

TECHNICAL MEMO

CREATING AND DELIVERING BETTER SOLUTIONS

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TO: MEMO TO FILE

DATE: September 3, 2009

C:

MEMO NO:

FROM: Chris Gräpel, P.Eng.; Kevin Leopold

FILE: Y14101066.007

SUBJECT: **Public Safety and Awareness Plan
Bluefish Dam**

1.0 INTRODUCTION

A Public Safety and Awareness Plan has been created to inform the public of the potential hazards and restricted access in the vicinity of Bluefish Dam, as well as to minimize the possibility of personal injury in the event of a release of water. This work was conducted as part of the engineering services EBA Engineering Consultants Ltd. (EBA) is providing for the Northwest Territories Power Corporation (NTPC) for the investigation and design of the new Bluefish Dam at the Bluefish Hydroelectric Facility.

This memo summarizes the results of EBA's considerations on the signage and audible warning design required for Public Safety Management at the dam and spillways. Additionally, a method of restricting boater access in the upstream and downstream of the dam is presented in this memo.

2.0 PURPOSE

The proposed gated spillway and overflow spillway of Bluefish Dam create a potential hazard to users of both the upstream and downstream waterways, as well as the surrounding shoreline. As a result, a recommended plan for the safety and awareness of the public is presented.

The criteria for a public safety plan were based on the hazards introduced to the waterway that would not normally exist in the absence of Bluefish Dam. While it is the public right for personal use of the water and adjacent land of Bluefish Lake, it is the responsibility of NTPC to take the necessary precautions to warn the public of the hazards.

3.0 PUBLIC SAFETY AND AWARENESS CONSIDERATIONS

3.1 FACILITY INTERACTIONS

The purpose for public safety and awareness around dams is to warn all potential users within the area of the hazards associated with Bluefish Dam. These users include:

- Boaters;
- Anglers (summer and winter);
- Hikers;
- Snowmobilers, and
- Employees.

3.2 POTENTIAL HAZARDS

The hazards introduced to the users of the waterway by the presence of Bluefish Dam include:

- Persons boating or snowmobiling in the headpond area could be drawn into the spillway if the gates are opened;
- Persons boating or snowmobiling in poor visibility conditions could ramp the dam or spillway;
- Persons boating or snowmobiling near the outflow may be washed away or over-topped by the release of water through the spillway;
- Persons using the downstream shoreline may be swept away or trapped by a sudden increase in water level, and
- Persons on the dam facility could fall from areas with no guardrail or fence.

4.0 HAZARD CONTROL MEASURES

In accordance with short courses and seminars sponsored by Canadian Dam Association (CDA), the following hazard awareness measures have been developed. These measures are based on the content of a workshop on Public Safety Around Dams held in Ottawa, ON in September 2004, which reflect the practices of Ontario Power Generations at that time.

4.1 WATERWAY SAFETY BOOMS

The design criteria for waterway safety barriers should include:

- Foam-filled safety booms both upstream and downstream of the facility capable of restraining stranded boaters;
- Capable as a means for self-rescue of stranded boaters and swimmers;
- 'Keep Out' buoys spaced less than 150m measuring no less than 30.5cm x 15.25cm, visible in poor conditions;

- Buoy must be white in colour with an orange diamond containing a cross on both sides and must have a horizontal band above and below, and
- Private buoys must be marked with the letters 'PRIV' on the top with owner information sticker visible.

A detailed image of a keep-out buoy is presented in Figure 1.

4.2 SIGNAGE

The following design criteria should be considered for all signage installed on site:

- 'Danger' signs must be printed in all reasonable languages (English and possibly local First Nations), positioned at either end of each boom and on either side of the facility (dam name and contact information should be visible, as well as logo of dam owner) ;
- Standard signage material consists of 2 mm aluminium (Lexan may be used for its bullet resistant properties) with 25 mm radius rounded corners;
- Signage should be constructed to a minimum size of 1.82 m x 3.05 m;
- Background and lettering should be reflective, printed in scotchlite 3290 or 2290 printed 700 series ink or equivalent ;
- The sign must be red in colour with white letters while pictographs must be black on a white background located on the left edge of the sign;
- Headline text should be 1.5 times the size of the message text, both in Helvetica font, and
- The facility name must be located in the bottom left corner, while the company logo must be located in the bottom right. While it is common procedure to display an emergency contact number, this practice may not be applicable due to limited cell phone reception in the surrounding area.

Examples of signs suitable for the purposes discussed herein are presented in Figures 2.

