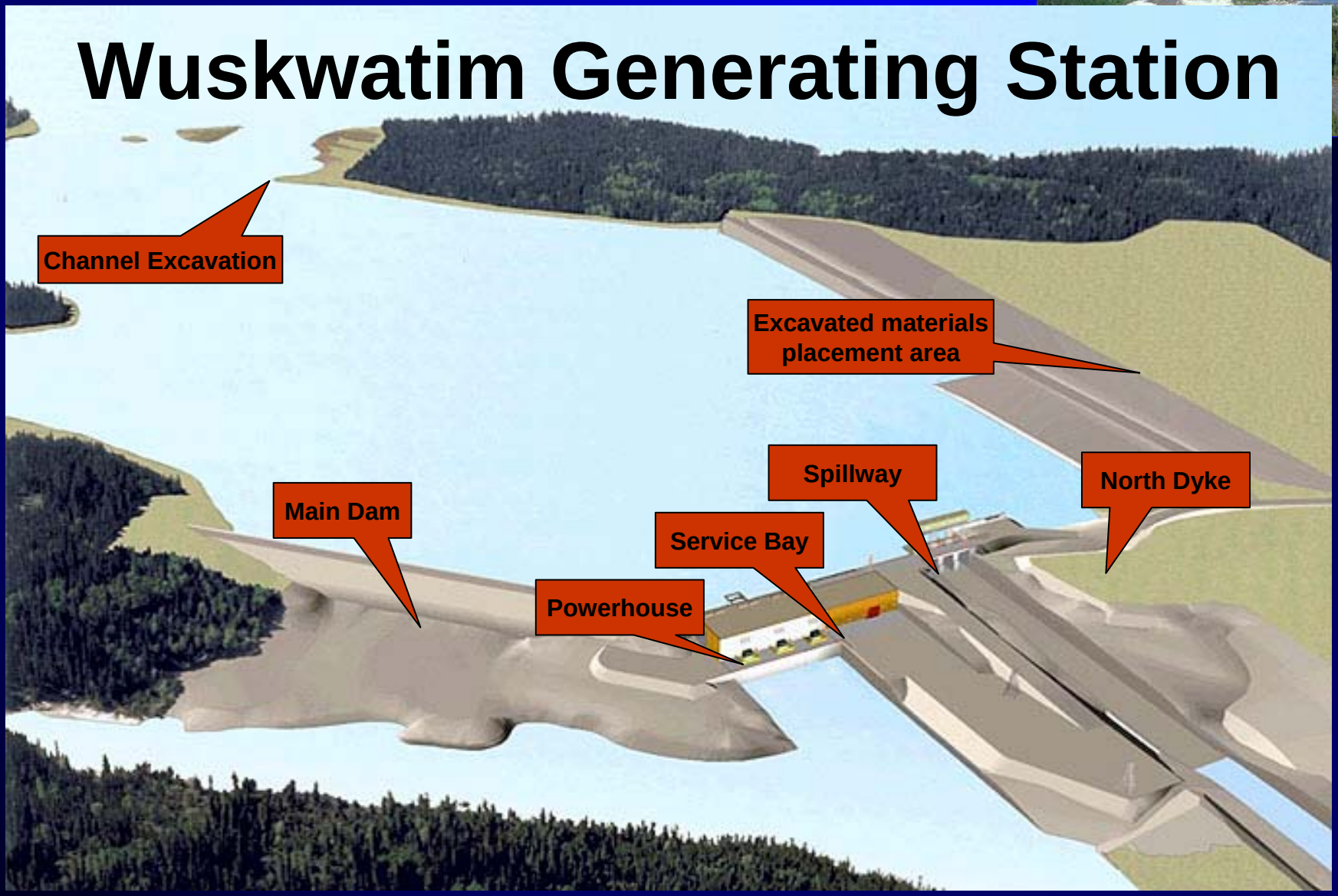
- DC - Bipole 3



Wuskwatim Generating Station



Wuskwatim Generating Station



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Regulatory Liaison

Challenge

- New provincial/federal legislation
- Combined two provincial public review processes
- Greater enforcement of existing legislation
- Uncertainties for all regarding schedule/protocols

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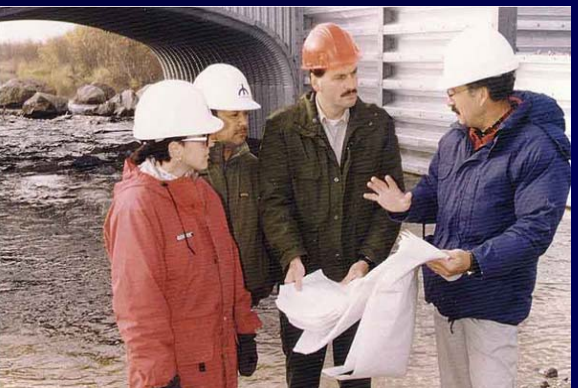
Regulatory Liaison

Response

- Use of consulting consortium with recent regulatory experience
- More issue-based discussions – outside of project
- Opportunities/invitation to provide feedback to regulator



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Public Participation

Challenge

- Public focus on historic issues beyond scope of existing regulatory process
- Influence of negative publicity

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Public Participation

Response

- Extensive public participation process
- Better communication on positive activities/programs undertaken – outside regulatory process

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Internal Communication

Challenge

- Many staff new since last GS
- New regulatory process
- Potential partnership with local First Nation/aboriginal community
- Challenging schedules based on above

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Internal Coordination

Response

- Establishment of Major Projects Licensing Department
- Additional staff resources
- Improvement of internal project committees
- Assignment of priorities to support departments

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Part 2

Applications of Hydraulic Models

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Winnipeg, MB. Canada

Water Management Process to meet, regulators and Environmental Objectives

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Outline

- Wuskwatim GS Project Description
- Methodology of Assessment
- Study Area
- Hydraulic Analysis of Water Regimes
  - Methods & Models
  - Results
- Use of Model Studies for assessment of Fish Habitat

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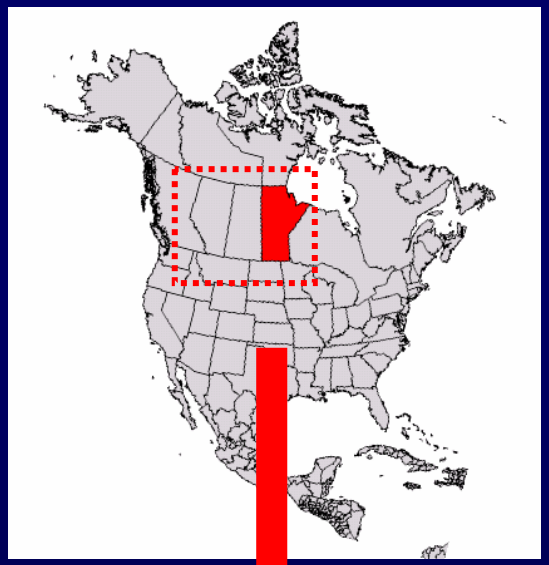
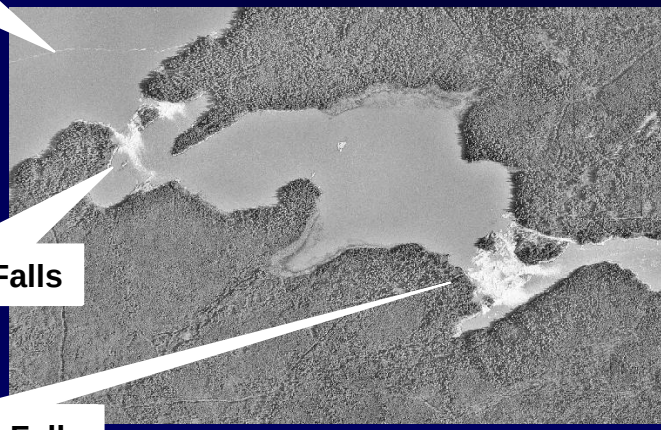
Location

