

POLARIS MINE

An Overview of the Decommissioning and Reclamation Plan

Nunavut Water Board

SM3E{ s / C4ys6=4

bm l 4p q bf / s i q p2fx5

wA5tZs i z x7m l

wody z k5 st6t t5i3j5 X6NA5

kNK5 wmoEp5 vtmp5

INTRODUCTION

rh4m z b s i v s t 5

- Located on Little Cornwallis Island, 100km NW of Resolute Bay
- World's most northern metal mine
- Starting producing Zinc/Lead concentrate in 1981
- Finished mining in September, 2002
- Approx. 21 million tonnes of ore was processed
- mDo eug6, 100 rMub
rt z b s x o z z i
cshw5g2
- yM6Jxu d5t4i6K6
srs6b6gu n=4k5
s / C4ys6=4
- WQx6ymJ6 n=4nos3i6
xegu tyJul
n=C/4n3u4 1981_u
- W/ Eg6 s / C4ys3i6
ytWE, 2002_u
- u4h i 21 uox8 b8y i 4
n=4nos6=symJ6



ARCTIC
OCEAN

BEAUFORT
SEA

**POLARIS
MINE**

GRISE
FIORD

RESOLUTE

LANCASTER SOUND

POND
INLET

VICTORIA ISLAND

GJOA
HAVEN

ARCTIC CIRCLE

NORTHWEST
TERRITORIES

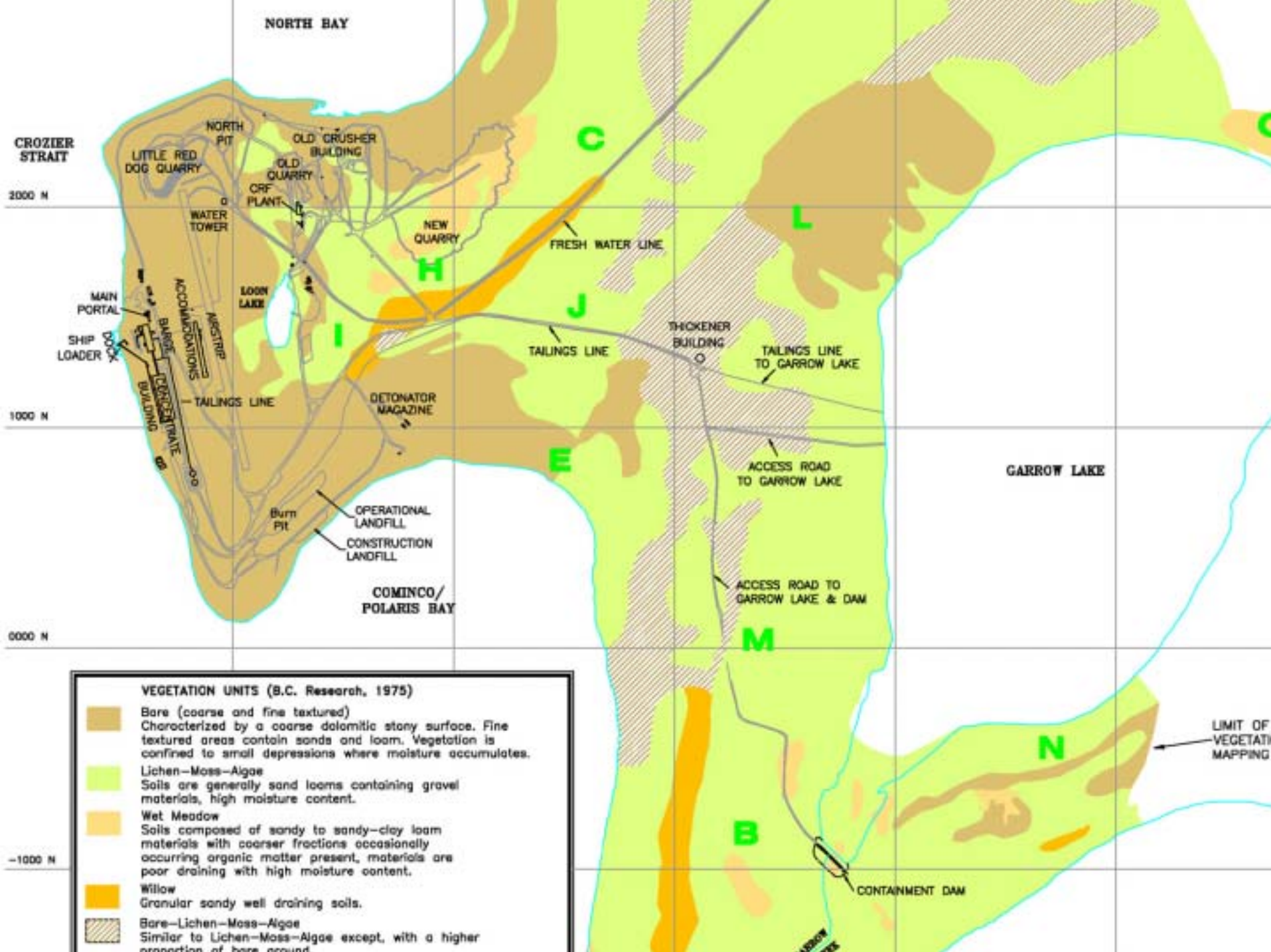
NUNAVUT

YELLOWKNIFE

Environment

x? t o E i 6

- High arctic climate
- Gently-rolling landscape with low hills
- Tundra vegetation is sparse, gravel cover predominates
- Few musk oxen or caribou
- Polar bears are commonly sighted
- d5y4g2 s r s3b6g2 yM z
- m i C s i 6n6 k N z Sr5g i 4 x r = z c 6g6
- N t 6Nu WD6g5 x f5gJ5, g x X / a i 3n6
- s u 1mrg6 g4grg l i l
- N k y Z J N 3g6



Regulatory Background

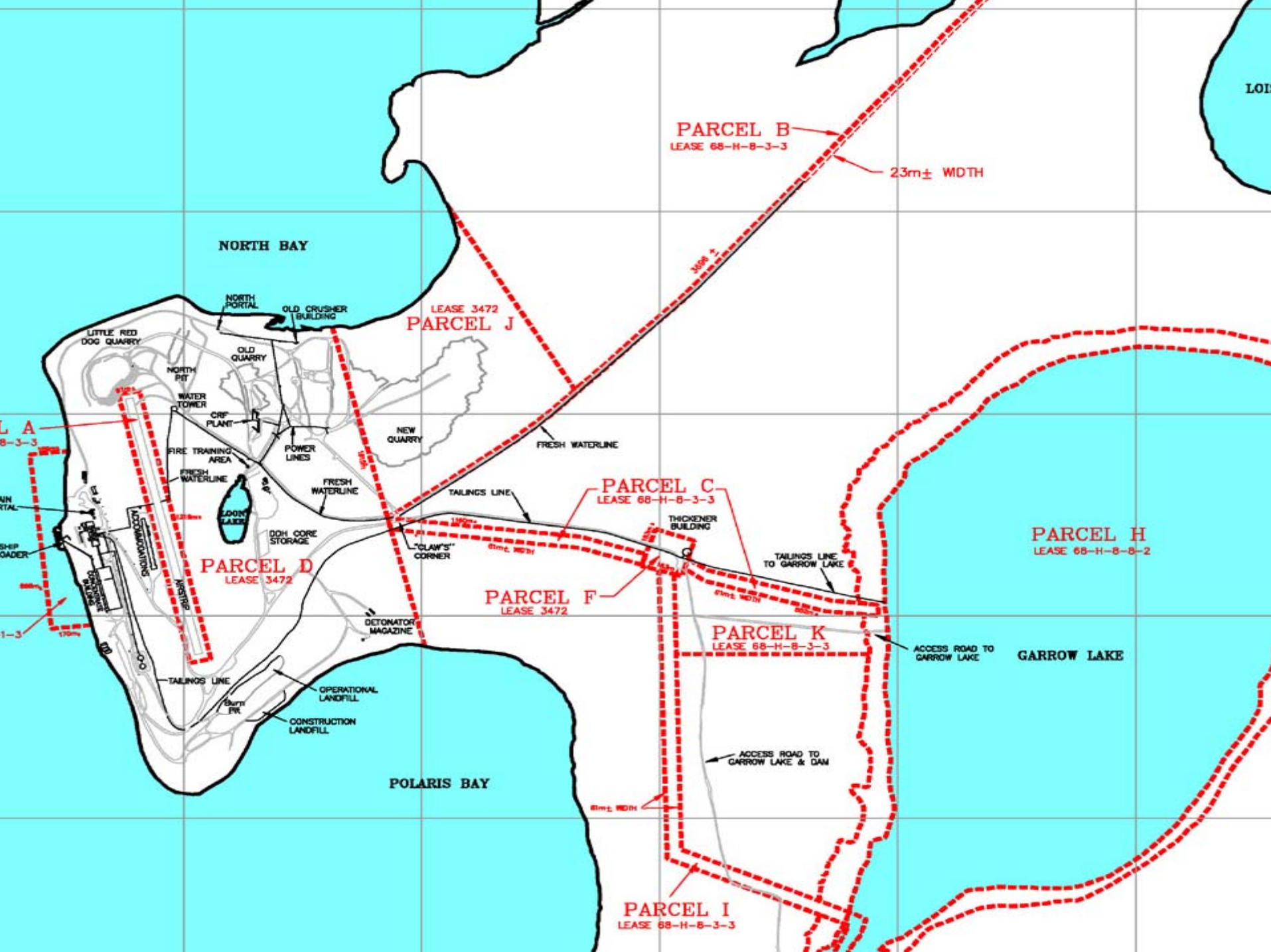
x s M 5 t p k 5 s i 2 v s y q

- Nunavut Water Board
- Water Licence N4L2-0262 issued by NWT Water Board
 - First licence: Nov 81-Dec 91
 - Second Licence: Jan 92-Dec 93
 - Third Licence: Jan 94-Dec 02
 - Final Licence: pending approval following March Hearing
- k N K 5 w m o E p 5 v t m p 5
- w m 6 j 5 M w n z N 4 L 2 - 0 2 6 2
g i / s y m J 6 k N 5 y x 6
w m o E p 5 v t m p 5
 - y K o 6 M w n z : k = W E
81- t y W E 91
 - g 4 o 6 M w n z : j k x E 92-
t y W E 93
 - W Z J x 5 M w n z : j k x E
94- t y W E 02
 - r a o 6 X 6 M w n z :
N I N w D m 6 x q 6 b s i z
r a i x A 5 j n p u x W 6 h w i 6

