Concept to Closure
Victoria Junction Coal Preparation Plant

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Closure Design

- Site Description
- Closure Objectives
- Closure Plan Description
- Cover Design
- Benefits

Site Description

Closure Objectives

- Protective of human health and environment
- Significant benefit to the environment maximize reductions in contaminant loadings
- Designing for simple and robust measures with acceptable level of long-term maintenance

Closure Plan Description
Outcomes

- Design influenced by need to collect and treat water during the transition period
- Incorporates improvements to water management and sludge handling
- Addresses foundations and subsurface infrastructure
- Provides for on-site management of ARD generating and other (demolition debris) closure materials

Closure Plan Description
Closure Options

Typical design process of identify and evaluate options against performance criteria.

The overall site closure options, commonly accepted in the mining industry, were considered:

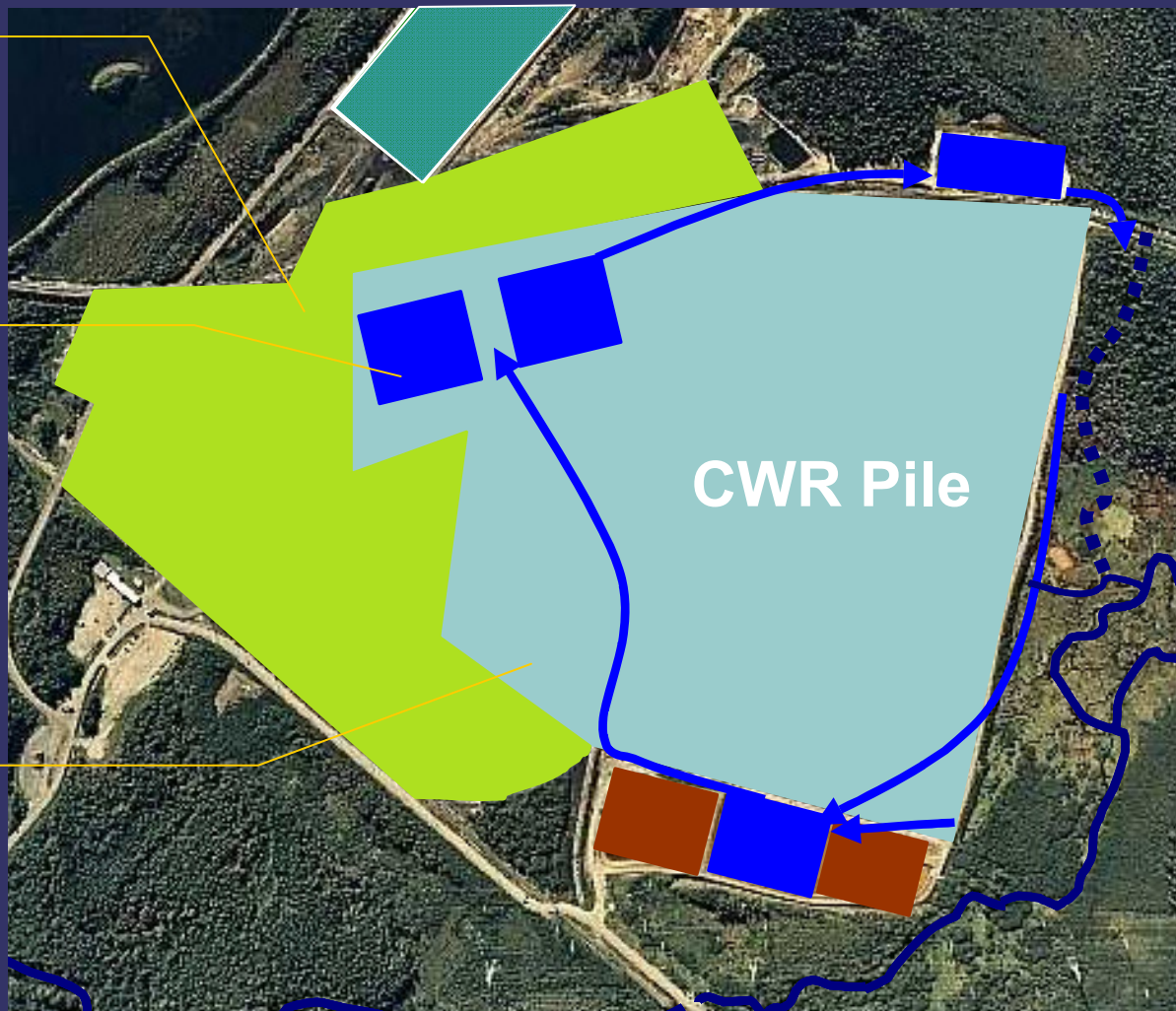
- Collect and treat
- Clean-up all
- Cover all
- Clean-up/consolidate and cover

