



7.0 CUMULATIVE EFFECTS

7.1 Approach and Methodology

The approach used for assessing the potential cumulative effects of the Project are consistent with the requirements of CEAA 2012, and follow the procedures set out by the Agency in the document entitled “Technical Guidance for Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act, 2012*” (CEAA, 2014). Additional information is set out in the operational policy statement entitled “Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act, 2012*” (CEAA, 2015). The process for evaluating cumulative effects includes the following five steps:

-) Scoping;
-) Analysis;
-) Mitigation;
-) Significance; and
-) Follow-up.

The procedures and guidance from the Agency (CEAA, 2014) are such that some of the valued components (VCs) will be eliminated in the initial scoping step, while others will be carried all the way through to the determination of significance and the identification of follow-up measures.

7.2 Scoping for Potential Cumulative Effects

Within the scoping step, the following need to be determined in order to establish whether a VC needs to advance to the next step:

-) Identify the VCs for which residual effects were predicted;
-) Determine the spatial boundaries for the cumulative effects;
-) Determine the temporal scope for the cumulative effects;
-) Examine past activities; and
-) Examine future activities.

Each of these will be done in the following section.



7.2.1 Valued Components (VCs) for Assessing Cumulative Effects

The guidance from the Agency states that the assessment of cumulative effects should be done for those valued components (VCs) for which residual environmental effects are predicted. Residual environmental effects are those effects that remain after consideration of technically and economically feasible mitigation. In total, 62 VCs were identified for use in describing the effects of the Project on the environment, 50 of which were identified as having residual adverse effects. A summary of the VCs considered in this assessment, and whether residual adverse effects of the Project are predicted to occur (as presented in Section 6) is provided in Table 7.2.1-1.

Table 7.2.1-1: Summary of Valued Components (VCs) and Predicted Residual Effects

Discipline or Component	Valued Components (VCs)	Predicted Residual Adverse Effects
Terrain and Soils	Natural landscapes	Yes
	Overburden	—
	Soil chemistry	—
Geology and Geochemistry	Pit lake water quality	Yes
Noise	Ambient noise levels	Yes
	Noise disturbance to wildlife (including SAR)	Yes
	Blasting noise and vibration	Yes
	Noise related health effects	Yes
Light	Light trespass	—
Air Quality	Air quality	Yes
Climate	GHG emissions	Yes
	Changes in climate due to the Project	—
Surface Water Quality	Surface water quality	Yes
Surface Water Quantity	Surface water quantity	Yes
Groundwater Quality	Groundwater quality	—
Groundwater Quantity	Groundwater quantity	Yes
Wildlife and Wildlife Habitat	Wildlife Species at Risk	Yes
	Ungulates	Yes
	Furbearers	Yes
	Upland birds	Yes
	Wetland birds	Yes
	Small mammals	Yes
	Reptiles and amphibians	Yes
	Invertebrates	Yes
Migratory Birds	Upland birds	Yes
	Wetland birds	Yes
Fish and Fish Habitat	Stream-resident fish population	Yes
	Migratory fish populations	—
	Lake-resident fish populations	—
	Fish species at risk	—
Wetlands and Vegetation	Wetland extent	Yes
	Vegetation communities and species	—
Land Use	Land Use Planning and Policies	Yes
	Aggregate operations	Yes
	Forestry	Yes
	Mineral exploration	Yes



Table 7.2.1-1: Summary of Valued Components (VCs) and Predicted Residual Effects (continued)

Discipline or Component	Valued Components (VCs)	Predicted Residual Adverse Effects
	Fishing - recreational and commercial	Yes
	Hunting	Yes
	Trapping	Yes
	Cottagers and outfitters	Yes
	Other recreational uses	Yes
Social	Population demographics	Yes
	Education	Yes
	Infrastructure and services	Yes
	Housing and property values	Yes
	Public safety	Yes
	Transportation and traffic	Yes
Economic	Labour force, participation and employment	Yes
	Income levels	Yes
	Cost of living	Yes
	Real estate	Yes
	Economic development	Yes
	Existing businesses	Yes
	Government revenues	Yes
Human Health	Human health	—
Heritage Resources	Archaeological sites	—
	Historic heritage sites	—
Aboriginal Peoples	Health effects	Yes
	Gathering of plant material	Yes
	Hunting, trapping, fishing	Yes
	Cultural activities	Yes
	Socio-economic effects	Yes

Note: The “—” symbol denotes where no residual adverse effects were predicted for the VC. This could represent situations where no adverse effects were predicted, or where predicted adverse effects were fully mitigated, as detailed in Section 6.

The twelve VCs for which no residual adverse effects were predicted include the following:

-) Overburden;
-) Soil chemistry;
-) Light trespass;
-) Changes in climate due to the Project;
-) Groundwater quality;
-) Migratory fish populations;
-) Lake-resident fish populations;



-) Fish species at risk;
-) Vegetation communities and species;
-) Human health;
-) Archaeological sites; and
-) Historic heritage sites.

7.2.2 Spatial Boundaries for Assessing Cumulative Effects

Spatial extents for assessing cumulative effects were identified for each of the VCs identified in Table 7.2.1-1 as having residual adverse effects. These spatial extents were identified giving considerations on the nature of the VC and the characteristic of the residual Project effects. It should be noted that for a cumulative effect to occur with the effects of the Project, the physical activity does not need to be located within the identified spatial extent. Rather, the effects of the physical activity need to overlap with the spatial extents identified. The spatial extents to be used in this cumulative effects assessment are provided in Table 7.2.2-1.

Table 7.2.2-1: Spatial Extents for use in Assessing Cumulative Effects

Discipline or Component	Valued Components (VCs)	Predicted Residual Adverse Effects
Terrain and Soils	Natural landscapes	The residual adverse effect for natural landscapes is associated with the waste rock storage area (WRSA) that will be visible in some viewsapes from Thunder Lake. For there to be a cumulative effect, the physical activity would need to appear in the same general viewscape. Therefore, the spatial boundaries for this effect would be limited to an area extending about 3 km from the east side of Thunder Lake.
Geology and Geochemistry	Pit lake water quality	The residual adverse effect for the pit lake water quality is restricted to the footprint of the pit lake. The effects associated with discharges from the pit lake are captured as part of the surface water quality VC. For there to be a cumulative effect, the physical activity would need to affect the pit lake directly. Therefore, the spatial boundaries for this effect would be limited the operations area for the Project, which represents the catchment for the pit lake.
Noise	Ambient noise levels	The spatial extent for the various noise VCs has been characterized collectively. The predicted noise levels from the Project at sensitive receptor locations provide an indication that noise will be a localized effect, dropping below background levels within 5 km of the Project. For there to be a cumulative effect, the physical activity would need to affect the noise levels within 5 km of the Project. Therefore, the spatial boundary for effects on these VCs is a 5 km radius from the open pit.
	Noise disturbance to wildlife (including SAR)	
	Blasting noise and vibration	
	Noise related health effects	
Air Quality	Air quality	The spatial extent of the air effects of the Project were shown to be about the same as the 20x20 km modelling domain. At the limits of the modelling domain (e.g., Dryden in the west, Village of Wabigoon in the



Table 7.2.2-1: Spatial Extents for use in Assessing Cumulative Effects (continued)

Discipline or Component	Valued Components (VCs)	Predicted Residual Adverse Effects
		southeast), the modelled concentrations would be indistinguishable from background at those distances. For there to be a cumulative effect, the physical activity would need to affect air quality parameter concentrations within the modelling domain. Therefore, the spatial boundary for effects on air quality is a 10 km radius from the open pit.
Climate	Project GHG emissions	The only residual adverse effects are those associated with the quantity of emissions from the Project in terms of Treasury Metals own requirements under the Ontario Cap and Trade Program (O. Reg. 144/16). There would be no cumulative effects in this regards as each physical activity would be required to report individually, and would be managed individually under the program.
Surface Water Quality	Surface water quality	Residual adverse effects were predicted for the watercourses adjacent to the Project. The predicted water quality levels would be less than existing concentrations, or would meet the Provincial Water Quality Objectives (PWQO). While the model predicted minimal changes in Thunder Lake and Wabigoon Lake, it is likely that the changes are too small to be measured. Effects on surface water quality would not extend downstream from Wabigoon Lake. For a cumulative effect on surface water quality to occur, the physical activity would need to affect the quality of water in the waterbodies measurably affected by the Project. Therefore, the spatial boundaries for surface water quality would be the LSA used in Figure 6.1.4.8-1.
Surface Water Quantity	Surface water quantity	The predicted residual adverse effects of the Project on surface water quantity were shown to be restricted to those watersheds affected by the Project (i.e., Blackwater Creek and its tributaries, Thunder Lake Tributary 2 and 3, Little Creek and Hoffstrom's Bay Tributary). There were no residual adverse effects predicted on the levels in either Thunder Lake or Wabigoon Lake. For there to be a cumulative effect, the physical activity would need to affect the flows in these catchments, either upstream or downstream of the Project. Therefore, the spatial boundaries for the effects on surface water quantity will be the LSA described in Section 6.1.4.9.
Groundwater Quantity	Groundwater quantity	The predicted residual effects of the Project on groundwater quantity are directly related to lowering the water table as a result of mine dewatering. For there to be a cumulative effect, a physical activity would need to affect the groundwater regime within the zone of influence created by the dewatering activities. Therefore, the spatial boundaries for the effects on groundwater quantities is the zone of influence shown on Figure 6.1.4.10-1
Wildlife and Wildlife Habitat	Wildlife Species at Risk	The residual adverse effects on wildlife are associated with the loss of habitat due to the construction of the Project, the alteration of habitat due to the operation of the Project (e.g., noise levels) and mortality wildlife. For most of the VCs, these effects are described on the scale of the LSA (Figure 6.1.4.12-1) as the effects would not be measurable on a regional scale. The exception is the ungulate VC, which used moose as the indicator. These effects were evaluated on a regional scale given the areas required to support moose throughout its life. For cumulative
	Ungulates	
	Furbearers	
	Upland birds	
	Wetland birds	
	Small mammals	
Reptiles and amphibians		