Regulatory Background

x s M 5 t p k 5 s i 2 v s y q

- Department of Indian Affairs and Northern Development
- Land Leases
 - 5 surface leases
 - 3 mining leases
- w k o E p g c f 5 v N b u
- k N j 5 x g 6 g x D t 5
 - 5 k N 2 c z i
x g 6 g x D t 5
 - 3 s / C 4 y s 3 i 6 j 5
x g 6 g x D t 5



Regulatory Background

x s M 5 t p k 5 s i 2 v s y q

- Department of Fisheries and Oceans
 - Garrow Lake
 - Dock/Foreshore Area
- w c l o E p 5 b E s 6 u s b o E p 5
 - Z 3 D b y 6
 - g M 4 b 6 = 4 F b E s 2 y N z i

Regulatory Chronology

x s M 5 t p i 5 x g Z s y m i q

- March 2001 - Cominco Ltd. submits Polaris Closure and Reclamation Plan
- September 2001 - Technical Meeting held in Resolute Bay
- October 2001 Submissions received on C&R Plan by interested parties
- April 2002 – NWB and DIAND jointly approve the C&R Plan with certain exceptions, exceptions include:
 - Garrow Lake
 - Dock area and shoreline
 - Frustration Lake
- j n p 2001 - v u 1 f N u i c 6 g 5
g i y J 5 S M 3 E { m g / s i z k 5 x 7 m l
w o d y z k 5 s t 6 t 5 i z k 5
X 6 N A t i 4
- y t W E 2001 – W l x 6 N 6 g o E i 6 j 5
v t m J 5 c s h w 5 g u
- x 4 g W E 2001 g i / s J 5 W / s y m J 5
n o 4 b s i z k 5 x 7 m l w o d y z k 5
s t 6 t E i 6 j 5 X 6 N A t k 5
g n s m c b s J i 5 W c b s J i 5
- x w W E 2002 – w m o E p 5 x 7 m l
w k o E p g c f 5 v g p c t 0 4 L t 4
x q 6 b q p 2 f x 5 n o 4 b s i z k 5
x 7 m l w o d y z k 5 s t 6 t E i 6 j 5
X 6 N A t 5 w M q
W c b s q 5 v l x 6 t 5 l Q 5, w M c 6 g 5
b m f i z :
 - Z 3 D b y 6
 - g M 4 b 6 = 4 x 7 m l y 1 / 3 X y z
 - w u 6 b 6 = 4 b y 6

Regulatory Chronology

x s M 5 t p i 5 x g Z s y m i q

- September 2002 – DFO approves C&R Plan for Garrow Lake and Dock and Shoreline areas
- October 2002 – Cominco Ltd. applies for water licence to cover C&R activities
- November 2002 – NPC approves C&R Plan
- December 2002 – NIRB approves plan
- January 2003 – NWB pre-hearing held in Resolute Bay
- y t W E 2002 – w c l o E p 5
b E s 6 u s b o E p 5 x q 6 b q
n o 4 b s i z k 5 x 7 m l w o d y z k 5
s t 6 t E i 6 j 5 X 6 N A t 5 Z 3 D b y 6 j 5
x 7 m l g M 4 b 6 = 4 y N z k 5 c i z k 5
- x 4 b W E 2002 – v u 1 f N u i c 6 g 5
g 4 y C 6 g 5 w m 6 j 5 M w n 4 n u 4
W o E 5 J t 4 n k 5 n o 4 b s i z k 5 x 7 m l
w o d y z k 5 s t 6 t E i 6 j 5
W o E x k 5
- k = W E 2002 – X 3 N w p 5 x q 6 b z 5
n o 4 b s i z k 5 x 7 m l w o d y z k 5
s t 6 t E i 6 j 5 X 6 N A t 5
- t y W E 2002 – x ? t o E p 5 x q 6 b q
X 6 N A t 5
- / k x E 2003 – w m o E p 5 y K x i
x W 6 h w i x n 5 t 5 l Q 5 v t m t 5 t J 5
c s h w 5 g u

The Closure Plan

] b7N mg / s i z k5

X6NA t5

Plan Objectives

X6NAb sJ k5 W / sNh x3g5

- To ensure that public health/safety and environment are protected
 - To eliminate or minimize need for long term maintenance
 - To restore site to aesthetically acceptable condition
 - To address concerns of stakeholders during implementation
- WNh4 i q bmf x5 wkw5
x i x6bwom i f
dx6n6Ng f6bwom i q
x7m l x? t5 nSt /sym i q
 - xJN q X5 x r i s q M6
c k w g i = i z k
s t t b s N h 4 l i
 - s t 6 t b s 5 i z n N = s J 6
b f u N 6 y l A c k w o z 5 i z
 - W o E N h 4 i q w h m l A b s J 5
w M s = s c b s J i 5
x g Z s ? o x t 5 l Q 5 x g Z 4 n o x 5

