GLWB Technical Session
Town Of Inuvik
Municipal Water Licence Renewal (G17L3-001)

Thursday April 27, 2017

AlecSandra Macdonald
GLWB Regulatory Specialist

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Agenda

AGENDA	
9:30 – 9:45 am	Opening & Introductions
9:45 am -10:45 am	SNP Monitoring: Station Locations and Parameter Selections
10:45 am – 11:00 am	Health Break
11:00 am -12:00 pm	O/M Manual Updates and Hazardous Waste Management
12:00 pm – 1:00 pm	Lunch Break
1:00 pm – 2:00pm	Bears: Landfill and Deterrents
2:00 pm – 2:15 pm	Health Break
2:15 pm – 3:15 pm	Climate Change and Permafrost Mitigation
3:15 pm – 4:00 pm	Open Floor & Meeting Closure

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9:45 - 10:45

SNP Monitoring: Station Locations and Parameters

SNP Monitoring

- SNP Overview
- Recommendations and Discussion: Sampling Locations
- Recommendations and Discussion: Effluent Quality Criteria

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Surveillance Network Program (SNP)

- Surface water monitoring
- Measures water quality at point of discharge into receiving environment
  - Lagoon effluent (point of compliance)
  - Landfill leachate
- Monitor nearby control locations for comparison
- Measure water use

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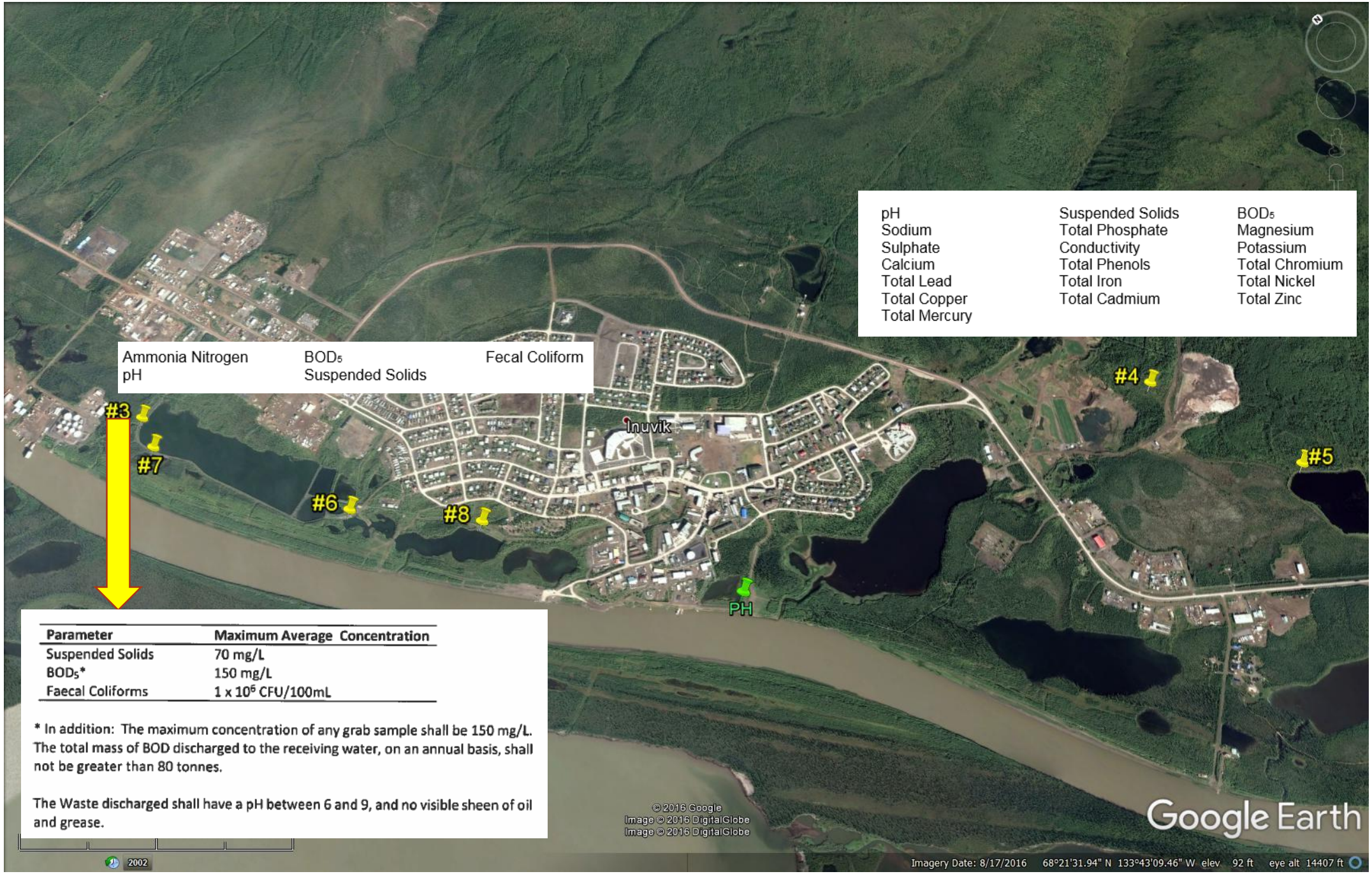
pH
Sodium
Sulphate
Calcium
Total Lead
Total Copper
Total Mercury
Suspended Solids
Total Phosphate
Conductivity
Total Phenols
Total Iron
Total Cadmium
BOD5
Magnesium
Potassium
Total Chromium
Total Nickel
Total Zinc
Ammonia Nitrogen
pH
BOD5
Suspended Solids
Fecal Coliform
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Parameter | Maximum Average Concentration
Suspended Solids | 70 mg/L
BOD5* | 150 mg/L
Faecal Coliforms | 1 x 10^6 CFU/100mL
* In addition: The maximum concentration of any grab sample shall be 150 mg/L. The total mass of BOD discharged to the receiving water, on an annual basis, shall not be greater than 80 tonnes.
The Waste discharged shall have a pH between 6 and 9, and no visible sheen of oil and grease.
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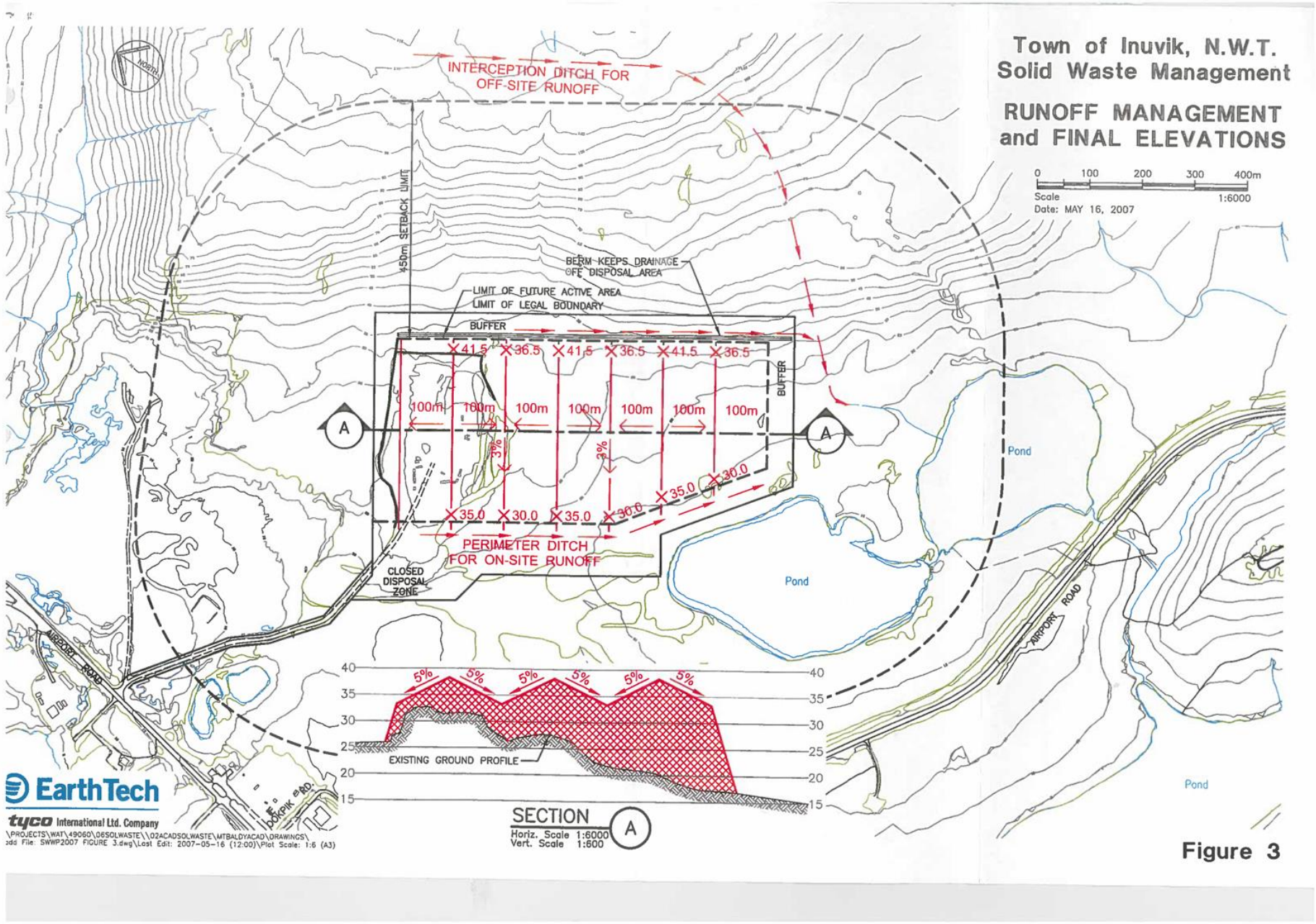
Town of Inuvik, N.W.T.
Solid Waste Management
RUNOFF MANAGEMENT
and FINAL ELEVATIONS
EarthTech
SECTION
Figure 3


