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AANDC -	Aboriginal Affairs and Northern Development Canada
ASPPR -	Arctic Shipping Pollution Prevention Regulations  PPD%C%DΓ DΓϤʹ;ϯϤʹ;σϐ ϲʹΡʹͽϹϷʹϹΔϲʹͰϧͺͺϤʹϧϧʹϭʹʹͿʹ ϹͺͺϷʹϧ
AWAR -	All Weather Road/All Weather Access Road るいろして上い るいめのいくるいろして上い るいめのりゃしている。
DEIS -	Draft Environmental Impact Statement በበናጭርኦኒጭፖርቲና বዊበር   ላኮጋΔረሚናማናጋና ፈጋፈΔታΔንፈስና
DFO -	Fisheries and Oceans Canada Δ۹۵۵ - همور کی ۱۹۵۶ - ۱۹۵۶ - ۱۹۵۶ - ۱۹۵۹ - ۱۹۵ - ۱۹۵ - ۱۹۵ - ۱۹۵۹ - ۱۹
EC -	Environment Canada くろしてんともdc bolcに
EIS -	Environmental Impact Statement くろして くっしょうしょう しょうしょう しょうしょ しょうしょう しょうしょく しょう しょうしょく しょうしょく しょく しょく しょく しょく しょく しょく しょく しょく しょく
FEIS -	Final Environmental Impact Statement Pもていく くるしてい くゃついっとしているいのでしょう。
GN -	Government of Nunavut 
GNWT -	Government of the Northwest Territories
HTO -	Hunters and Trappers Organization ላህo.ሎሶ Γየቦላናσላጭበናጋ bጋንትናbበሶጭቦና
IIBA -	Inuit Impact Benefit Agreement ΔΔΔ΄ ϤϧϽͼϹϦϟϹϧϭϧϹϧϭϧϹϧϭϧϹϧϭϧ
IR -	Information Request ンPィハCトいへもものできた。 フトイト
KIA -	Kitikmeot Inuit Association ʹʹΡΩʹʹʹϧϹϹʹ ΔͺϼΔʹͺϧϽϧϟϧϧϹͿϔϧϧϲ
LKDFN -	Lutsel K'e Dene First Nation Δ΄ Δ΄ Δ΄ Δ΄ Δ΄ Ρ΄Γ Φ Δ΄ Β΄
NIRB -	Nunavut Impact Review Board 
NLCA -	Nunavut Land Claims Agreement 
NPC -	Nunavut Planning Commission ΔαΡιΓ < αΔλ βΓλαββρο

NSA - Nunavut Settlement Area

NTI - Nunavut Tunngavik Incorporated  $2^{\circ}$   $2^{\circ}$   $1^{\circ}$   $1^{\circ}$ 

NWB - Nunavut Water Board

ΔΟΦΙΓ ΔΙ ΓΛΟΓΙΙ ΒΟΙΙΙ Ι

OPEP - Oil Pollution Emergency Plan

>%\d\_\%\formalfont\colon \colon \co

TC - Transport Canada
Δ°Γ٬ςζζζλος (ΔΡ΄-ἐρηςλεδί) δος CΓ

YKDFN - Yellowknives Dene First Nation

γ\_οΔΓ Δ° ω ο ιδιδιο Ο ιδι

- ▷¹Ы▷┦▷┦Ь┦Ь₹ ԵՈLσ∿ቦ⁰σ Λϲሲላሢ┦Lሮჼንጋσ Λϟ⋂ΊԵჼንσ ԵՈLԷՎԵՒԵԹΎ ΔΊԵ૩ԵΊΠΔኘσ ΦΔΛΛ 13, 14, 4μΦ 15, 2015-ΨΠ²Φ, ΛϲΛάΨλΕς ΕΊΡΕ "ΡΊΓΫΑΪσΦΡΕ" ▷ΊΗΡΑΝ ΤΕΊΡΑΝ ΑΓΛσ ΔΥΝΡΘ ΕΚΤΡΑΗΡΟΠΡΊΑΡΡΟΘΗ ΣΊΗΡΑΝ ΓΘΗ ΠΛΑΘΑΤΑΓΑΝ ΑΘΠΓΙΑΡΟΘΑΤΑΓΑΝ ΦΡΟΘΑΤΑΓΑΝ ΑΦΟΓΕΝΑΓΑΝ ΑΦΟΓΕ

 $\mathsf{NP^{<<}}$ ርላታኄቦኄ  $\mathsf{NCL}$ ላህላታ  $\mathsf{bNLPN}$ ነሪና  $\mathsf{ALD}$   $\mathsf{C}$ Δላኄ  $\mathsf{NCL}$ ላህላ $\mathsf{L}$ ላታ b∩Lσ<sup>5</sup>]<sup>5</sup>. ζαζίζ<sup>6</sup> <sup>6</sup>βσΓζ<sup>6</sup>Γ<sup>6</sup>σ<sup>6</sup> 400–<sup>6</sup>Γσ΄σ<sup>6</sup>Οσ<sup>6</sup> Λσζ<sup>6</sup>σς<sup>6</sup>ζίζ<sup>6</sup>Ιζ<sup>6</sup>  $P_{P} = P_{P} = P_{P$ հգ<sub></sub>ԽԽՎևԺ<sup>ռ</sup>ՐԳԺԻ  $4^{\circ}$ PCPCP%D'  $\Delta$ CP4 $\alpha$ ' C $\Delta$ b $\sigma$   $\Lambda$ C $\alpha$ 4 $\gamma$ 4 $\sigma$ 6 bNL $\sigma$  $\gamma$ 6 $\sigma$ 6. ACP4L' $\alpha$ 1 $\alpha$ 1 $\alpha$ 2  $b \cap L^{2} \cap \Delta^{c} b \cap \Delta^{c} \cap \Delta^{c}$ ∆**∟**⁰b°σ∿Ր°σ 1-Γ ᢣᡆᢣ᠌ᠵᠦᡥᡥᠣᡑ ᡏ᠙᠒ᠮᡑ ᡏ᠗ᢛ᠘᠘ᠻᢐᡆᡲᡉᡲᢧᡑ ᡆᢖᡆ᠘ᢣ᠘ᠻᢐᢗᠸᡳ᠘ᠻᢐᡝᠳᡗᢆ ᡃᡗPᠮᠻ᠌᠌᠌ᢓᢦᡥᢗ᠌᠌᠌ᡔᠦᡥᡥᠣ*ᠬᠬᠺᢚᢗ᠔ᡩᠣ᠋ᡩᢐᡩᢐᠰ᠘ᠸᡥᢨᠦ*᠈᠂ᡏ᠙᠒ᠮ᠈᠂ᡏ᠑᠘ᢞ᠘ᢩ᠂ᡦᡑ ᡆ᠋ᠴᡆ᠘ᡃᠵᡥᠨ᠘ᡃᡲᡥ᠋᠂ᢤᡗᡥᢗᠺ᠋ᡣᠬᢙ᠌ᢪᡆᢩ᠂ᠳᡏᡑ᠋᠘᠂ᡷᠳᡏ᠘ᡃ᠋ᡱᡠ᠂ᢗ᠘ᠪᠦ᠌ᡱᡠ᠂ᢣ᠍᠍᠍ᡖ᠘ᢑᡰď  $a_{\Delta} \Delta^{5b} \wedge^{5} \wedge^{10} \nabla^{6} \nabla^{6}$ .  $A^{1}CD^{5b} \wedge^{10} \wedge^{10} \nabla^{5} \wedge^{10} \wedge^{10} \nabla^{5} \wedge^{10} \wedge^{10} \nabla^{5} \wedge^{10}$  $\Lambda^{L}L\Lambda = \Lambda^{C} \Lambda^{C}$  $\triangleright$   $^{\varsigma}$  $^{\flat}$  $^{\varsigma}$  $^{\varsigma}$  $^{\varsigma}$  $^{\flat}$  $^{\varsigma}$  $^{\varsigma}$ **⊴**4 > ሲ<u>ር</u>Րፈ<sup>1</sup> ጋንርኦቦፈርኦ<sup>1</sup> የተመተ ረር ረቃσፈነ <u>የ</u> የሀገር የተመሰር የ  $\Delta$ ርቦታኦ የነጋσ የ.  $\Delta$  ይላላ ጋ የሀልኦ ነጋቦ የ.  $\Delta$  ይበኒት የ.  $\Delta$  የ ላ የ  $\Delta$  የ ይልዮ የ የተለማት የተለማ ᠕ᠸ᠋᠋᠌ᡊ᠂ᠪ᠒᠂ᠪ᠙᠘᠘ᠳ᠘ᡎ᠘᠘᠘᠘ᢣᢄᡥ᠘᠘ᢣᢕ᠖᠘᠙ᡠ᠙᠐ᢕ᠘ᠳ᠘᠙ᡚᢗᢊᠳ᠘ᠻ᠘  $\Delta \lambda \Gamma = \Gamma \Lambda^{10} \Lambda^{1$ 

- ĊჼჃႭჼႱ, ĊჼჃჃ ለር'Ҍ'ႣჼՐჼႭ', վჼĹჂ bጚ/ዊ'ႠվჼՐჼႭႫჼႭჼჼႮႣჼ ჃჼႮჼჼCP/LႠႫჼႭჼႣჼՐჼ ႮჼႮ∆ჼ, ለჼĹሲÞႣჼՐჼჂ ႮჼႮውჼ ႭጚႱሲትÞዊჼႮውჼ ውႭ∆ჼ;
- Δσ<sup>6</sup>\<sup>6</sup>\<sup>6</sup>\<sup>6</sup> ασ<sup>6</sup>α<sup>6</sup>\<sup>6</sup>\<sup>6</sup>
   √6c\<sup>6</sup>\<sup>6</sup>\<sup>6</sup>\<sup>6</sup>\<sup>6</sup>
   √6c\<sup>6</sup>\<sup>6</sup>\<sup>6</sup>\<sup>6</sup>\<sup>6</sup>
   √6c\<sup>6</sup>\<sup>6</sup>\<sup>6</sup>\<sup>6</sup>\<sup>6</sup>
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   √6c\<sup>6</sup>\<sup>6</sup>\<sup>6</sup>
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   √6c\<sup>6</sup>
   √6c
- \>°σ<!"C>>°σ<!"C>>°σ<!"C>>°σ<!"C'δ<!">ΔΓ°C'δ<!">ΔΓ°C'δ<!">ΔΓ°C'δ<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!">Δ°C<!"
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- Δbժ%/%C>σ%Γ
   Δαċς, ΔασσσωσςΙ
   Δτράκλης
   Δτράκης
   Δτρακης
   Δτρ
- Φ'D'\*CP/Lt\* Φ'σ%Γ' ÞLtΔ', ÞLt'σ4%CP%σ%Γ'→ Λ
   ΔC'b'\*tΠ' ÞLt'σ\* τ'→ Ͻ\*Ͻσ\*, Φ'ςσ\*, Δ'Φ¬%σ\*, Π%Γ4'σ\*, 4/%Γ"σ→σ'τΠσ\*.

- $\Delta$ /L<sup>6</sup>\%/PPCP/L $\sigma$ %/P° $\sigma$ 6 \Capacalcape \Capacalcap

- $dPC^{1}+CP^{1}$
- $\Delta\dot{C}$   $\Delta\dot{C}$
- $P^{6}P^{2}P^{2}D^{6}$   $C\Delta^{6}dA$   $C\Delta^{6}D^{6}CP^{2$

## 1. 90% ALAPPALAFA

LcbCb'  $_{2}$  በcbb/Lt' ለcadb\bσ\pa\pa\pa\ 4\L  $_{2}$   $_{3}$ \Labelth\brace\text{  $}$   $_{4}$ \CbCb'  $_{2}$ \brace\text{  $}$   $_{4}$ \cbCb'  $_{4}$ \brace\text{  $}$   $_{4}$ \brace\text{  $}$   $_{4}$ \cbCb'  $_{4}$ \brace\text{  $}$   $_{4}$ \brace\text{  $}$ 

LcbCb'  $\Delta$ h Lcu  $\Delta$ h Dcb  $\Delta$ h Dcb  $\Delta$ h Allah  $\Delta$ h Lcu  $\Delta$ h Chu  $\Delta$ h Chu  $\Delta$ h Allah  $\Delta$ h Allah Allah  $\Delta$ h Allah  $\Delta$ h Allah  $\Delta$ h Allah Allah

- (a) ρ'b'°CPィL'∩Δ'°Dσ° ΔιλώCPτσ° ϽΡγΡ'∩Δ'°σγλτσ°/ΔΛ'σΩ'°ς δρτσ;

- (d) PY = APV = A
- (f) ϽΡィσϤΡLσʹΊ ΔϲϷʹϧϹϷσϤʹͽϽʹ ΔϧϯʹͽϹϷͺͼʹϲϝͼͺͼͺͰͺͽͺίϹͺάʹ·ϸʹϧϹͿϮͺͿϲʹϥϽϝͼͺͼϧϹϷ϶Ͻϻ ϧϹͿ϶ϹϷϯ;

- (h)  $\Lambda$ ታ $\dot{\alpha}$  የርଚልካ የቦታ የ  $\Delta$ ታር አውን የ  $\Delta$ ታር የተመረቀ የ

 $\Delta \Delta C^{3}\sigma$   $\Delta C^{6}\delta^{6}C^{6}C^{6}\sigma^{6}$   $\Delta C^{6}\sigma^{6}C^{6}\sigma^{$ 

᠕ᠸ᠒᠋᠘᠘᠘᠘  $\Diamond^{\circ}$  $^{\prime}$ ር ነ $^{\prime}$ 6 $^{\prime}$ 7 $^{\prime}$ 6 $^{\prime}$ 7 $^{\prime}$ 6 $^{\prime}$ 7 $^{\prime}$ 6 $^{\prime}$ 7 $^{\prime}$ 8 $^{\prime}$ 7 $^{\prime}$ 9 $^$  $\dot{\Delta}$ CP4%D%N(NCP%P°G%P°G  $\Delta$ DA%CP4d\*DP(  $\Delta$ LD  $\Delta$ CYb%NCPG%NP4d\*DP( ΔζΙΟΠΡΡΑς ΔΓζΩς ΔΕΓΡΡΑς ΥΡΓΥΡΑΝΟΡΑΦ, ΔΙΙΟ ΛΑΝΛΝΝΝΟΡΦ  $\dot{\Delta} \text{CLdipJi} \text{Ver} \qquad \text{PUTUALLY QUARTED TO SUPPLY STATE STAT$ <u>ά</u>\_ΓΔΔΘΘ

 $P^{\mu}$  $<^{\varsigma}$  $\Delta$ bb $\sigma$  $^{\varsigma}$ bcded᠘ᠸᡳ᠋ᡏᡲ᠍ᡖ᠘ᢆ᠘ᢣᡲᡎᢐ᠘ Parity = P $\nabla \sigma^b b c \nabla^2 \Gamma \sigma^b / \Delta \Delta^b \Delta^b \Delta^b \Delta^b \Delta^b C \nabla^a C \Delta^b d^c$ ₫₽Ͻͼ₽ϟϒϹϟͼ*Œ*ͼϭϲϧϽͼ  $\forall C \in \mathcal{C}^{\text{bh}}$  $\Diamond^{\circ}$  $4\%d\Omega^{\prime\prime}$ ታጋ  $4\%\Delta^{\prime\prime}$   $4\%\Delta^{\prime\prime}$   $4\%\Delta^{\prime\prime}$   $4\%\Delta^{\prime\prime}$   $4\%\Delta^{\prime\prime}$  $\Delta \subset D^{4}bCD \subset D^{4b}D^{4}$   $D^{4}b^{4}b^{4}b^{4}b^{4}b^{4}$   $D^{4}D^{4}D^{4}$   $D^{4}D^{4}D^{4}D^{4}$  $\frac{1}{2} - \frac{1}{2} - \frac{1}$ ΘΕΡΡΟΙΟΡΙΑΡΡΑΝΟΘΕΝΕΙΚΑΙ ΑΝΕΙΚΑΙΑΝ ΑΝΕΙΚΑΝ ΑΝΕΙΚΑΙΑΝ ΑΝΕΙΚΑΝ ΑΝΕΙΚΑΙΑΝ ΑΝΕΙΚΑΙΑΝ ΑΝΕΙΚΑΙΑΝ ΑΝΕΙΚΑΙΚΑΝ ΑΝΕΙΚΑΙΑΝ ΑΝΕΙΚΑΙΑΝ Α ᡩ᠙ᠮᠻᢓᡏ᠋ᡃᡆᡲᢨᠣ᠍᠈ᢣᠦᡲ᠘ᢞᠮ᠘ᡠᢥᠮ᠕ᠸᡎ᠘ᢐ᠘ᢐ᠈ᢕ᠘ᢠ᠐ᢗᠵᡶᠣᡲᡥᠦᢐ,᠘ᡫᡧᠥ᠍  $\Delta \mathcal{L} \rightarrow CD \sigma^{\circ} \Gamma^{\circ} \qquad \Lambda^{\dagger} \mathcal{L} \cap G^{\circ} D^{\circ} \qquad \Lambda \Gamma \mathcal{L} \rightarrow CD \sigma^{\circ} \Gamma^{\circ} \qquad \Lambda^{\dagger} \mathcal{L} \rightarrow CD \sigma^{\circ} \Gamma^{\circ} \Gamma^{$  $\Gamma^{\mu}$ 

### 

 $\Delta DC_{C}$   $\Delta DC_{C}$ 1, 2012-Γ ΦΦC%Φ° 'd5¬%Ö5%F, Δ5%¬%Ö5%A5%, ▷%A5%Ö5%, C¬54<β, ĠU54% ⟨\$\L¬\$\$  $\Delta C^{0}$  (  $\Delta C^{0}$  (  $\Delta C^{0}$  (  $\Delta C^{0}$  )  $\Delta C^{0}$  (  $\Delta C^{0}$  )  $\Delta C^{0}$  (  $\Delta C^{0}$  ) ႱペĽჼďჼჽჼႻჼ  $\Lambda$ ርሲል $^{\circ}$ ቦ<sup>'</sup>,  $\Delta$ ው $\Delta$ <sup>'</sup> bጋ $^{\prime}$ ትነበ $\dot{\rho}$ የ  $\Delta$ CP> $\Delta$ CP  $dQUCUP_{QQ} = dQUCUP_{QQ} = dQUCUP_{QQ} = QQUCUP_{QQ} =$ hoየኖትና hoረLጋበቦታኄቦዮው በዮጋሀ ላሀረ 22, 2012-J $^\circ$ ; CL $^\circ$ a የህ $\sigma$ ላJ $^\circ$  $b \supset^{\flat} A^{\flat} b \cap \dot{C}^{\flat} C^{\bullet}$   $\Delta \triangle^{\flat} G^{\bullet} \cap \dot{C} A^{\flat} C \cap \dot{C}^{\flat} C \cap \dot{C}^{\bullet} C \cap \dot{C}^{\flat} C \cap \dot$  $\Gamma \sigma^{\prime} C^{\prime} U \sigma^{\prime} \Delta \sigma^{\prime} b^{\prime} b^{\prime} D \sigma^{\prime} \Delta^{\prime} C^{\prime} U \Delta^{\prime} \Delta^{\prime}$  $2012-\Gamma$ . 3%

### Pr-c.P.49542pp PorlbA4c dpDecD4F4e or dela

#### ᢀᢕᡎᢗᠵ᠘ᠮᢋᠳ᠙ᠸ᠘᠘ᡧ᠙ᠸᠸᡏ᠐᠘ᡥ᠘ᡥ᠘ᠳ

በረለሲ 17, 2012– $^{1}$ ሀበ' $^{2}$ Ј,  $^{1}$ Ј,

 $\delta \Delta^{\circ}$ ט שליביט ליביט בדילייבי. אפררת שליכיט בדילייביני בדילייביט אפררת שליכיט בדילייביט בדילייביט איניביט בדילייביט איניביט איניניט איניביט איניניט איניביט איניביט איניניט איניט איניניט איניט איניט איניט איניט איניט א  $\Delta \dot{C}^{\dagger} \Delta \dot{C}^{\dagger$ ል><a 1. \( \) \( ᡃ᠙ᠮᠻ᠌᠌᠌ᢓᡏᡃᡆᡮᢣᠵ᠋ᠦᡥ᠃᠒ᡤᢐᠯ᠒ᡴᡳᢣᠵᢗᠣᡰ, ᡏ᠋᠘᠘᠂᠙᠙ᠪᠵᠰᢥᡎᡥᠳ᠈᠙᠒ᠺ᠒ᡤᢋᢣᠵᢇ᠐ᢆ ᠪᢕ᠘ᢣ᠘᠙᠂ᠫᡲ᠘ᢤᠬᡠ᠋᠘᠘᠙᠙ᠫᠣᡈ᠂ᡠ᠐᠘᠘ᠺᡆᡠ᠂᠘᠘᠘᠙᠙᠘ᡱᡠᡕ በርታ▷ፖLσ∿ቦ°σ $^{\circ}$ , የb $\Delta$ የበፖL $^{\circ}$ ቦ $^{\circ}$  ▷ $^{\circ}$  $^{\circ}$ ሁ $^{\circ}$  ፖ $^{\circ}$ ወ $^{\circ}$ ላታ $^{\circ}$  $^{$  $\Delta \wedge L^{b} \wedge V^{c} \wedge L^{c} \wedge$  $^{\circ}$ 2013-ئا\c^6\f\_J. 4%

- ₫ჼ₽Ր₫ჼჼႠ₽ჍႾႡ ႶႶႺჼჼႠႲĠႻჼჼჼჍႾჾჼ ₫ᲓႶႠჼ ႯჼჂჼჼჍႾႡႻჼႣჼႠჼ ႭჂႭ∆๖ႣჾჼჃჼ ₫ჼ₽₽ႾჾႭႯჼႦჼႫჼჽჼ ႾႠႱჼჽልჼ ለႠႭႯႭႣႯჼჼႠჼჽჼልჼ, ჂჼჍႺჼჽ₽ჍႾჼჂႶჼ ႠႾჼႠჼ Ճϲჽჼ>ႣჃႠჼჼჂჼ ჼ₽ႠჼჇႯჼႯჾႦჾჼ ĊჼჃႣჼႱ ႶႶჼႦჼჽჼႻჼ, ႯჼႾჂ ႲჼႦႲჍჼჼჀჍႾႣႯჼჼႠჼჽჼ ႦႶႾჇውჼ ჼႦፚჼႶჍႾჼႯჾႦჼ ჂႶჼ ႦჼჂჼႱႣ ჍჼႣႯႮჂჼႣჼ Å> 8, 2013-Ⴀ; ႯჼႾჂ

 $\dot{\Delta}$ > 5, 2013-ህበጎጋЈ, ላዊበርሲትያ ኣየበናበርርኦቴንና ርሷትኦላσቴ <u>ለውርኒ</u>σቴ <u>ጋ</u>ዖ/σላናልቴትናው <u>ለ</u>ይቅተሊላቴትናውላቴጋታቴ <u>ይበ</u>ይቴትዮውቴ <u>ኦምቴትር</u> ላዊበርሲትያና የቦናንላናውቴ ይልፎልቴና Јርረኦቴስጎጋ አልናበላዊቴኣቴት/ኦስጎጋ ላላ>ቪኣቴሪና "አውጌታና ፊኒራ" ለርሲላህታረታ የተመከተለ በበቴስፕቴናልቴቦ ልዩ የተመከተለ በበቴስፕቴናልቴቦ ልዩ የተመከተለ በለቴስፕሬት የተመከተለ በበቴስፕቴናልቴቦ ልዩ የተመከተለ በለቴስፕሬት የተመከተለ በለቴስፕሬት የተመከተለ የተ

Lcbcbbb Δጋሮች 12.5.2-  $\dot{\Gamma}$  ጋ ወ ይዛና ይወር  $\dot{\Gamma}$  ወ ሚተገሰሩ,  $\dot{\Delta}$  30, 2013-  $\dot{\Gamma}$ ,  $\dot{\Delta}$  Θ  $\dot{\Gamma}$   $\dot{\Gamma}$ 

ታውላሲ 20, 2014–%ር%በሩጋЈ, 4%በሩሲትያේ  $\Delta$ ርር%/ርኦ%ጋና  $\%\Delta$ ርኦታ%ቦቴታ  $\mathsf{AB}\Delta \mathsf{a}^{\mathsf{b}} \mathsf{d}^{\mathsf{b}} \mathsf{d}^{\mathsf{$ ᢄᡊᡑpᡄ᠘ᡒᠾᢛᡆᢛ/ᠳᠳᠳ᠋ᢆᢕᢛ᠘ᡓ  $\mathsf{C} \mathsf{D} \mathsf{Q} \sigma$ ᢣᠦ᠊ᡲᠾᢅ᠌ᢣᡲ᠋ᡏ᠍᠍ᢐ  $\Lambda \subset \Lambda^{0} \cup \Lambda^{0} \cup$  $LC^{\alpha}$  $b \cap L + \Delta^{c} \subseteq L + \Delta^{c} \subseteq$ ᢣᠬ᠈ᢣᢄ᠘᠘ᠸᡑᢕᠳᢍ 

 $\Delta \Delta^{6}$  \'(\d\rangle)\rangle \rangle \rangl CΔb°σ ρ'→"lσ γ9σ4J'→"σ' L'½ 13. 2014-Γ. ⊃σ½ρςρ'→∩" 4'L→  $P^{r}$  $2014-\Gamma$  egraphi ᠴᠣ᠌ᢀᡕ᠃᠖ᠮ᠙ᡀᠾᢛᢆᠣᡕ᠂ᡧᠮᢇ᠂ᠣᠣᡕᡪᡧ᠂᠃᠖ᠮ᠙ᡀᠾᢛᢆᡡ᠂᠈ᢣᢋᢕᡶᢔ᠙ᠫᡆᠷ᠂ᢗ᠙ᠹᡆᡅᡒᡤ  $\mathsf{DPYU}(\mathsf{CP}^{\mathsf{p}}\mathsf{d}^{\mathsf{q}}\mathsf{L}\mathsf{d}^{\mathsf{q}})$  $\Lambda \Gamma^{\text{N}} = \Gamma^{\text{N}} \Gamma^{\text{N$  $\triangleright \sigma^{\flat} c \circ \sigma^$ 2014-710°3J,490ca26° A7Lcc26°3° 23.  $\mathsf{DP}^{\mathsf{L}} \mathsf{CD}^{\mathsf{L}} \mathsf{C$ LC°CD>N° 4·L>  $\rho$ ህ $\sigma$ 4 $J^{\varsigma}$   $CL\Delta^{\circ}\sigma^{\circ}$   $\Lambda \dot{\gamma} \dot{\gamma}$   $^{\circ}$ CD $^{\prime}$ L $^{\varsigma}$ በላ $^{\varsigma}$ 0 $^{\circ}$ D $^{\varsigma}$  $^{6}$  $^{\circ}$ ጋσ $^{\circ}$ Ρ $^{\circ}$ Ρ $^{\circ}$ Ο $^{\circ}$ 

http://ftp.nirb.ca/02-REVIEWS/ACTIVE%20REVIEWS/12MN036-SABINA-BACK%20RIVER/.

## 1.2 ለርኪላካኒ $\Delta^{c}$ ኦታቴ የሌርኦታ የቤተራት ርሀላ የተገና

ᢧᡐᠯ᠘ᢗ᠙ᢐ᠘ᢗᡠᡃᡗᠵᠣ᠋ᠦ᠘᠘ᡠᡥᢗᠵ᠘ᡫ᠋᠘ᠾ᠖ᢗᡆᡗᡏᢃᢗᠪᢞᡆᢩᢛ᠑ᢉ᠕ᠸᠬ᠘ᠳᢣᡐ᠘ᡫᢆᢋᠦ ᠘ᠳᡠᡃᡠᢛᢗᠵ᠘ᡃᢉ᠒ᡥ᠑ᠦᡰ᠘ᢞᠣᡲ᠘ᢞᠮ᠘ᢤᠮ, ᡣᡴᡪ᠌᠌᠌᠌ᡳᢕ᠙ᡎ᠘ᡶᠯᠦᡰ᠘᠙ᡣᡄᡙᢣᡈᢨ᠘ᡃ; ᢗ᠘ᠮᠮ᠕ᠸᠬ᠘ᡰᢣᡐᡶ᠘ᠳᡥᢉᠣᠦᡰ᠌᠈ᠪᠣᡃᡠᠧ᠋ᡆᡳ᠃ᠳ᠘ᢗᡃᢆᠫᠣᡲᡳᡳ᠃ᢗᡆᠳᡆᡥᢗᠵᢞᡆᢩᠮᡳᡃ 'bռCPታነሪ'  $Cd\sigma$ ላ%CP%ልኄሁ $\sigma$  bበLP $\sigma$   $\Delta$  $\Delta$  $\sigma$ Ċ $\sigma$  LD $\Delta$ ኄሁላ $\sigma$ ነ በበ'b'b'ልኄቦ° $\sigma$   $\rho$ የ $\sigma$  'bռCPታነሪ' Dና?በሮኄΓ:

http://ftp.nirb.ca/02-REVIEWS/ACTIVE%20REVIEWS/12MN036-SABINA-BACK%20RIVER/02-REVIEW/05-DRAFT%20EIS%20&%20CONFORMITY%20REVIEW/02-DEIS%20JAN%202014/.

▷ሃናѷσჼ ፖቴሮበሲኖልѷΓჼ ◁▷ሬናበጔበჼ CĹσ 150 ₽ċΓCσჼ ▷ኄレィѷσϲѷΓჼ σՐ◁σჼ  $P \stackrel{\circ}{\leftarrow} \Gamma \stackrel{\circ}{\leftarrow} D^{\circ} U \stackrel{\circ}{\rightarrow} C^{\circ} D^{\circ} D^{\circ} U \stackrel{\circ}{\rightarrow} C^{\circ} D^{\circ} U \stackrel{\circ}{\rightarrow}$  $PA^{\circ}a^{\circ}C$  $(\mathsf{DPC^3\Gamma^6}\ \mathsf{bY^{\Gamma^6}})$  sallo  $\mathsf{dLS}\ \mathsf{dLS}\ \mathsf{dLS}\ \mathsf{dLCD^{\Gamma^6}\ CD}$ ᠣᢄ᠘᠘ᡥ᠘ᢖ᠘᠘ᢖ <sup>კს</sup>├<sup>ና</sup>⁰</d♂⁰ CΔbσ حمد طلاء عمل  $\Delta \neg \Diamond \dot{\sigma}^{\varsigma} b^{\varsigma} C^{\varsigma} \neg \bigcap^{\flat}$ ᠘᠑᠘ᢐ᠘ᠸ᠋ᠮ  $\mathsf{OPPL} \mathsf{PPC} \mathsf{PPC}$ 7,000 C°70° Þ96LΔ°06' Þ99Δ° Þ92CŰ. Þ99Δ° Þ96-◁₫°σ∿°°Ġσ◁∿Ͻ° 300.000-400.000 ◁▷°ፖσ▷ ▷ፕ₫∟∆°σċ° ϳ϶σ▷ ◁ፕናͿϹĹ℅  $P_{\lambda} = A_{\lambda} + A_{\lambda$ 'dcob 10-ob 18-or d'SJor. C'cLob d'SJob LD>>&'cdc5ob d'Lo  $PU\sigma dU LD PULCUNCULU DUNGUNG PUCCULU CONTRA CONTR$ 

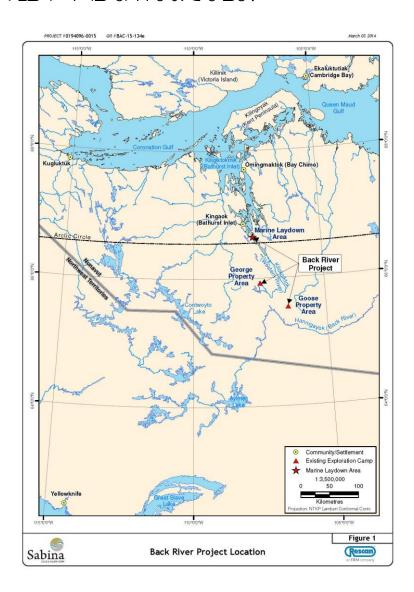
#### 1.1.1 J/Ľ¹⊃¹ \_o\_%Ր¹

 $\Lambda \Gamma$ ▷ታና $^{\circ}$ ታሪናል $^{\circ}$ ታሪና ር∆ታ⊳ላታ $^{\circ}$  ሀረΓ ጋናርናል⊳ $^{\circ}$ ታና $^{\circ}$ ጋΓ, ላ⊦⊳ላናብΓ ላ⊦ $^{\circ}$ ታ  $^{\circ}$ ር  $^{\circ}$ ር.  $LD\Delta^{\circ}U\sigma^{\circ}U\sigma$   $\Delta\DeltaD\sigma^{\circ}UC$   $\Delta\dot{C}U'$ .  $CL'\Gamma^{\circ}$   $\Delta\DeltaC\dot{C}'$   $\Lambda^{\prime}L^{\prime}D^{\prime}CD^$  $\mathsf{CL}\Delta^\circ\sigma^\flat$   $\mathsf{Dad}^\flat$   $\mathsf{AD}\mathsf{Ad}^\flat$   $\mathsf{AD}\mathsf{CD}\mathsf{P}^\mathsf{F}\mathsf{F}\mathsf{F}\sigma^\flat$   $\mathsf{CAb}\sigma$   $\mathsf{P}^\mathsf{F}\mathsf{CAb}\sigma$   $\mathsf{AD}\mathsf{A}^\flat$ DታናCሊ $^{6}$ D $^{7}$ C $^{1}$ D $^{1}$ C $^{1}$ D $^{1}$ C $^{1}$ D $^{1}$ C $^{1}$ D $^{2}$ D $^{2}$ D $^{2}$ D $^{2}$ D $^{2}$ D $^{3}$ D $^{4}$ D $\Delta \mathcal{L}^{\eta} \sigma^{\eta}$ ᢣᡆᢣ᠌᠌ᢦᢀᠻᢐᡃ᠘ᡣᢆ حاله  $\triangleright$ 5 $^{5}$  $^{4}$  $^{2}$  $^{5}$ 

#### 1.1.2 ነረላነት ፲ ፲፬፬ የቦር

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 $\Lambda$ Γ<br/>  $\Lambda$ Υ<br/>  $\Lambda$ Υ



### $2. \Delta\Delta\dot{\Delta}$ $^{6}$ CD7L $^{6}$ $^{6}$ D $^{6}$ D $^{7}$ L $^{6}$ $^{6}$ D $^{6}$ D $^{7}$ L $^{6}$ $^{6}$ D $^{6}$ D $^{7}$ D

## $2.1 \text{ POSTDC } \Delta_{D}\Delta^{C} \text{ both Post Comparison } \Delta_{D}\Delta^{C}$

 $^{\circ}$ PU%PD  $^{\circ}$   $^{\circ}$ P%PD  $^{\circ}$ PPP  $^{\circ}$ PP  $^{\circ}$ PPP  $^{\circ}$ PPP  $^{\circ}$ PPP  $^{\circ}$ PPP  $^{\circ}$  $LC^bCD \rightarrow C^b$   $LC^bC^c$   $\Delta C^2D$ ,  $\Delta C^2D$ ,  $\Delta C^bCD$ ΔΡ
Δ  $^{6}$  $\dot{\mathsf{C}}^{\mathsf{b}}\mathsf{d}\sigma^{\mathsf{b}}\mathsf{U}\qquad \mathsf{`P}\mathsf{\Gamma}^{\mathsf{c}}\mathsf{P}\mathsf{d}^{\mathsf{b}}\mathsf{C}^{\mathsf{b}}\mathsf{\Gamma}\sigma^{\mathsf{b}}\sigma^{\mathsf{b}},\qquad \mathsf{\mathsf{D}}^{\mathsf{c}}\mathsf{b}\mathsf{P}\mathsf{P}\mathsf{P}\mathsf{A}^{\mathsf{b}}\mathsf{A}\mathsf{P}\mathsf{P}\mathsf{D}^{\mathsf{b}},\qquad \Delta\mathsf{P}\mathsf{P}\mathsf{D}^{\mathsf{b}}\mathsf{A}\mathsf{D}^{\mathsf{b}}\mathsf{D}^{\mathsf{b}}\mathsf{A}\mathsf{D}^{\mathsf{b}}\mathsf{D}^{\mathsf{b}}\mathsf{A}\mathsf{D}^{\mathsf{b}}\mathsf{D}^{\mathsf{b}}\mathsf{A}\mathsf{D}^{\mathsf{b}}^{\mathsf{b}}\mathsf{D}^{\mathsf{b}}\mathsf{D}^{\mathsf{b}}\mathsf{D}^{\mathsf{b}}^{\mathsf{b}}\mathsf{D}^{\mathsf{b}}^$  $C\Delta^{b}dA$   $ACD^{b}$   $A^{b}D^{c}b'A'LA^{c}\Delta^{c}D^{c}$   $A^{b}\Delta^{c}D^{c}$   $A^{c}D^{c}$  $^{\circ}P\Gamma^{\circ}PA^{\circ}CP\sigma^{\circ}\Gamma^{\circ}\sigma^{\circ}$   $P^{\circ}DP^{\circ}APCP^{\circ}D\sigma^{\circ}$   $P^{\circ}DP^{\circ}DP^{\circ}DP^{\circ}$   $P^{\circ}DP^{\circ}DP^{\circ}DP^{\circ}DP^{\circ}$ 53- $\sigma^{\flat}$   $\rho^{\flat}$  $^{\circ}$ PU\*LD  $^{\circ}$ DOT  $^{$  $\Lambda$ C $\Lambda$ G $^{\circ}$ C $^{\circ}$ G $^{\circ}$ D $^{\circ}$ D $^{\circ}$ C $^{\circ}$ G $^{\circ}$ G $^{\circ}$ G $^{\circ}$ C $^{\circ}$ G $^{\circ}$ G $^{\circ}$ C $^{\circ}$ G $^{\circ}$ G $^{\circ}$ C $^{\circ}$ G てからるく 

