

APPENDIX G: ENVIRONMENTAL ANALYSIS SUMMARY

*APPENDIX G1:
CONSTRUCTION AND UPGRADE OF
CROWN ROADS AND WATERCROSSINGS*

Component: Construction and Upgrades of Crown Roads and Watercrossings – Site Access Road

Evaluation Considerations	Alternatives Considered		
	Null Alternative	Upgrade Bissett Creek Road	Create a New Access Road
Identification of the Environmental Effects and their Estimated Significance	<ul style="list-style-type: none"> Bissett Creek Road is a primary road for Ottawa Valley Forest Inc. and is used by other individuals/groups to access Crown land and provincial parks. Increased use of the road without improvements may degrade the road or cause unsafe conditions, affecting usability for others. 	<ul style="list-style-type: none"> Potential to affect surface water quality through downstream sediment transport. Potential for sediment transport, resulting in increased turbidity and disturbance to fish and fish habitat. Potential disturbance to aquatic biota and habitat, permanent enclosure of portions of a watercourse, loss of bed material within the length of the culvert, and changes to riparian vegetation within road allowance. Improved safety for road users with increased traffic movements resulting from construction and operation of the mine. Potential employment opportunities associated with road upgrades. 	<ul style="list-style-type: none"> Although the route is unknown, negative effects are anticipated for the following: <ul style="list-style-type: none"> water quality/quantity; SAR and habitat; aquatic species and habitat; ecological integrity; terrestrial wildlife; fragmentation, alternation and/or critical loss; drainage; and, navigation. It is unknown whether the new road would result in release of contaminations in soils/sediments; affect natural heritage features and areas; or from where aggregates would be sourced. Create a new access which could benefit users of the Crown land but would also make previously inaccessible areas accessible. Result in new traffic infrastructure and a change in traffic patterns.

- 1 – Most disadvantaged in relation to the other alternatives.
- 2 – Disadvantaged in relation to the other alternatives.
- 3 – Neutral in relation to other alternatives.
- 4 – Advantaged in relation to other alternatives.
- 5 - Most advantaged in relation to other alternatives.

Component: Construction and Upgrades of Crown Roads and Watercrossings – Site Access Road

Evaluation Considerations	Alternatives Considered		
	Null Alternative	Upgrade Bissett Creek Road	Create a New Access Road
			<ul style="list-style-type: none"> • Disturbance to recreationalists and potential to effect hunting/trapping. • Negatively affect aesthetics. • Result in mine construction and operation, however the existing Bissett Creek Road could be used. • Negative effects from safety perspective of increased traffic in a new area. • Northern Graphite would hire employees to construct the road which would positively affect the local/regional economy. • Potential to provide additional tourism opportunities with the new access road. • Area has traditional and current use for harvesting of large and small game, fishing and possibly other types of gathering (e.g., medicinal plants and blueberries). A new road could improve access or could potentially cause negative effects such as

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- 5 - Most advantaged in relation to other alternatives.

Component: Construction and Upgrades of Crown Roads and Watercrossings – Site Access Road

Evaluation Considerations	Alternatives Considered		
	Null Alternative	Upgrade Bissett Creek Road	Create a New Access Road
			overprinting harvesting/gathering areas.
Score	3 The increase in truck traffic, although anticipated to only be three to five trucks per day, does pose potential safety risks to other users of the site given the lack of line of sight in some areas.	4 Bissett Creek Road is an existing corridor currently travelled by different user groups. The upgrades are minor, with limited potential negative effects. At this time, the need to modify existing watercourse crossings have not been definitely assessed and may not be required, thereby eliminating a number of the potential negative effects.	1 There are many unknowns with the prospect of constructing a new access road, however numerous negative effects would be anticipated. Creating a new access road when a suitable access road already exists is not eh most viable solution.
Indication of the Potential for Mitigation of the Environmental Effects	<ul style="list-style-type: none"> Additional signage could be installed warning motorists of curves in the road. 	<ul style="list-style-type: none"> Mitigation measures including erosion and sedimentation control measures, adherence to timing windows for in-water work, and measures for working around fish habitat would be applied. 	<ul style="list-style-type: none"> Mitigations measures for the potential negative effects exist, however a substantial amount of effort would likely be required.
Score	4 The installation of new signage is a relatively easy task, however there would be ongoing safety concerns if motorists disregard the signage.	4 Mitigation measures for watercourses are well known are effective at limiting the potential for negative effects.	1 Numerous mitigation measures would be required to reduce the potential for negative effects.
Estimate of the Effectiveness of the Alternative to Meet its Intended Purpose	<ul style="list-style-type: none"> Provides continued access to Northern 	<ul style="list-style-type: none"> Provides continued access to Northern Graphite and other users. 	<ul style="list-style-type: none"> Provides access to Northern Graphite and other potential users.

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Component: Construction and Upgrades of Crown Roads and Watercrossings – Site Access Road

Evaluation Considerations	Alternatives Considered		
	Null Alternative	Upgrade Bissett Creek Road	Create a New Access Road
	Graphite and other users.		
Score	3 All alternatives would provide access to the mine, however there would be ongoing safety concerns.	5 All alternatives would provide access to the mine, however this alternative offers a reduction in potential safety concerns over the null alternative.	3 All alternatives would provide access to the mine, however there are many unknowns associated with this alternative.
Estimate of the Cost and Feasibility of Carrying out the Alternative	<ul style="list-style-type: none"> The cost of new signage would be minimal and incurred by Northern Graphite. 	<ul style="list-style-type: none"> \$27,820 (GMining, 2012), incurred by Northern Graphite. 	<ul style="list-style-type: none"> Unknown but expected to be the highest cost option.
Score	5 Lowest cost alternative.	3 Mid-range cost alternative.	1 Highest cost alternative.
Monitoring Requirements	<ul style="list-style-type: none"> None required. 	<ul style="list-style-type: none"> Monitoring would be required during any upgrades to ensure proper mitigation measures are being implemented. 	<ul style="list-style-type: none"> More intensive monitoring may be required, dependent upon the final routing of a new access road and the types of features impacted.
Score	5 No monitoring requirements.	4 Monitoring requirements are expected to be minimal.	1 Monitoring requirements are anticipated to more onerous than the other options.
Total Score	20 This alternative is not preferred.	20 This alternative is preferred, as it provides increased safety for road users over the null alternative.	7 This alternative is not preferred.

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- 4 – Advantaged in relation to other alternatives.
- 5 – Most advantaged in relation to other alternatives.

Component: Construction and Upgrades of Crown Roads and Watercrossings – Access Road to the Process Plant

Evaluation Considerations	Alternatives Considered		
	Null Alternative	Access Road to the Process Plant 1	Access Road to the Process Plant 2
Identification of the Environmental Effects and their Estimated Significance	<ul style="list-style-type: none"> The inability to development the mine as planned could result in delays and design challenges. Substantial effort has been invested in designed the mine to operate in a specific way. Inability to construct the mine as designed would negatively impact the development of the mine. 	<ul style="list-style-type: none"> Upgrades to existing watercrossings and installation of a new watercourse crossing can potentially affect surface water quality through downstream sediment transport, resulting in increased turbidity and disturbance to fish and fish habitat. Additional effects from culvert installation include disturbance to aquatic biota and habitat, permanent enclosure of portions of a watercourse, loss of bed material within the length of the culvert, and changes to riparian vegetation within road allowance. The existing watercourse crossing overlaps potential nesting habitat for Blanding's Turtles. The watercourse crossings will be an upgrade and therefore the area is already disturbed. The installation of the new watercourse crossing will 	<ul style="list-style-type: none"> Upgrades to existing watercrossings and installation of a new watercourse crossing can potentially affect surface water quality through downstream sediment transport, resulting in increased turbidity and disturbance to fish and fish habitat. Additional effects from culvert installation include disturbance to aquatic biota and habitat, permanent enclosure of portions of a watercourse, loss of bed material within the length of the culvert, and changes to riparian vegetation within road allowance. The existing watercourse crossing overlaps core wetland habitat for Blanding's Turtles. The watercourse crossings will be an upgrade and therefore the area is already disturbed. The installation of the new watercourse crossing will