Table 7.2.2-1: Spatial Extents for use in Assessing Cumulative Effects (continued)

Discipline or Component	Valued Components (VCs)	Predicted Residual Adverse Effects
	Invertebrates	effects to occur, the physical activity would need to have effects that overlap with the study areas used. Therefore, the spatial boundaries for the effects on most wildlife VCs is the LSA used in the Section 6.1.4.12, with the RSA used for ungulates. This selection is in keeping with CEAA guidance (CEAA, 2014).
Migratory Birds	Upland birds	The residual adverse effects on migratory birds are associated with the loss of habitat due to the construction of the Project, the alteration of habitat due to the operation of the Project (e.g., noise levels) and mortality. These effects are described on the scale of the LSA (Figure 6.1.4.12-1) as the effects would not be measurable on a regional scale. For cumulative effects to occur, the physical activity would need to have effects that overlap with the migratory birds LSA. This selection is in keeping with CEAA guidance on determining the zone of influence of effects (CEAA, 2014).
	Wetland birds	
Fish and Fish Habitat	Stream-resident fish population	For fish and fish habitat, the only residual adverse effects were those on the stream-resident fish living in those watercourses that would be directly affected by the Project (i.e., Blackwater Creek Tributary 1 and Blackwater Creek Tributary 2). For there to be a cumulative effect, the physical activity would need to affect the same fish population. Therefore, the spatial boundary for the effects on stream resident fish populations is the limit of the Blackwater Creek watershed, both upstream and downstream of the Project.
Wetlands and Vegetation	Wetland extent	The residual adverse effect on wetland extent is associated with the physical loss of wetlands as a result of the construction and operations of the Project. For the purpose of describing these effects (Section 6.15.4), the LSA (Figure 6.1.4.15-1) was used. This is the same LSA as used for wildlife. Viewed on a local scale, the effects of the Project would be measurable; however, they would not be measurable on the scale of the regional study area for vegetation and wetlands (Figure 6.1.4.15-1). For there to be a cumulative effect, the physical activity would need to directly affect wetlands within the appropriate study area. Therefore, the spatial boundaries for the effects on wetland extent is the LSA used in Section 6.1.4.15. This selection is in keeping with CEAA guidance (CEAA, 2014).
Land Use	Land Use planning and policies	The residual adverse effects of the Project on the land use VCs are tied to the effects of the Project on lands and waters. The study areas used correspond to the RSA for wildlife and fish, and are shown on Figures 6.1.4.16-1 and 6.1.4.16-1. For there to be a cumulative effects, the physical activity would need to have effects that overlap with the study areas. Therefore, the spatial boundaries for the effects on land use are the terrestrial and aquatic RSAs used in Section 6.1.4.16.
	Aggregate operations	
	Forestry	
	Mineral exploration	
	Fishing - recreational and commercial	
	Hunting	
	Trapping	
	Cottagers and outfitters	
Other recreational uses		
Social	Population demographics	The social residual effects of the Project were characterized on the scale of the study area used (Figure 6.1.4.17-1). This study area also includes the Indigenous communities identified by the Agency. For there
	Education	



Table 7.2.2-1: Spatial Extents for use in Assessing Cumulative Effects (continued)

Discipline or Component	Valued Components (VCs)	Predicted Residual Adverse Effects
	Infrastructure and services	to be a cumulative effect, the physical activity would need to have effects that overlap with the study area.
	Housing and property values	
	Public safety	
	Transportation and traffic	
Economic	Labour force, participation and employment	The same logic and reasoning used for social VCs applies for the economic VCs. The economic residual effects of the Project were characterized on the scale of the study area used (Figure 6.1.4.17-1), which is the same study areas used for the social VCs. This study area includes the Indigenous communities identified by the Agency. For there to be a cumulative effect, the physical activity would need to have effects that overlap with the study area.
	Income levels	
	Cost of living	
	Real estate	
	Economic Development	
	Existing businesses	
	Government revenues	
Aboriginal Peoples	Health effects	The residual effects of the Project on Aboriginal peoples were characterized on the scale of the study area used (Figure 6.1.4.17-1), which is the same study areas used for the social and economic VCs, and includes the Indigenous communities identified by the Agency, and their traditional lands. For there to be a cumulative, the physical activity would need to have effects that overlap with the study area.
	Gathering of plant Material	
	Hunting, trapping, fishing	
	Cultural activities	
	Socio-economic effects	

7.2.3 Temporal Boundaries for Assessing Cumulative Effects

The temporal boundaries used for assessing cumulative effects were selected to be consistent with those used in evaluating the effects of the Project, namely:

-) Site preparation and construction phase (2 years);
-) Operations (11 to 12 years);
-) Closure (3 years); and
-) Post-closure (beyond year 17).

Table 7.2.3-1 provides the temporal boundaries for each of the VCs for which residual adverse effects were predicted.



Table 7.2.3-1: Temporal Boundaries for use in Assessing Cumulative Effects

Discipline or Component	Valued Components (VCs)	Predicted Residual Adverse Effects
Terrain and Soils	Natural landscapes	The residual adverse effect is associated with the presence of the WRSA. This feature will be constructed during the first few years of operations, and will remain a permanent feature on the landscape. A physical activity would need to have effects that overlapped with the operations, closure and post-closure phases of the Project for there to be a cumulative effects. However, it is not reasonable to foresee future activities into the far future. Therefore, the temporal boundary for this effect will be set from year 3 to year 37 (20 years following closure).
Geology and Geochemistry	Pit lake water quality	The residual adverse effect associated with the pit lake quality VC is tied to the presence of the pit lake. At the end of mining, the dewatering activities will cease and the open pit will be allowed to fill with water. The filling of the pit lake will take between 5 to 8 years, at which time the pit lake will become a permanent feature on the landscape. A physical activity would need to have effects that overlapped with the post-closure phases of the Project for there to be a cumulative effects. However, it is not reasonable to foresee future activities into the far future. Therefore the temporal boundary for this effect will be set from year 19 (5 years after the end of operations) to year 37 (20 years after closure).
Noise	Ambient noise levels	Activities at the Project associated with the residual adverse effects on the noise VCs are restricted to the site preparation and construction, operations and closure phases of the Project (blasting would not occur during closure). There would be no residual adverse effects on the noise VCs during the post-closure phase. For there to be a cumulative effect on noise, the physical activity would have to occur during the active period of the Project life, from year 1 through year 17 (the end of the closure activities).
	Noise disturbance to wildlife (including SAR)	
	Blasting noise and vibration	
	Noise related health effects	
Air Quality	Air quality	Activities at the Project associated with the residual adverse effects on the air quality VC are restricted to the site preparation and construction, operations and closure phases of the Project. There would be no residual adverse effects on the air quality VC during the post-closure phase. For there to be a cumulative effect on air quality, the physical activity would have to occur during the active period of the Project life, from year 1 through year 17 (the end of the closure activities).
Climate	Project GHG emissions	This VC relates to Treasury Metals own requirements under the Ontario Cap and Trade Program (O. Reg. 144/16) for the reporting and management of their emissions. Although GHG emissions are identified as contributing to climate change, there were no residual adverse effects predicted for changes in climate due to the Project VC.
Surface Water Quality	Surface water quality	The residual adverse effects of the Project on surface water quality occur during the operations phase, when excess water at the Project will be treated to meet the PWQO before discharge to Blackwater Creek, and the post-closure phase when excess water from the pit lake is passively discharged into a tributary of Blackwater Creek. During the post-closure phase, seepage from the TSF and WRSA will leave the site and interact with adjacent waterbodies. Releases from the pit lake and seepage from the WRSA and TSF will effectively be permanent. However, it is not reasonable to foresee future activities into the far



Table 7.2.3-1: Temporal Boundaries for use in Assessing Cumulative Effects (continued)