Closure Plan Description

- Remove ARD generating fills and vegetate
- Cover foundations with till and vegetate

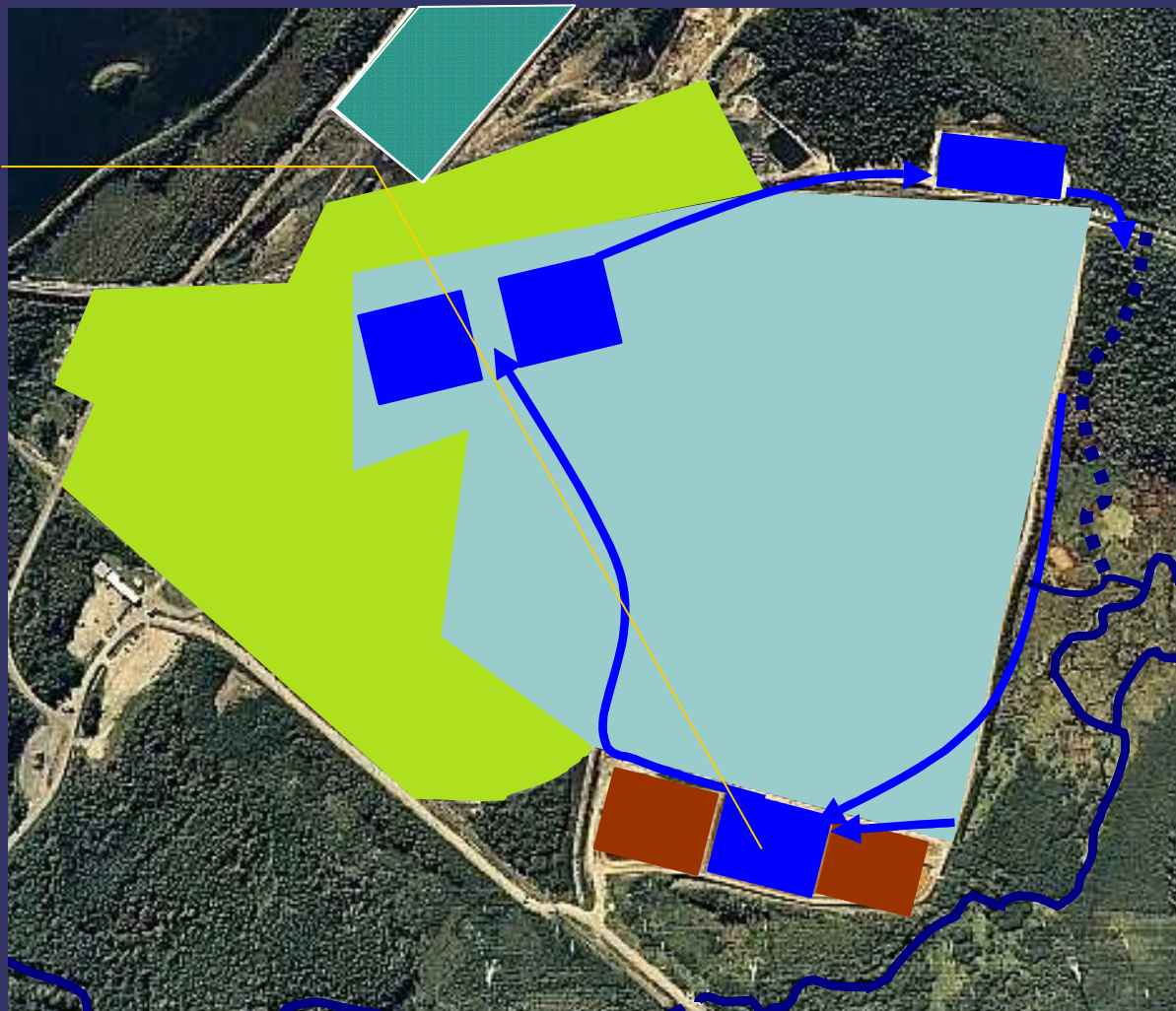
- Cover tailings ponds with HDPE geomembrane
- Construct new water treatment ponds on top
- New ponds to be free draining and sludge removed by excavator