Town of Inuvik, N.W.T.
Solid Waste Management
RUNOFF MANAGEMENT
and FINAL ELEVATIONS
0 100 200 300 400m
Scale 1:6000
Date: MAY 16, 2007
INTERCEPTION DITCH FOR OFF-SITE RUNOFF
450m SETBACK LIMIT
BERM KEEPS DRAINAGE OFF DISPOSAL AREA
LIMIT OF FUTURE ACTIVE AREA
LIMIT OF LEGAL BOUNDARY
BUFFER
41.5 36.5 41.5 36.5 41.5 36.5
100m 100m 100m 100m 100m 100m 100m
3% 3%
35.0 30.0 35.0 30.0 35.0 30.0
PERIMETER DITCH FOR ON-SITE RUNOFF
CLOSED DISPOSAL ZONE
Pond
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AIRPORT ROAD
HOKPIK RD.
5% 5% 5% 5% 5% 5%
EXISTING GROUND PROFILE
40 35 30 25 20 15
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EarthTech
tyco International Ltd. Company
\PROJECTS\WAT\49060\06SOLWASTE\\02ACADSOLWASTE\MTBALDYACAD\DRAWINGS\
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Figure 3


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Town of Inuvik, N.W.T.
Solid Waste Management
RUNOFF MANAGEMENT
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EarthTech
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Figure 3


