

Bipole III Transmission Project

Clean Environment Commission
Public Hearings
Fall 2012
Pine Creek Watershed Study



Clean Environment Commission – Fall 2012 – Pine Creek Watershed Study

Outline

- Project Background
- Methodology & Scope
- Results
- Analysis/Conclusions
- Summary



Clean Environment Commission – Fall 2012 – Pine Creek Watershed Study

Project Background

- Manitoba Hydro is aware of concerns of potential Bipole III impacts to Pine Creek First Nation:
 - Wild Flora and Fauna Habitat
 - Vegetation Control
 - River Flooding
- To address concerns of river flooding, WRE undertook an analysis to assess potential Bipole III impacts to the local watershed.



Clean Environment Commission – Fall 2012 – Pine Creek Watershed Study

Project Methodology & Scope

- | | |
|---|--|
| <ul style="list-style-type: none"> • Preliminary Investigation • Delineate drainage basins and determine area impacted by clearing • Identify existing landcover along Bipole III ROW • Establish difference between existing and future runoff response within Bipole III ROW through literature review. | <ul style="list-style-type: none"> • Watershed Modelling • Develop computer model to simulate streamflow within the basin • Verify/validate model by comparison to observed streamflow data • Conduct sensitivity analysis changing landcover along Bipole III ROW to quantify basin sensitivity to flooding |
|---|--|



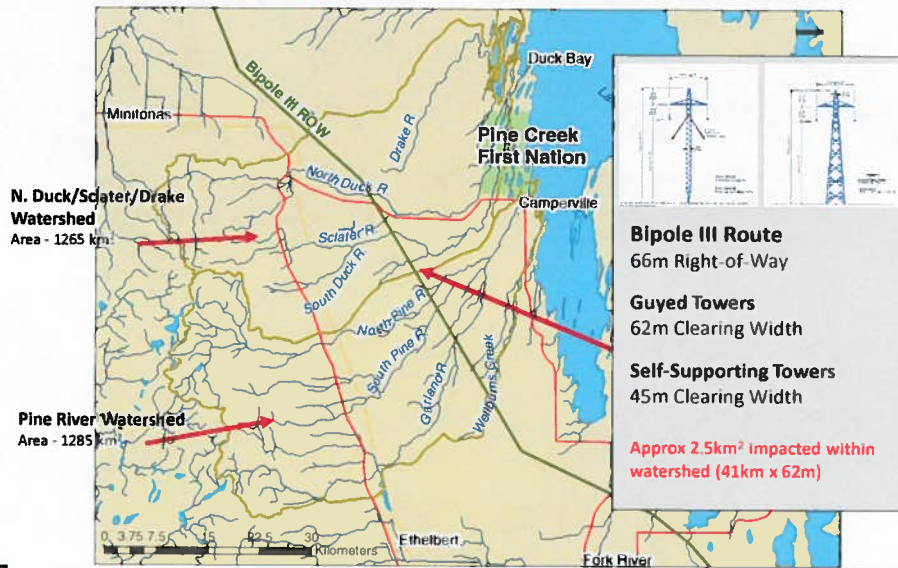
Clean Environment Commission – Fall 2012 – Pine Creek Watershed Study

Preliminary Analysis – Watershed



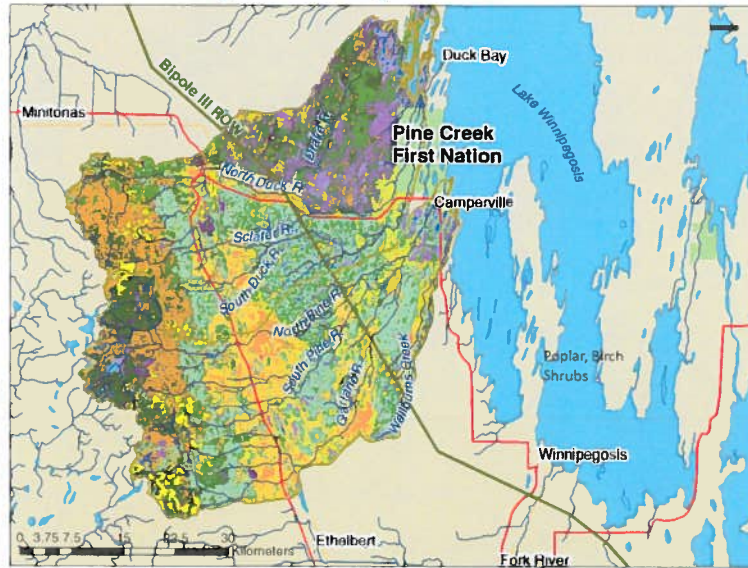
Clean Environment Commission – Fall 2012 – Pine Creek Watershed Study