'የበጐΓὸ' Δ $\Delta$ Δ' ▷'ኦʔժረ $\Delta$ ▷")' Þdσ∿ሀ  $\lambda$ ር  $\Delta$ ለ $\Delta$ L $\Delta$ CÞ $\lambda$ σ° ▷'bÞላÞ $\lambda$ L $\lambda$ °C)σ $\delta$   $\lambda$ С $\lambda$ 4 $\delta$ Δ $\delta$ 4°  $\delta$ 5°:

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 $dQUCU^{2}d^{2}D^{C}$   $\Delta CD^{2}d^{2}D^{C}$   $\Delta CD^{2}d^{2}D^{C}$ しゃくとしている  $4^{L}$   $\Lambda$  $P^{1}P^{1}$  $C \Delta_{P} d \Delta$  $\bigcap_{s \in S} \bigcap_{s \in S} (s \in S)$  $\Lambda$ CL $^{3}$ ULL $^{4}$ C,  $^{4}$ C $^{5}$ ᠕ᠸ᠋ᠬ᠘ᡀ᠘ᠮᢛ᠑ᠳ᠈᠙ᠮᠻ᠌᠌ᡝᡐᢗᢀ᠋ᠦᡥᡥᠣᡑ᠂᠙ᠻᠪᠵᡟ᠘᠙᠘ᢛᡀ᠙ᢆᡛ <u>᠘᠘᠙᠘᠙᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠙᠙᠙᠙᠙᠙᠙᠙᠙᠙᠙᠙᠙᠙</u>  $\dot{\alpha}$   $\dot{\alpha}$ 

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 $C\Delta^{b}da^{b}U^{c}$  37- $UcD^{c}D\sigma^{b}$   $ACA^{U}ZLC^{c}D\sigma^{b}$   $^{c}PC^{c}PA^{c}\sigma^{b}C^{c}\sigma^{b}$   $^{c}DD^{c}D\sigma^{b}$  $^{6}$  $D^{\flat}$  $^{\circ}$   $b^{+}$ 2/6/L' $b^{-}$ 0  $b^{-}$ 0/6/LC  $b^{-}$ 0/6/C  $b^{-}$ 0/C  $4^{\circ}$ PCD $4^{\circ}$ QCD $^{\circ}$ P'O',  $4^{\circ}$ L  $2^{\circ}$ CD $^{\circ}$ POYDYQA'b $^{\circ}$ D $^{\circ}$ DO',  $A^{\circ}$ POYDO', PACP = PACP + $\Delta \Delta \Delta^{c} - \Delta \dot{\Delta}^{b} + C^{b} \Delta^{c} \Delta^{c} C^{b} C^{b} C^{b} C^{b} C^{b} C^{b} C^{b} C^{b} C^{c} C^{$  $\forall P^{\prime}$ ᡆ᠙᠐᠙᠙  $\Lambda^{\flat}$   $\Lambda^{\lambda}$   $\Lambda^{\flat}$   $\Lambda^{\flat}$   $\Lambda^{\flat}$   $\Lambda^{\flat}$   $\Lambda^{\flat}$   $\Lambda^{\flat}$   $\Lambda^{\flat}$   $\Lambda^{\lambda$  $C\Delta^{b}dQ$   $9-^{b}d^{c}$   $d^{c}$   $d^{c}PLD^{b}D\dot{G}\sigma^{c}\Omega^{d}CD^{b}\Gamma^{c}\sigma^{b}\Gamma^{c}$   $\Lambda C^{c}DCD^{c}\sigma^{b}\Gamma^{c}\sigma^{b}$   $\Lambda B\Delta^{c}D^{c}$  $PP^{1}+\Pi^{$  $\mathsf{LQL^bd^b\Gamma^a} \Delta^c \quad \mathsf{D^5} \mathsf{A} \mathsf{LD^5} \Delta^c \quad \Delta^c \mathsf{D^6} \Delta^c \quad \Delta^c \mathsf{D^5} \mathsf{D^6} \Delta^c \quad \mathsf{D^6} \Delta^c \mathcal{D^6} \Delta^c \mathcal{D^6} \Delta^c \quad \mathsf{D^6} \Delta^c \mathcal{D^6} \Delta^c \mathcal{D^6}$  $4^{L}$   $\Delta C^{49}$ )  $\Delta C^{99}$   $\Delta C^{99}$   $\Delta C^{99}$   $\Delta C^{99}$   $\Delta C^{99}$   $\Delta C^{99}$ 4%Ldσ%և:

- $\dot{\mathsf{D}}$ Lላሮሲσ<sup>1</sup> (GN-20, 21, 22)  $\mathsf{D}$ ΦΦ°  $\mathsf{L}$  ( $\mathsf{D}$  (
- $b ext{ } ext{$

- $\Lambda^{1}$   $\Lambda^{1$
- ላቴር $\Delta$ ና (GN-27, 28, 29) ውሲዎና ሁዊ Lቴժኒዮና  $\Delta$ ርርቴት/ትርና ኣΒ $\Delta$ ሲቴሪና ላኒዮንበቦ ተርታኒዮቴ  $\Lambda$ ርናቴቴስናበን ተርላቴት የተመተ የተመተመ የተመነው የተመነ
- $\Lambda$ 2'%▷ተ°  $\Delta$ '°  $\Delta$ '

Δαινιόνος δας υνειστρούς απονείς δελρης σενούνος συνείος αντιστρούς αντιστρο

 $C \Delta^b d \Delta \sigma$   $A C \Delta^b J Z L C^{b} D \sigma^b$   $S P C A^b D C A^b J Z L C^{b} D C A^b D C D C D C D C D C D C D C D C$  $C\Delta L^{e}\sigma J^{e}$ .  $\Omega \Lambda^{e}C \Lambda^{e}C$  $\ensuremath{\mathsf{A}}\ensuremath{\mathsf{L}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ensuremath{\mathsf{A}}\ensuremath{\mathsf{C}}\ens$  $\Delta b \prec^{\varsigma_0} \angle^{\varsigma_0} C D \prec^{\varsigma_0} C \Delta^{\varsigma_0} C$  $P_{\alpha}$   $P_{\alpha$  $\Delta \Delta^{\circ} \nabla^{\circ} \nabla^$  $dQCCL^{b}d^{c}$   $PCPA^{c}d^{c}D^{c}$ ,  $\Delta LCPD^{c}D^{c}D^{c}$   $\Delta \Delta^{c}D^{c}D^{c}D^{c}$  $\mathsf{DP}$   $\mathsf{PP}$   $\mathsf{PP$  $3PCP^{1}CP$ ᢀᠫᡥᠨ᠘ᡶᢆ᠙᠊ᡆᢩ᠂ᠣᡲᡥᠣᢐ ᡆᠴᡆ᠘᠈ᢣ᠘᠈ᢣ᠒ᡥᡥᠦᢑ ᢂᠣᡠᡶᡄ᠌᠌ᡆᡲᡥᠦᢛ, ᠕ᡥᡥᠾᡃᠴ᠒ᢛ ᢦ᠋ᡥᡳ᠙ᢗᠵ᠘ᠳᡕ ᢐᢛᡳ᠘ᡒ᠘ᡒᠾᢤᡎᠽᡥ᠘ᡓᡧ ᠫᡑ᠘ᡆᡎ ᠫᠷᠸᢆᢦᠫ᠒᠘᠘᠘᠘ᢆ᠘  $\Delta \Delta \Delta \nabla \Delta \sigma^{1}$   $\Delta \sigma^{b} C^{b} \sigma^{c} \sigma^{c} \Delta \sigma^{b}$ .

#### 2.4 **4**<br/> **9.4 1**<br/> **9.6 1**<br/> **9.7 1**<br/> **9.7 1**<br/> **9.8 1**<br/> **9.9 1**

 $ACOCCL^{2}$   $ACOCCL^{2}$  ACO $\wedge^{1}$  $^{6}$  $4^{L}$   $\dot{L}^{\circ}$   $\dot$ Ͻ<sup>ϧ</sup>୵ϚʹϐϘᢞ᠊ᡅʹϭʹϧʹʹϻϧ ϤͰͺͻ ΛϲʹͲϥϠϧʹͰϹͼϧϽϘ<sub>ͼ</sub> ͺϧϹͺϧϽϧϧͺ  $P_{\rho}$  $\mathsf{DP}$   $\mathsf{CP}$   $\mathsf{CP$  $^{6}$  ነው  $^{6}$  -  $b \cap L^{\flat} + C \triangleright \sigma^{\flat} \cap \sigma^{\flat}$   $d^{\iota} L \supset \dot{\alpha} \subset \Gamma d^{\flat} \supset f \wedge C \triangleright^{\flat} \cap \sigma^{\flat} \cap \sigma^$  $^{\circ}$  $^{\circ}$ 

 $\Delta \Gamma \dot{\sigma}$   $\Delta \dot{\sigma}$ 

ϽϤልჼႭჼჼϽϲሊσჼ厂ჼ <ᡃᠬᠣᢦ<ᡑᡤ᠂ᢐ᠘ᡶᡕᢕᡏᠫᢛᠳᡶ **J**LL  $VIV_c$ ¿¿¿ἐ<<<α√°α′σ∿ρια αΠΟΘαία αιμώ Θεία ιο βοία  $24^{1}$  2OOC = OOC = OOCQ\_QQΔγΔσίμι Ρσιβςης. ΙΡΟΡΟΝΟ ΟΡΟΡΙΚΟΡΙΚΟΝΟ ΠΩςωΥΕΡήρησω  $C\Delta L^{e}\sigma^{b}$   $\Delta b \prec^{\epsilon_{b}}C D \prec L C D^{\epsilon}\sigma^{\epsilon_{b}}C^{e}\sigma^{b}$   $^{\epsilon_{b}}D > P \wedge C D \prec L C \wedge C D \wedge$  $4^{\circ}$ ) $^{\circ}$ CP  $\rightarrow$ 4 $\dot{\alpha}$  $^{\circ}$ 6 $^{\circ}$ 6 $^{\circ}$ 6 $^{\circ}$ 7 $^{\circ}$ 9 $^$  $\mathsf{D}^1$  $^{\circ}$ לארוארים בריושרים שרשיאלים שרכלאיליכשם שרשיאלים שרביושלים שרביושל שרביושלים שרביושלים שרביושלים שרביושלים שרביושלים שרביושלים שר <sup>ᡕ</sup>ᡖᢄᠫ᠘ᡕᢛᢗᢄᢐᠦ᠊ᡥᢕᡕ ᠑ᡩᠣ᠋ᡥ᠑ᠻᢐ᠑ᠸᢐ ᢗ᠘ᢣᠵ᠋ᡳᠮᢐ ᢣ᠘ᢣᠣ᠘ᢉᠮᡑ ᡏ᠙᠒᠋᠘ᢠᢗᠵ᠖ᢤᠸ᠘ᢞᡆᢩ᠂ᢅᠤᡥᡗᡥᠦᢧ. 46UCV5pqc Parition A = Parition + Paritio $^{\circ}$  $^{\circ}$ ᠑᠘ᢗᠫᡃᡎᢗᠺᢖᡟᡉᡥᡥ᠘᠘ᡮᢗᡆᠸᢦᡎ᠖᠙ᢞᡎᠸᡎᡆᢣᡥᢅ᠌᠘᠘᠙ᡥ᠘ᡎ᠘ᠸᡎ᠙ᢣᡆᢆᡎᡎ **\_**ДФГ.

4%በርኪትዕና  $\Delta$ ርር%ታ/LCP%ጋና  $\Delta$ B $\Delta$ ይዕና  $\Delta$ σላናσ%ቦීσ% የቃ $\Delta$ CP2ቦሎ\የb2Lσ%  $\Delta$ /L $\Delta$ CP $\Delta$ σ%  $\Delta$ C(%) በናበታ  $\Delta$ %በናበታ  $\Delta$ %በናበታ  $\Delta$ %በናበታ  $\Delta$ 7%  $\Delta$ 8%  $\Delta$ 8%  $\Delta$ 8%  $\Delta$ 8%  $\Delta$ 9%  $\Delta$ 9%

## $2.5 \Delta^{5}$

 $\Delta$ ነ৳」ት/▷ነል៌ና  $\Delta$ Lትቦትσቱ, LcቱC▷ትጋበቱ ጋዖነቴቱበር▷σቱቦና  $\Delta$ ጋላσ  $\Delta$ ነቴጋርሊσናህና  $Lct\Delta$ ና ▷ንትቴጋቴር▷ናበላሲላናቴናσቱቦውና ለርቴርጉር▷ታሲላናቴትቦውቸው  $\Delta$ ነቴጋቴውና  $\Delta$ ነቴጋቴው  $\Delta$ ነቴጋቴው  $\Delta$ ነቴጋቴው  $\Delta$ ነቴጋቴው  $\Delta$ ነቴጋቴውና  $\Delta$ ነቴ

 $\Delta^{5}$ b $\rightarrow$ C $\Delta^{5}$ d $^{6}$ d $^{6}$  $\Delta^{6}$ b $^{6}$ C $\Delta^{6}$ d $^{6}$ D $^{6$ 4የበ-ሲትነሪ  $\frac{1}{2}$   $\Delta \subset \mathbb{R}^q \wedge \sigma^q \cap \mathcal{L}^q \cap$ ᢀᠫᢛ᠘᠘ᠮᢆᢋᠳᡎᢕᢛᠸ  $L \subset U^{1} \subset A \subset A^{1} \subset A^{$ ᠕ᠸᠬ᠘ᡀ᠘ᡶ᠋᠋᠆ᡥ᠑ᠳ᠈᠙ᠮᠻ᠌ᡝᢓ᠘ᡥᢗ᠌᠌᠌ᡔᢐᡥᢨᠦ᠍᠈ᠪᠪᠵᡟ᠘ᠮᠪ᠌᠕ᠵᡧᡆ᠌᠘ᠵᢡᡥᢨᠦᡰ. ᢗ᠘ᠪᠦ ᠄ᠹ᠋ᠮᡃᡗ᠌᠌ᢓᡏᡥᢗ᠌᠌ᡔᠦᡥᡥᠣ ᠬᠬᠺᢐᢗᠫᡩᠣ᠋ᢆᢋᢛᡟ᠘ᡖᡥᡳ᠄᠘᠙ᡣᠮ᠈᠂᠘ᡑᠫᡃᡥᢣᢣ᠘ᢞ᠘᠂ᠳᡥᢇᠳ  $\Delta \Delta \Delta^{1} \Delta^{1} + \Delta^{1} \Delta^{1$  $^{\circ}$  $^{\circ}$ ᡩ᠘ᡩᠬᡄ᠌᠌ᠵᡥᢣᠬ᠍ᡑ 15᠆ᠦ᠍ ᠕ᠸᡙ᠍᠌ᠬᡧ᠘ᠸᡥ᠑ᠸᢐ  $^{\circ}P\Gamma^{\circ}P = 0$   $^{\circ}P\Gamma^{\circ}$ ሲ<u></u>\_\_Ր⊲<sup>ւ</sup>, ጋነል⊳\_\_⊳<sup>ւ</sup>, ቦ<sup>ւ</sup>σ<sup>ւ</sup> ԵՈL᠙Ի<sup>ι</sup>, Ե ᠂᠐᠘᠘ᡶ᠙᠙᠘ bnlibcdto dog clair bnloing.

### 2.6 Dalpothernand pace

 $bLPPCP^c = APC^c + A$ 

ΔαΓΡΟΟίδης Δαρίδιος αφοριώνος ΟΔΙθυί Λησήνου σφηριώνος  $\Delta$ /L $^{6}$ / $^{6}$ / $^{6}$ / $^{6}$ / $^{6}$   $^{6}$   $^{6}$ / $^{6}$ / $^{6}$   $^{6}$ / $^{$  $\Delta$ CLP>P( $\delta$ PG4)DGb 4LD DP7G4PCPGbpb, 46ULr> ᡆ᠋ᠴᡆ᠘ᢣ᠘ᠳ᠋᠋᠂᠘᠂ᡑᡠᠸ᠊ᡏᡳᠳᡏᡥᢗᢥᡗᡥᠥᡰ ᢀ᠆᠙᠘᠘᠘᠘᠘᠘  $L \subset U^{b} \setminus C \cup A^{c} \cup A^{$  $\Lambda \subset \Lambda \subset \Lambda^{1}$   $\Lambda \subset \Lambda^{1}$   $\Lambda^{1}$   $\Lambda \subset \Lambda^{1}$   $\Lambda^{1}$   $\Lambda^{1$ ᠄ᠹ᠋ᠮᡃ᠌᠌᠌᠌ᢓᢦᡥᢗ᠌᠌ᡔᠦᡥᡥᠣ ᠬᢉᠷᡥᢗᢣᡩᠣ᠋ᢆᡪᢛᡟ᠘ᠣᡥᡳ ᡏᡧ᠒ᠮᡑ ᡏᡑᠫᡥᢣ᠘ᡶᢞ᠊ᡅᢩᡝᠳᡥᢇᢨᠳ  $a \Delta \Delta^{1} \Delta^{1} C^{0} C^{0}$ ᡃᢐ᠘ᡃᡣᡄ᠌᠌ᢧᢛᢅ᠌᠃᠘ᢓ᠆ᠳ᠈᠘᠙ᢣᠬᢗᠵ᠋ᡣᠿᡑ᠙ᠽᡶᠣᡥᠾ᠊ᡓᡕ ᠌ᢇᡳᡶᠵ᠐ᠳ᠈ᡩᡥ᠘ᢣᠥ  $P^{r} = A^{r} + A^{r$ ᡏᡒ᠘ᡊ᠘ᡀ᠘ᠾ᠘᠕ᠸ᠘᠕ᡶᠬ᠘ᡒ᠘᠘᠘ ₽∪Γℷ⊀ℂ⊳ŒℴႱ<sub></sub>Ⴇ bNL5bCDdob dDa CLASab bNLaspea.

しゃくくりしゃいく ᠑᠙᠘ᢏᠺ᠒ᡩᠳᢑ᠘ᠵᠳ᠘᠙᠐᠘  $^{\diamond}$   $(\dot{\mathsf{d}}^{\mathsf{J}^{\mathsf{C}}}\mathsf{U}_{\mathsf{C}}^{\mathsf{C}}^{\mathsf{C}}\mathsf{U}_{\mathsf{C}}^{\mathsf{C}}^{\mathsf{C}}^{\mathsf{C}}\mathsf{U}_{\mathsf{C}}^{\mathsf{$  $74^{1}$   $16^{1}$  1 $P^{\mu}$ Λαιαθισαθος λαγρημέσο Λίση Αυλού, σα Γρασίδια ρα ΓΓ 4ጋርናdታርኦርኦ%ጋና 4Β $\Delta$ ፬%dና ዖህናር%dና%ቦීው 4የበΓ $\delta$  4የጋ%ረረLላී፬ናታ%ቦීው  $a \rightarrow a \Delta b \Delta \sigma^{\prime} \perp^{\prime} \Delta \sigma^{\prime} \Gamma^{\prime} \sigma^{\prime} \Delta^{\prime} \Gamma^{\prime} \sigma^{\prime} \Delta^{\prime} \Gamma^{\prime} \Delta^{\prime} \Gamma^{\prime} \Delta^{\prime} \Gamma^{\prime} \Delta^{\prime} \Gamma^{\prime} \Delta^{\prime} \Gamma^{\prime} \Gamma^{\prime} \Delta^{\prime} \Gamma^{\prime} \Delta^{\prime} \Gamma^{\prime} \Gamma^$  $\Delta b \dot{d} \cap b \dot{d} \circ \sigma > \sigma \Delta^{(b)} \cap b \wedge \Delta^{(c)} = \sigma \Delta^{(c)} \cap b \wedge \Delta^$ ᠂ᡏ᠘᠙᠘ᠰ᠘᠘᠘᠘᠘᠘ ∆L⁵ےdحاے ᢦ᠋°ᢗᡪᢐᠵ᠙ᢅᠸᡆᡟ᠘ᠳᡆᢛᢅᠫᠳᢆ, ᡠᡲᡥ᠋ᠳᠸᠴ᠘᠈ᢣᠦᡠᡥ᠒ᡴᠳᡆᡎᠳᡲᡥᢐ ᡐᢗᡆ᠘ᠺ᠘᠘ᠮᠴᡆ᠘ᠺ CP64 40C18P1F46D40 41F7 P2884.4 4.0 CP64 4.0 CP6

 $4^{6}\text{Cd}^{6}\text{N} \wedge \text{Cd}^{6}\text{N} \wedge \text{Cd}^$ 

 $\Delta$ αΓΡΟς νος λνός  $\Delta$ α ος  $\Delta$ ς νος δυνος  $\Delta$ ς Γανος δραρος  $\Delta$ ς τος νος δραρος  $\Delta$ ς δυρος  $\Delta$ ς δυ

### $2.7 \, \text{d}$ d $\text$

 $\forall L \supset \Delta b \forall \forall \Delta \sigma \forall \Gamma \land \Delta \varphi \in \forall \sigma ^{\circ} \Gamma^{\circ} \sigma^{\circ} C L \Delta^{\circ} \Delta \sigma \in L \Delta^{\circ} \supset \dot{\forall} \forall L \varphi b \supset (\Delta \varphi ) \nabla \Delta \sigma \in \Delta \sigma$  $\mathsf{AP}^\mathsf{L} = \mathsf{AP}^\mathsf{L} + \mathsf{AP}^\mathsf{L} + \mathsf{AP}^\mathsf{L} = \mathsf{AP}^\mathsf{L} + \mathsf{AP}^\mathsf{L} = \mathsf{AP}^\mathsf{L} + \mathsf{AP}^\mathsf{L} + \mathsf{AP}^\mathsf{L} = \mathsf{AP}^\mathsf{L} + \mathsf{AP}^\mathsf{L} + \mathsf{AP}^\mathsf{L} = \mathsf{AP}^\mathsf{L} + \mathsf{AP}^\mathsf{L} + \mathsf{AP}^\mathsf{L} + \mathsf{AP}^\mathsf{L} = \mathsf{AP}^\mathsf{L} + \mathsf{A$ שבאסטטלי טכיטי, סרסיזעי סיגש סרסי טגראספיטי. ססיבאטרהאטיט טבכר  $\forall P_{C} = \nabla_{P_{C}} \nabla_{P$  $LCU\sigma^{b}$ , 2001,  $PP^{Sb}C^{Sb}D\Gamma$   $\Delta L^{S}\sigma^{b}$   $P^{Sb}U^{C} \Delta CL\Delta^{a}$  and  $D^{S}\sigma^{C}U^{C}$   $LCU\Delta^{C}$ ,  $C \cap P T \mathcal{O} \sigma^b$ √<sup>10</sup>5°6<√Dσ°Γ  $\sigma$ PPN $^{4}$ 6 $^{6}$ AP $^{4}$  $^{6}$  $^$ *ᡏ┡"ᡄ?∩₺ᠮᠳ*᠘  $L \subset U \Delta^{\zeta}$   $C \cap D^b d^{\zeta}$ ひてるらひんしゅうく  $LCU^{*}$ ,  $1992-\Gamma$ ,  $4^{*}$ L  $4^{*}$ L

ᠮᢛᡏ᠋᠘ᠵ᠘ᢏᢛ᠘᠙ᡯ᠘ᡁ᠘ᠾ᠘ᠾ᠘ᠾ᠘ᠾ᠘ᠾ᠘ᠾ᠘ᠾ᠘ᠾ᠘ᡧ᠘ᡁ  $C \cap P^{c} \Gamma$ .  $A^{c} L \supset AB \Delta \cap A^{c} A^{c}$  $\Delta \wedge L^b \wedge D^a \wedge$  $L \subset U^{\dagger} \cap A^{\dagger} \cap$  $D\Gamma d^{5}d C \Delta d \Delta D = D\Gamma d^{5}d C \Delta d \Delta D$ ᠕ᢗᡃᢐᢐᠼᡥᡥ᠘ 207F42P  $a \rightarrow a \Delta^{\mathfrak{s}} \wedge^{\mathfrak{s}} b^{\mathfrak{s}} \wedge^{\mathfrak{s}} \wedge^{\mathfrak$  $\Lambda \subset L^2 L^2 \Gamma^2 \sigma^6$  $\Lambda H^0 \cap \Pi^0 \cap \Pi^$ ᠫ᠋᠋ᡏ᠙᠘᠘᠙ᠳ᠘᠘᠙ᠳ᠘᠘᠙ᠳ᠘᠘᠙ᠳ᠘᠘᠙ᠳ᠘᠘᠙ᠳ᠘᠘᠙ᠳ᠘᠘᠙ᠳ᠙᠘᠘᠙ᠳ᠙ ᡏᢧᡄᡕ᠐ᢣᢧᡆᡥᠾᢛᡆᢛ ᠕᠂ᠯ᠘᠂ᠵᢆᡆ ᠈ᠵᢛᢆᡠᡥᢣ᠘ᡃᠺ᠒ᡩᢐᢗᡳ᠘ᡩᢐᡃᠦ᠊<sup>ᢌ</sup>ᡥ᠌᠊ᢩᠤᡕ  $\Lambda$ Calling both the street  $\Lambda$ Calling both  $\Lambda$  $\Delta \Delta C = \Delta C + \Delta C = \Delta$ bact,  $d^{L}$  bact,  $d^{L}$  bact,  $d^{L}$ LCLCLOTT  $\Lambda$ CUALPACALQ  $\Lambda$ CALPACALQ  $\Lambda$  $\Lambda \subset \Lambda^{5}$ 

 $4^{\circ}P^{\circ}D^{\circ}JCD^{\circ}Q\Delta C^{\circ}L\sigma^{\circ}P^{\circ}$ ᡏ᠘᠘ᡎ᠘ᢐ ᠘᠘᠘  $\Delta \subset C_{\Lambda} \to C_{\Lambda} \to$ ᠘᠘᠘᠅ᢗᠵ᠘᠘ᠸᡥᡥ᠋ᢨᠦ ᡔᠣᢆᡠᢓ᠒᠘᠘ᢆᡎ᠐  $\mathsf{C}\Delta^{\mathsf{b}}\mathsf{d}\Delta^{\mathsf{v}}\mathsf{b}$  $^{\circ}$ PC42%P3A% CP1P  $^{\circ}$ PA47UP%P  $^{\circ}$ PA474%P1A  $^{\circ}$ PC42%P1A  $^{\circ}$ PC42%P3A%  $\Lambda \Gamma \Delta^{\text{16}} \Gamma C D + L \sigma^{\text{1}} \Gamma \Delta^{\text{16}} \Delta^{\text{16}}$ հΒΔα<sup>ь</sup>d<sup>c</sup>  $L \subset U^{\varsigma} \sigma^{-b}$ . ᠔᠘᠙ᢋ᠘ᢗᡒ᠘ᡧ᠘  $\Delta$ /L $^{6}$ / $^{6}$ / $^{7}$ C $^{7}$ 0 $^{$  $4^{\circ}$ ) $^{\circ}$ } $^{\circ}$ } $^{\circ}$  $^{\circ}$ bacl Dipolitic Δησα Dipolifican CQpqq paclbca ησηρώς γρώς/ρας ᡆᠵᡎᢕᡥ᠋᠘ᢤ᠘᠘᠙᠘᠘ᡎ ᠫᡲ᠘᠗ᠫᠻᠪᢗᢗᠬ᠘ᡩ᠙ᡆᡐᢕᢑ᠋ᡆᡒᠾᢑᡆᢛ᠘᠑᠘ᠳ᠙ᡓ᠙᠂ᠵᡆ᠌᠘ᢗᠪ᠘ᠮ᠘᠘᠘᠘᠙᠙᠙ᢆ  $^{\circ}$  $^{\circ}$ ά L τσ Δι Γσ ιροδορλίριος Γιανίρισης συδοσορτού.

### 2.8 Jacyd Lelyc

 $\Delta \sigma^{\prime} A^{\prime} = \Delta^{\prime} \Phi^{\prime} \Phi^{\prime}$ 4)4ᡋ᠋᠘ᢕᢣᡃᠪᠺᢗᠬ᠘ᡩ᠙ᢛᢗᡥᡎᢛ ᠘ᢎᢕ᠈᠘ᠫ᠙ ᠈ᠳᠳᡥᡣᢐᡓ᠘ ΔώλΥΠρΥιρ5CρΥσαιαιί/ἡσργαρλαρδαιαιίστης Φοιθης Γρων ᠕ᢗᡃᠪᡃᡉᡲᡥ᠋ᢐ᠋᠐ᠻ᠘᠙ᢗᠵ᠐ᠳ᠋᠄᠘ᢤᡎᡲᠪ᠒ᢆᡶᠿᢕᡑ᠂ᠣᠣᢌᡕ᠂᠘ᢅ᠙ᠵᡎᡲᠾᢛᡐ᠂ᢆᠮᢛᠣᠵᡧ

A A

 $\Delta \alpha^{4}$ ᡩ᠋᠋᠙ᠮᠻ᠌᠌᠌ᢓᢦᠬ᠋ᡠᠲ᠘ᢞᡉᠲ᠘ᢞᠮ ᠯᠲᠮ ᠕ᢉᡏᠲ᠐ᢗᢂᡫᡳᠦ ᠕ᠸ᠒ᢀᡃᡳᠥᡃ,  $\Delta$ CLPP  $^{\circ}$   $L \subset U^{b} \subset A \subset A^{b} \subset A^{$ 4)\$\con\_0\quad \quad \qua  $\Lambda \subset \Lambda \subset \Lambda^{1}$   $\Lambda \subset \Lambda^{1}$   $\Lambda^{1}$   $\Lambda \subset \Lambda^{1}$   $\Lambda^{1}$   $\Lambda^{1$  $^{\circ}$ የአርስር እምጋና 13-ው ጋየተበር እናበላ የተመተመና ጋት ተና እስተ ጋና ነርተው  $\Delta C^{\dagger} = \Delta C^{\dagger} + \Delta C^$  $b \cap L^{\flat} + C \triangleright \sigma^{\flat} \cap \sigma^{\flat} = \Delta^{\flat} L^{\flat} = \Delta^{\flat} \cap \sigma^{\flat} \cap \sigma^{\flat} = b \cap L^{\flat} \cap \sigma^$  $^{\circ}$  $^{\circ}$ 

 $\nabla \Gamma$  $\mathsf{C}\Delta\mathsf{L}^\mathsf{e}\sigma^\mathsf{b}$   $\mathsf{D}^\mathsf{b}}\mathsf{P}^\mathsf{e}\mathsf{D}^\mathsf{c}$   $\mathsf{D}^\mathsf{b}}\mathsf{D}^\mathsf{c}$   $\mathsf{D}^\mathsf{c}\mathsf{D}^\mathsf{c}\mathsf{D}^\mathsf{c}\mathsf{D}^\mathsf{c}$  $C\Delta^{6}d\Delta^{6}U$   $D^{6}DA^{6}DC^{6}DC^{6}U$   $D^{6}DA^{6}DC^{6}U$   $D^{6}D^{6}D^{6}U$ ᢦ᠋᠑ᢑᢗᠵᢞᡆᢩ᠂ᠣᡲᡎ᠋ᠳᢑ᠂ᡬ᠘ᢣ᠘ᡕ, "ᠰᡰ᠘᠘ᡠᠣ᠋ᡏᡐᡎᠣᡪᢛᢗᠵ᠘᠘ᠳᡲᡥ᠖ᢐᡰ" ᢣᡆᡳ᠘ᢣᠥᢩ  $D^bD^bG^bC^c$ :  $D^bG^bG^bC^c$   $G^bD^bG^bC^b$ ᡏᠪ᠌᠌ᠵᡪᢛ᠘᠘ᢖᠺ᠘ᠣᢐ᠘  $^{\circ}$   $\label{eq:controlling} $$ ^bD^+ \end{array} $$ CD^+ \end{array}$ 

- $acb \cdot \dot{C} PCD \sigma^{\alpha} \Gamma^{\alpha} \sigma^{\beta} D^{\beta} D^{\alpha} \Delta^{\beta} L^{\beta} D^{\beta} \sigma^{\alpha} \Gamma^{\alpha} \sigma^{\beta} D^{\alpha} D^{\alpha$

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2.9 שם כ"רי יף ליטיר, אר שליטיר, שליטייר, שליטייר, שליטייר, שליטייר, שליטייר, שליטייר, שליליר, כשילאס אינש אליבשי שם כ"רי של ער שם כ"רי שליטייר, אליטייטייר, אליטייטייר, אליטייטייר, אליטייטייר, שליליר, כשליטייר, אליטייר, שליטייר, שליטייר, אליטייר, אליטיר, א

Δσεντερίνος Ατερίστης σε σας διεντερίνος και στο διεντερίνος του σε δυπορονίς άς Γαρόρος διαθορονίς του διαθορονίς διαθορονίς του διαθορονον του διαθορονον του διαθορονον του διαθορον του διαθορονον τ

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$V_{\rho}C_{\rho}D_{\rho}D_{\rho}$	ᢦ᠋᠙᠙᠙᠘᠘ᠳ᠘᠘ᠳ᠘᠘ᠳ᠘᠘ᠳ᠘᠘ᠳ᠘᠘᠙᠙᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙
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ᡏᠣᡲ᠘ᢗ᠘ᡃᠺ᠕ᢞ᠋᠋᠌ᠵᡝᢗ	Δ/L. ΔCP  Δ/L. ΔCP Δ/L. Δ

$V_{\rho}$ ረሀፈዋ።	$P^{5}DP^{2}P^{2}L\sigma^{5}\Gamma^{6}\sigma^{6}/\Delta^{2}L\dot{\omega}CP^{2}\sigma^{6}/P^{5}DP^{4}S^{5}S^{6}\sigma^{5}\Gamma^{6}\sigma^{6}$
	᠕ᠮᡆᡣᡄ᠋ᡅᠣᢞᡥ᠋ᠣᠣ᠂᠌ᡠᢗᠵᡃᢐᡃᢗᠬᠳ᠌ᡆᠲᢦᡳ᠅᠂ᡃᢐᡲᡫᢗᠵᢥᡈᡃ᠌ᡱᡠᡕ ᢂᠮᡆᠮᡳᠯᢦᡟᡆᠯᡝᠳᠬᡈᢣᠺᢦᡟᢗᠬᠳᡆᠻ᠑ᠣᡰ᠌ᡱᡩᡕ
	ΔΔΔ <sup>(</sup> ᡆ᠙ᢑᡶᡝᢐᢗᠬᢐᢦᡆᠬᢐ<( ᠳᢐᢑᡫᢗᠵᡟᡈ᠙ (ᡃᠵᠴᡆ᠘ᠮᡕᠴ°ᡠᡕ, ᠘ᠳ᠘᠈ᡠ᠋ᡣ᠐ᠬᠮᢑ, ᠮᡆᡃᠴᠬᡑᠫᡃᠮᠮ, ᡏ᠋᠘ᢝᠾ᠆ᢐ᠊ᡠᡕ)?
$\begin{array}{c} Q_{\ell p} Q U_{p} / \nabla_{\ell} \\ Q J_{\ell p} C D + G U_{\ell p} J_{\ell} \\ Q_{\ell \ell} Q U_{p} / G U_{p} \\ \end{array}$	ᡩᡅ᠘ᢗ᠑ᡦᢀ᠘᠘᠘᠘ᠳ᠘ᠻ᠘ᢗ᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙
¿Pc4CVQ&P	ᡩᡥᢗᡶ᠋ᠸ᠋ᡊ᠊ᡥᡥᠳ, ᠋ᡠᡥᢣᢣ᠘᠋᠋ᠪᢀᠳᠳᡠᡏᠳᢗ᠅ᢗÞ᠙ᠳ ᠘ᡆᠮ, ᢗ᠘᠘᠘ᠳᠳᡏ᠌᠌᠌᠐ᠳ ᠑ᠮᡆᡃᡥᢣᢣ᠘ᡕᡣᡆᡃᢐᡃᢗᠬᠳᡆᡃᢛᠵᠢ?
⊃ీ⊃⊂∿రో	$^{6}$ ΡΛ%ΓΡς Ρ΄-σΡς $^{6}$ ΡΡ% $^{6}$ Ο $^{6}$
	ΛC'b'σ%Γ'       γρ%LPL       γρωσ         ΔΓΑ΄ΚΑΘΑΥΕΙΚΑΘΕ       ΛΕΙΚΑΘΕ       ΡΑΦ         ΚΕΙΚΑΘΑΕ       ΚΕΙΚΑΘΕ       ΓΕΙΚΑΘΕ       ΓΕΙΚΑΘΕ         ΚΕΙΚΑΘΑΕ       ΚΕΙΚΑΘΕ       ΓΕΙΚΑΘΕ       ΓΕΙΚΑΘΕ <t< td=""></t<>
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	ላ▷፫ር▷‹በላʔቴፌቴՐጋላʔበቴ         ጋቴጋΔ‹,           ፊåቴՐቴፌʔቴፌቴቴቴዮርጋህና,         ጋቴጋΔቴታ           ሩናፌ▷በՐታ▷ላσቴ         ፊላቴቴናል▷በር▷ላσቴ         ഛቴናል▷ቴና           ዮርጢታ▷ላበር▷ላσቴ         ▷ኖሚጔቴቴና         ለ፫ላህσቴՐቴσቴ         ላዊጔላσ           ▷ታናቴσላናልና.         እተናቴσላናልና         አተናቴσላናልና

√シ≺∪。₽。₽⊃Ф₽	ᢄᡠ᠋᠘᠘ᡎ᠘᠘ᡊᡒᢕᢛᢁᢛ/᠘᠘᠘ᢅᢖᢗ᠐ᠵᠻᠣ᠘᠙᠙᠘᠙᠘᠙᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘᠘
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$\Delta \triangle^{\circ}b^{\circ}A \triangleright @ \triangle^{\circ}D \triangle^{\circ}$ $\wedge^{\circ}d \cap^{\circ}b^{\circ}A \cap^{\circ}$	ΦΕ       Λ΄       ΦΕ       ΦΕ <t< td=""></t<>