Reclamation Components

w o d y z k 5

s t 6 t E i 6 j 5 w l o q

NORTH BAY



000 N

LOADING DOCK

MAIN PORT

FRESH WATERLINE

FIRE TRAIL AREA

Central Sh

SHIP LOADER

000 N

CONCRETE BUILDING

TAILINGS LINE

DIESEL TANK FARM

PIT

CONSTRUCTION LANDFILL

POLARIS BAY

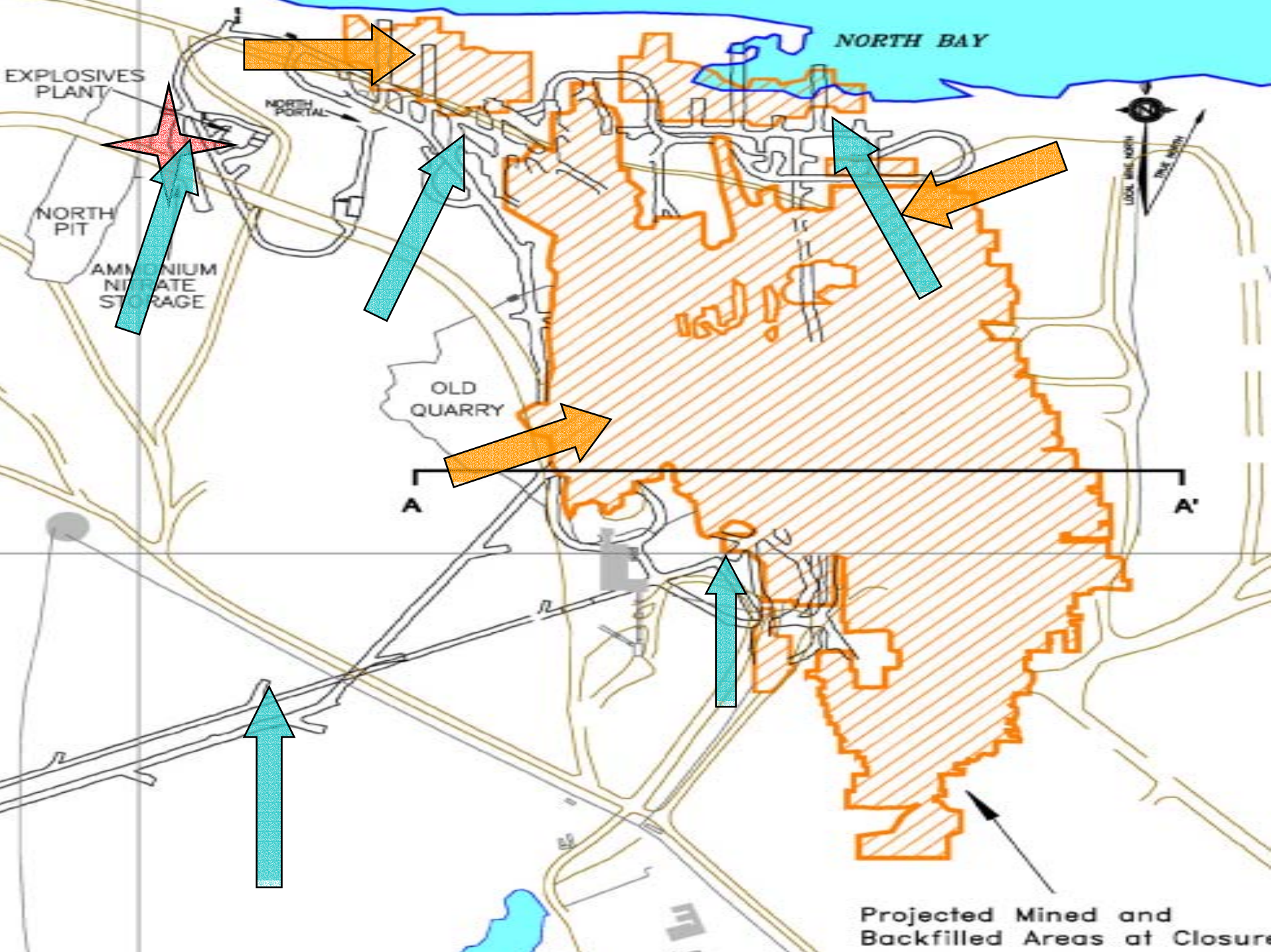
Reclamation Components

w o d y z k 5 s t 6 t E i 6 j 5

w l o q

Mine Workings

s / C 4 y s 6 = 4 u W o E 5 J t 5



Underground Workings

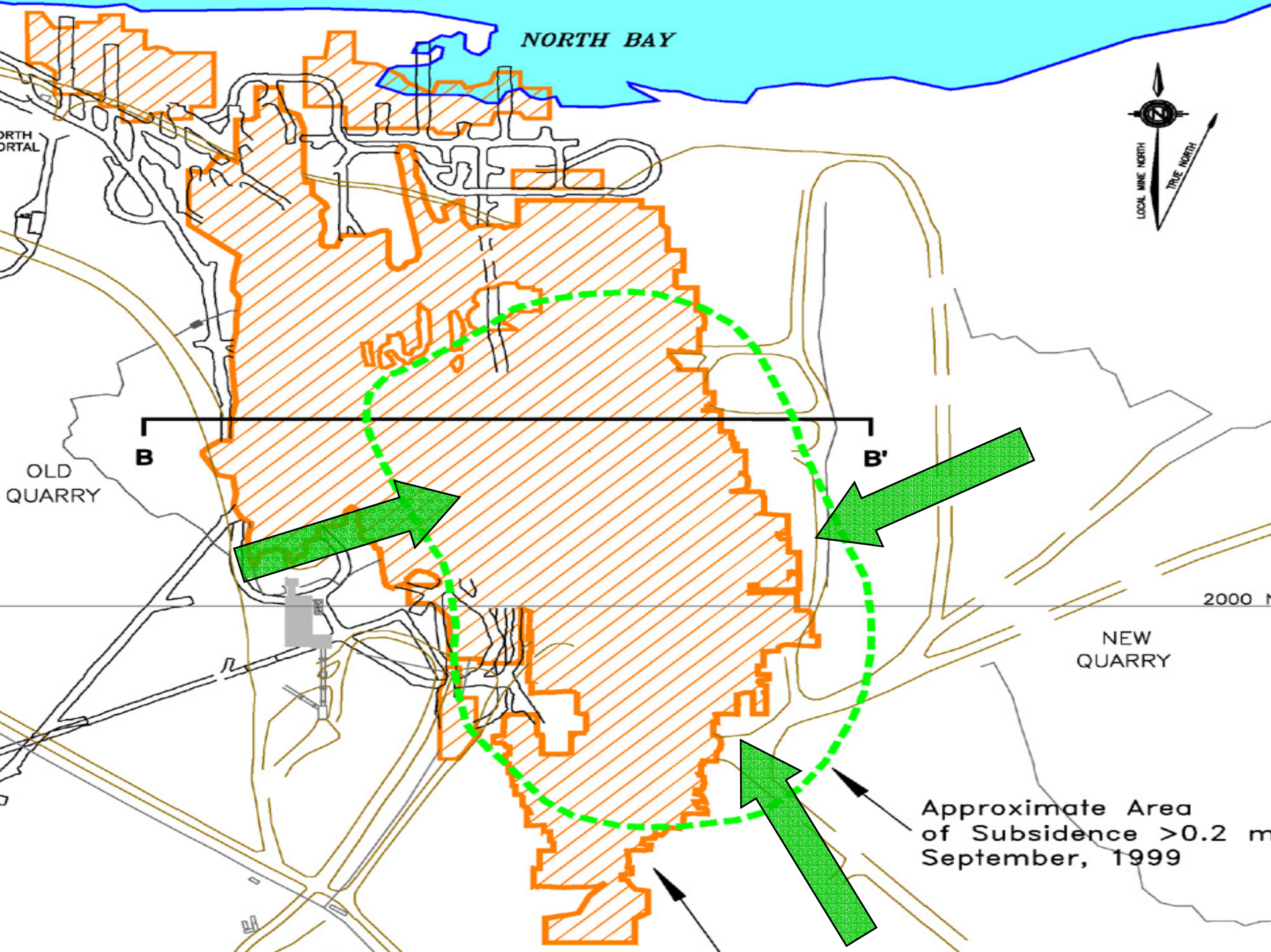
kN2 w l x i W o E5J t5

- Equipment to be reused, sold or left in mine
- Hazardous material removed from underground
- Portals, raises, shafts and entrances to be sealed
- Underground fuel tank to be drained and stored.
- nN5J t5 xgv i ZsJ4n5, i s=DbsJ4n5 s? lji5 em4bsJ4n5 s/C4ys6=4u
- hD6N i c6g5 Wd t5 xj/sJ4n5 kN2 w l x i5
- x1msmi q kNj5, S6gyQx6ymi q, kNj5 w l x k4 Sgymi q x7m l wy6b6= q mg/s/Exc6g5
- kN2 w l x i s6hc6f5 c5bs/6Dx5 wmw/Zs l t4 x7m l g5d6bs i x5.

Subsidence

N i 6 o J6

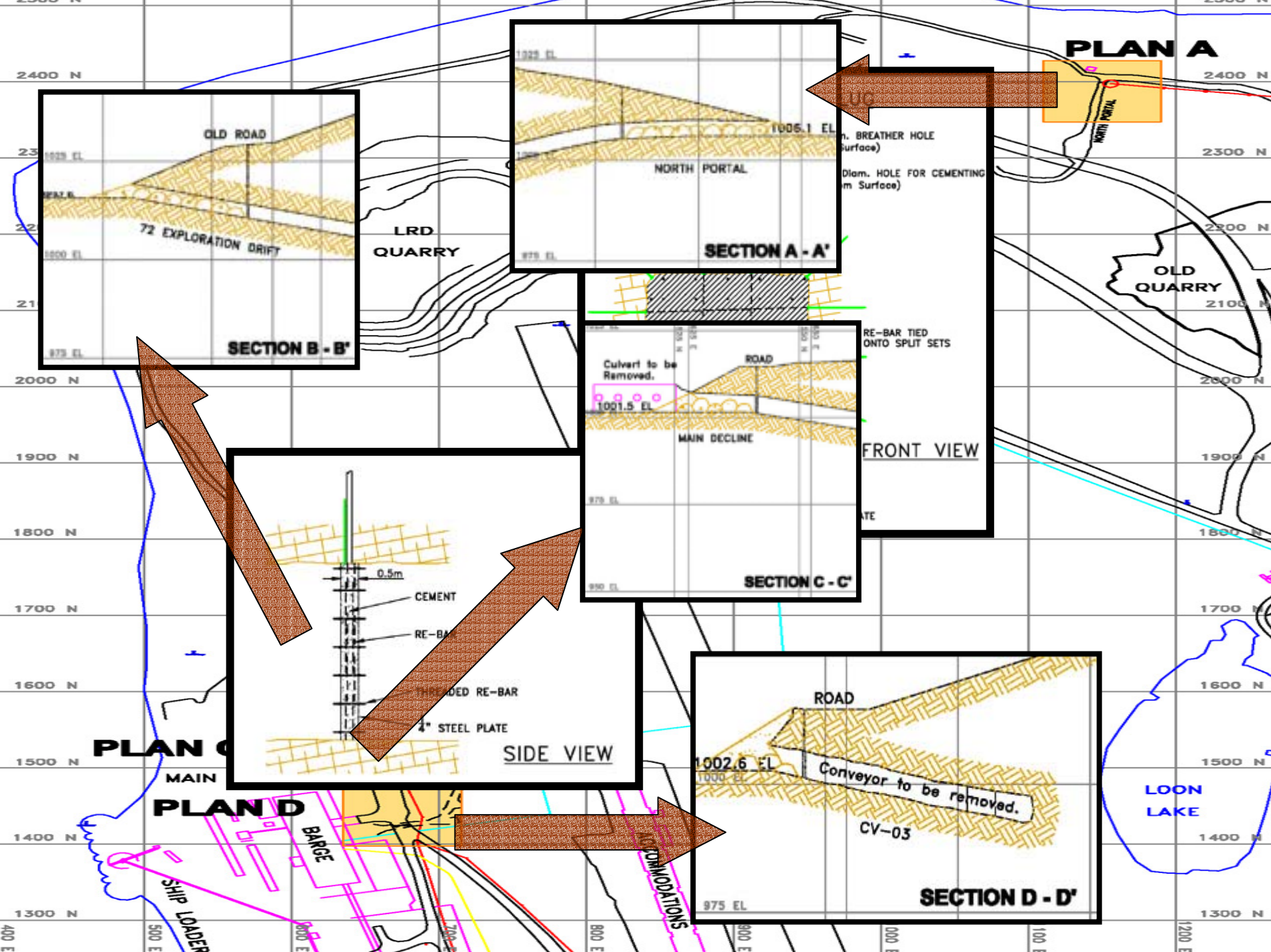
- Some subsidence has occurred
 - Backfill programs have reduced subsidence rates
 - SR is predicted to diminish
 - Regular monitoring is conducted
- N i 6 o y m i c 6 g 6
w M z k 5
 - r = x 6 g Z s i q k 5
W o E 5 J t 5
N i 6 o y m i q k 5
W l x 6 b w o b s J 5
 - N i 6 o 6 b 6 i z
u 4 y ? o x i x C h Q / s J 6
 - N s t s m / s i z
W o E / s i z
v J y q N 6 i x 6



Mine Portals

s / C4b6=s2 wy6b6= q

- Four portals
 - Access to be maintained until materials are stored underground
 - Portals to be sealed by concrete barriers and then backfilled and contoured
- ybm5 wy6b6]5
 - wy6b6= q h i q5 l Q5
Wd t5 gd6bs c6 t5 l Q5
k N2 w l x i
 - wy6b6]5 mg / s i x5
e e5b6g k5 g4 l Zs l t4
x7m l r=x6bs l t4
x7m l
y= z i c6 t5 l Q5



Waste Rock

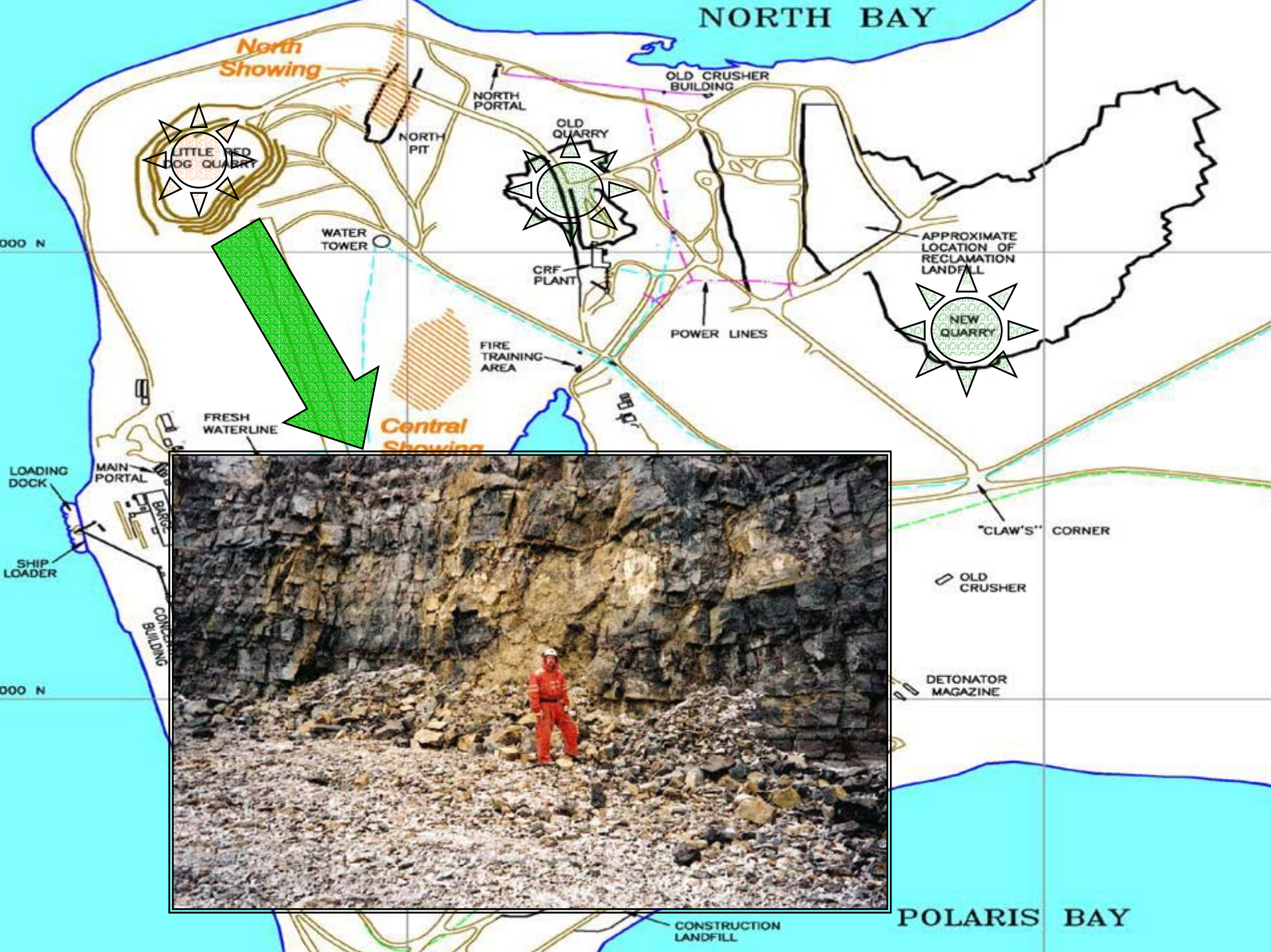
x4bf5 s / c5

- Limestone and shale waste rock has been stockpiled around the 1972 and North portals
- The waste rock is not acid-generating
- Most waste rock has been used for backfill or construction purposes
- yscOx5 x7m l hgZj/5
s / c5 vt tZsymJ5
c i z i 1972 x7m l
r t z ji 5 i 6n i
x1msm i 6 i
- bmf x5 x4bf5 s / c5
hD6N6 i c q 5g5
- x q i 6n6 x4bf5 s / c5
xgZsymJ5
r}=x6gDbs2 l t4 s ? l ji 5
nN / sJ k5 xgZsymJ5

