General Water Licence Application
(Application for a new Water Licence)

Document Date: May 2011

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Month/Day/Year

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DOCUMENT MANAGEMENT

Original Document Date: April 2010

DOCUMENT AMENDMENTS

	Description	Date
(1)	Updated for public distribution as separate document from NWB Guide 4	June 2010
(2)	Updated NWB logos and reformatted table to allow rows to break across page	May 2011
(3)		
(4)		
(5)		
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GENERAL WATER LICENCE APPLICATION
(APPLICATION FOR NEW WATER LICENCE)

The applicant is referred to the NWB's Guide 4: *Guide to Completing and Submitting a Water Licence Application for a New Licence* for more information about this application form.

LICENCE NO:
(for NWB use only)

1. APPLICANT (PROPOSED LICENSEE) CONTACT INFORMATION (name, address)

Shawn Marshall
Department of Geography, University of Calgary
2500 University Dr NW, Calgary AB
T2N 1N4

Phone:403-220-4884
Fax: 403-282-6561
e-mail: shawn.marshall@ucalgary.ca

2. APPLICANT REPRESENTATIVE CONTACT INFORMATION if different from Block 1 (name, address)

Phone: _____
Fax: _____
e-mail: _____
(Attach authorization letter.)

3. NAME OF PROJECT (including the name of the project location)

Glacier-climate studies, Prince of Wales Icefield, Ellesmere Island

4. LOCATION OF UNDERTAKING

Project Extents

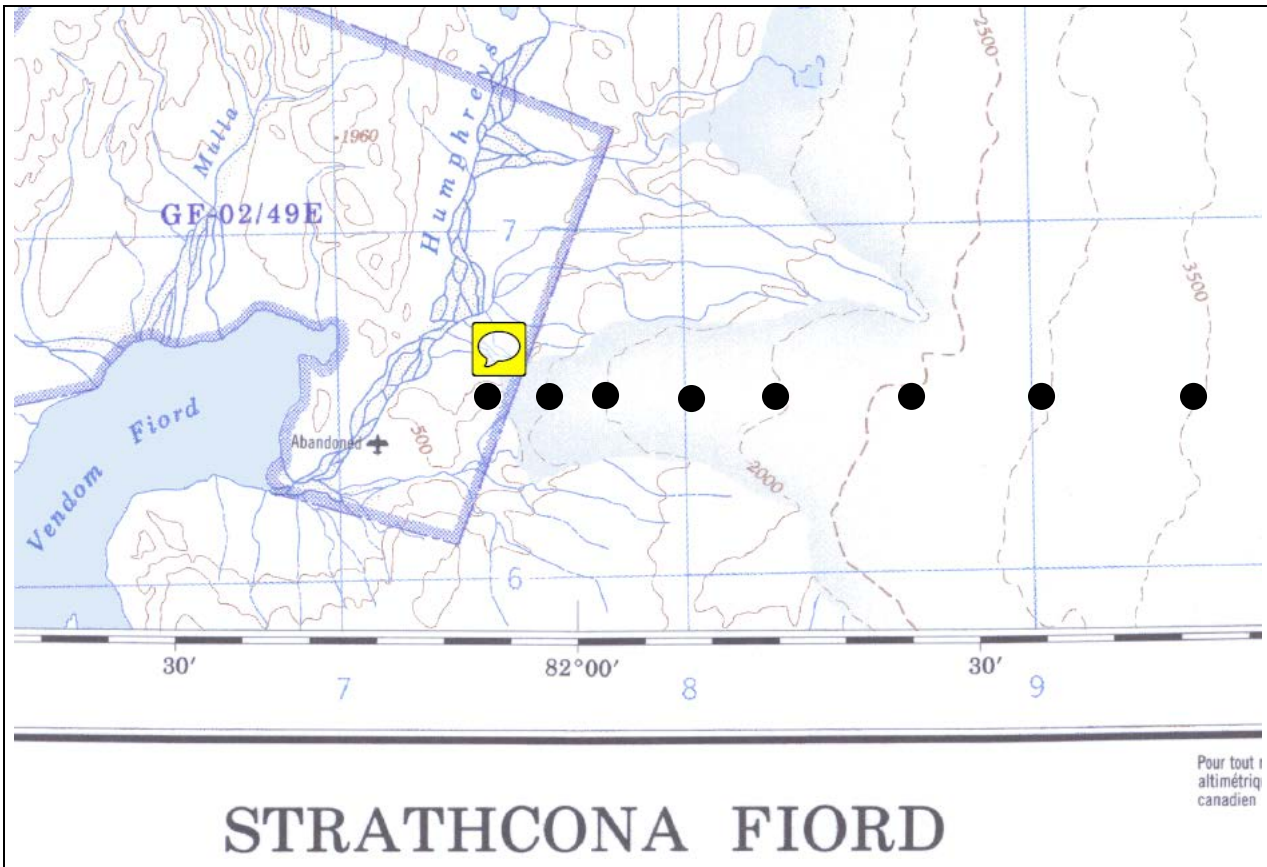
NW:	Latitude: (78 ° 5 ' " N)	Longitude: (82 ° 5' " W)
NE:	Latitude: (78 ° 5' " N)	Longitude: (80 ° 50' " W)
SE:	Latitude: (78 ° 0 ' " N)	Longitude: (80 ° 50' " W)
SW:	Latitude: (78 ° 0' " N)	Longitude: (82 ° 15' " W)