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/ <sup>ι</sup> /5 <sup>5</sup> 6 <sup 3/ <sup>5</sup> Γ ÞΓ⊲ <sup>5</sup> 7√5° ΦΡ <sup>5</sup> 5Δδ° Þ/ር <sup>5</sup> 6)Δδ°	$\frac{1}{1000000000000000000000000000000000$
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$V_{r}4U_{\ell}P_{\ell r}DQ_{r}$	$P^{5}DP^{2}P^{2}L\sigma^{5}P^{6}\sigma^{6}/\Delta^{2}L\dot{\omega}CP^{2}\sigma^{6}/P^{5}DP^{4}S^{5}N^{5}N^{6}\sigma^{6}$
	Δċσᢐ᠙ ᡧᡷᡤᡲᡳ᠌᠐ᢂᢣᠣ ᠌᠌᠌᠌ᠺ᠙᠙᠙ᡏ, ᠕ᡠ᠘ᢣ᠘°᠘ᠮᡆᠮ᠘ ᠘ᡃᡶᠴ ᠈ᠯᠯ᠘ᡶᢝᡆ᠋ᡅᡃ᠘ᠬᡑ ᡏ᠐ᢣ᠙ᠦᡥᡫᠦ, ᠙ᠮᡏᠮᠯᡏᡏᢧ᠙ ᠘ᡥᢉᡏᡪᢉᠬᡏᡮᠠ᠘ᢗ᠙ᡟ᠘ᡏᢐᡏᠣᡏᡑ᠐ᠦᡟ, ᡏ᠐᠘ᡥᡆ᠙ᡣᡏᠬ᠘ᡮᠮᢐᢗᡩ᠘ᠬ᠘ ᠕ᡠ᠘᠙᠘ᡮ᠙ᡩ᠘ᡠᢎ᠘᠃᠘ ᠕ᡠ᠘ᡷ᠘ᡠᢎ᠘᠃᠘ᡠ
	$CL^{1}$ $\Delta$ CD $^{1}$ $b$ CD $^{1}$ $C$
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	「b'\\P'b'C'で    CP   CP   CP   CP   CP   CP   CP   C
	ᡩ᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙᠘᠙
$(P454c)$ $PLQ_24QCVQ_2p$ $CVP_pQ_c$	するとしている       DL4がしゅのでしないところ       OL4がしゅのでしないところ       (CLでします)?
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#### 2.10 P5PPYYU7PCPLC 44200 QCPCP2PDQP

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γΟ $\Delta$ Γ  $\Delta$ <sup>c</sup>  $\Delta$ <sup>c</sup>  $\Delta$ <sup>r</sup> D4PD4PDC  $<^{\iota}$ A $^{\flat}$ C $^{\varsigma}$ D $^{\varsigma}$ D $^{\varsigma}$ D $^{\circ}$ D $^{\circ}$ ᠙ᡀᡕᡄᠮ᠘ᢣᠪᢋᢛᠦᡎ᠘ᢗᡶ᠙᠙ᢛᠣ᠘ᠳᡏᢛᡡ ᠐ᠺᠻ᠙ᡯᠳ᠘ᡶᢛᠮ᠘ᡓᢆᡊ᠘ᢆᡑᡳ D°DΔ°. ⊲LCD°° ᠘᠙᠘ᡊᢗᠵᡲᡊ᠊ᢛᡳᠾᢛ᠘᠗ᠳ᠘᠕᠘ᡎᢗᠵᡲᡆ᠈ᡆᡥᠾᢛᢧ ᡏ᠙᠘᠙᠙᠘᠙᠙᠘᠙᠙᠘᠙᠙᠘  $\Delta^{\nu}\Gamma\sigma^{\nu}$   $\Delta^{\nu}V^{\prime}C^{\prime}C$ ᠌ᠫᠬ᠘ᡭ᠌᠌ᢣᠦᡥᡗᡥᠦ **d**LL⊃  $\Delta^{\varsigma}$   $\Delta^{\varsigma}$ 

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 $\Lambda$ ር'bcp%ቦ'ጋ%  $\Delta$ cp'bCpcp%ጋσ%  $C\Delta$ bσ  $\dot{\alpha}$ crd%ጋ' $\dot{\alpha}$ pc  $\dot{\alpha}$ crd%  $\Delta$ cp $\dot{\alpha}$ crd%  $\Delta$ cp $\dot{\alpha}$ cp $\dot{\alpha$ 

#### 2.11 add %CD/L $\sigma$ %C' AddLL

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 $<sup>^4</sup>$  ላጋΔ° $^4$ ው የብርሲትያና ΔϼϲͰϼና ΓϽΔͽͰΫΓ CdσϤͽϹϷʹϐͽͳ በበነዮሲϐͽͰσ በበነቴነቴነϐͽͰ·϶ ϷϨσ ϽϚ;ϽϹͼͳ ϧϧͺϹϷϧϧϥ CdσϤͽϹϷʹϐͽͰͱ:

 $<sup>\</sup>underline{\text{http://ftp.nirb.ca/02-REVIEWS/ACTIVE\%20REVIEWS/12MN036-SABINA-BACK\%20RIVER/02-REVIEW/08-BACK\%20RIVER/02-REVIEWS/ACTIVE\%20REVIEWS/12MN036-SABINA-BACK\%20RIVER/02-REVIEWS/08-BACK\%20RIVER/02-REVIEWS/12MN036-SABINA-BACK\%20RIVER/02-REVIEWS/08-BACK\%20RIVER/02-REVIEWS/12MN036-SABINA-BACK\%20RIVER/02-REVIEWS/08-BACK\%20RIVER/02-REVIEWS/12MN036-SABINA-BACK\%20RIVER/02-REVIEWS/08-BACK\%20-REVIEWS/08-REVIEWS/08-BACK\%20-REVIEWS/08-REVIEWS/08-REVIEWS/08-REVIEWS/08-REVIEWS/08-REVIEWS/08-REVIEWS/08-REVIEWS/08-REVIEWS/08-REVIEWS$ 

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 $<sup>^5</sup>$  በበ'ቴጐርሲኦዮ/L የ ላኄኒላቴጐኄው F. ፫ጐዘላቦናቦ, ኃና/ተሶና ላቴርልና ውልቴቴጐጋጋቴልና ቴጋንትቴበሶሢላኄቦቴሙ ርልđኄ ል. ዘላቴኄጌኒ, ላኮሬናበትኄኒና ለ፫ሲላኄኒ/ኒላሙ ለትናበናልታናቦ, (ላዊበ፫ሲትቄሮው), ኦጌቴጐጋጐ ውልለሲ 18, ቴበኒትውኄ ለኦዑኒኮጐጋና ውልለሲ 19- Γ. ላጋΔኄልኮና ላዊበ፫ሲትቄና ልው፫ኒውና LጋΔኄኒተኮ ርዕታላጐርኦጳልኄ୮ በበናትሲልኄኒታ በበናቴቴናልኄሁኄ ኦዊታ ጋናትበሮኄና ቴሊርኦኦቴና ርዕታላጐርኦጳልኄኒና

http://ftp.nirb.ca/02-REVIEWS/ACTIVE%20REVIEWS/12MN036-SABINA-BACK%20RIVER/02-REVIEW/08-

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PHC%20PRESENTATIONS%20%26%20SUBMISSIONS/.

 $\Delta$ /Lቦታ▷ናሪታ▷ር ▷ናሪ▷/ጭርጭር ላጋጭር▷/Lσጭር  $\Delta$ Ċ? $\Delta$ ናውር▷ናሪታ▷σጭር  $\Delta$ /Lቦታ▷ናሪታ▷ና ▷ናሪ▷/Lσጭር  $\Delta$ ናውና በበናጭ/Lσጭር  $\Delta$  ጋው▷ናሪጭር▷/Lc▷ና ር $\Delta$ L $\Delta$ ትሪውና  $\Delta$ ናር▷/L $\Delta$ ትሪ  $\Delta$ ናሪ▷/ $\Delta$ ናን  $\Delta$ 60  $\Delta$ 

┖┺<sup>₺</sup>८००००००००००००००००००००००००००० ᠕᠈᠊ᡶᢗ᠌᠌᠌ᡔᠦᡥᡳᡥ᠋ᡆᠤ ے ہے  $\mathsf{DPCP}^\mathsf{th}\mathsf{CP}\mathsf{ZL}^\mathsf{t}\mathsf{\Pi}\mathsf{d}^\mathsf{th}\mathsf{D}\mathsf{d}^\mathsf{t}\mathsf{\sigma}^\mathsf{th}\mathsf{CP}\mathsf{d}^\mathsf{t},\ \ \mathsf{'P}\mathsf{\Pi}^\mathsf{th}\mathsf{FP}^\mathsf{t}\ \ \Delta \Delta \Delta^\mathsf{t}\ \ \mathsf{b}\mathsf{D}^\mathsf{t}\mathsf{P}\mathsf{Sh}\mathsf{\Pi}^\mathsf{th}\mathsf{P}^\mathsf{th}\mathsf{D}^\mathsf{t},\ \ \mathsf{D}^\mathsf{t}\mathsf{Y}\mathsf{SP}\mathsf{CP}\mathsf{d}^\mathsf{t}$ <>\rightarrow \frac{1}{5} \rightarrow \frac{1}{5} \ ᡖᠵᠽᡥᠾᢇᠦ ᠌ᢀᢣ᠘᠙᠘᠙᠘ᠳ᠘᠘᠙᠘᠙  $2^{1}$  $\delta \Gamma = \frac{1}{2} \delta \Gamma^{a} \Gamma^{a} \Gamma^{b} \Gamma^{b}$ σωργνος.  $AB\Delta$ ωνς  $AB\Delta$ υνς  $\Delta \wedge L^{\dagger} = \Delta L^{\dagger} = \Delta$ ᠂ᠪ᠘ᢗ᠆ᡐ᠌ᢓᠬᢛᡃᡳᡥᢇᢧᡕ ᠘᠘᠘᠊ᢖᢆᢗᡃᠵᠵᡕ. ᢣ᠍᠍ᡌᡆ᠊ᢛᡀ ᠑᠙ᠸ᠌᠌ᠵᢛᠫᡕ  $\Delta$ d $\sigma$ ᠕ᢗᡃᠬᢐᡏᠳ᠘ᢣᡎᢕᡒᡎ᠘᠘ᢣᢗ᠐ᢣᠲ᠋᠘ᡩᢗ ᡏᡖ᠘᠙᠘᠘ᢗᢛ᠘᠙᠙᠘᠘᠘᠘ Qυαλγλσίμε ροιριστών απουριστών σειριστών σε ᠙᠙ᠳᠳ  $^{5}$ h $^{9}$ L $^{3}$ A $^{6}$ O $^{5}$ b  $4^{\circ}$ ) $^{\circ}$ CP $\rightarrow$ 4 $\dot{\alpha}$  $^{\circ}$ d $\Omega$  $^{\circ}$ 5 $^{\circ}$ 6 $^{\circ}$ 1 $^{\circ}$ 6 $^{\circ}$ 7 $^{\circ}$ 9 $^{\circ}$ 7 $^{\circ}$ 9 $^{\circ}$ 7 $^{\circ}$ 9 $^{\circ}$ 9

ላኮጋጐርኦጋላሲካዕበኮኒናቴናσኁቦσካ ለኦፖሊኦኦሮላσካጋσ ር∆ካዕዉσ ላኮርዕዖጐፖLላσካ ኦሃናልσናσካ ፖናቴሮግርኦፖLሮካጋσካ ላኮLጋ  $\Delta$ Lናጋዕσኁቦኄσካ ላኦሬናበσናጋና ሩናዉኦበጐቦኄσካ, ር $\Delta$ ካዕላጋ ኒጋኑሬ፣ካኒጐርኦσኄቦና  $\Delta$ Lናጋዕሮላሲኦኦዊናሮላና ላኦሬርኦኦሲላናቴናσኄዮኄማካ አልልσኮርናቴናካጋσካ ኦሃናኄσላናልኄσኄኒናካጋσካ ለፖናዉናካጋሮኒማካ ላኮርዕσካ Lলሁናቴናክበርኦዊካጋσካ ላንኦሶካጋ $\Delta$ ንሬስኦላσካ ላዛLጋ  $\Delta$ Lናናካ ላጋዖኄልናσኄቦኄልና Lলሁናቴናክበርኦዊካጋσካ ላንኦሶካጋልኄልኦላσካ ላዛLጋ  $\Delta$ Lናናካ ላጋዖኄልናσኄቦኄልና Lলሁናቴናክበርኦσኄቦኄልና ጋσታኦፖLተሪ የማኄቦኄσካ

\B\Delta\bullet \delta\cong \text{\cong}\cong \text{\cong}\cong\

# 2.12 $\Delta$ ር $\triangleright$ ር $\triangleright$ የነጋ $\sigma$ የ $\delta$ በ $\cot$ የ የ $\delta$ ር $\triangleright$ የ $\delta$ የ $\delta$ የነ የነጋየር $\triangleright$ የነው የነጋየር $\triangleright$ የነው የነጋየር $\triangleright$ የነው የነጋዩር የነጋዩ

 $\dot{\alpha}$ CD  $\dot$ 

- 2. ▷'ጔ∿しơʰ, 'bʰʔ⊿석'σ∿しơʰ 석나ጔ 쇼ጵ°ኇ석'σ∿しơʰ Рኂ'æ<<a>ሲ</a> ሲ</a> ሶኅ⁰ጋʔ
- 4. ፭፡ΡΡΙΠΟΡσ³Γι ΔΖΙΔΟΡσ³Γι ἀΔΓΔιΡΟΤΑΝΡσΑΝΡσΑ

7.  $\Delta A \Delta A \Delta$ 

\ΒΔΦρς Ριβρήρησης βΠΓΑνης συρφαίτου σσηγίτου Πυιρήμου Ετίνος αδυρός βυρών ανουρήνησης συρφαράτης δουρός Αυσφαρίτου καιρήσης κα

 $\Lambda^{\flat}$ የህ'ር% $\dot{\dot{\zeta}}$ Γ  $\dot{\dot{\zeta}}$ ር  $\dot{\dot{\zeta}}$ Γ  $\dot{\dot{\zeta}$ Γ  $\dot{\dot{\zeta}}$ Γ  $\dot{\dot{\zeta}$ Γ  $\dot{\dot{\zeta}}$ Γ  $\dot{\dot{\zeta}$ Γ  $\dot{\dot{\zeta}$ Γ  $\dot{\dot{\zeta}}$ Γ  $\dot{\dot{\zeta}$ Γ  $\dot{\dot{\zeta}}$ Γ  $\dot{\dot{\zeta}$ Γ  $\dot{\dot{\zeta}$ Γ  $\dot{\dot{\zeta}}$ Γ  $\dot{\Delta}$ ᠙᠊ᡃᠾᡃ᠆ᠸᠲᡃᠵ᠋᠘᠘᠐ᠳ ᠈ᢕ᠐ᠳ ϽϭϧϷϭϤϨႶϧ  $^{\circ}$  ላይል የመተመታ ነር ምትር በረላሊ በታይት ለነፈት የመተመታ የህተር የሚተር የመተመታ የመተመታ ነር የህተር የሚተር የመተመታ ነር የህተር የሚተር የመተመታ ነር የመተመ ነ  $^{2}$ לארט  $^{2}$ לישלים  $^{2}$ לים  $^{2}$ לים ᢧᡆ᠋ᠲ᠙ᡩᠲ᠘᠘᠘ᡯ᠘᠘ᡯ᠘᠘ᡯ᠘ᡯ᠘ᡯ᠘ᡯ᠘ᡯ᠘ᡯ᠙ᡯ᠙ᡊᢢᠾ᠙ᡯᠰ᠘ᠵ᠙ᠮ᠙ᡎᡗ᠘᠙ᠮ᠙ᡎ᠘ᢣ᠙ᠮ᠙ᡯ᠘ᠵ᠙ᠮ᠙ᡎ᠘ᢣ᠙ᠮ᠙ᡯ  $\Delta \Delta^{1} d \cap \Delta \Delta C$   $\Delta C$   $\nabla^{1}$   $\nabla^{1}$ ᢧᡆ᠋ᠮ᠙ᢗᠫᡃᡉᡄᡙᡷᡆ᠙᠂᠕ᠸᡙᡲ᠊ᡆᠺᠴᡏᡅ᠋᠘ᠾ᠖ᡶᡄᠾᢛᡆ᠂ᢆᠣᢛ ᠕ᢀᢛᡳᡄᡆᡲᡟ᠘ᡯᡑᠫᡡ PU = PU = PU $\phi_{\text{A}} = \phi_{\text{A}} + \phi_{\text{A}}$  $\Delta$ CLO46Did2abiclet  $\Delta$ Dbed5  $\Delta$ CLO46Did2abiclet  $\Delta$ CLO46Did2abic  $b \Delta C \Gamma \Delta \Delta \Delta^{0} A C D^{1} C D^{1}$  $b \cap L + \sigma^c \Delta D \subset L \sigma^b \cap \sigma^$ 

 $\wedge^{1}$  $\Delta \Delta C \dot{L} \sigma^b \Delta C V \Delta^b C V$ ᠂ᡃᡉ᠘ᡴᠦᡥᡥᠣ ᠘ᢣᠻᡃᠳᠻᠣᡪᡃ᠘ᡕ. ᡏ᠘᠘ᠺ᠉᠂᠘ᠳ᠙᠙ᢆᡠ᠃᠑ᠸ᠘ᢣᠳᢉ, ᠈ᢣᢣ᠘ᢞᠳᠻ᠘ᠣ ▷ ○ ▷ ○ ▷ ○ ▷ ○ ▷ ○ ▷ ○ ▷ ○ ▷ ○ ▷ ○ ▷ ○ ○ ▷ ○ ○ ▷ ○ ○ ○ ▷ ○  $CL\Delta^{\circ}\sigma^{\circ}$   $\Lambda \subset \Lambda$  $4^{\circ}$ )%} $7^{\circ}$  $7^{\circ$ Parity = P᠕᠈ᡰᢗᢕ᠋᠆ᢃᠳ᠘ᠮᡫᠣᡟ ᠌᠌᠐ᠻ᠘ᡎ᠐ᢗᡐᢉ᠒ᠫ᠘ᠳ᠋᠋᠂᠘᠘ᢣ᠘᠙᠘᠘᠙᠘᠘᠙ ᡩ᠙ᠮᠻᢓᡏᡥᢗᢀ᠋ᠣᡥᡳ᠅᠈ᡎ᠘᠙ᡎᡏ᠙ᠸᡐᠫᠾ᠉ᢃ᠐᠆ᠪᢑᠣᢀᡆᢣᡥᠫᠦ᠈᠂ᠺ᠆᠈ᠻᢐᡥ᠒ᢗᢀᡃᠪᢎᠳᠫ᠐᠈  $\Delta$ CL $^{6}$ CD $^{7}$ L $^{6}$ D $^{6}$ C $^{6}$ C $^{6}$ CD $^{7}$ CD $^{6}$ CD $^{7}$ CD $^{7$ ᡃ᠋ᠨᢀᢐᢦ᠋᠋ᡝ᠂᠙ᡃ᠋ᢞ᠆ᠬᢛᢅᡩ᠂᠒᠒ᡪᢛᡟ᠘ᢣ᠒ᡁ᠂ᡃᢐ᠘ᢗ᠌Þᢣᡎ᠋᠋ᢀᡩᡕ᠘ᡩᡕ᠘ᡩ᠙᠘᠙᠘ᠸ᠖ᢞᡥᠣᢐᡥᠣᢐ. ΔαΓΡΟϽʹϦϹπλ<sup>6</sup>d' ραCL Ρίρσρ<sup>6</sup>Ο΄ ΟΔ<sup>6</sup>dσ<sup>6</sup>υ ϽΡΥΓΔ<sup>6</sup>ρΟΥΠΔ<sup>6</sup>ρ<sup>6</sup>σ?LσίΔί  $\Delta^{2}$ ᠄᠙᠋ᠮᠻᢓᡏᢐᠮ᠘ᠮ ᠕ᠸ᠘᠊᠋᠋᠘᠘᠘᠘᠘ 40%CPL450cᠵ᠙᠙᠘ᡎ᠘ᠸ᠐ᠫᠲᠳ᠙ᡆᢆ  $\Delta$ b $\prec$ የ $\sigma$ የ $\sigma$ የናንር ላ/የታይ ወንደው እንደነበር እርላን የነርን ላን የርዕላን የነርን ላን የነር  $\phi$  $\Lambda^{\flat}$ ל $\Lambda^{\flat}$ ל $\Lambda^{\flat}$  $\Lambda^{\lambda}$  $\Lambda^{\flat}$  $\Lambda^{\flat}$  $\Lambda^{\flat}$  $\Lambda^{\flat}$  $\Lambda^{\flat}$  $\Lambda^{\flat}$  $\Lambda^{\flat}$  $\Lambda^{\flat}$  $\Lambda^{\flat}$   $a ext{location} ext{location}$ 

 $PUC^{5}$  $\Delta \Delta^{\circ} \Delta^{\circ}$  bhlibeded in all and thinder the condition of the state of the condition o (Ċ<sup>6</sup>daĠ<sup>6</sup>bCPdσ ΔdLcPPCPdL<sup>6</sup>DN CΔγPd<sup>6</sup> ΔL<sup>6</sup> <u>ΠΠ<sup>6</sup>bΔ<sup>6</sup> Δc<sup>6</sup>b<sup>6</sup>σ<sup>6</sup>P<sup>6</sup>σ<sup>6</sup></u> a  $\Delta \Delta \Delta \sigma^4 \Delta$  $PUC^{5}$   $C^{5}$   $C^$  $PU\sigma J^{\prime} \Lambda C \Delta^{\prime} \Delta^{\prime} \sigma \Delta^{\prime} \Lambda^{\prime} \Lambda^{\prime}$ -2.10 Codas Poorsing  $\Lambda^{2}$ P%J'C'6
CDσσ60
CDσ60
<p

- $\Delta \triangle$   $\Gamma$   $\Delta L^i \Delta^i$   $\delta \cap L^i \Delta^i$   $\Delta \Delta \triangle \Delta^i \Delta^i \Delta^i$   $\Gamma^i$   $\Delta^i \Delta^i \Delta^i$   $\delta \cap \Gamma^i$   $\delta \triangle \Gamma$

ᢦᠲ᠙ᠳᢕᢆᡄᠵᢛᠫᡕ ᠙᠋ᢕᠮᢣᢐᡳ ᠮᡄᠬᠮᡃᢣᢐᠽᡧ᠑ᠳ᠙᠘ᢣᡳᢇᢣᢐᠽᡕᡕ ᡏ᠐ᢛᢗᢐᠽᡧᢧᡳ ₽ฃ゚Ⴀჼჼ<σჼ ൎ在ᠺᠯᢀᡗᢐᠻᢐᢐᡥᢨᠦ Lᠸしᠬᢣᠵ᠋᠐᠙᠂᠙ᠻᠫᡊᠰ᠙᠘ᠻ᠋ ΦΦLΡCϽ<sub>4</sub>ρς ρΦCL ϽϧϞυϹϧͺυσ5ΓΓΓ<sub>2</sub>, Δδυς ρφης σο ΓΣ<sub>1</sub>ρο  $PPCP^{5}CPS^{-1}CP^{-$ ᠕ᡃᡶ᠋ᠮ᠘᠋᠋ᠣᡎ᠋ᠮ᠊ᠣᡑ᠘ᢣᡥ᠋ᡆᢎ᠑ᠳ᠈ᠪᠻᢐᢕᡤᢐᡃᢗᠬᡈᢣᠣᢛ. ᠙᠘ᠳᡆ᠂ᢗ᠘᠍ᢐᡏᡆ᠂ᠪ᠒ᠮ᠙ᢗᠵᢙᢀ᠘  $\Lambda^{L}L\Lambda D + \sigma^{b} \Delta L \dot{J}CD + L + \sigma^{b} \Delta C C \Lambda^{b}D^{b}C C D^{b}D \sigma^{b} C L^{b}d \sigma^{b}U b \Gamma L^{b}C^{c}\sigma^{b}\Gamma^{c}\sigma^{b}$ ᠵᡆᡥᡠᢛᡳ᠘ᠵᡕ ᠵ᠙ᠪᠵ᠘ᠵ᠙ᢗᡄᢛᢣ᠘ᠳᡥᢕᢛᠣ ᠕᠈ᢣ᠘᠙ᢛᠫᡕ ᢤ᠙᠙᠐ᢕ᠐ᢕ᠐ᠸᠳᡎᢙᢁᢗ  $\Delta^{\circ}$   $\Delta^{\circ$  $P^{Q}$   $\rightarrow$   $P^{Q$  $\dot{a}^{\mu}$ 

ᢦ᠋᠑ᠮᢐ᠘᠘᠘ᠳ᠙ᡥᠣᢐ ᠈᠐ᠸ᠐ᠳ᠙ᡎᡎ  $402^{\circ}$   $\Delta^{\circ}$   $\Delta^$  $\forall^{L}CD^{rb}$ ,  $\forall^{B}\Delta a^{b}d^{c}$   $D^{r}b a^{c}D^{r}D^{c}$   $\Lambda C^{r}b^{rb} \cap (\cap^{r}b \cap \neg^{r}) \cap \neg^{r}b a^{b}$ POPP = $\Lambda$ CL $\Delta$ LC%C%P°G  $\delta$   $\delta$ LCG%P°G  $\delta$   $\delta$ L $\delta$   $\delta$ L $\delta$   $\delta$ L $\delta$   $\delta$ LC $\delta$   $\delta$ LC $\delta$   $\delta$ LCG%P°G  $\delta$ C%P°G  $\delta$ 49ησηλους CΔΙολοΔαιοCDio 41PDLη(ηλαςλίνιο 4)16CDαλιο)σο  $\Delta \lambda^{\prime} \Gamma_{\gamma} P_{\gamma} \Gamma_{\gamma} P_{\gamma} P_$  $\Lambda \subset \Lambda^{0}$  $\Lambda \subset \Lambda \subset \Lambda^{1} \cup \Lambda^{1$  $P^{\prime}$  $b \cap L \cap A'b' = A'L \rightarrow A'b \wedge A$ άcΓ√√°>2C>σ√°> α\_α2° σ΄Ω√°<C.

 $^{5}$ לרור שר  $^{5}$ 

 $\Lambda^{\flat}$  $C\Delta L^{\circ}\sigma^{\circ}$   $b \cap L^{\circ}b \cap CD \cap \Delta^{\circ}b \cap \Delta^{$ ᢣᡆ°᠗ᡔᡕ᠘ᠣ᠈᠘ᠣ᠖ᢗdᠳ᠌ᡏᠬᢦ<ᡤᠺᡪᢣ᠌ᢇ᠐᠖᠘ᢞᠳ᠘ᡁ᠂ᠵ᠙ᢅᠫᢛᡩ᠂᠘ᡄ᠘ᢣᠪᠳ᠋᠄᠘ᠴᡄᢆ᠘ᠳ  $\dot{\alpha}$  =  $\dot$  $^{\circ}$   $^{\circ}$  $Cd\sigma = \Delta L^{\dagger} \Delta L^{\dagger$  $\Delta$ L $^{1}$  $^{1}$  $^{2}$  $^{3}$  $^{4}$  $^{4}$  $^{5}$  $P_{\rho} = P_{\rho} = P_{\rho$ ላጋር የብሎር የብሎር ላላ አር ልተር አር ልተር አር ልተር አር ልተር አር ልተር አር ልተር ልተር አር ልተር እር ልተር አር ልተር እር ልተር dQUCUPPQ dCDUPPQ dCDUPQ dCDUPPQ dCDUPPQ dCDUPPQ dCDUPPQ dCDUPPQ dCDU $C\Delta ag{D} = J \cdot C^{\dagger}$   $C\Delta ag{D} = C\Delta ag{D} = C\Delta$  $^{\circ}$   $\Delta \subset D \prec^{c} \cap A \prec^{c} \land^{c} = \Delta \subset \Delta \cap A \land^{c} \cap A \prec^{c} \land^{c} = \Delta \cap A \land^{c} = \Delta \cap A \land^{c} \land^{c} = \Delta \cap A \land^{c$  $^{6}$ CDQ°Q \_oQ°U  $\mathsf{CL}^{\mathsf{L}}\mathsf{L}^{\mathsf{b}}$   $\mathsf{A}\mathsf{D}\mathsf{A}^{\mathsf{c}}\mathsf{a}\mathsf{b}^{\mathsf{c}}\mathsf{A}^{\mathsf{c}}\mathsf{a}^{\mathsf{c}}\mathsf{D}\mathsf{A}^{\mathsf{c}}\mathsf{a}\mathsf{a}^{\mathsf{c}}\mathsf{b}^{\mathsf{c}}\mathsf{b}^{\mathsf{c}}\mathsf{a}^{\mathsf{c}}\mathsf{b}^{\mathsf{c}}\mathsf{b}^{\mathsf{c}}\mathsf{a}^{\mathsf{c}}\mathsf{a}^{\mathsf{c}}\mathsf{b}^{\mathsf{c}}\mathsf{a}^{\mathsf{c}}^{\mathsf{c}}^{\mathsf{c}}^{\mathsf{c}}\mathsf{a}^{\mathsf{c}}^{$  $b \cap L^{r}b \subset D \cap A^{r}D^{r}$ ,  $P^{r}U^{r}C^{r}b < \sigma^{r}$   $\dot{G} \subset C \cap A^{r}D^{r}A \cap A^{r}D^{r}$ **⊲**Ч >  $\Delta A^{1}$  $D^{1}$  $D^{1}$ Διρσημοίρος αγροφίος διρώρος βυρώρος βυρώρος βυρώρος ανθώρος ανθώρος βυρώρος βυρώρος ανθώρος ανθώρος βυρώρος β ط<sup>ا</sup>لے عور<sup>ا</sup>√۲۵۲ ا

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- 1.  $\sigma$ LPC> $\sigma$ CPC+ $\sigma$ CPC  $\sigma$ CP
- 2. ▷'ጔ'<sup>6</sup>, 'b'ᆉ」ፈ<sup>6</sup><<sup>7</sup>, ᠘ᡠ°σፈ<sup>7</sup>ናራ<sup>1</sup>し그 Рೈ<sup>1</sup>'는<sup>6</sup><<sup>7</sup> ሲርበፈ<sup>6</sup>ጋ'ል▷σፈ<sup>6</sup>ጋ<sup>6</sup>

- 3. \( \Lambda \\ \forall \forall \forall \\ \forall \forall \forall \forall \\ \fora
- 4. ὑΔΔς ὑΛΟΡσϤʹσͽΓ ΔζΙ. ΣΟΡΚ ΟΔΕσ ὡς ΓϤ϶ϽʹΑΡσΥΓ

- 7.  $47^{\circ}$   $\Delta b$ ליסיbרבירלי  $\Delta b$ ליסיbרבירלי  $\Delta c$ רd)  $\Delta c$ ליסיbרבירלי  $\Delta c$ רdיc0  $\Delta c$ 0  $\Delta$

2017/04 POLY POLOCYPI POLOCYPI POLOCYPU ΔϹϹΛϧϘϟϹϾϔϨͼϭϭϤϹ ϤϤϽ ϽϒϹϘͽϧͰϲͶϤͽϭϤ;Ϲ ΔϟϹ϶ϹϷϘϧϧϲ  $\forall d^2 \nabla \nabla d^2 \nabla$ b $\Delta P = \Delta^{\dagger} P + \Delta^{\dagger} P$  $40^{\circ}$   $40^{\circ}$ 

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## 3.3 ∆¿Ĺ⊃C>σ%°

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 $b \cap L^{2} \cap b \cap b \cap d^{3} d^{2} \cap d^{3} d^{2} \cap d^{3} d^{3} \cap d^{4} \cap d^{4}$ ᠕ᢣ᠋᠋ᡬ᠊ᡥᠨ᠘ᡃᠺᠠ᠔ᠬ᠘ᡩᢐ᠋ᡥᡉᡑ ᠙ᡃ᠍ᠾ᠆ᢑᡃᢆᠵᠳ ᠘᠙᠒ᠮᡑ ᠘ᡑ᠌᠑ᢛ᠘᠘ᡶᢝ᠘᠂ᠳᢥᡗᡥᠳᡑ  $CLP^{\eta_0}CD^{-1}CD^{\eta_0}CD^{-1}CD^{$  $\forall A'^bb^b\sigma^b \cap D'A' \cap A'^b \cap$ ᠌ᢦᠣ᠋ᡠᠸᢦ᠋ᠬᠦᢗᡥ᠋ᠣᢛ ᠕ᢣᡤᡎ᠘ᠻ᠒ᡧᠣᢦᡎᠮᢗ ᢗᠮ᠙ᢑᠳ᠂ᢙᠮᢇᢇᢇᢇ᠁ᢗᠮ᠙ᢆᡄ᠘᠙ᠳᡎ LC'N $^{1}$ LC LC $^{1}$ DNC $^{1}$ C $^{2}$ C $^{3}$ LC  $P/4\sigma C$ ,  $C\Delta^{b}dA$   $\sigma C\Delta^{b}D$   $\sigma C^{b}D$   $\sigma C^{b}D$   $\sigma C^{b}D$ SBΔQbd°Qc.  $\frac{1}{2}$   $\frac{1}$  $\Lambda^{1}$   $\Lambda^{1$ Ϥ<sup>ͺ</sup>ͰϽ ϹϪͰϪʹϹʹϹͺϤʹϧʹͽϟʹͶͽ ϹϪϧϥϤ ϤʹϧϧͺͽϲϹϧϸͺϲͺϧϥϢ Ϸϭʹϲͺϧϲͺϧͺϲ  $\Delta \sigma^{\text{b}} C^{\text{b}} \sigma^{\text{c}} \sigma^{\text{c}} C^{\text{b}} C^{\text{b}}$  $\Delta$ CD $\sigma$ 4 $\Gamma$ 7 $\sigma$ 5.