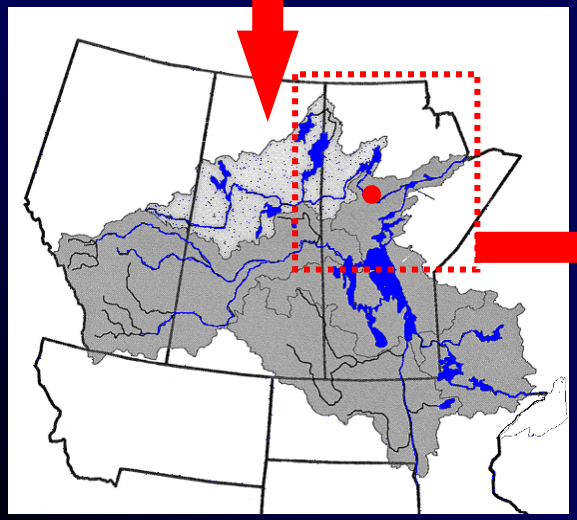


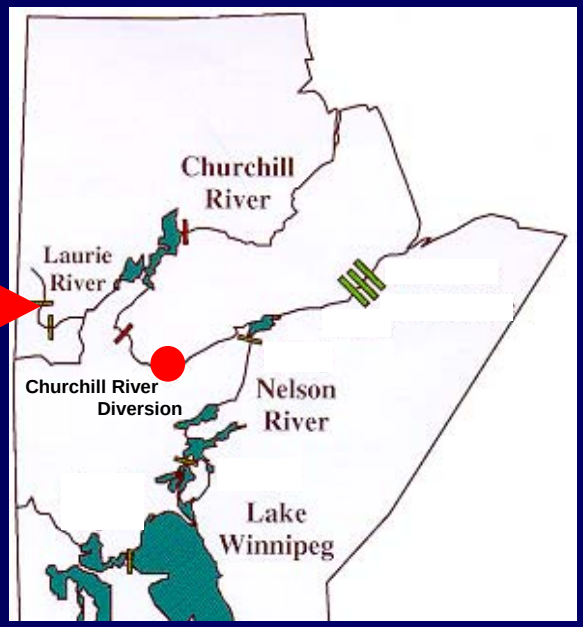


Wuskwatim Lake

Wuskwatim Falls

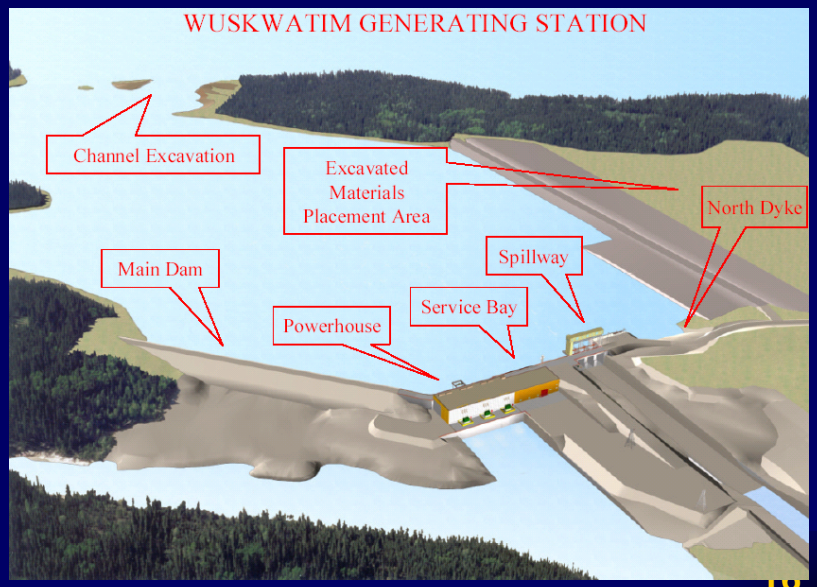
Taskinigup Falls





Wuskwatim GS

- 3 Units
- “Modified” Run of River (Daily shaping of inflows)
- Installed Plant Q = 1100 cms
- 22m head
- 200 MW
- 1m storage on Wuskwatim Lake
- Partnership with Nisichawayasihk First Nation



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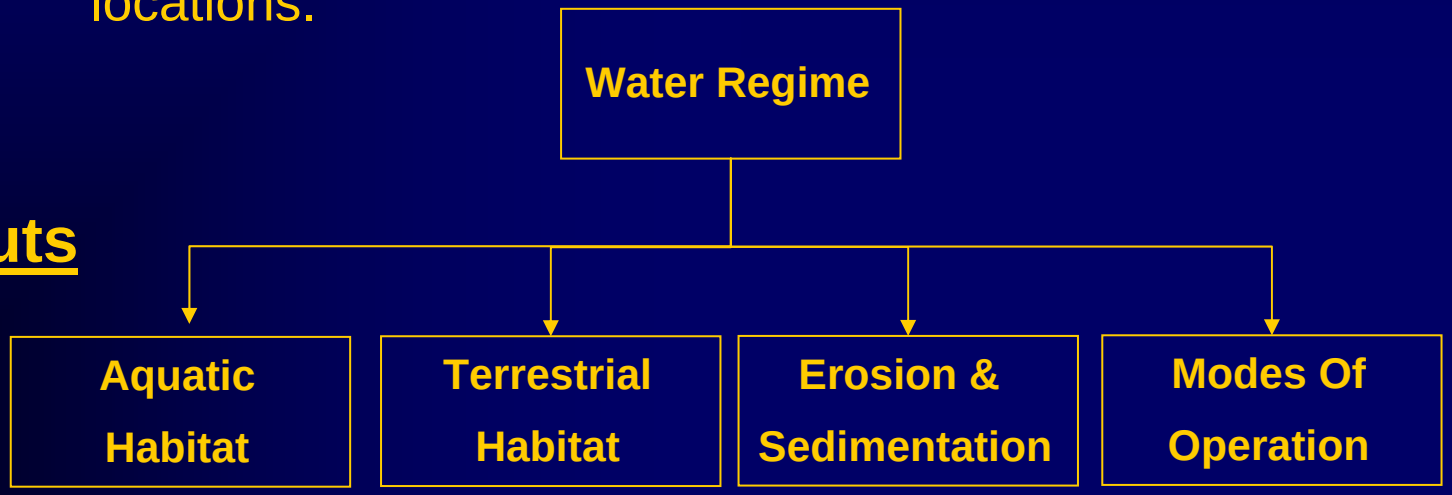
Study Approach

- EIS Guidelines:
  - “planned, average hourly discharges at the plant”; and
  - “under a range of flow and station operating conditions, discuss average hourly forebay elevations, tailrace water elevations and water elevations at several downstream locations.”