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Component: Construction and Upgrades of Crown Roads and Watercrossings – Access Road to the Process Plant

Evaluation Considerations	Alternatives Considered		
	Null Alternative	Access Road to the Process Plant 1	Access Road to the Process Plant 2
		allow Northern Graphite access to its process plant. <ul style="list-style-type: none"> Improving the condition of existing watercourse crossing and installation of the new watercourse crossing will allow Northern Graphite access to its process plant. Located a further distance than Site Access Road 2 to the process plant. Requires traffic to run parallel to the haul roads. Longer distance from Bissett Creek Road and Highway 17 than Access Road to the Process Plant 2. Temporary increase in noise levels during upgrade/installation activities. Provides access for Northern Graphite to the mine site. Northern Graphite and its shareholders will benefit financially from development of the mine. 	allow Northern Graphite access to its process plant. <ul style="list-style-type: none"> Improving the condition of existing watercourse crossing and installation of the new watercourse crossing will allow Northern Graphite access to its process plant. Shorter distance than Access Road to the Process Plant 1 from Bissett Creek Road and Highway 17. Separates light vehicle traffic from the mine haul trucks. Temporary increase in noise levels during upgrade/installation activities. Provides access for Northern Graphite to the mine site. Northern Graphite and its shareholders will benefit financially from development of the mine.
Score	2 There is a potential for negative economic effects resulting from the re-design	2 The watercrossings associated with Access Road to the Process Plant 1 have the potential to	3 The watercrossings associated with Access Road to the Process Plant 2 have the

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Component: Construction and Upgrades of Crown Roads and Watercrossings – Access Road to the Process Plant

Evaluation Considerations	Alternatives Considered		
	Null Alternative	Access Road to the Process Plant 1	Access Road to the Process Plant 2
	of critical mine components should watercrossings need to be avoided.	negatively affect some natural environment components. This access road is located farther from Highway 11 and has some onsite traffic safety concerns.	potential to negatively affect some natural environment components. This access road is located closer from Highway 11 and allows for improved onsite safety.
Indication of the Potential for Mitigation of the Environmental Effects	<ul style="list-style-type: none"> No mitigation measures available to compensate for loss of potential revenue. 	<ul style="list-style-type: none"> Mitigation measures including erosion and sedimentation control measures, adherence to timing windows for in-water work, and measures for working around fish habitat would be applied. A security gate house will be located at the entrance of the mine site to control the flow of persons and vehicles entering and exiting the site. The Overall Benefit Plan will involve habitat creation or enhancement and management for Blanding's Turtle and Whip-poor-will within the regional landscape. 	<ul style="list-style-type: none"> Mitigation measures including erosion and sedimentation control measures, adherence to timing windows for in-water work, and measures for working around fish habitat would be applied. A security gate house will be located at the entrance of the mine site to control the flow of persons and vehicles entering and exiting the site. The Overall Benefit Plan will involve habitat creation or enhancement and management for Blanding's Turtle and Whip-poor-will within the regional landscape.

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Component: Construction and Upgrades of Crown Roads and Watercrossings – Access Road to the Process Plant

Evaluation Considerations	Alternatives Considered		
	Null Alternative	Access Road to the Process Plant 1	Access Road to the Process Plant 2
Score	1 Should mine components require re-design, there is no potential financial mitigation available to Northern Graphite.	3 Mitigation measures for watercourses are well known are effective at limiting the potential for negative effects.	3 Mitigation measures for watercourses are well known are effective at limiting the potential for negative effects.
Estimate of the Effectiveness of the Alternative to Meet its Intended Purpose	<ul style="list-style-type: none"> Does not meet the purpose of allowing the development of the mine. 	<ul style="list-style-type: none"> A precursor for mine development. 	<ul style="list-style-type: none"> A precursor for mine development.
Score	1 Development of the mine would potentially need to be altered.	5 The mine could be developed as currently designed.	5 The mine could be developed as currently designed.
Estimate of the Cost and Feasibility of Carrying out the Alternative	<ul style="list-style-type: none"> \$0. 	<ul style="list-style-type: none"> Accurate costs for the watercrossings are not currently known. Costs would include two new watercrossings. Costs would be incurred by Northern Graphite. 	<ul style="list-style-type: none"> Accurate costs for the watercrossings are not currently known. Costs would include upgrades to two watercrossings and one new watercrossings. Costs would be incurred by Northern Graphite.
Score	5 No costs are associated with this alternative.	1 Costs for both alternatives considered (except the null) are expected to be similar.	1 Costs for both alternatives considered (except the null) are expected to be similar.
Monitoring Requirements	<ul style="list-style-type: none"> None required. 	<ul style="list-style-type: none"> Monitoring would be required to ensure proper mitigation measures are being implemented. 	<ul style="list-style-type: none"> Monitoring would be required to ensure proper mitigation measures are being implemented.

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Component: Construction and Upgrades of Crown Roads and Watercrossings – Access Road to the Process Plant

Evaluation Considerations	Alternatives Considered		
	Null Alternative	Access Road to the Process Plant 1	Access Road to the Process Plant 2
Score	5 No monitoring requirements.	3 Monitoring requirements are expected to be minimal.	3 Monitoring requirements are expected to be minimal.
Total Score	14 This alternative is not preferred.	14 This alternative is not preferred.	15 This alternative is preferred.

- 1 – Most disadvantaged in relation to the other alternatives.
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- 3 – Neutral in relation to other alternatives.
- 4 – Advantaged in relation to other alternatives.
- 5 - Most advantaged in relation to other alternatives.

Component: Construction and Upgrades of Crown Roads and Watercrossings – Haul Road

Evaluation Considerations	Alternatives Considered				
	Null Alternative	Haul Road 1	Haul Road 2	Haul Road 3	Haul Road 4
Identification of the Environmental Effects and their Estimated Significance	<ul style="list-style-type: none"> The inability to develop the mine as planned could result in delays and design challenges. Substantial effort has been invested in designing the mine to operate in a specific way. Inability to construct the mine as designed would negatively impact the development of the mine. 	<ul style="list-style-type: none"> Installation of new watercrossings can potentially affect surface water quality through downstream sediment transport, resulting in increased turbidity and disturbance to fish and fish habitat. Additional effects from culvert installation include disturbance to aquatic biota and habitat, permanent enclosure of portions of a watercourse, loss of bed material within the length of the culvert, and changes to riparian vegetation within road allowance. The northern most watercrossing overlaps potential habitat for Blanding's Turtles. 	<ul style="list-style-type: none"> Installation of new watercrossings can potentially affect surface water quality through downstream sediment transport, resulting in increased turbidity and disturbance to fish and fish habitat. Additional effects from culvert installation include disturbance to aquatic biota and habitat, permanent enclosure of portions of a watercourse, loss of bed material within the length of the culvert, and changes to riparian 	<ul style="list-style-type: none"> Installation of new watercrossings can potentially affect surface water quality through downstream sediment transport, resulting in increased turbidity and disturbance to fish and fish habitat. Additional effects from culvert installation include disturbance to aquatic biota and habitat, permanent enclosure of portions of a watercourse, loss of bed material within the length of the culvert, and changes to riparian 	<ul style="list-style-type: none"> Installation of new watercrossings can potentially affect surface water quality through downstream sediment transport, resulting in increased turbidity and disturbance to fish and fish habitat. Additional effects from culvert installation include disturbance to aquatic biota and habitat, permanent enclosure of portions of a watercourse, loss of bed material within the length of the culvert, and changes

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4 – Advantaged in relation to other alternatives.