#### 3.3.2 Þ'\_>゚し, 'b\/」

490cm264 4074744 Delate allynd allyndrode of the allowed ᠘ᢀᠳ᠋᠘᠙᠘᠘᠘᠘᠙᠙ᡤᠫᡫᠳᢛ᠂ᡐᠫ᠕ᠻᠣᢛ᠂ᡖᡘᡶᠸᢛᠵᡶᡎ᠂ᡦᡊᡶᡧᡐᡆᠫᢕᡧᢙᠰ  $4^{L}$   $\sigma \rightarrow \sigma \nabla_{\ell \rho} C \rho_{\ell} U d <_{\ell}$  $^{\circ}$   $^{\circ}$ 2077PCP3DP 46UCV5pqc  $\bigcap_{b} \bigcap_{c} \sigma^b$   $\bigvee_{c} \bigcap_{c} \bigcap$ 5PC5P46CPCP57Up Pf7cfp</c>  $4^{L}$   $\Lambda \Gamma 4^{56} \Pi C D A^{5} \Gamma^{6} \sigma^{6}$ /%σ⊳σ**⊲**%ጋΓ.  $C\Delta b\sigma C P \Omega^b$ ᠌᠘ᢞᡳᡥᡯ ᡖ᠘ᡶᢆᢐᡆᡳ᠘᠙᠙᠘᠘ **ᡠ᠘᠑᠘᠙ᢗ᠐᠙ᠳ᠘᠘᠘᠘᠘᠘᠘᠘᠘** 

ጋዮሮኦጭ<'፫ላሮናΓ፮ ፭፡ዮላLውፕ୮፮ ዮឃሮ፫፮፡ሩ፟ው ሲርቦላጭጋንርኦውላጭጋውኔ, bበLኦርኦጭ  $\Delta$ ረ៤፮५%/ኦዖበቴሲላቴሪትኒኒኒር  $\Delta$ ጋሮዮዮጵ፡ጋውኔ ሲኒኦበሮኒውኔ 12.2.27-፮ውሴ  $\Delta$ ይዩር  $\Delta$ ይርንበውኔ ላኄዮንበውኔ, ኦቴጭረኒላውኔ  $\Delta$ ይጌ:

 $CLT^b$   $dD^bCDPC^c-dbndb^bD^c$   $PUCh^bD^c$   $d^cb^cC^bC^c-d\sigma^cD^c$   $d^cD^bCDPC^bC^bD^c$ ,  $bDALDDC^bD^c$ ,  $bDALDDC^bD^c$ ,  $bUDDC^bD^c$ ,  $bUDDC^bD^c$ ,  $ac^cD^cD^cD^c$ ,  $ac^cD^cD^c$ ,  $ac^cD^c$ ,  $ac^cD^cD^c$ ,  $ac^cD^cD^c$ ,  $ac^cD^cD^c$ ,  $ac^cD^cD^c$ ,  $ac^cD^c$ ,  $ac^cD^cD^c$ ,  $ac^cD^c$ ,  $ac^cD$ 

4%በርሊትዕና 6በLትኄቦ°2ና 42‰CPታሊላ2ና 6የራሊኒንPታሊላ3% 66 66 67 1116 1117 111

4°0°C>C>C>5)

4°0°C>C>C>5)

4°0°C>C>C>C>5)  $4^{\circ}$ ) $^{\circ}$  $^{\prime}$  $^{\prime}$  $^{\prime}$  $^{\prime}$  $^{\circ}$  $^{$ しらんでして  $\Box$ ᢄ᠆ᠾ᠙ᡎᠳ ᢣᡆᠵ᠋ᡶᡳ᠄᠂᠙ᠫᢣᠬ᠋᠊ᢙ᠙ᡙᢕᢕᠣᢦ᠗᠄᠂ᢗᡯᢊᠲᢘᡙ᠂᠐ᢆᢣ᠘ᢕᢕᡧ᠘ᡥ᠙ᠳᠫᠮᠲᠽᡀ᠂᠗ᠷᡳ᠔ᢣ᠐ᡯ  $\Delta \supset d\sigma$  30 Pis $\Delta^c$  Satisfactors and Price Pri  $\Lambda$ ታሲላጋበቦσ $^{\mathfrak{h}}$ ቦ $^{\mathfrak{h}}$  ላ $^{\mathfrak{h}}$  ላ $^{\mathfrak{h}}$  ላ $^{\mathfrak{h}}$  ላ $^{\mathfrak{h}}$  ላ $^{\mathfrak{h}}$  ላ $^{\mathfrak{h}}$ )ያለበርኦበላ $^{6}$ ታሪት )ታሪት ᠂ᡃᡋᠫ᠘ᡶᡳ᠂᠋᠘᠙᠘ᡶ᠙᠂᠘᠙᠘ᡶ᠙ᡊ᠙ᡶ᠙ᡊ᠙᠘᠙᠘ᡶ᠙ᡊ᠘᠙᠘ᡶ᠙ᡊ᠘᠙᠘ᡶ᠙ᡊ᠘᠙᠘ᡶ  $a \triangle \Delta b \Delta \sigma^{\eta} \cap \Delta^{\zeta}$   $b \sigma^{\eta} b c d \sigma^{\eta}$   $b \Delta C D d^{\zeta}$   $b \Delta b d b d d^{\eta} \sigma^{\eta} \sigma^{\eta} \sigma^{\eta}$  $^{\circ}$  $^{\circ}$ ϽʹϯႱჀϧϷϞϭ· ՈႶናჼϲϷϲͰ;ႶჃႭჃჼϧჼϭჼՐჼϭ· ΛϭϤჼϭႭϲϷჼჼႠჼՐჼϭჼ, LϲჼϲϷͻႶჼ  $C\Delta^b dA$   $\Omega^b b^c$   $\Delta^c b^c \sigma^b \Gamma^c \sigma^b$  Appendices 1- $\Gamma$   $A^L \Delta 2-\Gamma$ ,  $C\Delta \dot{L}^b$ **ላ**ሬሀር ሆኑባሪ  $\Lambda A^{b} \Gamma^{b} P^{c} = \Gamma A^{c} P^{c} P^{c} P^{c} = \Gamma A^{c} P^{c} P^{c$ 

ΡϑσϤͿʹ bΠLϷʹ ᡩΓናΡϤʹσϞΓ·σͰ LC·ΓͿϤʹͰͰͺͰͺͰͺͰͺͺϹ, ΔΨΠ</brack bΠLϷʹΓ ΔΥΘΑΘΕΝΟ ΛΕΝΤΑΝΟ ΛΕΝΝΟ ΛΕ

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 $d \& \lambda \lambda \lambda^{2} + b < 0$   $b = \Delta C > 2 \cap b + \Delta C > 0$   $b = \Delta C > 0$  b =

ጋ° ኒしልኦσኄቦ  $^{\circ}$   $^{$ 

- 10.5  $\Delta \Delta b$   $\Delta b$   $\Delta$

- $\Delta$ ሩ/∩%ጋ $\Delta$ ናbCናσናJና ላጋሁካ $\Delta$ ና ካ $\Delta$ ታ>>/L $\sigma$ ላናL<sup>®</sup>UC ናb>>\*ላC>ናbCና $\sigma$ ናJና  $\Delta$ C>C>C>>/C+ $\sigma$ 6  $\Delta$ D</br>  $\Delta$ 0<br/>  $\Delta$ 1<br/>  $\Delta$ 2<br/>  $\Delta$ 3<br/>  $\Delta$ 4<br/>  $\Delta$ 5<br/>  $\Delta$ 5<br/>  $\Delta$ 6<br/>  $\Delta$ 6<br/>  $\Delta$ 6<br/>  $\Delta$ 7<br/>  $\Delta$ 7<br/>  $\Delta$ 7<br/>  $\Delta$ 8<br/>  $\Delta$ 9<br/>  $\Delta$ 9<br

- 14.  $\Delta$ ጋላσ የህʹϲʹჼ·  $^{14}$   $^{14$ 
  - a.  $\Lambda$ 'b/▷'ታ▷σኄቦ' CL'Γ⁵  $\dot{L}$ ° $\Delta$ ▷C°D' 4°LPC▷·LC°°D' 4LD  $\sigma$ Λ°D'▷V\* $\Delta$ °D'  $(\Delta \Delta d\sigma + d \theta C \Lambda \Delta V)$   $\delta$ 0°C▷· $\delta$ 1°C  $\delta$ 1°C

- $\Delta \Delta^{\Gamma}$   $\Delta L^{\Gamma}$   $\Delta C^{\Gamma}$   $\Delta C^$

- $\Delta$ /LCP2CP/L $^{6}$ b%< $^{6}$   $\Delta$ CD/L $^{6}$ CP/L $^{6}$ CP/L $^{6}$ D $^{6}$ CP/L $^{6}$ CP/L $^{6}$ D $^{6}$ CP/L $^{$

- የቦናჼΓ▷ና ΔΦΔና ϸϽϧϟͱϸͶϳϧͺʹͰϲ; ▷ͱϙϷϧϥϷϭϧͺͰϲͺͺͼϷϪϹϧͺͰϲͼϧͺͰϲͺ ΔΦΔς ΔϷϽͼͺϹϷͰͰϭϧͺͰͺϷϲ ϤͰΓ϶ Φράϧϥϗͼͺ϶ͿͿͼ, Αλικά, Α

- $bL\Gamma_{P} \sim \Delta C^{*} U \sim C$
- $\Delta C = \Delta C + \Delta$

- $\Delta$ %ቦናናላርሲትዕና bact ላኔLɔ bacpና ለሁንጭ</dot apናበጭጋΔትና ሃየሃpበናቴታና: praጭጋናልpታቄ ልናው የምህpir, arguments arguments of the composition of the compositio

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 $4^{\text{h}}PCP + L^{\text{h}}PCP + DPCP + DPCPP + DPCP + DPCPP + DPCP + DPC$ 

 $\Lambda$ -L $\Lambda$ D $\Delta$ -D $^b$   $\Delta$ -C $\Lambda$ -D $\Delta$ -L $\Delta$ -D $^b$   $\Lambda$ -C $\Lambda$ -Q-U-D $^b$   $\Lambda$ -C $\Lambda$ -D-C-D-G-C-

# 3.3.6 ለነdሰነ, Þነቴኦት ላጋኈርኦσъቦ, ጋኒት, Þነቴኦት ፴ላኈበኈርኦት ፲፱፻፫ በበነቴል ላዜጋ ቴበኒታ ተለርኦ መለርኦ መደርኦ መደርኦ መደርኦ ማስርኦ የተጠና የተመደርኦ የተ

 $\Delta$ CC $\Lambda$ ታ>/L' $\Delta$ በ $^{6}$   $\Delta$ ac $^{6}$ σ  $^{6}$ υ $^{6}$ 3 $\Delta$ 2 $^{6}$ Γ $^{6}$ σ $^{6}$   $^{6}$ υ $^{6}$ 1 $^{6}$ 0 $^{6}$ 0 $^{6}$ 0 $^{6}$ 0 $^{6}$ 1 $^{6}$ 1 $^{6}$ 1 $^{6}$ 2 $^{6}$ 1 $^{6}$ 2 $^{6}$ 1 $^{6}$ 2

 $\Delta \Delta \Delta^{\circ} \Delta D^{\circ} D^{$ 

#### 3.3.7 ላ/ $^{\circ}$ ርርኦ $^{\circ}$ $\Delta$ / $^{\circ}$ Lቦ $^{\circ}$ ኦኦሊላ፦ ለኦሊላዮ $^{\circ}$ σ $^{\circ}$ ታ $^{\circ}$ $^{\circ}$ ው $^{\circ}$ $\dot{}$ $\dot{}$ $\dot{}$ $\dot{}$ $\dot{}$ $\dot{}$ $\dot{}$

### 4.1 DOSLL PLACE PUTPLE

 $\Delta c$   $\Delta c$ 

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 $\Delta \Phi_{\Gamma} = A_{\Gamma} + A$ PUTPCD40  $\Lambda \Delta C^{\prime} \Delta$  $\mathsf{CL}\Delta^{\mathsf{e}}\sigma^{\mathsf{f}}\mathsf{D}^{\mathsf{f}}\mathsf{b}$   $\mathsf{ACLC}\mathsf{D}^{\mathsf{b}}$ ,  $\mathsf{D}^{\mathsf{f}}\mathsf{b}\mathsf{D}^{\mathsf{f}}\mathsf{D}^{\mathsf{f}}\mathsf{b}$  $4^{\circ}$ ) $^{\circ}$  $^{$  $^{\circ}$   $4^{\circ}$ )% $7^{\circ}$  $b \cap L @ \dot{\Gamma}^{5b} \cap C \triangleright C \triangleright \Gamma^{5b} \supset \sigma$ .

 $b \cap \dot{L}^{\lambda}$   $\sigma \wedge \dot{D}^{\phi} > c$   $\dot{L} B \Delta \dot{D}^{\phi} - c$   $\dot{C} \Delta d d^{c} - d d d^{c} -$ 

 $\mathsf{LCLQ}_{\mathsf{P}} \mathsf{LCLQ}_{\mathsf{P}} \mathsf{L$  $\Diamond^{\circ}$  $\bigcap_{b} \bigcap_{a} \bigcap_{b} \bigcap_{b} \bigcap_{a} \bigcap_{b} \bigcap_{a} \bigcap_{b} \bigcap_{b} \bigcap_{b} \bigcap_{a} \bigcap_{b} \bigcap_{b} \bigcap_{b} \bigcap_{a} \bigcap_{b} \bigcap_{b$ 'bdangar' od on de la proposition de la proposit Parity P $\mathsf{ABA} = \mathsf{ACPA} = \mathsf{ACP$ QLD Partial  $\text{CD}^{\text{b}}$   $\text{CD}^{\text{b}}$   $\text{CD}^{\text{b}}$   $\text{CD}^{\text{b}}$   $\text{CD}^{\text{b}}$   $\text{CD}^{\text{b}}$  $\Diamond^{\circ})^{\circ}$   $\partial^{\circ}$   $\mathsf{LC^bCb^h}$   $\mathsf{LC^bC^bh}$   $\mathsf{LC^bC^bh}$   $\mathsf{LC^bC^bh}$   $\mathsf{LC^bC^bh}$   $\mathsf{LC^bC^bh}$   $C\Delta^{b}dd$   $\Lambda C^{f}b\Lambda d^{f}b^{f}\sigma d^{f}D\sigma^{b}$   $DP^{f}\sigma d^{f}\delta D^{f}b^{f}\sigma d^{f}D\sigma^{b}$   $\Lambda C^{f}b\Lambda d^{f}b^{f}\sigma d^{f}b^{f}\sigma d^{f}D\sigma^{b}$   $\Lambda C^{f}b\Lambda d^{f}b^{f}\sigma d^{f}b^{f}\sigma d^{f}b^{f}\sigma^{h}D\sigma^{h$ 

4%በርሊትዕና 4/ጐኄጐጐጐ 6 ውታዕናበላናታላናፒላና በርረናበላናጋቦት 6 ለኦረሊትኦታሪተርጭ 6 የህናርጐሩረትኦበታ 6 4ጋጭርኦታሪማት ናዖናንሪተው 6 4 ነውርኦታሪማት የየናንላናታሴታው 6 4 ነውርኦታሪማት 6 4 ነውር 6 6 ነውር 6 ነ

 $b \cap \dot{L}^{2}$  ' $d \not= c \cap d^{4} \nearrow c$   $C \cap d^$ 

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 $\Delta$ 67 $\Phi$ C66

PUL5<sub>%</sub> Lc

- 1) Please note that any commitments requiring submission of materials prior to the Final Environmental Impact Statement (FEIS) are also to be included within the FEIS where applicable.
- 2) Where it is requested that data be provided, it is expected a related discussion will also be included within the FEIS.3) Where no timelines are indicated, Sabina Gold & Silver Corp. (Sabina) is to provide as per requests of the party putting the commitment forth.

Commit-	Party	Reference	Commitment	Comments
ment #		(relevant IR or TRC)		
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
	ı		DAY 1	
			DEIS Organization, Conclusions and Methodologies	
4	AANDC	AANDC TDC 1	Alternative Assessment including Geology, Geotechnical Information and Wa	ste Management
1	AANDC	AANDC TRC 1	Sabina commits to show within the FEIS how alternatives were analyzed and to explain when options are dropped off, identify rationale for the selection, and clarify which alternative options remains a possibility. This should include how environmental and socio-economic factors have been applied to the selection of alternatives.	
2	NRCan	NRCan 7	Sabina commits to provide any additional site specific investigations (e.g. geotechnical, geophysical) of the foundational materials for proposed alignments for dykes and embankments, that are undertaken in the next six months, in the FEIS.	
3	KIA	KIA IR 9, 10, 12	Sabina commits to providing information on ground ice based on results of geotechnical site investigations conducted between the release of its feasibility study and submission of the FEIS.	
4	KIA	IR 15	Sabina commits to presenting the seepage data for the airstrip as soon as practical and to assessing the results in the context of an adaptive management framework within the waste rock management plan to be submitted as a part of the FEIS.	
5	KIA	n/a	Sabina commits to demonstrating consideration of realignment of the winter road north of Tahikafalok Lake (Bathurst Lake) to the marine laydown area in order to address potential impacts to identified riparian zones. This reconsideration may include a site visit conducted in coordination with the KIA, discussion of which shall be included within the FEIS.	
6	NWB	n/a	Sabina commits to providing a discussion of potential tailings slurry density, taking into account other projects in the north, specifically Meadowbank. This information wil be included wtihin the FEIS.	
7	NRCan	NRCan 36/37	Sabina commits to further consult and engage with NRCan regarding its response to technical review comments 36 and 37 prior to submission of the FEIS.	
8	GN	IR 12	Sabina commits to removing reference to a hard-surface airstrip in the FEIS.	commitment 24 from GN submission
9	GN	CR 20	For the FEIS, Sabina commits to detailing whether bulk fuel storage will include overwintering of fuel vessels in sea ice.	commitment 25 from GN submission
			Atmospheric Environment including Climate, Air Quality, Noise and V	libration
10	NWB		Sabina commits to demonstrating in the FEIS that it has considered the experience gained at Meadowbank with respect to dust suppression as well as its related effects assessment, and water consumption rates.	
11	KIA	CR 14	Sabina commits to come up with a methodology for modelling climate change and to discuss it with the KIA and other interested parties prior to the submission of the FEIS.	
12	KIA	KIA IR 18	Sabina commits to providing more detail on the operation of the incinerator and management of emissions in the FEIS. Details will include: the make and model of the incinerator including a letter from the manufacturer stating that it is designed to incinerate sewage sludge, adheres to EC's guidance document on batch incineration, and is a dual-chamber incinerator. Details will be provided for adapative management if elevated metals, dioxans, furans, and/or ammonia are detected through the dustfall monitoring program.	

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13	GN		At this time the Goose Property Airstrip will not be designed to accommodate aircrafts as large as a Boeing 767. If larger aircraft are selected as a viable option, Sabina commits to updating the air quality and noise models and conduct an effects assessment to address the potential effects of this larger class of aircraft. This would be included in the FEIS.	commitment 48 from GN submission
14	GN		Dustfall sampling locations will be chosen to ensure that all large sources of emissions are monitored. Sabina will consult with the GN on the number and location of sampling sites prior to finalizing the Air Quality Monitoring Plan for the FEIS.	Communicate 45 from GN submission
				commitment 49 from GN submission
	Δαιια	tic Environment	including Water Management, Freshwater Environment, Hydrology, Hydroged	plogy and Mine Rock Characterization
15	NWB	itic Environment	Sabina commits to include the conceptual design of all water management structures	biogy and wine Nock Characterization
	5		within the water licence application filed as part of the FEIS.	
16	KIA		Sabina commits to develop site specific water quality objectives where relevant for parameters that naturally exceed CCME protection of aquatic life levels. This pertains to each of the project locations including Goose, George and the Marine Laydown Area.	
17	AANDC	AANDC 13	Sabina commits to reviewing table 4.8-1 for the FEIS to ensure clarity with the text that water will not be discharged to the aquatic receiving environment prior to meeting site water quality objectives.	
18	AANDC	AANDC 15	Sabina commits to providing more details in the FEIS on the waste water management strategy including sewage effluent. This will include discharge locations and the characteristics of those locations as well as impacts on the receiving environment, attenuation capacity, end of pipe locations, seasonal considerations, alternatives, and design or engineering contingencies.	
			DAY 2	
19	AANDC	AANDC-22	Sabina commits to reviewing the need for contingency measures in relation to all potentially contaminated discharge (of particular concern and interest to AANDC are potential discharges from the waste rock storage areas, tailings impoundment area, and the pit lakes at closure). Where it is deemed that contingency measures would significantly reduce the risk to the environment, those measures will be presented in the FEIS. Where contingency measures are not provided, a rationale will be provided as to why they are not necessary.	
20	EC	EC-26	Sabina commits to including sensitivity analysis for approach of zero-discharge volumes within the detailed site wide water and load balance presented in the FEIS to address higher than predicted water volumes.	
21	EC	EC-28	Sabina will provide detailed effluent quality predictions, an assessment of the receiving environment concentrations, and identification of water quality objectives within the FEIS.	
22	DFO	3.1.1	As part of the Site Preparation Application and in the FEIS, Sabina commits to provide DFO and other parties with supplemental information on how the Rascal stream realignment may affect the following: existing channel stability and erosion potential; the potential for re-suspension of sediments in ponds; and areas with undefined channels.	
23	DFO	3.1.1 (DFO 2)	As part of the Site Preparation Application and in the FEIS, Sabina commits to provide DFO and other parties with supplemental information on whether Arctic grayling spawning and rearing habitat is limiting within the watershed for the population using the stream.	
24	DFO		As part of the Site Preparation Application and in the FEIS, Sabina commits to provide DFO and other parties with supplemental information on how the Rascal stream realignment may result in Arctic grayling spawning and egg stranding in the deactivated reaches of Rascal Stream East.	
25	KIA		Sabina commits to provide a discussion of the expected seepage volume from the tailings storage facility in the perimeter ditches and a threshold for a maximum acceptable flow to be included in the FEIS. Sabina also commits to provide further discussion of mitigation within the FEIS and specific adaptive management protocols that would be triggered should the proposed thresholds be breached.	

26	KIA	IR-30	Sabina commits to ensuring that all mine phases are addressed within plans listed in the FEIS (as presented in the DEIS table 13.1), including: the Mine Waste Rock and Tailings Management Plan (addition of construction and closure phases), the Site Water Monitoring and Management Plan (addition of temporary and final closure phases), and the Fish Offsetting Plan (addition of final closure phase).					
27	KIA	n/a	Sabina commits to working with the KIA, EC, and DFO on the components of the final AEMP prior to submission of the FEIS.					
28	KIA	IR-16	Sabina commits to providing the appropriate justification for design criteria adopted for any water management structures at Lytle and Occurrence Lakes and to demonstrate a consideration for whether or not contingency plans are warranted within the FEIS.					
29	AANDC	AANDC-23	abina commits to providing within the FEIS, an estimate of water quantity and quality roduced throughout the project, parameters to form the basis for design of water nanagement structures, monitoring that will be required at each of the sites and how his monitoring will be effective, and associated treatment options.					
30	AANDC	AANDC-26	Sabina commits to providing in the FEIS an updated preliminary closure plan which includes definitions of temporary closure and care and maintenance including outlining what activities and monitoring may continue at the project subject to the phase within which care and maintenance is implemented.					
31	EC	EC-24, EC-36	Sabina commits to include the marine laydown area within water management plans as presented in the FEIS.					
32	EC	EC-27	Sabina commits to incorporate contributions from blasting reagent residues in the water balance and load estimates submitted within the FEIS.					
33	EC	EC-31	Sabina commits to identify appropriate surrogates for total suspended sediment (TSS) assessment and to continue to calibrate this with build data.					
34	TC		Sabina commits to providing sufficient detail in the FEIS that would clarify any alternative to relocate or adjust the spatial location of a tailings impoundment area with respect to any involved or surrounding waterbodies as such relate to navigability.					
35	KIA		Sabina commits to giving consideration to high salinity within its groundwater model and subsequent data presented within the FEIS.					
36	KIA	KIA CR-10	Sabina commits to further sampling and analysis during operations where required to support waste rock management activities. It is anticipated that there will be two components to this work, including collection and analysis to classify waste rock during the mining process, and sampling and analysis to verify the effectiveness of the management plans. Details on these plans will be provided in the waste rock management plan submitted as part of the FEIS.					
37	NRCan	NRCan-23 24	Sabina commits to addressing these considerations and to further investigating the methods for predicting and managing groundwater inflows (such as those suggested in Appendix O of the DEIS) in the site water and monitoring management plan in the FEIS.					
			Socio-Economic Environment and Assessment including Heritage Re	sources				
38	GN	GN-1	The Proponent commits to include project-specific data concerning employee					
30	3	5.7 1	community of residence and number of employees that relocated from the year prior (to and from, for Cambridge Bay, Kugluktuk, Taloyoak, Gjoa Haven, and Kugaaruk) in their Socio-Economic Monitoring Program within the FEIS and subsequent annual reports. The details of this process will be captured in the Terms of Reference for the project-specific Back River Socio-Economic Monitoring Committee.					
39		GN-3	Sabina commits to provide a summary of initiatives it supports through its Donations Policy pertaining to "youth and education" and "community wellness and traditional lifestyle" in the FEIS and to provide details of a potential summer student program directed at post-secondary.					

40		GN-4	Sabina commits to provide full National Occupational Coding in its workforce schedule, and to identify and register with the appropriate GN department, all trades persons and apprentices working within the Project operations. Sabina will consult with the GN's Department of Family Services Career Development Division to identify current apprentice students for training and employment.	
41		GN-17, GN-18	Sabina commits to work with the GN's Territorial Archaeologist to provide the maps and site status reports in a manner and timeline that is agreeable to both parties and to be determined at a later date. Timing will be included within the FEIS.	
42		AANDC-35	Sabina commits to working with the GN, AANDC and other interested parties to develop a draft Terms of Reference for a Back River Socio-Economic Monitoring working group; a summary of the draft Terms of Reference will be provided in the FEIS.	
			Public Engagement and Incorporation of Inuit Qaujimajatuqang	git
			Terrestrial Environment including Wildlife, Migratory Birds, Species at Risk	and Vegetation
43	KIA	KIA IR-1, 2, 4	Sabina commits to providing within the FEIS, more detail specifying site-specific monitoring plans, specific thresholds and triggers and adaptive management responses with regard to wildlife.	
44	KIA	KIA IR-1, 2, 4	Sabina commits to providing additional clarity on project specific monitoring associated with wildlife VECs in question within the FEIS (noting that these would not be at the population level, and would be focused on project effects).	
45	KIA	KIA CR-1, 2, 3, 4	Sabina commits to provide within the wildlife and cumulative effects assessments, a better explanation or justification for the magnitude rating cut off points including the divisions between nil, low, and moderate. If there is not sufficient data to justify these divisions as suggested above, Sabina commits to remove the restriction from the methodology chapter that the EIA practitioner must conclude that an effect is not significant if they select low.	
46	KIA	KIA CR-1, 2, 3, 4	Within the wildlife and cumulative effects assessments, Sabina commits to include species specific duration categories with justification for each, or if not sufficient data to justify species specific duration categories, as suggested above, Sabina removes restriction that the EIA practitioner must conclude that an effect is not significant if they select short term as their duration value.	
47	EC	EC-10; 6.1.10	Sabina commits to reduce disturbance to known colonies of nesting, feeding, or moulting birds by imposing flight restrictions to maintain a distance of 3000 metres from colonies of birds.	
48	EC	EC-9; 6.1.9	Sabina commits to demonstrating consideration for inclusion of EC's recommended setback distances within the FEIS.	
			DAY 3	
		Terre	estrial Environment including Wildlife, Migratory Birds, Species at Risk and Ve	egetation - continued
49	GN	IR 14	Sabina commits to updating Table 5.6-2 (Cumulative Habitat Loss in the Bathurst Caribou CEA Boundary) in the FEIS. For closed or past developments it was assumed that dust no longer contributes as habitat alteration and wildlife are anticipated to re-inhabit these areas, thus blank cells should read NA.	
50	GN	CR 15	For the FEIS, Sabina commits that updates will be provided to include the most recent 2012 data in Volume 5, Table 5.1-2 (Bathurst Caribou Herd Population Numbers and Breeding Females from 1986 to 2009).	commitment 94 from GN submission  commitment 95 from GN submission
51	GN	IR 19	Sabina commits to include the Nunavut Wildlife Act in the List of Permits, Licenses, and Authorizations Required for the Project in the FEIS.	commitment 96 from GN submission
52	GN	GN-20	Sabina commits to including text in the FEIS referencing Project-related effects in the context of Nunavut wildlife management populations.	commitment 97 from GN submission
53	GN	TRC 20	Sabina has assessed areas where wildlife may be disturbed by noise as indirect habitat loss. Sabina commits to providing additional information (which may include literature) within the FEIS to describe potential effects to wildlife that may continue to use this area, including energy expenditure, stress and population health.	

CNI		Tall the state of	,						
GN	TRC 21	Sabina commits to include in the WMMP as part of the FEIS, a plan to collaborate in programs led by the GN in future population level monitoring of grizzly bear, wolverine, muskox, and caribou, if and when such monitoring is undertaken.							
GN	TRC 21	Sabina commits to demonstrate in the FEIS how the remote camera study (if this is the program used) design will meet species-specific monitoring objectives taking into account the differences in sampling requirements amongst program objectives as well as differences in the expected densities and distribution amongst the species being monitored. Clarify how remote cameras will be effective at detecting change in low density species.	commitment 344 from GN submission						
GN	TRC 21	Sabina has made the commitment to participate in regional monitoring plans, lead by government, for several wildlife VECs, including caribou, muskox, grizzly bear and wolverine if and when they exist. At that time, these regional, government-led programs will replace the proposed regional monitoring plans in the DEIS WMMP. An update on							
GN	TRC 21	Sabina commits to verifying model results that determined areas of indirect habitat loss for wildlife using actual field noise monitoring results and to present this information within the FEIS.							
GN	TRC 21	Sabina commits to include in the WMMP as presented in the FEIS, additional details on the design of focal species monitoring programs including the metrics being measured, sampling design and intensity, threshold values for acceptable impacts and expected sample size and ability to detect when thresholds have been exceeded.							
GN	TRC 22	Sabina commits to include within the FEIS, additional details for mitigation measures and the associated implementation protocols, specifically: (a) Human-wildlife conflict management, including the establishment of i) Project-related wildlife mortality thresholds above which mitigation measures would be revised and adapted ii) communication protocols with regulatory agencies and co-management organizations on the use of deterrents, translocations or destruction of wildlife especially bears and furbearers. (b) Nest management plans (c) Den site management plans.							
GN	TRC 22	Sabina commits to update within the FEIS, mitigation measures and associated implementation protocols to include detailed staged reduction in Project activities in response to approaching wildlife, including the different stages of work reduction and how they would be triggered.							
GN	TRC 22	Sabina commits to, within the FEIS, clarifying inconsistencies regarding proposed mitigation measures relating to staged reduction in Project activities in response to approaching wildlife, including considerations of wildlife group size and composition, season, sensitive periods, and distance to Project.							
GN	TRC 22	Sabina commits to the development of a mitigation response decision tree for approaching caribou. This would consider multiple variables such as species, group size and composition, season, sensitive periods, and distance to Project in determining the appropriate mitigation response. This will be included within the FEIS.							
GN	TRC 22	Sabina commits to enhance monitoring mechanisms for detecting wildlife approaching the Project as triggers for mitigation actions such as blasting management, traffic management and staged work reductions. These should take into consideration the required time for implementation of mitigation measures following detection of approaching wildlife. This detection capacity can be enhanced by giving consideration to measures such as the use of dedicated wildlife monitors stationed at key points around the site and at distances up to 4km from the site during sensitive caribou periods, use of spotting scopes for distant scanning, height of land surveys and potentially the use of elevated observation platforms around the project site.							
GN	TRC 28	Sabina commits to including potential effects on hunting allocations due to potential Project related direct mortalities of grizzly bears within the FEIS.							
GN	TRC 27	Sabina commits to update the FEIS to include the final results of the grizzly DNA study conducted in 2012 and 2013 including additional details on methodology and analytical approach as requested by the GN.							
	GN GN GN GN GN GN	GN TRC 21  GN TRC 21  GN TRC 21  GN TRC 22  GN TRC 22  GN TRC 22  GN TRC 22	programs led by the GN in future population level monitoring of grizzly bear, wolverine, muskox, and caribou, if and when such monitoring is undertaken.  GN TRC 21 Sabina commits to demonstrate in the EIS how the remote camera study (if this is the program used) design will meet species specific monitoring objectives taking into account the differences in sampling requirements amongst program objectives as well as differences in the expected densities and distribution amongst the species being monitored. Clarify how remote cameras will be effective at detecting change in low density species.  GN TRC 21 Sabina has made the commitment to participate in regional monitoring plans, lead by government, for several wildfile VECs, including carbono, muskox, prizzly bear and wolverine if and when they exist. At that time, these regional, government-led programs will replace the proposed regional monitoring plans in the DBIS WMMP. An update on this commitment is to be provided within the FEIS.  GN TRC 21 Sabina commits to verifying model results that determined areas of indirect habitat loss for widelife using actual field noise monitoring results and to present this information within the FEIS.  Sabina commits to include in the WMMP as presented in the FEIS, additional details on the design of focal species monitoring programs including the metrics being measured, sampling design and intensity, threshold values for acceptable impacts and expected sample size and ability to detect when threshold have been exceeded.  GN TRC 22 Sabina commits to include within the FEIS, additional details for mitigation measures and the associated implementation protocols with regulatory agencies and co-management organizations on the use of deterrents, translocations or deterrined in the gradience of the project related wildlife mortality thresholds above which mitigation measures and co-management organizations on the use of deterrents, translocations of destruction of wildlife especially bears and furbearers. (b) Nest management plans (						

66	GN	TRC 27	Sabina commits to develop adaptive management measures to mitigate potential impacts to grizzly bears from defense kills should set thresholds be exceeded and to include this information within the FEIS. Adaptive management measures may include undertaking DNA mark-recapture studies for grizzly bears similar to those conducted in baseline studies to assess the significance of potential impacts.	
67	GN	TRC 24	Sabina will include more detail on the definition of "population and subpopulation health" and "acceptable risk thresholds" in definition of Significance Ratings in the FEIS.	
				commitment 98 from GN submission
68	GN	TRC 24	Sabina commits to develop adaptive management measures to mitigate impacts to caribou should any of the 4 herds were to dramatically shift ranges or migration routes into the Project area during the life of the Project and to include this within the FEIS.	
69	GN	TRC 29	Sabina commits to develop a stand-alone Bear Safety and Response Plan that pulls together relevant information provided in the DEIS and to include thresholds for acceptable impacts associated with human-bear conflicts (e.g. number of problem bear encounters per year, number of translocations required, number of direct mortalities resulting) and proposed actions to be taken if these thresholds are exceeded. This plan should also include information on coordinating with government agencies and comanagement partners and will be included within the FEIS.	
70	GN	TRC 30	Sabina commits to revise the FEIS to validate the Habitat Suitability Index (HSI) that was used in the impact assessment for muskox.	
71	GN	TRC 31	Sabina will update and expand the management and monitoring sections of the WMMP that deal with attraction of predators (including wolverine) to camps and managing problem wildlife (including wolverine). This information will appear in the FEIS.	
				commitment 349 from GN submission
72	GN	TRC 31	A discussion surrounding wolf, wolverine, and grizzly bear predation of ungulates will be added to the ungulate sections of the FEIS.	commitment 102 from GN submission
73	GN	TRC 32	Additional information on the proposed raptor monitoring protocols will be added to the wildlife mitigation and management plan (WMMP) for the FEIS following guidance on measuring and analyzing a zone of influence (ZOI) on nest success by the Canadian Wildlife Service. This information will appear in the FEIS.	
				commitment 350 from GN submission
74	GN	TRC 32	Sabina commits to update the WMMP to include an example of a nest specific management plan for a nest located with the PDA to illustrate the range of mitigation and monitoring actions that would be undertaken.	
75	GN	TRC 32	Sabina commits to include in the WMMP for the FEIS, a protocol for working with the GN and other co-management partners to mitigate impacts on nests located within the PDA, including the requirement for seeking regulatory approval prior to any action that could potentially damage/destroy or disturb these nests.	
76	GN	TRC 32	Sabina commits to provide additional detail to the raptor chapter of the FEIS (Volume 5, Chapter 10) to provide relevant citations to support mitigation activities.	
				commitment 103 from GN submission
77	GN	TRC 36	Sabina acknowledges the requirements of the Scientists Act and commits to ensuring that legislated reporting requirement under the Scientists Act are reflected in the FEIS.	
	2			commitment 104 from GN submission
78	GN	TRC 37	Sabina commits to update the table on Permits and Approvals for Mine Development in the FEIS to include all relevant authorizations required for the life of the Project.	commitment 10F from CN submission
				commitment 105 from GN submission
			Marine Environment and Marine Transportation	
79	EC	EC 2 / 6.1.2	Sabina commits to recommending that shippers adhere to the 30 km setback from Prince Leopold Island as proposed by EC and assuming ship safety. This information will be included within the FEIS.	
80	EC	EC 5 / 6.1.5	Sabina commits to identifying and considering known colonies of migratory birds along the shipping route and to ensure that information is considered for project shipping. This information will be included within the FEIS.	
			<u> </u>	

81	EC	EC 25	Sabina commits to characterization of the brine effluent and review of alternative discharge strategies and to a further review in the FEIS of monitoring requirements of discharged brine for compliance with subsection 36(3) of the Fisheries Act prior to release to the marine environment.	
82	KIA	n/a	Sabina commits to update within its FEIS, a discussion on community level capacity in spill planning and response.	
83	NIRB	n/a	Sabina commits to including additional information within the FEIS as related to the potential for cumulative impacts from shipping activities associated with other proposed and approved development projects within the Kitikmeot Region, including Doris North, Phase 2 Hope Bay Belt, Hackett River, and Izok Corridor.	
84	GN	GN-25	Sabina will review the references related to occurrence of polar bears in the marine environment in particular known summer time concentrations along the shipping route and update the information within FEIS as needed.	commitment 99 from GN submission
85	GN	GN-26	Sabina commits to working within the existing regulatory framework defined by Transport Canada. An approved SOPEP will be in place by the shipping provider prior to the commencement of any shipment.	commitment 100 from GN submission
86	GN	GN-26	Sabina will work with the GN and other agencies to acquire appropriate public data related to polar bear distribution and density. To the extent possible, this information will be used to assess worst case and best case scenarios should a fuel release or spill event occur in the marine environment along the shipping route.  Using the available data where applicable, Sabina will for the FEIS:  1) highlight rough densities of polar bears along the shipping routes;  2) provide further rationale on the risk of potential spills and provide rationale around the parameters of magnitude (i.e., location of spill, volume of spill, area of dispersion, type of spill, response time);  3) identify worst case scenario (i.e., highest density of polar bears, high volume, worst type of liquid) and best case scenario (i.e., lowest density of polar bears, low volume, lightest type of liquid).	
				commitment 101 from GN submission
87	GN	GN-26	Sabina commits to participate in relevant research and management initiatives and increasing understanding and mitigation of potential cumulative effects associated with the Project's shipping activities.	
88	GN	n/a	Sabina commits to limit their shipping period to the open water season and to not ship within the Nunavut Settlement Area after October 15 each year (except under unforeseen and exceptional events including consideration for vessel safety). All vessels utilized will be appropriate as defined by Transport Canada's Zone Date System. This will be included in the FEIS.	

Human Health and Risk Assessment										
89	KIA	n/a	Sabina commits to review table 6.4.4 (volume 8, ch 6) against figure 6.4-8 and to ensure all pathways identified in figure 6.4-8 are included in tables of the FEIS. Sabina shall also ensure that all inputs (including incinerator) are included in the risk assessment model as per figure 6.4-8.							
90	KIA	IR 3	Sabina commits to update the human health risk assessment and terrestrial and aquatic wildlife risk assessments with more realistic forage and consumption numbers.							
			Cumulative Effects Assessment							
91	KIA									
			Accidents and Malfunctions							
92	AANDC	AANDC 16	Sabina commits to include in the FEIS, plans or design contingencies where appropriate, that are in place to prevent and manage reasonably foreseeable worst case scenarios as they relate to accidents and malfunctions.							
93	AANDC	AANDC 16	abina commits to extending the accidents and malfunctions assessment into the closure nd post closure periods, within the FEIS.							

94	NRCan	n/a	Sabina commits to update and clarify to the extent possible, Project components and activities related to explosives manufacture and storage within the FEIS.	
95	NRCan	n/a	Sabina commits to provide an updated Explosives Management Plan within the FEIS and to ensure that the plan accurately describes explosives manufacturing and storage and which clarifies whether Sabina anticipates storing explosives components at the marine laydown area.	
96	NRCan	n/a	Sabina commits to carrying forward updated project components and activities associated with explosives manufacturing and storage in its assessment of accidents and malfunctions (including the marine laydown area if applicable) within the FEIS.	
97	GN	GN-26	Sabina commits to provide information specific to mitigation measures for polar bears for consideration in the shipping carrier's marine spill response plan. This will be included in the FEIS.	