- Stacker area will become repository for ARD generating fills from the remainder of the Plant Site area



Closure Plan Description

- Asphalt from the surge ponds to be removed
- Smaller geomembrane lined surge pond required for transition period
- Excess surge pond capacity to be utilized as sludge repository



Cover Design
Type of Cover

Dry ‘Impervious’ Cover

- Isolate the runoff from the ARD material
- Minimize infiltration to reduce transport out of the CWR pile
- Reduce oxygen influx

Cover Design
Constraints

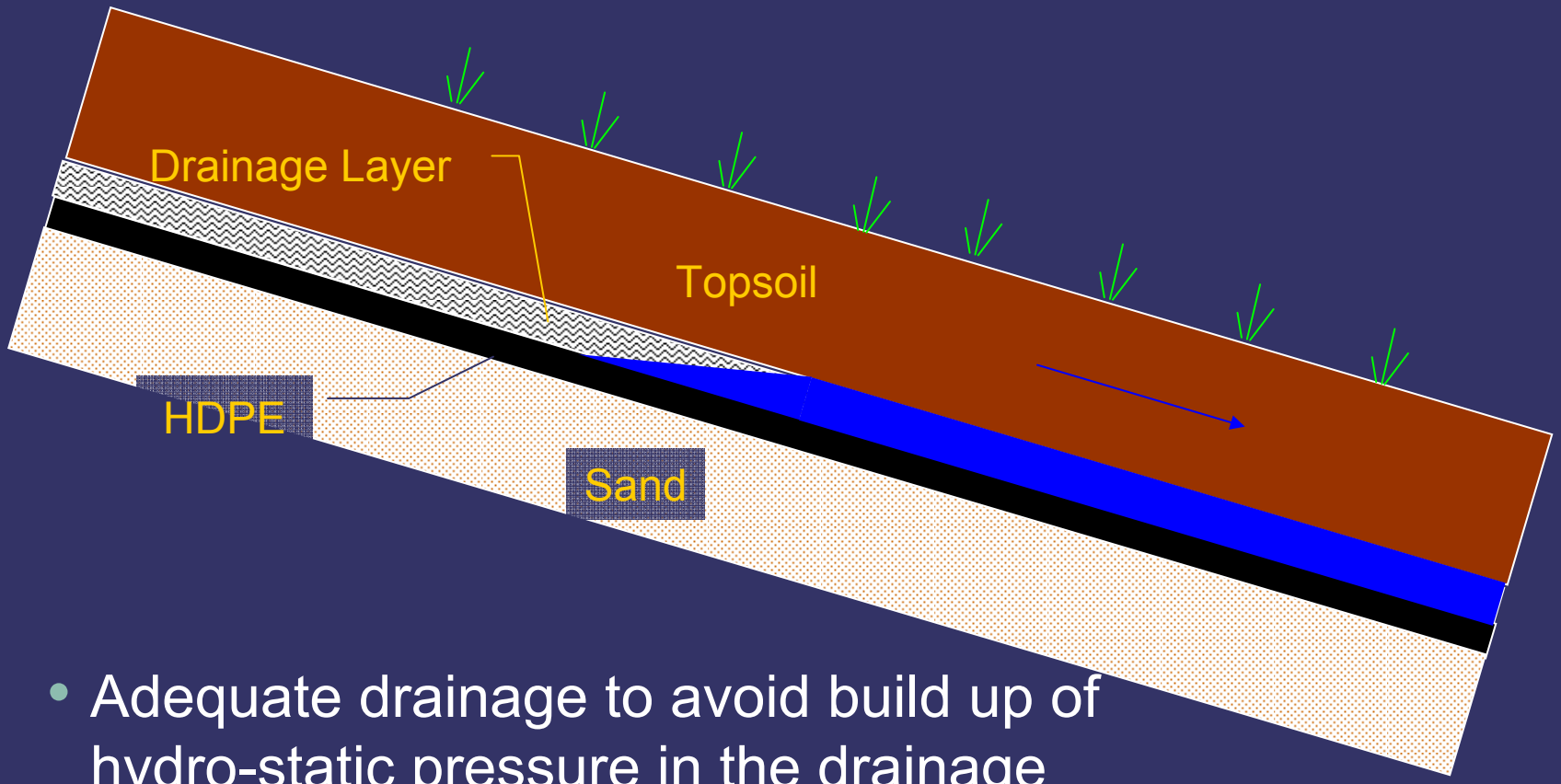
- Vegetative cover – aesthetics
- 3:1 side slopes on the order of 80 m long – economical practicality
- Minimize intrusion into the wetland