5 – Most advantaged in relation to other alternatives.

Component: Construction and Upgrades of Crown Roads and Watercrossings – Haul Road

Evaluation Considerations	Alternatives Considered				
	Null Alternative	Haul Road 1	Haul Road 2	Haul Road 3	Haul Road 4
		<ul style="list-style-type: none"> One of the watercrossings would traverse a wetland. The installation of the new watercrossings will allow Northern Graphite access to and from its truck maintenance facility and process plant. Since this road will be used regularly by Northern Graphite, public access will be restricted. Northern Graphite and its shareholders will benefit financially from development of the mine. 	<ul style="list-style-type: none"> vegetation within road allowance. The northern most watercrossing overlaps potential habitat for Blanding's Turtles. One of the watercrossings would traverse a wetland. The installation of the new watercrossings will allow Northern Graphite access to and from its truck maintenance facility and process plant. Since this road will be used regularly by Northern Graphite, public access will be restricted. Northern Graphite and its 	<ul style="list-style-type: none"> vegetation within road allowance. One of the new watercrossings is in the area of a confirmed turtle nesting area (species unknown). The existing watercrossing is in close proximity to Category 2 Habitat for Blanding's Turtle. Two of the watercrossings would traverse a wetland (one new watercrossing and an existing watercrossing). There will be increased traffic on a portion of Graphite Mine Road for Northern 	<ul style="list-style-type: none"> to riparian vegetation within road allowance. The installation of the new watercrossings will allow Northern Graphite access to and from its truck maintenance facility and process plant. Since this road will be used regularly by Northern Graphite, public access will be restricted.

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2 – Disadvantaged in relation to the other alternatives.

3 – Neutral in relation to other alternatives.

4 – Advantaged in relation to other alternatives.

5 - Most advantaged in relation to other alternatives.

Component: Construction and Upgrades of Crown Roads and Watercrossings – Haul Road

Evaluation Considerations	Alternatives Considered				
	Null Alternative	Haul Road 1	Haul Road 2	Haul Road 3	Haul Road 4
			shareholders will benefit financially from development of the mine.	Graphite's hauling activities. <ul style="list-style-type: none"> The installation of the new watercrossings will allow Northern Graphite access to and from its truck maintenance facility and process plant. Since this road will be used regularly by Northern Graphite, public access will be restricted. Northern Graphite and its shareholders will benefit financially from development of the mine. 	
Score	2 There is a potential for negative economic effects resulting from the re-	2 The two new watercrossings associated with Haul Road 1 have the	2 The two new watercrossings associated with Haul Road 2 have	1 The two new/one upgraded watercrossings associated with	4 The one new/one shared (with Access Road to the Process Plant

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- 5 – Most advantaged in relation to other alternatives.

Component: Construction and Upgrades of Crown Roads and Watercrossings – Haul Road

Evaluation Considerations	Alternatives Considered				
	Null Alternative	Haul Road 1	Haul Road 2	Haul Road 3	Haul Road 4
	design of critical mine components should watercrossings need to be avoided.	potential to negatively affect some natural environment components. The watercrossings for Haul Roads 1 and 2 are the same.	the potential to negatively affect some natural environment components. The watercrossings for Haul Roads 1 and 2 are the same.	Haul Road 3 have the potential to negatively affect some natural environment components, including traversing a confirmed turtle nesting area.	2) watercrossings have limited potential for negative effects. Potential effects to SAR and SAR habitat are avoided.
Indication of the Potential for Mitigation of the Environmental Effects	<ul style="list-style-type: none"> No mitigation measures available to compensate for loss of potential revenue. 	<ul style="list-style-type: none"> Mitigation measures including erosion and sedimentation control measures, adherence to timing windows for in-water work, and measures for working around fish habitat would be applied. The Overall Benefit Plan will involve habitat creation or enhancement and management for Blanding's Turtle and Whip-poor-will within the regional landscape. 	<ul style="list-style-type: none"> Mitigation measures including erosion and sedimentation control measures, adherence to timing windows for in-water work, and measures for working around fish habitat would be applied. The Overall Benefit Plan will involve habitat creation or enhancement and management for Blanding's 	<ul style="list-style-type: none"> Mitigation measures including erosion and sedimentation control measures, adherence to timing windows for in-water work, and measures for working around fish habitat would be applied. The Overall Benefit Plan will involve habitat creation or enhancement and management 	<ul style="list-style-type: none"> Mitigation measures including erosion and sedimentation control measures, adherence to timing windows for in-water work, and measures for working around fish habitat would be applied.

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3 – Neutral in relation to other alternatives.

4 – Advantaged in relation to other alternatives.

5 - Most advantaged in relation to other alternatives.

Component: Construction and Upgrades of Crown Roads and Watercrossings – Haul Road

Evaluation Considerations	Alternatives Considered				
	Null Alternative	Haul Road 1	Haul Road 2	Haul Road 3	Haul Road 4
			Turtle and Whip-poor-will within the regional landscape.	for Blanding's Turtle and Whip-poor-will within the regional landscape.	
Score	1 Should mine components require re-design, there is no potential financial mitigation available to Northern Graphite.	2 Mitigation measures for watercrossings are well known are effective at limiting the potential for negative effects.	2 Mitigation measures for watercrossings are well known are effective at limiting the potential for negative effects.	2 Mitigation measures for watercrossings are well known are effective at limiting the potential for negative effects.	3 Mitigation measures for watercrossings are well known are effective at limiting the potential for negative effects. No mitigation for SAR or SAR habitat are required.
Estimate of the Effectiveness of the Alternative to Meet its Intended Purpose	<ul style="list-style-type: none"> Does not meet the purpose of allowing the development of the mine. 	<ul style="list-style-type: none"> Required for the current design of the mine. 	<ul style="list-style-type: none"> Required for the current design of the mine. 	<ul style="list-style-type: none"> Required for the current design of the mine. 	<ul style="list-style-type: none"> Required for the current design of the mine.
Score	1 Development of the mine would potentially need to be altered.	5 The mine could be developed as currently designed.	5 The mine could be developed as currently designed.	5 The mine could be developed as currently designed.	5 The mine could be developed as currently designed.
Estimate of the Cost and Feasibility of Carrying out the Alternative	<ul style="list-style-type: none"> \$0. 	<ul style="list-style-type: none"> Accurate costs for the watercrossings are not currently known. Costs are expected to be similar for all 	<ul style="list-style-type: none"> Accurate costs for the watercrossings are not currently known. Costs are expected to 	<ul style="list-style-type: none"> Accurate costs for the watercrossings are not currently known. Costs 	<ul style="list-style-type: none"> Accurate costs for the watercrossings are not currently known. Costs

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Component: Construction and Upgrades of Crown Roads and Watercrossings – Haul Road

Evaluation Considerations	Alternatives Considered				
	Null Alternative	Haul Road 1	Haul Road 2	Haul Road 3	Haul Road 4
		alternatives and would be incurred by Northern Graphite.	be similar for all alternatives and would be incurred by Northern Graphite.	are expected to be similar for all alternatives and would be incurred by Northern Graphite.	are expected to be similar for all alternatives and would be incurred by Northern Graphite.
Score	5 There are no costs associated with this alternative.	1 Costs for all alternatives considered (except the null) are expected to be similar.	1 Costs for all alternatives considered (except the null) are expected to be similar.	1 Costs for all alternatives considered (except the null) are expected to be similar.	1 Costs for all alternatives considered (except the null) are expected to be similar.
Monitoring Requirements	<ul style="list-style-type: none"> None required. 	<ul style="list-style-type: none"> Monitoring would be required to ensure proper mitigation measures are being implemented. 	<ul style="list-style-type: none"> Monitoring would be required to ensure proper mitigation measures are being implemented. 	<ul style="list-style-type: none"> Monitoring would be required to ensure proper mitigation measures are being implemented. 	<ul style="list-style-type: none"> Monitoring would be required to ensure proper mitigation measures are being implemented.
Score	5 No monitoring requirements.	3 Monitoring requirements are expected to be minimal.	3 Monitoring requirements are expected to be minimal.	3 Monitoring requirements are expected to be minimal.	3 Monitoring requirements are expected to be minimal.
Total Score	14 This alternative is not preferred.	13 This alternative is not preferred.	13 This alternative is not preferred.	12 This alternative is not preferred.	16 This alternative is preferred.