Camp Location(s)

Latitude: (78° 2' 50" N) Longitude: (82° 7' " W)

5. MAP - Attach a topographical map, indicating the main components of the undertaking.

NTS Map Sheet No.: 92E Map Name: Strathcona Fiord Map Scale: 1:250,000



STRATHCONA FIORD

Study Site. Cropped from NTS map sheet 49E and showing the 'Humphrey lobe' of the POW Icefield, the proposed field camp site on the icefield margin, and the landing strip for twin otter access. The research instruments (weather stations, melt poles) are indicated with the black circles. The proposed camp (the 'callout') is at 78°3′N and 82°7′W. Stream gauging of glacier runoff and atmospheric soundings will be done near the camp site.

6. NATURE OF INTEREST IN THE LAND - Check any of the following that are applicable to the proposed undertaking (at least one box under the 'Surface' header must be checked).

Sub-surface

☐ Mineral Lease from Nunavut Tunngavik Incorporated (NTI)
Date (expected date) of issuance: _____ Date of expiry: _____

☐ Mineral Lease from Indian and Northern Affairs Canada (INAC)
Date (expected date) of issuance: _____ Date of expiry: _____

Surface

X Crown Land Use Authorization from Indian and Northern Affairs Canada (INAC)
Date (expected date) of issuance: __May 2012___ Date of expiry: ___August 2012_____

X Inuit Owned Land (IOL) Authorization from Kitikmeot Inuit Association (KIA)
Date (expected date) of issuance: __May 2012___ Date of expiry: ___August 2012_____

☐ IOL Authorization from Kivalliq Inuit Association (KivIA)
Date (expected date) of issuance: _____ Date of expiry: _____

☐ IOL Authorization from Qikiqtani Inuit Association (QIA)
Date (expected date) of issuance: _____ Date of expiry: _____

☐ Commissioner's Land Use Authorization
Date (expected date) of issuance: _____ Date of expiry: _____

☐ Other: _____
Date (expected date) of issuance: _____ Date of expiry: _____

Name of entity(s) holding authorizations:
_____

7. NUNAVUT PLANNING COMMISSION (NPC) DETERMINATION

Indicate the land use planning area in which the project is located.

X North Baffin
☐ South Baffin
☐ Akunniq
☐ Keewatin
☐ Sanikiluaq
☐ West Kitikmeot

Is a land use plan conformity determination required?