Surface Stockpiles

kN2 c z i v t t 6ymJ5

- Ore was stockpiled on waste rock dump near the '72portal
- Sulphide ore was found near the stockpiles
- The ore will be processed or placed underground
- Lead ore contamination around North Portal to be excavated and disposed underground
- n=4nw5 v t t ZsymJ5 c z i
x4bf5 s / c5 x4b6= z i
c i z i '72 wy6b6= z i
- n9?w5 n=4n6 N i / symJ6
c i z i p2fx5
vtbsym i q5i
- p2fx5 n=4n5 nN / s i x5
s? lji5 wo / s l t4 kN2
w l x k5
- o x4 n=4n6u4 hD6N6 i c6g5
c i z i r t z b wy6b6= z i
xy?6bs i x5 x7m l kN2
w l x k4bs l t4



Surface Quarries

k N2 c z i s / C4b6]F=5

- Little Red Dog (LRD): limestone quarry
 - No risk for acid rock drainage
 - To be used as disposal location for buildings, concrete foundations, pipelines, cables, *et cetera*
 - No hazardous materials to be disposed
 - Engineered cover to be employed, contoured to prevent ponding of surface water
- k N2 c z i s / C4b6== i 6
(xsX3g6 euf l4): cf6g i 4
s / Cb3=4
 - dx6n3N q 5g5 hD6N6 i o4 i 4
s / c5]4=s i q k5
 - xg6bs i x6 x4b6=s i z k5
w[l 6Jx k5, dx6t ymJ5
g z = q k5, h2 l k5,
x9D / k5, xy q k5 /
 - hD6N6 i o4 i 4 Wd t i 4
x4b6=s i x q 5g6
 - cspmpsJ i 5
c o6gD t4n o x i 4
ns / s i x6, y= z i c6t5 l A
byCo6bM z q 5gu4 k N2
c z i wm6u5

Surface Quarries

k N2 c z i s / C4b6]F=5

- Two shale quarries
 - Walls and floors to be graded to ensure long term stability and to limit ponding of water
 - No risk of acid rock drainage
- m9D4 yxCM6g5 s / Cc6]F=4
 - x r N q x7m l N t q m i 4Zs l t4 y=gJ j5 h i xMw / 6 l Q5 x7m l byCo6b6 l xMw / 6 l Q5 w m6u4
 - d x6n3N q 5g5 hD6N6 i o4 i4 s / c5]F= s i q k5

Metal Leaching/Acid Rock Drainage (ML/ARD)

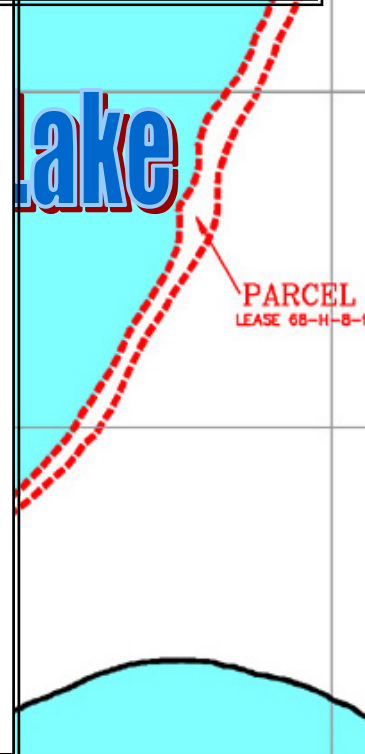
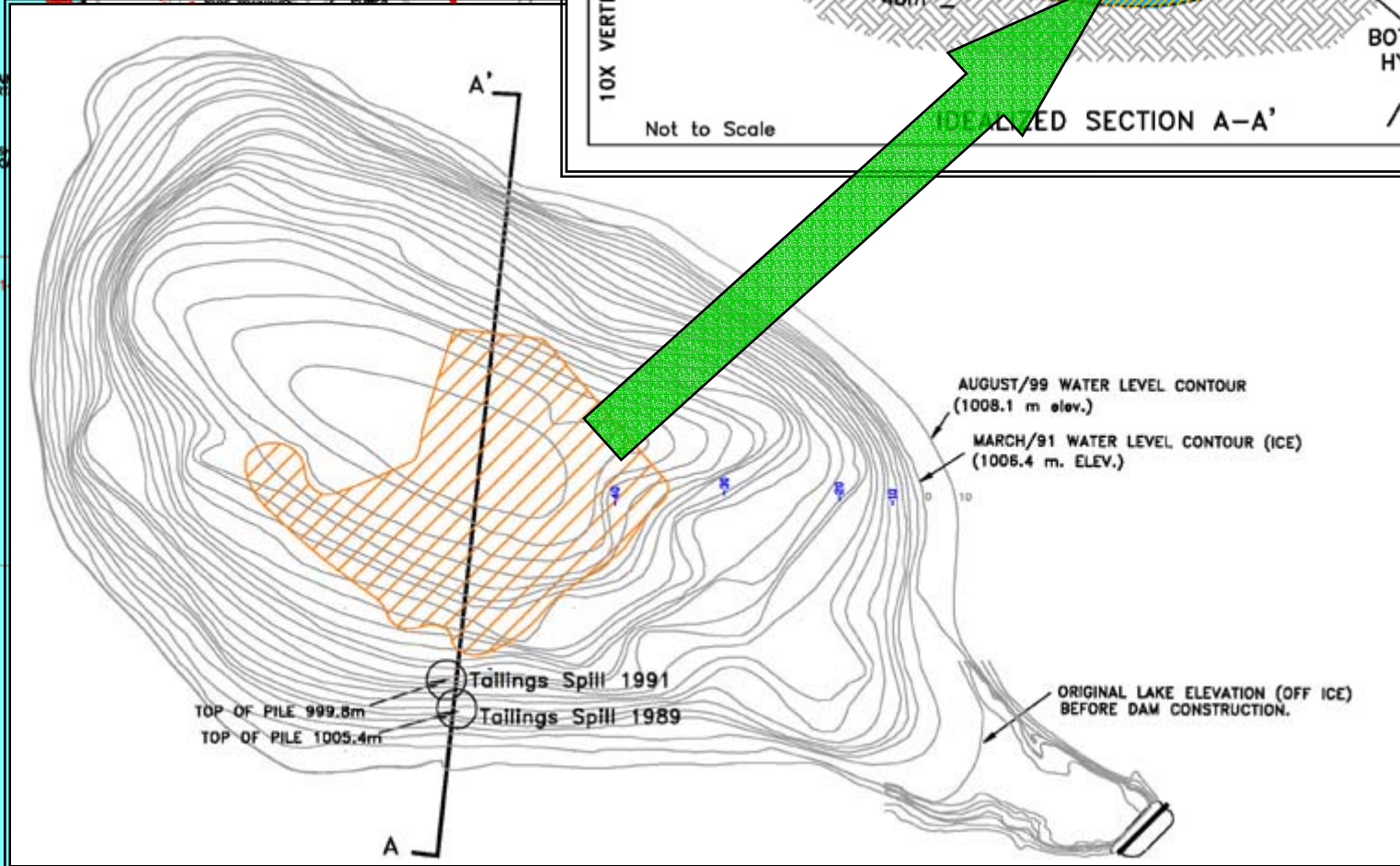
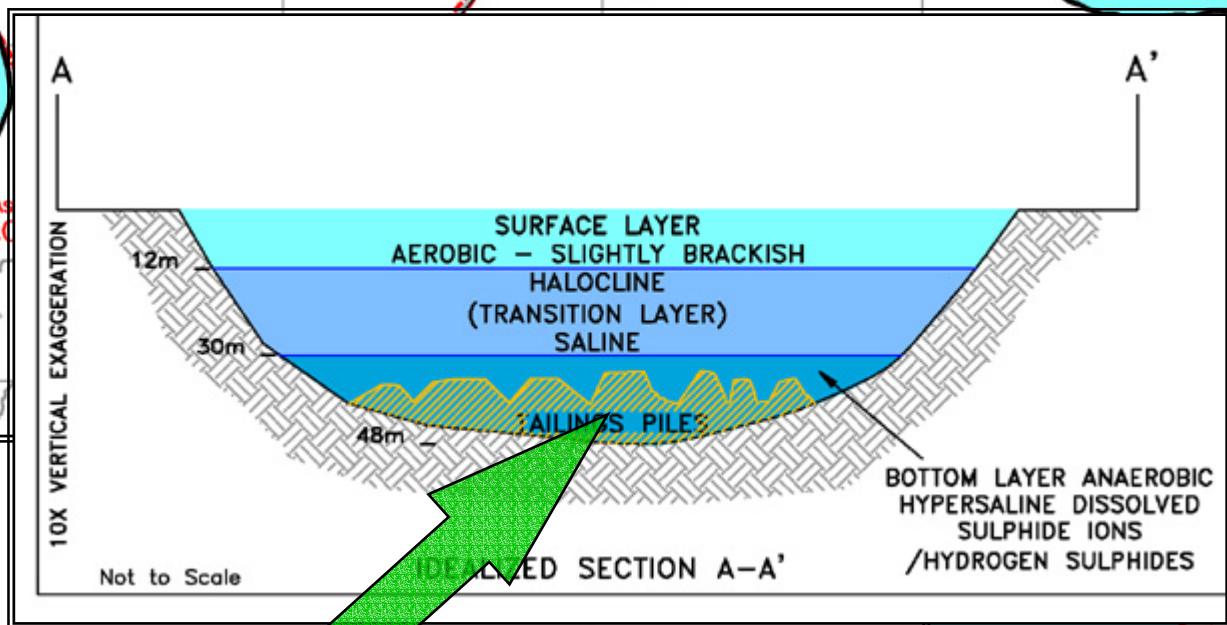
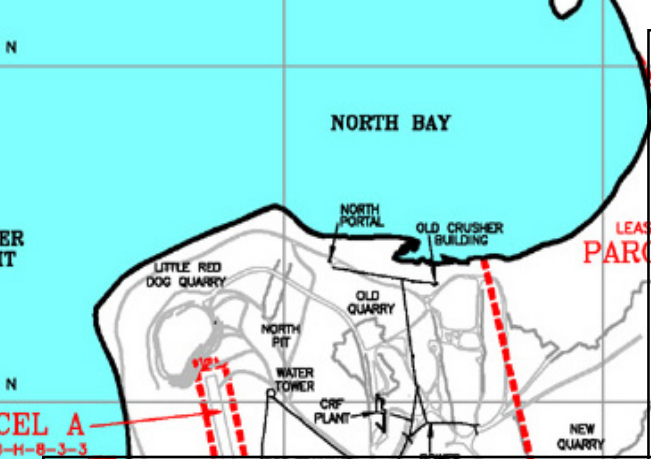
n=Z6 i 4 me i z FhD6N6 i 3u4 J=s i z