- 1 – Most disadvantaged in relation to the other alternatives.
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- 3 – Neutral in relation to other alternatives.
- 4 – Advantaged in relation to other alternatives.
- 5 - Most advantaged in relation to other alternatives.

Component: Construction and Upgrades of Crown Roads and Watercrossings – Continued Access for Crown Land Use

Evaluation Considerations	Alternatives Considered			
	Null Alternative	Re-route Graphite Mine Road	Replace the Bridge on Menet Lake Road	New Bypass Road
Identification of the Environmental Effects and their Estimated Significance	<ul style="list-style-type: none"> Two recreation camps (one on Tigger Lake and one on the unnamed creek south of Roo Lake) would be inaccessible. Access for other resource and recreational use via Graphite Mine Road passed the open pit would not be possible. As per Northern Graphite's lease, "nothing whatsoever herein contained shall prevent or interfere with the free user of any public or travelled road or highway crossing the hereinbefore described premises". Given the location of the open pit, which is resource dependent and cannot be shifted, the mine would not be able to be developed as currently designed. 	<ul style="list-style-type: none"> The re-routed Granite Mine Road would be very close to Mag Creek and a watercrossing would be required. The re-routed Graphite Mine Road would overprint Category 2 Habitat for Blanding's Turtles. Mag Creek provides Brook Trout habitat. Juvenile Brook Trout were caught in one reach during a fish community survey. Sedimentation resulting from construction and use of the road could negatively affect aquatic species and habitat. Re-routing the road will provide continued access to Crown land within and beyond Northern Graphite's mining leases. It is anticipated that traffic infrastructure may be improved with 	<ul style="list-style-type: none"> Upgrades to existing watercourse crossings can potentially affect surface water quality through downstream sediment transport, resulting in increased turbidity and disturbance to fish and fish habitat. The watercrossing is in close proximity to a Blanding's Turtle observation. The watercrossing is located within Grant's Creek Provincial Park. Upgrading the watercrossing is in accordance with the guidance provided in <i>Grant's Creek Provincial Park Interim Management Statement (2007)</i>. Replacing the bridge will provide continued access to Crown land within and beyond Northern Graphite's mining leases. The bridge is identified as part of trail 195 of the 	<ul style="list-style-type: none"> The existing and proposed roads are located within potential Blanding's Turtle nesting habitat. These areas will be disturbed if TMF Option 1 is the preferred option. The by-pass road will provide continued access to Crown land within and beyond Northern Graphite's mining leases. Traffic that would typically use Graphite Mine Road would use the site access road to access Crown land . Traffic infrastructure would be modified/constructed in order to allow safe passage around the TMF (if Option 1 is selected).

1 – Most disadvantaged in relation to the other alternatives.

2 – Disadvantaged in relation to the other alternatives.

3 – Neutral in relation to other alternatives.

4 – Advantaged in relation to other alternatives.

5 - Most advantaged in relation to other alternatives.

Component: Construction and Upgrades of Crown Roads and Watercrossings – Continued Access for Crown Land Use

Evaluation Considerations	Alternatives Considered			
	Null Alternative	Re-route Graphite Mine Road	Replace the Bridge on Menet Lake Road	New Bypass Road
	<p>Northern Graphite has invested substantially in work completed to date, which would no longer be of any use. The mining lease would not be viable.</p>	<p>construction of a new portion of road.</p> <ul style="list-style-type: none"> LUPs on Tigger Lake and on the unnamed creek south of Roo Lake would remain accessible. Shared use of Graphite Mine Road with mining related vehicles would be a safety concern if site access option 1 is preferred; shared use will be minimal if site access option 2 is preferred. 	<p>Missing Links Snowmobile Club (Missing Link Snowmobile Club, n.d.).</p> <ul style="list-style-type: none"> Menet Lake Road is identified as a primary road for forest management activities (Ottawa Valley Forestry Inc., 2010). It is anticipated that traffic infrastructure may be improved with installation of a new bridge. LUPs on Tigger Lake and on the unnamed creek south of Roo Lake would remain accessible. Additional archaeological/cultural studies may be required before the bridge could be constructed. A new bridge would improve safety conditions over the existing bridge. The Menet Lake Road 	<ul style="list-style-type: none"> LUPs on Tigger Lake and on the unnamed creek south of Roo Lake would remain accessible. Shared use of site access road 2 (if selected) and service roads with mine vehicles.

1 – Most disadvantaged in relation to the other alternatives.

2 – Disadvantaged in relation to the other alternatives.

3 – Neutral in relation to other alternatives.

4 – Advantaged in relation to other alternatives.

5 - Most advantaged in relation to other alternatives.

Component: Construction and Upgrades of Crown Roads and Watercrossings – Continued Access for Crown Land Use

Evaluation Considerations	Alternatives Considered			
	Null Alternative	Re-route Graphite Mine Road	Replace the Bridge on Menet Lake Road	New Bypass Road
			would not be used by Northern Graphite to access the mine site; there would be no shared use of this road with mine vehicles.	
Score	1 If no action is taken to maintain access, then Northern Graphite would be unable to develop the mine, resulting in negative economic effects to Northern Graphite and its shareholders.	2 The re-routed Graphite Mine Road would provide similar access to the existing road. There is the potential for safety concerns should site access option 1 be preferred as mine vehicles and other vehicles would be sharing the road. The re-routed road would be in close proximity to Mag Creek which supports Brook Trout.	4 The watercrossing would be an upgrade of an existing bridge. Replacing the bridge would provide continued access to Crown land within and beyond Northern Graphite's mining leases and may improve safety as it has been noted the bridge is in a state of disrepair.	3 This alternative is only viable if site access road option 2 is selected as the preferred. The shared route (between mine vehicles and the public) could cause potential safety concerns. A suitable route for the road would need to be determined and would depend on the selection of the final TMF option.
Indication of the Potential for Mitigation of the Environmental Effects	<ul style="list-style-type: none"> No mitigation measures available to compensate for loss of potential revenue. 	<ul style="list-style-type: none"> Mitigation measures including erosion and sedimentation control measures, adherence to timing windows for in-water work, and measures for working 	<ul style="list-style-type: none"> Mitigation measures including erosion and sedimentation control measures, adherence to timing windows for in-water work, and measures for working 	<ul style="list-style-type: none"> The Overall Benefit Plan will involve habitat creation or enhancement and management for Blanding's Turtle and Whip-poor-will

1 – Most disadvantaged in relation to the other alternatives.

2 – Disadvantaged in relation to the other alternatives.

3 – Neutral in relation to other alternatives.

4 – Advantaged in relation to other alternatives.

5 – Most advantaged in relation to other alternatives.