Inputs



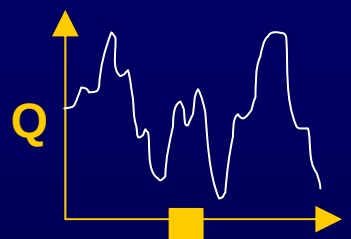
Methodology

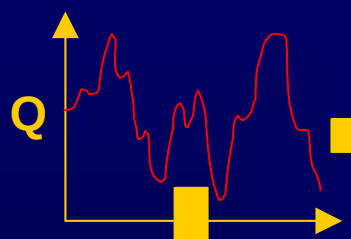
Regimes

Existing Environment

Project Environment

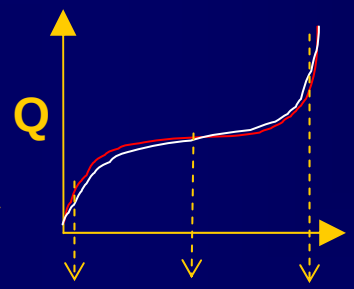
Monthly Inflow Files





1-Dimensional Models

Duration Curves

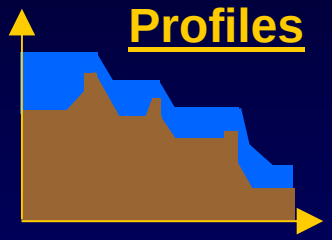


$Q_{5\%}$ $Q_{50\%}$ $Q_{95\%}$

Q_{1UBG} Q_{2UBG} Q_{3UBG} Q_{3UFG}

Intermittently Exposed Area; Flooded Area

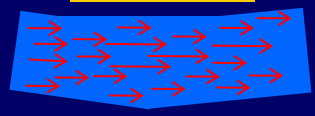
Profiles

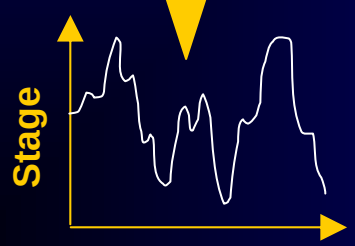


1-Dimensional Models

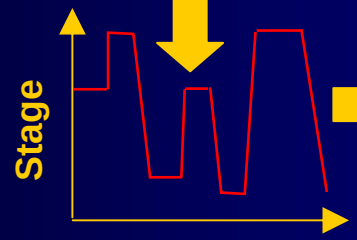
2-D & 3-D Models

Velocity

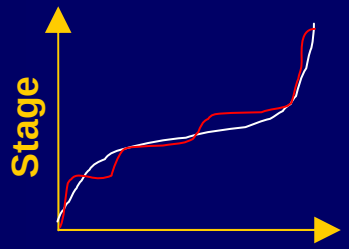


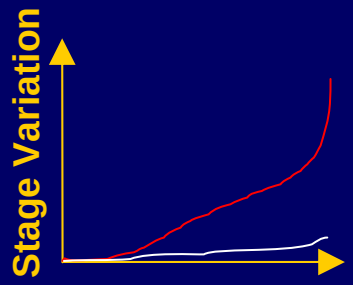


Shape Flows



"Key Sites" only





Duration Curves

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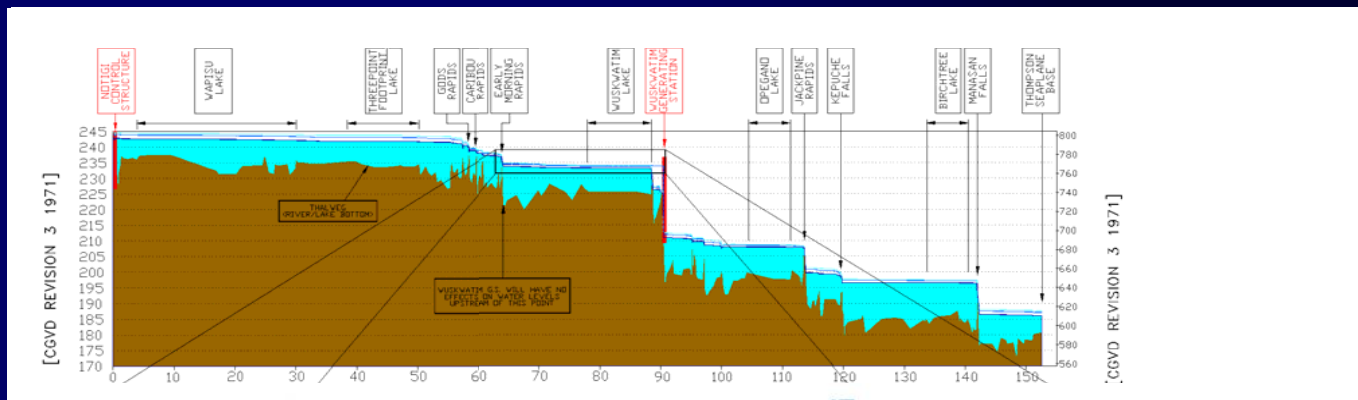
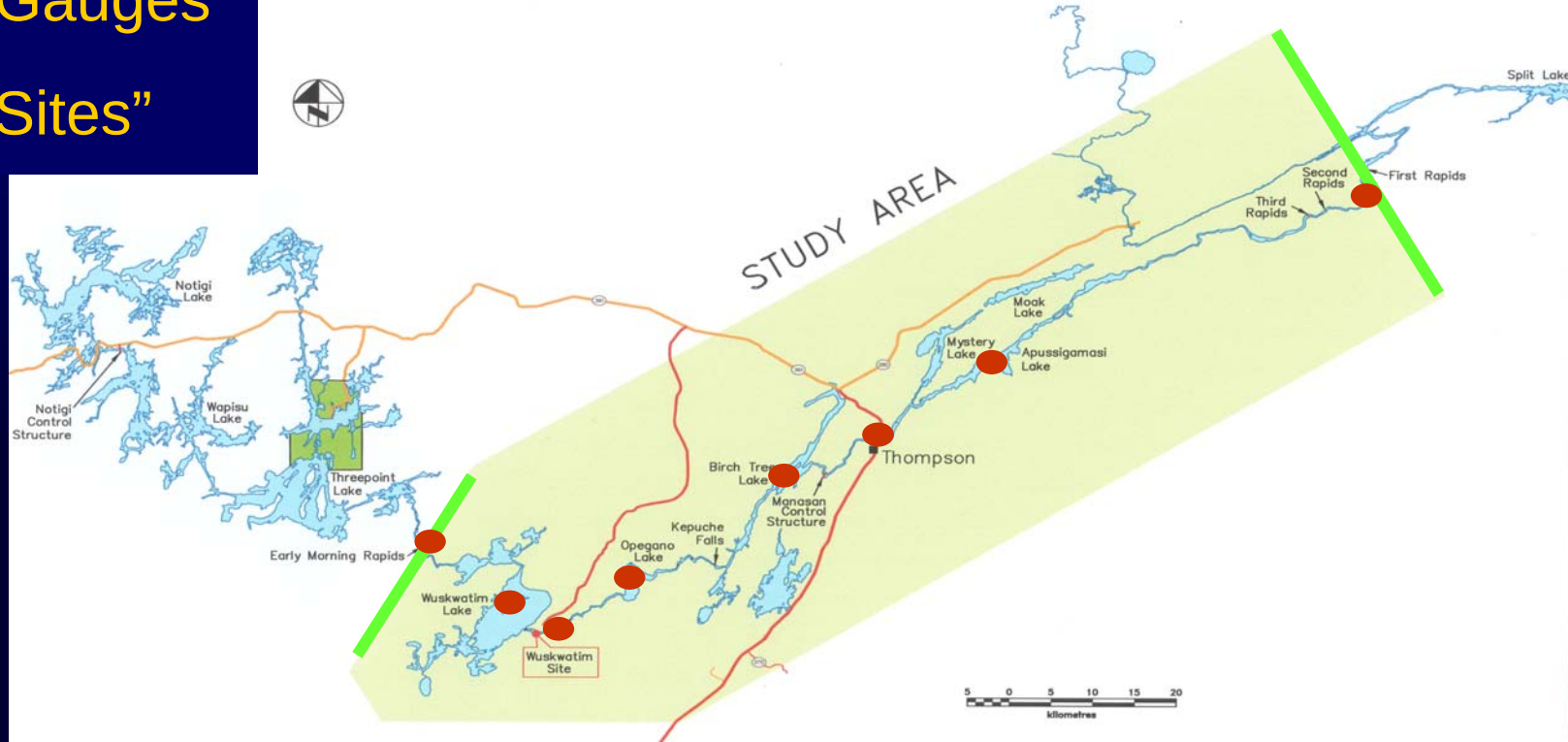
Hydraulic Models

Dimensions	Model	Period	Purpose
1	HEC-RAS ICEDYN	Open Water Winter	Water Level Variations
2	River2d	Open Water	Velocity
3	Flow3D	Open Water	Velocity

Study Area

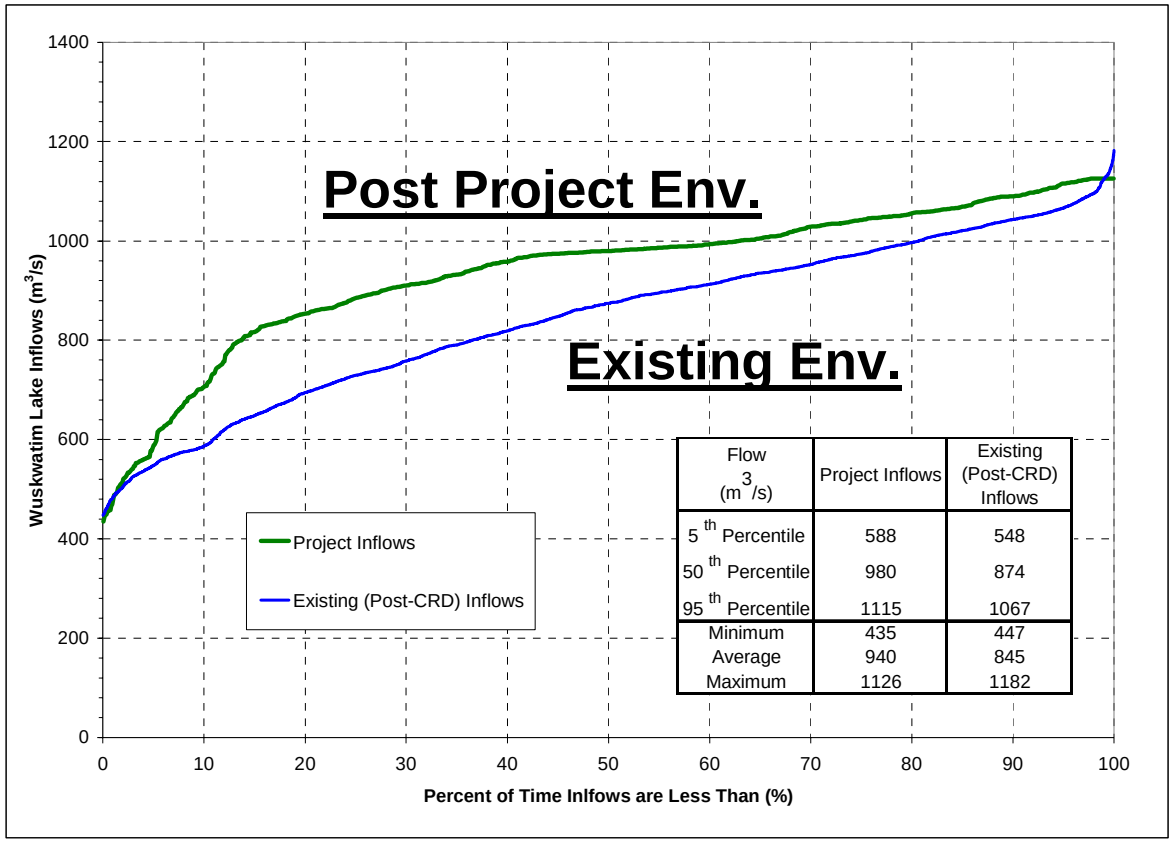
- 156 km
- 66m drop
- 300 Cross Sec
- 50 WL Gauges
- 8 “Key Sites”