- Various sites was assessed for ML/ARD potential
- The absence of underground water and an ore body encased in permafrost will prevent underground workings from ML/ARD
- Portals and raisebore holes to be sealed
- Lack of oxygen at the bottom of Garrow Lake will prevent ML/ARD
- wMq nN=sJ5
N l Nw6gZsymJ5 n=Z6 i 4
me i z FhD6N6 i 3u4 J=s i z
WbcC/6 i q k5
- Wbc q5 i z kN2 w l x i wm6u4
x7m l n=4n6bc6 i z
so4bsym i z eeym i z k5
W5bwobs i x6 kN2 w l x i
nN=sJ k5 bmfk z n=Z6 i 4
me i z FhD6N6 i 3u4 J=s i z
- kNj5 wy6b6=q x7m l
d5t4yym i q k5 x1msm i q
mg/s i x5
- Wbc5t x q5 i z
x i 6nAbsJ1N6gu4 N t z i Z3D
by6u W5bwo5Jbs i x6 n=Z6 i 4
me i z FhD6N6 i 3u4 J=s i z

Reclamation Compoments
w o d y z k 5 s t 6 t E i 6 j 5 w M q

Garrow Lake Tailing
Impoundment

Z3D b y 6 s / C 4 b 6 i f k 5 x 4 b 6 = 4
y x m 4 b w o = s J 6





Garrow Lake – Disposal History

Z3D by6 _ x4b6=s i z k5 s i 2v s y q

- Garrow Lake is stratified
 - Tailings deposited at least 26m below surface
 - Pipeline breaks in 1985 and 1989 increased zinc concentration
 - Containment dam built at outflow due to pipeline breaks
 - Lake water was discharged after 1994
- Z3D by6 w m z c o E4b6 i c 6g6
 - S/C4b6 i f5 x4b f5 f=5bZs?4g5
c i z k5 @^ μ b w t i z k5
 - h5 l x l 4 yduymJ6 1985u
x7m l 1989u Wbc o v i Dbs2 l i
p14 v t 6h6 i z i 4
 - yxm4bwo5 nSbsJ6
nN / symJ6 f=5b6= z i
W5Jbs2 l i h5 l x l 4
ydu5b6 i z
 - bys2 w m z f= / symJ6
r a xA5 1994

Garrow Lake – Closure Approach

Z3D by6 _ mg / s i z k5 gC z J6

- Lines flushed after mine equipment dismantled and cleaned
- Lines to be floated to surface and cut into sections
- Tailings lines, Garrow Lake pipes and siphons to be disposed in the LRD quarry
- h5 l x l w5 s x6bs l t4
s / C4ys6=4u nN5J t5
wA5tZsc6t5 l Q5 x7m l
no4bs l i
- h5 l x l w5 S4bybs l t4
c z k5 x7m l r9 l 6bs l t4
Nw[oQx6bs l t4
- s / C4b6 i f k5 x4bf k5
x2dbsJ5, Z3D by6u
h5 l x l w5 x7m l X4XAbw
x4bZs l t4 b[K z
w l g i x l 4j5
s / C4b6== i 6j5

Garrow Lake – Stability and Chemistry

Z3D by6 _ h i x b w o i z k5 x7m l
xKQ4 t b6 i z k5

- Studies revealed:
 - Vertical layers are maintained
 - Zinc concentration in surface layer have decreased
 - Concentrations are predicted to decrease over time
- Modeling indicates that lake-level can be reduced without affecting layers
- cspn6bsJ5 ne6tbsJ5:
 - x8j4Xoxymi q
d9oE4tymi q
h i x b w o l Q5
 - p14 vt6hymi q
d9o6Xu wms2
x=4ymi z i
Wbc6 l xDw6g6
 - vt6hymi q i EsQ/sJ5
uy?oxq N6 i x6t5 l Q5
xCA5 xuh5
c q 6Xox i q i
- b4gDt axox5 N l Nw2fbsJ5
b2fx5 by6u wmsZ6 i z
wm4y?oZsJ1N6g6
h i x q t5 l Q5 d9oE4tymi q

Garrow Lake – Discharge

Z3D by6 _ f= t b s i z

- Lake level is approx. 2.5 m higher than pre-dam level
- Need to discharge 10 M m³
- Metals of concern zinc, copper, lead
- bys2 wmsZ6 i z 2.5
µbu4 wmZ6 i 6nsJ6
yKx i
nSy6bs i xn6t5 l A
- W/Exo4 f= t b s l i
10 µbu4
r4L6Ns] t5 l A
- N=Zw5 whj n l Q / s J5
p14, yS3, o x5

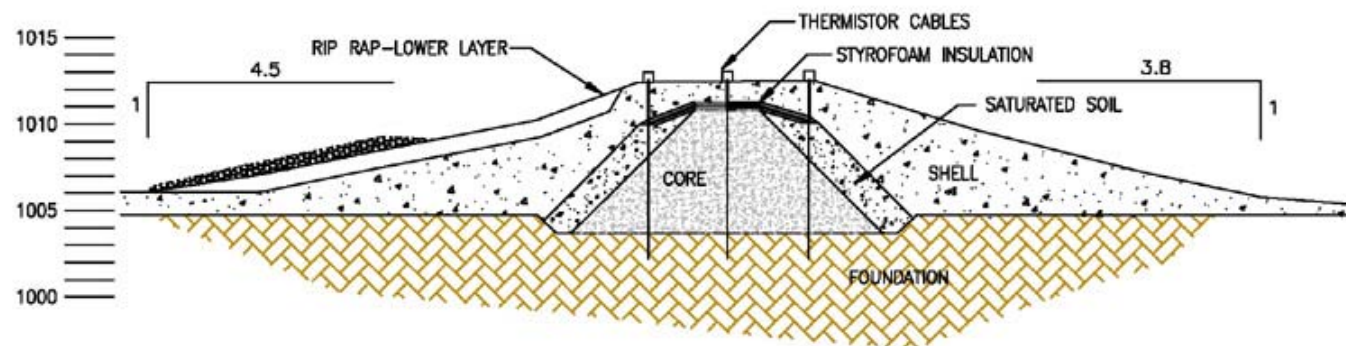
Garrow Lake Discharge

Z3D by6 _ f=tbs i z

- To maintain water quality, Consultants have recommended that:
 - Discharge does not occur prior to melting sea ice (avoid sensitive period for young aquatic organisms)
 - Cease discharge in fall when sea ice begins to form solid cover. (avoids breeding period for aquatic fauna)
 - Monitor discharge from GL and receiving environment Garrow Bay
- $\text{N}^{\text{H}}_4\text{LA}$ wms2
ckE5i z, cspmpsJ5
WNhxdpJ5 bmf i z:
 - f=t5t c5b q5l t4 ryxi4
bEs6 xs4Xoxo6t5lA
(W5bwom l Q5
WD6n? oxon6t5l Q5
bEs6usb l 4b5 j mJC l w5)
 - s i4t c5b6 l A f=tbs i z
srx4nu bEs6
eemEo6t5l A.
(W5bwom l A
w3i s6Xox t5l Q5 bEs6u
j mJ5)
 - Nstsm l A f=tbs i z
Z3D by6u5 x7m l f==sJ2
x? t z Z3D vq 6L4

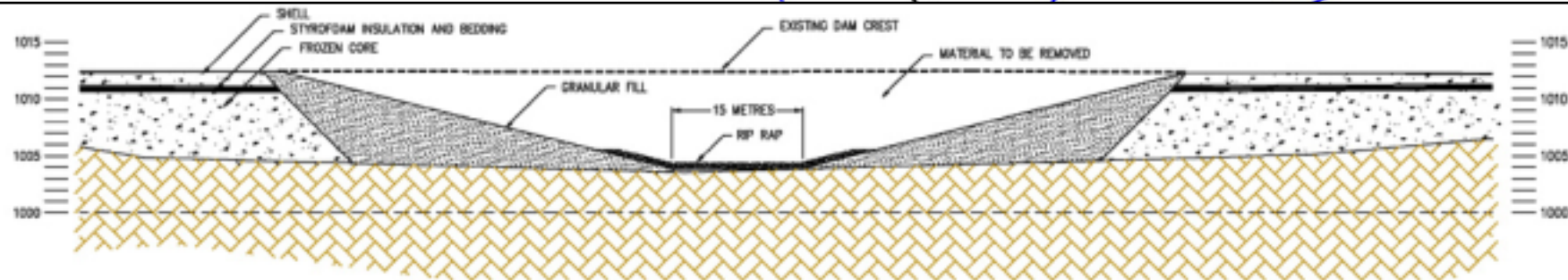
LOIS LAKE

LAKE



Dam Cross-section

POLARIS BAY



Decommissioned Dam Longitudinal Section



POINT

Garrow Lake – Frozen Dam Core

Z3D by6 _ edmJ6 nSbsJ2 e t z

- Built in 1990/1991 to allow better control over water discharge
- Core made of crushed slate and ice
- nN / symJ6
1990/1991-u
WJ1Nd2 I A
]k e4ym i 6nu4 wm6u4
f = t5t J1N6 i z
- e t z nNymJ6
ydmE4yymJu4
s / Coxu4 x7m I yfu4