Component: Construction and Upgrades of Crown Roads and Watercrossings – Continued Access for Crown Land Use

Evaluation Considerations	Alternatives Considered			
	Null Alternative	Re-route Graphite Mine Road	Replace the Bridge on Menet Lake Road	New Bypass Road
		around fish habitat would be applied. <ul style="list-style-type: none"> The Overall Benefit Plan will involve habitat creation or enhancement and management for Blanding's Turtle and Whip-poor-will within the regional landscape. Proper erosion and sediment control methods would be used to mitigate any potential effects from soil erosion. Fencing to prevent unauthorized access to the open pit. 	around fish habitat would be applied. <ul style="list-style-type: none"> The Overall Benefit Plan will involve habitat creation or enhancement and management for Blanding's Turtle and Whip-poor-will within the regional landscape. 	within the regional landscape. <ul style="list-style-type: none"> Fencing to prevent unauthorized access to the TMF (if TMF Option 1 is selected).
Score	1 Should development of the mine not proceed, there is no potential financial mitigation available to Northern Graphite.	2 Mitigation measures available to limit the potential for negative effects.	2 Mitigation measures available to limit the potential for negative effects.	2 Mitigation measures available to limit the potential for negative effects.
Estimate of the Effectiveness of the Alternative to Meet its Intended Purpose	<ul style="list-style-type: none"> Does not meet the purpose of allowing the development of the mine. 	<ul style="list-style-type: none"> The development of the mine could proceed. Allows for continued access to Crown land 	<ul style="list-style-type: none"> The development of the mine could proceed. Allows for continued access to Crown land 	<ul style="list-style-type: none"> The development of the mine could proceed. Allows for continued access

- 1 – Most disadvantaged in relation to the other alternatives.
- 2 – Disadvantaged in relation to the other alternatives.
- 3 – Neutral in relation to other alternatives.
- 4 – Advantaged in relation to other alternatives.
- 5 – Most advantaged in relation to other alternatives.

Component: Construction and Upgrades of Crown Roads and Watercrossings – Continued Access for Crown Land Use

Evaluation Considerations	Alternatives Considered			
	Null Alternative	Re-route Graphite Mine Road	Replace the Bridge on Menet Lake Road	New Bypass Road
		within and beyond Northern Graphite's mining leases with limited change to existing access. <ul style="list-style-type: none"> • 	within and beyond Northern Graphite's mining leases. <ul style="list-style-type: none"> • Access from Menet Lake Road instead of Graphite Mine Road/Bissett Creek Road. 	to Crown land within and beyond Northern Graphite's mining leases. <ul style="list-style-type: none"> • Access from Menet Lake Road instead of Graphite Mine Road/Bissett Creek Road.
Score	1 Development of the mine would potentially need to be altered.	5 The mine could be developed as currently designed.	5 The mine could be developed as currently designed.	5 The mine could be developed as currently designed.
Estimate of the Cost and Feasibility of Carrying out the Alternative	<ul style="list-style-type: none"> • \$0. 	<ul style="list-style-type: none"> • Accurate costs for the watercrossings are not currently known. Costs are expected to be similar for all alternatives and would be incurred by Northern Graphite. 	<ul style="list-style-type: none"> • Accurate costs for the watercrossings are not currently known. Costs are expected to be similar for all alternatives and would be incurred by Northern Graphite. 	<ul style="list-style-type: none"> • Accurate costs for the watercrossings are not currently known. Costs are expected to be similar for all alternatives and would be incurred by Northern Graphite.
Score	5 There are no costs associated with this alternative.	1 Costs for all alternatives considered (except the null) are expected to be similar.	1 Costs for all alternatives considered (except the null) are expected to be similar.	1 Costs for all alternatives considered (except the null) are expected to be similar.
Monitoring Requirements	<ul style="list-style-type: none"> • None required. 	<ul style="list-style-type: none"> • Monitoring would be required to ensure proper mitigation measures are being implemented. 	<ul style="list-style-type: none"> • Monitoring would be required to ensure proper mitigation measures are being implemented. 	<ul style="list-style-type: none"> • Monitoring would be required to ensure proper mitigation measures

1 – Most disadvantaged in relation to the other alternatives.

2 – Disadvantaged in relation to the other alternatives.

3 – Neutral in relation to other alternatives.

4 – Advantaged in relation to other alternatives.

5 - Most advantaged in relation to other alternatives.

Component: Construction and Upgrades of Crown Roads and Watercrossings – Continued Access for Crown Land Use

Evaluation Considerations	Alternatives Considered			
	Null Alternative	Re-route Graphite Mine Road	Replace the Bridge on Menet Lake Road	New Bypass Road
				are being implemented.
Score	5 No monitoring requirements.	3 Monitoring requirements are expected to be minimal.	3 Monitoring requirements are expected to be minimal.	3 Monitoring requirements are expected to be minimal.
Total Score	13 This alternative is not preferred.	13 This alternative is not preferred.	15 This alternative is preferred.	14 This alternative is not preferred.

- 1 – Most disadvantaged in relation to the other alternatives.
- 2 – Disadvantaged in relation to the other alternatives.
- 3 – Neutral in relation to other alternatives.
- 4 – Advantaged in relation to other alternatives.
- 5 - Most advantaged in relation to other alternatives.

*APPENDIX G2:
HARVEST OF CROWN TIMBER*

Component: Harvest of Crown Timber

Evaluation Considerations	Alternatives Considered	
	Null Alternative	Harvest of Crown Timber
Identification of the Environmental Effects and their Estimated Significance	<ul style="list-style-type: none"> No change to existing conditions. The mine cannot be developed without the removal of trees. Northern Graphite has invested substantially in work completed to date, which would no longer be of any use. The mining lease would not be viable. 	<ul style="list-style-type: none"> Loss of habitat/SAR habitat. Potential for habitat fragmentation. Removal of wetland communities. Negative effect to aesthetics. Potential for changes in drainage area, runoff, evapotranspiration and infiltration characteristics resulting from an increase in imperviousness of the cleared area and reduction in vegetative cover. Hunting/trapping activities may be negatively affected by removal of trees/habitat. Revenues from eventual operation of the mine to Northern Graphite and its shareholders. Portions of the mine site have been subject to regeneration efforts. It is anticipated that some areas in silviculture will need to be removed in order to develop the mine.
Score	1 If the trees are not harvested, the mine cannot be developed which would result in substantial economic loss to Northern Graphite and its shareholders.	1 Removal of trees will negatively affect several natural environment components, however there will be positive economic effects as a result of timber harvesting and the eventual development of the mine.
Indication of the Potential for Mitigation of the Environmental Effects	<ul style="list-style-type: none"> No mitigation measures available to compensate for loss of potential revenue. 	<ul style="list-style-type: none"> Standard erosion and sediment control measures. Implementations of habitat compensation measures. Minimize the construction footprint to the extent possible.

- 1 – Most disadvantaged in relation to the other alternatives.
- 2 – Disadvantaged in relation to the other alternatives.
- 3 – Neutral in relation to other alternatives.
- 4 – Advantaged in relation to other alternatives.
- 5 – Most advantaged in relation to other alternatives.

Component: Harvest of Crown Timber

Evaluation Considerations	Alternatives Considered	
	Null Alternative	Harvest of Crown Timber
		<ul style="list-style-type: none"> The Overall Benefit Plan will involve habitat creation or enhancement and management for Blanding's Turtle and Whip-poor-will within the regional landscape. Northern Graphite will be responsible to reimburse the costs associated with the regeneration efforts. Ottawa Valley Forest Inc. will have first right of refusal to harvest the Crown timber.
Score	1 Should timber harvest be prohibited, the mine could not be developed and there is no potential financial mitigation available to Northern Graphite.	2 Habitat compensation measures as a result of the Overall Benefit Permit under the <i>Endangered Species Act</i> would provide mitigation for the loss of habitat.
Estimate of the Effectiveness of the Alternative to Meet its Intended Purpose	<ul style="list-style-type: none"> Does not meet the purpose of allowing the development of the mine. 	<ul style="list-style-type: none"> A precursor for mine development.
Score	1 Development of the mine could not proceed.	5 The mine could be developed.
Estimate of the Cost and Feasibility of Carrying out the Alternative	<ul style="list-style-type: none"> \$0. 	<ul style="list-style-type: none"> Financial resources for removal of the timber would be the responsibility of Ottawa Valley Forest Inc. Northern Graphite would reimburse regeneration efforts.
Score	5 There is no cost associated with carrying out the null alternative.	1 Ottawa Valley Forest Inc. would be responsible for the cost of harvesting the timber. Northern Graphite would be responsible for reimbursing regeneration efforts.