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Commitment #	Volume	EIS Reference	IR REF	CR REF	TC REF	Commitment
1	2	Project Description & Alternatives	~	~	AANDC-1	Sabina commits to updating the alternatives assessment to include a more explicit analysis of alternatives and evaluation criteria in the FEIS.
2	2	Project Description & Alternatives	AANDC-8	~	~	Sabina commits to clarify the elevation and location of underground access, and any potential risk of flooding shall be addressed in the FEIS.
3	2	Project Description & Alternatives	AANDC-10	~	~	Sabina commits to providing details of dust suppressants and dust suppression methods for underground and aboveground facilities in the FEIS.
4	2	Project Description & Alternatives	AANDC-11	~	~	For the FEIS, Sabina commits to providing details on any potential design changes resulting from additional years of available earthquake data.
5	2	Project Description & Alternatives	AANDC-12	~	~	For the FEIS, Sabina commits to providing details on schedules and volumes of materials and updated information resulting from the optimization of facility and infrastructure configuration.
6	2	Project Description & Alternatives	~	~	AANDC-15	Sabina commits to providing more details on the sewage effluent management strategy in the FEIS.
7	2	Project Description & Alternatives	~	~	AANDC-20	Sabina commits to providing additional information on the TIA freeboard and the potential for overtopping the tailings storage embankment during operations. This work, which will be done in accordance with the Canadian Dam Association Guidelines will be presented in the FEIS.
8	2	Project Description & Alternatives	AANDC-48	~	~	Sabina commits to providing a more detailed estimation of waste generation quantities and facilities design in the FEIS.
9	2	Project Description & Alternatives	AANDC-49	~	~	Sabina commits to providing a more detailed estimation of waste generation quantities and facilities design in the FEIS.
10	2	Project Description & Alternatives	AANDC-50	~	~	Sabina commits to providing a list of expected hazardous materials in the FEIS.
11	2	Project Description & Alternatives	~	AANDC-61	~	New information obtained through ongoing community consultations will be integrated for the final alternatives assessment presented in Sabina's FEIS.
12	2	Project Description & Alternatives	~	AANDC-61	~	Sabina commits to providing minutes from post-DEIS submission meetings and information from the final TK Workshop Report into the FEIS.
13	2	Project Description & Alternatives	EC-2	~	~	Sabina commits to providing incinerator vendor specifications in the FEIS.
14	2	Project Description & Alternatives	~	~	EC-15	Sabina commits to providing details on landfill design and seepage management in the FEIS.
15	2	Project Description & Alternatives	~	~	EC-17	Sabina commits to discussing the requirements for the management of landfarms and wastewater treatment in the FEIS.

Commitment #	Volume	EIS Reference	IR REF	CR REF	TC REF	Commitment
16	2	Project Description & Alternatives	~	EC-18	~	Sabina commits to revise the Volume 2 section titled "Design of Impoundment / Retention Structures for Seepage and Runoff Control" to further include design details for water management structures used for seepage and runoff control from the open pits.
17	2	Project Description & Alternatives	EC-19	~	?	As engineering design progresses and ongoing characterization information is available, the balance of suitable quarry material and required volumes will be assessed. Sabina commits to providing these estimates in the FEIS.
18	2	Project Description & Alternatives	?	~	EC-20	Sabina commits to providing details on stockpile design, foundation requirements and runoff management with the FEIS.
19	2	Project Description & Alternatives	EC-21	~	~	The method for assessing alternatives within the Project has included consideration of technical feasibility, cost implications, potential environmental impacts, and amenability to reclamation. Community acceptability or preference and socio-economic effects were not provided. Sabina commits to including additional information on these aspects in the FEIS alternatives assessment.
20	2	Project Description & Alternatives	?	7	EC-22	Sabina commits to providing clarification on the transition of the TIA from operations to closure in the FEIS.
21	2	Project Description & Alternatives	~	~	EC-23	Sabina commits to providing the rationale and design criteria for the TIA including ice entrainment. This information will be provided in the FEIS.
22	2	Project Description & Alternatives	EC-26	~	~	Sabina commits to investigate and provide adequate details on potential seepage rates from the TIA. Further Sabina will provide design information on any required seepage collection system in the FEIS.
23	2	Project Description & Alternatives	~	~	EC-34	In the FEIS, Sabina commits to including anticipated locations and volumes for the: TIA, WMF, treated sewage, collection ponds, on-land discharges, and any other potential discharges. Plans will be made to minimize the number of discharge locations on site.
24	2	Project Description & Alternatives	GN-12	~	~	Sabina commits to removing reference to a hard-surface airstrip in the FEIS.
25	2	Project Description & Alternatives	~	GN-20	7	For the FEIS, Sabina commits to detailing whether bulk fuel storage will include overwintering of fuel vessels in sea ice.
26	2	Project Description & Alternatives	~	~	KIA-CR-7	Sabina commits to optimizing the location and design of the TIA based on an alternatives assessment founded on environmental, technical, and economic reasons. In addition Sabina commits to providing a detailed summary of the overburden and permafrost conditions for the TIA foundation with sufficient detail to justify and support the design. This information will be provided in the FEIS.
27	2	Project Description & Alternatives	KIA-62	~	~	As engineering design progresses and ongoing characterization information is available, the balance of suitable quarry material and required volumes will be assessed. Sabina commits to providing this updated information in the FEIS.
28	2	Project Description & Alternatives	KIA-63	~	~	Winter road design, construction, and operation will be informed by extensive expertise from other winter roads in the area, specifically the Tibbitt-Contwoyto Winter Road. Sabina commits to provide details in the FEIS.
29	2	Project Description & Alternatives	~	KIA-77	~	Sabina commits to assessing options for subaqueous storage of PAG/ML waste rock for the FS. Results will be captured in the FEIS.

Commitment #	Volume	EIS Reference	IR REF	CR REF	TC REF	Commitment
30	2	Project Description & Alternatives	?	KIA-92	~	Sabina commits to including design criteria for all water management facilities in the FEIS.
31	2	Project Description & Alternatives	KIA-103	~	~	Sabina commits to update Volume 2, Table 6.4-3 (Proposed Bulk Fuel Storage Pooling Water Discharge Criteria) to provide the correct value for lead discharge (0.2 mg/L).
32	2	Project Description & Alternatives	KIA-106	~	~	Sabina commits to update Volume 2, Table 6.6-7 (Proposed Landfarm Pooling Water Quality Discharge Criteria) and Table 6.7-6 (Proposed Landfarm Pooling Water Quality Discharge Criteria) to reflect the incorrectly transcribed values for lead and ethylbenzene. This will be addressed in the FEIS.
33	2	Project Description & Alternatives	NRCan-3	~	~	In the FEIS, Sabina commits to revising the statement found in Volume 2, Section 7 to read as follows: "Overburden includes a number of glacial deposits consisting predominantly of till. Occasional esker deposits of sand and gravel form long ridges of stratified sand and gravel that can reach hundreds of kilometres in length."
34	2	Project Description & Alternatives	~	TC-10	~	Sabina commits to amend the text in Volume 2, Section 6.3.3.2 "Shipping" to include the Transportation of Dangerous Goods Act, 1992.
35	3	Public Consultation, Government Engagement & TK	~	~	AANDC-14	Sabina commits to including the findings of the TK workshop report in the FEIS, including any information available on drinking water sources. Sabina also commits to including this additional information in our assessment for the project.
36	3	Public Consultation, Government Engagement & TK	~	AANDC-25	~	For the FEIS, Sabina commits to provide updated information on drinking water sources in the Project area derived from the 2014 TK report prepared by the KIA.
37	3	Public Consultation, Government Engagement & TK	~	~	AANDC-28	Sabina commits to providing access to all primary documents used during public consultation in the FEIS.
38	3	Public Consultation, Government Engagement & TK	~	~	AANDC-30	The results of the TK workshop report will also be integrated into Sabina's FEIS submission.
39	3	Public Consultation, Government Engagement & TK	~	AANDC-62	~	Sabina commits to providing minutes from post-DEIS submission meetings and information from a final TK workshop report into the FEIS.
40	3	Public Consultation, Government Engagement & TK	~	~	KIA-CR-13	Sabina commits to revising the TK section of Volume 6, Chapter 4 in the FEIS to more accurately reflect the application of TK.
41	3	Public Consultation, Government Engagement & TK	~	KIA-110	~	On the topic of traditional drinking water sources, Sabina commits that the statement about direct incorporation of TK into the existing environment and baseline information (Volume 6, Chapter 4, Sect. 4.2.4) will be removed from the FEIS unless direct information becomes available from the KIA's Phase 2 TK Report.

Commitment #	Volume	EIS Reference	IR REF	CR REF	TC REF	Commitment
42	3	Public Consultation, Government Engagement & TK	~	KIA-139	~	In the FEIS, Sabina commits to providing an additional report on the site specific aspects of the Naonaiyaotit Traditional Knowledge Project database in Volume 3, App V3-3A.
43	3	Public Consultation, Government Engagement & TK	YKDFN- 4-4	~	~	Sabina commits to integrate the findings of the document 'Existing and Publically Available Traditional Knowledge from Selected Aboriginal Groups in the Northwest Territories' into the FEIS (Appendix V3-3B).
44	4	Atmospheric Environment	~	EC-3	~	Sabina commits to completing an assessment of MLA air emissions that includes emissions from on land sources and ship emissions during "hoteling" and during transport. This will be provided in the FEIS.
45	4	Atmospheric Environment	EC-5	~	~	For the FEIS, Sabina commits to adding a footnote (Table 2.5-3 in Volume 4) that includes descriptions from the modelling report for: night-time noise level for assessing wildlife habitat loss, threshold 45 dBA; and sound exposure level for assessing wildlife sensitivity to helicopter noise (ringed seal and marine birds), threshold 70 dBA; sound exposure level for assessing wildlife sensitivity to helicopter noise (all other wildlife), threshold 80 dBA; peak sound pressure level for assessing wildlife sensitivity to impulsive blasting noise (disturbed habitat), threshold 108 dB; peak sound pressure level for assessing wildlife sensitivity to impulsive blasting noise (functional habitat loss), threshold 120 dB.
46	4	Atmospheric Environment	~	~	EC-13	Sabina will commit, as part of the water licensing process, to providing vendor specifications stating that the incinerator is designed to incinerate sewage sludge.
47	4	Atmospheric Environment	~	~	EC-13	Stack testing for all incinerators will be completed as part of the commissioning process to ensure achievement of the Canada-wide Standards for emissions.
48	4	Atmospheric Environment	GN-18	~	?	At this time the Goose Property Airstrip will not be designed to accommodate aircrafts as large as a Boeing 767. If larger aircraft are selected as a viable option, Sabina commits to updating the air quality and noise models and conduct an effects assessment to address the potential effects of this larger class of aircraft. This would be included in the FEIS.
49	4	Atmospheric Environment	~	~	GN-35	Dustfall sampling locations will be chosen to ensure that all large sources of emissions are monitored. Sabina will consult with the GN on the number and location of sampling sites prior to finalizing the Air Quality Monitoring Plan for the FEIS.
50	4	Atmospheric Environment	~	KIA-49	~	Sabina commits to monitoring of various particulate fractions (TSP, PM10 and PM2.5) at multiple locations onsite during the construction and operation phases of the Project. Sabina commits to working with the appropriate regulators to finalize monitoring plans prior to submission of the FEIS.
51	4	Atmospheric Environment	~	KIA-54	~	For the FEIS, Sabina commits to further investigating mitigation measures required to reduce dust emissions and the likelihood of any potential health effect.
52	4	Atmospheric Environment	KIA-56	~	~	Sabina commits to comply with Environment Canada Sulphur in Diesel Fuel Regulations (updated in 2012).
53	4	Atmospheric Environment	~	KIA-60	~	Sabina commits to providing a design memorandum in the FEIS indicating how climate change considerations have been integrated into design and incorporate the most current and relevant peer-reviewed climate data.
54	4	Atmospheric Environment	KIA-72	~	~	Sabina commits to include community acceptability and socio-economic effects in the full alternatives assessment for the FEIS. Community acceptability or preference and socio-economic effects were not been formally considered as there was very little concern expressed during our consultation efforts.
55	4	Atmospheric Environment	~	KIA-122	~	Sabina commits to establishing annual targets and BMPs for GHG emissions and potential reductions throughout operations. This will be stated in the FEIS.
56	4	Atmospheric Environment	~	~	NRCAN-2	Sabina commits to substantiating the TIA closure design criteria and completing a thermal analysis, inclusive of climate change considerations, to demonstrate the viability of the plan. This information will be presented in the FEIS.

Commitment #	Volume	EIS Reference	IR REF	CR REF	TC REF	Commitment
57	4	Atmospheric Environment	~	~	NRCAN-3	Sabina commits to providing justification for selection of the design freezing point in the thermal analysis for the TIA. This information will be presented in the FEIS.
58	4	Atmospheric Environment	~	~	NRCAN-4	Sabina commits to completing and presenting all appropriate geotechnical analysis of the TIA structure including its foundation in the FEIS.
59	4	Atmospheric Environment	~	~	NRCAN-33	Sabina commits to further substantiating the waste rock and TIA closure design criteria and completing a thermal analysis, inclusive of climate change considerations, to demonstrate the viability of the plan. This information will be presented in the FEIS.
60	4	Atmospheric Environment	~	~	NRCAN-34	Sabina commits to further substantiating the waste rock and TIA closure design criteria and completing a thermal analysis, inclusive of climate change considerations, to demonstrate the viability of the plan. This information will be presented in the FEIS.
61	4	Atmospheric Environment	~	~	NRCAN-35	Sabina commits to further substantiating the waste rock and TIA closure design criteria and completing a thermal analysis, inclusive of climate change considerations, to demonstrate the viability of the plan. This information will be presented in the FEIS.
62	5	Terrestrial Environment	~	~	AANDC-2	Sabina commits to incorporating all up to date information relating to geomechanical and topographical field and laboratory data in an updated assessment of mine stability and provide further detail on the underground mining method, layout, and design in the FEIS.
63	5	Terrestrial Environment	~	~	AANDC-3	Sabina commits to providing an updated presentation, analysis, and interpretation of geological faults and structures in the FEIS.
64	5	Terrestrial Environment	~	~	AANDC-4	Sabina commits to providing an updated analysis of permafrost distribution at depth through thermal modelling, updated data analysis, and any other means required to depict any groundwater connections with the mine openings. This analysis will provide an updated account of the potential formation/decline of taliks, including any potential through-taliks. Requested information will be presented in the FEIS.
65	5	Terrestrial Environment	~	~	AANDC-5-1	Sabina commits to providing additional details related to how the hydrogeological system and permafrost thermodynamics may be affected by the proposed open-pit and underground mining operations. Requested information will be presented in the FEIS.
66	5	Terrestrial Environment	~	~	AANDC-5-2	Sabina commits to providing a detailed summary in the FEIS of overburden and permafrost conditions for the property with sufficient detail to demonstrate how planned surface infrastructure will interact with this system.
67	5	Terrestrial Environment	~	~	AANDC-6	Sabina commits to further substantiating the waste rock and TIA closure design criteria and completing a thermal analysis, inclusive of climate change. This information will be presented in the FEIS.
68	5	Terrestrial Environment	~	~	AANDC-17	Sabina commits to further work to understand the variability in ARD and arsenic levels, and will present this information in the FEIS.
69	5	Terrestrial Environment	~	~	AANDC-18	Sabina commits to providing additional clarity in the FEIS on the mitigation and monitoring that will be required to address the predicted concentrations of arsenic, copper, and cyanide concentrations exceeding MMER discharge limits.
70	5	Terrestrial Environment	~	~	AANDC-19	Sabina commits to including additional details on the TIA constructability and assessing the associated risks. This information will be presented in the FEIS.
71	5	Terrestrial Environment	AANDC-20	~	~	Sabina commits to thermal modelling as part of the FS to validate the practicability, constructability and prevention of adverse environmental impacts of the proposed TIA closure measure of a 2m non-PAG rock cap.
72	5	Terrestrial Environment	AANDC-21	~	~	Sabina commits to providing thermal modelling to support the adequacy of waste rock cover depth to protect permafrost in the FS.
73	5	Terrestrial Environment	~	AANDC-23	~	Sabina commits that thermal modelling to support the design criteria will be conducted as part of the FS and the predictions provided in the FEIS. The assumptions used for thermal modelling will be informed by observations obtained from similar northern mining operations.
74	5	Terrestrial Environment	~	AANDC-31	~	Sabina commits to providing dyke designs and seepage calculations into the pits. This will be presented in the FEIS water balance.

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75	5	Terrestrial Environment	~	AANDC-39	~	Sabina commits that geothermal modelling calibrated to temperature measurements and incorporating project components, will be conducted in the FS and provided in the FEIS.
76	5	Terrestrial Environment	~	AANDC-40	~	Sabina commits that geothermal analyses incorporating a more detailed evaluation of the influence of climate change on permafrost degradation will be provided in the FEIS.
77	5	Terrestrial Environment	~	AANDC-47	~	Sabina commits to providing the required background information pertaining to the design and effectiveness of landfills and otherwise managing waste in relation to the context of the project into the FEIS and final NWB water licencing process.
78	5	Terrestrial Environment	AANDC-57	~	~	As part of the FEIS, Sabina commits to providing additional information regarding closure and reclamation resulting from the mine design being optimized in the FS.
79	5	Terrestrial Environment	AANDC-58	~	~	Sabina commits to providing more information on the potential interactions between sub-permafrost groundwater and closure scenarios for the Umwelt underground within the FEIS.
80	5	Terrestrial Environment	~	~	EC-9	Sabina commits to using habitat data to predict the likelihood of birds nesting in various habitats. This information will appear in the FEIS.
81	5	Terrestrial Environment	~	~	EC-9	Sabina commits to using methods that are as non-intrusive as possible for pre-clearing surveys. This information will appear in the FEIS.
82	5	Terrestrial Environment	~	~	EC-9	Sabina commits to updating Table 6.2-1 (Wildlife Sensitive Periods Applicable to the Project) to include Mid-May to Mid-August from June 1 to July 31. This information will appear in the FEIS.
83	5	Terrestrial Environment	~	EC-22	~	Sabina commits that the results of feasibility study analyses for potential seepage from the TIA will be provided in the FEIS.
84	5	Terrestrial Environment	EC-24	~	~	Confirmation of the thickness of cover material based on thermal modelling and the confirmation of grain size will be studied in more detail as part of the FS and presented in the FEIS.
85	5	Terrestrial Environment	~	~	EC-26	Sabina commits to conducting additional site characterization of the TIA foundation to support detailed design after receipt of the water licence.
86	5	Terrestrial Environment	~	EC-27	~	For the FEIS, Sabina commits that assessment of the applicable screening criteria for both waste rock and tailings will be revisited as part of ongoing geochemical characterization work. During the FS, kinetic test results will be reinterpreted to determine a site specific NP:AP ratio for both tailings and waste rock.
87	5	Terrestrial Environment	EC-29	~	~	For the FEIS, Sabina commits to revising Figures 3.2-4, 3.2-5, 3.2-6 (Appendix V11-4A). The legend should be revised so the dark dot is labelled "sampled" (not "deposit").
88	5	Terrestrial Environment	EC-31	~	~	Sabina commits to incorporating updated results from the ongoing kinetic tests into the FEIS.
89	5	Terrestrial Environment	~	~	EC-41	For the FEIS, Sabina commits to correcting the reference to Price 2009, which is a MEND guideline, not (as stated previously) a federal guideline.
90	5	Terrestrial Environment	~	~	EC-42	Sabina commits to a further review of correlations between solid phase concentrations and leachate concentrations for parameters of interest, and will further assess whether appropriate samples were used. Data interpretation will include a review of all of the potential factors controlling trace element release.
91	5	Terrestrial Environment	~	~	EC-43	For the FEIS, Sabina commits to providing further information on the mine plan to clarify the length of time that ore and low grade ore will be stockpiled prior to processing. Additionally, further interpretation of the kinetic test data will be completed to assess the potential lag times to the onset of ARD in these material and in waste rock.
92	5	Terrestrial Environment	~	~	EC-44	Sabina commits to further substantiating the waste rock and TIA closure design criteria and completing a thermal analysis, inclusive of climate change considerations to demonstrate the viability of the plan. This information will be presented in the FEIS.
93	5	Terrestrial Environment	~	~	EC-45	For the FEIS, Sabina commits to reassessing the proposed frequency of monitoring summarized in Table 7-1 (Summary of ML/ARD Monitoring Program), and will determine the frequency as a number of samples per volume of rock as suggested by EC.

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94	5	Terrestrial Environment	GN-14	~	?	Sabina commits to updating Table 5.6-2 (Cumulative Habitat Loss in the Bathurst Caribou CEA Boundary) in the FEIS. For closed or past developments it was assumed that dust no longer contributes as habitat alteration and wildlife are anticipated to reinhabit these areas, thus blank cells should read NA.
95	5	Terrestrial Environment	~	GN-15	~	For the FEIS, Sabina commits that updates will be provided to include the most recent 2012 data in Volume 5, Table 5.1-2 (Bathurst Caribou Herd Population Numbers and Breeding Females from 1986 to 2009).
96	5	Terrestrial Environment	GN-19	~	~	Sabina commits to include the Nunavut Wildlife Act in the List of Permits, Licenses, and Authorizations Required for the Project in the FEIS.
97	5	Terrestrial Environment	~	~	GN-20	Sabina commits to including text in the FEIS referencing Project-related effects in the context of Nunavut wildlife management units.
98	5	Terrestrial Environment	~	~	GN-24	Sabina will include more detail on the definition of "population and subpopulation health" and "acceptable risk thresholds" in definition of Significance Ratings in the FEIS.
99	5	Terrestrial Environment	~	~	GN-25	Sabina will provide publically available information in the FEIS detailing areas frequented by polar bears along the shipping route.
100	5	Terrestrial Environment	~	~	GN-26	Sabina commits to working within the existing regulatory framework defined by Transport Canada. An approved SOPEP will be in place by the shipping provider prior to the commencement of any shipment.
101	5	Terrestrial Environment	~	~	GN-26	Sabina will provide publically available information in the FEIS detailing areas frequented by polar bears along the shipping route.
102	5	Terrestrial Environment	~	~	GN-31	A discussion surrounding wolf and wolverine predation of ungulates will be added to the ungulate sections of the FEIS.
103	5	Terrestrial Environment	~	~	GN-32	Additional detail can be added to the raptor chapter of the FEIS (Volume 5, Chapter 10) to provide citations to support these mitigation activities.
104	5	Terrestrial Environment	~	~	GN-36	Sabina acknowledges the requirements of the Scientists Act and commits to ensuring that legislated reporting requirement under the Scientists Act are reflected in the FEIS.
105	5	Terrestrial Environment	~	~	GN-37	Sabina commits to update the table on Permits and Approvals for Mine Development in the FEIS to include all relevant authorizations required for the life of the Project.
106	5	Terrestrial Environment	~	~	GNWT-1	In the FEIS, Sabina commits to updating Sections 5.1.1 and 5.1.2.3 of the caribou assessment (Volume 5, Chapter 5), using information from 2014 discussing status of the Bathurst herd.
107	5	Terrestrial Environment	~	۲	GNWT-1	Sabina commits to further clarifying how the determination of significance might change in the context of recovery. This will include a clarification on "the predicted effects on post-calving and summer areas." This information will appear in the FEIS.
108	5	Terrestrial Environment	~	~	GNWT-1	In the FEIS, Sabina commits to discussing Significance Ratings for Residual Effects on caribou (Table 5.5-3, Volume 5, Chapter 5) in the context of time horizons that are relevant to communities that depend on caribou.
109	5	Terrestrial Environment	~	~	GNWT-1	In the FEIS, Sabina commits to incorporating a discussion of how predicted impacts would be expected to change depending upon whether the herd is at a high or low population level and/or in an increasing or decreasing phase.
110	5	Terrestrial Environment	~	~	GNWT-3	For the FEIS, references to the caribou cumulative effects assessment (Section 5.6.2.2) will be added to the effects assessment section.
111	5	Terrestrial Environment	~	~	GNWT-4	Sabina commits to review the location of the NICO and Nechalacho Projects and include them in the cumulative effects analysis of the FEIS should they fall within the defined 95% kernel home range of the herd.
112	5	Terrestrial Environment	~	GNWT-5	~	Sabina commits to providing more information in the FEIS on caribou monitoring programs. This will include details on Sabina participation in a collaborative regional (i.e., herd level) research and monitoring program for caribou, where involvement is capped at an agreed financial value; and a local-scale monitoring program to document caribou activity in areas surrounding the mine.
113	5	Terrestrial Environment	~	~	GNWT-5	Sabina commits to including additional information and analysis on annual variation in herd movement and historic calving ranges in the FEIS.

Commitment #	Volume	EIS Reference	IR REF	CR REF	TC REF	Commitment
114	5	Terrestrial Environment	GNWT-7	~	~	Sabina readily commits to participating in GNWT led meetings that formally include the GN and relevant aboriginal groups when the content of these meetings include issues that are related to potential project interactions. Sabina is also willing to discuss options related to grizzly bear and wolverine monitoring initiatives as they relate directly to monitoring requirements for the Back River Project and where they tie in to a formalized agreement with the GN and relevant aboriginal groups for the management of these animals.
115	5	Terrestrial Environment	~	~	GNWT-7	The FEIS will be updated with reported harvest data provided by Malik (2012), that suggests a total removal of a maximum of 15 bears per year should be sustainable for the region.
116	5	Terrestrial Environment	~	~	GNWT-7	Additional text will be added to the FEIS to discuss potential Project and cumulative effects on bears within the context of regional harvest opportunities.
117	5	Terrestrial Environment	GNWT-8	~	~	Sabina commits to compling with the Shipping Zone Date System which defines when certain vessel classes can enter certain waters to ensure safe operation in Arctic waters.
118	5	Terrestrial Environment	GNWT-9	~	~	If the TCWR connector becomes a feasible option for the Project, Sabina commits to explore timing and methodologies available for conducting fall/winter pre-clearing surveys to be conducted prior to yearly construction of the road.
119	5	Terrestrial Environment	GNWT-10	~	~	If the combined decrease to grizzly bear or wolverine reproductive productivity was anticipated to be greater than natural variability in reproductive productivity in the population alone, then the magnitude was increased from 'negligible' or 'low' to 'moderate'. Sabina commits to provide this text in the FEIS.
120	5	Terrestrial Environment	~	~	KIA-CR-1	Sabina commits to adding a totals column to Table 5.6-4 in the FEIS that sums direct habitat loss in the mine footprint and indirect habitat loss in a zone of influence surrounding the mine footprint.
121	5	Terrestrial Environment	KIA-4	~	~	Sabina commits to providing the data from the 2013 Wildlife Baseline Report into the FEIS.
122	5	Terrestrial Environment	~	~	KIA-IR-5	Sabina commits to including a brief discussion on why the dietary modelling found that mercury will not threaten the health of grizzly bears in the FEIS.
123	5	Terrestrial Environment	~	~	KIA-CR-8	Sabina commits to completing and presenting all appropriate geotechnical and hydrotechnical analysis of the TIA structure, including its foundation in the FEIS.
124	5	Terrestrial Environment	~	~	KIA-IR-8	Sabina will continue to optimize the extraction of the resources located at the George Property including accounting for engineering costs and environmental liability. Additional information on this topic will be presented in the publically available Feasibility Study Report.
125	5	Terrestrial Environment	KIA-8	~	~	In consultation (as appropriate) with the GN and KIA, Sabina commits to formalizing the details of the Wildlife Effects Monitoring Program prior to construction of the Project.
126	5	Terrestrial Environment	~	~	KIA-CR-9	Sabina commits to further substantiating the waste rock closure design criteria and completing a thermal analysis, inclusive of climate change considerations to demonstrate the viability of the plan. This information will be presented in the FEIS.
127	5	Terrestrial Environment	~	~	KIA-IR-9	In the FEIS, Sabina commits to providing a detailed summary of overburden and permafrost conditions with sufficient detail to demonstrate how planned surface infrastructure such as the WRSA's will interact with this system.
128	5	Terrestrial Environment	~	~	KIA-CR-10	Results and interpretation of additional sampling and testing work for potentially acid generating samples will be included in the FEIS.
129	5	Terrestrial Environment	~	~	KIA-IR-10	Sabina commits to further substantiating the waste rock closure design criteria and completing a thermal analysis, inclusive of climate change considerations to demonstrate the viability of the plan. This information will be presented in the FEIS. Sabina does not believe a contingency plan is warranted at this stage.
130	5	Terrestrial Environment	~	~	KIA-IR-11	Sabina commits to optimizing the location and design of the TIA based on an alternatives assessment founded on environmental, technical, and economic reasons. In addition Sabina commits to providing a detailed summary of the overburden and permafrost conditions for the TIA foundation with sufficient detail to justify and support the design. This information will be provided in the FEIS.

Commitment #	Volume	EIS Reference	IR REF	CR REF	TC REF	Commitment
131	5	Terrestrial Environment	~	~	KIA-CR-12	In the FEIS, Sabina commits to identifying and quantifying geochemically suitable material that will be available for construction. Details for specific locations, extraction and sorting methods will be provided as part of water licensing process.
132	5	Terrestrial Environment	~	~	KIA-IR-12	Sabina commits to further substantiating the waste rock closure design criteria and completing a thermal analysis, inclusive of climate change considerations to demonstrate the viability of the plan. This information will be presented in the FEIS.
133	5	Terrestrial Environment	~	~	KIA-IR-13	For the FEIS, Sabina commits to providing a detailed summary of overburden and permafrost conditions for the property with sufficient detail to demonstrate how planned surface infrastructure such as the fuel storage areas will interact with this system.
134	5	Terrestrial Environment	~	~	KIA-CR-14	Sabina commits to further substantiating the waste rock and TIA closure design criteria and completing a thermal analysis, inclusive of climate change considerations to demonstrate the viability of the plan. This information will be presented in the FEIS.
135	5	Terrestrial Environment	~	~	KIA-IR-14	Sabina commits to providing additional discussion of the carbonate mineralogy in the FEIS.
136	5	Terrestrial Environment	~	~	KIA-IR-15	For the FEIS, Sabina commits to describing all of the assumptions made in the scaling calculations and the level of uncertainty and conservatism that is built into those calculations.
137	5	Terrestrial Environment	~	~	KIA-IR-16	Sabina commits to providing the appropriate justification for design criteria adopted for any water management structures at Lytle and Occurrence Lakes in the FEIS.
138	5	Terrestrial Environment	KIA-18	~	~	For the FEIS, Sabina commits to reviewing Vol. 5, Section 5.6.3 and editing text where appropriate. This includes replacing the word 'grizzly bear' with 'caribou'.
139	5	Terrestrial Environment	~	KIA-28	~	In the FEIS, Sabina commits to avoid, where possible, the usage of contrasting colours so shading can be visually discerned.
140	5	Terrestrial Environment	KIA-30	~	~	Sabina commits to delineating lake locations with high caribou abundance into Volume 5, Figures 5.1-2, 5.1-3, 5.1-5 and 5.1-6.
141	5	Terrestrial Environment	~	KIA-32	~	In the FEIS, Sabina commits to correcting the typo on page 5-17 (Vol. 5, Section 5.1.2.3): "Boulanger et al. (2011) proposed that the population has likely declined due to decreasing calf survival, and concomitant reductions in female fecundity, and hunting."
142	5	Terrestrial Environment	~	KIA-59	~	Sabina commits to collecting any additional geotechnical information characterizing shallow permafrost conditions, as required, for the FEIS.
143	5	Terrestrial Environment	~	KIA-70	~	Sabina commits to reviewing and advancing the design of the TIA during the FS. Updated information on the TIA design will be included in the FEIS.
144	5	Terrestrial Environment	KIA-73	~	~	Designs for tailings and waste rock disposal are being re-assessed in their entirety during the FS. Impacts on and from permafrost will be given due consideration through thermal modeling, baseline and predictive inputs. Sabina commits to providing this additional information in the FEIS.
145	5	Terrestrial Environment	~	KIA-74	~	Sabina commits to reviewing and advancing the design of the TIA during the FS. Updated information on the TIA design will be included in the FEIS.
146	5	Terrestrial Environment	~	KIA-75	~	Sabina commits to providing details on shallow geotechnical conditions at the various fuel storage facilities for the FEIS and again for the water licence application process.
147	5	Terrestrial Environment	KIA-76	~	7	Geotechnical assessments were conducted as part of the PFS but the results of these assessments were not available at the time of preparation of the DEIS. Sabina commits to providing these data, their interpretation, and implications in the FEIS.
148	5	Terrestrial Environment	~	KIA-78	~	Sabina commits to using available kinetic data to develop site specific criteria as well as assessing the screening criteria used at other similar operations in Nunavut to help characterize our definition of PAG material. This will be presented within the FEIS.

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149	5	Terrestrial Environment	KIA-79	~	~	Sabina commits that further interpretation of the forms and reactivity of NP will be made as part of detailed interpretation of the humidity cell test results. This will be completed as part of the FEIS. Consideration will be given to different lithologies and/or zones within the deposit area that may have different proportions of unreactive NP.
150	5	Terrestrial Environment	KIA-85	٧	~	For Volume 11 (App1A to App4A), Sabina commits to rectify the classification of Barrel 6 as the material in the barrel has a sulphide net potential ratio of 2.95 and is therefore classified as uPAG, this will be rectified in the FEIS.
151	5	Terrestrial Environment	~	KIA-89	~	As part of the FEIS, Sabina commits to detailing thermal analyses to determine the extent and timing of open taliks developing for all of the open and underground pits. The existing groundwater understanding will subsequently be expanded to include these new open taliks.
152	5	Terrestrial Environment	KIA-100	~	~	Sabina is committed to using only geochemically suitable material for construction and closure and will continue characterization studies to further assess the ML/ARD potential and to develop an appropriate strategy in the FEIS for identifying and classifying this material at the time of the works to ensure appropriate use for construction.
153	5	Terrestrial Environment	KIA-116	?	?	Sabina commits that WRSA and TIA design criteria will be assessed during the FS as thermal modelling analyses are conducted and the designs optimized. Updates will be provided in the FEIS.
154	5	Terrestrial Environment	NRCan-1	~	?	Prescreening of material will be completed prior to its removal and if substantial metal leaching and acid rock drainage potential is identified, the material will be managed accordingly. Sabina commits to reporting further details on these mitigation plans in the FEIS following development in the FS.
155	5	Terrestrial Environment	~	~	NRCAN-1	Sabina commits prior to commencement of works, but not necessarily prior to FEIS submission, to assess the geomechnical properties of the borrow material, its geochemistry and ARD/ML potential, the available volume of material, proximity to infrastructure, and to consider avoidance of environmentally sensitive (e.g. fish and fish habitat) and culturally sensitive (e.g. archaeological) areas.
156	5	Terrestrial Environment	NRCan-3	~	~	Sabina commits to updating the terrain maps for Figure 4.2-1 (Appendix V5-3A) to illustrate the predominant direction of esker makers being northward.
157	5	Terrestrial Environment	NRCan-3	~	~	Sabina commits to updating the legend for terrain maps in (Appendix V5-3B) the FEIS to indicate which map sources were used.
158	5	Terrestrial Environment	~	~	NRCAN-5	Sabina commits to substantiating the TIA closure design criteria and completing a thermal analysis, inclusive of climate change considerations, to demonstrate the viability of the plan. This information will be presented in the FEIS.
159	5	Terrestrial Environment	~	١	NRCAN-7	Sabina commits to conducting additional site characterization of foundation materials for proposed alignments of dykes and embankments for water retention structures associated with the TIA and dewatering of lakes to support detailed design after receipt of the water licence. This information will appear in the FEIS.
160	5	Terrestrial Environment	~	~	NRCAN-8	For the FEIS, Sabina commits to completing and presenting all appropriate geotechnical analysis of the TIA structure, including its foundation.
161	5	Terrestrial Environment	NRCan-9	?	?	Sabina commits to providing further information on closure of the underground workings in the FEIS.
162	5	Terrestrial Environment	~	?	NRCAN-9	Sabina commits to considering the potential for through-taliks beneath flooded open pits in assessing the long-term effects on water quality and quantity. Information will be presented in the FEIS.
163	5	Terrestrial Environment	~	~	NRCAN-10	Sabina commits to providing an updated analysis of permafrost distribution at depth through thermal modelling, updated data analysis, and any other means required to depict any groundwater connections with the mine openings. This analysis will provide an updated account of the potential formation/decline of taliks, including any potential through-taliks. Requested information will be presented in the FEIS.
164	5	Terrestrial Environment	NRCan-13	~	2	Sabina commits to undertake thermal modelling of both WRSA's and the TIA to validate cover design criteria. This will be provided in the FEIS.
165	5	Terrestrial Environment	~	~	NRCAN-13	Sabina commits to providing the appropriate design criteria and justification for any mitigation measures adopted for the project. This information will be presented in the FEIS.