Preliminary Analysis – Watershed



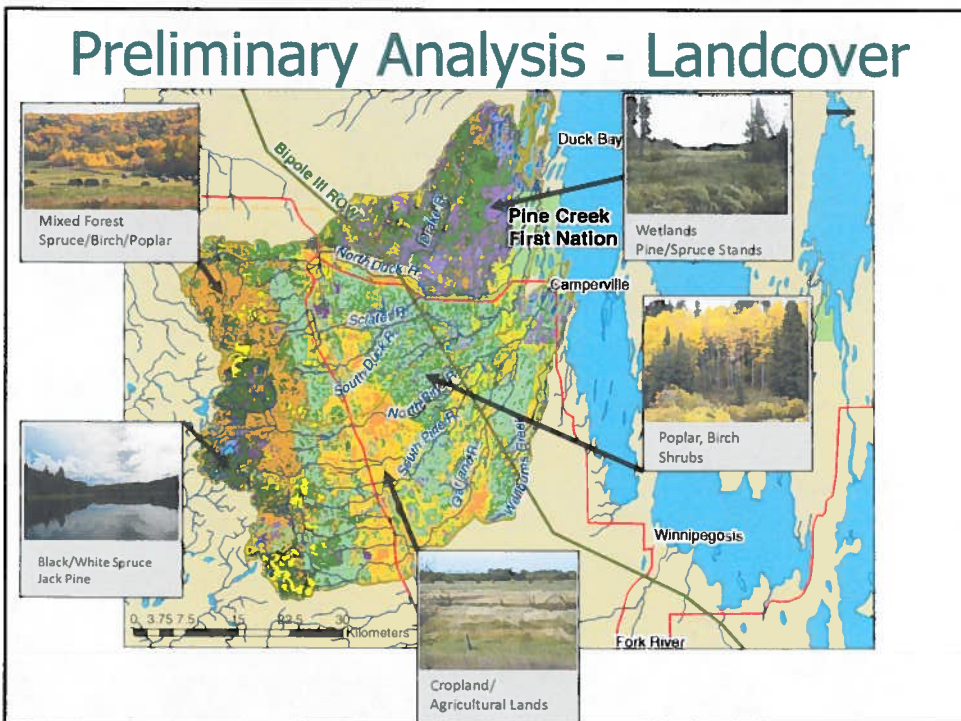
Clean Environment Commission – Fall 2012 – Pine Creek Watershed Study

Preliminary Analysis - Landcover



Clean Environment Commission – Fall 2012 – Pine Creek Watershed Study

Preliminary Analysis - Landcover



Effects of Tree Cutting on Runoff

- Scientific literature on tree cutting impacts:
 - Tree cutting increases runoff potential
 - Magnitude of runoff increase is proportional to area harvested
 - Cutting of 15-30% of a watershed is typically required to have a statistically significant increase in streamflow
 - Small watersheds are most sensitive to deforestation (>100km²). Larger basins have a less pronounced response
 - Extreme flood events are less sensitive to tree removal than average events.



Clean Environment Commission – Fall 2012 – Pine Creek Watershed Study

Summary of Preliminary Analysis

- Total watershed area reaching Pine Creek community is 2,550km²
- Bipole III ROW will require clearing of ~2.5km² within the basin (0.1% total drainage area)
- Area impacted by clearing is predominantly poplar forest (clearing of trees would be required)
- Local watershed is quite large and area cleared is relatively small, therefore negligible flooding effects are anticipated.

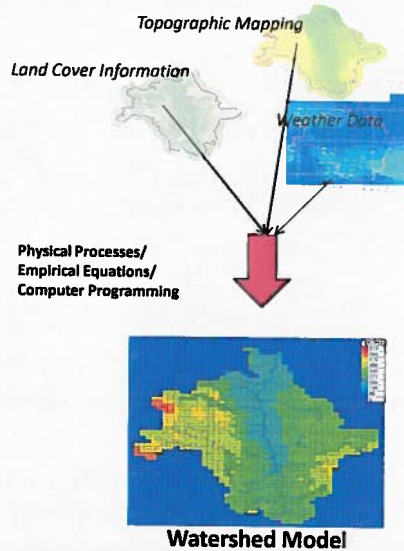


Clean Environment Commission – Fall 2012 – Pine Creek Watershed Study

Watershed Modelling

Sensitivity Analysis

- Develop watershed model for study area
- Calibrate/validate model to existing streamflow data
- Conduct Sensitivity analysis by changing landcover along Bipole III ROW, assuming **WORST CASE** effects (impervious land)
- Compare model results with/without clearing to determine magnitude of flooding impacts