Discipline or Component	Valued Components (VCs)	Predicted Residual Adverse Effects
		future. Therefore, the temporal boundary for this effect will be set from year 2 (the start of operations) to year 37 (20 years after closure).
Surface Water Quantity	Surface water quantity	The residual adverse effects of the Project on surface water quantity will vary by phase of the Project. At the start of the site preparation and construction phase, a perimeter ditch will be constructed around the operations area to prevent runoff leaving the site. This will permanently alter the size of the catchment areas for Little Creek, Hoffstrom's Bay Tributary and Blackwater Creek. During operations, fresh water requirements will be provided from the irrigation ponds on Thunder Lake Tributary 2 and 3. Additionally, excess water at the Project will be treated to meet the PWQO before discharge to Blackwater Creek. At closure, the site will be graded and all runoff directed towards the open pit. The reclaimed site will have different runoff characteristics from the baseline conditions for the catchment. Changes to the flows in Little Creek, Hoffstrom's Bay Tributary and Blackwater Creek will be permanent. However, it is not reasonable to foresee future activities into the far future. Therefore, the temporal boundaries for this effect will be set from year 2 (the start of operations) to year 37 (20 years after closure).
Groundwater Quantity	Groundwater quantity	The predicted residual effects of the Project on groundwater quantity are directly related to the lowering of the water table as a result of the dewatering of the open pit and underground mine. For there to be a cumulative effect, a physical activity would need to affect the groundwater regime within the zone of influence created by the dewatering activities. These effects will occur during the operations phase, but will last into post-closure, when the open pit fills and the groundwater levels return to near pre-development levels. The temporal boundaries for the residual effects on groundwater quantities extends from year 2 (the start of operations) to year 35 (10 years after the flooding of the open pit).
Wildlife and Wildlife Habitat	Wildlife Species at Risk	The predicted residual effects of the Project on the wildlife VCs will continue throughout the active life of the Project, and are expected to recover following the closure and reclamation activities. The temporal boundaries for the residual effects on the wildlife VCs extends from year 1 to year 27 (10 years after closure).
	Ungulates	
	Furbearers	
	Upland Birds	
	Wetland Birds	
	Small mammals	
	Reptiles and amphibians	
Invertebrates		
Migratory Birds	Upland Birds	The predicted residual effects of the Project on the migratory bird VCs will continue throughout the active life of the Project, and are expected to recover following the closure and reclamation activities. The temporal boundaries for the residual effects on the migratory VCs extends from year 1 to year 27 (10 years after closure).
	Wetland Birds	
Fish and Fish Habitat	Stream-resident fish population	For fish and fish habitat VCs, the only residual adverse effects were those on the stream-resident fish living in those watercourses that would be directly affected by the Project (i.e., Blackwater Creek Tributary 1 and Blackwater Creek Tributary 2). These effects would be restricted to the site preparation and construction phase. It is expected that Treasury



Table 7.2.3-1: Temporal Boundaries for use in Assessing Cumulative Effects (continued)

Discipline or Component	Valued Components (VCs)	Predicted Residual Adverse Effects
		Metals will be required to implement a plan to offset the effects of overprinting portions of Blackwater Creek tributary 1 and 2. The temporal boundaries for the residual effects on the stream-based fish populations extends from year 1 to 2 (the end of the site preparation and construction phase).
Wetlands and Vegetation	Wetland extent	The predicted residual effects of the Project on the wetland extent will continue throughout the active life of the Project. The effects are expected to recover following the closure and reclamation activities. The temporal boundaries for the residual effects on wetland extent last from year 1 to year 27 (10 years after closure).
Land Use	Land use planning and policies	The predicted residual effects of the Project on the land use VCs are predicted to begin at the start of the site preparation and continue through into post-closure. Most of the effects will dissipate with time, therefore, the temporal boundaries for the residual effects on wetland extent last from year 1 to year 22 (5 years after the end of the closure phase).
	Aggregate operations	
	Forestry	
	Mineral exploration	
	Fishing - recreational and commercial	
	Hunting	
	Trapping	
	Cottagers and outfitters	
Other recreational uses		
Social	Population demographics	The predicted residual effects of the Project on the social VCs are predicted to begin at the start of the site preparation and continue through into post-closure. Most of the effects will dissipate with time, therefore, the temporal boundaries for the residual effects on wetland extent last from year 1 to year 22 (5 years after the end of the closure phase).
	Education	
	Infrastructure and services	
	Housing and property values	
	Public safety	
Transportation and traffic		
Economic	Labour force, participation and employment	The predicted residual effects of the Project on the economic VCs are predicted to begin at the start of the site preparation and continue through into post-closure. Most of the effects will dissipate with time, therefore, the temporal boundaries for the residual effects on wetland extent last from year 1 to year 22 (5 years after the end of the closure phase).
	Income levels	
	Cost of living	
	Real estate	
	Economic development	
	Existing businesses	
	Government revenues	
Aboriginal Peoples	Health effects	The predicted residual effects of the Project on the Aboriginal peoples VCs are predicted to begin at the start of the site preparation and continue through into post-closure. Most of the effects will dissipate with time, therefore, the temporal boundaries for the residual effects on wetland extent last from year 1 to year 22 (5 years after the end of the closure phase).
	Gathering of plant material	
	Hunting, trapping, fishing	
	Cultural activities	
	Socio-economic effects	



7.2.4 Past Activities Considered for Assessing Cumulative Effects

In evaluating the potential effects of the Project, consideration was given to the existing conditions onto which the Project effects would be added. As set out in the operational policy statement (CEAA, 2015) and the technical guidance from the Agency (CEAA, 2014), the use of the present day conditions is an appropriate means for capturing the cumulative effect from past activities.

The present day conditions used for describing existing conditions inherently includes the effects of ongoing harvesting activities in the region (fishing, hunting and trapping). These activities are considered to be sustainable, and are thus reflective of the existing, present day conditions.

7.2.5 Future Activities Considered for Assessing Cumulative Effects

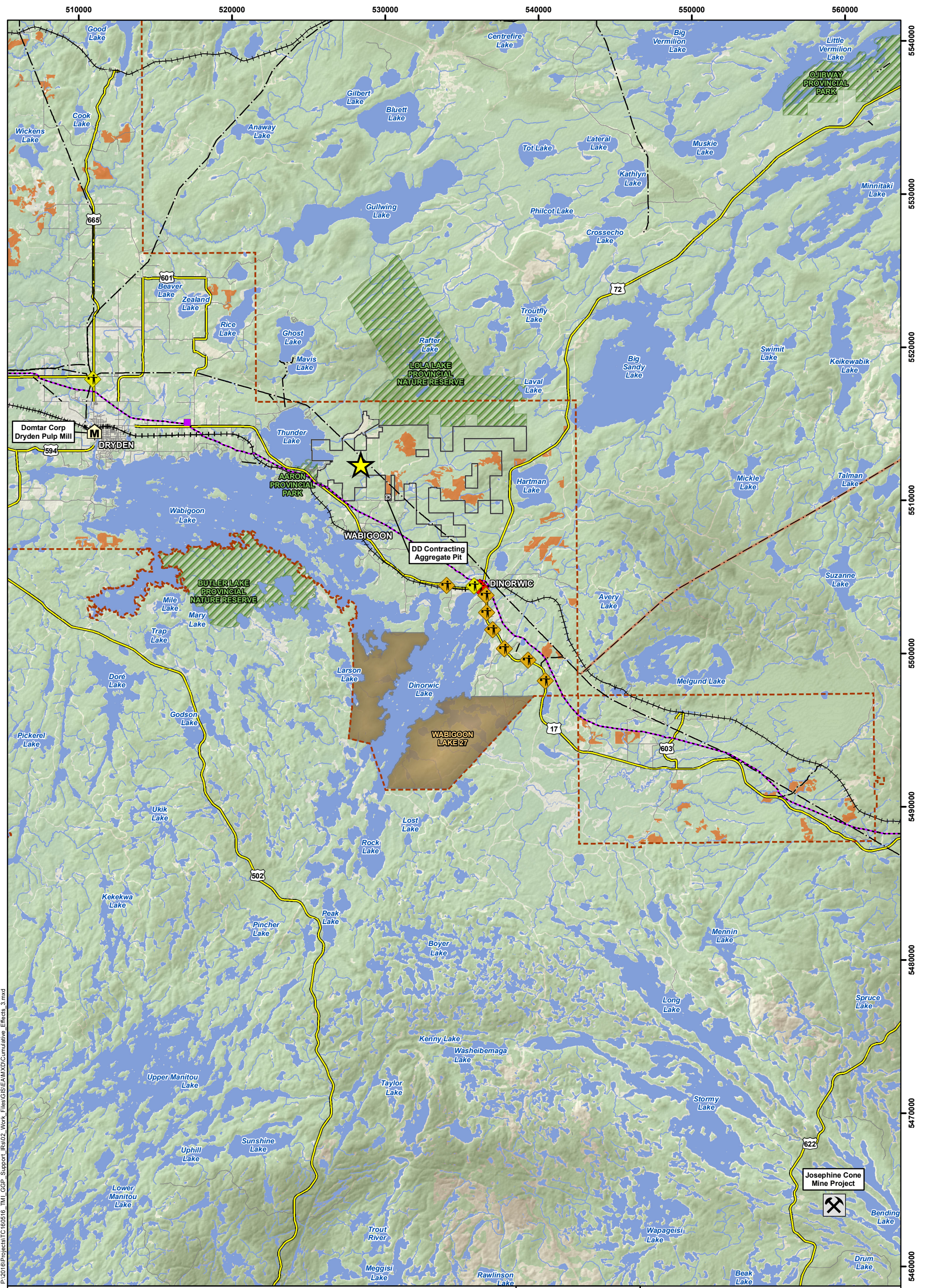
The following future activities were considered as part of the cumulative effects assessment for the Project. These future Project were specifically identified as part of the Round 1 information requests, specifically in TMI_252-CE(1)-02:

-) Treasury Metals Inc. exploration program;
-) Highway 17;
-) Canadian Pacific rail line;
-) Forestry operations by Dryden Forest Management Company;
-) Domtar Corp.'s Dryden Pulp Mill;
-) Proposed 1-5 MW power generation facility;
-) Energy East pipeline;
-) Josephine Cone Mine Project;
-) Aggregate pits or quarries;
-) The 230kV transmission line proposed by Wataynikaneyap Power; and
-) The development of local infrastructure and minor road upgrades in Dryden and Wabigoon



These projects are discussed briefly below and are show in Figure 7.2.5-1:

- J) **Treasury Metals Exploration Program:** During all phases associated with the Project, Treasury Metals may conduct mineral exploration within its property boundary to further delineate its depot or to identify new depots. Mineral exploration activities could include, but are not limited to; prospecting, surveys and exploration drilling. Mineral exploration programs could result in effects to the environment which are cumulative with effects from the Project. Accordingly, mineral exploration activities within the Project property boundary have been included through this cumulative effects assessment.
- J) **Highway 17:** King's Highway 17 is part of the Trans-Canada Highway system and is the main Trans-Canada highway through the province of Ontario. It begins at the Ontario/Manitoba boarder approximately 50 km west of Kenora, Ontario, and traverses west until it becomes Highway 417 west of Arnprior, Ontario. Highway 17 passes through the town of Dryden, Ontario and is a major transportation route between Dryden and the proposed Goliath Gold Project. The MNDM publishes a list of northern highway projects, including projects along Highway 17 (MNDM, 2016), Upcoming work being done to Highway 17 near the Project includes: resurfacing, culvert replacements at McKenzie Creek and Moose Creek near Dryden, and replacement of a Canadian Pacific Railways overpass near Dinorwic. These projects have been included in the cumulative effects assessment.
- J) **Canadian Pacific Railway:** The Canadian Pacific Railway is a publicly traded company on the Toronto and New York stock exchanges. It has over 14,000 miles of rail network from Vancouver to Montreal along with rail to a few major industrial centers in the US (Canadian Pacific, 2017). Canadian Pacific Railway has tracks that run proximal to the Project, and generally parallel to Highway 17. An annual vegetation control program is implemented along the tracks to decrease vegetation growth adjacent to the rails.
- J) **Dryden Forest Management Company Limited:** The Dryden Forest Management Company Limited (DFMC) has managed the Dryden Forest area since it was issued a Sustainable Forest License from the Ontario Minister of Natural Resources and Forestry in 1998. The DFMC has identified through its Ten-year Forest Management Plan, that it plans on logging in areas located between Thunder Lake and Hartman Lake located within the Treasury Metals' property boundary between 2016 and 2021 (Dryden Forest Management Company, 2016). The current 10-year Forest Management Plans 2011-2021 (FMP) show a planned harvest of approximately 11,952 ha.
- J) **Domtar Corporations Dryden Pulp Mill:** Domtar Corporation's Dryden Pulp Mill is located along the Wabigoon Chain of Lakes within Dryden, Ontario and produces cellulose fibers including paper grade and bleached softwood kraft market pulp. It has an annual pulp production capacity of 327,000 tonnes and is the largest employer in Dryden supporting over 350 employees with a regional economic impact of \$603.4 million (Domtar, 2017). The pulp mill has been in operation in Dryden since 1913, and was acquired by Domtar in 2007. The pulp mill is located on the west side of Dryden, approximately 15 km from the Project, adjacent to the Wabigoon River.



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LEGEND

- ★ Site Location
- Property Boundary of Claims and Dispositions
- ⚒ Josephine Cone Mine Project
- Energy East Pipeline Pumping Station
- M Domtar Corp Dryden Pulp Mill
- Proposed Wataynikaneyap Power
- Transmission Line
- Natural Gas Pipeline (Proposed upgraded for Energy East Pipeline)
- DD Contracting Aggregate Pit
- +++ Canadian Pacific Railway
- First Nation Reserves
- Provincial Parks
- Dryden Forest Management Unit
- Planned Harvest Areas (2016 - 2021)
- Highway
- Local Road
- MNDM Proposed Road Works (2017-2021)
- ◆ Bridge Rehabilitation
- ◆ Culvert Replacement
- ◆ Resurfacing

NOTES:

- Topographic data extracted from Land Information Ontario, MNR
- MNDM proposed road works extracted from Northern Highways Program 2017-2021.
- Planned harvest areas were digitized from Dryden Forest Management Units Operational Planning Maps.
- Energy East Pipeline route extracted from Energy East Pipeline Project 'Environmental and Socio-economic Assessment', Stantec, 2014.
- Wataynikaneyap Power routes extracted from 'Phase 1 Draft ES', Golder Associates, 2016.

Datum: NAD83
Projection: UTM Zone 15N



GOLIATH GOLD PROJECT

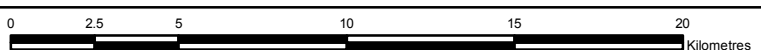
Cumulative Effects

PROJECT N°: TC160516

FIGURE: 7.2.5-1

SCALE: 1:225,000

DATE: August 2017





- J) **Proposed 1-5 MW power generation facility:** As part of the alternatives assessment, Treasury Metals were exploring a range of options for providing power to the Project. As detailed in the Section 3, power for the Project will be provided from the 115 kV HydroOne transmission line that runs through the Project, adjacent to the processing plant. There are no longer plans to use diesel to generate electricity on site. This activity, which is not a project, is only part of the cumulative effects assessment as its inclusion was explicitly required by the Agency (TMI_252-CA(1)-02).
- J) **Energy East Pipeline:** TransCanada's Energy East Pipeline is a 4,500 km pipeline that is planned to transport 1.1 million barrels of oil per day from Alberta and Saskatchewan to refineries and a marine terminal in Eastern Canada (TransCanada, 2017). The pipeline will run through northern Ontario, replacing an existing natural gas pipeline that runs adjacent to the Project. The Energy East Project will include a new pumping station in Dryden. The pipeline will require excavation during its construction and maintenance during operations.
- J) **Josephine Cone Mine Project:** The Josephine Cone Mine Project is a proposed iron ore mine owned by Bending Lake Iron Group Limited. The proposed mine would be located 49 km southwest of Ignace, Ontario, 80 km north of Atikokan, Ontario and approximately 50 km southwest of the Project property boundary. The project would be an open pit mine with an ore throughput of approximately 56,000 tonnes per day. The project is currently undergoing a Federal Environmental Assessment, which commenced in mid-2012. The EIS Guidelines were issued in June of 2012, and have since been extended to June of 2018, although no EIS had been filed at the time of Treasury Metals revised EIS preparation. The project if constructed has an anticipated life span greater than 25 years.
- J) **Aggregate Pits and Quarries:** D&D Contracting holds an aggregate permit (Permit 46764) for an aggregate pit within the property boundary of Treasury Metals (MNR, 2017). This aggregate pit has been included in the cumulative effects assessment.
- J) **Wataynikaneyap Power:** Wataynikaneyap Power is a transmission company owned by 22 First Nations communities and provides power to remote First Nations communities in Northwestern Ontario by means of diesel generation. The Wataynikaneyap Transmission Project plans to bring reliable power to 16 of these remote communities with 1800 km of new transmission lines with a potential construction start date in December of 2018 (Wataynikaneyap Power, 2012). A segment of the transmission line will run from the Hydro One 230 kV line southeast of Dinorwick to Pickle Lake. The segment of this project within the cumulative effects study area is expected to be completed in 2020.
- J) **Local infrastructure:** The development of local infrastructure and minor road upgrades are expected in communities within the cumulative effects study area (i.e., Dryden and Wabigoon). No large scale projects (>\$500,000) are anticipated (Meridian Planning Consultants 2007).



7.3 Assessment of Cumulative Effects

7.3.1 Screening of Potential Cumulative Effects

To determine the potential for cumulative effects associated with the above projects, a series of tables have been prepared that explores each of the VC for which there were predicted residual adverse effects.

For terrain and soils, the residual adverse effect identified for consideration of cumulative effects was the residual effect of the WRSA on the natural landscapes VC. The spatial extent is limited to the 3 km area to the east of Thunder Lake (Table 7.2.2-1). The temporal boundaries are from year 2 to 37 years (Table 7.2.3-1). The assessment determined that there would be or could be some cases (shaded in green) where there was both spatial and temporal crossover between the effects area of the Project and the effects of certain of the identified future projects. An evaluation of the potential cumulative effects is provided in Table 7.3.1-1.

Table 7.3.1-1: Cumulative Effects Screening for Terrain and Soils

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Treasury Metals exploration program	Yes	Yes	Although these activities will overlap, the effects are not similar. There would be no cumulative effects.
Highway 17	No	Yes	The upgrades to Highway 17 would not be visible in the same viewscales.
Canadian Pacific line	No	Yes	The upgrades to CPR lines would not be visible in the same viewscales.
Dryden Forest Management Company	Yes	Yes	While the FMA for the company overlaps with the viewscape of the WRSA, the planned harvesting areas (see Figure 7.2.5-1) are located several kilometres to the east of the project. As a result, there would be no cumulative effect on the view of the WRSA from Thunder Lake.
Domtar Dryden Pulp Mill	No	Yes	There is no spatial overlap
1-5 MW power generation facility	—	—	This is not a project
Energy East pipeline	No	Yes	The pipeline would not be visible in the same viewscales.
Josephine Cone Mine Project	No	Yes	This project would not be visible in the same viewscales
Aggregate pits or quarries;	Yes	Yes	Although these projects overlap, there is a low potential for tall structures at a quarry. Therefore, they would not be visible in the same viewscales
Wataynikaneyap Power	No	Yes	This project would not be visible in the same viewscales
Local infrastructure	No	Yes	This project would not be visible in the same viewscales

A single residual effect for geology and geochemistry was identified, specifically the effects on the pit lake water quality VC. The spatial extent is limited to the operations area (Table 7.2.2-1). The temporal boundaries are from year 2 to 37 years (Table 7.2.3-1). The assessment determined that there would be no cases of predicted spatial and temporal crossover between the effects



area of the Project and the effects of other projects in the surrounding area. An evaluation of the potential cumulative effects is provided in Table 7.3.1-2.