Commitment #	Volume	EIS Reference	IR REF	CR REF	TC REF	Commitment
166	5	Terrestrial Environment	NRCan-14	~	~	Sabina commits to further geotechnical studies, basic design, stability analysis, and any thermal analyses that are required to advance the design of tailings managment for the purpose of water licencing. This work will be presented in the FEIS. Potential settlement from freeboard calculations will be further clarified in the FEIS.
167	5	Terrestrial Environment	~	~	NRCAN-14	Sabina commits to presenting the scope and details of the thermal modelling completed. Requested information will be presented in the FEIS.
168	5	Terrestrial Environment	NRCan-15	~	~	For the FEIS, Sabina commits to estimate seepage quality and quantity to further advance the water management plans.
169	5	Terrestrial Environment	~	~	NRCAN-15	Sabina commits to clarifying the extent of the Llama Lake talik to be used for assessment of project effects. This will be presented in the FEIS.
170	5	Terrestrial Environment	NRCan-16	~	~	For the FEIS, Sabina commits to provide more specific climate change predictions. These may be calculated from thermal models to help refine the final engineering design.
171	5	Terrestrial Environment	~	~	NRCAN-16	Sabina commits to substantiating the closure design criteria for the open pits and completing a thermal and/or hydrogeological analysis, inclusive of climate change considerations, to demonstrate the viability of the plan. This information will be presented in the FEIS.
172	5	Terrestrial Environment	NRCan-17	~	~	Sabina commits that additional analysis on the long-term effectiveness of permafrost encapsulation will be completed as part of the FS, and will be reported in the FEIS. The analysis will consider the sensitivity to climate change and the rate of freezing for the WRSA and TIA.
173	5	Terrestrial Environment	NRCan-19	~	~	Sabina commits to continue geochemical characterization of pit wall materials, including a kinetic testing program. Water quality predictions for the pit lakes will be developed based on this characterization work and will be provided in the FEIS. A conceptual plan for treatment of the water from the filled pits will be developed once water quality predictions are available.
174	5	Terrestrial Environment	NRCan-22	~	?	Sabina commits to providing additional geochemical characterization work, including results from the ongoing kinetic testing program. The updated water quality predictions will be provided in the FEIS.
175	5	Terrestrial Environment	~	~	NRCAN-30	Sabina commits to further substantiating the TIA closure design criteria and completing a thermal analysis, inclusive of climate change considerations, to demonstrate the viability of the plan. This information will be presented in the FEIS.
176	5	Terrestrial Environment	~	~	NRCAN-32	Sabina commits to further substantiating the waste rock and TIA closure design criteria and completing a thermal analysis, inclusive of climate change considerations, to demonstrate the viability of the plan. This information will be presented in the FEIS.
177	6	Freshwater Environment	~	~	AANDC-9	Sabina commits to including underground mine inflow in the site water and load balance model and account for the effect of the PAG backfill on the quality of that water and ultimately in the TIA. Further, Sabina will provide quality estimates of the underground mine water at closure, including the effect of the PAG backfill, if such mine water is expected to be released to the natural environment. Requested information will be presented in the FEIS.
178	6	Freshwater Environment	~	~	AANDC-10	Sabina commits to including a rationale for excluding the 2006 phosphorus data
179	6	Freshwater Environment	~	~	AANDC-10	Sabina commits to presenting phosphorus data from 1994 onwards in the FEIS.
180	6	Freshwater Environment	~	~	AANDC-10	Sabina commits to presenting tabulated pH data that distinguishes between field and laboratory data. Clarification of the specific methodologies used to measure pH in the baseline program will be included in the FEIS.
181	6	Freshwater Environment	~	~	AANDC-10	Sabina commits to including the requested information in the FEIS as described in the detailed response part of the technical response package (AANDC-10).
182	6	Freshwater Environment	AANDC-15	~	~	The water balance for the Project is under review and will be updated for the FEIS. Sabina commits to further describing the viability of "zero discharge" and the implications on TIA design.
183	6	Freshwater Environment	AANDC-29	~	~	For the FEIS, Sabina commits to providing an estimate of water volume change, water volume remaining, and water level for each lake and surface mine (by year) throughout the Project.

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184	6	Freshwater Environment	~	AANDC-30	~	Sabina commits to provide an operational plan and water balance to document how the minimum water levels within Goose and Propeller Lakes will be maintained. The FEIS will provide additional detail by incorporating the latest engineering inputs derived from the FS.
185	6	Freshwater Environment	AANDC-33	1	?	For the FEIS, Sabina commits to including Appendix A and Appendix B with the geotechnical and hydrogeological drilling program report written by SRK (Nov, 2012).
186	6	Freshwater Environment	AANDC-34	7	~	The appendices for the Knight Piesold report in Vol 5, App.2D will be included in the FEIS.
187	6	Freshwater Environment	~	7	DFO-3	Sabina commits to including additional details on the Umwelt Lake outflow in the FEIS.
188	6	Freshwater Environment	~	?	DFO-4	Sabina commits to providing additional rationale for selection of design criteria for sizing of culverts in the FEIS.
189	6	Freshwater Environment	~	7	DFO-5	Sabina commits to conducting a fish passage flow assessment as part of the culvert design process. This information will appear in the FEIS.
190	6	Freshwater Environment	~	7	DFO-15	Sabina commits to updating relevant references to current DFO policies and guidance documents found on the agency website. These updates will be completed within the FEIS.
191	6	Freshwater Environment	EC-14	7	~	For the FEIS, Sabina commits to providing details on the total volume of water requiring treatment at the George Property. These values will support the final sizing and design of the collection ponds.
192	6	Freshwater Environment	~	~	EC-19	Wherever reasonable Sabina prefers the use of passive culverts instead of active pumping. Sabina commits to properly installing culverts where they are necessary. This information will appear in the FEIS.
193	6	Freshwater Environment	~	EC-25	~	Sabina commits to satisfy all regulations, including MMER, and water quality targets will be progressed further during the water licencing process.
194	6	Freshwater Environment	~	~	EC-26	Sabina commits to providing a detailed site-wide water and load balance. This information will be presented in the FEIS.
195	6	Freshwater Environment	~	~	EC-30	Sabina commits to adding xylene in the FEIS as a measured parameter for these discharge criteria.
196	6	Freshwater Environment	~	1	EC-33	Sabina commits to addressing seepage capture and pump-back requirements for dyke structures at the George site. Requested information will be presented in the FEIS.
197	6	Freshwater Environment	GN-8	٧	?	The effects of evapotranspiration were discussed in the Volume 6, Chapter 1 (Sections 1.1.1.3, 1.1.3.2, and 1.1.3.4) but were not addressed in Volume 9, Chapter 2, "The Effects of the Environment on the Project". Sabina commits to providing this interaction in the FEIS risk matrix.
198	6	Freshwater Environment	GN-9	~	~	Sabina plans to develop Standard Operating Procedures that include the use of chlorination to ensure potability of water. Regular testwork of water quality will be conducted to ensure potable water meets Canadian drinking water standards. Sabina commits to meet all regulatory requirements around the management of potable water and additional details will be provided in the FEIS.
199	6	Freshwater Environment	~	~	KIA-CR-11	Sabina commits to providing additional justification for design criteria adopted for any water management structures. Furthermore, Sabina commits to completing and presenting all appropriate geotechnical and hydrotechnical analysis of water management structure in the FEIS.
200	6	Freshwater Environment	~	١	KIA-CR-16	Sabina commits to monitoring TIA water quality until the WQO's are met.
201	6	Freshwater Environment	~	~	KIA-CR-17	The updated water balance will be used to provide additional details on the Umwelt Lake and outflow system in the FEIS. If an updated effects assessment indicates residual effects, then mitigation measures such as offsetting will be considered in collaboration with DFO and the KIA.
202	6	Freshwater Environment	~	~	KIA-IR-17	Sabina commits to provide further rationale and methodology for criteria selection during the water licensing process. Further, Sabina commits to provide specific tundra discharge locations for treated sewage, along with supporting rationale, in the FEIS.

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203	6	Freshwater Environment	~	~	KIA-CR-18	Sabina commits to conducting a second year of baseline fish sampling in Giraffe Lake if this lake remains a potential receiving environment. Sabina will make this information available in the FEIS or prior to the final technical review.
204	6	Freshwater Environment	~	~	KIA-IR-19	Sabina commits to provide further rationale and methodology for criteria selection during the water licensing process. Further, Sabina commits to provide specific tundra discharge locations for treated sewage, along with supporting rationale, in the FEIS.
205	6	Freshwater Environment	~	~	KIA-IR-20	Sabina commits to provide further rationale and methodology for criteria selection during the water licensing process. Further, Sabina commits to provide specific tundra discharge locations for treated sewage, along with supporting rationale, in the FEIS.
206	6	Freshwater Environment	~	~	KIA-IR-21	Sabina commits to provide specific tundra discharge locations for treated sewage, along with supporting rationale, in the FEIS.
207	6	Freshwater Environment	~	~	KIA-IR-22	Sabina commits to provide further rationale and methodology for criteria selection during the water licensing process. This information will appear in the FEIS.
208	6	Freshwater Environment	~	~	KIA-IR-23	Sabina commits to provide further rationale and methodology for criteria selection during the water licensing process. This information will appear in the FEIS.
209	6	Freshwater Environment	~	~	KIA-IR-25	Sabina commits to provide further rationale and methodology for criteria selection during the water licensing process. This information will appear in the FEIS.
210	6	Freshwater Environment	~	~	KIA-IR-26	Sabina commits to provide further rationale and methodology for criteria selection during the water licensing process. This information will appear in the FEIS.
211	6	Freshwater Environment	~	~	KIA-IR-27	Sabina commits to developing a water and load balance that will be used to develop water management plans for all stages of the project including construction, operation, closure and post-closure. This will be used to demonstrate that any discharge that runoff will comply with appropriate WQOs once it reaches the closest waterbody or watercourse. Locations for discharges to the tundra along with rationale for their selection will be provided. This information will be provided as part of the FEIS.
212	6	Freshwater Environment	~	~	KIA-IR-28	In the FEIS, Sabina commits to clarifying the TSS thresholds and mitigation measures to meet those limits as well as describing the fate of water removed from Llama Lake, Lytle Lake and Occurrence Lake as part of the site-wide water and load balance.
213	6	Freshwater Environment	~	~	KIA-IR-29	Sabina commits to including seepage from the TIA as a pathway for the freshwater water quality assessment chapter for the FEIS.
214	6	Freshwater Environment	~	~	KIA-IR-33	Sabina commits to use figures illustrating creek cross sections under baseline and projected scenarios for a range of wet and dry years in the FEIS.
215	6	Freshwater Environment	KIA-88	~	~	The preliminary designs for the impermeable dykes will be an output from the FS. Further geotechnical investigation will address the dyke design, the foundation conditions and the potential for the development of a talik. The potential for seepage from Lytle and Occurrence Lake to the Locale 1 and Locale 2 pits will be considered. Estimated seepage rates and management of the potential seepage will also be completed. Sabina commits that this information will be included in the FEIS.
216	6	Freshwater Environment	~	KIA-128	~	Sabina commits to providing design criteria in the FEIS and NWB applications to quantify the wetted habitat loss in all impacted water.
217	6	Freshwater Environment	NRCan-4	~	~	Further geothermal analysis is being conducted as part of ongoing preparation for the FS and Sabina commits that this information will be included in the FEIS.
218	6	Freshwater Environment	NRCan-5	~	~	Saline water management has been considered through the operational stipulation to transport the saline water to the TIA. Sabina commits to include saline groundwater contributions to the TIA and confirm the final quality of the tailings supernatant at closure in the FEIS water balance.
219	6	Freshwater Environment	NRCan-8	~	~	For the FEIS, Sabina commits to developing a thermal model to confirm permafrost predictions beneath the TIA.

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220	6	Freshwater Environment	~	~	NRCAN-11	Sabina commits to depicting any groundwater connections with mine openings. Where discharges to the environment are predicted based on the site wide water and load balance, appropriate mitigation measures will be presented in the FEIS.
221	6	Freshwater Environment	~	~	NRCAN-17	Sabina commits to presenting the scope and details of the hydrogeological modelling completed. Requested information will be presented in the FEIS.
222	6	Freshwater Environment	~	~	NRCAN-18	Sabina commits to providing details on the Llama Lake talik zone through all phases of mining and closure. Details will be presented in the FEIS.
223	6	Freshwater Environment	~	~	NRCAN-19	Sabina commits to providing an updated analysis of permafrost distribution at depth through thermal modelling, updated data analysis, and any other means required to depict any groundwater connections with the mine openings. This analysis will provide an updated account of the potential formation/decline of taliks, including any potential through-taliks. Requested information will be presented in the FEIS.
224	6	Freshwater Environment	~	~	NRCAN-22	Sabina commits to providing justification for not obtaining more information on the fault zones as it relates to groundwater flows in talik regions. This information will be provided in the FEIS.
225	6	Freshwater Environment	~	~	NRCAN-24	Sabina will develop and operate a safe mine including appropriate underground water management. These elements will be addressed as part of the standard mine operational procedures to be approved by the Mines Inspector.
226	6	Freshwater Environment	~	~	NRCAN-27	Sabina commits to providing results of any groundwater modelling completed for Llama pit. These details will be presented in the FEIS.
227	6	Freshwater Environment	~	~	NRCAN-29	Sabina commits to providing an updated analysis of permafrost distribution at depth through thermal modelling, updated data analysis, and any other means required to depict any groundwater connections with the mine openings. This analysis will provide an updated account of the potential formation/decline of taliks, including any potential through-taliks. Requested information will be presented in the FEIS.
228	7	Marine Environment	DFO-6	~	7	Sabina commits to develop marine mammal observation procedures in-line with federal and government of Nunavut shipping management protocols. Further details will be provided in the FEIS.
229	7	Marine Environment	~	~	DFO-6	For the FEIS, Sabina will include potential impacts along the shipping route, including ship noise and ship strikes. This will be conducted utilizing publically available information.
230	7	Marine Environment	~	~	EC-2	Sabina will provide additional detail in the FEIS and further consider realistic 'no disturbance' setbacks.
231	7	Marine Environment	~	~	EC-2	Sabina will provide an annual log and map of ship tracks in annual monitoring reports.
232	7	Marine Environment	~	~	EC-3	To the extent that the information is made available from the Canadian Coast Guard, Sabina commits to providing data on the percentage increase in shipping traffic in the FEIS.
233	7	Marine Environment	~	~	EC-5	Sabina commits to working within the existing regulatory framework defined by Transport Canada. An approved SOPEP will be in place by the shipping provider prior to the commencement of any shipment.
234	7	Marine Environment	EC-6	~	~	Sabina commits to develop seabird observation procedures in-line with federal and government of Nunavut shipping management protocols. These details will be provided in the FEIS.
235	7	Marine Environment	~	~	EC-8	Sabina commits to working within the existing regulatory framework defined by Transport Canada. Sabina will consider additional clarity on the reporting of bird strikes in the Incidental Observation Procedure included in the FEIS. If the frequency of strikes is significant, Sabina will implement adaptive management procedures to address this concern.
236	7	Marine Environment	~	EC-9	~	Sabina commits to complying with standard shipping guidance, and implementing a series of management plans, which will be in effect within the marine Local Study Area and/or the marine Regional Study Area in Bathurst Inlet. Implemented together, these plans will limit effects on marine birds in the common shipping route.
237	7	Marine Environment	~	~	EC-25	Sabina commits to a further review in the FEIS of monitoring requirements of discharged brine for compliance with subsection 36(3) of the Fisheries Act prior to release to the marine environment.

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238	7	Marine Environment	?	~	TC-2	For the FEIS, Sabina will provide details on any accommodation barge or overwintering fuel vessel proposed for use. This will address compliance with regulatory requirements and include information on the type of vessels involved, operations plan, and risk assessment.
239	7	Marine Environment	?	TC-3	?	Sabina commits to reference the AWPPA in the Shipping Management Plan section related to pollution prevention as the vessels transiting to/from and employed within the MLA are required to comply with the Act in addition to the Canada Shipping Act (2001).
240	7	Marine Environment	~	~	TC-3	Sabina commits to reviewing, for the FEIS, the stated regulatory requirements specific to choice of route and vessels.
241	7	Marine Environment	~	TC-4	~	Sabina commits to request a meeting with Canadian Hydrographic Services officials to ensure their engagement on a potential bathymetric survey of the MLA area.
242	8	Human Environment	~	~	AANDC-31	Sabina commits to further consider the potential of the Project to result in out-migration of skilled workers, as well as out-migration of former employees upon various closure phases of the mine. This information will be included in the FEIS.
243	8	Human Environment	~	~	AANDC-32	For the FEIS, Sabina will provide training plans derived from the completed job descriptions for the Back River site positions.
244	8	Human Environment	~	~	AANDC-34	Sabina will govern gender equality through the CHRC - Human Rights Maturity Model where current and future polices and practices follow: 1) Leadership and accountability; 2) Capacity building and resources; 3) Alignment of policies and processes; 4) Communication and consultation; and 5) Evaluation for continuous improvement. This commitment will appear in the FEIS.
245	8	Human Environment	~	~	AANDC-34	Sabina will work with relevant Community groups to promote and encourage the candidacy of women for employment vacancies. This commitment will appear in the FEIS.
246	8	Human Environment	AANDC-60	~	?	Sabina commits to providing an FEIS update to the Mince Closure Reclamation Plan that summarizes the post-reclamation risks to humans and the environment. This will bebsed on more detailed evaluations provided in Volume 8, Chapter 6 and applicable Volume 8 appendices. Sabina will also present a closure cost estimate.
247	8	Human Environment	AANDC-67	~	~	Sabina commits to provide additional details on workforce requirements as part of the FEIS submission.
248	8	Human Environment	~	AANDC-69	~	Sabina commits to update the FEIS to include more recent socio-economic baseline data than the information referenced in the Volume 8, Chapter 3.
249	8	Human Environment	AANDC-70	~	~	Sabina commits to providing appropriate training to ensure Inuit and Nunavummiut have employment opportunities.
250	8	Human Environment	AANDC-73	~	~	Sabina commits to providing appropriate notice periods for lay-offs from Back River operations as mandated by the statutes of the Labour Standards Act of Nunavut.
251	8	Human Environment	~	~	GN-1	The Kitikmeot Region SEMC is actively engaged in the monitoring of conditions in communities, including aspects of Population Demographics and Community Infrastructure and Public Services. Sabina will continue to participate in this ongoing initiative.
252	8	Human Environment	~	~	GN-3	Sabina commits to ongoing community engagement so that members of the communities, including youth and education service providers, are aware of the career opportunities with the Project and can make informed decisions regarding education and skills development. This information will appear in the FEIS.
253	8	Human Environment	~	~	GN-3	Sabina commits to actions to promote youth being able to make informed choices regarding their career direction, including encouraging youth to stay in school to take advantage of the employment opportunities made available by the Project. This information will appear in the FEIS.
254	8	Human Environment	~	~	GN-3	Updated information will be included in the FEIS. This will include more specific information on the number of jobs that will be available with the Project and the general education/training requirements for these jobs.

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255	8	Human Environment	~	~	GN-4	Further details regarding the workforce schedule, including number of positions and general skill and experience requirements, will be provided in the FEIS based on what is known at the time with the advancement of engineering design.
256	8	Human Environment	~	~	GN-4	Sabina will work closely with GN Family Services and the Apprenticeship program in Nunavut to align mine site program planning. This information will appear in the FEIS.
257	8	Human Environment	~	~	GN-5	Sabina commits to updating the baseline information provided in Volume 8, Chapter 3 (Socio-economics), Section 3.1.2.2 (Employment) and Section 3.1.2.3 (Education and Training) with the most current and applicable National Household Survey and Labour Force Survey data. Additional analysis and more detail will be provided in the FEIS for potential in-migration due to Project-related indirect (supplier) and induced employment in Kitikmeot communities and the consequences/needs of immigrant workers,
258	8	Human Environment	~	~	GN-6	Sabina commits to including additional information in the FEIS concerning:  1. Training approaches and methods specific to Nunavummiut and Inuit  2. Incorporation of Inuit Qaujimajatuqangit into Community Based Monitoring initiatives.
259	8	Human Environment	~	~	GN-7	Sabina will continue to support childcare in the communities through our donations policy and informal visits to assess potential areas of need. Also, Sabina employees will be encouraged to support childcare through volunteering and participation on the associated non-profit boards responsible in each community for the delivery of childcare programming. This information will appear in the FEIS.
260	8	Human Environment	~	~	GN-8	Sabina will continue to support childcare in the communities through our donations policy and informal visits to assess potential areas of need. Also, Sabina employees will be encouraged to support childcare through volunteering and participation on the associated non-profit boards responsible in each community for the delivery of childcare programming. This information will appear in the FEIS.
261	8	Human Environment	~	~	GN-9	Sabina commits to providing in the FEIS further analysis and more detail regarding the potential for migration into Cambridge Bay and Kugluktuk due to Project-related indirect and induced employment. As recommended by the Nunavut Housing Corporation (NHC), a sensitivity analysis that incorporates a number of scenarios will be included as part of the analysis given the uncertainties involved.
262	8	Human Environment	~	~	GN-10	Sabina commits to reviewing relevant statements concerning annual housing construction in Nunavut and, in the FEIS, will provide a regional breakdown of where new public and private housing units have been constructed where the information is available.
263	8	Human Environment	~	~	GN-11	For the FEIS, Sabina will provide information regarding sexual health as part of our general Wellness information program to be delivered at site. The company commits to providing on-site access to condoms in an effort to mitigate the spread of STI's. The program information will be delivered by qualified health practitioners.
264	8	Human Environment	~	~	GN-12	Sabina will review the subject of "up-to-date" immunization for employees and provide additional details in the FEIS. Sabina will be offering annual influenza vaccinations to all employees and providing education on proper personal hygiene to limit the spread of influenza. All medical incidents or occurrences, including those tied to a rabid animal, will be addressed through the company HS&E policy, where a qualified on-site Nurse/Medic will assess the situation and where necessary consult with our Medical Doctor. All regulatory reporting will be adhered to for compliance.
265	8	Human Environment	~	~	GN-13	In the event that pre-employment medicals are required, Sabina will commit to a service fee payable to the Community Health services based on a negotiated fee schedule. Sabina will develop any pre-employment medical screening program in discussion with Nunavut Health Services. This commitment will be added to the FEIS.
266	8	Human Environment	~	~	GN-14	Sabina commits to providing a descriptions of all employee support programs and training undertaken including: a qualitative description of the structure and goals of each program; the number of times it was provided to employees and; the percentage of employees (at every level) who have successfully completed the program. This will be provided annually via a relevant annual report mechanism.

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267	8	Human Environment	~	~	GN-14	Sabina commits to providing a description of the manager's, councilors, or HR representative's duties in relation to employee support, their on-site availability and a general assessment of whether the position is achieving the desired goals. This will be provided annually via a relevant annual report mechanism.
268	8	Human Environment	~	~	GN-15	Sabina commits to integrating Table GN-CH-37 (Regional Study Area Archaeology Site Types) into the appropriate sections of FEIS.
269	8	Human Environment	~	~	GN-16	Sabina commits to integrating Table GN-CH-41-1 (Archaeological Site Cultural Affiliations) and Table GN-CH-41-2 (Archaeological Artifacts by Site) into the appropriate sections of the FEIS.
270	8	Human Environment	~	~	GN-17	Sabina commits to providing a set of maps to the Department of Culture and Heritage on March 31st of each year illustrating changes in the Project footprint are occurring or an archaeological permit is obtained.
271	8	Human Environment	~	~	GN-18	Sabina commits to providing summaries of the current status of all known archeology sites within 80 meters of the Project Infrastructure by March 31 of each year.
272	8	Human Environment	~	GN-23	~	For the FEIS, Sabina commits to updating data for 'GDP contributions of the Back River Project for Operation' (Volume 8, Table 3.5-8)
273	8	Human Environment	~	GN-24	~	Sabina commits to providing more recently released information from the 2011 National Household Survey in the FEIS.
274	8	Human Environment	GN-28	~	~	Sabina commits to working in partnership with the KIA and other stakeholders such as MiHR, Northern Arctic College to identify skills gaps for work readiness training.
275	8	Human Environment	~	GN-29	~	Sabina commits to ensuring appropriate policies are included in the FEIS to protect the workforce from sexual harassment or abuse.
276	8	Human Environment	GN-31	~	?	Sabina commits to providing an EAP which is appropriate to our workforce. That may include access to counselors onsite or referrals to additional facilities should the need arise. Sabina remains committed to allowing for employment opportunities onsite for Inuinnaqtun and/or Inuktitut speaking staff.
277	8	Human Environment	GN-32	~	~	Currently there are no formalized plans for community contributions related to community health and wellbeing. Over the past five years, Sabina has committed funds and resources towards community initiatives including daycares, food banks, suicide prevention, traditional pursuits, cultural events, and education initiatives. As the Project advances Sabina remains committed to working with the Kitikmeot Inuit Association, Government of Nunavut, the Kitikmeot communities and associated community groups to ensure reasonable community benefits are established. This will be stated in the FEIS.
278	8	Human Environment	GN-33	~	~	Sabina has obtained information on the new Rent Scale System and will include this information, where relevant, in the FEIS. Going forward, Sabina commits to working with the NHC, as appropriate, to help ensure that accurate information is provided to workers.
279	8	Human Environment	~	GN-34	~	Sabina commits to making a formal request to the Nunavut Housing Corporation for detailed information on the number of new housing units by community. This will be provided in the FEIS.
280	8	Human Environment	~	GN-36	~	In the FEIS, Sabina commits to providing updated information on the Nunavut Housing Corporation's annual budget, as made available by the NHC.
281	8	Human Environment	~	GN-36	~	Sabina commits to correcting the numbers presented in the DEIS for archaeological sites such that values are consistent throughout the FEIS for each project management area.
282	8	Human Environment	~	GN-39	~	In the FEIS, Sabina commits to providing more detail on the criteria used to assign archaeological significance in the main body of the EIS (Volume 8, Section 1.5.2.4).
283	8	Human Environment	GNWT-13	~	~	Sabina commits to present a final determination of flight routes and schedules in the FEIS. It is anticipated that some Southern employees may travel through Yellowknife in order to access site during the Project life.
284	8	Human Environment	GNWT-14	~	~	Sabina commits to responsibility for financing any potential evacuations of all project personnel. This will be stated in the FEIS.
285	8	Human Environment	KIA-44	~	~	For the FEIS, Sabina commits to include a more robust consideration of the broader RSA effects that were considered and included in the assessment (Vol 8, Employment - Cumulative Residual Effects).

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286	9	Methodology & Effects of Environment on the Project	AANDC-3	~	~	Sabina commits to clarifying in the FEIS, the approach used to determine spatial effects including consideration for the extent of potential project effects.
287	9	Methodology & Effects of Environment on the Project	~	~	AANDC-16	Sabina commits to review and update, as appropriate, the chapter for accidents and malfunctions in the FEIS.
288	9	Methodology & Effects of Environment on the Project	~	AANDC-55	~	Sabina commits to providing additional information on oil spill response procedures, and expected conditions outside the MLA, for non-navigable rivers, creeks and other waterways. This will be provided for the FEIS.
289	9	Methodology & Effects of Environment on the Project	EC-Followup- 1	~	~	Sabina commits to including the missing appendices from the Oil Pollution Emergency Plan in the FEIS.
290	9	Methodology & Effects of Environment on the Project	EC-Followup-	~	~	For the FEIS, Sabina commits to providing response details in an updated version of the Spill Contingency Plan for a potential ammonium nitrate spill to water.
291	9	Methodology & Effects of Environment on the Project	EC-Followup- 4	~	~	Sabina commits to replacing the references from (Section 7.2.2 Regional Environmental Emergencies Team of the Oil Pollution Emergency Plan; and Section 2.1.6, Spill Response Procedures, of the Shipping Management Plan) with the Environmental Emergencies Science Table information provided by Environment Canada.
292	9	Methodology & Effects of Environment on the Project	~	~	TC-1	Sabina commits to amending the legislative requirement section of the OPEP to comply with section 168 (1) (b) (iii) of the CSA, 2001. Sabina will include a list of all employees authorized to implement the OPEP and their contact information, on the Oil Handling Facility Declaration. It should be noted that any list of authorized employees would be initial in detail as Sabina will not have all relevant positions hired. All requested information will be included in the FEIS.
293	10	Management Plans	~	~	AANDC-7	Sabina commits to determining potential groundwater flow pathways (where possible) and including those in the site wide water and load balance. This water and load balance will be used to determine the appropriate water management plans for all the project phases including construction, operation, closure and post closure. This information will be presented in the FEIS.
294	10	Management Plans	~	~	AANDC-8	Sabina commits to determining the groundwater flow pathways and including those in the site wide water and load balance. This water and load balance will be used to determine the appropriate water management plans for all the project phases including construction, operation, closure and post closure. This information will be presented in the FEIS.
295	10	Management Plans	AANDC-13	~	~	Sabina commits to providing additional design details deemed necessary for any planned raw water intakes in a future update to the Site Water Monitoring and Management Plan in the FEIS.
296	10	Management Plans	AANDC-18	~	?	Sabina commits to providing details regarding the management of potential overflow prior to pit water quality meeting limits. This will include predictions for pit filling times in the FEIS.
297	10	Management Plans	~	~	AANDC-21	Sabina commits to providing additional rationalization of the temporal boundaries used to determine pit water quality with consideration for predicting the ultimate residual effects to water quality in the long term. A suitable water management plan will be presented in the FEIS.

Commitment #	Volume	EIS Reference	IR REF	CR REF	TC REF	Commitment
298	10	Management Plans	~	~	AANDC-22	Sabina commits to providing a detailed site wide water and load balance for the project. This will be used to develop detailed water management plans for the different phases of the project including construction, operation, closure and post-closure. This information will be presented in the FEIS.
299	10	Management Plans	~	~	AANDC-23	Sabina commits to providing a detailed site wide water and load balance for the property. This will be used to develop detailed water management plans for the different phases of the project including construction, operation, closure and post-closure. This information will be presented in the FEIS.
300	10	Management Plans	~	~	AANDC-24	Sabina commits to providing an updated Mine Closure Reclamation Plan and closure costs in the FEIS.
301	10	Management Plans	~	~	AANDC-25	Sabina commits to re-evaluating and providing additional justification on the duration of post-closure monitoring that will be required based on the new Mine Closure Reclamation Plan submitted as part of the FEIS.
302	10	Management Plans	~	~	AANDC-27	Sabina commits to including the potential for re-vegetation research in the Preliminary MCRP in the FEIS.
303	10	Management Plans	~	~	AANDC-33	Sabina commits to providing additional details on how Sabina will support development of a workforce that is career oriented, particularly in relation to the Continuous Development and Training Program. This information will be presented in the FEIS.
304	10	Management Plans	AANDC-35	~	~	For the FEIS, Sabina commits to providing an updated water balance into the management plans and water licence application material. This will specific include inputs from any saline groundwater inflow.
305	10	Management Plans	~	AANDC-44	~	Sabina commits that the AEMP analyses will explicitly consider statistical power and will be refined and developed throughout the program. For example, time-series regression analyses may be introduced to the analysis later in the AEMP to provide independent validation and verification of results.
306	10	Management Plans	AANDC-52	~	~	As part of the FEIS and water licencing process, Sabina commits to update and build on the Adaptive Management framework described in the EMP (Volume 10, Chapter 1).
307	10	Management Plans	DFO-5	~	~	Potential impacts due to physical works associated with the desalination plant at the MLA will be addressed as part of the overall Fisheries Offsetting Plan provided in the FEIS.
308	10	Management Plans	~	~	DFO-7	For the FEIS, Sabina will produce appropriate protocols, based on the DFO protocols, but adapted for incidental marine mammal observations by ship's personnel.
309	10	Management Plans	~	~	DFO-8	Sabina commits to designing the desalinization plant intake and outfall structures in accordance with DFO Operational Standards and any other guidelines. Details will be presented in the FEIS.
310	10	Management Plans	~	~	DFO-9	Sabina commits to continuing to explore offsetting options and consultation with the affected communities through the permitting process. Offset engagement has and will continue to be primarily those communities in close proximity to the Project.
311	10	Management Plans	~	~	DFO-10	Sabina commits to continue working with the DFO in the development of the offsetting plan and the quantification of Serious Harm.
312	10	Management Plans	~	~	DFO-11	If any other lakes are proposed as water source lakes for closure, then Sabina commits to providing details specific to those lakes in the FEIS.
313	10	Management Plans	~	~	DFO-13	Sabina commits to producing monitoring and adaptive management SOPs for seal lairs during the construction of the winter road to the MLA and aircraft strip.
314	10	Management Plans	~	~	DFO-14	For the FEIS, Sabina commits to updating the general triage number and email address from the DEIS to the current DFO information provided.
315	10	Management Plans	~	~	EC-1	Sabina commits to recording data on incidental seabird observations along the shipping route. Proposed methods for observations and data handling to ensure compatibility with existing databases will be included in the FEIS Wildlife Mitigation and Monitoring Plan.

Commitment #	Volume	EIS Reference	IR REF	CR REF	TC REF	Commitment
316	10	Management Plans	~	~	EC-4	In order to monitor potential effects on waterfowl in on-site ponds, Sabina commits to:  1) monitoring water quality in Project ponds,  2) monitoring whether migratory waterfowl use these ponds for staging and breeding,  3) if the water quality in a pond is poor and waterfowl are using the waterbody for a sufficient period to cause the potential for harm (a combination of evaluating the water quality and the time spent using the on-site ponds), then Sabina will conduct adaptive management activities to exclude waterfowl from ponds.  This information will appear in the FEIS.
317	10	Management Plans	EC-Followup- 5	~	~	For the FEIS, Sabina commits to updating the Key Government Contacts sections (Table 2-4 of the Risk Management and Emergency Response Plan and Table 5.10-4 of the Spill Contingency Plan) to remove "Wade Romanko, Env. Emerg. Officer". All Environment Canada spill information is now facilitated via the NWT/NU 24hour Spill Report Line.
318	10	Management Plans	~	~	EC-7	For all pertinent management plans in the FEIS, Sabina commits to the monitoring of spills in marine environments and reporting to the NT-NU Spill Line the presence of oily sheens on the water near vessels at the port site.
319	10	Management Plans	~	~	EC-9	The buffers listed in Table 1 of the EC comment Section 6.1.9 will be used as guidance, taking into account site-specific and project-related restrictions for operability. Mitigation actions and their success will be reported in the WMMP report. This information will appear in the FEIS.
320	10	Management Plans	~	~	EC-11	Sabina commits to consulting the document titled "Preventing Wildlife Attraction to Northern Industrial Sites" (Canadian Wildlife Service 2007) while preparing procedures for waste and wildlife attractant management. This information will appear in the FEIS.
321	10	Management Plans	~	~	EC-12	The fish-out program for Llama Lake will follow the DFO protocols for such programs in Nunavut and the NWT. Suggested avoidance measures will be considered and can be included in the fish out plan in the FEIS.
322	10	Management Plans	~	EC-13	~	For the FEIS, Sabina commits that the potential impacts of climate change will be further considered in the Project design as a result of FS optimization. This will apply to the TIA design basis.
323	10	Management Plans	~	~	EC-14	In the FEIS, Sabina will add a commitment to the Site Water Monitoring and Management Plan that terrestrial discharge sites will be assessed for stability and thaw-susceptibility during detailed design and/or on-site during construction, as appropriate.
324	10	Management Plans	~	~	EC-16	Sabina commits to providing details of landfill design including locations, waste quantifications, and management of contact water. Consideration will be given to the Guidelines for Developing a Waste Management Plan (MVLWB, 2011). This information will appear in the FEIS.
325	10	Management Plans	~	~	EC-18b	The 2013 Bathurst Inlet Marine Diesel Fuel Spill Modelling Report presented in Appendix V9-3A will be updated to show sensitive marine mammal areas and fishing areas important to Inuit, and evaluate potential effects of a spill on these figures in addition to coastal birds.
326	10	Management Plans	~	~	EC-18c	For the FEIS, Sabina will prepare a tactical response plan showing fuel spill dispersion modelling results relative to local sensitivities (i.e., marine birds, fishing areas, marine mammal areas), that also identifies the location of strategic booming, if any is recommended.
327	10	Management Plans	~	~	EC-18d	The FEIS Hazardous Waste Management Plan will be updated to include applicable cyanide mitigation and management measures, principles and standards.
328	10	Management Plans	~	~	EC-24	Sabina commits to including a reference on already established Marine VECs into the FEIS Site Water Management Plan.
329	10	Management Plans	~	~	EC-27	Sabina commits to including detailed mitigation measures to minimize loss/spillage; and BMPs during use, storage, transport and handling of explosives in the FEIS Explosives Management Plan.
330	10	Management Plans	~	~	EC-28	Sabina commits to providing a detailed site wide water and load balance for the property. This will be used to develop detailed water management plans for the different phases of the project including construction, operation, closure and post-closure. This information will be presented in the FEIS.
331	10	Management Plans	~	~	EC-32	Sabina commits to monitoring for erosion at the western outlet of Rascal Lake with additional details to be included in the FEIS Site Water Monitoring and Management Plan.

Commitment #	Volume	EIS Reference	IR REF	CR REF	TC REF	Commitment
332	10	Management Plans	~	~	EC-35	Sabina commits to keeping information on harmonization of EEM in the FEIS AEMP and working with EC and other agencies to finalize
333	10	Management Plans	~	~	EC-36	the AEMP during the water licence process.  Sabina commits to working with EC and other agencies to finalize sampling sites for the AEMP and Site Surveillance Monitoring as part of the water licence process.
334	10	Management Plans	~	~	EC-37	In the FEIS AEMP, Sabina commits to providing the proposed locations of sampling and the number of samples within each waterbody. This will be developed as part of the water licence process.
335	10	Management Plans	~	~	EC-39	As part of the AEMP for water licencing, Sabina commits to working with EC and other agencies to define "significant change" as used for the water quality and sediment quality indicators.
336	10	Management Plans	~	~	EC-40	Sabina commits to working with EC and other agencies to summarize and clearly present baseline data for the AEMP as well as outline all sampling procedures for previous sample collection.
337	10	Management Plans	~	~	GN-2	Through the Back River Project Socio-Economic Monitoring Program (SEMP) and annual reporting to NIRB, Sabina commits to socio-economic monitoring throughout all phases of the Project as long as there is a reasonable expectation of Project-related impacts to the socio-economic environment. This will include temporary closure and care and maintenance phases of the Project. This commitment will be included in the FEIS and finalized in the Terms of Reference.
338	10	Management Plans	~	GN-5	~	For the FEIS, Sabina commits to further refining management plans, including the overall Environmental Management Plan to include all required monitoring programs, and detail how the overall approach to resource allocation, adaptive management, and integration of TK throughout the life of the Project will be implemented. The EMP will also identify the approach to Inuit engagement and monitoring.
339	10	Management Plans	~	~	GN-19	Sabina commits to inserting a reference, in the FEIS, to Appendix B of the Cultural and Heritage Resources Protection Plan for the definition of Chance Find Procedure as well as include relevant educational material in a training program that would be provided to onsite workers.
340	10	Management Plans	~	GN-21	~	Sabina commits to providing additional clarity on proposed measures to mitigate impacts on grizzly bears as well as provide additional information related to Bear-Human Deterrent and Bear Safety within the FEIS.
341	10	Management Plans	~	~	GN-21	More information will be added to the monitoring section of the WMMP for the FEIS that includes detail on proposed methods, threshold values, and their rational for monitoring activities.
342	10	Management Plans	~	~	GN-22	Per the detailed response to GN-22, Sabina commits to including more information in the management sections of the WMMP for the FEIS.
343	10	Management Plans	~	~	GN-24	Sabina commits to provide more detail on the likely framework for contributions to government-led initiatives for monitoring caribou, and a backup plan should these government-led programs not come to fruition in time for the construction of the Project. This information will appear in the FEIS.
344	10	Management Plans	~	~	GN-24	The Wildlife Mitigation and Monitoring Plan for the FEIS will include more information on the proposed analysis of the remote camera data used for monitoring certain wildlife VECs.
345	10	Management Plans	~	~	GN-27	Sabina will include more information in the grizzly bear monitoring and management component of the WMMP. This information will appear in the FEIS.
346	10	Management Plans	~	~	GN-28	Sabina will include more information in the grizzly bear monitoring and management component of the WMMP. This information will appear in the FEIS.
347	10	Management Plans	~	~	GN-29	Sabina commits to adding more information to the extensive list of sections provided in our response to GN-29. This will produce a unified response plan, including information on coordinating with government agencies and HTOs. This information will appear in the FEIS.
348	10	Management Plans	~	~	GN-30	Sabina commits to expanding the description of the analysis used to evaluate the camera techniques listed in Section 7.3.3 of the WMMP (Volume 10, Chapter 20).
349	10	Management Plans	~	~	GN-31	Sabina will update and expand the management and monitoring sections of the WMMP that deal with attraction of predators (including wolverine) to camps and managing problem wildlife (including wolverine). This information will appear in the FEIS.