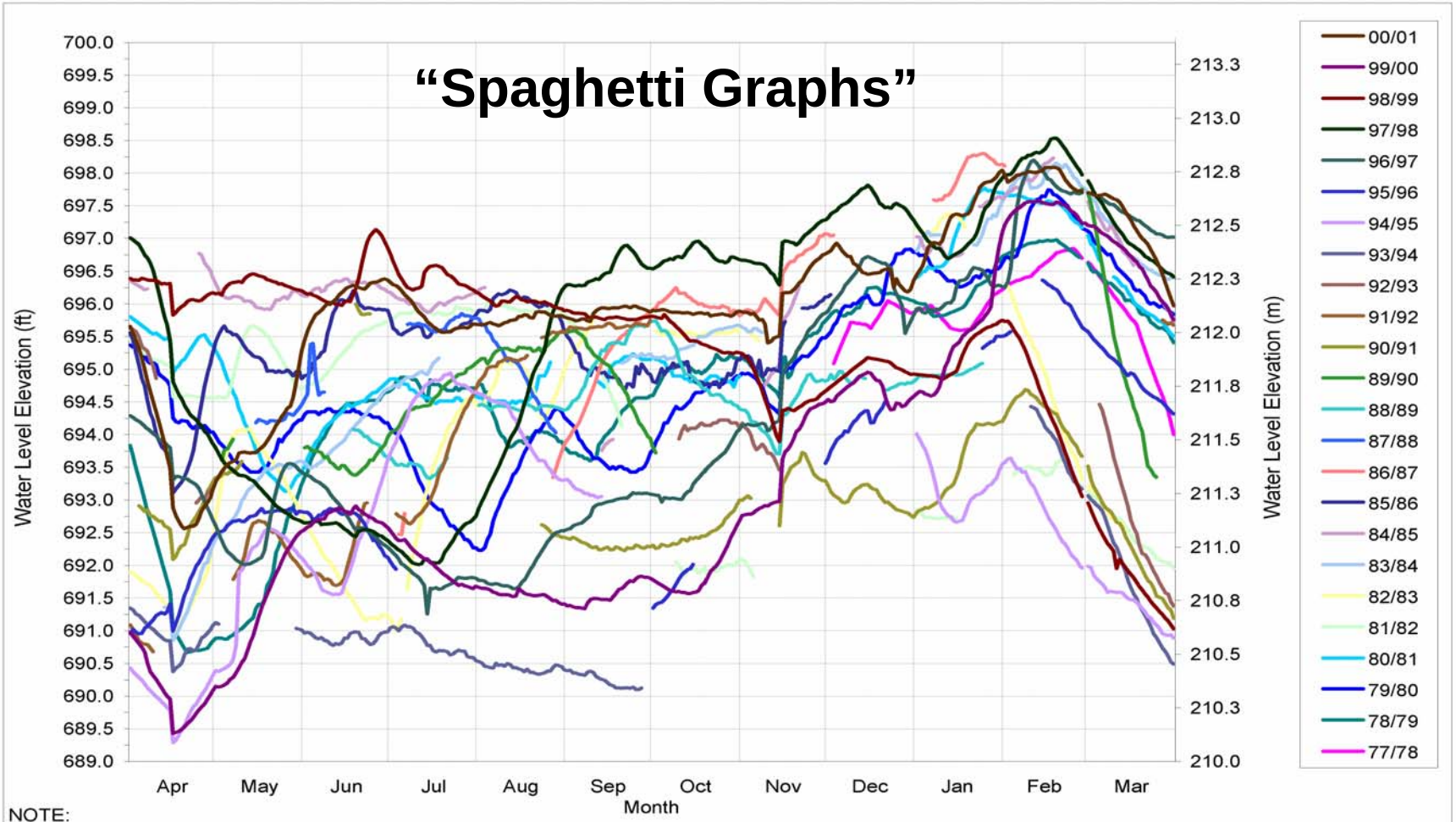
Inflow Files

- Existing Environment – Historical Post-CRD -1977-1997 (20yrs)
- Project Environment – Best estimate of simulated long term inflows to Wuskwatim Lake - 1912-1997 (86yrs)



Flow (m^3/s)	Project Inflows	Existing (Post-CRD) Inflows
5 th Percentile	588	548
50 th Percentile	980	874
95 th Percentile	1115	1067
Minimum	435	447
Average	940	845
Maximum	1126	1182

Existing Env. Water Levels



NOTE:
1. Source : Existing Physical Environment Water Regime Package Memorandum W-7.2.2 Rev. A
2. Water levels are referred to as Canadian Geodetic Vertical Datum (CGVD) (1971 Rev. 3) above sea level. (Also referred to as the 1969 local adjustment)

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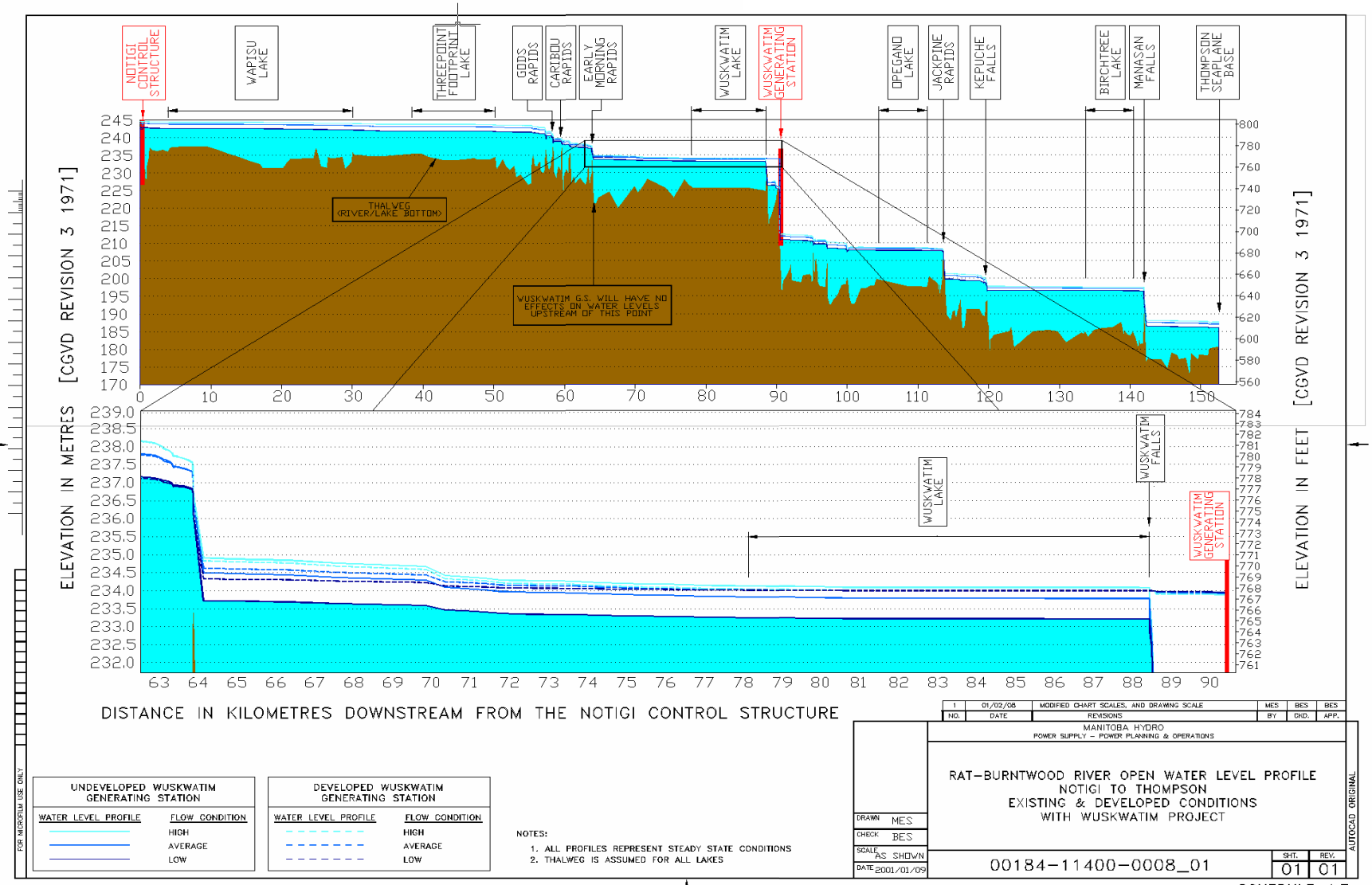
Water Surface Profiles



