# [15]P**hosFinder** Fact Sheet

PhosFinder was built in collaboration with the Red River Basin Commission, Environment Canada and the IISD. **Strategic Systems Engineering Inc.** are pleased to release PhosFinder as a free open-source Python script in celebration of our rebranding.

**Who:** Strategic Systems Engineering Inc. is a specialized Environmental Systems Engineering R&D company in Winnipeg, Manitoba, Canada. We are committed to cost-effective methods for saving Lake Winnipeg including intercepting and re-using phosphorus before it can pollute Lake Winnipeg.

**What:** PhosFinder is software that can be used with GIS information to estimate non-point loading of phosphorus and nitrogen at any point in a watershed using high-resolution Digital Elevation Models derived from LiDAR.

**When:** PhosFinder software is available now on GitHub. The nutrient load estimate will be for the year of the crop data. AAFC produces a GIS database of crop information every year @ 30m resolution. We used 2019 data for comparing PhosFinder with PTMApp.

**Where:** PhosFinder estimates the nutrient loading in any watershed for which crop data is available and where a high-resolution Digital Elevation Model (DEMs) is available. A major motivation for developing PhosFinder is that watershed managers in Manitoba needed reliable software that can import the 1m LiDAR-derived DEMs available in most of the Manitoba portion of the Lake Winnipeg basin. Our validations and comparisons with PTMApp took place in the Upper Oak Watershed, a nutrient loading hotspot previously identified in the Oak-Arrow Integrated Watershed Management Plan.

**Why:** Phosphorus in high concentration is a pollutant that causes algae blooms, which seriously degrades water quality of lakes and rivers, can be toxic to animals and humans and deprives fish of oxygen in lakes and rivers—a process called eutrophication. On one hand phosphorus is problematic environmental pollutant, on the other hand, phosphorus is a scarce, extremely valuable and strategic resource. Phosphorus is a key component of agricultural fertilizer; it's mined from the Earth as rock phosphate from only a few mines in the world. All phosphorus in Canada is imported and there are no longer any rock phosphate mines operating in North America.

PhosFinder allows the user to understand the origins and geographic distribution of non-point phosphorus loading, to plan where to intercept and recover phosphorus using phyto-extraction principles—basically harvesting vegetation that thrives on high phosphorus concentrations such as cattails for multiple beneficial

# [15] PhosFinder Fact Sheet

PhosFinder is inspired by the American PTMApp.

PhosFinder implements the following advances:

| PhosFinder |
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| Derives Land use classifications from Annual Crop Inventory. Any version is compatible |
| Calculates Nutrient Mobility based on Shallow, Sheet, and Overland Flow |
| Determines Nutrient Loadings in Grams |
| Open-source software available on GitLab |
| Provides methods to determine Travel Time |
| PhosFinder is based on advanced hydrographic analysis that determines the true flow paths based on the high-resolution 1m LiDAR data available for Manitoba |

GIS

PhosFinder can be executed on a cloud server because it comes bundled in a python package.
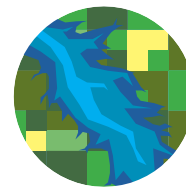
PhosFinder began development in February 2021 when we were modelling projections of the Lake Winnipeg basin.

Download PhosFinder here: **https://gitlab.com/strategic_systems_engineering/phosfinder**

# STRATEGIC SYSTEMS ENGINEERING

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