Garrow Lake – Decommissioning

Z3D by6 _ wA5 tZs? o x i z

- Centre portion of dam to be removed
- Styrofoam insulation sent to LRD
- Creek bed to be armored to minimize erosion
- Slopes blend to reflect surrounding terrain
- e t z]i 5g6 nSt2
xy?6bs i x6
- edm i z k5
g4 l Q/ sJ6 x[/Zs i x6
w l g i x l 4j5
s / C4b6== i 6j5
- fZs /2 y]N z
c i Zs i x6
ydu l x6bwo t4n z i 4
- y= z i q
xpoQx6bs i x5
x? t z k5 m i c j5

Reclamation Components

w o d y z k 5 s t 6 t E i 6 j 5 w M q

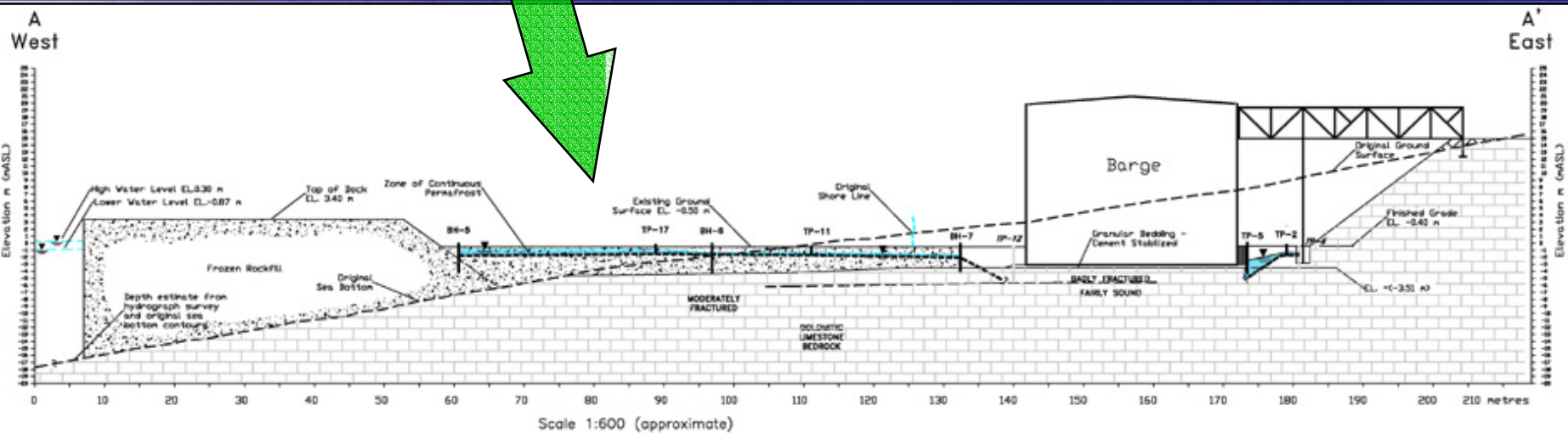
Major Surface Structures

x q i 6 j 5 k N 2 c z i n N y m J 5

Process Barge

n=4nos6=4 sux6Jx2 v l b z

- Contains a process plant, power generators, office, shops
- Decommissioning:
 - Buried in LRD as refloating it would cause significant damage
 - Contaminated rockfill to be disposed of underground
- Wbc6g6 n=4nos6=4 i 4, wfmd t k5 doosDt i 4, x9M4=4 i 4, nN=4 i 4
- wA5tZs i z :
 - ns / s l i w l g i 6Jxj5
s / C4b6== i 6j5
S4btbs i z x q Ju4
dx6n6NC / 6m5
 - hdwymJ5 s / c5
r=xdb s J5
x4bZs / Exc6g5 k N2
w l x k5



Concentrate Storage Building

n=4n k5 g5d6ym=4 w[l 6Jx6

- All co
equip
- Steel
dispo
- Conta
be dis
under



- Concrete footing to LRD
- Area backfilled and
graded to stable slope

- 7m l
6bs i x5
- 2 w l x k5
- e s Z5
- g z = q w i g i x l 4 j 5
s / C 4 b 6 = = i 6 j Z s i x 5
- w i z r = x b s l i x 7 m l
h i x M w / 6 l A
y = z i o 6 b s l i

Cemented Rockfill Plant

e e t y m J 6 s / e s Z 6 s / c u 4

r = x D t 4 n o s 6 = 4 W o E = 4

- Equipment to be reused or disposed of at LRD
- Cement contaminated soil to be disposed of in LRD
- Fuel tanks to be cleaned, crushed, and sent to LRD
- Foundation broken and covered with overburden
- W o E 5 J t 5 x g Z s v i 6 i x 5
s ? l j i 5 x 4 b Z s l t 4
w l g i x l 4 j 5
s / C 4 b 6 = = i 6 j 5
- e e t y m J u 4 s / e s Z 6 u 4
h d w y m J 5 k N 5 x 4 b Z s i x 5
b [K z w l g i x l 4 j 5
s / C 4 b 6 = = i 6 j 5
- s 6 h c 6 j 5 c 5 b s / 6 J x 5
n o 4 b s i x 5, N i 4 t b s l t 4,
x 7 m l w o / s l t 4
w l g i x l 4 j 5
s / C 4 b 6 = = i 6 j 5
- g z = z y d 2 g Z s l i x 7 m l
n s / s l i k N u 4

Accommodation Complex

gJ6u=4 w[l 6Jx6

- Fuel tanks and storage
- Hazardous materials stored offsite
- Building of use
- Remaining to be disposed
- Foundation graded



- z = z yd2gZs l i, c i z
m i 4nZs i x6

Tailings Thickener

s / C4b6 i f5 x4bfk5 r i 6 t t D5

- Tailings basin to Garrow in under working
- Building tanks and flushed
- Material LRD
- Base graded to stable slope



s / C4b6== i 6 j5

- N t z m i 4 n Z s i x 6
h i x M w / 6 l A y = z i z

= z i
y6j5
4 kN2
5
s l i ;
Z s i x5
x5

Fuel Storage and Handling Areas/Distribution Lines

s6hk5 gd6ym]5 x7m l WoE=sJ5Fx2db sJ5
h5 l q

- At closure all diesel fuel to be transferred to one main tank, for removal
- Sludge removed and burned
- Tanks and pipelines to be cleaned and sent to LRD Quarry
- Impermeable liner and contaminated soils disposal underground
- Tank and pipeline areas to be graded
- mg / sQx6X5 bmwb
s6h6Jx5 xbsy6j5
c5bs / 6Jx6jZs i x5,
xy?6bsJ4n6
- yt i q xy?6bs l t4 x7m l
wfxM / s i x5
- c5bs / 5 x7m l h5 l q
no4bs l t4 wo / s i x5
w l g i x l 4j5
s / C4b6== i 6j5
- meM q5gu4 me5bwo t5
x7m l hdwymJ5 kN5
x4bZs i x5 kN2 w l x k5
- c5bs / c6]5 x7m l
h5 l c6]5 m i 4nZs i x5

Bulk Chemical Storage Area

x q J5 xKQ / sJ5 gd6ym= q

- Invent
repack
off-site
dispos
supplie



vi 6 l t4,
N=sJu5
k4bZs l t4
l t4

Concentrate Load-out Conveyors

n=4n k5 s y o 6gD t 5 b2y6Jx5

- Conveyors cleaned, removed and dismantled
- Steel/equipment no to be reused will be



w i g i x i 4 j 5

s / C4b6== i 6 j 5

- hd6ymJ5 kN5
x? t z i b2y6Jx5
no4bs i x5

Reclamation Compoments
w o d y z k 5 s t 6 t E i 6 j 5 w M q

Support Infrastructure
w L x d b s J 5 n N / s y m J 5

Dock Site and Shoreline

gM4b6=c 6=4 x7m l y4/ z



n75 co4tymJ5
r9lZs i x5 xp k5
wmc6 i sJ j5
wodyC l x z yN z b
v= z i z st6tbs i x6

last structures
addressed

- Temporary dock to have steel pilings cut off at ground level



Airstrip

u5b6=4

- Airstrip is to be largely left intact
- Lights, beacon and other equipment to be removed
- Airstrip to be formally closed with notification to authorities
- u5b6=4
h i sm / s i x q 5g6
- d9o q , vw=5b6g6
d o 6 x7m l x y q
Wd t5 x y ? 6bs i x5
- u5b6=4 mg / smE4 i x6
gn6ybs l t4
WJ1Nsy o Ep q

Tailings Lines

s / C4b6 i f5 x4bf5 h9 l x l q



- Pipeline right-of-way returned to restore natural drainage and prevent ponding.

X/m l WO / S l X5

w l g i x l 4 j 5

s / C4b6 == i 6 j 5

- h9 l x l c6 = s J5 w i q
s t 6 t b s l t 4 J 4 = g c q
x7m l byC i 4bMw / 6 l Q5

Freshwater Lines and Pumphouse

wub6=4u5 h9 l q x7m l

X4Xs t c6= z



- Wbc6g6 5 rMubu4, 200
uoᵐbu4 n i j4tQJu4
eebwot o4u4 ᵑN6 i 6j5
cspnst o4u4
wMwAt6X l 4gu4 h9 l u4,
uᵐ 2 1 000 000 1

and pipes to be dismantled



y= z i o6bs l i mi4nZs l i
Wᵐ c6 i z

Access Roads and Ramps

x2d t q x7m l mJ6b6= q

- ~40 km roads on site
 - No stream crossings, except a small culvert crossing over a stream exiting loon lake
 - Culverts to be removed to reestablish natural drainage
 - Re-contouring will be implemented as needed to ensure long term stability
- ~40 rJmub x2d t5 nN=4u
 - JZs / i 4 wJyDt c q5g6, ryx i 4 wm6 k5 J4= o s6ymJ5 h9 l w5 wJyZ4n6 JZs / u J l 8 by6u z 6gu5
 - wm6 k5 J4= o s6ymJ5 h9 l w5 xy?Exc6g5 wod yC l x z k5 wo s6 l Q5 J4b6 i q
 - y= z i o6gZs i x6 xgExc6gk5 WNhx6 l Q5 y=gJ j5 h i xMw / 6 l Q5

Reclamation Components
w o d y z k 5 s t 6 t E i 6 j 5 w M q

Solid Waste Management Options
y t J k 5 x 4 b f k 5 x s M 5 t 5 J b s J 1 N 6 g 5

Construction Landfill

nN / sJ k5 x4b6=4



EROSION

- Material is being relocated to the toe of the operational landfill
- An inventory of relocated waste is being kept

- Wd t5 k4tZsJ5 b[K z
c i z k5xgZsJ j5
x4b6=4j5
- t tC6bs? o xJ5 k4tZsJ5
x4bf5 Wym / s j5