X Yes ☐ No

If Yes, indicate date issued and attach copy ___March 28, 2012_____
If No, provide written confirmation from NPC confirming that a land use plan conformity review is not required.

Attached (NRI/NPC determination – further forwarded to NIRB)

8. NUNAVUT IMPACT REVIEW BOARD (NIRB) DETERMINATION

Is an Article 12 Part 4 screening determination required?

X Yes ☐ No Under evaluation whether required

If Yes, indicate date issued and attach copy
If No, provide written confirmation from NIRB confirming that a screening determination is not required.

pending (communication with Tara Arko)

9. DESCRIPTION OF UNDERTAKING – List and attach plans and drawings or project proposal.

Scientific Research.

Forecasts of glacier and ice sheet response to climate change require an understanding of ice-atmosphere interactions and feedbacks, and the proposed project will examine these on the Prince of Wales (POW) Icefield, Ellesmere Island. We will do this through: (i) measurements of energy balance fluxes and meltwater runoff from the icefield, and (ii) tethersonde (weather 'kite') measurements of temperature, humidity, and wind profiles in the lower atmosphere (up to 300 m).

We will be working on the southwest margin of the icefield, on the glacier and on adjacent lands.

Automatic weather stations will be deployed along a vertical transect in the POW icefield ablation zone, up top 1200 m altitude, to help quantify the meteorological gradients and energy fluxes. The transect spans about 800 m of elevation from the icefield margin to the interior accumulation area. These instruments will be installed in May and taken out in August, recording 30-minute data for the study period. Measurements of cloud conditions and lower-atmosphere humidity, temperature, and wind profiles will be made while in the field, using the tethersonde system. The tethersonde is a small weather balloon anchored to the ground, with up to 8 radiosonde instruments rigged to measure wind, temperature, pressure and humidity at different atmospheric heights. This instrument will be deployed two to four times daily from our camp on the glacier forefield, adjacent to the icefield margin. Visits in May and July will allow two ~10-day periods for this study, one in late spring and one during the heart of the summer melt season. We will also measure stream discharge from the sector of the icefield. The southwestern margin of POW icefield is well-suited for these studies, as there is a summer stream that drains the glacier here, access to the ice is safe and straightforward, and the Humphrey landing strip is nearby.

10. **OPTIONS** – Provide a brief explanation of the alternative methods or locations that were considered to carry out the project.

This icefield and camp site are well-suited to our research objectives, but if it is preferred we could place our temporary camp on the glacier rather than on adjacent lands. Our research group has worked on the icefield near here before, with weather data collected in 2001-2003 that indicates strong ice-marginal warming at this site. We also saw this on the northwestern margin of the icefield, which could be an alternate site with respect to our research goals. The Humphrey site on the southwestern margin is logistically preferable due to the proximal landing strip. It is also closer to Resolute.

11. **CLASSIFICATION OF PRIMARY UNDERTAKING -** Indicate the primary classification of undertaking by checking one of the following boxes.

☐ Industrial ☐ Agricultural
☐ Mining and Milling (includes exploration/drilling/exploration camps)
☐ Conservation
☐ Municipal (includes camps/lodges) ☐ Recreational
☐ Power X Miscellaneous (describe below):
___scientific research _____

See Schedule II of *Northwest Territories Waters Regulations* for Description of Undertakings.

Information in accordance with applicable Supplemental Information Guidelines (SIG) must be submitted with a New Water Licence Application. Indicate SIG(s) applicable to your application.

☐ Hydrostatic Testing
☐ Tannery
X Tourist / Remote Camp
☐ Landfarm & On-Site Storage of Hydrocarbon Contaminated Soil
☐ Onshore Oil and Gas Exploration Drilling
☐ Mineral Exploration / Remote Camp
☐ Advanced Exploration
☐ Mine Development
☐ Municipal

☐ General Water Works
☐ Power

12. **WATER USE -** Check the appropriate box(s) to indicate the type(s) of water use(s) being applied for.