Cover Design
'Impervious' Component

Low permeability elements:

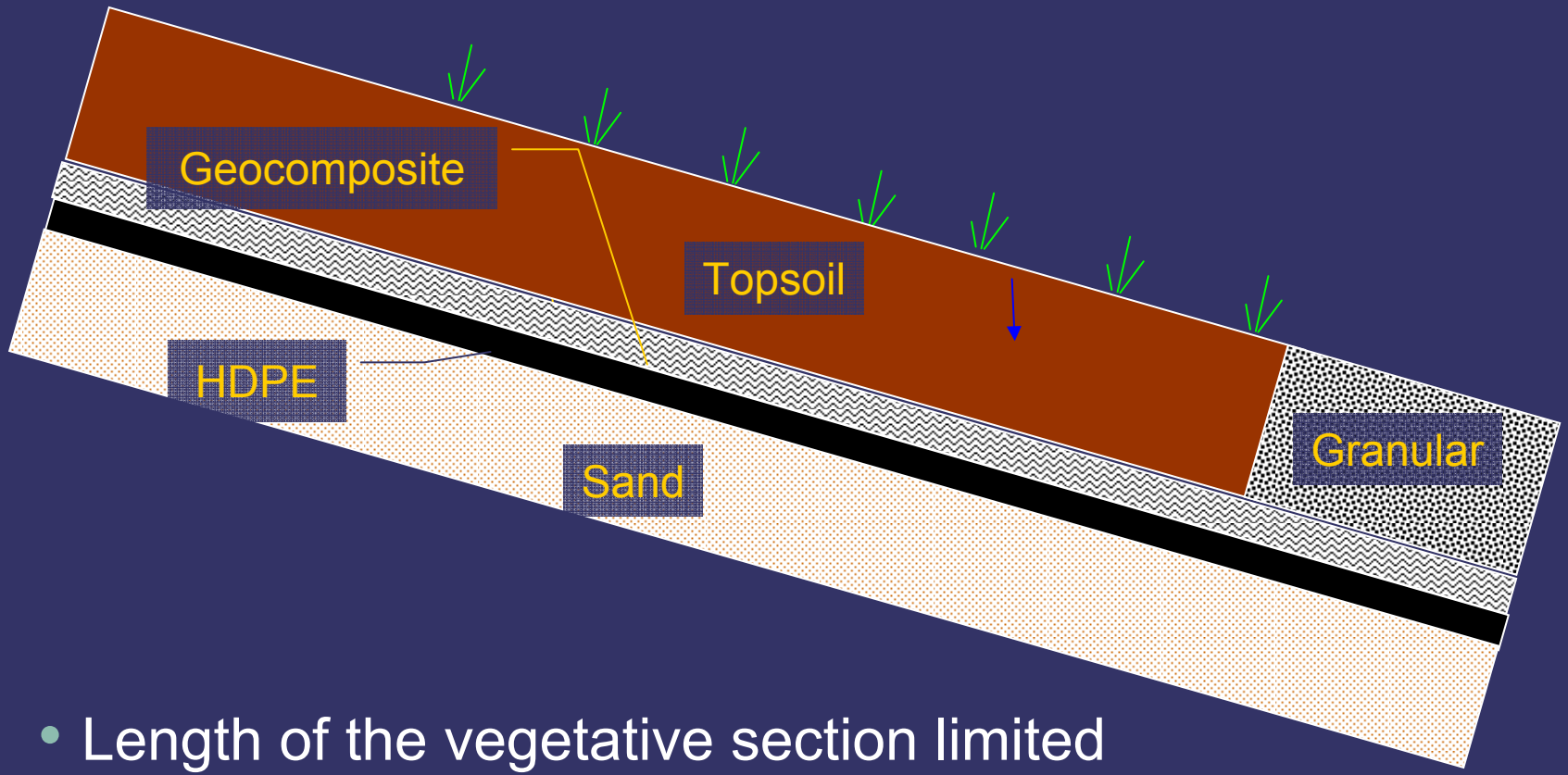
- Locally available low permeability soils
- Geosynthetic Clay Liners (GCLs)
- Geomembrane (HDPE) – preferred option