SCHEDULE 4.7

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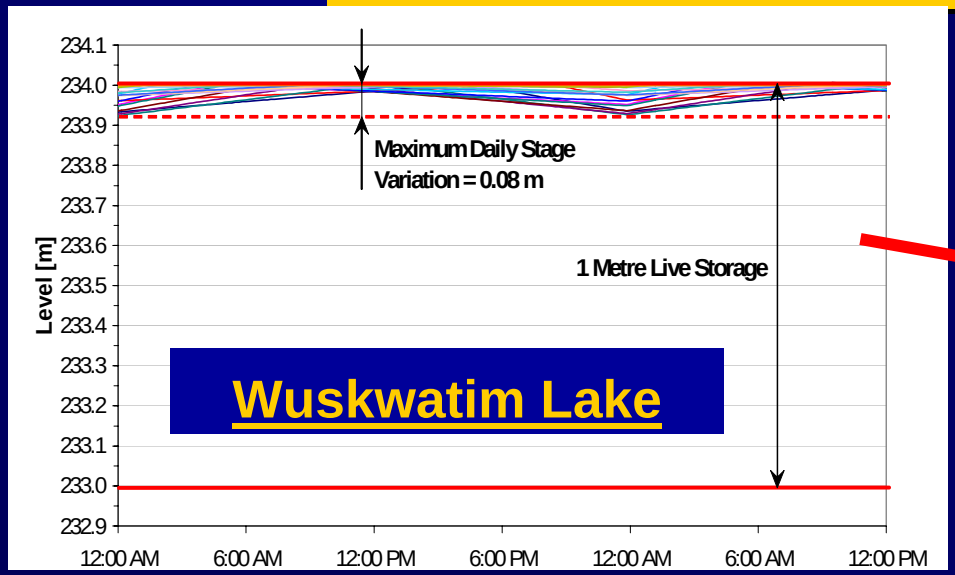
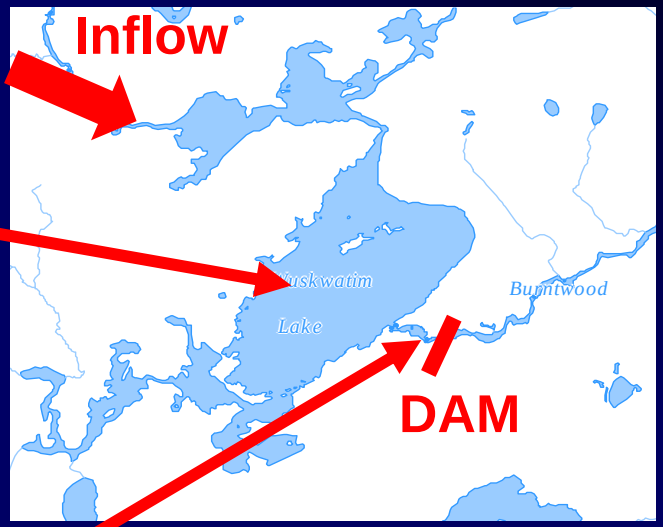
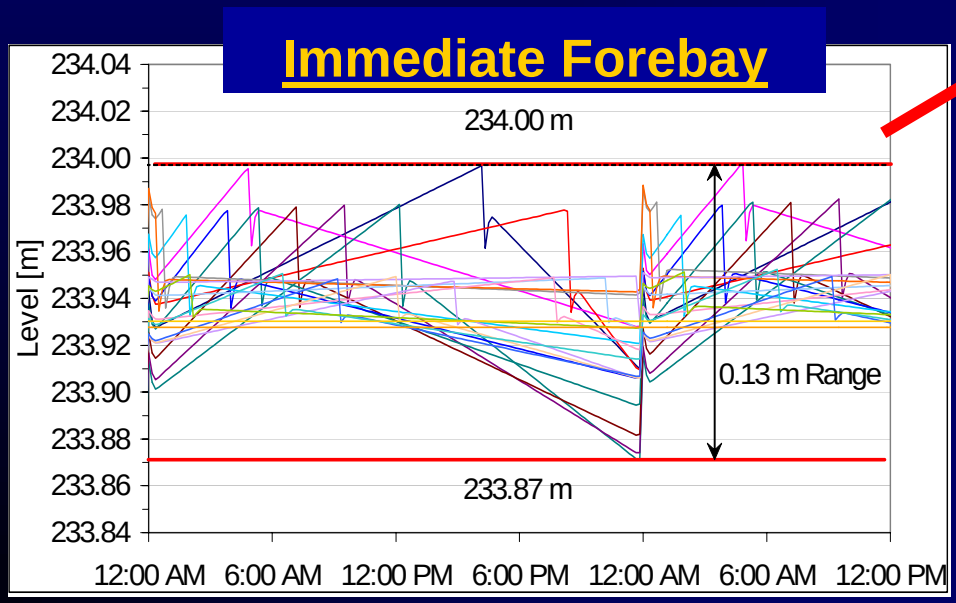
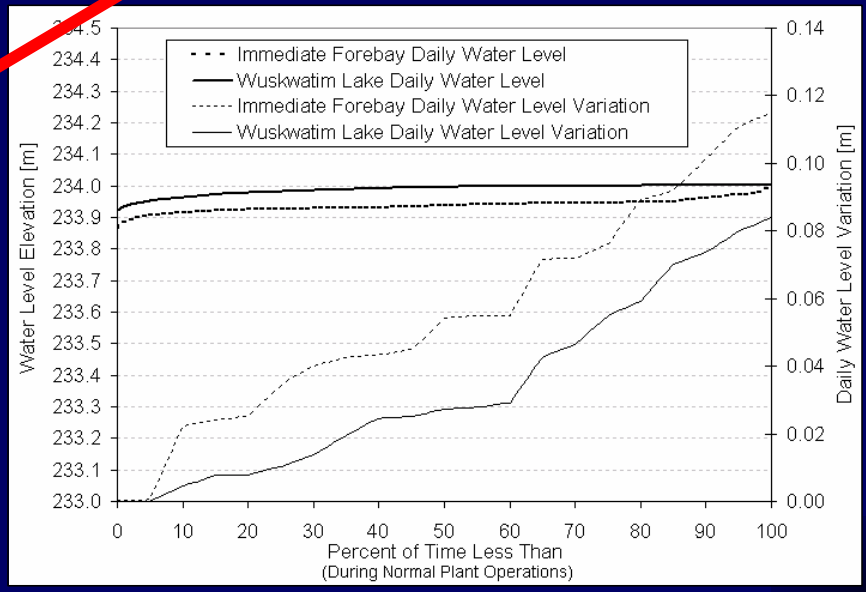
Reservoir Simulations