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ISSUED FOR TENDER
C100
LOCATION PLAN
Town of Inuvik, N.W.T.
Solid Waste Management
RUNOFF MANAGEMENT
and FINAL ELEVATIONS
SECTION
Figure 3
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HIDDEN LAKE
EXISTING WATER INTAKE BUILDING
EXISTING WATER TREATMENT BUILDING
PROPOSED EXPANSION TO WATER TREATMENT BUILDING
EXISTING BACKWASH LINE
EXISTING WATER INTAKE
DUCK LAKE
PROPOSED WATER INTAKE LINE FROM INTAKE PUMPHOUSE TO WATER TREATMENT PLANT
PROPOSED INTAKE PUMPHOUSE LOCATION
PROPOSED SEASONAL FILL LINE LOCATION
MACKENZIE RIVER
PROPOSED WATER INTAKE LINE LOCATION
TOWN OF INUVIK
TOWN OF INUVIK
1:30000
Conditions of Use
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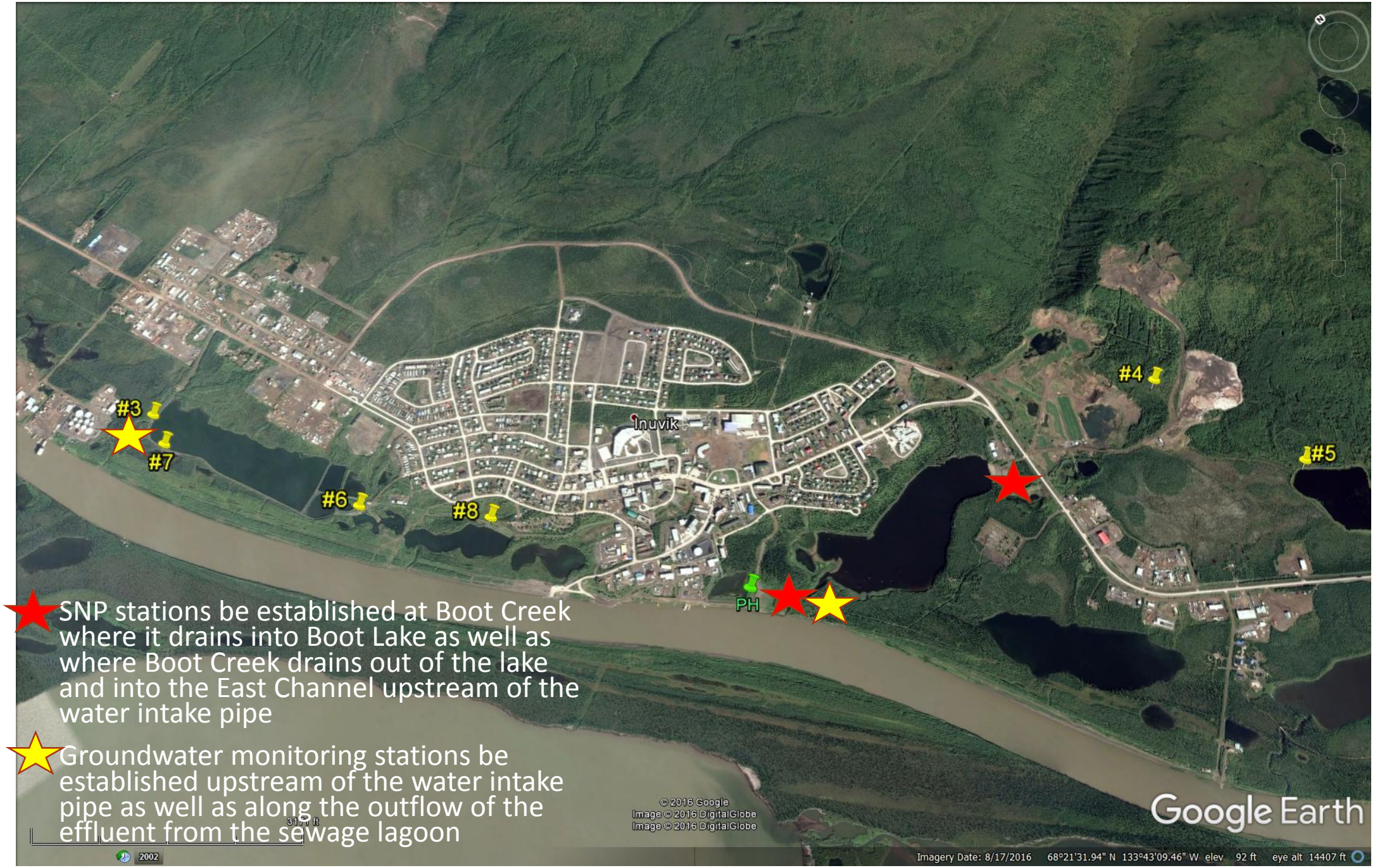
PERMIT NUMBER P 010
DILLON CONSULTING LIMITED
REGISTERED PROFESSIONAL ENGINEER
B. MUELLER
NWT.
ISSUED FOR TENDER
DILLON CONSULTING
B RENDITION (RE-DESIGN) 11/06/14 MAW/BWM
A RENDER 05/30/2014 DML/GA
1 REVIEW 11/12/13 JGA
0 DESIGN STATEMENT 06/12/13 JGA
DESIGN TPW
REVIEWED BY GG
DRAWN TPW
CHECKED BY BWM
DATE NOVEMBER 2014
SCALE AS SHOWN
INUVIK WATER TREATMENT PLANT
TOWN OF INUVIK
PROJECT NO. 126732
CIVIL WORKS
LOCATION PLAN
SHEET NO. C100
DILLON CONSULTING LIMITED 4920 47TH STREET, YELLOWKNIFE, NORTHWEST TERRITORIES, X1A 2P1 PHONE (867) 920-4555 FAX (867) 873-3328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PH
SNP stations be established at Boot Creek where it drains into Boot Lake as well as where Boot Creek drains out of the lake and into the East Channel upstream of the water intake pipe
Groundwater monitoring stations be established upstream of the water intake pipe as well as along the outflow of the effluent from the sewage lagoon
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Imagery Date: 8/17/2016 68°21'31.94" N 133°43'09.46" W elev 92 ft eye alt 14407 ft

Discussion: SNP Stations

- Are current locations appropriate?
- Are SNP stations at Boot Lake warranted?
- Should groundwater monitoring be required?