X To obtain water for camp/ municipal purposes
☐ To obtain water for industrial purposes
☐ To cross a watercourse
☐ To alter the flow of, or store water
☐ Other: _____
☐ To divert a watercourse
☐ To modify the bed or bank of a watercourse
☐ Flood control

13. **QUANTITY AND QUALITY OF WATER INVOLVED -** For each type of water use indicated in Block 12, provide the source of water, the quality of the water source and available capacity, the estimated quantity to be used in cubic meters per day, method of extraction, as well as the quantities and qualities of water to be returned to source.

Name of water source(s) (show location(s) on map):
Snowmelt (May) and glacier streams (July); the stream water will be collected from the glacier terminus, above where it feeds into Humphrey River

Describe the quality of the water source(s) and the available capacity: _____
High quality freshwater (snowmelt, glacier runoff); capacity greatly exceeds our needs for camp sustenance (cooking, drinking water, cleaning)

Provide the overall estimated quantity of water to be used: 0.03 m^3/day

Provide the estimated quantity(s) of water to be used from each source:
May: all from snow melt; July: all from the stream

Indicate the estimated quantities to be used for each purpose (camp, drilling, etc.)
all for camp use

Describe the method of extraction(s): Dipping a pot or water bottle into the stream

Estimated quantity(s) of water returned to source(s) 0 m^3/day

Describe the quality of water(s) returned to source(s): ___n/a_____
_____

14. **WASTE** – Check the appropriate box(s) to indicate the types of waste(s) generated and deposited.

X Sewage
X Solid Waste
☐ Hazardous
☐ Bulky Items/Scrap Metal
☐ Animal Waste
☐ Waste oil
X Greywater
☐ Sludges
☐ Contaminated soil and/or water
☐ Other (describe): _____

15. **QUANTITY AND QUALITY OF WASTE INVOLVED** – For each type of waste indicated in Block 14, describe its composition, quantity in cubic meters/day, method of treatment and method of disposal.

Type of Waste	Composition	Quantity Generated	Treatment Method	Disposal Method

Garbage	Paper, plastic, organics	c. 0.05 m^3/day	n/a	Shipped out at end of season
Sewage/ human waste		0.002 m^3/day	Portable toilet	Shipped out at end of season
Greywater	From cooking, dishes	0.005 m^3/day	n/a	Poured into the soil/snow, away from any surface water

16. OTHER AUTHORIZATIONS – In addition to the sub-surface and surface land use authorizations provided in Block 6, indicate any other authorizations required in relation to the proposed undertaking. For each provide the following:

Authorization: Research and land use permits

Administering Agency: Nunavut Research Institute, NIRB, KIA, PCSP, AANDC

Project Activity: Glacier-Climate Research

Date (expected date) of issuance: May 2012 Date of expiry: August 2012

17. PREDICTED ENVIRONMENTAL IMPACTS OF UNDERTAKING AND PROPOSED MITIGATION MEASURES - Describe direct, indirect, and cumulative impacts related to water and waste.

No permanent structures are needed. We will establish a temporary (tent) camp at the glacier margin and all equipment and supplies will be flown in and out in summer 2012. Camp will consist of four tents, we will cook from propane-burning Coleman stoves, and we will drink local water (snow melt and glacier runoff). We will be using a portable backcountry toilet, and all waste will be flown out. Travel on-site will be on foot and ski, pulling pulks to transport gear on and off the glacier. The glacier margin is too steep for snowmobile access on and off, but it is a straightforward hike (requiring the field crew to have experience in roped glacier travel). This study is planned for summer 2012 only, and we will leave the site as we found it.