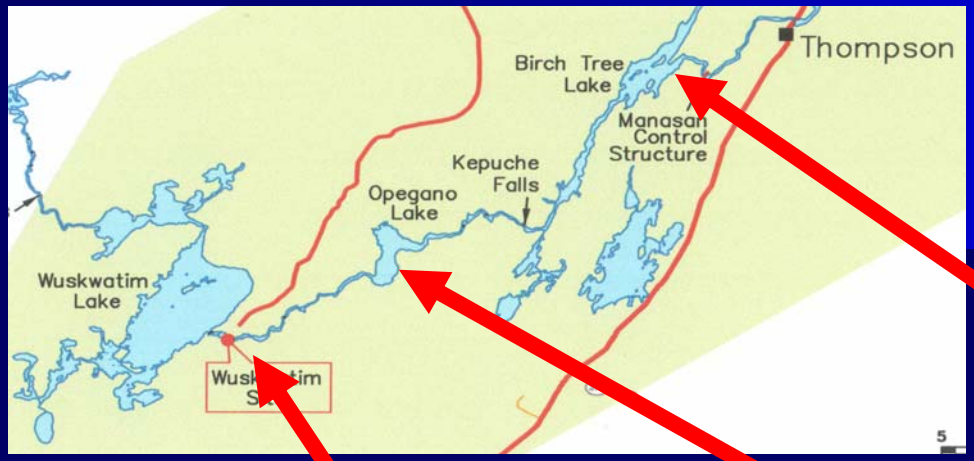


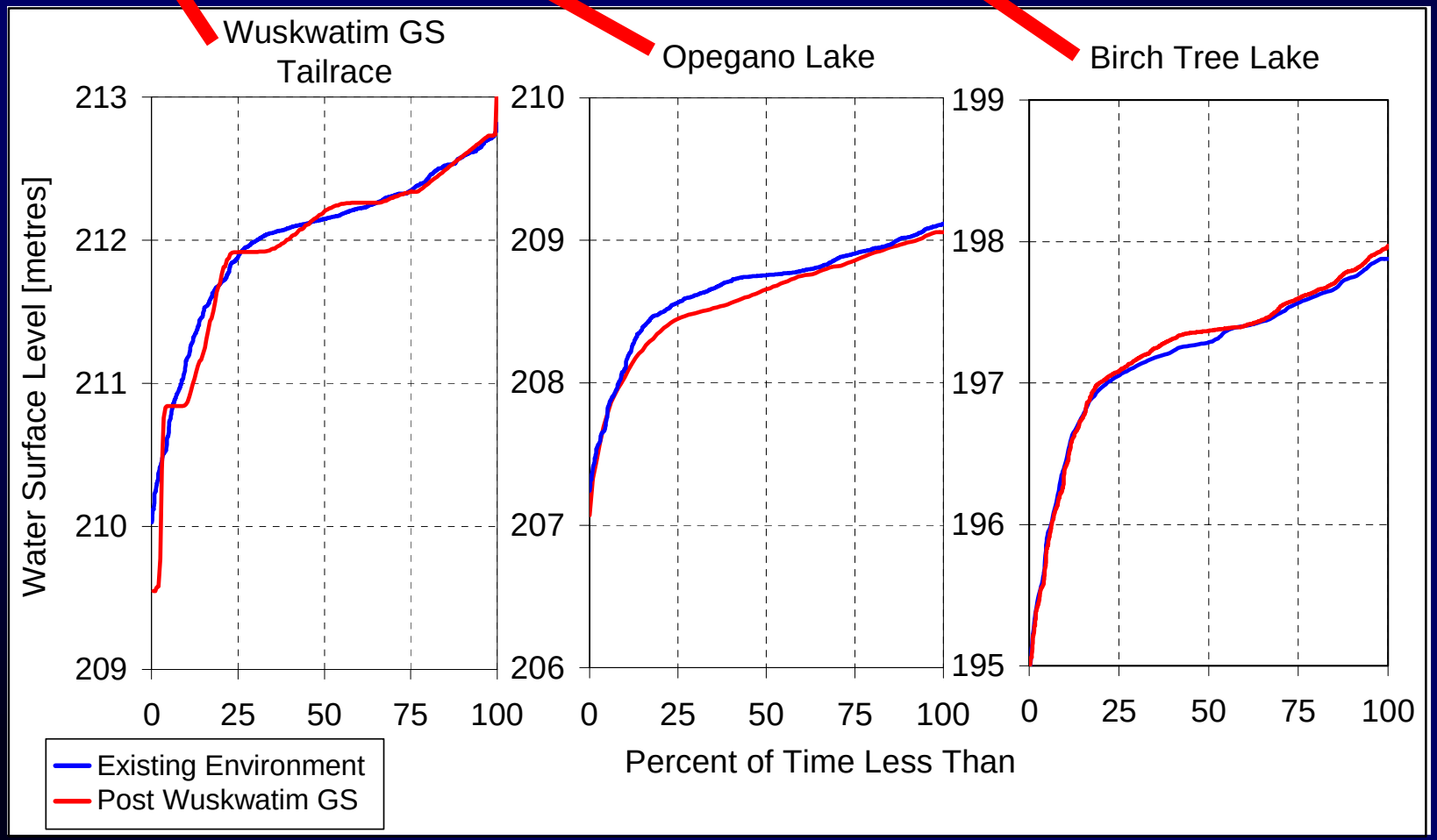




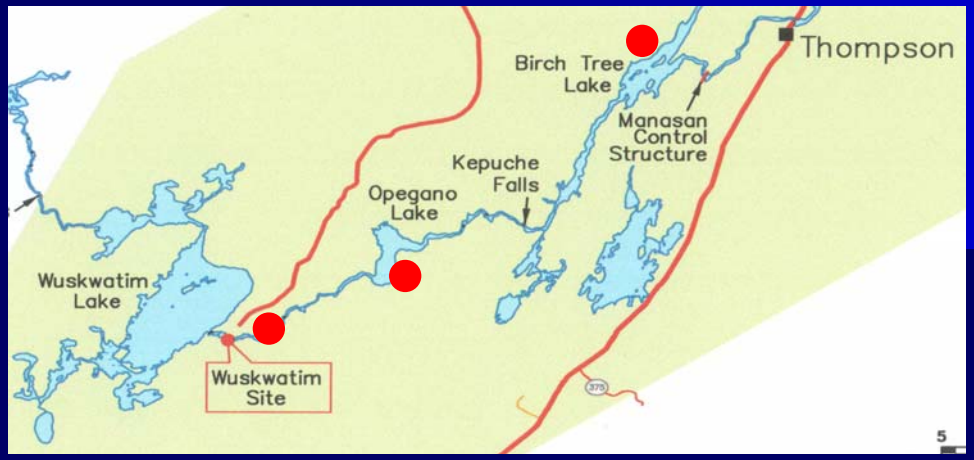


Water Levels



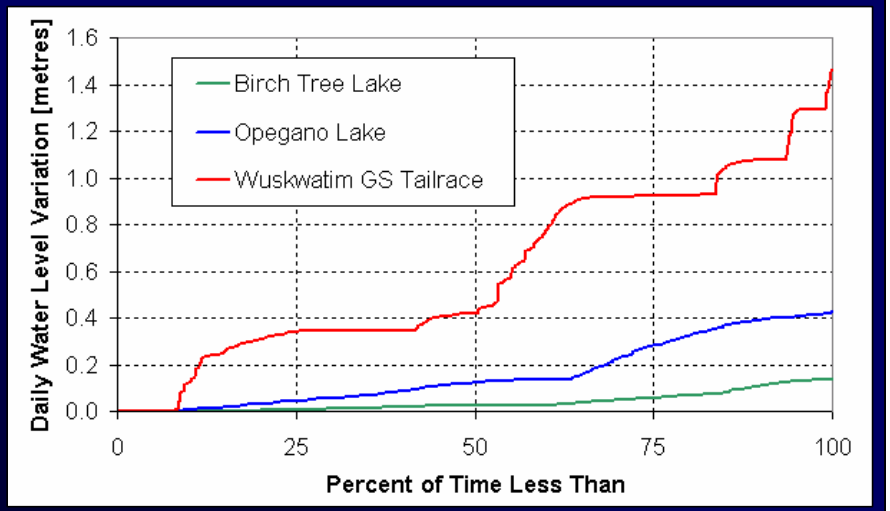


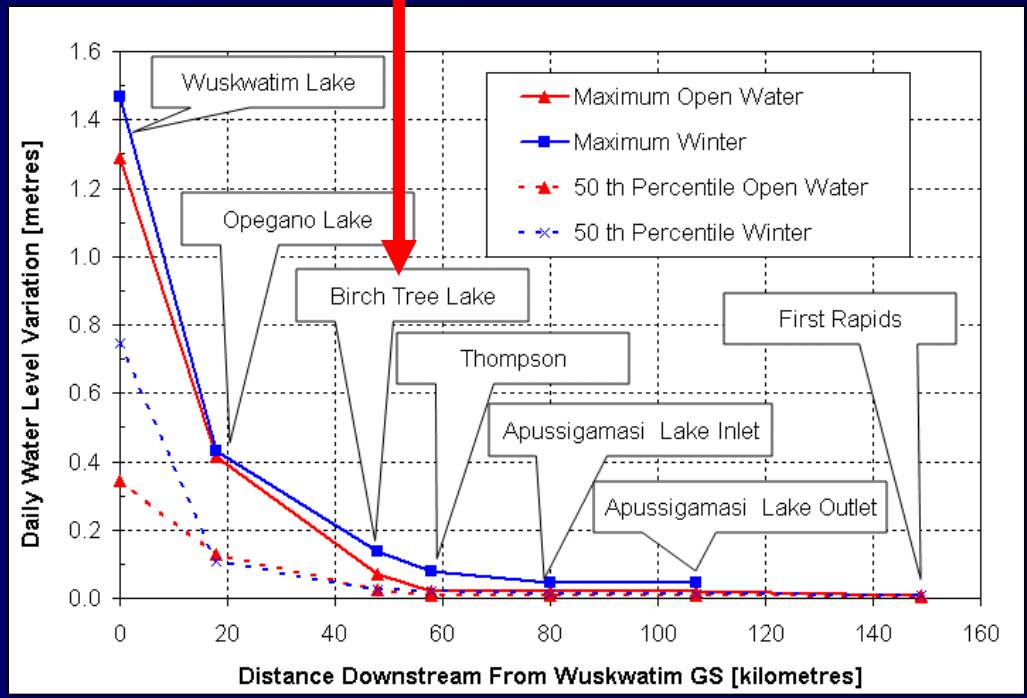