Clean Environment Commission – Fall 2012 – Pine Creek Watershed Study

Watershed Model Development

Watershed Model

- WATFLOOD™ Hydrologic Model

Topographic Data

- LIDAR Survey of Watershed
- PFRA Stream Networks
- Provincial Drain Maps

Land Use Information

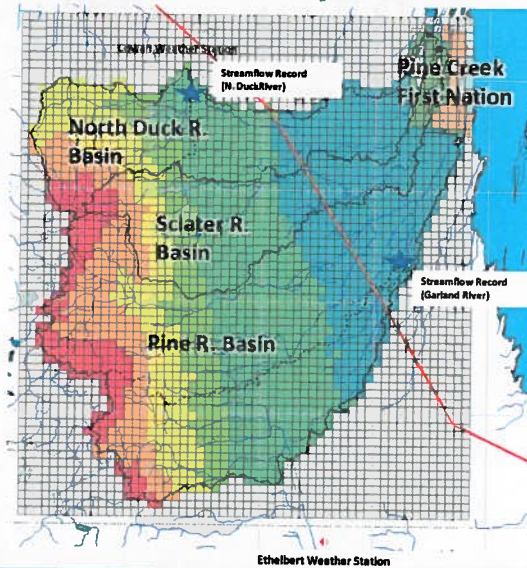
- EOSD circa 2000 Landcover Data

Weather Data

- Ethelbert, MB
- Cowan, MB
- Dauphin, MB
- Roblin, MB

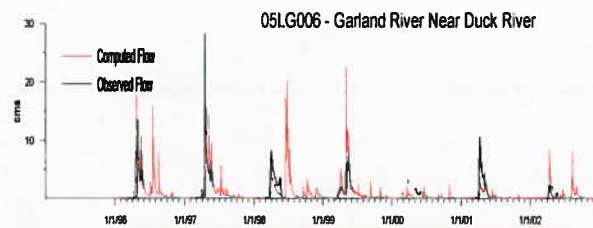
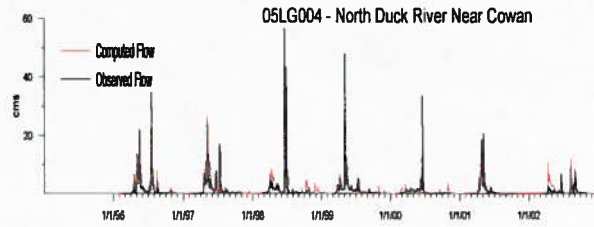
Streamflow Data

- 05LG004 – North Duck River Near Cowan
- 05LG006 – Garland River Near Duck River



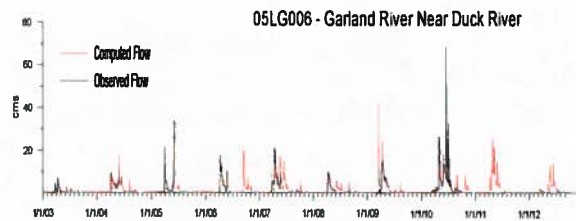
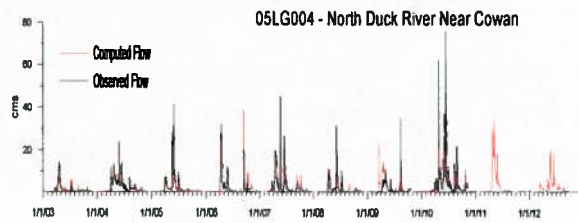
Clean Environment Commission – Fall 2012 – Pine Creek Watershed Study

Model Calibration



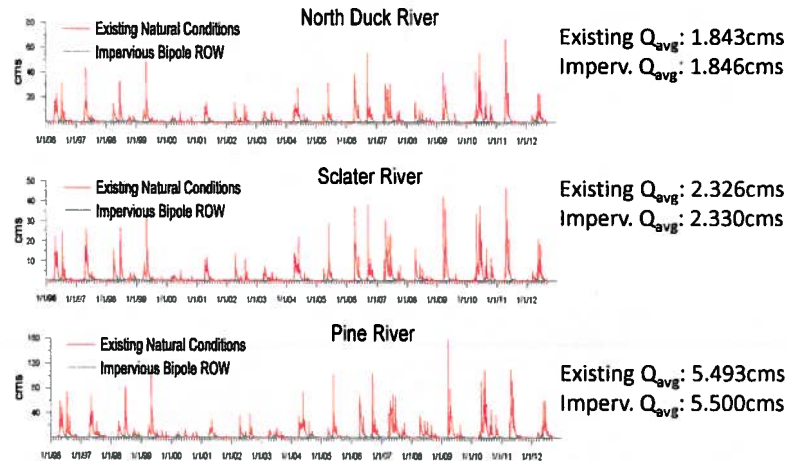
Clean Environment Commission – Fall 2012 – Pine Creek Watershed Study

Model Validation



Clean Environment Commission – Fall 2012 – Pine Creek Watershed Study

Sensitivity to Landcover Change



Clean Environment Commission – Fall 2012 – Pine Creek Watershed Study

Conclusions

- Area impacted by Bipole III is minimal
 - less than 0.1% of catchment area
- Modelling results show that streamflow reaching Pine Creek FN is not sensitive to Bipole III clearing activities due to minimal area impacted.
- Projected streamflow change is conservatively on the order of 0.001 m³/s
- Literature on forest hydrology supports results of watershed model results
- Measures in place to minimize disturbance
 - Buffer zones near stream crossings
 - Allowance for low growth vegetation



Clean Environment Commission – Fall 2012 – Pine Creek Watershed Study