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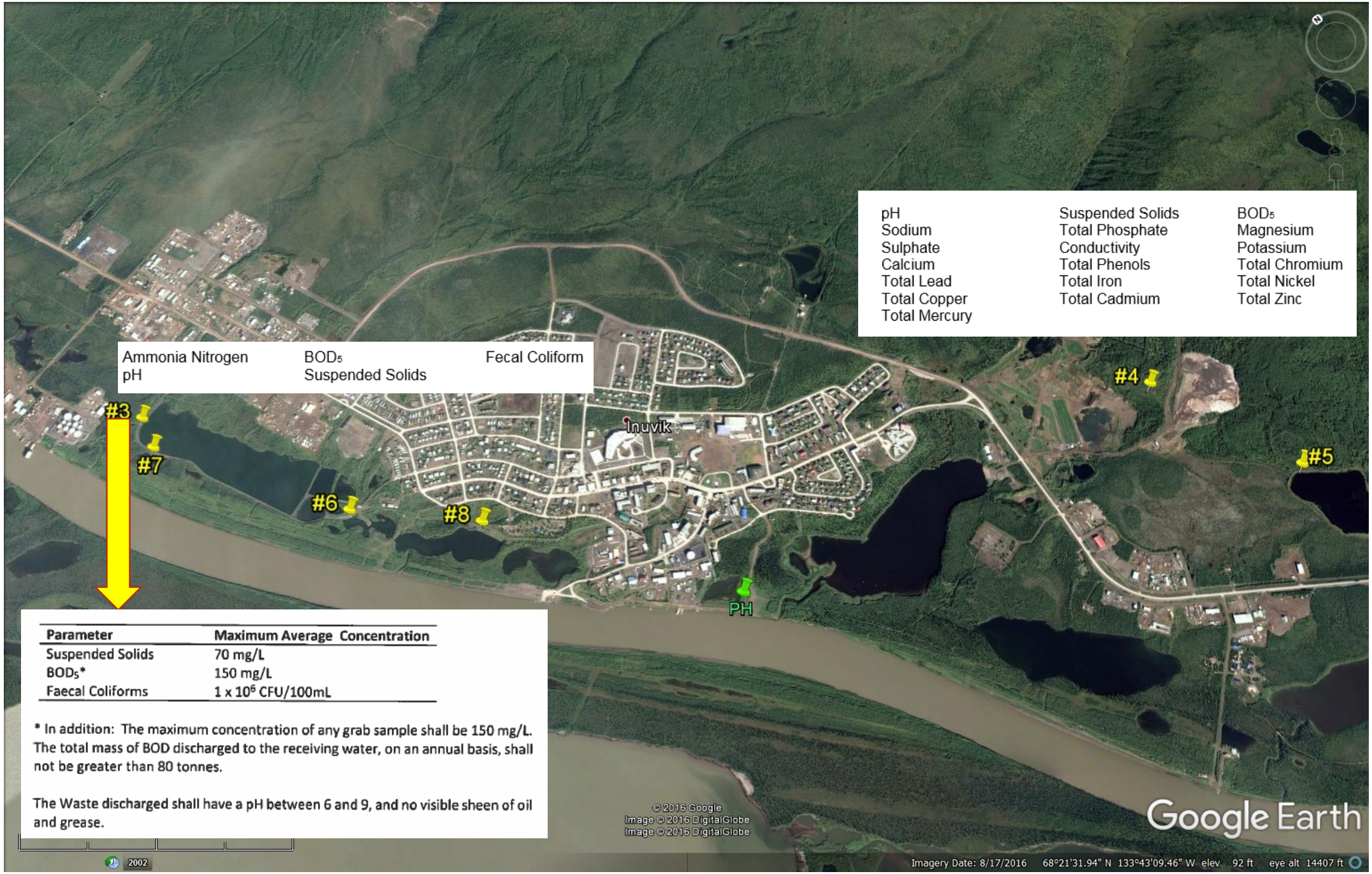
pH
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Total Phosphate
Conductivity
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Total Iron
Total Cadmium
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Google Earth
2002
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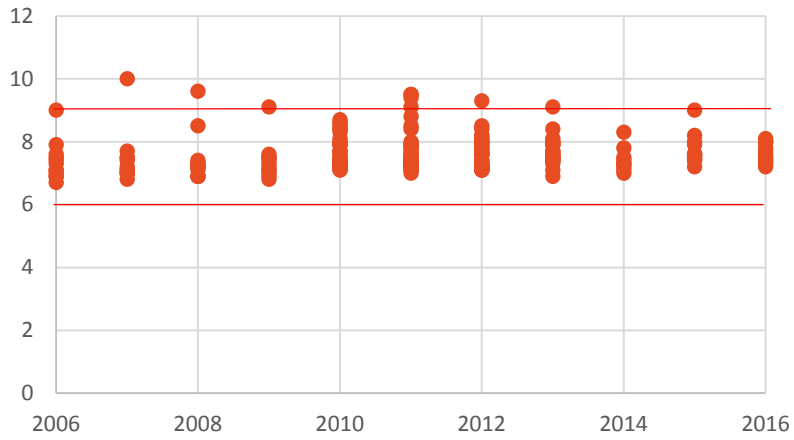
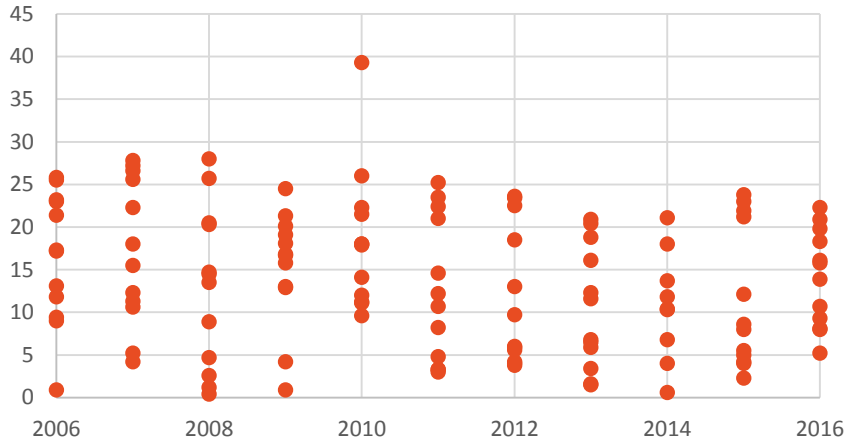
SNP #3 (Sewage lagoon discharge) 2006 - 2016

