

# Arianne Phosphate optimises haulage routes with HAULSIM

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Director, Mining**



## Overview

Toronto Stock Exchange-listed Arianne Phosphate is a development-stage phosphate mining company advancing the Lac à Paul phosphate project in Quebec’s Saguenay-Lac-St-Jean region. The project is set to consist of an open pit mine, a concentration plant and deep-water port facilities designed to handle a yearly phosphate concentrate production of three million tonnes. At that targeted output, Lac à Paul is claimed to be the world’s biggest greenfield phosphate rock project. The mine and concentration plant will be located at the Lac à Paul, about 200 kilometre north of the city of Saguenay. Port facilities will be linked to the mine site by a 240km off-road highway. During construction of the Lac à Paul mine, more than 2,000 jobs will be created followed by 1,000 direct and indirect on-going jobs through the life-of-mine. During the critical engineering study phase, the company required an advanced haulage solution to model a number of hauling operating scenarios between the mine and the port. Arianne Phosphate looked to HAULSIM as its ideal haulage tool.

## Challenge

Arianne Phosphate required a leading mining simulation tool that could quickly identify and quantify the impact of alternative haulage route scenarios so they could select the optimal haulage route. Prior to selecting HAULSIM as its haulage simulation solution, Arianne Phosphate was estimating haul cycle times using a ‘rule of thumb’ approach. As such, no calculations or hard data were available. In selecting a suitable haulage simulation solution, Arianne Phosphate was seeking to dynamically simulate the concentrate haulage operations in order to see possible interferences between:

- Equipment
- Validate fleet size
- Optimise road design
- Equipment performance

## Case Study

Company	Arianne Phosphate
Commodity	Phosphate
Solution	HAULSIM
Mine site	Lac à Paul project
Location	Quebec



To do this effectively, Ariane Phosphate required a powerful, industry-specific haulage simulation solution that would enable the company to analyse various mine haulage scenarios. This would in turn help it optimise the most favourable routes and determine the most profitable combination of trucks from the port to the mine. Using HAULSIM, the impact of changes to mine haulage systems can be simulated and quantified rapidly, giving users confidence in their planning and design improvement decisions.

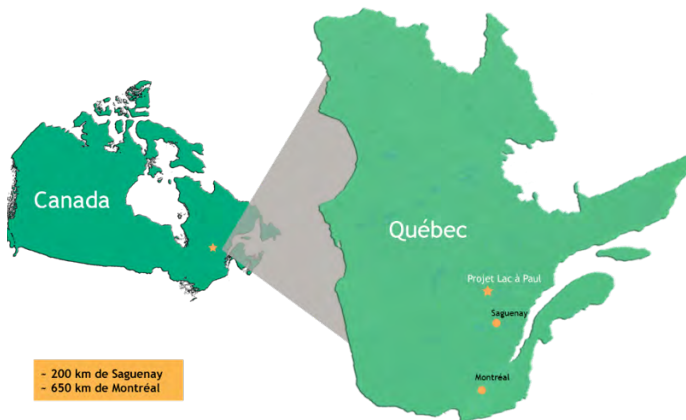


## Solutions

In order to determine the most optimal haulage scenarios between the pit and port for the Lac à Paul, Ariane Phosphate needed a robust tool to support its haul route economic and financial analysis efforts. The company identified HAULSIM as the most comprehensive and dynamic haulage solution on the market. HAULSIM is a 3-D Discrete Event Simulation (DES) engine which connects the fleet assets, mining operational plans and the people to build a digital twin of any mining operation to deliver an accurate representation of any mine sites' haulage operations.

HAULSIM is the only mining simulation software that can quantify the impact of changes as the models reflect the complex and dynamic nature of a mine site in its entirety; including the variability, interactions and dependencies that occur in these systems.

Over only a few weeks, Ariane Phosphate used HAULSIM to create a digital twin of the concentrate hauling operations.



## Impact

Using HAULSIM, Ariane Phosphate was able to gather critical insights on the optimal operating conditions for the Lac à Paul projects haulage route. By modelling, analysing and enhancing different 'what if' scenarios for the ideal haulage network, the company had confidence in its recommendation to invest capital in its mine to port haulage route with a clear view of predicted outcomes. The company was able to take out the guess work and rely on proven, calculated insights to assist in understanding the optimal haul cycle routes. For the first time, Ariane Phosphate has been able to effectively link the mine to the port and evaluate several optimal haul scenarios, including:

- From the simulation results, it was determined that a road configuration with sidings every 5 kilometres would provide the best travel time performances.
- The single lane and 40km options are almost equivalent for travel time trucks as they have a high tendency to bunch together, thus increasing wasted time at loading and unloading points.
- When operating and capital expenditure components are combined, the 5km and 10km options are almost equivalent. During detailed engineering, spacing should be optimised to respect this range depending on terrain configuration.

After implementing HAULSIM, Ariane Phosphate determined that investing in strategically placed sidings along the main haul road would be a key component to maintain continuous operation flow, thus optimising productive time use and maximising asset value. It was also determined that frequent, shortly spaced sidings will contribute to enhanced road safety for both heavy and light vehicles in reducing need to overtake slower vehicle by using an incoming lane, creating a positive social impact.

