

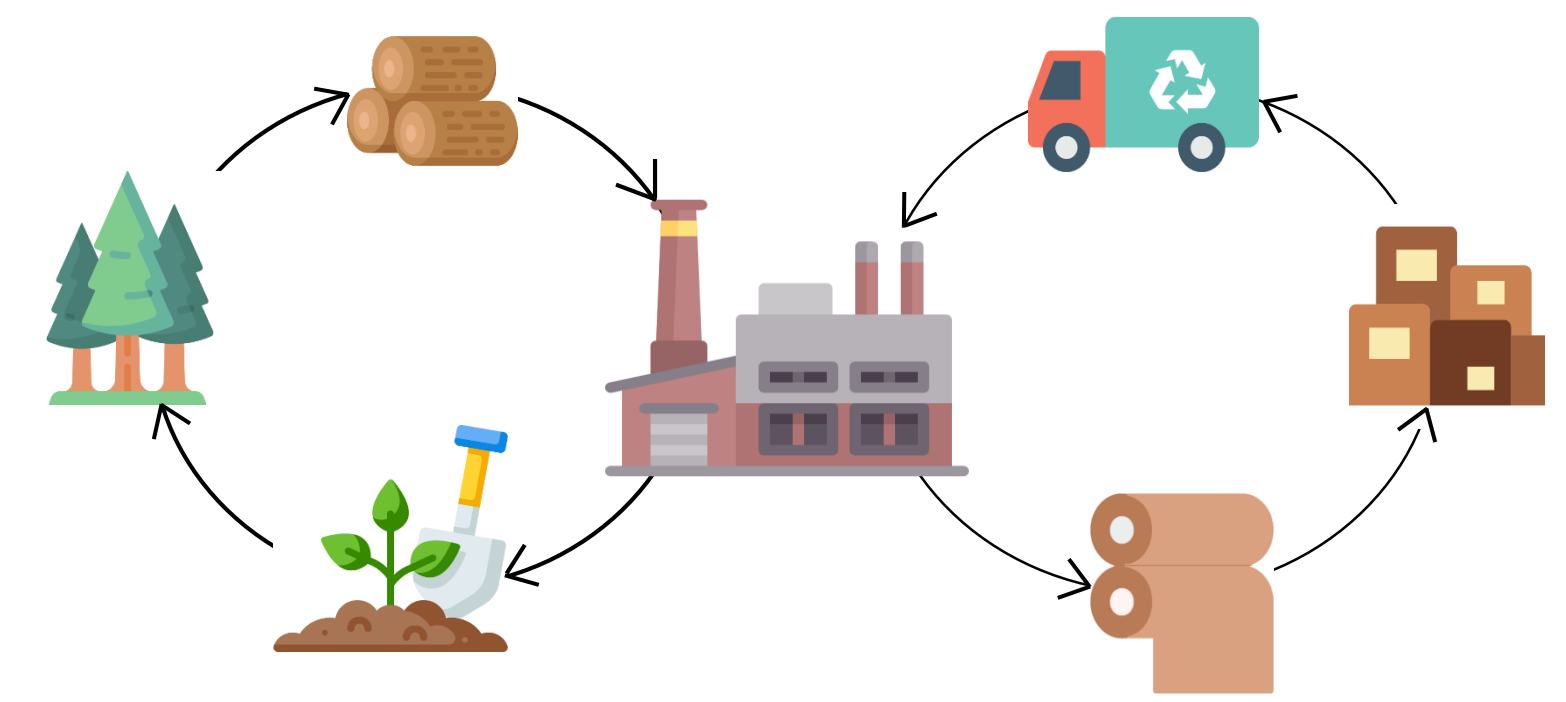
## Executive Summary

- Project Objective**  
Upgrade Lake Utopia Paper's fiber recovery system to remove contaminants from the recycled effluent streams, while continuing to recover valuable fibers. The design must integrate with mill operations and satisfy a capital investment of less than \$2 million CAD.
- Proposed Design**  
Valuable fibers are recovered and recycled to the mill. To prevent oils from impacting existing biological treatment, relevant streams enter an oil separation process. Contaminated streams with low fiber content are sent to thickening and dewatering before disposal.
- Conclusions**  
The design exceeds the proposed capital investment, however, is profitable, achieving a ROI of 23%. To reduce capital expenses, it is recommended to first try and correct the source of oil leaks. The screw skimmer, pressure screen, and centrifuge should be implemented.