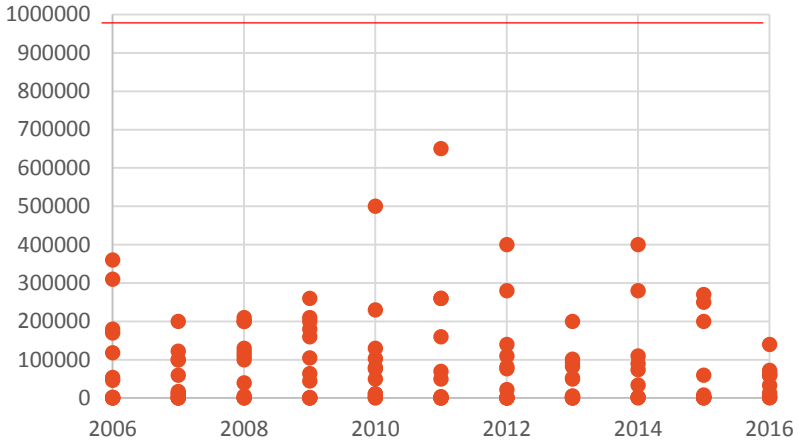
pH



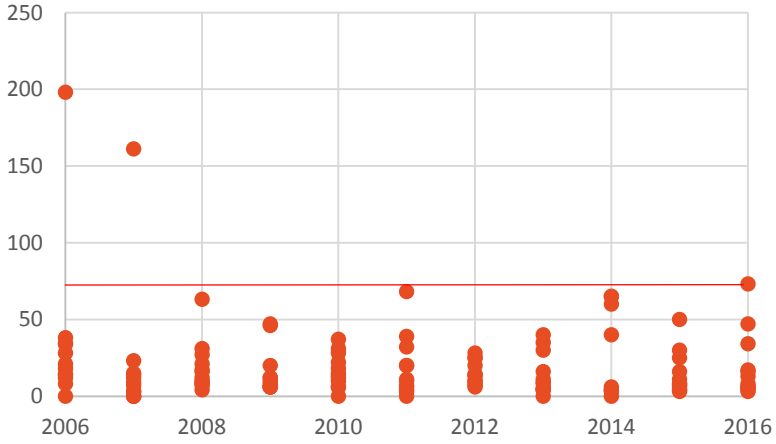
Ammonia



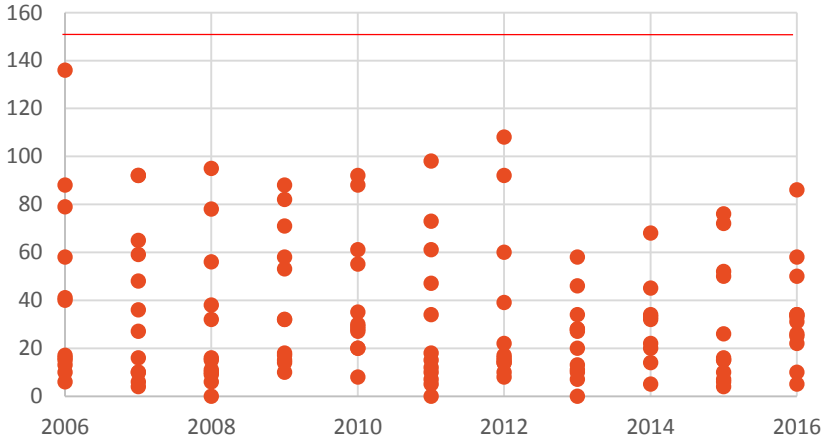
Faecal Coliform



Suspended Solids



BOD5



Parameter	Maximum Average Concentration
Suspended Solids	70 mg/L
BOD_5*	150 mg/L
Faecal Coliforms	1 x 10^5 CFU/100mL

* In addition: The maximum concentration of any grab sample shall be 150 mg/L. The total mass of BOD discharged to the receiving water, on an annual basis, shall not be greater than 80 tonnes.

The Waste discharged shall have a pH between 6 and 9, and no visible sheen of oil and grease.

Recommendations: CBOD/BOD

- ENR: Set CBOD at 90% of BOD_5 (reflecting trends of monitoring programs taken place in other communities)
- TOI: Monitor both parameters for a given period of time to establish a site specific ratio

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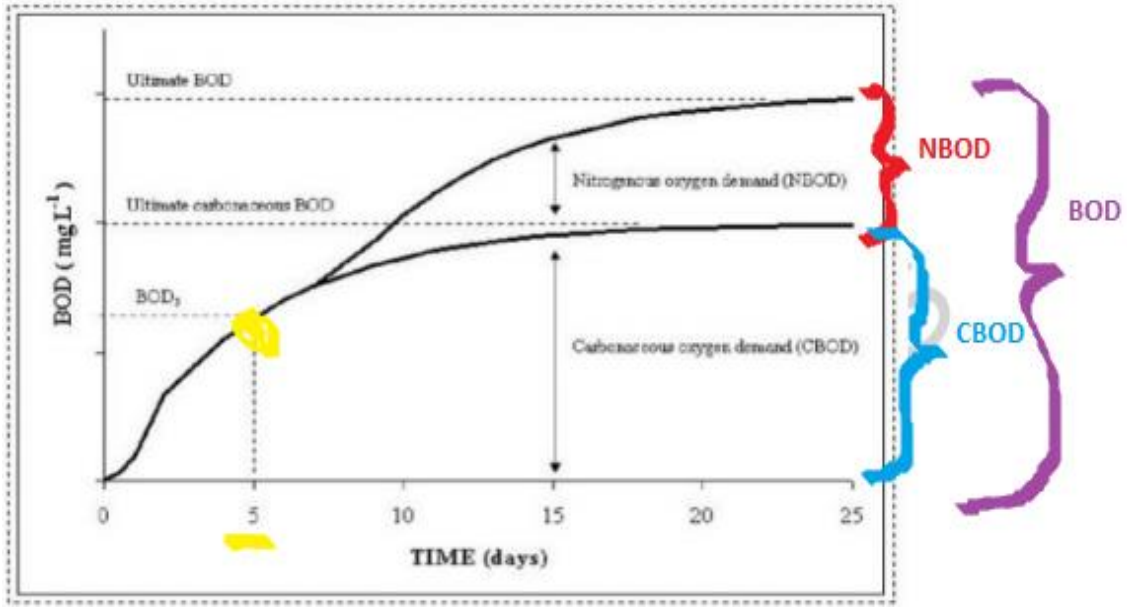
Biological Oxygen Demand



$CH_20 + O_2 + \rightarrow C0_2 + H_2O$

Carbohydrates + Oxygen (Plus bacteria!)→ Carbon Dioxide and Water

$NH_3 + O_2 \rightarrow NO_3^- + H_2O + H^+$

Ammonia + Oxygen (Plus bacteria!) → Nitrate and Water and Hydronium

- Biochemical Oxygen Demand (BOD) informs the concentration of wastewater effluent by measuring how much oxygen was consumed by microbes that digest sewage waste
- Gasses produced by bacteria over a five day period are measured: It's assumed that water with high CO_2 and $N0_3^-$ at the end of the test had high concentrations of organic material (decaying plants and human waste) at the beginning
- Carbonaceous oxygen demand (CBOD) measures only the $C0_2$ that is produced
- CBOD and NBOD together make up the total BOD
- In theory, there should be no difference between CBOD and BOD after 5 days, but in practice this is not quite true, which is why BOD_5 can't be compared directly to $CBOD_5$

Discussion: SNP Parameters

- ENR: Wastewater Systems Effluent Regulations update
- Suggestions for BOD vs CBOD ECQ
- Should other effluent quality criteria (EQC)s be updated?