4.3 AUDIBLE SIGNAL

An audible signal is recommended to warn the public in the event where the spillway gates are opened. The recommended design criteria for an audible signal include:

- An audible signal coinciding with opening of spillway gates, no more than 115 dB, with signs informing the public of audible meaning should be installed;
- The audible signal must be clearly distinguishable within the signal reception area;
- Red visual strobe-lights for areas with noise above 115 dB should be used meeting SAE J1318 Class 1 with a maximum output of 15 Joules and 60 flashes/min, and

- The audible and visual signals should have a monitoring circuit to indicate loss of power.

5.0 SITE PLAN CONSIDERATIONS

EBA has developed a site plan for implementing the aforementioned measures of public awareness. This includes the positioning of all signage, warning signals and booms and is presented in Figure 3.

6.0 PUBLIC SAFETY OUTREACH

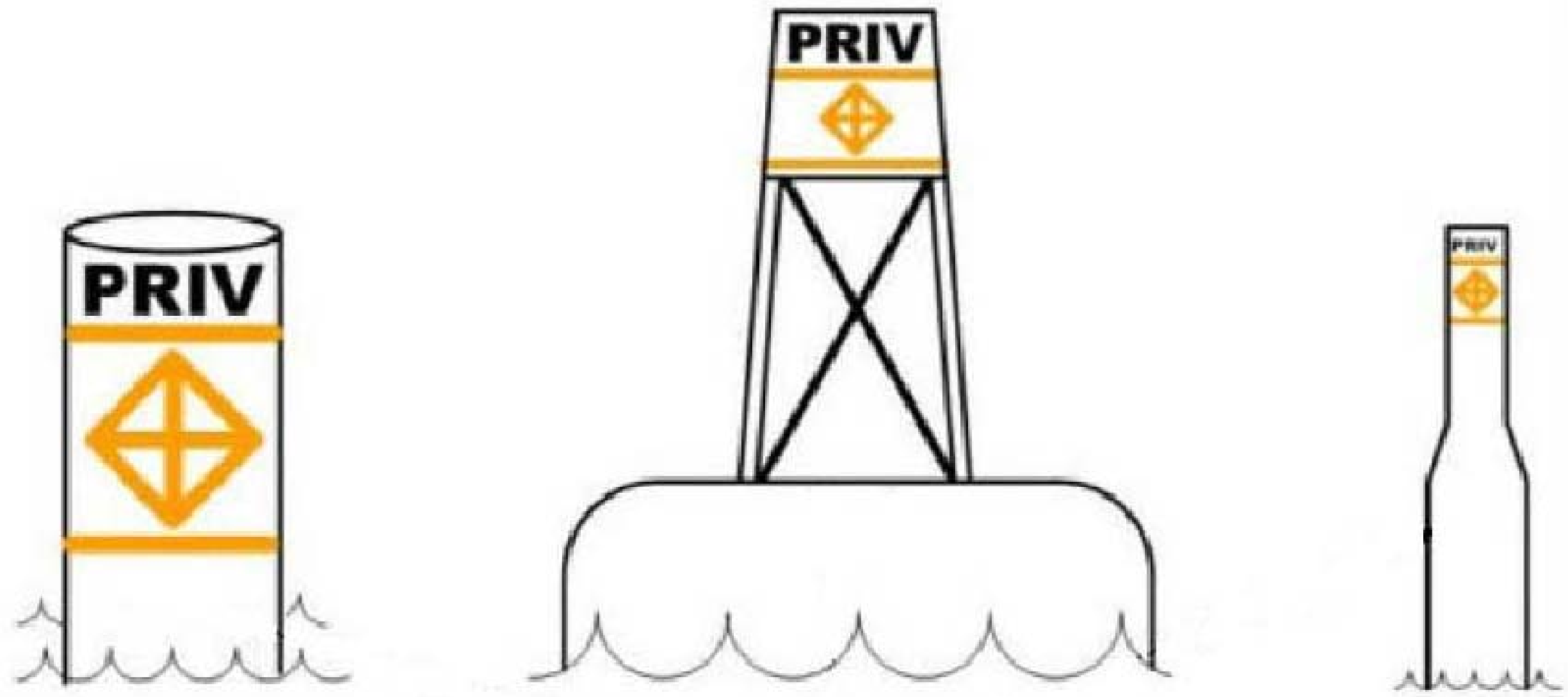
NTPC should implement a public awareness program aimed at education of the risks to the recreational demographic that would interact with the proposed new dam and spillway channels. This may include, but not be limited to, open houses, attendance at fish and game society meetings as well as snowmobile society meetings, advertisements or local newspapers and magazines.



7.0 RECOMMENDATIONS

It is recommended that waterway barriers manufactured by Worthington Products, Inc. be used, or an equivalent provider. Booms should have adequate freeboard to prevent swimmers or boaters from crossing over the top.