## Background

Lake Utopia Paper (LUP), one of four mills in JDI's Pulp and Paper Division, produces 185,000 tonnes of corrugating medium annually. The mill uses recycled corrugated containers and virgin hardwood chips as feedstock in the production process.



To recover unprocessed fibers, the mill currently recycles effluent streams back to the paper-making process, re-introducing contaminants.

## Project Objective

The current fiber recovery process recycles contaminants to the paper-making process. Accumulation of contaminants results in:

- Equipment failure
- Extended downtime
- Loss of revenue

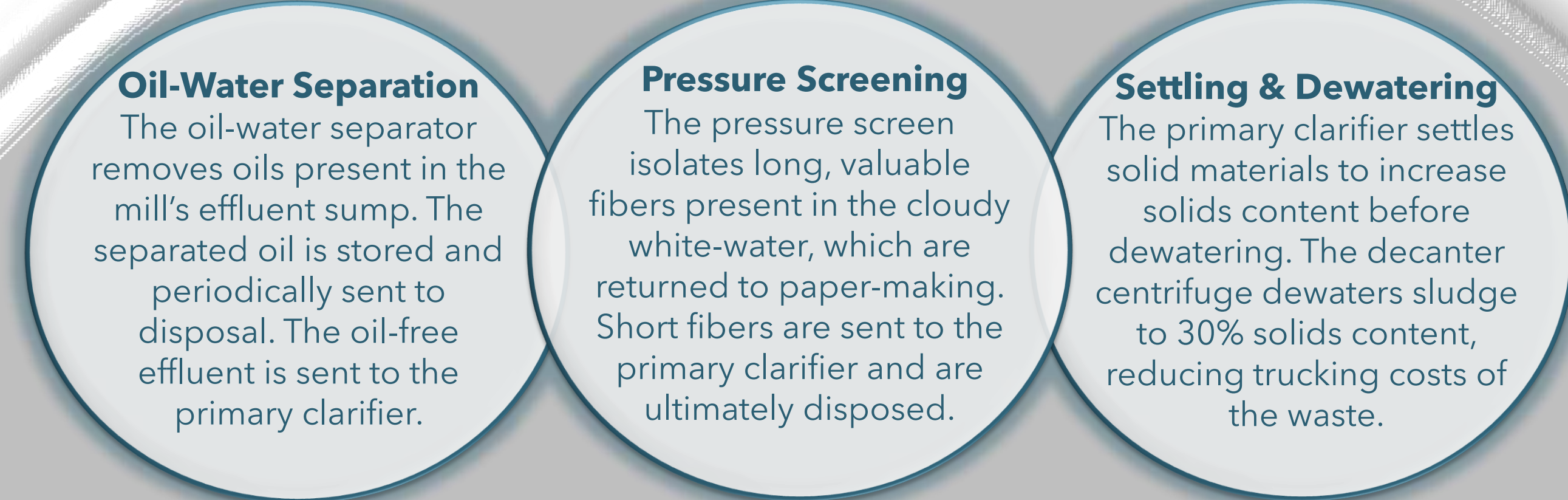
LUP requires the removal of contaminants prior to recycling fiber back to the mill, while maximizing fiber recovery.

Based on past mill performance, removal of 90% of contaminants results in a 30% reduction in production downtime.

### Contaminants in the effluent streams include:



## Proposed Design



The design must satisfy the following criteria:

- Recoverable Fiber Length**: > 0.2mm
- Contaminant Removal**: 98%
- Capital Investment**: ≤ \$2M

## Economics

Class V Estimate: -50% to +100% accuracy

**Equipment Cost Breakdown**

Oil-water separator	\$1.1M
Decanter centrifuge	\$730K
Pressure screen	\$660K
Pumps	\$320K
Screw skimmer	\$22K
Oil storage tank	\$16K

**Total Capital Investment: \$3.4M**

- Oil-water separator: 38%
- Decanter centrifuge: 26%
- Pressure screen: 23%
- Pumps: 11%
- Screw skimmer: 1%
- Oil storage tank: 1%