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Next Session Begins at 11:00

Health Break

11:00 – 12:00

O/M Updates and Hazardous Waste Management

O/M Updates and Hazardous Waste Management

- Current Plans
- Recommendations
- Discussion: Hazardous Waste Management Planning

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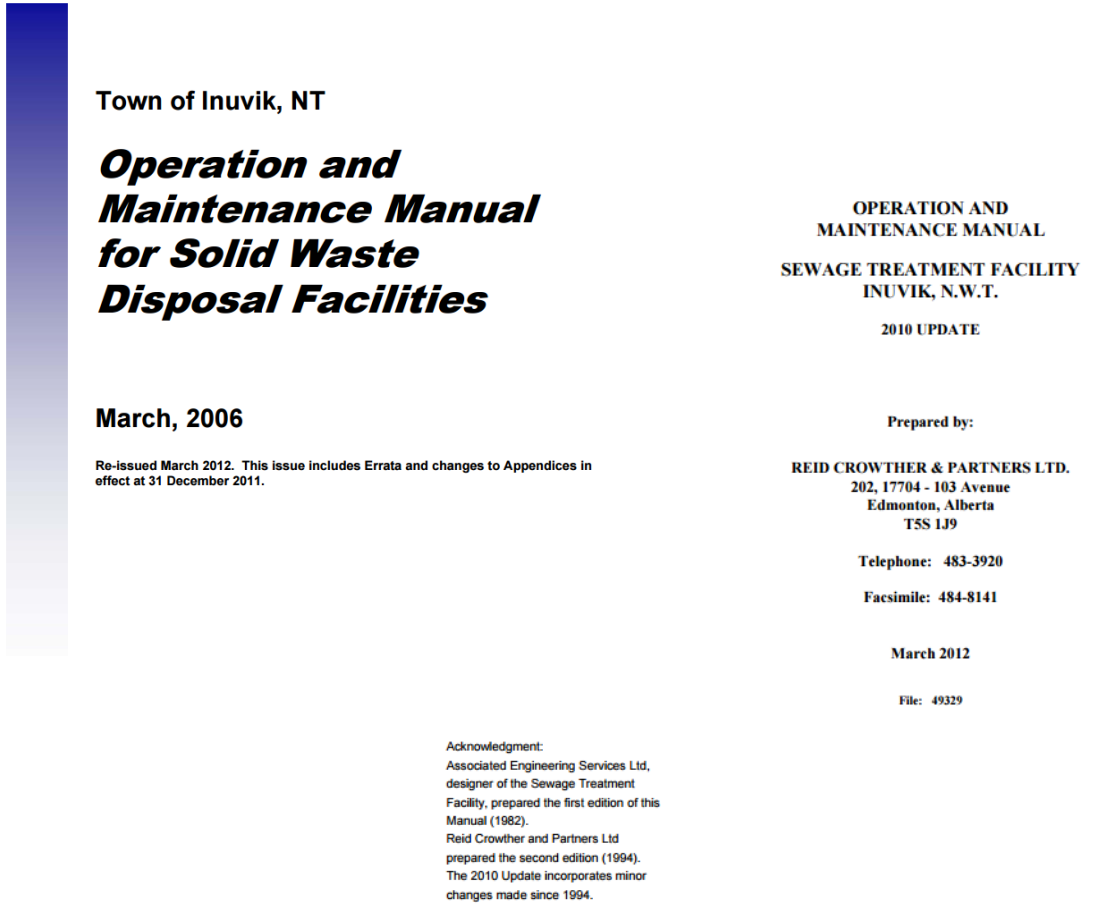
O/M Updates and Hazardous Waste Management

Current Plans:

- Landfill O/M (2006, updated 2011)
- Lagoon O/M (1982, updated 1994, 2010)
- Spill Contingency Plan (2016, updated 2017)

Forthcoming Plans:

- Water Treatment O/M



Town of Inuvik, NT

Operation and Maintenance Manual for Solid Waste Disposal Facilities

March, 2006

Re-issued March 2012. This issue includes Errata and changes to Appendices in effect at 31 December 2011.

OPERATION AND MAINTENANCE MANUAL

SEWAGE TREATMENT FACILITY INUVIK, N.W.T.

2010 UPDATE

Prepared by:

REID CROWTHER & PARTNERS LTD.
202, 17704 - 103 Avenue
Edmonton, Alberta
T5S 1J9

Telephone: 483-3920

Facsimile: 484-8141

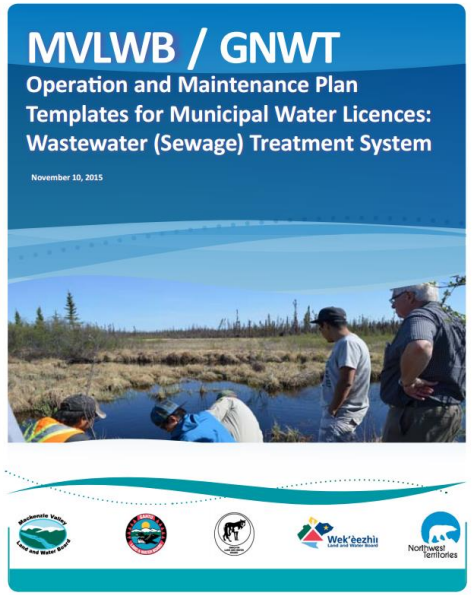
March 2012

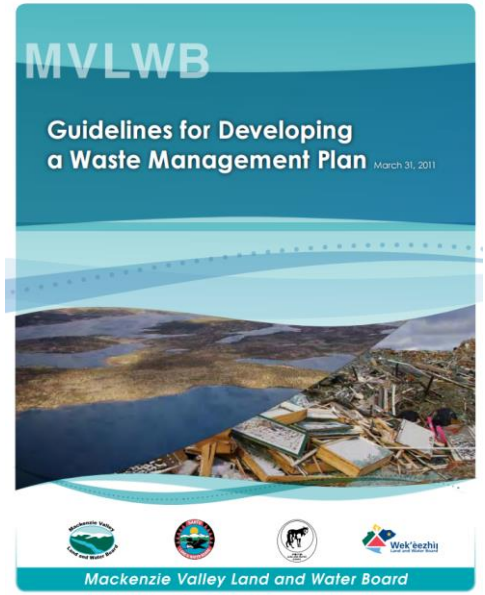
File: 49329

Acknowledgment:
Associated Engineering Services Ltd, designer of the Sewage Treatment Facility, prepared the first edition of this Manual (1982).
Reid Crowther and Partners Ltd prepared the second edition (1994).
The 2010 Update incorporates minor changes made since 1994.