Water Level Variations



D/S Hydraulic Zone of Influence of GS

Duration Curve





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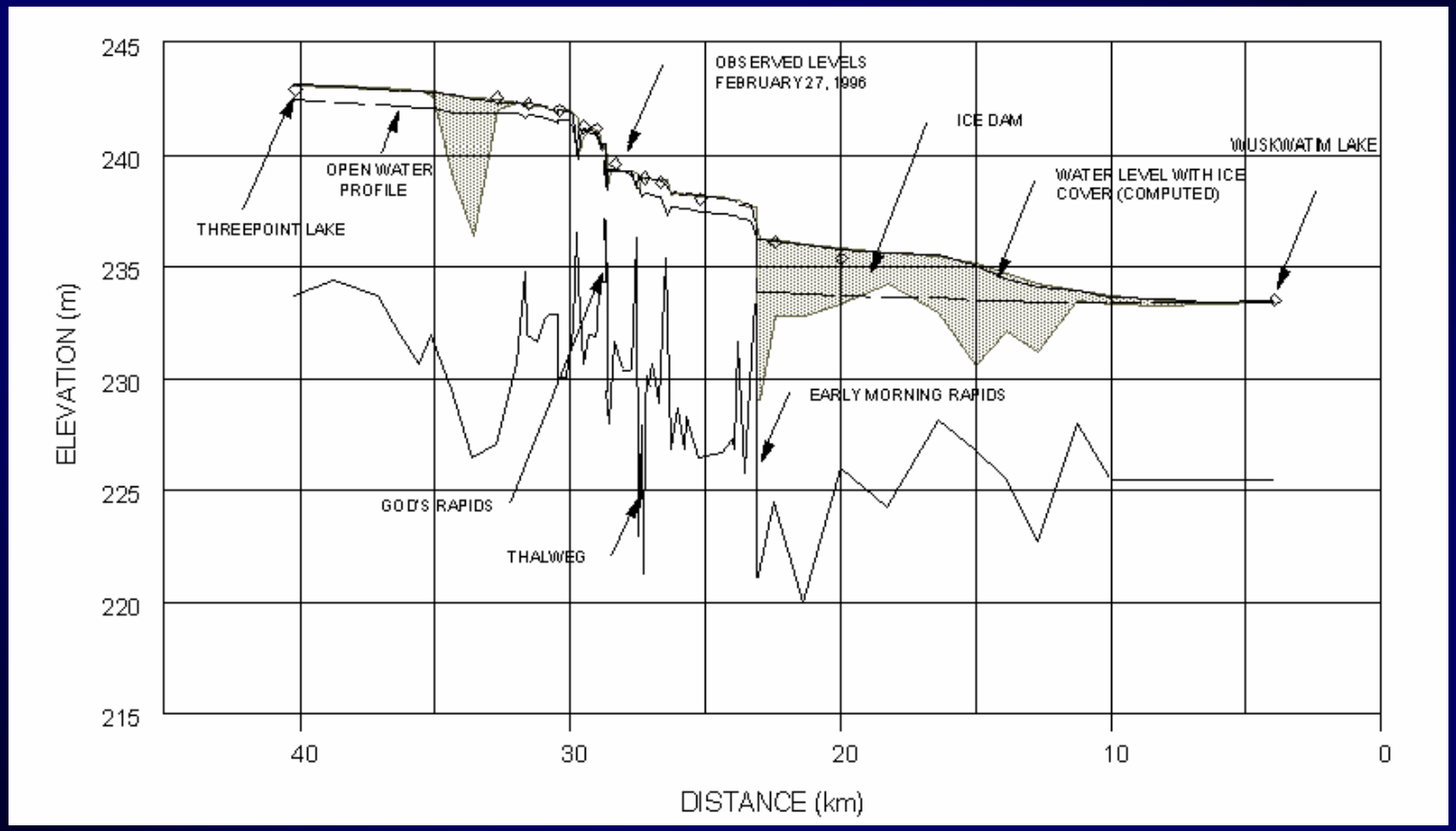
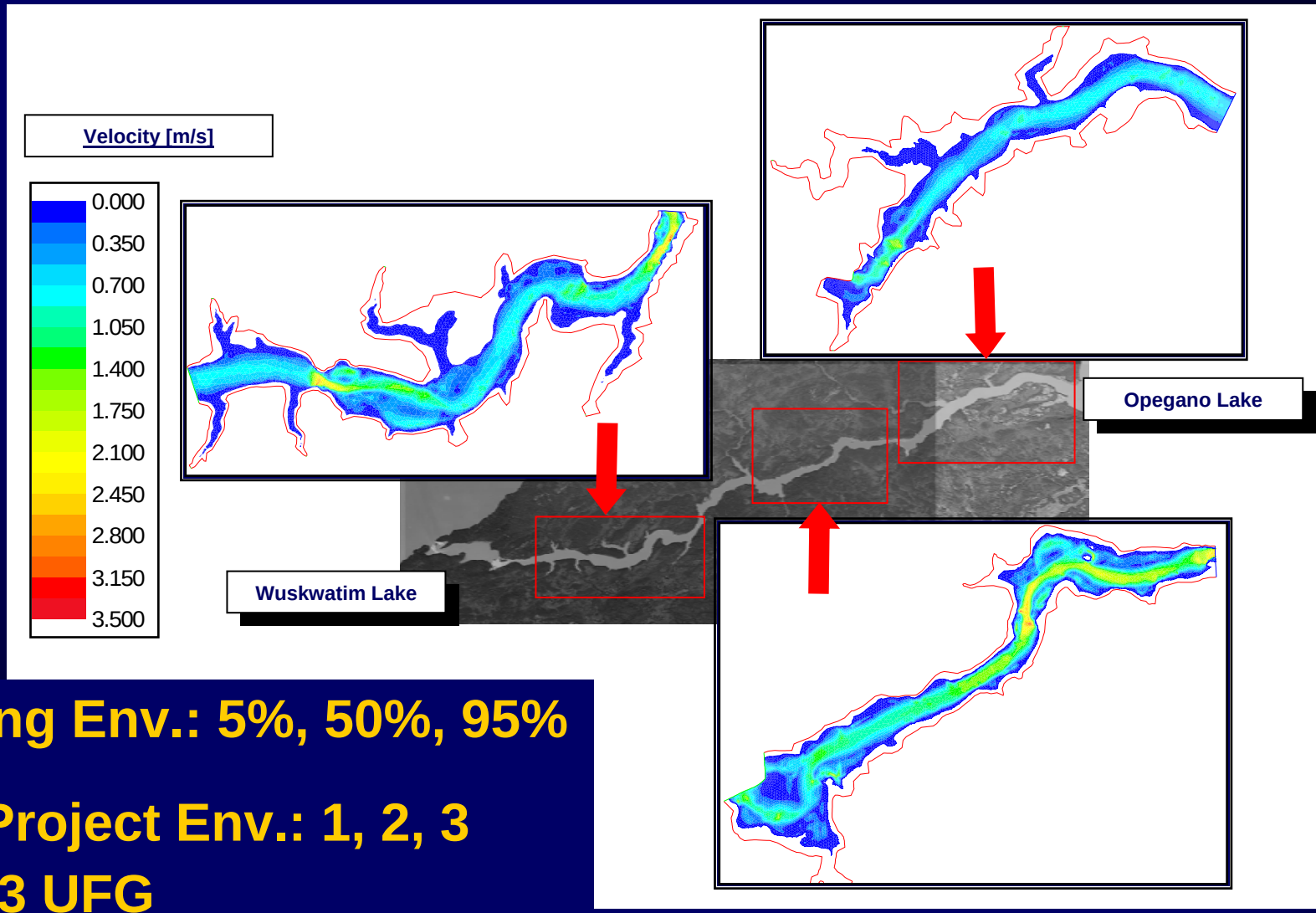
Ice Modelling