Annual Operating Expenses: **\$530K**

## Conclusions

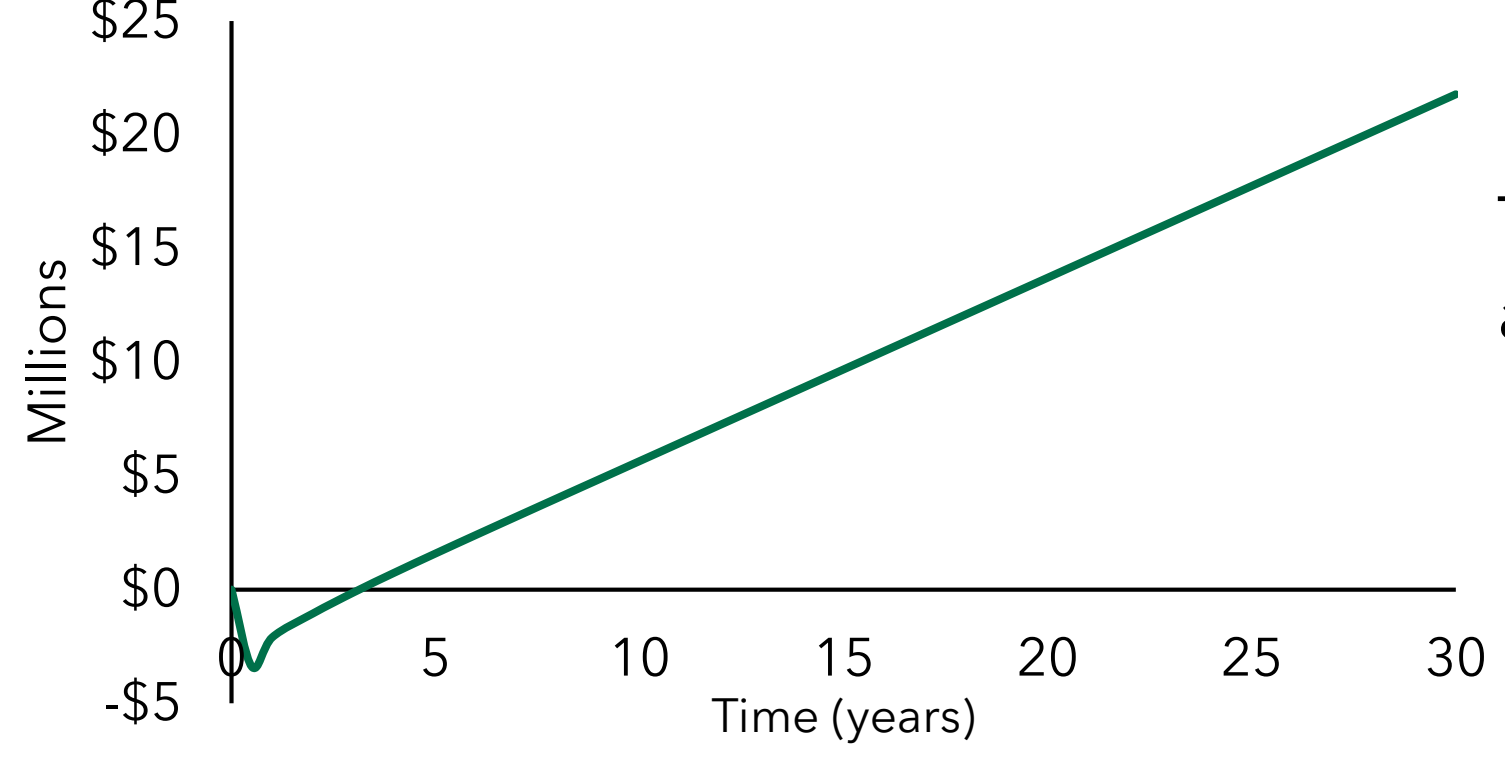
- While the proposed design is profitable, the capital investment exceeds the proposed budget.
  - The oil-water separator constitutes a large portion of the costs.
  - Corrective maintenance to control oil contamination should be attempted before proceeding with capital investment(s).
- Removal of the oil-water separator and its auxiliary equipment from the proposed design results in:

- Total Capital Investment**: \$1.7M
- Return on Investment**: 55%
- Payback Period**: 1.5 yrs

### Design Features

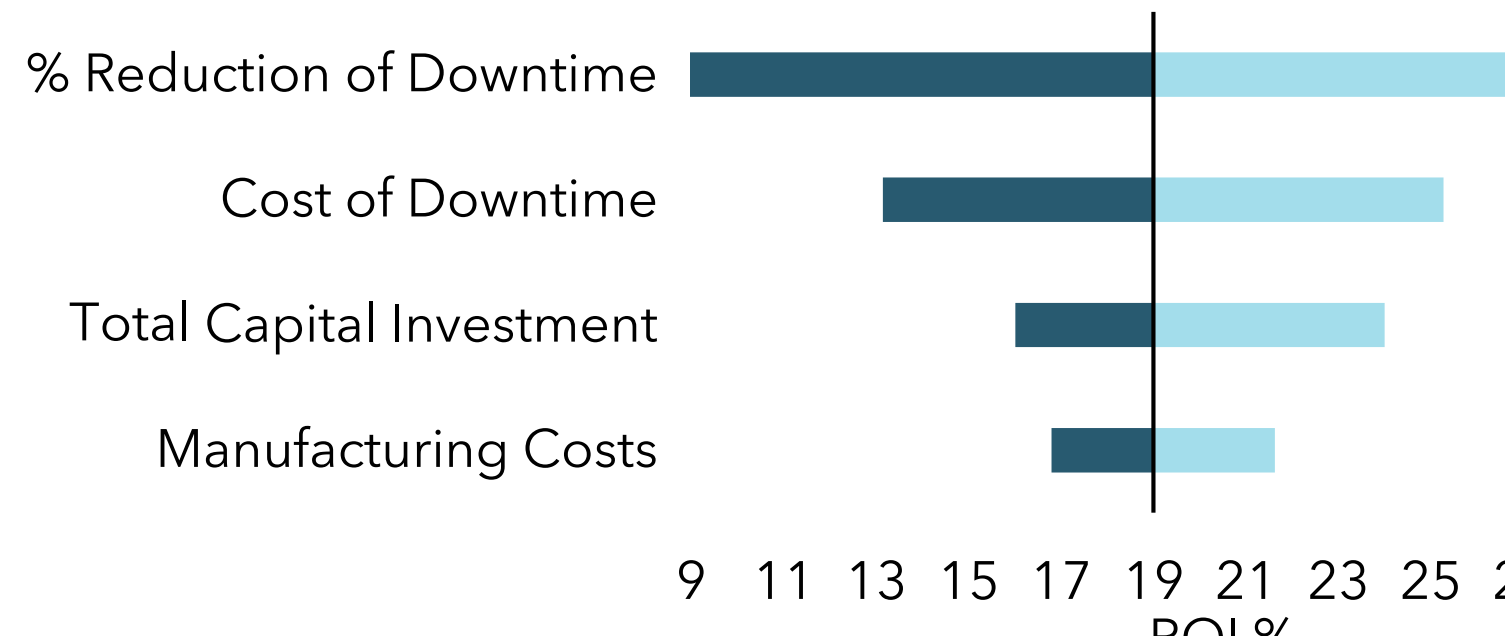
- P&ID**: The accompanying Process and Instrumentation Diagram ensures the design integrates with existing mill operations by minimizing surges in flows to the equipment.
- 94%**: The design successfully removes 94% of contaminants and recovers 91% of useable fibers.

### Non-Discounted Cash Flow Diagram



The revenue of the design is the savings associated with the reduction in downtime.

### Sensitivity Analysis (±20%)



**Profitability Indicators**

- Annual Revenue**: \$1.7M
- Return on Investment**: 23%
- Internal Rate of Return**: 29%
- Payback Period**: 3 yrs

## Project Recommendations

- Implement Fiber Recovery Systems**  
Move forward with more detailed design work and installation of the screw skimmer, pressure screen and decanter centrifuge.
- Correct Leaks in the Existing Lubrication System**  
Ideally this will eliminate the need for an oil removal system, thus reducing the capital investment of the project.
- Produce an Emergency Plan for Oil Spills**  
Develop protocols for emergency spill events to prevent oil from entering the existing biological treatment.

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