8.0 REFERENCES:

- Canadian Dam Association. Public Safety Around Dams Workshop, 2004.



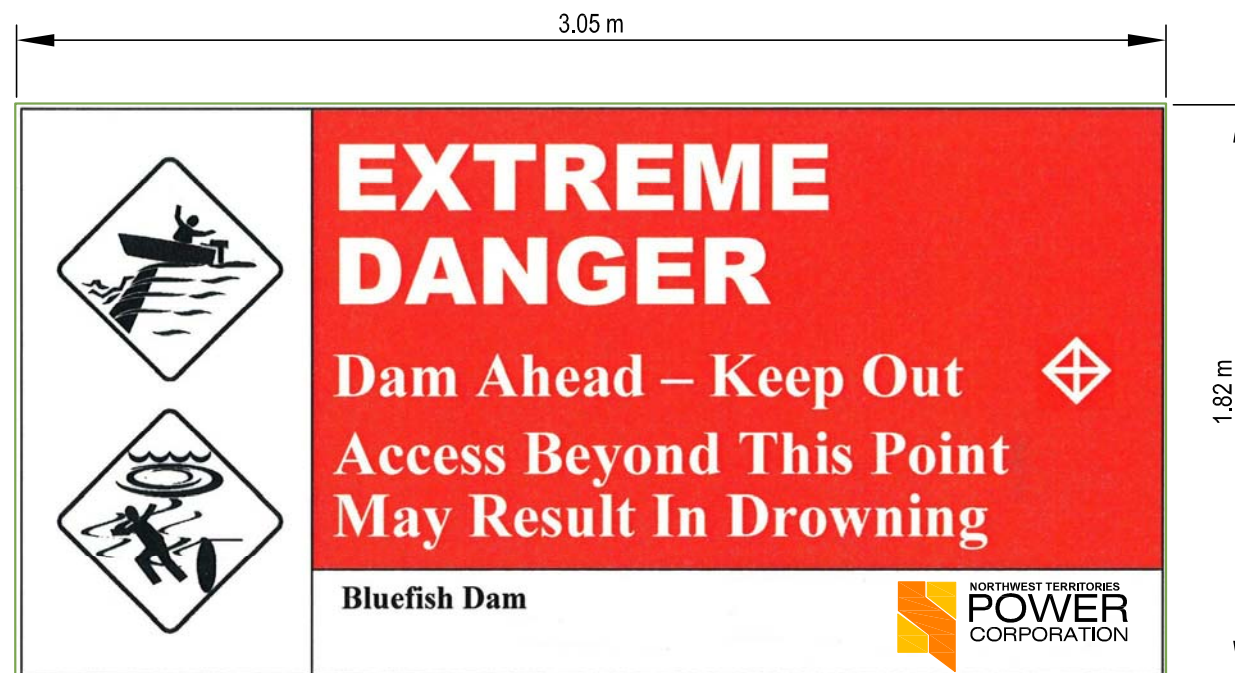
CLIENT		REPLACEMENT DAM AND SPILLWAY BLUEFISH HYDRO, NT			
 NORTHWEST TERRITORIES POWER CORPORATION		TYPICAL DETAILS OF KEEP-OUT BUOYS			
		PROJECT NO. Y14101066.010	DWN DRG	CKD KL	REV 0
EBA Engineering Consultants Ltd. 		OFFICE EDM	DATE September 2009		