Velocity Distributions



- Existing Env.: 5%, 50%, 95%
- Post Project Env.: 1, 2, 3 UBG, 3 UFG

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Intermittently Exposed Zone

- Quantify area of habitat at various flows

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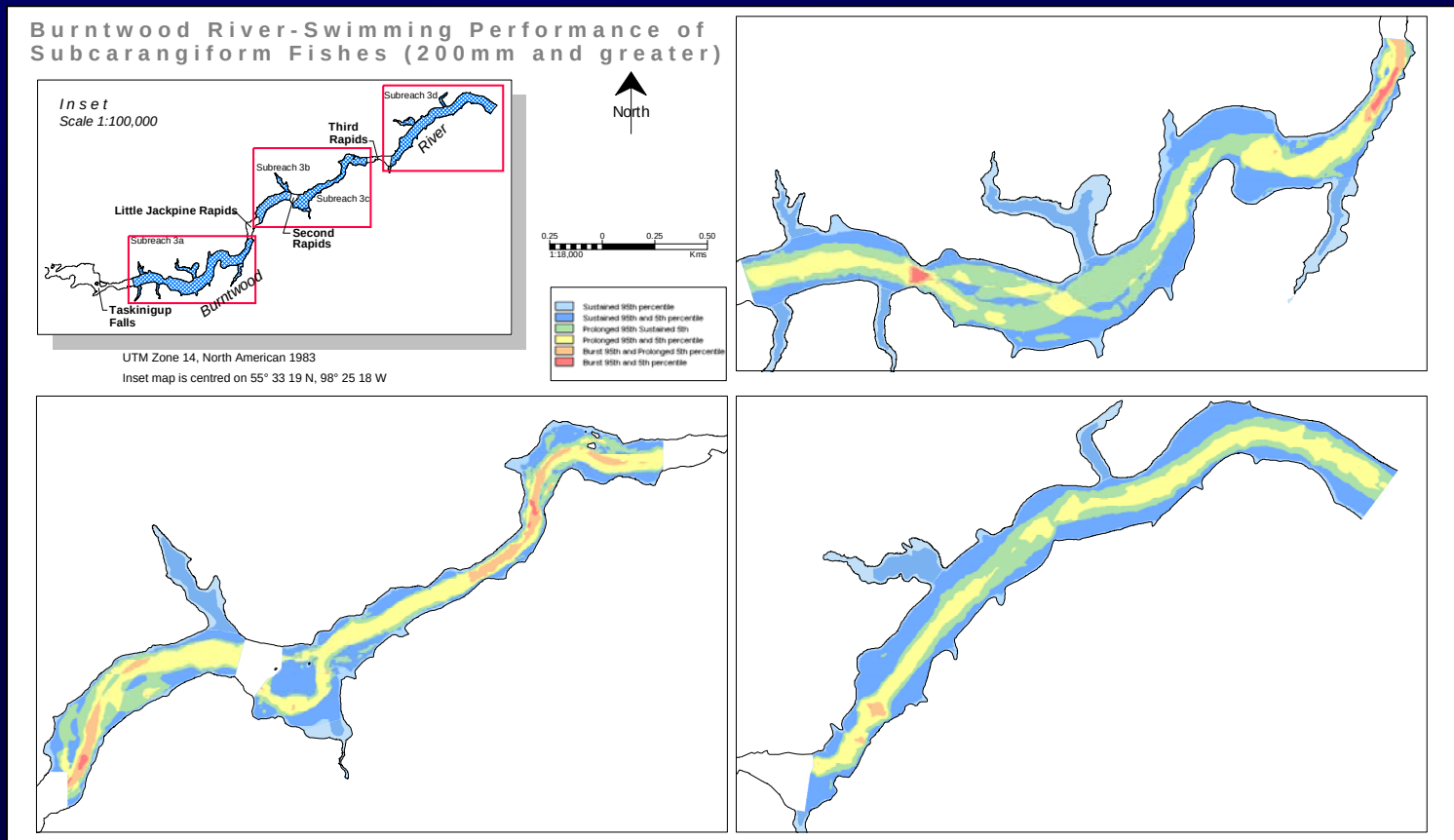
Velocity Distribution

- Fish entrainment
- Critical velocity thresholds for plants
- Swimming performance

Sustained 95th percentile
Sustained 95th and 5th percentile
Prolonged 95th Sustained 5th
Prolonged 95th and 5th percentile
Burst 95th and Prolonged 5th percentile
Burst 95th and 5th percentile



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Conclusions

- Hydraulic models were instrumental in developing the Wuskwatim GS Environmental Impact Statement
- Models are great tools for characterising Existing & Post Project Water Regimes
- Models developed information for other areas of environmental assessment

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Conclusions

- Clean Environment Commission (CEC) hearings completed recently – CEC recommended in favor of the project with some recommendation that Manitoba Hydro need to meet
- Pending on
  - DFO (Federal)
  - Navigable Water Protection Act (Federal)
  - Environment Act (provincial)
  - Water Power Act (provincial)

Thank you!

Manitoba Hydro Website: http://www.hydro.mb.ca
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Questions ?

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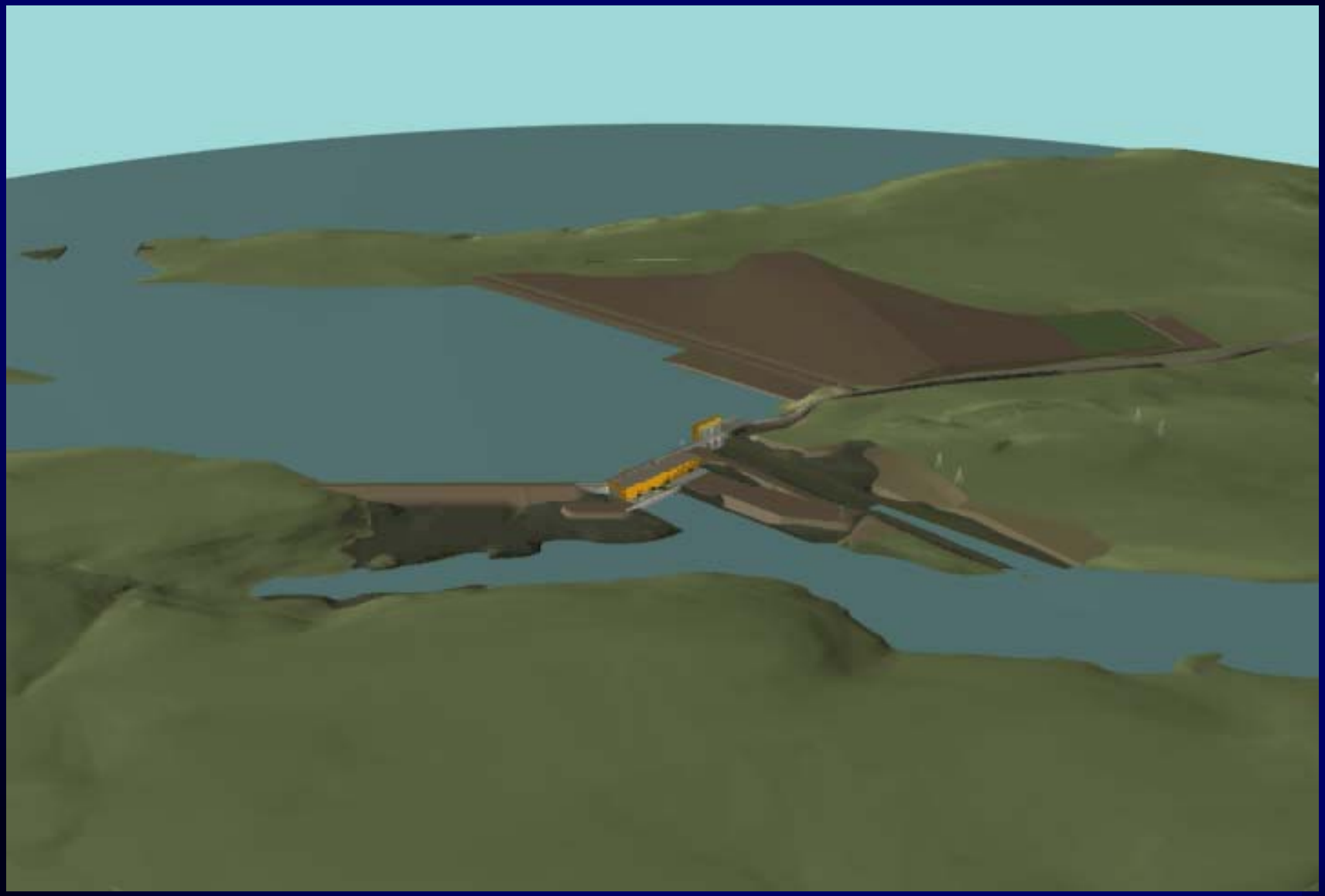
Questions?