Table 7.3.1-2: Cumulative Effects Screening for Geology and Geochemistry

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Treasury Metals exploration program	Yes	No	Pit lake does not exist until between 6 and 8 years following operations. Therefore, there would be no temporal overlap.
Highway 17	No	Yes	There is no spatial overlap
Canadian Pacific line	No	Yes	There is no spatial overlap
Dryden Forest Management Company	No	Yes	There is no spatial overlap
Domtar Dryden Pulp Mill	No	Yes	There is no spatial overlap
1-5 MW power generation facility	—	—	This is not a project
Energy East pipeline	No	No	There is no temporal or spatial overlap
Josephine Cone Mine Project	No	Yes	There is no spatial overlap
Aggregate pits or quarries;	No	No	There is no spatial overlap
Wataynikaneyap Power	No	No	There is no spatial overlap
Local infrastructure	No	Yes	There is no spatial overlap

Residual adverse effects for noise were predicted for the ambient noise levels, noise disturbance to wildlife, blasting noise and vibration and noise related health effects VCs (Section 6.4.6). The spatial extent for noise was identified a 5 km radius from the open pit (Table 7.2.2-1). The temporal boundaries are from year 1 to 17 years (Table 7.2.3-1). The assessment determined that there would be or could be some cases (shaded in green) of predicted spatial and temporal crossover between the effects area of the Project and the effects of other projects in the surrounding area. An evaluation of the potential cumulative effects is provided in Table 7.3.1-3.

Table 7.3.1-3: Cumulative Effects Screening for Noise

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Treasury Metals exploration program	Yes	Yes	It is unlikely the relatively limited activities associated with exploration would alter the noise predictions
Highway 17	No	Yes	The major upgrades to Highway 17 are too far away to be cumulative.
Canadian Pacific line	No	Yes	The upgrades to lines are too far away to be cumulative.
Dryden Forest Management Company	Yes	Yes	While there are planned harvesting areas (see Figure 7.2.5-1) located within 5 km of the open pit, the activities would be far enough from the Project they would not alter the maximum predicted noise magnitudes which would occur in close proximity to the operations area.
Domtar Dryden Pulp Mill	No	Yes	The mill is too far away to have any cumulative effects for noise
1-5 MW power generation facility	—	—	This is not a project



Table 7.3.1-3: Cumulative Effects Screening for Noise (continued)

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Energy East pipeline	Yes	No	Any construction activities along the right of way are expected to be completed before 2020 so there is no temporal overlap
Josephine Cone Mine Project	No	Yes	The mine is too far away to have an cumulative effects for noise
Aggregate pits or quarries;	Yes	Yes	There is the potential for overlap in space and time. However, it is expected that the level of activity would not alter the maximum noise predictions. If the aggregate source was sufficiently close to the Project, it is likely that the recovery would be done using Treasury Metals equipment.
Wataynikaneyap Power	No	Yes	The project is too far away to have any cumulative effects for noise
Local infrastructure	Yes	Yes	There is the potential for overlap in space and time. It is expected that the level of activity would not alter the maximum noise prediction on which the magnitude of effects are established.

There were no residual adverse effects predicted for the light VC of light trespass.

Residual adverse effects were predicted for the single air quality VC. The spatial extent for air quality cumulative effects is a 10 km radius from the open pit (Table 7.2.2-1). The temporal boundaries are from year 1 to 17 years (Table 7.2.3-1). The assessment determined that there would be or could be some cases (shaded in green) of predicted spatial and temporal crossover between the effects area of the Project and the effects of other projects in the surrounding area. An evaluation of the potential cumulative effects is provided in Table 7.3.1-4.

Table 7.3.1-4: Cumulative Effects Screening for Air Quality

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Treasury Metals exploration program	Yes	Yes	There is the potential for overlap in space and time. It is expected that the level of activity would be small compared to the Project
Highway 17	No	Yes	The major upgrades are too far away to have any cumulative effects for air quality
Canadian Pacific line	No	Yes	The major upgrades are too far away to have any cumulative effects for air quality
Dryden Forest Management Company	Yes	Yes	While there are planned harvesting areas (see Figure 7.2.5-1) located within 10 km of the open pit, the activities would be far enough from the Project they would not alter the maximum predicted air concentrations, which would occur in close proximity to the operations area.
Domtar Dryden Pulp Mill	Yes	Yes	Although the pulp mill is located outside of the 10 km extent for cumulative air quality effects, there is a potential that the effects from Dryden pulp will overlap with those of the Project. It should be noted that the mill will need to comply with their ECA requirements at the property line. The highest air concentrations from the pulp mill will occur near the pulp mill, just as the highest



Table 7.3.1-4: Cumulative Effects Screening for Air Quality (continued)

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
			concentration from the Project would occur near the property line of the Project. Therefore the high concentrations from these projects would not affect the same receptor, and thus the cumulative effects will not affect the magnitude of the air quality effects of the Project.
1-5 MW power generation facility	—	—	This is not a project
Energy East pipeline	Yes	No	Any construction activities along the right of way will be completed before 2020 so there is no temporal overlap
Josephine Cone Mine Project	No	Yes	The mine is too far away to have any cumulative effects for air quality
Aggregate pits or quarries;	Yes	Yes	There is the potential for overlap in space and time. It is expected that the level of activity would be small compared to the Project
Wataynikaneyap Power	No	Yes	The project is too far away to have any cumulative effects for air quality
Local infrastructure	Yes	Yes	There is the potential for overlap in space and time. It is expected that the level of activity would be small compared to the Project

Despite the effects avoidance (Section 6.8.3) and mitigation (Section 6.8.5), surface water quality modelling identified residual adverse effects for surface water quality. The spatial extent for surface water quality cumulative effects is the LSA used for the assessment (Table 7.2.2-1). The residual effects were predicted during the operations and post-closure phases. There were no residual effects during the site preparation and construction, and closure phases as there would be no releases to surface water during either of these Project phases. The temporal boundaries are from year 2 to 37 years (Table 7.2.3-1). The assessment determined that there would be or could be some cases (shaded in green) of predicted spatial and temporal crossover between the effects area of the Project and the effects of other projects in the surrounding area. An evaluation of the potential cumulative effects is provided in Table 7.3.1-5.

Table 7.3.1-5: Cumulative Effects Screening for Surface Water Quality

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Treasury Metals exploration program	Yes	Yes	These activities are not expected to measurably alter surface water quality.
Highway 17	Yes	Yes	These activities are not expected to measurably alter surface water quality.
Canadian Pacific line	Yes	Yes	These activities are not expected to measurably alter surface water quality.
Dryden Forest Management Company	Yes	Yes	Although there are planned harvesting activities that overlap small portions of the fisheries LSA (see Figure 7.2.5-1), they do not overlap the watercourses potentially affected by the project. Therefore, these activities are not expected to measurably alter surface water quality.



Table 7.3.1-5: Cumulative Effects Screening for Surface Water Quality (continued)

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Domtar Dryden Pulp Mill	No	Yes	The effects of the Project would not be measurable at Dryden, or downstream
1-5 MW power generation facility	—	—	This is not a project
Energy East pipeline	Yes	No	Any construction activities along the right of way will be completed before 2020 so there is no temporal overlap
Josephine Cone Mine Project	No	Yes	The project is too far away to have any cumulative effects for surface water quality
Aggregate pits or quarries;	Yes	Yes	These activities are not expected to measurably alter surface water quality.
Wataynikaneyap Power	No	Yes	The project is too far away to have any cumulative effects for surface water quality
Local infrastructure	Yes	Yes	These activities are not expected to measurably alter surface water quality.

Section 6.9.6 describes the predicted residual adverse effects on surface water quantity. The spatial extent is the LSA for surface water used in Section 6.1.4 of the revised EIS (Table 7.2.2-1). The temporal boundaries are from year 2 to 37 years (Table 7.2.3-1). The assessment determined that there would be or could be some cases (shaded in green) of predicted spatial and temporal crossover between the effects area of the Project and the effects of other projects in the surrounding area. An evaluation of the potential cumulative effects is provided in Table 7.3.1-6.

Table 7.3.1-6: Cumulative Effects Screening for Surface Water Quantity

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Treasury Metals exploration program	Yes	Yes	These activities are not expected to measurably alter surface water quantities
Highway 17	No	Yes	The project is too far away to have any cumulative effects for surface water quantity
Canadian Pacific line	No	Yes	The project is too far away to have any cumulative effects for surface water quantity
Dryden Forest Management Company	Yes	Yes	Although there are planned harvesting activities that overlap small portions of the fisheries LSA (see Figure 7.2.5-1), they do not overlap the watercourses potentially affected by the project. Therefore, these activities are not expected to measurably alter surface water quantities.
Domtar Dryden Pulp Mill	No	Yes	The project is too far away to have any cumulative effects for surface water quantity
1-5 MW power generation facility	—	—	This is not a project
Energy East pipeline	Yes	No	Any construction activities along the right of way will be completed before 2020 so there is no temporal overlap
Josephine Cone Mine Project	No	Yes	The project is too far away to have any cumulative effects for surface water quantity



Table 7.3.1-6: Cumulative Effects Screening for Surface Water Quantity (continued)

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Aggregate pits or quarries;	Yes	Yes	These activities are not expected to measurably alter surface water quantities
Wataynikaneyap Power	No	Yes	The project is too far away to have any cumulative effects for surface water quantity
Local infrastructure	Yes	Yes	These activities are not expected to measurably alter surface water quantities

Residual adverse effects were predicted for the groundwater quantity VC, specifically for the changes in contributions to surface flow patterns indicator. The spatial extent is the zone of influence from dewatering (Table 7.2.2-1). The temporal boundaries are from year 2 to 35 years (Table 7.2.3-1). The assessment determined that there would be or could be some cases (shaded in green) of predicted spatial and temporal crossover between the effects area of the Project and the effects of other projects in the surrounding area. An evaluation of the potential cumulative effects is provided in Table 7.3.1-7.