Operational Landfill

xgbsJ6 m3 l f3=4

- Operational since 1981
- Includes construction



-
-
-
-
- do E o t ymJ6



Little Red Dog Quarry

xsXg6 euf l j ns/s=4



~100,000 m³

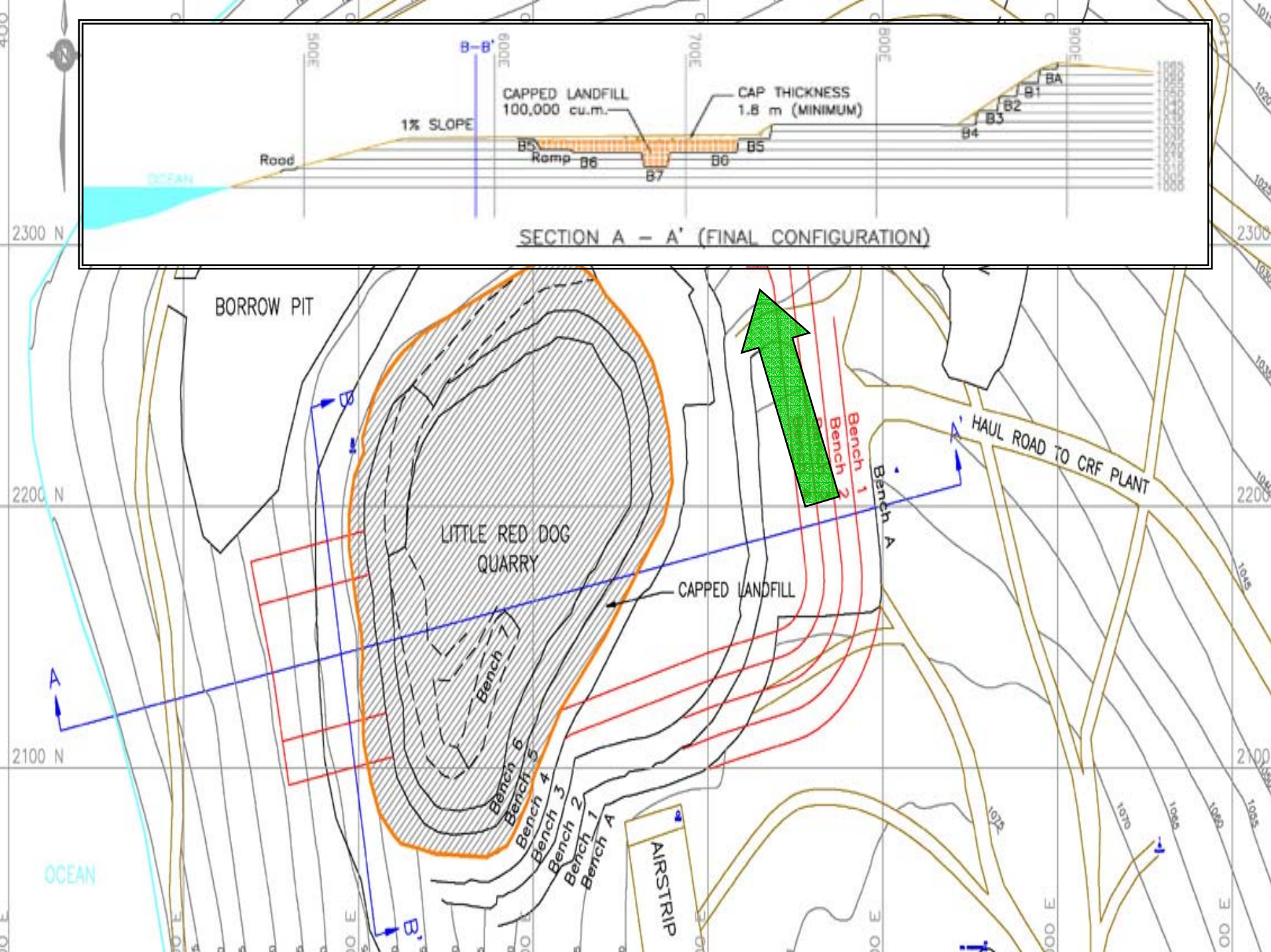
of

- xpQ q g i 4
nwv=s i xq6 h3 l



%),))) ubw
rXE t y m l A x q i z





Reclamation Components

rhbcm z 5 c k w g i = i z b
s t t b s N h i z

Chemicals, Reagents, Fuel and
Lubricants

wmw5 wMnw5, s3hw5 xm l s3h t D t 5

Chemicals, Reagents, Fuel and Lubricants

wmw5 wMnw5, s3hw5 s3h tD t l

- Inventory will be controlled to ensure minimum quantities on site at closure.
- Remaining materials will be:
 - Returned to supplier
 - Sold to another user
 - Used at another Cominco facility
 - Shipped to licensed disposal facility
- Nnbsym i5 rhgwNw5
N l NwyJbs i x3S5 bmf x
s3hDJw5 s kg q vx l m z b
bwv i g5
- xuxf q5 wmwbs i x3g5:
 - s t tbs i x3g5
i s==sJ=i3 i5
 - xy z q k5 i sDbs i x3g5
 - xy z z i vuff5 Wq i
xgbs i x3g5
 - xsMtbs l t4 WJNst o k
bwmwg i m3 l f i j5

Hazardous Materials Management

hfNg5 rhgwNw5 xSMbs i q5

- Materials to follow environmentally acceptable management procedures
- Materials Management regulated by:
 - EC, (TDF Act and Regs)
 - Natural Resources Canada (Explosives Act, Mine Safety act)
 - Atomic Energy Control Ltd
 - GN DSD guidelines
- Materials include: Waste Oil, Antifreeze, Solvents, Paint, Freon, Batteries, Asbestos, PCB, Explosive
- rhgwNw x? t j5
hfN q v l x m z b
xSMbsZ l x m z b cspnbs l t4
- sfk z rhgwNw moZ i
mo tbs J5:
 - x? t o Ep5 vNbu
 - kNusboEpf5 vNbu
Gc t t i j moZ, s/Cyst5
xbN q J t moZ qH
 - c3t yp5 xSMyp q5
vgp c t Q5
 - v?mf q5 kNK5
wfW=oepf5 mobsd / q5
- rhgwNs i Cbs J5 wmwgcg5: ,
s3h6 xgbs i f, dxEft4,
wMnw5, xux5, dxEf5, Xbo5,
hfNgo5 xpQqg5 xml c3bJ5

Reclamation Components
ckwg i z i s t tbsNh i z b
N l NwD t q 5

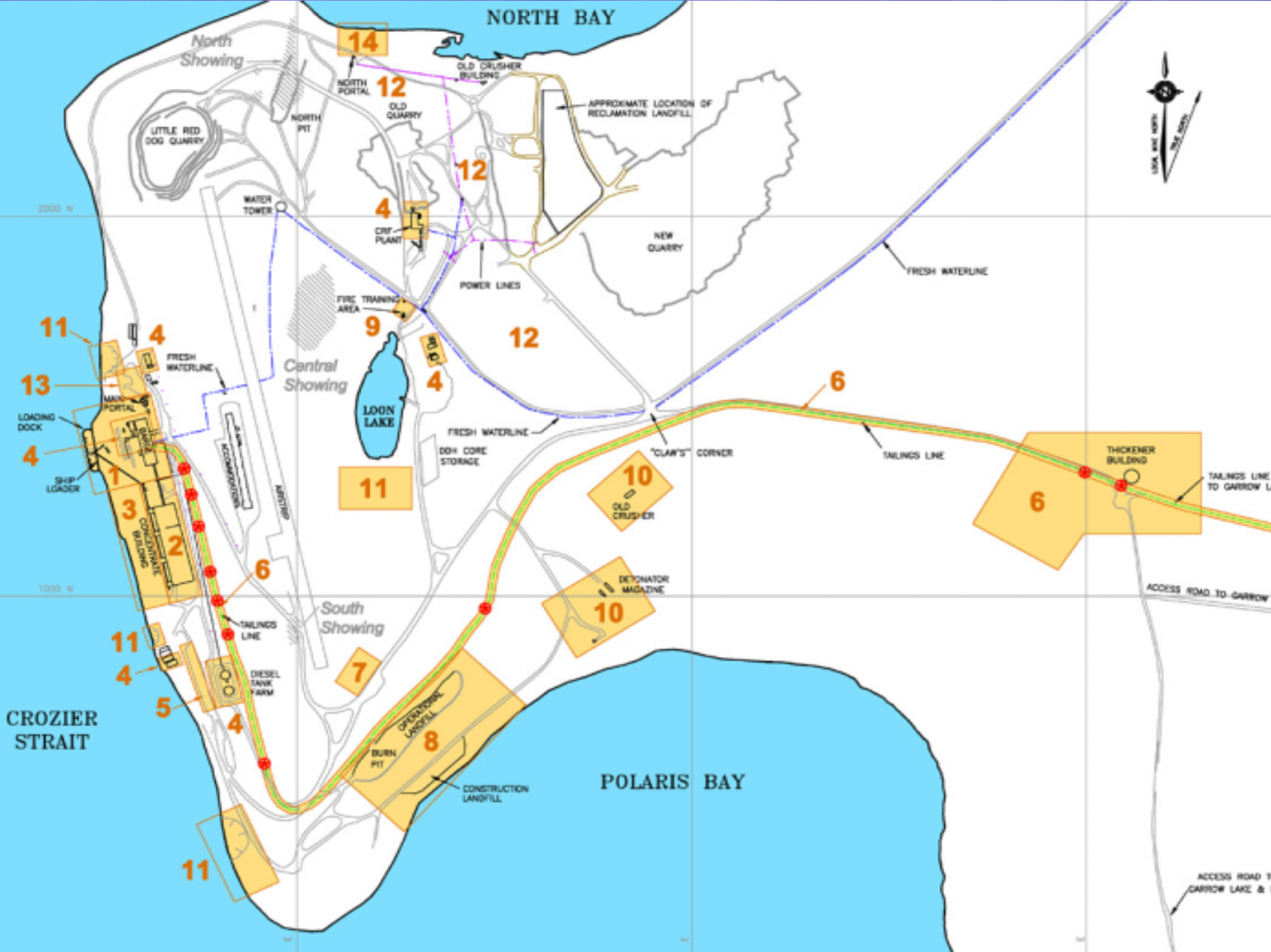
Contaminated Soil Management
hDymJ6 kN n l mnbs i z b
xsMbs i z