WS-1

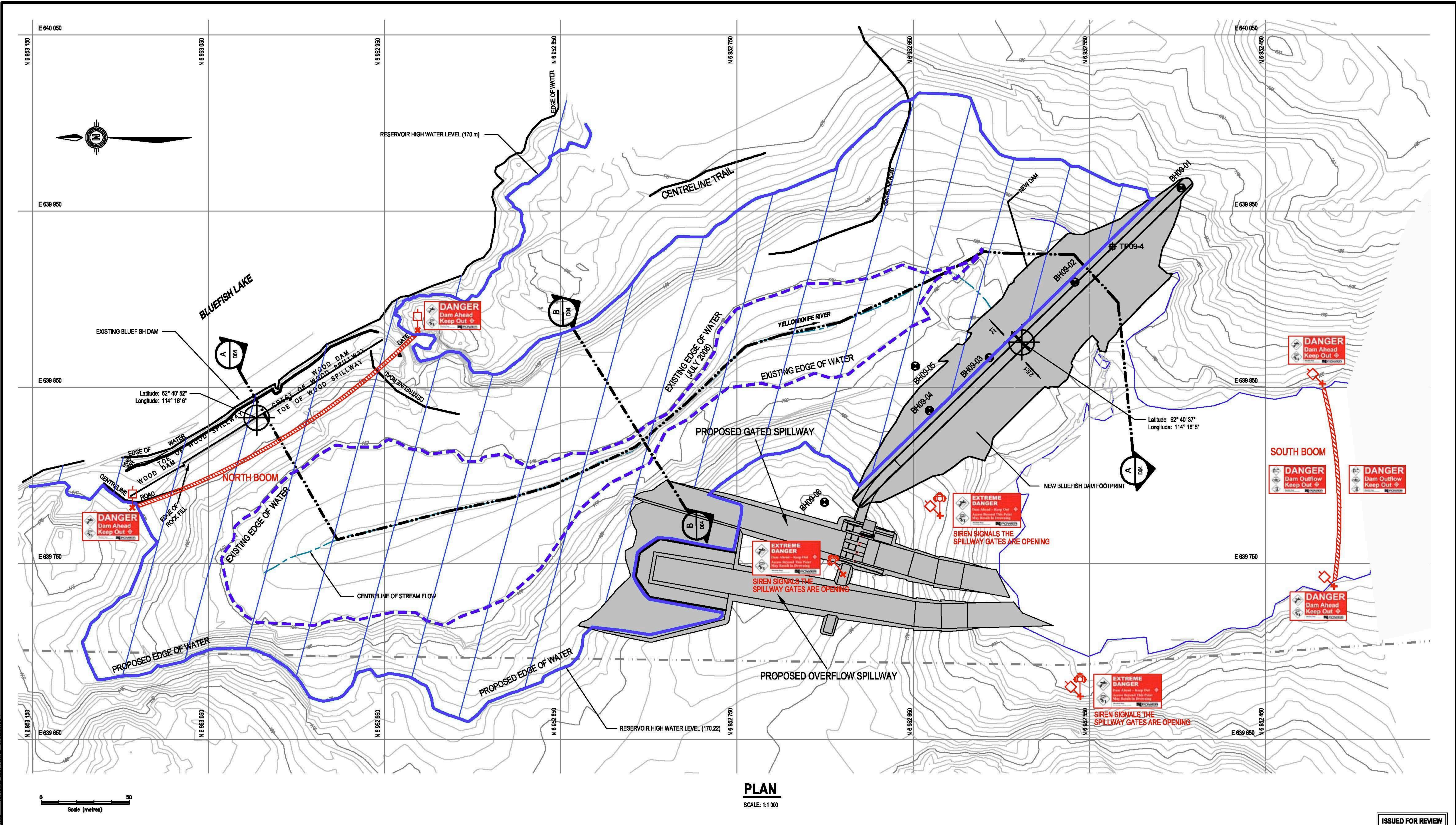


WS-2

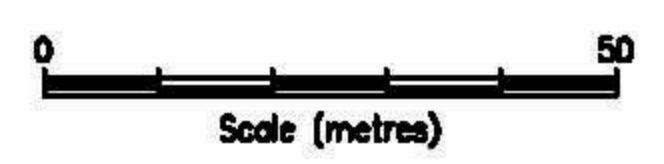


WS-3

CLIENT 		REPLACEMENT DAM AND SPILLWAY BLUEFISH HYDRO, NT				
		PUBLIC SAFETY MANAGEMENT SIGNAGE				
EBA Engineering Consultants Ltd.		PROJECT NO. Y14101066.010	DWN DRG	CKD KL	REV 0	Figure 2
		OFFICE EDM	DATE September 2009			



PLAN
SCALE: 1:1 000



ISSUED FOR REVIEW

- NOTES:
1. BASE SURVEY PLAN PROVIDED BY SUB-ARCTIC SURVEYS LTD. FILE NO.: 08-092-NT, DATED: JULY 30, 2008 AND FEBRUARY 2009
 2. CONTOUR INTERVAL = 1 m

- LEGEND:
- BOREHOLE LOCATION (PROPOSED 2009 INVESTIGATION)
 - WARNING SIGN
 - AUDIBLE SIGNAL AND VISUAL STROBE
 - WATERWAY BOOM

NUM	DATE	DWN	CKD	APR	DESCRIPTION	NUM	DATE	APR	DESCRIPTION
REVISIONS					DRAWING STATUS				

PERMIT PROFESSIONAL SEAL

CLIENT

**NORTHWEST TERRITORIES
POWER
CORPORATION**

EBA Engineering
Consultants Ltd.

**REPLACEMENT DAM AND SPILLWAY
BLUEFISH HYDRO, NT**

**PLAN SHOWING PUBLIC SAFETY
MANAGEMENT MEASURES**

PROJECT No. Y14101088.010	OFFICE EDM	DES CG	CKD MW	REV 0	DRAWING
DATE September 2009	SHEET No. 5 of 18	DWN DDB	APP EH	STATUS A	Figure 3