Table 7.3.1-7: Cumulative Effects Screening for Groundwater Quantity

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Treasury Metals exploration program	Yes	Yes	These activities are not expected to alter surface groundwater quantities
Highway 17	No	Yes	The project is beyond the zone of influence
Canadian Pacific line	No	Yes	The project is beyond the zone of influence
Dryden Forest Management Company	Yes	Yes	While the closest planned harvesting areas (see Figure 7.2.5-1) will overlap with the zone of influence resulting from the dewatering of the open pit and underground mine, the forestry activities are not expected to measurably alter groundwater quantities.
Domtar Dryden Pulp Mill	No	Yes	The project is beyond the zone of influence
1-5 MW power generation facility	—	—	This is not a project
Energy East pipeline	Yes	No	Any construction activities along the right of way will be completed before 2020 so there is no temporal overlap
Josephine Cone Mine Project	No	Yes	The project is beyond the zone of influence
Aggregate pits or quarries;	Yes	Yes	These activities are not expected to alter surface groundwater quantities.
Wataynikaneyap Power	No	Yes	The project is beyond the zone of influence
Local infrastructure	No	Yes	The project is beyond the zone of influence

Residual adverse effects were predicted for each of the wildlife and wildlife habitat VCs. The spatial extent is the LSA used in Section 6.1.4 of the revised EIS for all VCs except for ungulates that uses the RSA (Table 7.2.2-1). The temporal boundaries are from year 1 to 17 years (Table 7.2.3-1). The assessment determined that there would be or could be some cases (shaded



in green) of predicted spatial and temporal crossover between the effects area of the Project and the effects of other projects in the surrounding area. An evaluation of the potential cumulative effects is provided in Table 7.3.1-8.

Table 7.3.1-8: Cumulative Effects Screening for Wildlife and Wildlife Habitat

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Treasury Metals exploration program	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on wildlife
Highway 17	Yes/No	Yes	The effects do not overlap the LSA for most VCs, but are within the RSA used for ungulates. The cumulative effects to individuals are not likely to be measurable
Canadian Pacific line	Yes/No	Yes	The effects do not overlap the LSA for most VCs, but are within the RSA used for ungulates. The cumulative effects to individuals are not likely to be measurable
Dryden Forest Management Company	Yes	Yes	While the closest planned harvesting activities will overlap small portions of the wildlife LSA (see Figure 7.2.5-1), the affected areas are a small percentage of the available habitat. These activities are not expected to measurably alter the wildlife effects. While harvesting activities will also overlap with the wildlife RSA, any cumulative effects to individuals are not likely to be measurable at this scale.
Domtar Dryden Pulp Mill	Yes/No	Yes	The effects do not overlap the LSA for most VCs, but are within the RSA used for ungulates. The cumulative effects to individuals are not likely to be measurable. The local forestry effects are addressed for the Dryden Forest Management Company.
1-5 MW power generation facility	—	—	This is not a project
Energy East pipeline	Yes	No	Any construction activities along the right of way will be completed before 2020 so there is no temporal overlap
Josephine Cone Mine Project	No	Yes	The project is too far away to have any cumulative effects for wildlife
Aggregate pits or quarries	Yes	Yes	These activities are not expected to meaningfully alter the magnitude of residual effects on wildlife
Wataynikaneyap Power	Yes/No	Yes	The effects do not overlap the LSA for most VCs, but are within the RSA used for ungulates. The cumulative effects to individuals is not likely to be measurable
Local infrastructure	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on wildlife

Residual adverse effects were predicted for both of the migratory birds VCs. The spatial extent is the LSA used in Section 6.1.4 of the revised EIS for both VCs. The temporal boundaries are from year 1 to 12 years (Table 7.2.3-1). The assessment determined that there would be or could be some cases (shaded in green) of predicted spatial and temporal crossover between the effects area of the Project and the effects of other projects in the surrounding area. An evaluation of the potential cumulative effects is provided in Table 7.3.1-9.



Table 7.3.1-9: Cumulative Effects Screening for Migratory Birds

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Treasury Metals exploration program	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on migratory birds
Highway 17	No	Yes	The effects do not overlap the LSA for migratory birds.
Canadian Pacific line	No	Yes	The effects do not overlap the LSA for migratory birds.
Dryden Forest Management Company	Yes	Yes	While the closest planned harvesting activities will overlap small portions of the migratory birds LSA (see Figure 7.2.5-1), the affected areas are a small percentage of the available habitat. These activities are not expected to measurably alter the migratory bird effects.
Domtar Dryden Pulp Mill	No	Yes	The effects do not overlap the LSA for migratory birds. The local forestry effects are addressed for the Dryden Forest Management Company.
1-5 MW power generation facility	—	—	This is not a project
Energy East pipeline	Yes	No	Any construction activities along the right of way will be completed before 2020 so there is no temporal overlap
Josephine Cone Mine Project	No	Yes	The project is too far away to have any cumulative effects for migratory birds
Aggregate pits or quarries	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on migratory birds
Wataynikaneyap Power	No	Yes	The effects do not overlap the LSA for migratory birds.
Local infrastructure	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on migratory birds

Residual fish and fish habitat adverse effects were predicted for the stream-based fish populations VC. The spatial extent is the Blackwater Creek watershed upstream and downstream of the Project (Table 7.2.2-1). The temporal boundaries are from year 1 to 2 years (Table 7.2.3-1). The assessment determined that there would be or could be some cases (shaded in green) of predicted spatial and temporal crossover between the effects area of the Project and the effects of other projects in the surrounding area. An evaluation of the potential cumulative effects is provided in Table 7.3.1-8.

Table 7.3.1-10: Cumulative Effects Screening for Fish and Fish Habitat

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Treasury Metals exploration program	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on fish
Highway 17	No	Yes	The effects do not overlap the portions of Blackwater Creek used by the affected stream-based fish populations
Canadian Pacific line	No	Yes	The effects do not overlap the portions of Blackwater Creek used by the affected stream-based fish populations
Dryden Forest Management Company	Yes	Yes	Although this future activity will overlap with the fisheries LSA, the planned harvesting areas (See Figure 7.2.5-1) do not overlap the portions of Blackwater Creek used by the affected stream-based fish populations



Table 7.3.1-10: Cumulative Effects Screening for Fish and Fish Habitat (continued)

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Domtar Dryden Pulp Mill	No	Yes	The effects do not overlap the portions of Blackwater Creek used by the stream-based fish populations affected. The local forestry effects are addressed for the Dryden Forest Management Company.
1-5 MW power generation facility	—	—	This is not a project
Energy East pipeline	No	No	Any construction activities along the right of way will be completed before 2020 so there is no temporal overlap
Josephine Cone Mine Project	No	Yes	The project is too far away to have any cumulative effects for fish
Aggregate pits or quarries;	Yes	Yes	These activities are not expected to meaningfully alter magnitude the residual effects on fish
Wataynikaneyap Power	No	Yes	The effects do not overlap the portions of Blackwater Creek used by the stream-based fish populations affected
Local infrastructure	Yes	Yes	These activities are not expected to alter magnitude the residual effects on fish

Residual adverse effects for wetlands and vegetation were predicted for the wetlands extent VC. The spatial extent is the wetlands LSA described in in Section 6.1.4.14 (Table 7.2.2-1). The temporal boundaries are from year 1 to 17 years (Table 7.2.3-1). The assessment determined that there would be or could be some cases (shaded in green) of predicted spatial and temporal crossover between the effects area of the Project and the effects of other projects in the surrounding area. An evaluation of the potential cumulative effects is provided in Table 7.3.1-11.

Table 7.3.1-11: Cumulative Effects Screening for Wetlands and Vegetation

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Treasury Metals exploration program	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on wetland and vegetation
Highway 17	No	Yes	The project is too far away to have any cumulative effects for wetland and vegetation
Canadian Pacific line	No	Yes	The project is too far away to have any cumulative effects for wetland and vegetation
Dryden Forest Management Company	Yes	Yes	While the closest planned harvesting activities will overlap small portions of the wetlands and vegetation LSA (see Figure 7.2.5-1), the planned harvesting does not overlap with any of the wetlands affected by the Project. Additionally, the planned harvest within the LSA represents a small percentage of the available forested land. These activities are not expected to measurable alter the wetlands and vegetation effects.
Domtar Dryden Pulp Mill	No	Yes	The project is too far away to have any direct cumulative effects for wetland and vegetation. The local forestry effects are addressed for the Dryden Forest Management Company.
1-5 MW power generation facility	—	—	This is not a project



Table 7.3.1-11: Cumulative Effects Screening for Wetlands and Vegetation (continued)

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Energy East pipeline	Yes	No	Any construction activities along the right of way will be completed before 2020 so there is no temporal overlap
Josephine Cone Mine Project	No	Yes	The project is too far away to have any cumulative effects for wetland and vegetation
Aggregate pits or quarries;	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on wetland and vegetation
Wataynikaneyap Power	No	Yes	The project is too far away to have any cumulative effects for wetland and vegetation
Local infrastructure	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on wetland and vegetation

Residual effects were predicted for each of the land use VCs. The spatial extent is the aquatic and terrestrial sty areas described in Section 6.1.4.16 (Table 7.2.2-1). The temporal boundaries are from year 1 to 22 years (Table 7.2.3-1). The assessment determined that there would be or could be some cases (shaded in green) of predicted spatial and temporal crossover between the effects area of the Project and the effects of other projects in the surrounding area. An evaluation of the potential cumulative effects is provided in Table 7.3.1-12.