1 – Most disadvantaged in relation to the other alternatives.

2 – Disadvantaged in relation to the other alternatives.

3 – Neutral in relation to other alternatives.

4 – Advantaged in relation to other alternatives.

5 - Most advantaged in relation to other alternatives.

Component: Harvest of Crown Timber

Evaluation Considerations	Alternatives Considered	
	Null Alternative	Harvest of Crown Timber
Monitoring Requirements	<ul style="list-style-type: none"> None. 	<ul style="list-style-type: none"> No monitoring requirements directly associated with the removal of trees.
Score	3 No monitoring requirements.	3 No monitoring requirements.
Total Score	11 This alternative is not preferred.	12 This alternative is preferred.

- 1 – Most disadvantaged in relation to the other alternatives.
- 2 – Disadvantaged in relation to the other alternatives.
- 3 – Neutral in relation to other alternatives.
- 4 – Advantaged in relation to other alternatives.
- 5 – Most advantaged in relation to other alternatives.

*APPENDIX G3:
AUTHORIZATIONS UNDER THE FISH
AND WILDLIFE CONSERVATION ACT*

Component: Authorizations under the *Fish and Wildlife Conservation Act*

Evaluation Considerations	Alternatives Considered	
	Null Alternative	Issue Authorizations
Identification of the Environmental Effects and their Estimated Significance	<ul style="list-style-type: none"> No change to existing conditions. The inability to develop the mine as planned could result in delays and design challenges. Substantial effort has been invested in designed the mine to operate in a specific way. Inability to construct the mine as designed (i.e., as a result of having to avoid dams/dens) would negatively impact the development of the mine. 	<ul style="list-style-type: none"> The licensed trapper for the area will be contacted for dam/den removal. Required in order to proceed with construction of the weir and potentially other components of the mine. Removal of dams may revert watercourses back to their natural flow. Northern Graphite and its shareholders will benefit financially from development of the mine. Induced and indirect economic benefits from construction and operation of the mine.
Score	3 There is a potential for negative economic effects resulting from the re-design of critical mine components should removal of the dams/dens not be permitted.	3 Removal of the dams/dens would be undertaken by a licensed trapper and in accordance with appropriate regulations. Removal of the dams/dens is not expected to negatively affect local populations of beaver/bear.
Indication of the Potential for Mitigation of the Environmental Effects	<ul style="list-style-type: none"> No mitigation measures available to compensate for loss of potential revenue to Northern Graphite. 	<ul style="list-style-type: none"> No mitigation measures required.
Score	1 Should mine components require re-design to avoid dams/dens, there is no potential financial mitigation available to Northern Graphite.	5 Mitigation measures would not be required for removal of dams/dens.
Estimate of the Effectiveness of the Alternative to Meet its Intended Purpose	<ul style="list-style-type: none"> Does not meet the purpose of allowing the development of the mine. 	<ul style="list-style-type: none"> A precursor for mine development as currently designed.
Score	1	5

- 1 – Most disadvantaged in relation to the other alternatives.
- 2 – Disadvantaged in relation to the other alternatives.
- 3 – Neutral in relation to other alternatives.
- 4 – Advantaged in relation to other alternatives.
- 5 – Most advantaged in relation to other alternatives.

Component: Authorizations under the *Fish and Wildlife Conservation Act*

Evaluation Considerations	Alternatives Considered	
	Null Alternative	Issue Authorizations
	Development of the mine would potentially need to be altered.	The mine could be developed as currently designed.
Estimate of the Cost and Feasibility of Carrying out the Alternative	<ul style="list-style-type: none"> • \$0. 	<ul style="list-style-type: none"> • Minimal – compensation to the licensed trapper is the only anticipated expenditure.
Score	4 There is no cost associated with carrying out the null alternative.	2 Northern Graphite would be responsible for compensating the trapper.
Monitoring Requirements	<ul style="list-style-type: none"> • None. 	<ul style="list-style-type: none"> • None.
Score	3 No monitoring requirements.	3 No monitoring requirements.
Total Score	12 This alternative is not preferred.	18 This alternative is preferred.

- 1 – Most disadvantaged in relation to the other alternatives.
- 2 – Disadvantaged in relation to the other alternatives.
- 3 – Neutral in relation to other alternatives.
- 4 – Advantaged in relation to other alternatives.
- 5 – Most advantaged in relation to other alternatives.

*APPENDIX G4:
LOCATION AND DESIGN OF WATER
IMPOUNDMENT STRUCTURES AND
ASSOCIATED IMPOUNDMENTS*

Component: Location and Design of Water Impoundment Structures and Associated Impoundments

Evaluation Considerations	Alternatives Considered		
	Null Alternative	TMF Option 1	TMF Option 2
<ul style="list-style-type: none"> • Identification of the Environmental Effects and their Estimated Significance 	<ul style="list-style-type: none"> • The mine cannot be developed without one of the TMF options. • Northern Graphite has invested substantially in work completed to date, which would no longer be of any use. • The mining lease would not be viable. • Potential negative effects to indirect and induced economies should the mine not be developed. 	<ul style="list-style-type: none"> • Overprinting of Unnamed Lake #2, Unnamed Lake #3 and a portion of Blimkie Lake. • All effluent from the TMF will meet provincial standards. • Displacement of two SAR (Blandings Turtles and Whip-poor-will) and their habitat, including potential nesting habitat, potential overwintering habitat, and core wetland habitat. • Creation of a new potential human-made hazard. • Overall footprint of approximately 900,000 m² will overprint existing natural vegetation. • Design of the TMF adheres to applicable regulations and guidelines. • Removal of wetland communities. • Navigation on the western portion of Blimkie Lake will no longer be possible once the TMF is constructed. • The baitfish license holder will no longer be able to use the western end of Blimkie Lake. • Hunting in the vicinity of the TMF would be negatively 	<ul style="list-style-type: none"> • Potential indirect impact to surface water from TMF runoff. • Potential for long term phreatic surface to not completely submerge ARD/ML materials creating potential groundwater quality concerns. • Potential issues with locating a discharge point of sufficient assimilative capacity to meet regulatory requirements. • Displacement of two SAR (Blandings Turtles and Whip-poor-will) and their habitat, including potential nesting habitat, potential overwintering habitat, and core wetland habitat. • Does not infill any lakes or significant water bodies. • Hunting in the vicinity of the TMF would be negatively affected • Overall footprint of approximately 960,000 m² will overprint existing natural vegetation. • Removal of topsoil and overburden for construction.

- 1 – Most disadvantaged in relation to the other alternatives.
- 2 – Disadvantaged in relation to the other alternatives.
- 3 – Neutral in relation to other alternatives.
- 4 – Advantaged in relation to other alternatives.
- 5 – Most advantaged in relation to other alternatives.

Component: Location and Design of Water Impoundment Structures and Associated Impoundments

Evaluation Considerations	Alternatives Considered		
	Null Alternative	TMF Option 1	TMF Option 2
		<p>affected and fishing in the western end of Blimkie Lake would no longer be viable.</p> <ul style="list-style-type: none"> • Harvest activities (i.e., to remove and harvestable timber) will be undertaken by Ottawa Valley Forest Inc. • Required in order to proceed with mine construction and operation. • With implementation of appropriate safety protocols (i.e., signage), there will be no effects to public health and/or safety. • Northern Graphite and its shareholders will benefit financially from development of the mine. • The mine is expected to employ 108 people. • Induced and indirect spinoffs from construction and operation of the mine. • TMF overprints a portion of an existing road. • Hunting/trapping in the vicinity of the TMF would be negatively affected with the removal of wildlife habitat. • The TMF will negatively affect aesthetics, however tourism is not anticipated to be effected. 	<ul style="list-style-type: none"> • 97% of tailings are non-potentially acid generating (PAG). A small portion (3%) of tailings are PAG. • TMF overprints an existing access road. • The TMF will negatively affect aesthetics, however tourism is not anticipated to be effected. • Required in order to proceed with mine construction and operation. • Harvest activities (i.e., to remove and harvestable timber) will be undertaken by Ottawa Valley Forest Inc. • Archaeological studies have not been completed in the area proposed for the TMF. • Northern Graphite and its shareholders will benefit financially from development of the mine. • The mine is expected to employ 108 people. • Induced and indirect spinoffs from construction and operation of the mine. • TMF overprints a portion of an existing road.

