

NOISE

Study geographic boundaries: 1 km wide PEAA and a 20 km wide REAA, both centred on the pipeline centreline. The size of the REAA takes into account the expected noise attenuation in the atmosphere.

Study time boundaries: Construction, operations, and decommissioning phases.

Project works and activities considered in the study*:

Construction – clearing; grading; trenching; blasting; welding; backfilling; construction of supporting surface structures; erection

of pump stations; assembly of pumps. Assessed equipment included truck graders, dozers, trucks, front end loaders, graders, mobile crane and pneumatic tools. Operations - work of rotating equipment such as electric motors, oil and condensate pumps.

Study methods: Predicted sound levels were assessed for compliance with relevant noise legislation, as well as for health and physiological effects on people and wildlife. The most relevant legislation is the Alberta Energy Resources Conservation Board (ERCB) Interim Noise Control Directive 99-8 that regulates

noise emissions from oil-related infrastructure. Noise modelling was used to predict sound levels in the loudest areas, that is, the three areas where the highest number of pumps are located: KP 0 in Bruderheim, Alberta; KP 117 in Cherhill, Alberta; and KP 1171 in Kitimat, BC. Two stations were used to assess potential noise effects: Whitecourt (KP 203.1) and Smoky River (KP 400.5) stations will house the highest number of pumps and motors (five for oil and two for condensate).

Existing baseline sound levels were determined by a continuous, 24-hour monitoring of sound at these three locations. Construction noise levels were modelled using acoustic data for construction equipment similar to the equipment that will be used during the project. It was assumed the spreading of the sound waves results in a 6 dBA decrease with doubling of the distance from the sound source. Acoustical specifications for the pumps and motors were based on data for similar equipment working at the Enbridge Athabasca terminal near Fort McMurray, Alberta.

VEC	Key Issues	KIR	Baseline Results	Measurable Parameter	Potential Project Effects**	Proposed Mitigation	Residual Effects	Cumulative Effects
Noise	Increase in ambient noise in rural and remote areas Wildlife disturbance Human disturbance	n/a	<p>The pipeline will be in rural and remote areas with low background noise. The overall daytime (7 am to 10 pm) background sound average baseline sound level was 38.8 dBA; the average nighttime Leq was 34.9 dBA.</p> <p>KP 0: The background daytime sound levels (7 am to 10 pm) were 43.1 dBA; nighttime Leq was 40.9 dBA. Industrial developments and traffic noise on the nearby highways make the baseline sound levels at KP 0 higher than at the other monitored locations. At the midrange frequencies of 500 to 2,000 Hz, predicted sound levels ranged 25 to 35 dBA with an increasing trend to 50 to 58 dBA towards the lower frequency band of 16 to 63 Hz.</p> <p>KP 117: Recorded values of the background noise survey at the Cherhill area show noise levels approximately Leq, 15h of 32 dBA at daytime and Leq, 9h of 26 dBA at nighttime, which are typical levels for rural Alberta where some farming activities and traffic noise adds to ambient noise level. The lowest recorded value Lmin was 20.2 dBA at nighttime and the highest Lmax was 39.7 dBA at daytime. Variance in L10, L50, and L90 indicate time-varying noise levels.</p> <p>KP 1171: The background daytime sound levels (7 am to 10 pm) were 21.5 dBA; nighttime Leq was 18.6 dBA. The absence of anthropogenic noise source in the Kitimat area and noise absorption effect of forest and hills are responsible for quiet nature of the area.</p>	<p>Continuous equivalent sound level (Leq)</p> <p>Maximum (Lmax) sound levels</p> <p>Minimum (Lmin) sound levels</p> <p>Sound frequency spectrum (sound level in decibels at individual frequencies from 16 Hz to 16 kHz)</p>	<p>Existing receptors, such as people and wildlife, may be susceptible to future increases in sound levels. During construction, noise will occur along the right-of-way (RoW); during operations it will be restricted largely to the 10 pump stations. For point sources, such as a pump station or vehicles, the noise attenuation is approximately a six dBA decrease with doubling distance from the source. The noise reduction will be enhanced if vegetation (especially forest) and terrain elevations break the propagation of sound between the noise source and the receptor.</p> <p>Pipeline – Noise along the pipeline will fluctuate depending on the type of construction equipment used, the number of units working at the site and their location, activities and duration of operation. At 10 kilometres from the pipeline centreline, even the highest noise levels caused by pile drivers or blasting would be mitigated to background levels. However, noise would cease as soon as a specific activity is completed or equipment is not operated. Because the pipe laying operation will be carried out in remote and sparsely populated areas, the noise is not expected to pose problems.</p> <p>Construction of the pipeline RoW through the Rocky Mountains and Coast Mountains will require blasting to trench through rocks. The blast noise is quite loud within a few hundred metres of the blast. In addition, the airborne pressure waves can cause hearing annoyance and feeling the sound at levels above peak linear values of around 115 dBA. However, at a distance, blasting noise is usually heard as a low rumble or popping sound that lasts one or two seconds. If the wind is blowing away from the listener, there might be no audible sound. Some atmospheric conditions, such as low cloud cover, may cause the sound waves to propagate over a greater distance and result in a more noticeable bang, referred to as an air blast. The explosives in a blast pattern are never fired simultaneously, but are sequenced over a second or two. This limits the amount of explosives fired at any one instance, thereby helping to reduce blasting noise.</p> <p>Noise will not occur along the right-of-way during operations since the pipeline will be buried along the majority of the route and liquid flows are almost silent.</p> <p>During decommissioning, levels are comparable to the construction phase, since the equipment used for RoW restoration will be similar (graders, backhoes, loaders and trucks). Use of cutting equipment (grinders and torches) will be common. It is unlikely that blasting will be required.</p> <p>Pump Stations – The sound modelling shows that site clearing, trenching, backfilling and erection of pump station buildings will result in composite construction noise levels around 70 dBA at 100 m from the source and 47 to 50 dBA at 1,500 m.</p> <p>During operations, most noise will come from rotating equipment at the pump stations, such as electric motors, oil and condensate pumps. Modelling predicts a sound level of 40 dBA at approximately 950 metres east of the stations. This sound level complies with the ERCB night time noise criterion of 40 dBA at 1,500 metres from the facility fence line. These low noise levels reflect the use of pumps and electric motors that conform to current noise standards for equipment, as well as the placement of pumps and motors inside buildings, which act as effective noise barriers.</p>	<p>ERCB Noise Directive, which requires that new facilities planned for remote areas must meet a target equivalent sound level (Leq) of 40 decibels A-scale (dBA) at night at a distance of 1,500 metres from the facility fence-line. If the sound levels are found to exceed the relevant criteria, mitigation measures will be implemented such as movable barriers, screens, enclosures, quieter alternatives, rescheduling and restricting hours of operation.</p> <p>If farmhouses or clusters of houses are within 100 m of pipeline construction, the noisy equipment will be operated only during daytime.</p>	Currently being assessed.	Currently being assessed.

*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.