Recommendations:
O/M Updates and Hazardous Waste Management

- Several administrative updates required (especially SCP)
- Ensure the plans contain all information required per MWLWB Municipal Operation & Maintenance Templates
- Develop and Submit Hazardous Waste Management Plan





Presentation:
Hazardous Waste Management

- Gerald Enns, GNWT ENR Hazardous Waste Specialist

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Discussion: Plan updates

- Priorities and timelines for O/M updates
- Hazardous Waste Plan

Next Session
Begins at 1:00

Lunch Break

1:00 - 2:00

Bears: Exploring Landfill Deterrents

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Bears at the Landfill

- Current Practices in Inuvik
- GRRB recommendations
- How are other Communities dealing with the issue?
- Discussion: Next steps

Whati landfill – CBC news – May 27, 2014

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Bears in Inuvik:
Current Management Practices

- Town of Inuvik
- ENR
- GRRB

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Recommendations:

- GRRB: “The Inuvik Landfill is an attractant for bears. This creates a hazard for people and increases mortality to bears that have become habituated to this source of food and are then killed by wildlife officers. Grizzlies were assessed as a species of Special Concern under the federal Species at Risk Act in 2012 and will be assessed by the NWT Species at Risk Committee in April 2017. The solid waste management plan does not address alternatives to lethal dispatch of habituated bears, such as fencing or other bear deterrents that are used successfully”
- TOI: “Bear deterrence from solid waste sites and from townsites generally is a well-known and seemingly somewhat intractable problem, in communities spanning the spectrum from Vancouver to Inuvik and beyond. Inuvik would be very pleased to host a GNWT-funded research project. The results would have application at all northern communities, and quite likely throughout Canada.”

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Discussion: Other Communities

- Hay River – Fence in 2013
- Yellowknife – Fence in 2000
- Norman Wells – Fence in 1992
- Fort Simpson – Bear deterrents 2015
- Mackenzie B.C. – Fence in 1995

Fort Simpson Landfill
(April Hudson - NNSL - July 23, 2015)

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Mackenzie, B.C

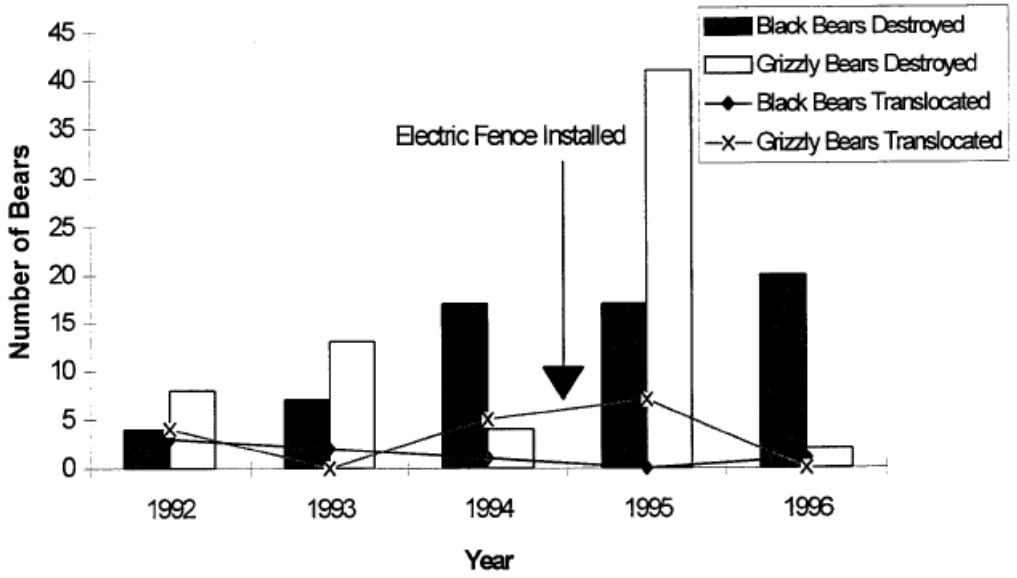

Figure 7.4 Bears destroyed and translocated, Mackenzie, B.C., 1992 to 1996

Discussion

Electric fencing a landfill site should be only one part of an overall community plan, especially in areas with a high population of conditioned bears. The townsite of Mackenzie had experienced problems with bears and residential/commercial garbage prior to the installation of the electric fence (MacKay 1996). After the installation of the fence, an increased number of bears were found to be drawn to the next available source of non-natural attractants, those within the townsite. Residential garbage, untended fruit trees and unlocked commercial dumpsters were found to be the greatest source of attraction for bears:

From: BC Ministry of Environment
Reducing Bear-human Conflicts 1998

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Discussion:
Next steps?

Next Session
Begins at 2:15

Health Break

2:15 – 3:15

Climate Change and Permafrost Mitigation

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Climate Change and Permafrost

- Climate Change in Inuvik
- Town's current strategy
- Discussion: How to address climate change in Water Licence?

http://www.myyellowknifenow.com/14752/feds-gnwt-to-study-effects-of-climate-change-on-nwt-roads/

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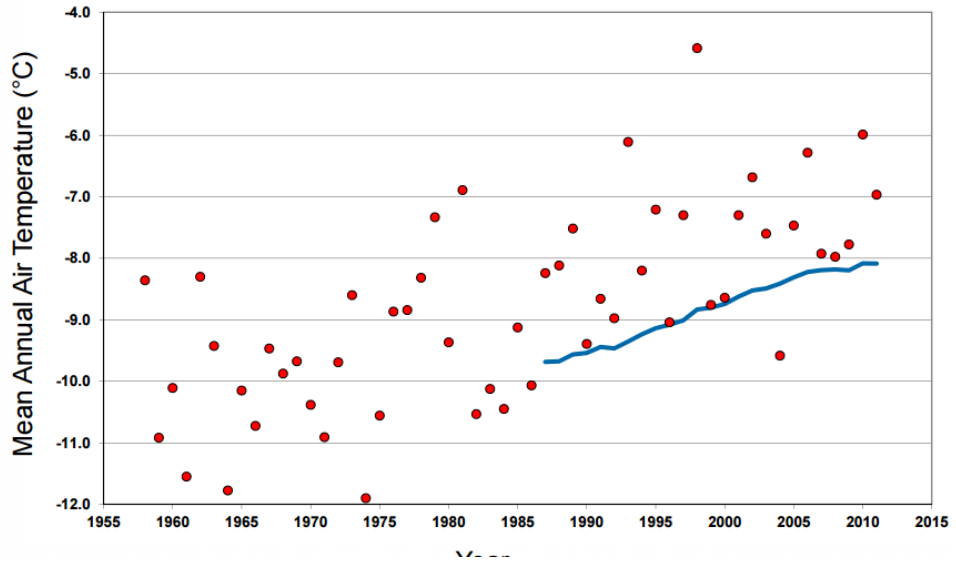
Climate Change in Inuvik

Inuvik Air Temperature Record



Conclusions

- Mean annual air temperatures have increased about 2°C since mid-1970's
- Until mid-1970's apparently no significant impact on ground temperatures from community development
- Ground temperatures at WARC about 2°C warmer than in 1950's, apparently changing in step with air temperature
- Active layer thickness has increased by about 0.5 since community development
- Geothermal gradient in the area is about 3 to 5 C°/100 m, reflecting heat flux out of the ground
- Since 1980's ground temperature gradient in the upper 13 to 14 m is about -7 to -10 C°/100 m, reflecting heat flux into the ground
- Theoretical pile capacities have decreased by about 30% due to ground temperature and active layer changes
- Minimum embedments have increased by about 50%