Commitment #	Volume	EIS Reference	IR REF	CR REF	TC REF	Commitment
350	10	Management Plans	~	~	GN-32	Additional information on the proposed raptor monitoring protocols will be added to the wildlife mitigation and management plan (WMMP) for the FEIS following guidance on measuring and analyzing a zone of influence (ZOI) on nest success by the Canadian Wildlife Service. This information will appear in the FEIS.
351	10	Management Plans	GNWT-1	~	~	As requested by the GN DOE and a stated objective of the GNWT-ENR, Sabina commits to contributing to regional caribou monitoring efforts focused on herd-level effects. This effort will be conducted in collaboration with the GN.
352	10	Management Plans	~	~	GNWT-6	Sabina commits to adding a section to the WMMP which describes the framework by which these various mitigation and monitoring activities for caribou are integrated together. This plan will describe the various stages of work alteration based on the number and distance of caribou to the Project site.
353	10	Management Plans	~	~	GNWT-8	Sabina will conduct grizzly bear den surveys along the winter road. Details of these surveys will be provided in the updated WMMP Plan that will be included in the FEIS.
354	10	Management Plans	~	~	KIA-IR-1	Sabina commits to including more information in the WMMP plan of the FEIS on the proposed monitoring for wildlife, with emphasis on a framework for working with government to monitor caribou in the area.
355	10	Management Plans	~	~	KIA-CR-2	Sabina commits to adding more detail to each section of the WMMP that deal with limiting the attractiveness of the camp to carnivores and managing problem wildlife on site. This FEIS update to the WMMP will include more detail on monitoring measures and triggers for mitigation actions.
356	10	Management Plans	~	~	KIA-IR-2	Sabina commits to including more information in the WMMP plan of the FEIS on the proposed monitoring for wildlife, with emphasis on a framework for an alternate monitoring plan for caribou, should the government-led plan not be in place by the point where construction is conducted.
357	10	Management Plans	~	~	KIA-IR-4	Sabina commits to including more information in the WMMP plan of the FEIS on the proposed monitoring for wildlife, with emphasis on focal species monitoring for other wildlife VECs which include a discussion surrounding power and experimental design.
358	10	Management Plans	~	~	KIA-IR-4	Sabina commits to including more information in the WMMP plan of the FEIS on the proposed monitoring for wildlife, with emphasis for on-site monitoring for grizzly bear interactions with camp and monitoring of the waste management processes and facilities as attractants.
359	10	Management Plans	~	~	KIA-CR-5	Sabina commits to adding additional references to monitoring programs from other, similar, operating projects in similar habitats to the discussion of effects in the FEIS, where additional information is available.
360	10	Management Plans	~	~	KIA-CR-6	Sabina commits to providing a conceptual design for the closure of the project that can be used in the environmental assessment. The potential impacts of Closure effects will be identified and assessed within the FEIS.
361	10	Management Plans	~	~	KIA-IR-30	In the FEIS, Sabina commits to updating Table 13.1 in the EMP to better reconcile management plan applicability to each project phase.
362	10	Management Plans	KIA-68	~	~	Monitoring of temperatures in stockpiles will be carried out as identified in the monitoring section of the Waste Rock and Tailings Management Plan (Volume 10, Chapter 9). Sabina commits to progress the design criteria during the feasibility study. It will be provided in the FEIS.
363	10	Management Plans	KIA-93	~	~	Sabina commits to present more information on the design of the Umwelt underground plug as part of the FEIS Mine Reclamation and Closure Plan.
364	10	Management Plans	KIA-113	~	~	Sabina commits to review Table 13.1 in Volume 10 Chapter 1 "Applications of Current EMP's to Phases of the Project" and make necessary changes. These changes will be reflected in the FEIS.
365	10	Management Plans	KIA-114	~	~	Sabina commits that the Site Water Monitoring and Management and the Mine Closure and Reclamation plans will continue to be refined for the FEIS. This will include discharge locations for mine contact water and expected potential volumes.
366	10	Management Plans	KIA-115	~	~	Sabina commits to updating the Explosives Management Plan to incorporate environment design criteria from the FS for the transport, storage and handling of explosives. These requirements will include secondary containment and procedures for spill prevention and response.

Commitment #	Volume	EIS Reference	IR REF	CR REF	TC REF	Commitment
367	10	Management Plans	~	KIA-127	~	Sabina commits to providing an updated Fish Offsetting Plan in the FEIS with detail to be included in an application for a DFO authorization as follows: the number of structures being placed in aquatic habitats; structure locations and size of footprints; the type of habitat, including the importance of the habitat to fish; the magnitude of impact; and an evaluation of the ability for fish to pass at water crossings at all flow levels.
368	10	Management Plans	NRCan-2	~	~	In the FEIS, Sabina commits to incorporating additional results, updated screening criteria, and updated geochemical interpretation into the Borrow Pits and Quarry Management Plan.
369	10	Management Plans	~	~	NRCAN-6	Sabina commits to addressing these considerations in the Mine Waste Rock and Tailings Management Plan. Requested information will be presented in the FEIS.
370	10	Management Plans	NRCan-7	~	~	Underground mine inflows will be sampled during operations to verify water quality predictions and inform storage and treatment requirements, as described in the Site Water Monitoring and Management Plan. Sabina commits to provide further results in the FEIS.
371	10	Management Plans	~	~	NRCAN-12	Sabina commits to justifying the duration of any post-closure monitoring that will be required based on the new Mine Closure Reclamation Plan that will be submitted as part of the FEIS.
372	10	Management Plans	NRCan-20	~	~	Sabina commits to address disposal of effluent treatment sludge in the FEIS Mine Closure and Reclamation Plan. The most likely disposal location would be within the TIA, prior to installation of the closure cover.
373	10	Management Plans	~	~	NRCAN-20	Sabina commits to determining the groundwater flow pathways and including those in the site wide water and load balance. This water and load balance will be used to determine the appropriate water management plans for all the project phases including construction, operation, closure and post closure. This information will be presented in the FEIS.
374	10	Management Plans	~	~	NRCAN-21	Sabina commits to determining the groundwater flow pathways and including those in the site wide water and load balance. This water and load balance will be used to determine the appropriate water management plans for all the project phases including construction, operation, closure and post closure. This information will be presented in the FEIS.
375	10	Management Plans	~	~	NRCAN-25	Sabina commits to providing a detailed site wide water and load balance for the property. This will be used to develop detailed water management plans for the different phases of the project including construction, operation, closure and post-closure. This information will be presented in the FEIS.
376	10	Management Plans	~	~	NRCAN-26	Sabina commits to providing a detailed site wide water and load balance for the Project which includes sensitivity analysis as appropriate. This will be used to develop detailed water management plans for the different phases of the project including construction, operation, closure and post-closure. This information will be presented in the FEIS.
377	10	Management Plans	~	~	NRCAN-28	Sabina commits to providing a detailed site wide water and load balance for the property. This will be used to develop detailed water management plans for the different phases of the project including construction, operation, closure and post-closure. This information will be presented in the FEIS.
378	10	Management Plans	~	~	NRCAN-31	Sabina commits to providing monitoring plans of TIA water quality and quantity in the Site Water Monitoring and Management Plan. Information will be presented in the FEIS.
379	10	Management Plans	TC-2	~	~	In the FEIS Shipping Management Plan, Sabina will confirm whether all equipment, supplies, fuel etc. will be transported to site directly from domestic locations in Canada. Shipment manifests and routing may be provided for each shipment.
380	10	Management Plans	~	TC-5	~	For the FEIS, Sabina commits to providing the missing appendices from the Volume 10 Oil Pollution Emergency Plan.
381	10	Management Plans	~	TC-9	~	For the FEIS, Sabina commits to renaming "Aviation Audits" (Volume 10, Chapter 3, Section 5.4) to "Surveillance Procedures" as Transport Canada does not conduct aviation audits.
382	10	Management Plans	~	TC-11	~	For the FEIS, Sabina commits to amend Volume 10, Fuel Management Plan Table 4-1, to include the Transportation of Dangerous Goods Regulations.
383	10	Management Plans	~	TC-12	~	For the FEIS, Sabina commits to amend Volume 10, Fuel Management Plan Table 7.3-1, to include the Transportation of Dangerous Goods Regulations.

Commitment #	Volume	EIS Reference	IR REF	CR REF	TC REF	Commitment
384	10	Management Plans	~	TC-13	~	For the FEIS, Sabina commits to amend the Shipping Management Plan, 4.2.3 Explosives and Hazardous Materials, to add the Transportation of Dangerous Goods Act, 1992.
385	10	Management Plans	TC-14	~	~	For the FEIS, Sabina will commit to amending the Explosives Management Plan (Training and Certification Requirements) to include the Transportation of Dangerous Goods Regulations.
386	10	Management Plans	TC-15	~	~	For the FEIS, Sabina commits to detailing steps in the application process for an "Emergency Response Assistance Plan" approval. The Explosives Management Plan will detail how the transportation of explosives will be conducted at all project storage sites.
387	10	Management Plans	TC-16	~	~	For the FEIS, Sabina commits to amending the Spill Contingency Plan (Section 6.1.8) to include (the Transportation of Dangerous Goods Regulations Part 8) 30 day spill reporting requirement.
388	10	Management Plans	TC-17	~	~	For the FEIS, Sabina will commit to indicating whether an Emergency Response Assistance Plan approval is required for the transportation of any of the reagents required by the project.
389	10	Management Plans	YKDFN- 1-2	~	~	Sabina commits to consult with Environment Canada on how monitoring criteria will be further defined in subsequent revisions of the Incineration Management Plan. This will be provided in the FEIS and the ensuing application for a Type A Water License with the NWB.
390	11	Type A Water Licence Application	AANDC-46	~	~	For the FEIS, Sabina will remove the reference to Appendix G (from Vol 11, Appendix 4C, Section 5.9).
391	11	Type A Water Licence Application	EC-12	~	~	For the FEIS and draft water licence application, Sabina commits to providing design information for water management structures. Design criteria will be presented along with an account of how climate change predictions have been considered in the selection of design criteria. Contingency measures will be identified as an intergral part of design.
392	11	Type A Water Licence Application	~	KIA-61	~	In the FEIS, Sabina commits to including additional information on identified quarry sites, with drawings to support regulatory applications presented in Volumes 11 and 12. Estimates on the vertical alignments, the fill requirements for access roads, site roads, and airstrips will be provided along with drawings to support regulatory applications.



NIRB File No.: 12MN036 NWB File No.: 2AM-BRP----

December 18, 2014

Ryan Barry, Executive Director Nunavut Impact Review Board P.O. Box 1360 Cambridge Bay Nunavut, X0B 0C0

RE: NIRB File No. 12MN036 – Nunavut Water Board's Technical Review Submission to the Nunavut Impact Review Board regarding Sabina Gold & Silver Corp.'s Back River Project Draft Environmental Impact Statement

Dear Mr. Barry:

Please find attached, the Nunavut Water Board's (NWB or Board) technical review comments and recommendations relevant to Sabina Gold & Silver Corp.'s (Sabina) Back River Project's Draft Environmental Impact Statement (DEIS). The submission is in response to the Nunavut Impact Review Board's (NIRB) correspondences dated July 31 and August 14, 2014, in which interveners were invited to review and provide submissions regarding the DEIS by September 29, 2014. The NIRB subsequently extended the deadline for submissions to October 10, 2014, in response to a request from Natural Resources Canada (NRCan).

In its review, the NWB placed particular emphasis on aspects of the DEIS aimed at fulfilling the Type-A water licensing requirements including the draft water licence applications, environmental management plans and sections pertaining to water use and waste disposal activities. Comments and/or recommendations have been provided for sections of the DEIS that have relevance to the NWB's mandate.

The NWB is appreciative of this opportunity to comment on the contents of the DEIS at this stage in the coordinated review process. The Board trusts that recommendations provided will assist in preparing the information required for the Type-A water licence application(s) that will accompany the Final Environmental Impact Statement (FEIS).

If you have any comments and or questions regarding the NWB's submission, please contact the undersigned at (867) 360-6338 or at <a href="mailto:karen.kharatyan@nwb-oen.ca">karen.kharatyan@nwb-oen.ca</a> or David Hohnstein, Director Technical Services at (780) 443-4406 or at <a href="mailto:dts@nwb-oen.ca">dts@nwb-oen.ca</a>.

Regards,

Karén Kharatyan Technical Advisor

Attachment: NWB Technical Review Submission



# **Nunavut Water Board**

# **Nunavut Water Board's Technical Review Submission**

to the

**Nunavut Impact Review Board** 

**Pertaining to** 

Sabina Gold & Silver Corp.'s

Draft Environmental Impact Statement for the proposed
Back River Project

#### **Summary English**

On January 20, 2014, Sabina Gold & Silver Corporation (Sabina or Proponent) submitted to the Nunavut Impact Review Board (NIRB) a Draft Environmental Impact Statement (DEIS) containing a detailed project description and supporting information for various components and activities associated with the proposed Back River Project, located at approximately 300 km southwest of Cambridge Bay within the Kitikmeot Region of Nunavut. The DEIS is aimed at satisfying the information required under the Project's Guidelines<sup>1</sup> issued by the NIRB. Section 1.4.1 of the Guidelines, identifies the condition under which the NIRB and the Nunavut Water Board (NWB) can coordinate the NIRB review process and the NWB water licensing process in accordance with the *NIRB and NWB Detailed Coordinated Process Framework* (DCPF)<sup>2</sup>.

The DCPF allows for the Proponent to include in the DEIS specific information required for either the NIRB process and/or the NWB process. It also provides an opportunity for the proponent to satisfy, where possible, information requirements of both the NIRB and NWB's processes, simultaneously, by submitting the information to the NIRB at the initial stage(s) of the process. In addition, it provides directions to the NIRB and NWB concerning the approach that can be taken when conducting a joint review of a DEIS.

The NIRB distributed the DEIS to interested parties including the NWB for completeness check then for a full technical review and comments on July 31, 2014. The NWB has reviewed the sections of the DEIS and relevant addendums and has provided comments specifically on items in volumes 10, 11 and 12. Particular emphasis was placed on the concordance table associated with the draft Type-"A" Water Licence Applications, environmental management plans, and studies, reports, and research related to water use and waste deposit activities. Comments and recommendations are organized sequentially by volume number, except where they apply to more than one volumes/sections of the DEIS. In such cases, the comments and/or recommendations are listed under the general comments section. The following is a summary of general items identified during the review:

- Lack of and/or insufficient information included in some sections of the water licence applications and/or over- reliance on information contained in other sections of the DEIS to satisfy information requirements that could be easily included on the application.
- Inconsistency in the scope of activities covered under some of the Environmental Management Plans and concerns surrounding functionality of some Plans.
- Duplication of information contained in some EMPs.

<sup>1</sup> Guidelines for the Preparation of an Environmental Impact Statement for Sabina Gold & Silver Corp's Back River Project (NIRB File No. 12MN036), April 2013.

<sup>&</sup>lt;sup>2</sup> Nunavut Impact Review Board (NIRB) and Nunavut Water Board (NWB) Detailed Coordinated Process Framework for NIRB Part 5 Review and NWB Licensing, September 2009.

- EMPs are mostly preliminary and conceptual in form and need to be updated to satisfy the NWB licence application requirements.
- Monitoring plans and sampling procedures are very conceptual and limited.
- Design drawings are preliminary and not generally stamped by an Engineer and would not necessarily satisfy NWB licence application requirements.

For the sections of the DEIS identified as lacking or containing insufficient information, recommendations have been provided concerning the information that should be included in the revision of the appropriate sections of the FEIS. Recommendations have also been made with respect to the extent to which the scope of some plans should be expanded, as well as ways to consolidate and streamline management plans so as to increase functionality and reduce redundancies. It is believed that the comments and recommendations provided will assist in many ways in preparing the Type "A" Water Licence Application(s) that will accompany the Final Environmental Impact Statement (FEIS).

#### **Summary Inuktitut**

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#### Introduction

On February 11, 2014 the Nunavut Impact Review Board (NIRB or Board) initiated the public technical review period for the Draft Environmental Impact Statement (DEIS) submitted by Sabina Gold & Silver Corporation (Sabina or the Proponent) for the Back River Project proposal received on January 20, 2014. Following the receipt of Sabina's response to initial Information Requests (IR) received from parties, on July 31, 2014 the NIRB invited interested parties to provide the Board with their technical review comments regarding the DEIS for the Back River Project by September 29, 2014. This deadline was later extended to October 10, 2014 at the request of Natural Resources Canada (NRCan).

The Back River Project (the Project) is a proposed gold mine project to be undertaken within the West Kitikmeot Region of Nunavut. The Project, which is owned by Sabina Gold & Silver Corp. (Sabina), is composed of three main areas with interconnecting winter roads: the Goose Property, the George Property, and the Marine Laydown Area (MLA) situated along the eastern shore of southern Bathurst Inlet.

The Project involves the construction, operation, closure and reclamation, and post-closure monitoring of open pits and underground gold mine, with a total ore production of 15-20 million tonnes to be processed at the single mill at the Goose property. The Project shall include several mineral targets to be mined through Umwelt, Llama and Main open pits and Umwelt underground mine at Goose Property and Lone Cow Pond North (LCP North), Locale 1, and Locale 2 open pits at George Property. Annual resupply will be completed using the MLA, located in Bathurst Inlet, and winter ice roads will be utilized to interconnect these sites.

The entire lifespan of the proposed project, from construction to reclamation and post-closure monitoring of the mine, is estimated at twenty-nine (29) years.

In its request for submissions, the NIRB indicated that Sabina had requested a joint review for the project proposal in accordance with the *NIRB and NWB Detailed Coordinated Process Framework* (DCPF), and the NIRB and NWB have agreed to coordinate their review processes to the extent possible. The DCPF allows the Proponent to include in the DEIS specific information required for either the NIRB process or the NWB process. It also provides an opportunity for the proponent to satisfy, where possible, information requirements of both the NIRB and NWB review processes, simultaneously, by submitting the information to the NIRB at the initial stage(s) of the process. In addition, it provides directions to the NIRB and NWB concerning the approach that can be taken when conducting a joint review of any DEIS.

The information provided in the DEIS associated with the water licensing process can be found within several volumes of the DEIS; however, the draft Type "A" Water Licence Applications

within Supplemental Information Guidelines (SIG) requirement tables and associated information are contained within Volumes 11 and 12 of the DEIS. The Environmental Management Plans (EMPs) are included within the Volume 10 of the DEIS.

Although the NWB has reviewed all 12 Volumes of the DEIS to varying extent, the NWB recognizes that additional information submitted by Sabina since the submission of the DEIS and the commitments made during the NIRB technical meeting capture generally the NWB questions and comments related to the Project areas' general environmental and socio/economic description and methodologies used for project study and description contained in the Volumes 1-9 of the DEIS.

Given the fact that the NWB's general mandate is the management of fresh-water through the regulation of water use and waste deposit activities, the NWB has reviewed thoroughly the relevant sections of the DEIS and more specifically the Volumes 10-12, and compiled below a list of comments and/or recommendations arranged sequentially by volume and sectors, in order to assist Sabina in the preparation of a complete final Type "A" Water Licence Application package(s) within the Final Environmental Impact Statement.

Comments and/or recommendations that apply to more than one Volume are listed under the general comments section.

#### 1.0 General Comments

- a. Minimum set-back distance above the ordinary high water mark of freshwater bodies for situating proposed project infrastructure is being listed as thirty (30) metres instead of thirty-one (31) metres in some of the plans and sections of the DEIS. It is recommended that the set-back distance in all plans and relevant sections of the DEIS be revised to thirty-one (31) metres, except in cases where authorized to allow for consistency with that of Indian and Northern Affairs Canada's (INAC or AANDC) Land Use guidelines and the NWB general licensing conditions.
- b. Where applicable, some of the Environmental Management Plans (EMPs or Plans) should be streamlined so as to reduce redundancies and increase the fluidity and ability for reviewers to easily locate appropriate information when required.
- c. Some Plans rely solely or excessively on information contained in related Plans that should have been included in the particular Plans. To ensure that the reviewers and users of those plans are able to access the information as readily as possible, it is recommended that attempts be made to decrease referencing or excessive reliance on related Plans for information that should and could be easily included in a particular plan.
- d. General Monitoring requirements are discussed in a limited way in the DEIS. It is recommended that a comprehensive, stand-alone monitoring plan be submitted with the FEIS to address monitoring requirements specific to water use and waste disposal activities. Further, it is recommended that the Quality Assurance and Quality Control Plans (QA/QC) also be provided for addressing both field sampling and laboratory analyses procedures.
- e. EMPs contain management and monitoring strategies provided for different phases of the project (construction, operation, closure and post-closure). However, it is often difficult to clearly differentiate which phase(s) of the project that the information in the management plans are addressing. Management and monitoring strategies during the mine care and maintenance are minimally discussed in EMPs. It is recommended that the strategies and management plan clearly identify the phase(s) that they are addressing.
- f. It is indicated that 5 years for Post-Closure Monitoring will be needed. Based on outcomes related to northern mines currently undergoing reclamation and post-closure monitoring (Nanisivik, Polaris) phases, the lifespan for Post-Closure Monitoring could be longer than 5 years; as such, it is recommended that contingencies be included to allow for an extended period of post-closure monitoring, if necessary, to achieve complete stability of project sites.
- g. No studies have been provided detailing the water quality of lakes that will be used to support the construction and maintenance of the winter road corridor (i.e. Lakes A –

Lakes O; Bathurst Inlet to Goose and George Properties. It is recommended that this information be included in the FEIS.

h. It is stated that a third 220-km-long winter road, connecting the Project to the Tibbitt to Contwoyto Winter Road is under consideration. Based on the information provided by Sabina during DEIS Technical Meeting (TM), this winter road is no longer under consideration and should therefore not be included in the FEIS.

# 2.0 Draft Type "A" Water Licence Applications – Mine Sites and Access

The Cover Letter accompanying the draft Water Licence Applications stated that the NIRB review process is considering all components and activities of the Back River Project under file NIRB No. 12MN036; however, for permitting, Sabina is applying for two Type "A" water licences:

- Back River Project Mine Sites Type "A" Water Licence Application, which includes mine site development and operation at the Goose and George Properties; and
- Back River Project Access Type "A" Water Licence Application, which includes the Marine Laydown Area and the winter road corridors.

Volumes 11 and 12 and respective Appendices V11-1A to V11-9 and V12-1A to V12-2J, and associated documents of the DEIS were reviewed for completeness and consistency with the NWB Guide 4<sup>5</sup>. The review determined that the following items should be addressed:

#### **Water Licence Application Form - Mine Site**

#### a. Block #4 (Location of Undertaking)

Based on information provided in this section of the application, Project components such as the George Camp and the George Connecting Road Junction are outside the provided 'Project Extents'.

The coordinates provided in the water licence application places the George Camp in the Back Watershed, Upper Back Sub-watershed (WMA 31), which is trans-boundary with the North West Territories. The maps in the DEIS place the George Camp in the Queen Maud Gulf Watershed, Bathurst Inlet–Burnside Sub-watershed (WMA-30).

The project coordinates provided on the water application (Mine Sites) do not match the spatial distribution provided on maps in the DEIS, specifically:

It is recommended that confirmation of the above-mentioned project extents as well as that of the George Property and Camp coordinates be provided in the FEIS.

#### b. Block #5 (Maps)

To address the requirement in this section, NTS Map Sheets No: 76G (Beechey Lake) and 76J (Tinney Hills), referenced respectively, were provided to a scale other than that

<sup>&</sup>lt;sup>5</sup> Guide 4, Completing and Submitting a Water Licence Application for a New Licence, April 2010

specified by NWB in Guide 4, 1:50,000. The NWB has noticed that some of the maps are of appropriate scales in the Project. It is recommended that appropriately scaled maps be provided within Water Licence Application(s) / referenced to satisfy the requirement of Guide 4.

#### c. Block #13 (Quantity and Quality of Water Involved)

Information contained in this section of the form states that 70 m<sup>3</sup> of water per day will be used for Industrial (miscellaneous) purposes at both of Goose and George Properties. The water use required should be re-assessed and confirmed, taking into consideration of all potential miscellaneous uses including dust suppression and machinery washing at sites as water use for Industrial (miscellaneous) purposes of Meadowbank Gold Mine is much higher.

#### d. Block #13 (Quantity and Quality of Water Involved)

The information provided in this section of the form indicates that Goose and Propeller Lakes will serve as sources for Industrial (miscellaneous) and Industrial (mill) use, respectively, at Goose Property; and George and Fold Lakes as sources for Domestic and Industrial (miscellaneous) use at George Property. However, the anticipated quantities of water to be used from each source are not provided. It is recommended that the table should include details on quantities of water required from each source.

#### Water Licence Application Form - Access

#### e. Block #13 (Quantity and Quality of Water Involved)

Details contained in the application indicates that 20 m<sup>3</sup> of water per day will be used for Industrial purposes at MLA. The water use amount should be re-assessed and confirmed taking into consideration all potential miscellaneous uses including dust suppression and machinery washing at MLA.

#### f. Block #13 (Quantity and Quality of Water Involved)

Information contained in the application indicates that 21 Potential Fresh Water Sources will be used to supply up to 121,500 m³ of water annually for the construction and maintenance of winter roads. However, anticipated quantities of water to be used from each water source are not provided. It is recommended that water quantity information for each water source be provided.

#### Water Licence Application Form – Mine Site and Access

#### g. Block #21 (Security Information)

This block requires that an estimate of the total financial cost for final reclamation be provided. The conceptual Closure and Reclamation Plan DEIS Volume 10 Chapter 29 is referenced as containing the required information. However, the conceptual Closure and Reclamation Plan does not provide the reclamation cost estimate. It is recommended that this information be included in the FEIS. Further, the most recent version of the RECLAIM model should be used to assess the reclamation cost.

#### h. Block #23 (Studies Undertaken to Date)

In response to this item, it is stated that comprehensive baseline studies have been initiated at the Project and that results from this ongoing work will be presented in baseline reports and used in ongoing feasibility studies. It is recommended that a list of studies relevant to the application be included on the application form in addition to appropriate referencing to the FEIS.

#### i. Miscellaneous Items

As required by the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Nunavut Waters Regulations* (Regulations), a complete application shall include subsection 12(7) (b) of the Regulations.

To calculate fees for the project, Aboriginal Affairs and Northern Development Canada (AANDC), Land and Water Management, NCR, Water Use Fee Calculator, (Ver. 1.4) shall be used.

#### 3.0 Back River Project Description

The information in this section appears to be mostly complete. In certain sections of the DEIS, there were few or no details with respect to the locations of receiving water bodies and drainage pathways (i.e. for landfills, details in the DEIS are limited to the following "Drainage pathways from the landfills will be sampled and monitored in conformance with Water Licence requirements). Mitigation measures are noted throughout the document that concern drainage pathways (e.g. "prevent oil from reaching natural drainage paths leading to the ocean"), but their locations are not specified.

- a. Section 4.2.a, Pg. 4-10, Raw Water Intake, should provide water intake design information. V.10-7, Site Water Monitoring and Management Plan (SWMMP), should be updated to include water intake, and generally all water infrastructures design details.
- b. Section 4.2.b, Pg.4-11, Water Storage and Treatment, should indicate the Propeller and Lower Long Lake supplemental water sources to be used.
- c. Section 4.2.d, Pg. 4-11, Location of Proposed Receiving Waterways, states *it has been assumed that Goose Property would operate as "zero-discharge."* Mitigation measures should be provided should discharge be required during mine operation. V.10-7 SWMMP should include these contingency measures.
  - Further: It has been assumed that George Property also would operate as "zero-discharge." However, according to Volume 10-7 SWMMP" treated sewage effluent will be land discharged at a location south of the Locale 2 Waste Rock Storage Area (WRSA) as shown on Figure 3.2-2. The effluent will ultimately report to the stream downstream of Sleigh Lake and upstream of Esker Pond". This should be clarified.
- d. Section 4.2.h, Pg. 4-13, Sewage Treatment Facilities and Discharge, states that "for the Operation phase, the sewage treatment plant will be decommissioned and raw sewage will be pumped to the Tailings Impoundment Area (TIA) (zero discharge facility)". As per AANDC request, Sabina clarified that sewage will be treated before being pumped to TIA. This should be made clear in future submission.

- e. Section 4.2.i.2, Pg. 4-14, Oily Water Treatment Methods, states that "during construction the excess water will be released to the receiving environment. During operation, these discharges will be routed to the Tailing Impoundment Area". It should be indicated the mean and frequency of excess water being routed to TIA from George Site.
  - The NWB acknowledges that Sabina committed to providing more details in the FEIS on the waste water management strategy including sewage effluent discharges. This will include discharge locations and the characteristics of those locations as well as impacts on the receiving environment, attenuation capacity, end of pipe locations, seasonal considerations, alternatives, and design or engineering contingencies.
- f. Section 4.2.1, Pg. 4-15, Landfills and Landfarms, states that "non-combustible non-hazardous materials will be at the Goose Property landfill". According to Figure 4.1-2, Project Development Area and Infrastructure Areas George Property "a landfill will be operating at George Site as well". According to Volume 10-7, Site Water Monitoring and Management Plan, Section 3.4.5, "Landfills will be constructed and operated at each of the Project properties".
  - Inconsistencies with respect to future landfills and their potential locations should be addressed in the FEIS.

#### 4.0 Baseline Information

#### **Environmental Setting**

The information in this section appears to be mostly complete, although it was not entirely provided in the locations referenced in the SIG. Two potential incomplete areas include the following:

- a. The history of the property development, including current status maps of the project properties would be helpful; and
- b. The data source for local watersheds is not provided in the DEIS (e.g. Big Watershed, Swan Watershed, Moby Watershed). Details should be provided on whether these boundaries were delineated by Consultants or are the official boundaries determined by an appropriate agency (e.g. Water Survey of Canada).

# 5.0 Appendices V11-1A and V12-1A: SIG Concordance

The review of the information contained in the SIG Concordance Table accompanying the water licence applications has determined that the referencing to the DEIS provided are mostly valid. There appears to be sufficient information in most areas; however, the references provided were for entire volumes (i.e. Volume 1 to Volume 12 and Volume 10-1.0 to 10-29). It is recommended that more specific references and examples be provided in the FEIS.

There are some instances, however, where no referencing is provided because the information was apparently not available for inclusion during the draft of the DEIS. In order to ensure that the information related to the water licence application is consistent and readily accessible for

consideration during the next stage of the review process, it is recommended that the Concordance Table be updated accordingly in the FEIS.

# The SIG Concordance Table indicates that the following information will be provided in the FEIS:

#### **5.1** Water Licence Application Form Information Requirement

- a. Section 3.16: Timetable for filing the appropriate plans and procedures required by other authorities. Description of how those authorizations may affect the NWB's water licensing process.
- b. Section 3.19: Inuit water Rights: Compensation agreements or status.
- c. Section 3.20: Results of Consultations: A Consultation List is provided in Appendix V3-2A that details various meetings with government agencies that may be of concern to the NWB (e.g. DFO consultations); however, the outcomes/results of those consultation sessions is not provided (e.g. no action items, track-record of issues raised, etc.).
- d. Section 3.21, Security: Financial security assessment that is prepared in a manner consistent with principles respecting mine site reclamation and implementation found in the *Mine Site Reclamation Policy for Nunavut*, Indian and Northern Affairs Canada, 2002.
- e. Section 3.26, Annual Reporting: Detailed information regarding the content of annual reports and a proposed outline or template of the annual report.

### **5.2** Baseline Information Requirements

a. Section 5.1, Environmental Setting: Description of streambed material, stream-bank material, and stream-bank vegetation for any streams affected by the application; The slope of the banks of any water course and the description of the meander pattern for any channel affected by the application;

#### **5.3** Water Use Information Requirements

- a. Section 6.2a, Water Use: Quality and Quantity, Water Intake: Description of the water intake method(s) including the intake facility, the operating capacity of the pump used, the details of any screening to exclude fish, and the distance the pump will be placed from the ordinary high water mark.
  - O Description of the general condition of any existing water intake facility; water withdrawal regime; amount of water returned to the source.
  - O Description of any hydrostatic testing programs, including water sources of the watercourse.
- b. Section 6.2b Water Storage: Plan showing representative cross-sections of the reservoir.
  - Most of Water Storage information regarding the Access Type "A" Licence Application.
- c. Section 6.2d Water Crossings: Plan of any watercourse crossing showing cross section and elevations.

- d. Section 6.2h Alterations in flow: If alteration involves a dam, a plan showing the length, height, cross section and elevations of the dam and the location and preliminary designs of spillways, canals, sluice pipes, and any other outlet work.
- e. Section 6.2k Modifications: Whether any changes are planned for the water intake.
- f. Section 6.21 Proposed Water Works.
- g. Section 6.3, Predicted Environmental Effects and Proposed Mitigation Measures: If the cross-section of any watercourse is changed, a description of the change and its effect on the flow capacity of the channel.
  - If the course of any channel is changed a description of measures to maintain stream bed and bank stability.
- h. Section 6.4 Studies: Construction plan and construction schedule for water works;
   Implementation schedule for construction of works.
   Construction quality assurance and quality control plans regarding the Access Type "A" Licence Application.

#### **5.4** Waste Disposal Information Requirements

- a. Section 7.2b Modifications: Whether any changes are planned for the wastewater, solid waste, or any other waste facilities
- b. Section 7.2c, Proposed Waste Facilities.
- c. Section 7.3, Predicted Environmental Effects and Proposed Mitigation Measures: Detailed treatment plans for discharges from any tailings containment area, attenuation pond, reclaim pond, sewage disposal area, sumps or dewatered area; description of the sub-surface soil compositions and provide information on groundwater elevations for the project area. The proximity between the proposed waste disposal system and the groundwater elevation;
  - Discussion of the consequences of long-term stratification in any pit lakes and associated contingency plans;
- d. Section 7.3a, Operations and Maintenance: Stand-alone Operations and Maintenance Manual for sewage and/or solid waste disposal facilities in accordance with the "Guidelines for the Preparation of an Operations and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories, 1996" as well as the "Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories, 2003".
- e. Section 7.3c, Emergency Response and Spill Contingency: Designs for the fuel tank farm facilities including a description of the nearest water bodies. An evaluation of impacts and mitigation measures in case of a fuel spill.
  - Explanation of how the applicant will ensure project contractors meet the applicant's due diligence standards with respect to oil and hazardous material spill prevention, preparedness, response, and restoration.
- f. Section 7.4 Studies: Inspection plan;
  - Geotechnical and structural monitoring:
  - Human health and ecological risk assessment for establishment of remediation objectives for closure;
  - Construction plan and construction schedule for waste management infrastructure; Implementation schedule for construction works, submission of studies and mitigation plans for operations regarding the Access Type "A" Licence Application;

#### **5.5** Monitoring Information Requirements

- a. Section 8.1 Monitoring Plan.
- b. Section 8.1a Inspection Plan: Inspection Plan including a description of the methods, procedures, standards, and schedules proposed. Inspections may be required for engineered facilities related to the management of water and waste as well as spills. The Inspection Plan must consider the life of the project, temporary closure and permanent closure.
- c. Section 8.1b QA/QC Plan: Quality Assurance/ Quality Control (QA/QC) Plan that addresses both field sampling and laboratory analyses.

# 6.0 Appendix V11-4A: Geochemical Characterization and ML/ARD Potential Report

- a. Sections 3.2.1.2 and 3.2.1.3, Pg. 3-7, it is stated that no overburden samples have been collected from the George Property and MLA, respectively, for the geochemical characterization. Samplings are to occur.
- b. Sections 3.2.2.2 and 3.2.2.3, Pg. 3-8, it is stated that no proposed quarries have been sampled at the George Property and MLA, respectively, for the geochemical characterization. Samplings will occur as the characterization program progresses and quarries are identified.
- c. Mine Workings and Waste Rock Section 4.3.2.1, Pg. 4-36, Mineralogy states that R-XRD (X-ray diffraction) analyses were completed on George Property in the fall 2013. No results available yet.
- d. Mine Workings and Waste Rock Section 4.3.2.2, Pg. 4-44, Leachate states that leachate tests were completed on George Property in the fall of 2013. No results available.
- e. Ore and Low Grade Ore Section 4.4.2.2, Pg. 4-49, states that to date no SFEs (Shake flask extraction leachate test) have been performed on George Property samples.