18. WATER RIGHTS OF EXISTING AND OTHER USERS OF WATER

Provide the names, addresses and nature of use for any known persons or properties that may be adversely affected by the proposed undertaking, including those that hold licences for water use in precedent to the application, domestic users, in-stream users, authorized waste depositors, owners of property, occupiers of property, and/or holders of outfitting concessions, registered trapline holders, and holders of other rights of a similar nature.

Advise the Board if compensation has been paid and/or agreement(s) for compensation have been reached with any existing or other users.

No concerns here, to our knowledge; no impacts on anyone.

19. INUIT WATER RIGHTS

Advise the Board of any substantial affect of the quality, quantity or flow of waters flowing through Inuit Owned Land (IOL), and advise the Board if negotiations have commenced or an agreement to pay compensation for any loss or damage has been reached with one or more Designated Inuit Organization (DIO).

No impacts on water quality or quantity.

20. CONSULTATION – Provide a summary of any consultation meetings including when the meetings were held, where and with whom. Include a list of concerns expressed and measures to address concerns.

No consultation meetings held; we are very small scale and far removed from settlements. We have spoken with Qikiqtani Inuit Association and submitted a land use application.

21. SECURITY INFORMATION

Provide an estimate of the total financial security for final reclamation equal to the total outstanding reclamation liability for land and water combined sufficient to cover the highest liability over the life of the undertaking. Estimates of reclamation costs must be based on the cost of having the necessary reclamation work done by a third party contractor if the operator defaults. The estimate must also include contingency factors appropriate to the particular work to be undertaken.

Where applicable, the financial security assessment should be prepared in a manner consistent with the principals respecting mine site reclamation and implementation found in the *Mine Site Reclamation Policy for Nunavut,* Indian and Northern Affairs Canada, 2002.

No reclamation necessary.

22. FINANCIAL INFORMATION

Provide a statement of financial responsibility.
If the applicant is a business entity, provide a list of the officers of the company.
If the applicant is a business entity attach a copy of the Certificate of Incorporation or evidence of registration of the company name.

Any financial liability, e.g. accidents, will be the responsibility of the principal researcher, Shawn Marshall, the University of Calgary, and the supporting federal science agency, Polar Continental Shelf Project, which is providing logistics.

23. STUDIES UNDERTAKEN TO DATE - List and attach copies of studies, reports, research, etc.

I carried out glacier-climate and ice core research on Prince of Wales Icefield in previous seasons: 2001-2003, 2005, and 2007. Publications arising from this research (available on request):

MSc thesis of Vivian Wasiuta (2007) and PhD thesis of Tara Moran (2011)

Moran, T.A., S.J. Marshall and M.J. Sharp, 2011. Isotope thermometry in melt-affected ice cores. *Journal of Geophysical Research*, 116 (F02010), doi:10.1029/2010JF001738.

Gardner, A.S., M.J. Sharp, R.M. Koerner, C. Labine, S. Boon, S.J. Marshall, D.O. Burgess, and D. Lewis, 2009. Near-surface temperature lapse rates over Arctic glaciers and their implications for temperature downscaling. *Journal of Climate*, 22, 4281-4298.

Mair, D., D. Burgess, M.J. Sharp, J. Dowdeswell, T. Benham, S.J. Marshall, and F. Cawkwell, 2009. Mass balance of the Prince of Wales Icefield, Ellesmere Island, Nunavut, Canada. *Journal of Geophysical*

Research, 114, F02011.

Marshall, S.J. and M.J. Sharp, 2009. Temperature and melt modelling on the Prince of Wales Icefield, Canadian High Arctic. *Journal of Climate*, 22 (6), 1454-1468.

Moran, T.A. and S.J. Marshall, 2009. Effects of meltwater percolation on stable isotope stratigraphy in a high Arctic snowpack. *Journal of Glaciology*, 55 (194), 1012-1024.

Marshall, S.J., M.J. Sharp, D.O. Burgess and F.S. Anslow, 2007. Near-surface temperature lapse rate variability on the Prince of Wales Icefield, Ellesmere Island, Nunavut: Implications for regional-scale temperature downscaling. *International Journal of Climatology*, 27 (3), 385-398.