From: Climate Change Impact on the State of Permafrost at Inuvik, NWT Presentation (Pan-Territorial Permafrost Workshop November 6, 2013)

Recommendations:

- GRRB: “Application has no discussion of potential impacts of melting permafrost on Inuvik's water supply and infrastructure or sewage effluent and infrastructure. Recommend that research be conducted into potential permafrost effects and a long term permafrost mitigation plan be developed
- TOI: “Warming climate and loss of permafrost poses potentially serious threats to all manner of townsite infrastructure, in economic terms perhaps most seriously to building foundations. All permafrost-region communities are vulnerable, though to varying degrees depending on local geotechnical conditions. Respectfully it is submitted that this is a regional concern, of great breadth and some importance, best addressed by GNWT.”

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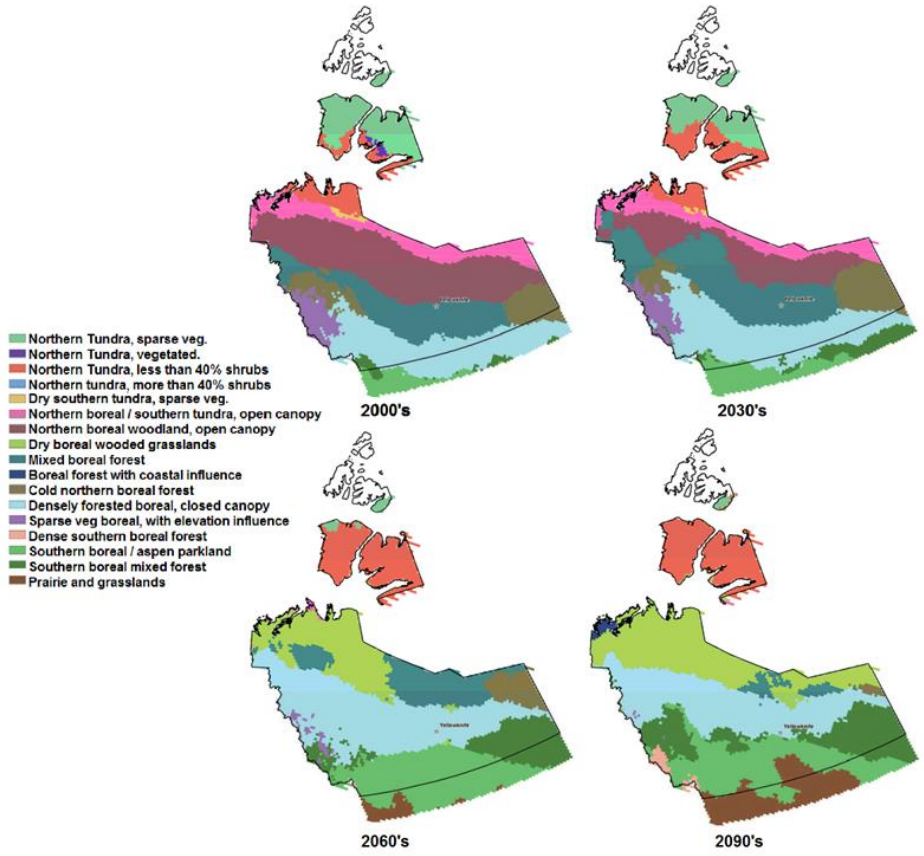
Discussion: Climate Change in Inuvik

- What are the Town's current Strategies?



http://www.enr.gov.nt.ca/programs/nwt-climate-change/climate-trends

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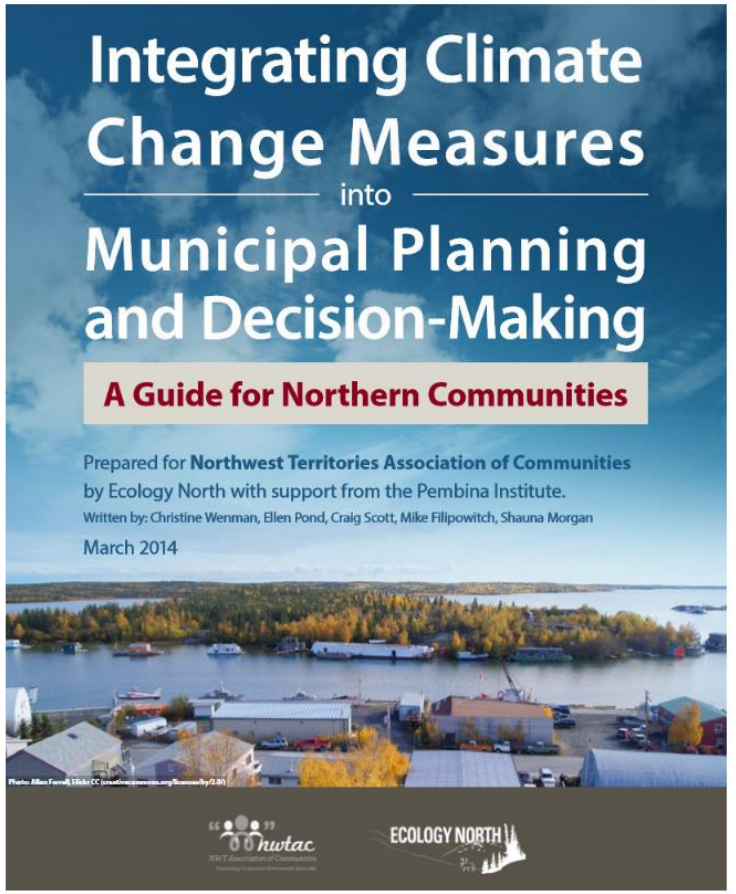
Discussion:
Next steps for Water and Waste Disposal Facilities?

- How to inform Water Licence?
- What is practical and achievable?



http://ecologynorth.ca/our-work/climate-change/

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3:15 – 4:00

Open Floor

G L W B

Open Floor

- Address outstanding item(s) from earlier sessions
- Any other areas of discussion

GLWB Next steps

- Recommendations today will assist in finalizing draft WL
- WL will be circulated for public review
- Meeting minutes will be made available on the registry

Thank You For Participating!

Any questions, comments, or recommendations –
Please let us know:

amacdonald@glwb.com

867-777-4954

GLWB