# 7.0 Appendix V11-4C: Waste and Water Management Report for Draft Environmental Impact Statement

- a. Tailings Impoundment Area, Table 3-1 Design Basis Summary indicates 49% solids of tailings from mill process as TIA design criteria. Contingency measures should be provided in the case if tailing slurry density is to be changed as in the beginning of another northern project, Meadowbank Gold Mine operation with close design criteria (51% solids) pipe sanding issue occurred in winter. With less percentage of solids content additional water use may be required.
- b. Knight Piésold (KP) Appendix D VA13-01716 Groundwater Mine Inflows Memorandum, Pg. 6, it is stated that groundwater inflows up to about 10 L/s are expected to be encountered as a result of structures such as faults. It is also suggested that based on professional experience and information in the literature (Freeze and Cherry 1979), higher inflows as a result of the mine working intersecting a permeable fault would likely decrease relatively quickly with time. The "decrease relatively

quickly" should be quantitatively assessed to plan for the management of "short-term" higher inflows.

### 8.0 Appendix V11-4D: Goose Property Water Quality Prediction Report

- a. Goose Property Water Quality Model Section 3.11, Pg. 3-20, Process Plant Discharge indicates that *the tailings production rate will be 5,000 tpd, piped out to the TIA as slurry comprising 65% solids.* However, throughout the DEIS documents the tailing slurry density is stated as 49% solids.
- b. As stated also in Appendix 3A KP Consulting Water Balance Memo the base water balance model *does not include downstream compliance points, which may be necessary for the EIS.*
- c. Appendix 3C KP Consulting 2013 Groundwater Mine Inflow Estimates indicates that analysis for Feasibility level design purposes would be improved by incorporation of advancements to the structural model being developed by Sabina for the Goose and George Properties, specifically with respect to the mine development, to improve the identification and characteristics of potential structures which may contribute to higher inflows during mine development. The NWB concurs with this conclusion.

#### 9.0 Volume 10: Management Plans

#### 9.1 Water Management

*Volume 10-7 Site Water Monitoring and Management Plan* (SWMMP or Plan) outlines Sabina's strategies for managing water at the Back River Project. The Plan will likely be revised for the FEIS. The Plan shall at a minimum include the followings additional information:

- a. Section 3.2.2, Pg. 4, Estimated Water Consumption, Table 3.2-1 provide Water Supply Locations and Volumes by Project Phases. However, does not provide a breakdown for Goose Lake and Propeller and other lakes, and for George Lake and Lower Long Lake and other lakes. The updated Plan shall provide these estimations.
- b. Section 3.2.3, Pg. 4, Winter Road should provide water supply locations for the winter roads preparation with respective anticipated consumption from each water source.
- c. Section 3.3.2, Pg. 9, Goose Property Sewage Treatment and Disposal should provide the treated sewage discharge on land location details before the TIA's construction and after its decommissioning in the Goose Property.
- d. Section 3.4.3, Pg. 13, states that there is the requirement for a thirty (30) metre set-back from water-bodies for treated oily water discharge on land. It is recommended that the set-back distance be changed to thirty-one (31) metres so as to be consistent with NWB general licensing conditions.
- e. Section 3.4, Pg. 12-14, Water Management General Site Runoff, Tables 3.4-1, 3.4-3, 3.4-4, 3.4-5 and 3.4-6 proposes Water Discharge and Quality Criteria. The updated Plan should indicate what respective Guidelines are being used for the proposed Criteria. Discharged water quantities and qualities should be estimated at all Project sites (i.e. waste rock contact water, treated sewage, collection ponds, fuel containments, on-land discharges etc.), and anticipated discharge locations should be provided.
- f. Section 3.4.2, Pg. 12, Soil Landfarms should provide details on landfarm designs and management or reference the document providing this information.

  The NWB recommends including a Landfarm Management Plan within the FEIS.
- g. Section 3.4.4, Pg. 13, Quarries and Borrow Areas states that "runoff will be collected within the work area and will only be discharged to land if meeting the water quality criteria in Table 3.4-5".
  - Details on runoff containment should be provided.
- h. Section 3.4.5, Pg. 14, Landfills states "Landfills will be constructed and operated at each of the Project properties" and provides landfill seepage criteria for MLA, Goose and George Sites landfills without providing details on landfills designs and management or reference the document providing this information.
  - The NWB acknowledges that the Landfill and Waste Management Plan is also conceptual and does not provide at this stage landfills design details. Besides that, according to the Volume 11, Section 4.2.1, Pg. 4-15, Landfills and Landfarms, "non-combustible non-hazardous materials will be at the Goose Property landfill". This should be clarified.

- i. Section 3.5.2, Pg. 15, Water Intakes should provide location, depth and design details on all water intakes for every water sources (Goose Lake, George Lake) including the one on Bathurst Bay for the Marine Laydown Area (MLA) water supply.
- j. Section 3.5.5, Pg. 16, Water Supplementation Pipeline from Propeller to Goose Lake states that "the Project includes the construction of a pump house and pipeline to potentially supplement the water demand of the milling operation from Propeller Lake, and to support active pit filling during closure" Designs details on pump-house and pipeline should be included within the updated
- k. Section 3.6.2, Pg. 17, Site Water Balances states that "the contact water will be stored in collection ponds prior to treatment at the water treatment plants to regulate inflows". The future updated Plan should provide contact water treatment details, design and management of collection ponds at George Property.

Plan.

- 1. Section 3.6.3, Pg. 23, Open Pits should also provide the extent of Llama Lake talik zone and assess project impacts on the Llama Lake talik zone through all phases of mining activities and closure.
- m. Section 3.6.4, Pg. 24, Umwelt Underground Mine states that "the Umwelt underground development is planned to a depth of approximately 660 m below ground surface (mbgs). At this depth, the planned workings will be approximately 260 m below the permafrost". Although it is stated that "average groundwater inflows have been estimated at between 1 and 2 L/s (Knight Piésold, 2013b)."
  - Groundwater and potential saline water inflow estimation should be re-assessed as well as details on management and monitoring of saline inflows throughout the Project development should be detailed in the updated Plan.
- n. Section 3.7.3, Pg. 26, Waste Rock Stockpiles states that "at the Goose Property, runoff from the WRSAs will be collected in the operation phase".

  The management of runoff from the Waste Rock Storage Areas (WRSA's) at George
  - The management of runoff from the Waste Rock Storage Areas (WRSA's) at George Site during operations should also be clarified.
  - It is also stated that "at closure, Potentially Acid Generating (PAG) waste rock stockpiles will be covered with a 4m cap of not PAG (nPAG) waste rock to promote the aggregation of permafrost in the piles so that the PAG rock remains permanently frozen". Figure 3.7-1 indicates 2m nPAG Cover for TIA. The rational should be provided on why 4m nPAG covering cap is planned for WRSA and 2m nPAG cap for TIA
- o. It is not clear whether the underground mine inflow is included within the site water balance model (it seems no). A Water Balance shall also include annual estimates for each lake, water volume change, volume remaining and water level throughout the Project multi-phased development.
- p. Monitoring details for each of Project sites should be included with an explanation on how this level of monitoring will be effective.
- q. Water treatment options for each of Project sites should be included with treatment details for potential contaminants.

- r. According to V. 2 Project Description, Section 6.4.12 "as part of the Site Water Monitoring and Management Plan, a drainage plan has been developed for the Marine Laydown Area".
  - This drainage plan for MLA wasn't found within SWMMP. A drainage Plan for MLA should be included within the Plan.
- s. The Plan provides just preliminary information regarding the Groundwater.
  - The NWB has acknowledged that Sabina committed to detail the management of groundwater for each phase of mine activities. The extent and potential formation/decline of taliks, including potential through-taliks, anticipated groundwater and saline water inflows and pathways estimations including through fault zones, effects on being re-flooded open pits water quality and quantity and other aspects of groundwater shall be detailed.
  - The NWB also acknowledged that Sabina committed to provide results of any groundwater modelling completed for Llama pit.
- t. The Plan should detail water management (including groundwater) for different phases of the project including construction, operation, closure and post-closure. A water management strategy for care and maintenance phase should also be developed.
- u. Lake Dewatering and Pit Re-flooding Plans shall be included within the SWMMP.
- v. Design criteria and drawings for all water management infrastructures (pump-house, intake, retention dikes, diversion ditches, run-off management, water crossings and works, and seepage and groundwater inflow collection structures and ponds) should be provided within the final Application.

#### 9.2 Waste Management

#### 9.2.1 Solid Waste

Inconsistencies noted with respect to the potential construction of landfill in George Property and MLA. According to Volume 11 Section 2 Minimum Application Requirements and Section 4 Back River Project Description landfilling is planned at Goose Property only. However, throughout the DEIS documents and figures landfills construction/operation is likely planned in George Site and MLA as well. These inconsistencies should be addressed.

Although the *Volume 10-10 Landfill and Waste Management Plan* (LWMP or Plan) is conceptual at this stage, the NWB has reviewed it and identified the following additional items, which should be addressed at a minimum within the updated Plan that shall likely accompany the FEIS.

- a. Waste management strategies and plans shall be elaborated with respect to each phase of mining: construction, operation, closure and post-closure.
- b. Waste management recycling/reusing initiatives, operating procedures at the mine shall be developed in detail with respect to each phase of mining: construction, operation, closure and post-closure.
- c. Estimated volume and types of waste generated during each phase of mine activities should be provided.
- d. Landfill design and management details should be provided. Expected changes to landfills operations and maintenance during each phase of mine should be described.
- e. Details on water potential run-off structures or measures and run-off management should be provided.
- f. Details on environmental monitoring during each phases of mine activities should be provided.

#### 9.2.2 Hazardous Waste

**Volume 10-12 Hazardous Materials Management Plan** (HMMP or Plan) is conceptual and shall be updated for the FEIS. The following additional information shall be provided at a minimum within the next version of the Plan:

- a. Hazardous materials anticipated quantities and inventory list with types, anticipated quantities, and sources of generation and description for each phases of mine activities.
- b. Details on environmental protection measures to be implemented to ensure Hazardous substances efficient and environmentally compliant collection, storage, transportation and disposal.
- c. Details on collection and temporary storage sites within the George and Goose Properties and main storage facility at the Marine Laydown Area. Details on types and estimated numbers of containers that will be on-site throughout the project development.
- d. Details on Hazardous materials transportation from temporary storage sites to the main storage facility at the Marine Laydown Area.

- e. Spill response considerations, procedures and reporting for all Hazardous substances applicable to each mine phase. Spill kits/emergency response equipment quantities and types, and available on-site locations.
- f. Temporary storage and main storage facilities design and management details. Expected changes to facilities operations and maintenance during each phases of mine.
- g. Map of appropriate scale with Hazardous materials storage facilities, and spill kits location, at a minimum.
- h. Details on potential run-off water structures or measures and run-off management.
- i. Details on employees training requirements and programs.
- j. Details on associated Monitoring programs.
- k. Details on internal/external inspections and audits.
- 1. Design details (drawings) are to be included.

#### 9.2.3 Ore, Mine Waste Rock and Tailings

The *Volume 10-8 Ore Storage Management Plan* (OSMP or Plan) is designed to cover operational procedures, the implementation of environmental protection measures, and monitoring the effectiveness of any mitigation strategies when managing stockpiles ore. The next update of the Plan should include, at a minimum the followings:

- a. Section 3.3, Pg. 6, Production Overview indicates that "the size of the stockpile at the George Site will vary between 80 and 430 kt", and the Section 3.5, Pg. 7, George Site Ore Stockpile Methods and Procedures state that for George Pits "storage design requirement for the pit is approximately 500 kt".
  - The NWB believes that those inconsistencies would be eliminated with design details.
- b. Section 6.1, Pg. 8, Runoff Management states that "the collection ponds constructed for the ore stockpiles will apply the same design criteria as has been developed for the WSRAs, in terms of managing extreme flows".
  - The next version of Plan should provide run-off management infrastructures' (ditches and ponds) details including design criteria.
- c. Section 7, Pg. 9, Monitoring Program should be detailed to include also inspection/monitoring frequency and phased monitoring requirements (i.e. Operations, Temporary Closure or Care and Maintenance, Post-closure).
- d. Design details (stockpile design, foundation requirements and runoff management etc.).

#### 9.2.4 Waste Rock and Tailings

The *Volume 10–9 Mine Waste Rock and Tailing Management Plan* (MWRTMP or Plan) applies to the construction and operation phases of the Project during which time both waste rock and tailings will be produced, as well as the closure/post-closure phases of the Project while waste rock and tailings will be permanently stored at the site. The Plan is more or less conceptual and, as such, it includes in some cases more than one proposed or alternative options for addressing components like Waste Rock Disposal and Management Alternatives, or runoff water management. Once details become available, more definite options should be presented.

The SIG requirement to "provide an assessment of alternatives for any proposed tailings containment facility" was acknowledged as not applicable by the proponent. A very brief discussion of a management alternative is provided in *Mine Waste Rock and Tailing Management Plan* (Section 3.2.9), but there is a potential need for a more elaborate discussion of how the proposed Tailings Impoundment Area (TIA) site was selected.

- a. Inconsistencies on numbers of total Waste Rock volumes that will be produced over the life-of mine in Waste Rock and Tailings Management, Pg. iv, and throughout the Plan.
- b. Section 3.1.3, Pg. 3, Waste Rock Stockpile Areas states that "waste rock generated by the Project will be contained in Waste Rock Stockpile Areas (WRSAs) located near to the open pits".
  - Other that stating that "each of the WRSAs has separate PAG and nPAG piles that will share a common water management system" there is insufficient information pertaining to the associated drainage areas or water management systems.
- c. Section 3.1.7, Pg. 9, Waste Rock Thermal Modeling states that "strategy of incorporating the PAG waste into the permafrost was developed based on computed depths of freeze and thaw".
- d. Provided estimates should be refined with available data. It should be clarified whether or not this thermal modeling would be applicable to TIA as well.
- e. Sections 3.1.8, Pg. 9, Waste Rock Management Alternatives shall detail all management alternatives with rationale on selected option.
- f. Section 3.2.1, Pg. 9, Tailings Physical Characteristics suggests 49% for Slurry Percent Solids.
- g. How those properties were determined? Whether or not other northern mining experiences (i.e. Meadowbank Mine) were taken into account for the determination of Tailings Slurry density?
- h. Section 3.2.3, Pg. 10, TIA Design Basis will take into account 16,3Mt of Total Ore milled as a Design Criteria. It is also stated that "should additional mineral resources be identified for mining and processing, additional raises to the TIA embankment will be necessary and should be possible".
- i. The TIA Design Criteria should assess additional possible raises to the TIA embankment for potential additional Ore. The TIA Design Criteria should also take into account that more freshwater than projected may be used (i.e. as a result of slurry density change etc.) that will increase the amount of waste water to be discharged into TIA.
- j. Section 3.2.9, Pg. 16, Tailings Management Alternatives states that "a potential alternative for tailings disposal is to deposit the tailings into one (1) or more of the open pits when mining at a pit has ceased, and that this alternative for tailings disposal will be considered in the feasibility study".
- k. The potential alternative shall be detailed and rational on selected option provided within the updated Plan.
- 1. Limited information pertaining to the monitoring is provided in the *Plan*.
- m. The Monitoring Plan must consider the entire life span of the project and include also provisions for care and maintenance or temporary closure, and permanent closure. The Monitoring Plan should further include a description of the proposed methods,

procedures, standards, and schedules, while acknowledging that further conditions may be established in the Water Licence.

#### 9.2.5 Metal Leaching & Acid Rock Drainage

The *Volume 10-22 Metal Leaching and Acid Rock Drainage Management Plan* (MLARDMP or Plan) is designed to ensure that the ML/ARD potential of geologic materials disturbed by Project activities is identified and the potential for generation of ARD and ML is minimized to ultimately protect aquatic environment, particularly minimizing effects to water quality.

a. Section 6.1.2, Pg. 5, Mine Workings and Waste Rock ML/ARD Prediction Program Table 6.1-1 provides ARD of Waste Rock and indicates that "George Property proportions are not differentiated by deposit".

No explanation is provided with respect to the reasons of not defining ARD of Waste Rock for George Property's deposits. And it is also unclear how (or based on which waste rocks?) the ARD was calculated for George Property?

#### 9.2.6 Road, Borrow Pits and Quarries

The *Volume 10-14 Road Management Plan* (RMP or Plan) outlines construction, operation and management of access and transportation for the Back River Project including construction, operation and closure of an all-weather airstrip, connecting winter roads and associated rock quarries. In the reviewing of the Plan, the NWB has identified items that, at a minimum should be addressed within the next version of Plan:

- a. Section 4.2, Pg. 11, All-Weather Road Infrastructures states that the "Goose and George sites will require all-season roads in order to operate year-round. The roads will be constructed in a permafrost environment".
- b. Measures to protect the permafrost regime, to minimize the potential erosion, ponding of water etc. are to be detailed.
- c. Section 4.2.4 Pg. 13, Construction of All-weather Roads states that "Efforts shall be made to minimize the duration of any in-stream works and minimize disturbance at stream crossings".
- d. The Plan should clearly indicate that all in-stream works for water-bodies frequented by fish shall be completed in accordance with DFO relevant Guidelines.
- e. Section 7.3, Pg. 18, states that winter roads will be inspected and maintained in accordance with the Field Guide for Ice Construction Safety (Depart. Of Transportation, NWT(1), refer to section 3 of the field guide, "Ice Capacity and Testing").
- f. It is recommended that inspection and maintenance details including the frequency and type of inspections be included within the Plan.
- g. Design details (drawings) are to be included.

The *Volume 10-16 Borrow Pits and Quarry Management Plan* (BPQMP or Plan) outlines development, operation and closure of approved borrow and rock quarry areas within the Back River Project including the Goose and George Properties, and the MLA. The Plan is designed to

minimize adverse effects to downstream water quality and quantity due to quarry operations and the MLA. The next update to the Plan should at a minimum include the followings:

- a. Section 3.5.1, Pg. 7, Development Plans Rock Quarries states that "A detailed procedure will be prepared before the start of development for each rock quarry. Site development plans will augment this management plan with specific details". It is suggested that these site development plans be subsequently incorporated into the Plan.
- b. Section 7.1, Pg. 13, Monitoring Water Quality indicates that "During high runoff periods, water may drain from borrow and rock quarry areas. Should noticeable flows occur, the water will be tested to ensure it meets permitted criteria." If needed, run-off containment measures/structures (ponds) should be included within water management infrastructures. Structures' capacity should be enough to contain the high run-off during freshet.

Although the *Volume 10-13 Explosives Management Plan* (EMP or Plan) is generally conceptual at this stage, the NWB has reviewed it and identified the following items, which should be addressed:

- a. It is stated that "at the George site, there will be a laydown and storage area for up to 100 tonnes of inert AN". However, Volume 2, Project Description Section 6.7.7.1 and V.11, Type "A" Licence Application, Section 4.2.u.1 indicate that "up to 500 tonnes of ammonium nitrate will be stored at the George Property". Inconsistencies are noted on Explosive storage capacities in Marine Laydown Area and Goose Property in Project Infrastructure, Pg. iii-iv, and throughout the Plan. Explosive storage capacities should be confirmed to eliminate discrepancies between different documents.
- b. Details on management of potential run-off water associated with ammonium nitrate storage shall be provided. Information should be provided on where/how the run-off water will be disposed of / treated and what steps will be taken to ensure that it meets discharge criteria before being released.
- c. According to Figure 6-3 Goose Property General Arrangement the Explosive Storage is located on the water body?
- d. Although Figures 6-1 to 6-3 provide Explosive Management facilities anticipated locations in Marine Laydown Area, George and Goose Properties, however no design details (drawings) are included within the Plan at this stage.
- e. A Site-specific Ammonia Monitoring and Management Strategies shall be developed to identify potential sources of ammonia; estimate ammonia loading and identify the need for additional controls if warranted; and include procedures to assist in mitigating ammonia contributions from blasting agent spillage or other losses.

#### 9.2.7 Emergency Response and Spill Contingency

The SIG requirement to address phases of the project including construction, operation, closure and post-closure as well as procedures during care and maintenance is not generally reflected in the series of Environmental Protection Plans (EPPs) that have been prepared for the Project DEIS (i.e. phased approach not present). At this stage, certain aspects of Plans remain

conceptual, and the next updates will likely accompany the FEIS. This includes the following documents:

The *Volume 10-3 Risk Management and Emergency Response Plan* (RMERP or Plan) is to ensure that an adequate level of emergency preparedness is available for the construction and operation of the Project. The scope of this plan includes the Marine Laydown Area in southern Bathurst Inlet, and both the Goose and George Properties. The Plan will be further updated based on detailed engineering designs prior to the start of construction. The following aspects of Plan also need to be more detailed:

- a. Section 4.2, Pg. 14 Natural Hazards states that "an assessment of risk and identification of mitigation measures associated with effects of the environment on the Project can be found in Volume 9, Chapter 3 of the DEIS".

  Instead of referring to another Volume of DEIS the final RMERP should provide all risks related to potential natural hazards and identify mitigation measures during each
  - risks related to potential natural hazards and identify mitigation measures during each phase of mine activities: construction, operation, closure and post-closure.
- b. Section 4.3. Pg. 14 Accident and Malfunctions states that "specific risk assessments, root cause, consequences, and mitigation processes are itemized in Volume 9 of the DEIS".
  - The updated RMERP should assess all accident and malfunctions related risks and consequences and identify mitigation measures during each phase of mine activities.
- c. Section 5.5, Pg. 16 discusses Emergency Response Procedures that may generally be related to the accident and malfunctions.
  - The updated RMERP should also provide Emergency Response Procedures that could be related to the natural hazards (storms, extreme rainfall or snowfall, extreme low temperatures) and geo-hazards (seismicity, ground and slope instabilities).
- d. Section 5.5.2 Fire/Explosion does not detail the procedures for such fires when fighting them with extinguishers is not or not anymore practically possible.

  No emergency procedures associated with explosives are provided.
- e. Emergency Response Procedures should also detail as to how multiple emergency events will be handled.
- f. Site map(s) that is (are) specifically designed to emphasize emergency response element should be provided.
  - The map(s) should depict emergency response equipment, fuel caches, nearby water bodies, camp infrastructures, and other relevant information.

**Volume 10-5 Spill Contingency Plan** (SCP or Plan) is to respond to hydrocarbon or other contaminant spill incidents that may occur at the Project including MLA in southern Bathurst Inlet, and both the Goose and George Property, during construction and operation of the proposed mine.

The Plan is generally conceptual and qualitative as no quantitative information is provided with respect to the material and number/type of containments to be stored on sites during different

phases of mine. NWB review of the plan has identified the following items that should also be addressed:

- a. Section 2, Pg. 6, Table 2-1. Contains External Reporting Volumes for the list Contaminants. It is noticed that unanticipated seepages from TIA, WRSA, landfills, containment ponds etc. have not been considered spills under the Plan. These seepages should be considered "spills" as they have unintentionally or accidently been allowed to breach their intended containment and may have an adverse impact on the environment.
- b. Section 7, Pg. 15, Spill Response Equipment states "that a vehicle outfitted with a self-contained collection of spill response materials for rapid deployment to spill sites will be utilized. Table 7-2 lists the typical content of mobile environmental emergency trailer that will be located on site at each of the Back River Project properties". However, besides the mobile environmental emergency trailer, spill kits shall permanently be located at various sites of each property as multiple spills events may occur simultaneously at different locations.
  - It is recommended that an explanation be provided as to how multiple events will be handled simultaneously.
- c. Section 8.3.2, Pg. 20, Domestic Sewage, Solid Waste and Contact Water states that "any problems with the sewage treatment system, incinerator or other waste disposal systems will be promptly reported to the Site Superintendent" without providing details regarding spill responses related to these types of materiel spilled. It is suggested that each camp be listed along with sewage storage facilities and/or treatment facilities and the amount of sewage generated. In addition, this section should include spill response procedures for addressing broken/dislodged sewer lines.
- d. Section 8.4, Pg. 21, Response to Fire refers to relevant site firefighting procedures without providing at a minimum the water use related information.
- e. Procedures for responding to spills involving fuel transport trucks should be included in the Plan.
- f. Appendix A lists the Hazardous Materials Transported, Stored and Used On-site with their descriptions and potential management and pollution prevention strategies.
- g. This table should also contain an estimated inventory and containment types of Hazardous Materials stored on-site at any given time. Responses to Ammonium Nitrate potential spill to water shall also be included within the list.
- h. Site map(s) that is (are) specifically designed to emphasize spill response elements should be provided. The map(s) should depict spill response equipment, fuel caches, nearby water bodies, camp infrastructures, and other relevant information.
- i. Actual copies of the MSDS for all hazardous substances stored on site should be included within the Plan.

Although the *Volume 10-6 Marine Laydown Area, Oil Handling Facility* (MLA-OHF), *Oil Pollution Emergency Plan* (OPEP) was developed to specifically assist in implementing measures to protect the marine environment and minimize impacts from potential spill events. Nevertheless, there are aspects of the Plan that are geared to addressing spills on land. The MLA-OHF OPEP has been designed specifically to compliment the Back River Project, SCP document. It is stated that the plan is not to be construed as to supersede existing emergency

response plans, rather it is conceived to address the specifics of the fuel storage facility, the bulk incoming transfer of fuel and spill scenarios directly relating to this operation.

The NWB reviewed the sections related to potential spills on land and identified the following items, which should be addressed:

- a. Section 2.2.3, Pg. 3, Dedicated Facility Spill Response Equipment, states that "a list of the equipment can be found in Appendix 4". However, no Appendix 4 appears to be included within the Plan and generally no Appendixes are included within the Volume 10 EMP's.
- b. Section 3.2, Pg. 4, Oil Handling Facility and Infrastructure states that "A preliminary site plan of the projected MLA-OHF configuration is provided in Appendix 2". No Appendix 2 is included in the Plan. No detailed information is provided related to all proposed fuel storage facilities (permanent and temporary facilities) associated with the site.
- c. Section, 3.3.5, Pg. 6, Ice Conditions should describe emergency procedures if ice conditions happen suddenly and earlier than expected with a ship being on the Bay for fuel deliveries.
- d. Section 4.1, Pg. 9, Bulk Oil Transfer, Ship to Shore states that "the bulk fuel transfer procedures are fully detailed in the standard operating procedure in Appendix 5". However, no Appendix 5 is included within the Plan.
- e. Section 5.4, Pg. 11, Equipment and Personal Protection states that "Spill kits are strategically placed primarily in areas of fuel handling to facilitate immediate first response in the event of a hydrocarbon release to land. A complete list of spill response equipment is found in Appendix 4 of this plan". However, no Appendix 4 appears to be included within the Plan and generally no Appendixes are included within the Volume 10 EMP's.
  - It is recommended that the MLA-OHF site layout map be included within the Plan to provide, at a minimum all oil handling and storage infrastructures and spill response equipment kits locations.
- f. Section 7, Pg. 17, states that "full details of the properties and hazards associated with potential spills of all products are found on the Material Safety Data Sheets (MSDS) in Appendix 8 of this plan". However, no Appendix 8 appears to be included within the Plan.
- g. Section 8.1, Pg. 26, Response Strategies Larger Spills states that spills less than 3.5m<sup>3</sup> will be handled by handled by MLA-OHF response operations. For spills larger than 3.5m<sup>3</sup>, it is stated that the Emergency Response Coordinator shall determine if it is necessary to increase the response capability by requesting third party without actually specifying procedures. It is recommended that any revision of the Plan should include actual procedures for dealing with large spills.
- h. No procedures and/or information are provided related to the hydrostatic testing for the proposed fuel storage facilities.

#### **General Comment with respect to the series of Environmental Protection Plans:**

Some ambiguities seem to exist concerning where the Risk Management and Emergency Response, Spill Contingency and Oil Pollution Emergency Plans start and end. This ambiguity

and confusion could potentially decrease the functionality of these Plans. Establishing more precise separation related to the usage of plans may help to address overlapping issues. Or If the Guidelines for EIS allow, it is suggested, that for on-land activities Goose, George Sites and Marine Laydown Area the Risk Management and Emergency Response, Spill Contingency and Oil Pollution Emergencies Plans be consolidated in one Plan as one consolidated Plan may increase effectiveness and functionality of the Plan.

#### 10.0 Monitoring

At this time, most of the overall monitoring plan details are scheduled to be provided in the FEIS. Only general details for the monitoring programs are provided.

The *Volume 10-19 Conceptual Aquatic Effects Management Plan* (AEMP or Plan) has been conceptually designed to minimize or eliminate potential adverse effects on the freshwater and marine environments that could result from their interaction with project components over the life of the Project. The Plan was reviewed, and the following items at a minimum are to be addressed within the updated Plan:

- a. Section 6.1.1, Pg. 4, Site Water Management states "that in the Goose Property Area, site contact water (including runoff from waste rock storage areas (WRSA) and mine water) and treated sewage effluent will be directed to the Tailings Impoundment Area (TIA) and discharged if necessary during the Reclamation and Closure Phase to an approved site and will meet applicable water licence criteria. The water management plan (Figure 6.1-2) for the George Property Area is very similar, with site contact water and treated sewage effluent being directed to the Water Management Facility (WMF)". No details are provided with respect to potential discharge locations and volumes for the TIA, WMF, treated sewage, collection ponds, on-land discharges, and any other potential discharges. No information is provided regarding the prevention of water ponding or erosion at discharge locations.
- b. Table 7.2-1, Pg. 16, provides AEMP Sampling Locations, Descriptions and Purposes. Table 7.2-2, Pg. 26, provides AEMP Monitoring Schedule. Table 7.2-3, Pg. 27, provides Physical, Chemical, and Biological Parameters in AEMP Sampling Program. It would be useful to create an additional Table with combining information from tables stated above. The exact locations of sampling points shall also be provided within given water-bodies.
- c. Table 7.2-2, Pg. 26, AEMP Monitoring Schedule, Back River Project provides schedules for Temporary Closure and Care and Maintenance Phases. The NWB notices that Temporary Closure and/or Care and Maintenance Phases are not clearly stated and defined in any of EMP's including in the Mine Closure and Reclamation Plan.
- d. Section 7.2.6, Pg. 30 AEMP Sampling Details Table 7.2-5 indicates that that CCME Guidelines for the Protection of Freshwater or Marine Aquatic Life and MMER Criteria (if/when triggered) used for water/sediment quality parameters.
  - EC noted that "CCME guidelines are not available for a number of freshwater, marine, and sediment parameters, and recommended that site-specific guidelines be developed for parameters of concern for which there are no CCME guidelines, or for parameters

(not identified) that are naturally greater than CCME". NWB concurs with this recommendation.

#### 11.0 Closure and Reclamation

The *Volume 10-29 Mine Closure and Reclamation Plan* is still preliminary and conceptual. The FEIS shall include a detailed Interim Mine Closure and Reclamation Plan. The followings items should be clarified at a minimum:

a. Section 2 Care and Maintenance Plan for Temporary Mine Closure define the "Temporary Closure as the cessation of mining and processing operations for a finite period of time with the intention of resuming operations upon resolution of the cause of the cessation (AADNC, 2007). It is also stated that Temporary closure could last for several weeks or as long as several years depending on the nature of the contributing factor(s)".

As the Water Licence generally defines the Care and Maintenance Phase the updated MCRP should provide definitions of temporary closure and care and maintenance including outlining what activities and monitoring may continue at the project, subject to the phase within which care and maintenance is implemented. This recommendation is valid for all EMPs that should include management strategies and monitoring during Care and Maintenance Phase.

- b. Section 4.4, Pg. 20, Umwelt Underground Mine Workings should be detailed and should take into account designs of all declines and raises, detailed hydrogeological conditions assessment and thermal modeling.
- c. Section 4.6, Pg. 24, Tailings Impoundment Area states the TIA "will be closed out by draining off and treating tailings supernatant, constructing a closure spillway and capping the TIA with a 2 m cover of nPAG waste rock".

It is noticed that WRSAs will be covered by 4m nPAG (S. 4.3 Open Pits).

Section 3.1.7 of Mine Waste Rock and Tailings Management Plan states that "average freeze/thaw depths were calculated using a number of simplified closed-form mathematical solutions including the Neumann and the Modified Berggren equations (Knight Piésold, 2013b). Based on these computations, the freezing depth over an average winter is estimated to be approximately 6 m and the thawing depth over an average summer is estimated to be approximately 3 m".

A rational should be provided on differences of cover thickness for WRSA and TIA. A thermal modelling should validate whether or not 2m cover depth is reasonable to facilitate aggradation and encapsulation in permafrost at TIA.

d. Section 5 Monitoring states that "Post-closure monitoring is expected to be required for five (5) years after completion of active closure activities in Closure Year 10. This is in line with mine reclamation at other northern sites and is believed to be a reasonable

monitoring period given the amount of post-closure verification monitoring that can be carried out during the closure phase".

Given the fact that the post-closure monitoring of other northern reclaimed mines (Nanisivik, Polaris Mines) is being generally longer (up to 25 years), the 5 years duration would not probably be enough to evaluate the mine structures stability. The Post-closure monitoring duration should be re-evaluated

Monitoring Program Stations locations shall also be included within the Project Development and Infrastructure Area maps during Care and Maintenance for Temporary Closure and Permanent Closure and Reclamation.

Section 6, Estimated Closure and Reclamation Costs does not provide the Closure Cost Estimate.

e. A Closure Cost Estimation shall be provided within the updated Plan to reflect the total financial Security for Mine final Closure and Reclamation.

#### 12.0 Project Designs and Drawings

Few drawings or designs have been provided as part of the DEIS. General Arrangement Drawings and Site Layout Drawings have been provided for the Goose Property, George Property, and the Marine Laydown Area. Also, design drawings have been provided for the Tailings Impoundment Area (TIA) (i.e. not for construction).

The proponent noted that these designs will be progressed under the FEIS and that design criteria will be based on the approach successfully used at the Ekati Diamond Mine, NWT (i.e. permafrost was used to minimize water leaching into the subsoil; the Back River Project site is located in a region of continuous permafrost).

# 13.0 Additional Environmental Management Plans to Consider

In addition to the mostly conceptual management plans presented in DEIS Volume 10 that should be updated, the following management plans should also be developed and submitted within the FEIS:

- a. Lake Dewatering Plan (could be included within SWMMP);
- b. Pits Re-flooding Plan (could be included within SWMMP)
- c. Wastewater Treatment Facilities Management Plan;
- d. Landfarm Management Plan;
- e. Ammonia Management Plan;
- f. Site Surveillance Network Monitoring Program

# 14.0 Type "B" Application for the Back River Project Pre-development Activities

The NWB acknowledges that as the Project development is approached in a phased manner with site preparation activities occurring first, Sabina has reiterated the following pre-development activities from the Type "A" Water Licence Application – Access and submitted to the NWB on October 20, 2014, as a Type "B" Water Licence Application:

- a. Construction and use of an all-weather road, and associated water crossings, from Goose Camp to the existing airstrip and quarry
- b. Expansion of the existing all-weather airstrip and associated realignment of Rascal Stream
- c. Expansion of the existing Goose quarry and development of the proposed Umwelt quarry
- d. Development of an ice-road for access to the quarries during the winter season before the all-weather road is completed
- e. Staging of a temporary laydown area at the Marine Laydown Area to store equipment, materials and fuel for 2016 construction activities (note: 2016 activities are not included in the scope of application).

The remaining major activities proposed under *Back River Project - Access Type "A" Water Licence Application* are the followings:

- a. Construction and operation of the Marine Laydown Area
- b. Construction and maintenance of winter roads
- c. Construction of infrastructure such as all-weather site roads, laydowns areas, increasing existing camp capacity, and fuel storage at the George Property

Based on recent discussions with Sabina the NWB is of an opinion that the 2 proposed Type "A" Water Licence Applications':

Back River Project - Mine Sites Type "A" Water Licence Application Scope and Back River Project - Access Type "A" Water Licence Application's remaining Scope, may potentially be merged and only one consolidated Type "A" Water Licence Application could be included within FEIS.

#### 15.0 List of Acronyms

AANDC or INAC Aboriginal Affairs and Northern Development Canada

AEMP Conceptual Aquatic Effects Management Plan BPQMP Borrow Pits and Quarry Management Plan

CCME Canadian Council of Ministers of the Environment

DCPF NIRB and NWB Detailed Coordinated Process Framework

DEIS Draft Environmental Impact Statement

DFO Fisheries and Oceans Canada

EC Environment Canada

EIS Environmental Impact Statement
EMPs Explosives Management Plan
EMPs Environmental Management Plans
EPP Environmental Protection Plan

FEIS Final Environmental Impact Statement

GN Government of Nunavut

HMMP Hazardous Materials Management Plan

IRs Information Requests

KP Knight Piésold

LWMP Landfill and Waste Management Plan MCRP Mine Closure and Reclamation Plan

MLA Marine Laydown Area

MLA/OHF Marine Laydown Area, Oil Handling Facility

ML/ARD Metal Leaching / Acid Rock Drainage

MLARDMP Metal Leaching and Acid Rock Drainage Management Plan

MMER Metal Mining Effluent Regulations

MWRTMP Mine Waste Rock and Tailing Management Plan

NIRB Nunavut Impact Review Board NLCA Nunavut Land Claims Agreement

NWB Nunavut Water Board

nPAG Not Potentially Acid Generating

NRCan
OPEP
Oil Pollution Emergency Plan
OSMP
Ore Storage Management Plan
PAG
Potentially Acid Generating
PHC
Pre Hearing Conference

QA/QC Quality Assurance / Quality Control

RMERP Risk Management and Emergency Response Plan

RMP Road Management Plan SCP Spill Contingency Plan

SFE Shake flask extraction leachate test

SIG Supplemental Information Guidelines

SWMMP Site Water Monitoring and Management Plan

TDS Total Dissolved Solids

TIA Tailings Impoundment Area

TM Technical Meeting

WMA Water Management Area
WRSA Waste Rock Storage Area
WMF Water Management Facility

XRD X-ray diffraction