PRE-HISTORIC RESOURCES

Study geographic boundaries: PDA, PEAA.

Study time boundaries: Construction phase.

Project works and activities considered in the study*: Pipelines: surface and subsurface disturbance, RoW and site preparation (clearing, slash burning/chipping, grading, blasting), infrastructure construction (tanks, pump stations, laydown areas, etc.), pipeline construction (strung pipe, set-up pipe, open ditch, blasting, backfill, clean-up), water crossings (trenched and trenchless crossings), tunnelling and waste rock disposal. Marine terminal: On-shore infrastructure site preparation (clearing, burning, grading, blasting), in-water infrastructure site preparation (dredging, blasting, pile drilling), on-shore infrastructure construction (tank terminal, inter-connector pipes, support buildings, pumps, etc.), in-water infrastructure construction (marine terminal, tanker berths, utility berth, pile installation), construction support vessels (barges, tugs), camp operations (waste water disposal), marine vessel traffic (wake, noise, collisions). Increased access and increased human presence.

Study methods: Areas of potentially fossiliferous bedrock were identified through pre-field desktop analysis. Field surveys took place in 2005, 2006 and 2008 where bedrock occurs at the surface along the RoW. The field surveys documented any fossils sites on or near the RoW and were used to determine the local palaeontological potential of each area. The analysis used the field results, geology maps, depth to bedrock maps, and construction parameters to determine where construction activities could disturb fossiliferous bedrock. Mitigation measures were recommended to reduce the likelihood of any negative project effects.

VEC	Key Issues	KIR	Baseline Results	Measurable Parameter	Potential Project Effects**	Proposed Mitigation	Residual Effects	Cumulative Effects
Palaeontological Resources	Long-term degradation, contamination and/or physical loss of palaeontological resources, interpretative context, or both	n/a	In Alberta, fossiliferous bedrock from two ages occurs. There is Cretaceous bedrock from the end of the age of the dinosaurs, which contains fossils 65 to 144 million years old. There is also Paleocene bedrock dating from the early diversification of mammals, which contains fossils 55 to 65 million years old. The field surveys found more than 20 fossil sites on or near the RoW. These sites include shell beds, dinosaur bones and fossilized wood and other plant remains. In British Columbia, the bedrock containing fossils is much more diverse. There is Mesozoic bedrock from the age of reptiles in the Rocky Mountain foothills and along the Nechako Plateau. The Mesozoic rocks contain fossils 65 to 250 million years old. The Rocky Mountains and front ranges are made up mostly of Paleozoic bedrock from the age of invertebrates. These rocks are 250 to 540 million years old and contain marine fossils. The field surveys found 15 fossil sites on or near the RoW. No dinosaur or other vertebrate material was found. Most of the fossils are the shelly remains of invertebrates such as corals, brachiopods, trilobites and ammonites. A few sites are Cretaceous, but most are Paleozoic.	n/a	Project effects could occur either directly through disturbing fossiliferous bedrock during construction or indirectly through collecting or altering fossil sites by increased access and increased human presence.	All sites of high heritage value will be avoided and, therefore, no mitigation excavation is required in advance of construction. Where construction will disturb fossiliferous bedrock, a qualified palaeontologist will monitor construction so that any fossils encountered are recovered and the site contexts are recorded. A palaeontological education program will be developed to teach project workers what to do in the event of the chance discovery of palaeontological resources during construction. A project ban on fossil collecting will also be issued to reduce indirect effects through unrecorded fossil collecting and loss of site context.	The project can make a positive contribution to the scientific knowledge base for palaeontological resources through fossil discovery, recovery, documentation, and protection.	Cannot be determined.

*Refer to Figure 3.1 in *section 3, Project description*, for the full list of physical works and activities. **The effects of spills and malfunctions will be included in the update for the supplemental filing.