Table 7.3.1-12: Cumulative Effects Screening for Land Use

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Treasury Metals exploration program	Yes	Yes	These activities are too minor too have measurable cumulative effects
Highway 17	Yes	Yes	These activities are too minor too have measurable cumulative effects
Canadian Pacific line	Yes	Yes	These activities are too minor too have measurable cumulative effects
Dryden Forest Management Company	Yes	Yes	The continuance of activities do not represent a cumulative effect distinct from the exiting conditions
Domtar Dryden Pulp Mill	Yes	Yes	The continuance of activities do not represent a cumulative effect distinct from the exiting conditions
1-5 MW power generation facility	—	—	This is not a project
Energy East pipeline	Yes	No	Any construction activities along the right of way will be completed before 2020 so there is no temporal overlap
Josephine Cone Mine Project	No	Yes	The project is too far away to have any cumulative effects
Aggregate pits or quarries;	Yes	Yes	These activities are too minor too have measurable cumulative effects
Wataynikaneyap Power	Yes	Yes	This project is not expected to have a measurable cumulative effect
Local infrastructure	Yes	Yes	These activities are too minor too have measurable cumulative effects



Residual effects were predicted for each of the social VCs. The spatial extent is the socio-economic study area provided in Figure 6.1.4.17-1 (Table 7.2.2-1). The temporal boundaries are from year 1 to 22 years (Table 7.2.3-1). The assessment determined that there would be or could be some cases (shaded in green) of predicted spatial and temporal crossover between the effects area of the Project and the effects of other projects in the surrounding area. An evaluation of the potential cumulative effects is provided in Table 7.3.1-13.

Table 7.3.1-13: Cumulative Effects Screening for Social Factors

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Treasury Metals exploration program	Yes	Yes	These activities are too minor to have measurable cumulative effects
Highway 17	Yes	Yes	These activities are too minor to have measurable cumulative effects
Canadian Pacific line	Yes	Yes	These activities are too minor to have measurable cumulative effects
Dryden Forest Management Company	Yes	Yes	The continuance of activities do not represent a cumulative effect distinct from the existing conditions
Domtar Dryden Pulp Mill	Yes	Yes	The continuance of activities do not represent a cumulative effect distinct from the existing conditions
1-5 MW power generation facility	—	—	This is not a project
Energy East pipeline	Yes	No	Any construction activities along the right of way will be completed before 2020 so there is no temporal overlap
Josephine Cone Mine Project	No	Yes	The project is too far away to have any cumulative effects
Aggregate pits or quarries;	Yes	Yes	These activities are too minor to have measurable cumulative effects
Wataynikaneyap Power	Yes	Yes	This project is not expected to have a measurable cumulative effect
Local infrastructure	Yes	Yes	These activities are too minor to have measurable cumulative effects

Residual effects were predicted for each of the economic VCs. The spatial extent for cumulative effects is the socio-economic study area provided in Figure 6.1.4.17-1 (Table 7.2.2-1). The temporal boundaries are from year 1 to 22 years (Table 7.2.3-1). The assessment determined that there would be or could be some cases (shaded in green) of predicted spatial and temporal crossover between the effects area of the Project and the effects of other projects in the surrounding area. An evaluation of the potential cumulative effects is provided in Table 7.3.1-14.

Table 7.3.1-14: Cumulative Effects Screening for Economic Factors

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Treasury Metals exploration program	Yes	Yes	These activities are too minor to have measurable cumulative effects
Highway 17	Yes	Yes	These activities are too minor to have measurable cumulative effects



Table 7.3.1-14: Cumulative Effects Screening for Economic Factors (continued)

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Canadian Pacific line	Yes	Yes	These activities are too minor too have measurable cumulative effects
Dryden Forest Management Company	Yes	Yes	The continuance of activities do not represent a cumulative effect distinct from the exiting conditions
Domtar Dryden Pulp Mill	Yes	Yes	The continuance of activities do not represent a cumulative effect distinct from the exiting conditions
1-5 MW power generation facility	—	—	This is not a project
Energy East pipeline	Yes	No	Any construction activities along the right of way will be completed before 2020 so there is no temporal overlap
Josephine Cone Mine Project	No	Yes	The project is too far away to have any cumulative effects
Aggregate pits or quarries;	Yes	Yes	These activities are too minor too have measurable cumulative effects
Wataynikaneyap Power	Yes	Yes	This project is not expected to have a measurable cumulative effect
Local infrastructure	Yes	Yes	These activities are too minor too have measurable cumulative effects

Residual effects were predicted for all of the Aboriginal peoples VCs. The spatial extent for cumulative effects for Aboriginal peoples is the socio-economic study area shown in Figure 6.1.4.17-1 (Table 7.2.2-1). A common study area was used for the assessment of effects on the social, economic, and Aboriginal peoples VCs. The temporal boundaries are from year 1 to 22 years (Table 7.2.3-1). The assessment determined that there would be or could be some cases (shaded in green) of predicted spatial and temporal crossover between the effects area of the Project and the effects of other projects in the surrounding area. An evaluation of the potential cumulative effects is provided in Table 7.3.1-15.

Table 7.3.1-15: Cumulative Effects Screening for Aboriginal Peoples

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Treasury Metals exploration program	Yes	Yes	These activities are too minor too have measurable cumulative effects
Highway 17	Yes	Yes	These activities are too minor too have measurable cumulative effects
Canadian Pacific line	Yes	Yes	These activities are too minor too have measurable cumulative effects
Dryden Forest Management Company	Yes	Yes	The continuance of activities do not represent a cumulative effect distinct from the exiting conditions
Domtar Dryden Pulp Mill	Yes	Yes	The continuance of activities do not represent a cumulative effect distinct from the exiting conditions
1-5 MW power generation facility	—	—	This is not a project
Energy East pipeline	Yes	No	Any construction activities along the right of way will be completed before 2020 so there is no temporal overlap



Table 7.3.1-15: Cumulative Effects Screening for Aboriginal Peoples (continued)

Future Project	Spatial Extents	Temporal Boundaries	Potential for Cumulative Effects
Josephine Cone Mine Project	No	Yes	The project is too far away to have an cumulative effects
Aggregate pits or quarries;	Yes	Yes	These activities are too minor too have measurable cumulative effects
Wataynikaneyap Power	Yes	Yes	This project is not expected to have a measurable cumulative effect
Local infrastructure	Yes	Yes	These activities are too minor too have measurable cumulative effects

7.3.2 Summary of Potential Cumulative Effects

A final list of the potential cumulative effects for the Project is provided in Table 7.3.2-1. In total there were 77 potential cumulative effects. However, none of the cumulative effects were identified as altering the predicted magnitudes of the residual effects described in Section 6. Therefore, the potential cumulative would not alter the significance of residual effects determined in Section 8.



Table 7.3.2-1: Summary of Cumulative Effects Screening

Future Project	Discipline	Do Spatial Extents Overlap?	Do Temporal Boundaries Overlap?	Potential for Cumulative Effects
Treasury Metals exploration program	Terrain and Soils	Yes	Yes	Although these activities will overlap, the effects are not similar. There would be no cumulative effects.
	Noise	Yes	Yes	It is unlikely the relatively limited activities associated with exploration would alter the noise predictions
	Air Quality	Yes	Yes	There is the potential for overlap in space and time. It is expected that the level of activity would be small compared to the Project
	Surface Water Quality	Yes	Yes	These activities are not expected to measurably alter surface water quality.
	Surface Water Quantity	Yes	Yes	These activities are not expected to measurably alter surface water quantities
	Groundwater Quantity	Yes	Yes	These activities are not expected to alter surface groundwater quantities
	Wildlife and Wildlife Habitat	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on wildlife
	Migratory Birds	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on migratory birds
	Fish and Fish Habitat	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on fish
	Wetlands and Vegetation	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on wetland and vegetation
	Land Use	Yes	Yes	These activities are too minor to have measurable cumulative effects
	Social Factors	Yes	Yes	These activities are too minor to have measurable cumulative effects
	Economic Factors	Yes	Yes	These activities are too minor to have measurable cumulative effects
	Aboriginal Peoples	Yes	Yes	These activities are too minor to have measurable cumulative effects
Highway 17	Surface Water Quality	Yes	Yes	These activities are not expected to measurably alter surface water quality.
	Wildlife and Wildlife Habitat	Yes/No	Yes	The effects do not overlap the LSA for most VCs, but are within the RSA used for ungulates. The cumulative effects to individuals are not likely to be measurable
	Land Use	Yes	Yes	These activities are too minor to have measurable cumulative effects
	Social Factors	Yes	Yes	These activities are too minor to have measurable cumulative effects
	Economic Factors	Yes	Yes	These activities are too minor to have measurable cumulative effects
Canadian Pacific Railway	Aboriginal Peoples	Yes	Yes	These activities are too minor to have measurable cumulative effects
	Surface Water Quality	Yes	Yes	These activities are not expected to measurably alter surface water quality.