Wasiuta, V.L., A.-L. Norman and S.J. Marshall, 2006. Spatial patterns and seasonal variation of snowpack sulphate isotopes of the Prince of Wales Icefield, Ellesmere Island. *Annals of Glaciology*, 43, 390-396.

24. PROPOSED TIME SCHEDULE – Indicate the proposed start and completion dates for each applicable phase of development (construction, operation, closure, and post closure).

Construction
Proposed Start Date: _____ (month/year) Proposed Completion Date: _____ (month/year)

Operation
Proposed Start Date: _____May/2012_____ (month/year) Proposed Completion Date: _____August/2012___ (month/year)

Closure
Proposed Start Date: _____ (month/year) Proposed Completion Date: _____ (month/year)

Post - Closure
Proposed Start Date: _____ (month/year) Proposed Completion Date: _____ (month/year)

For each applicable phase of development indicate which season(s) activities occur.

Construction
☐ Winter ☐ Spring ☐ Summer ☐ Fall ☐ All season

Operation
☐ Winter X Spring X Summer ☐ Fall ☐ All season

Closure
☐ Winter ☐ Spring ☐ Summer ☐ Fall ☐ All season

Post - Closure
☐ Winter ☐ Spring ☐ Summer ☐ Fall ☐ All season

25. PROPOSED TERM OF LICENCE

Number of years (maximum of 25 years): _____1____ years

Requested Date of Issuance: ___May/2012_____ (month/year) Requested Expiry Date: ___August/2012___ (month/year)

(The requested date of issuance must be at least three (3) months from the date of application for a type B water licence and at least one (1) year from the date of application for a type A water licence, to allow for processing of the water licence application. These timeframes are approximate and do not account for the time to complete any pre-licensing land use planning or development impact requirements, time for the applicant to prepare and submit a water

licence application in accordance with any project specific guidelines issued by the NWB, or the time for the applicant to respond to requests for additional information. See the NWB's *Guide 5: Processing Water Licence Applications* for more information)

26. ANNUAL REPORTING – If not using the NWB's *Standardized Form for Annual Reporting*, provide details regarding the content of annual reports and a proposed outline or template of the annual report.

Final reporting to NRI and PCSP is done annually, including translation to Inuktitut. I would propose that a copy of this report, due in Fall 2012, be sent on to NWB to summarize the research/operations results and to confirm completion of the study and cleanup of the site. I am happy to comply with any additional reporting requests for the NWB.

27. CHECKLIST – The following must be included with the application for the water licensing process to begin.

Written confirmation from the NPC confirming that NPC's requirements regarding land use plan conformity have been addressed.

X Yes ☐ No If no, date expected _____

Written confirmation from the NIRB confirming that NIRB's requirements regarding development impact assessment have been addressed.

☐ Yes X No If no, date expected ___April 20, 2012_____

Completed General Water Licence Application form.

X Yes ☐ No If no, date expected _____

Information addressing Supplemental Information Guideline (SIG) , where applicable (see Block 11)

☐ Yes X No If no, date expected _____

English Summary of Application.

X Yes ☐ No If no, date expected _____

Inuktitut and/or Inuinnaqtun Summary of Application.

X Yes ☐ No If no, date expected _____

Application Fee of $30.00 CDN (Payee Receiver General for Canada).

☐ Yes X No If no, date expected ___sent separately by mail__

Water Use Fee Deposit of $30.00 CDN (Payee Receiver General for Canada). The actual water use fee will be calculated by the NWB based upon the amount of water authorized for use in accordance with the Regulations at the time of issuance of the licence.

☐ Yes X No If no, date expected _____ sent separately by mail _

28. SIGNATURE

Shawn Marshall	Professor, University of Calgary		April 3, 2012
Name (Print)	Title (Print)	Signature	Date