1 – Most disadvantaged in relation to the other alternatives.

2 – Disadvantaged in relation to the other alternatives.

3 – Neutral in relation to other alternatives.

4 – Advantaged in relation to other alternatives.

5 – Most advantaged in relation to other alternatives.

Component: Location and Design of Water Impoundment Structures and Associated Impoundments

Evaluation Considerations	Alternatives Considered		
	Null Alternative	TMF Option 1	TMF Option 2
		<ul style="list-style-type: none"> Removal of topsoil and overburden during construction. 97% of tailings are non-potentially acid generating (PAG). A small portion (3%) of tailings are PAG. Removal of area with traditional and current use for harvesting of large and small game, fishing and possibly other types of gathering (e.g., medicinal plants and blueberries). 	<ul style="list-style-type: none"> Hunting/trapping in the vicinity of the TMF would be negatively affected with the removal of wildlife habitat. Removal of area with traditional and current use for harvesting of large and small game, fishing and possibly other types of gathering (e.g., medicinal plants and blueberries).
Score	3 If a TMF is not constructed, the mine cannot be developed which would result in substantial economic loss to Northern Graphite and its shareholders.	2 Development of TMF Option 1 will negatively affect several natural environment and social components; however there will be positive economic effects as a result of the eventual development of the mine.	1 Similar to TMF Option 1, however the lack of a receiving waterbody of sufficient capacity to assimilate discharge is of significant concern. To date, no archaeological studies have been completed in the area of TMF Option 2.
Indication of the Potential for Mitigation of the Environmental Effects	<ul style="list-style-type: none"> No mitigation measures available. 	<ul style="list-style-type: none"> The Overall Benefit Plan will involve habitat creation or enhancement and management for Blanding's Turtle and Whip-poor-will within the regional landscape. Topsoil and overburden would be stockpiled for closure purposes. 	<ul style="list-style-type: none"> The Overall Benefit Plan will involve habitat creation or enhancement and management for Blanding's Turtle and Whip-poor-will within the regional landscape. Installation of a water treatment plant to maintain

1 – Most disadvantaged in relation to the other alternatives.

2 – Disadvantaged in relation to the other alternatives.

3 – Neutral in relation to other alternatives.

4 – Advantaged in relation to other alternatives.

5 – Most advantaged in relation to other alternatives.

Component: Location and Design of Water Impoundment Structures and Associated Impoundments

Evaluation Considerations	Alternatives Considered		
	Null Alternative	TMF Option 1	TMF Option 2
		<ul style="list-style-type: none"> • Appropriate application of design measures will not result in any negative effects to drainage or cause flooding. • With implementation of appropriate safety protocols (i.e., signage), there will be no effects to public health and/or safety. • Proper erosion and sediment control methods would be used to mitigate any potential effects from soil erosion. 	<p>discharge at regulated levels.</p> <ul style="list-style-type: none"> • Topsoil and overburden would be stockpiled for closure purposes. • Appropriate application of design measures will not result in any negative effects to drainage or cause flooding. • With implementation of appropriate safety protocols (i.e., signage), there will be no effects to public health and/or safety. • Proper erosion and sediment control methods would be used to mitigate any potential effects from soil erosion. • An alternative road would be required.
Score	1 Should approval for a TMF not be issued by the MNRF, the mine could not be developed and there is no potential financial mitigation available to Northern Graphite.	2 Habitat compensation measures as a result of the Overall Benefit Permit under the <i>Endangered Species Act</i> would provide mitigation for the loss of habitat. Other mitigation measures are standard for mine construction.	1 Similar to TMF Option 1, however this option would require consideration of continued access with the overprinting of an access road and installation of a water treatment plant to ensure effluent levels are within regulated limits.

- 1 – Most disadvantaged in relation to the other alternatives.
- 2 – Disadvantaged in relation to the other alternatives.
- 3 – Neutral in relation to other alternatives.
- 4 – Advantaged in relation to other alternatives.
- 5 – Most advantaged in relation to other alternatives.

Component: Location and Design of Water Impoundment Structures and Associated Impoundments

Evaluation Considerations	Alternatives Considered		
	Null Alternative	TMF Option 1	TMF Option 2
Estimate of the Effectiveness of the Alternative to Meet its Intended Purpose	<ul style="list-style-type: none"> Does not meet the purpose of allowing the development of the mine. 	<ul style="list-style-type: none"> A precursor for mine development. 	<ul style="list-style-type: none"> A precursor for mine development.
Score	1 Development of the mine could not proceed.	5 The mine could be developed.	5 The mine could be developed.
Estimate of the Cost and Feasibility of Carrying out the Alternative	<ul style="list-style-type: none"> \$0. 	<ul style="list-style-type: none"> Initial construction cost of \$3.8 million (GMining, 2012). 	<ul style="list-style-type: none"> Initial construction cost of \$12.8 million (Stantec, 2014e).
Score	5 There is no cost associated with carrying out the null alternative.	3 TMF Option 1 has the lowest construction cost of the two TMF Options.	1 TMF Option 2 has the highest construction cost of the two TMF Options.
Monitoring Requirements	<ul style="list-style-type: none"> None. 	<ul style="list-style-type: none"> Monitoring of the TMF will provide important input for performance evaluation and refinement of operating practices. Monitoring data that will be collected includes: <ul style="list-style-type: none"> daily recording of the pond water levels; daily production records for deposited tailings; daily pumping records for all water transferred within the facilities; site specific meteorological data and flow levels within the project area; periodic survey checks of the embankment 	<ul style="list-style-type: none"> Monitoring of the TMF will provide important input for performance evaluation and refinement of operating practices. Monitoring data that will be collected includes: <ul style="list-style-type: none"> daily recording of the pond water levels; daily production records for deposited tailings; daily pumping records for all water transferred within the facilities; site specific meteorological data and flow levels within the project area;

1 – Most disadvantaged in relation to the other alternatives.

2 – Disadvantaged in relation to the other alternatives.

3 – Neutral in relation to other alternatives.

4 – Advantaged in relation to other alternatives.

5 - Most advantaged in relation to other alternatives.

Component: Location and Design of Water Impoundment Structures and Associated Impoundments

Evaluation Considerations	Alternatives Considered		
	Null Alternative	TMF Option 1	TMF Option 2
		<p>crests to verify that no localized settlement has occurred;</p> <ul style="list-style-type: none"> • measurement of the tailings filling rates for the TMF; • regular water quality samples collection to monitor water quality downstream of the TMF (as per Environmental Compliance Approval requirements); • monitoring of the vibrating wire piezometers installed in the embankments of the TMF; • monitoring of erosion of downstream slopes of the Neutral and Sulphide TMFs. <ul style="list-style-type: none"> • In addition to the data collection, regular inspections of the TMF and associated structures will be completed. • Surface water and groundwater sampling at during operations and the various states of closure would follow the requirements of Ontario Regulation 561/94, the 	<ul style="list-style-type: none"> • periodic survey checks of the embankment crests to verify that no localized settlement has occurred; • measurement of the tailings filling rates for the TMF; • regular water quality samples collection to monitor water quality downstream of the TMF (as per Environmental Compliance Approval requirements); • monitoring of the vibrating wire piezometers installed in the embankments of the TMF; • monitoring of erosion of downstream slopes. <ul style="list-style-type: none"> • In addition to the data collection, regular inspections of the TMF and associated structures will be completed. • Surface water and groundwater sampling at during operations and the various states of closure would follow the requirements of Ontario Regulation 561/94, the

- 1 – Most disadvantaged in relation to the other alternatives.
- 2 – Disadvantaged in relation to the other alternatives.
- 3 – Neutral in relation to other alternatives.
- 4 – Advantaged in relation to other alternatives.
- 5 – Most advantaged in relation to other alternatives.