Contaminated Soil Management

hDymJ6 kN n l mnbs i z b

xsMbs i z

- 1999 Phase I:
 - Reviewed current/historic potential areas of concern, site visit
- 2000 Phase II:
 - Determined occurrence and extent of contamination
 - Found localized areas of zinc, lead and hydrocarbon contaminated soils
- !(((yKo3X6
vmQ / s i z :
 - euD l Q5 mNsJ6Fbwhm i
whm l bsymJ5, kN z
euD l A
- @)))u xwX z
vmQ / s i s J2
 - cspnvi l A cspnbs i z
xm l c k tQ hDymm z 5
 - s / Cw n = C / nw tyJ4n / w5
xe i nwl xm l s3hDJw5
kNu o3g5 hDt EJ5 Ni l Q5



Overall Objectives Reclamation

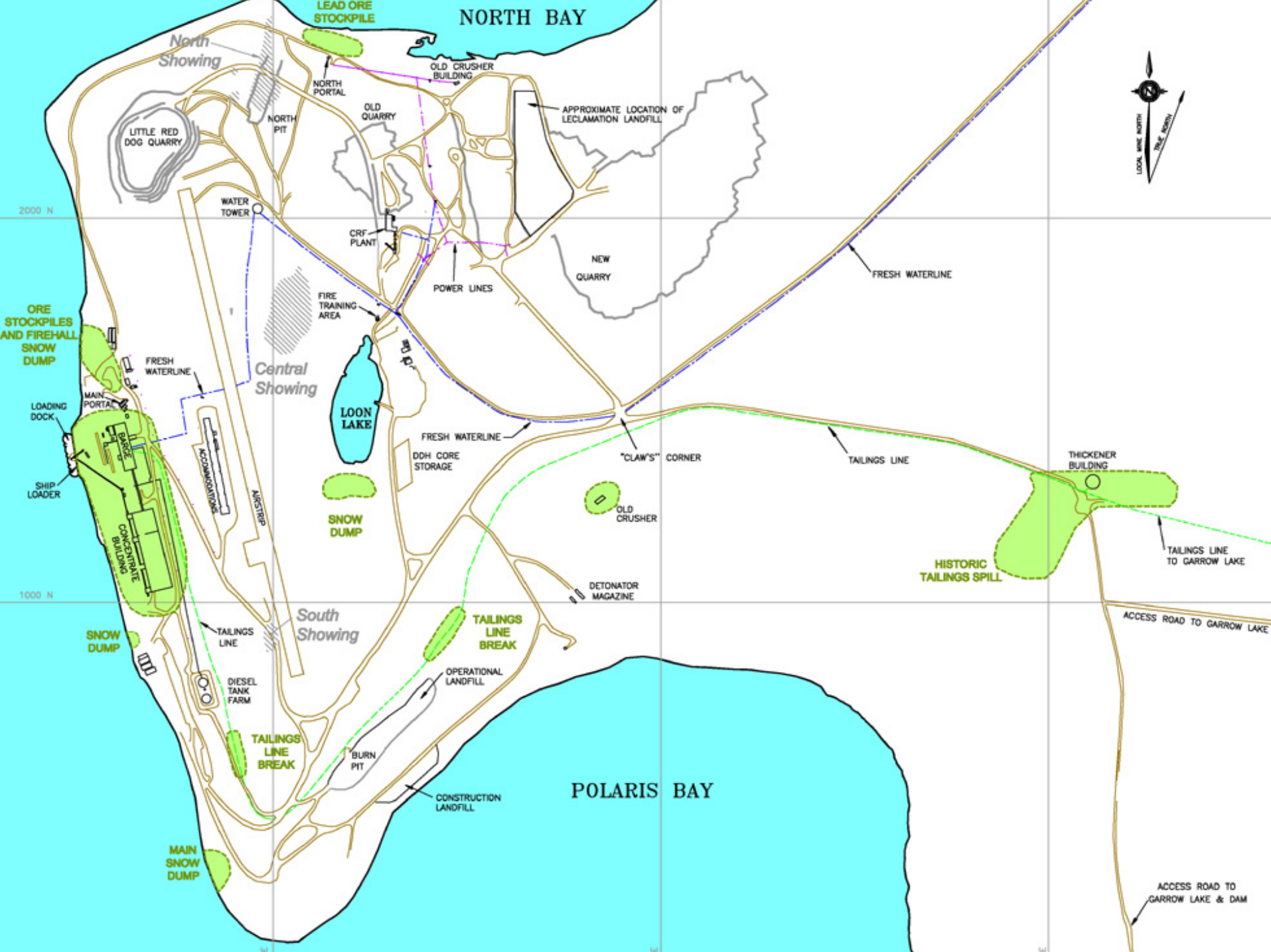
gCZENhb q 5 c k w g i = i z k
s t t b s i j 5

- To comply with Fed and Territorial Regulations
- Mitigate or prevent release of contaminants
- Aesthetically acceptable conditions
 - Considering: economics, climate, original land condition and future land use.
- =gD v?mf5 kNKu l
moZq i moQxo5
- yxm4tbsbwol t4
k c t l Q l i 5 hfN3g5
- kNozb xeymi z
NmQ / s / Exo4
 - whmQ l Q5: rNs / 4nst5,
kNz, c k w g i = i z
kNz xml yKiti
kNzb xgbsinz.

Metal Contaminated Soils

n=C/4n³j⁵ hDb symJ6 kN z

- Numerous area where metal contamination is present including: waste rock and rockfill areas, surface stockpiles, process barge, shiploader dock, conveyor, concentrate storage building, tailings pipeline and thickener, snowdumps
- Estimated clean up quantity is 92 350 m³
- Soil will be excavated and disposed underground
- Excavated areas to be regraded where necessary
- kNsJ6 s kgl t⁴ n=C/4n³j⁵ hfbsymJ sfx wMs l t⁴: d/NbsJ6 s/C6 xml wlgymJ⁵ s/Coh³bsv i g⁵, cz i g⁵ ctytbsymJ⁵, gM⁴b=a tbsymJ⁶, sux j syv³b³=s l i gM⁴b³=4, sw/3g⁶ syv³bs⁵, y³l x⁶ n=C/nf=s l i w l l, xuxf³l² h9 l x xml ei³yJ t⁴, xSbw/w= l
- whmQ/sJ6 n l m³nbs i xg⁶ (@ #%) r4XEyymJ⁵ x q i z
- noA³bs l i W/bs i x³g⁶ gxXz kNs l xbi g³jbs c i xL i
- noA³bsJ⁵ gxXohbsv i Exo⁴ wM z ym l x i q⁵



Petroleum Hydrocarbon Contaminated Soils

s3hx l j5 hDb sym i q5 kNw5

- Hydrocarbon contaminated soils are present at the process barge area, oil storage area, diverse above-ground storage tanks
- Approximately 36 700 m³ of contaminated soil (including 20 000m³ metal contaminated soil from the process barge)
- Boreholes test have indicated that permafrost restricts contamination
- s3hx l j5 hDb symJw5
N l NwbsymJ5 sfN i S5
gMb3=u, s3hx l c=u,
xpQ q g5 kNs2 c z i g5
s3hx l c s t Q / sJ5
- wmc #^ &)) ub i
r4XEyymJ5 hDymJ6 kN
GwMs l i @))))
rXEyymJ6 n=C/4n6
kN b? z gMb3=u z g6H
- wfbbs l t4 x4mb symJ5
N l NwyymJ5 dxawN3g5
hDt / q g5



Petroleum Hydrocarbon Contaminated Soils

s3hx l j5 hDbsym i q5 kNw5

- Preferred Treatment Option
 - Treatment technology limited by metal level contamination (I.e., barge area)
 - Soil to be place in underground within permafrost areas.
 - Free phase petroleum hydrocarbons will not be placed underground

- xg3bs z DmZ / 3g6
 - wh ob3= o u
n l m3nbsZ / 3g6
n=C / 4nj5 hDbsymJ6
Gh3 l gMb3=4H
 - n l A3bs i f5 gxX4
kNs2 xbkbs oZJ6
dx awN3g3 j5
 - s3hx l = i 3bcs q i z
kN noA3bsJ6 kNs2
xbk3bs / qg6

Northern Community Benefits

sxN3us kN o sJ5 wvJyx4n q 5

- Potential benefits:

- Disposal assets
- Decommissioning contracts and employment
- Post-closure monitoring and training

- wvJ t sgwNEx o5

- WQ / sJmJ i 3g5
Wd t Q / sJ5
- wAt E i q k5
vgCbgwNEx o5 xm l
WNhx3=sJN i x i q 5
- mg / s i x3t l A
mg / s t l A l
cspnts l t4
wo i xtbs l t4 l

Reclamation Component
s t t b s i z b c k w g i = i q b
w l o q 5

Post Closure Site Management
mg / s ? o x t l A b w v i
x s M y p c l i

Post Closure Site Management

- Phase I
 - C&R activities to take place
 - Surface leases to be maintained by company
 - Ongoing presence by Cominco staff
 - Phase I expected to end in October 2004
 - Monitoring:
 - Routine Monitoring
 - Testing of remediated soils
 - Vegetation Sampling
- yKo3X6 WoEx4n6
 - mg i z x m l c k w g i z k s t t b s i v J y t b s i x 3 g 5
 - k N s 2 c z i x g g x 3 i 5 W y m / s q N l t 4 v 7 X i s J 3 j 5
 - v u f f 5 W N h x 3 t q 5 m D o e u g c w N 3 l i
 - y K o x X z W o E x 4 n 6 i E s Q / s J 6 w h o i x g 6 x 4 g X @)) \$ a o 3 X 5
- cwpn3 i 6:
 - x f M w g 3 u c s p n b s q N 3 l t 4
 - c s p n b s q N l i k N z
 - W D X o x J 5 c s p n 3 b s l t 4

Post Closure Site Management

mg / s i n z b mDo eu l t4 xsMbs i z

- Phase II
 - 1-2 day site inspections to be conducted in 2005, 2006, 2007, 2009 & 2011
 - Sampling of Garrow Lake stability
 - Temperature readings from landfills
 - Ocean-going surface water to be sampled for metals
 - Inspection of main surface structure areas, subsidence areas, mine entrances and roadways
 - Vegetation sampling
- Review of data in 2011
 - if site is stable then land returns to the Crown
- xwXEobz vmQ / s i z b
 - s l u mD i l i c s p n b s l i
@))%a o3X5, @))^a oX5,
@))&s oX5, @))(a oX5
@)!!u l
 - w=c s p n b s l i b y Q x D
h i X o x q v l x m z 5
 - b E s j 3 X o x J 6 c s p n b s l i
n=C / 4 n c m z 5
 - w c s p n b s l t 4 c z k N s 2,
n s / s = s y m J l, s / C y s = j
w y 3 b 3 = q 5 x m l x d t q 5
 - W D g q 5 c s p n b s l t 4
- b w f x c s p n D t = i 5 e u D / s l t 4
@)!!a o3X5
 - k N c k w q N 3 X 5 = g D v ? m f k
s t t b s l i