Table 7.3.2-1: Summary of Cumulative Effects Screening (continued)

Future Project	Discipline	Do Spatial Extents Overlap?	Do Temporal Boundaries Overlap?	Potential for Cumulative Effects
Canadian Pacific Railway	Wildlife and Wildlife Habitat	Yes/No	Yes	The effects do not overlap the LSA for most VCs, but are within the RSA used for ungulates. The cumulative effects to individuals are not likely to be measurable
	Land Use	Yes	Yes	These activities are too minor to have measurable cumulative effects
	Social Factors	Yes	Yes	These activities are too minor to have measurable cumulative effects
	Economic Factors	Yes	Yes	These activities are too minor to have measurable cumulative effects
	Aboriginal Peoples	Yes	Yes	These activities are too minor to have measurable cumulative effects
Dryden Forest Management Company	Terrain and Soils	Yes	Yes	While the FMA for the company overlaps with the viewscape of the WRSA, the planned harvesting areas (see Figure 7.2.5-1) are located several kilometres to the east of the project. As a result, there would be no cumulative effect on the view of the WRSA from Thunder Lake.
	Noise	Yes	Yes	While there are planned harvesting areas (see Figure 7.2.5-1) located within 5 km of the open pit, the activities would be far enough from the Project they would not alter the maximum predicted noise magnitudes which would occur in close proximity to the operations area.
	Air Quality	Yes	Yes	While there are planned harvesting areas (see Figure 7.2.5-1) located within 10 km of the open pit, the activities would be far enough from the Project they would not alter the maximum predicted air concentrations, which would occur in close proximity to the operations area.
	Surface Water Quality	Yes	Yes	Although there are planned harvesting activities that overlap small portions of the fisheries LSA (see Figure 7.2.5-1), they do not overlap the watercourses potentially affected by the project. Therefore, these activities are not expected to measurably alter surface water quality.
	Surface Water Quantity	Yes	Yes	Although there are planned harvesting activities that overlap small portions of the fisheries LSA (see Figure 7.2.5-1), they do not overlap the watercourses potentially affected by the project. Therefore, these activities are not expected to measurably alter surface water quantities.
	Groundwater Quantity	Yes	Yes	While the closest planned harvesting areas (see Figure 7.2.5-1) will overlap with the zone of influence resulting from the dewatering of the open pit and underground mine, the forestry activities are not expected to measurably alter groundwater quantities.



Table 7.3.2-1: Summary of Cumulative Effects Screening (continued)

Future Project	Discipline	Do Spatial Extents Overlap?	Do Temporal Boundaries Overlap?	Potential for Cumulative Effects
Dryden Forest Management Company	Wildlife and Wildlife Habitat	Yes	Yes	While the closest planned harvesting activities will overlap small portions of the wildlife LSA (see Figure 7.2.5-1), the affected areas are a small percentage of the available habitat. These activities are not expected to measurable alter the wildlife effects. While harvesting activities will also overlap with the wildlife RSA, any cumulative effects to individuals are not likely to be measurable at this scale.
	Migratory Birds	Yes	Yes	While the closest planned harvesting activities will overlap small portions of the migratory birds LSA (see Figure 7.2.5-1), the affected areas are a small percentage of the available habitat. These activities are not expected to measurable alter the migratory bird effects.
	Fish and Fish Habitat	Yes	Yes	Although this future activity will overlap with the fisheries LSA, the planned harvesting areas (See Figure 7.2.5-1) do not overlap the portions of Blackwater Creek used by the affected stream-based fish populations
	Wetlands and Vegetation	Yes	Yes	While the closest planned harvesting activities will overlap small portions of the wetlands and vegetation LSA (see Figure 7.2.5-1), the planned harvesting does not overlap with any of the wetlands affected by the Project. Additionally, the planned harvest within the LSA represents a small percentage of the available forested land. These activities are not expected to measurable alter the wetlands and vegetation effects.
	Land Use	Yes	Yes	The continuance of activities do not represent a cumulative effect distinct from the exiting conditions
	Social Factors	Yes	Yes	The continuance of activities do not represent a cumulative effect distinct from the exiting conditions
	Economic Factors	Yes	Yes	The continuance of activities do not represent a cumulative effect distinct from the exiting conditions
	Aboriginal Peoples	Yes	Yes	The continuance of activities do not represent a cumulative effect distinct from the exiting conditions



Table 7.3.2-1: Summary of Cumulative Effects Screening (continued)

Future Project	Discipline	Do Spatial Extents Overlap?	Do Temporal Boundaries Overlap?	Potential for Cumulative Effects
Domtar Dryden Pulp Mill	Air Quality	Yes	Yes	Although the pulp mill is located outside of the 10 km extent for cumulative air quality effects, there is a potential that the effects from Dryden pulp will overlap with those of the Project. It should be noted that the mill will need to comply with their ECA requirements at the property line. The highest air concentrations from the pulp mill will occur near the pulp mill, just as the highest concentration from the Project would occur near the property line of the Project. Therefore the high concentrations from these projects would not affect the same receptor, and thus the cumulative effects will not affect the magnitude of the air quality effects of the Project.
	Wildlife and Wildlife Habitat	Yes/No	Yes	The effects do not overlap the LSA for most VCs, but are within the RSA used for ungulates. The cumulative effects to individuals are not likely to be measurable. The local forestry effects are addressed for the Dryden Forest Management Company.
	Land Use	Yes	Yes	The continuance of activities do not represent a cumulative effect distinct from the exiting conditions
	Social Factors	Yes	Yes	The continuance of activities do not represent a cumulative effect distinct from the exiting conditions
	Economic Factors	Yes	Yes	The continuance of activities do not represent a cumulative effect distinct from the exiting conditions
	Aboriginal Peoples	Yes	Yes	The continuance of activities do not represent a cumulative effect distinct from the exiting conditions
Aggregate pits or quarries;	Terrain and Soils	Yes	Yes	Although these projects overlap, there is a low potential for tall structures at a quarry. Therefore, they would not be visible in the same viewscapes
	Noise	Yes	Yes	There is the potential for overlap in space and time. However, it is expected that the level of activity would not alter the maximum noise predictions. If the aggregate source was sufficiently close to the Project, it is likely that the recovery would be done using Treasury Metals equipment.
	Air Quality	Yes	Yes	There is the potential for overlap in space and time. It is expected that the level of activity would be small compared to the Project
	Surface Water Quality	Yes	Yes	These activities are not expected to measurably alter surface water quality.
	Surface Water Quantity	Yes	Yes	These activities are not expected to measurably alter surface water quantities
	Groundwater Quantity	Yes	Yes	These activities are not expected to alter surface groundwater quantities.



Table 7.3.2-1: Summary of Cumulative Effects Screening (continued)

Future Project	Discipline	Do Spatial Extents Overlap?	Do Temporal Boundaries Overlap?	Potential for Cumulative Effects
Aggregate pits or quarries;	Wildlife and Wildlife Habitat	Yes	Yes	These activities are not expected to meaningfully alter the magnitude of residual effects on wildlife
	Migratory Birds	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on migratory birds
	Fish and Fish Habitat	Yes	Yes	These activities are not expected to meaningfully alter magnitude the residual effects on fish
	Wetlands and Vegetation	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on wetland and vegetation
	Land Use	Yes	Yes	These activities are too minor too have measurable cumulative effects
	Social Factors	Yes	Yes	These activities are too minor too have measurable cumulative effects
	Economic Factors	Yes	Yes	These activities are too minor too have measurable cumulative effects
Wataynikaneyap Power	Aboriginal Peoples	Yes	Yes	These activities are too minor too have measurable cumulative effects
	Wildlife and Wildlife Habitat	Yes/No	Yes	The effects do not overlap the LSA for most VCs, but are within the RSA used for ungulates. The cumulative effects to individuals is not likely to be measurable
	Land Use	Yes	Yes	This project is not expected to have a measurable cumulative effect
	Social Factors	Yes	Yes	This project is not expected to have a measurable cumulative effect
	Economic Factors	Yes	Yes	This project is not expected to have a measurable cumulative effect
Local infrastructure	Aboriginal Peoples	Yes	Yes	This project is not expected to have a measurable cumulative effect
	Noise	Yes	Yes	There is the potential for overlap in space and time. It is expected that the level of activity would not alter the maximum noise prediction on which the magnitude of effects are established.
	Air Quality	Yes	Yes	There is the potential for overlap in space and time. It is expected that the level of activity would be small compared to the Project
	Surface Water Quality	Yes	Yes	These activities are not expected to measurably alter surface water quality.
	Surface Water Quantity	Yes	Yes	These activities are not expected to measurably alter surface water quantities
	Wildlife and Wildlife Habitat	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on wildlife
	Migratory Birds	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on migratory birds
Fish and Fish Habitat	Yes	Yes	These activities are not expected to alter magnitude the residual effects on fish	



Table 7.3.2-1: Summary of Cumulative Effects Screening (continued)

Future Project	Discipline	Do Spatial Extents Overlap?	Do Temporal Boundaries Overlap?	Potential for Cumulative Effects
Local infrastructure	Wetlands and Vegetation	Yes	Yes	These activities are not expected to alter the magnitude of residual effects on wetland and vegetation
	Land Use	Yes	Yes	These activities are too minor too have measurable cumulative effects
	Social Factors	Yes	Yes	These activities are too minor too have measurable cumulative effects
	Economic Factors	Yes	Yes	These activities are too minor too have measurable cumulative effects
	Aboriginal Peoples	Yes	Yes	These activities are too minor too have measurable cumulative effects