Component: Location and Design of Water Impoundment Structures and Associated Impoundments

Evaluation Considerations	Alternatives Considered		
	Null Alternative	TMF Option 1	TMF Option 2
		Environmental Compliance Approval and the Mine Rehabilitation Code. <ul style="list-style-type: none"> • At closure, the physical stability of the tailings management facilities and dams will be monitored for at least the following: <ul style="list-style-type: none"> • vegetation cover growth; • surface erosion, including gully and/or wind erosion; • tension cracks at the crest of any slopes; • signs of new or ongoing failure; • seepage stains; • pipeline failure; • bulging of slopes; • sloughing of crests; drainage for suspended solids; • settlement, seepage increases or internal deformation which may require surveying or instrumentation; and, • water discharge by measuring discharge rates and comparing to design flows. 	Environmental Compliance Approval and the Mine Rehabilitation Code. <ul style="list-style-type: none"> • At closure, the physical stability of the tailings management facilities and dams will be monitored for at least the following: <ul style="list-style-type: none"> • vegetation cover growth; • surface erosion, including gully and/or wind erosion; • tension cracks at the crest of any slopes; • signs of new or ongoing failure; • seepage stains; • pipeline failure; • bulging of slopes; • sloughing of crests; drainage for suspended solids; • settlement, seepage increases or internal deformation which may require surveying or instrumentation; and, • water discharge by measuring discharge rates and comparing to design flows.
Score	5 No monitoring requirements.	1	1

- 1 – Most disadvantaged in relation to the other alternatives.
- 2 – Disadvantaged in relation to the other alternatives.
- 3 – Neutral in relation to other alternatives.
- 4 – Advantaged in relation to other alternatives.
- 5 – Most advantaged in relation to other alternatives.

Component: Location and Design of Water Impoundment Structures and Associated Impoundments

Evaluation Considerations	Alternatives Considered		
	Null Alternative	TMF Option1	TMF Option 2
		There are numerous monitoring requirements for TMFs as set out in Ontario Regulation 561/94, the Mine Rehabilitation Code, and as will be set out in the Environmental Compliance Approval.	There are numerous monitoring requirements for TMFs as set out in Ontario Regulation 561/94, the Mine Rehabilitation Code, and as will be set out in the Environmental Compliance Approval.
Total Score	15 This alternative is not preferred. Although the null alternative ranked the highest in this evaluation, the “do nothing” approach would not fulfill the purpose the Project and therefore it is not a viable alternative.	13 This alternative is preferred.	9 This alternative is not preferred.

- 1 – Most disadvantaged in relation to the other alternatives.
- 2 – Disadvantaged in relation to the other alternatives.
- 3 – Neutral in relation to other alternatives.
- 4 – Advantaged in relation to other alternatives.
- 5 - Most advantaged in relation to other alternatives.

*APPENDIX G5:
ACTIVITIES REQUIRING
AUTHORIZATION UNDER THE ESA,
INCLUDING CONDITIONS TO ACHIEVE
OVERALL BENEFIT TO SPECIES*

Component: Activities Requiring Authorization under the ESA, including Conditions to Achieve Overall Benefit to Species

Evaluation Considerations	Alternatives Considered	
	Null Alternative	Authorization Issued
<ul style="list-style-type: none"> Identification of the Environmental Effects and their Estimated Significance 	<ul style="list-style-type: none"> The mine cannot be developed without effecting Blanding's Turtle, Eastern Whip-poor-will and their habitat, which requires approval under the ESA. Northern Graphite has invested substantially in work completed to date, which would no longer be of any use. The mining lease would not be viable. Potential negative effects to indirect and induced economies should the mine not be developed. 	<ul style="list-style-type: none"> The mine will impact Blanding's Turtle, Eastern Whip-poor-will and their habitat. Potential impacts to Blanding's Turtle resulting from mine development and operation may include alteration or loss of habitat, accidental injury or mortality of turtles, or avoidance of habitat in proximity to project components. Construction of the mine will result in loss of overwintering, core wetland and nesting habitat for Blanding's Turtle. Potential impacts of construction and operation of the mine to Whip-poor-will may be both direct (i.e. habitat loss or mortality) and indirect (e.g., sensory disturbance). Construction of the mine will result in the direct removal of Eastern Whip-poor-will habitat.
Score	1 The mine cannot be developed which would result in substantial economic loss to Northern Graphite and its shareholders.	5 There will be damage or destruction of Eastern Whip-poor-will and Blanding's Turtle habitat, however as part of the permit conditions, actions will be undertaken to improve the relative standing of both species within a reasonable amount of time.
Indication of the Potential for Mitigation of the Environmental Effects	<ul style="list-style-type: none"> No mitigation measures available. 	<ul style="list-style-type: none"> Mitigation measures will be implemented to minimize impacts to the Species will be implemented as part of the requirements of the ESA permit. Measures that achieve an overall benefit to the Species will be

- 1 – Most disadvantaged in relation to the other alternatives.
- 2 – Disadvantaged in relation to the other alternatives.
- 3 – Neutral in relation to other alternatives.
- 4 – Advantaged in relation to other alternatives.
- 5 - Most advantaged in relation to other alternatives.

Component: Activities Requiring Authorization under the ESA, including Conditions to Achieve Overall Benefit to Species

Evaluation Considerations	Alternatives Considered	
	Null Alternative	Authorization Issued
		implemented as part of the requirements of the permit <ul style="list-style-type: none"> Mitigation measures (i.e. timing windows, education and training, installation of speed limits and signage, staking the limits of vegetation clearing), can be implemented to avoid and minimize effects.
Score	1 Should mine not be developed, there is no potential financial mitigation available to Northern Graphite.	3 A number of mitigation measures are well known and are effective at limiting the potential for negative effects.
Estimate of the Effectiveness of the Alternative to Meet its Intended Purpose	<ul style="list-style-type: none"> Does not meet the purpose of allowing the development of the mine. 	<ul style="list-style-type: none"> A precursor for mine development.
Score	1 Development of the mine could not proceed.	5 The mine could be developed.
Estimate of the Cost and Feasibility of Carrying out the Alternative	<ul style="list-style-type: none"> \$0. 	<ul style="list-style-type: none"> There will be costs associated with the implementation of the required mitigation measures and the overall benefit actions. The total amount will depend on the final actions that comprise the Overall Benefit Plan. The overall benefit actions are determined by outcome rather than cost.
Score	4 There is no cost associated with carrying out the null alternative.	2 Northern Graphite will be responsible for the costs associated with carrying out the overall benefit actions.
Monitoring Requirements	<ul style="list-style-type: none"> None. 	<ul style="list-style-type: none"> Monitoring would be required to ensure proper mitigation measures are being implemented and to inform adaptive

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Component: Activities Requiring Authorization under the ESA, including Conditions to Achieve Overall Benefit to Species

Evaluation Considerations	Alternatives Considered	
	Null Alternative	Authorization Issued
		management actions as may be required. <ul style="list-style-type: none"> Effectiveness monitoring will be required to assess overall benefit measures.
Score	5 No monitoring requirements.	2 Monitoring will be required as relevant of mitigation measures and overall benefit actions.
Total Score	12 This alternative is not preferred.	17 This alternative is preferred.

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