Cover Design
Slope Stability and Adequate Drainage



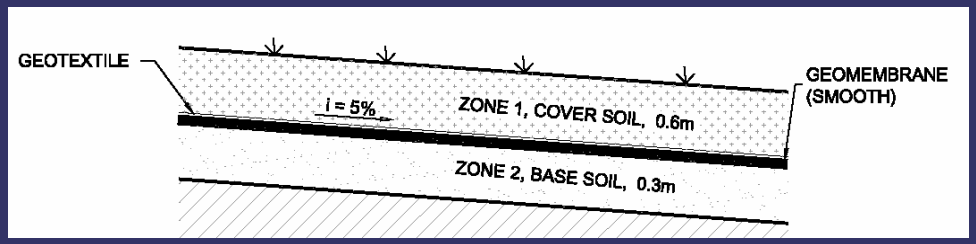
- Adequate drainage to avoid build up of hydro-static pressure in the drainage layer.
- Adequate drainage to ensure vertical seepage forces.

Cover Design
Slope Stability and Adequate Drainage

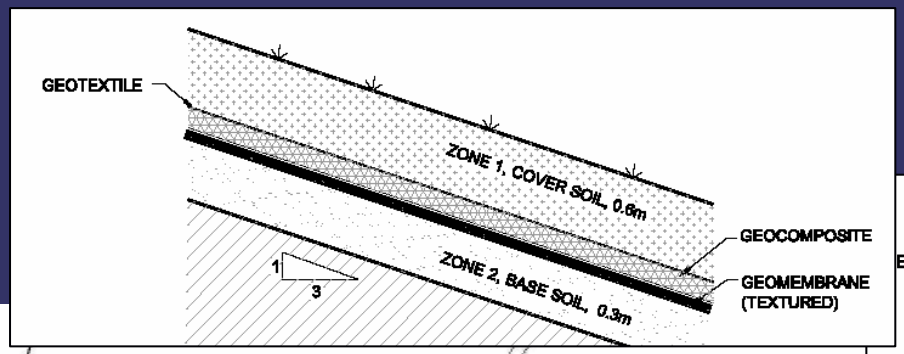


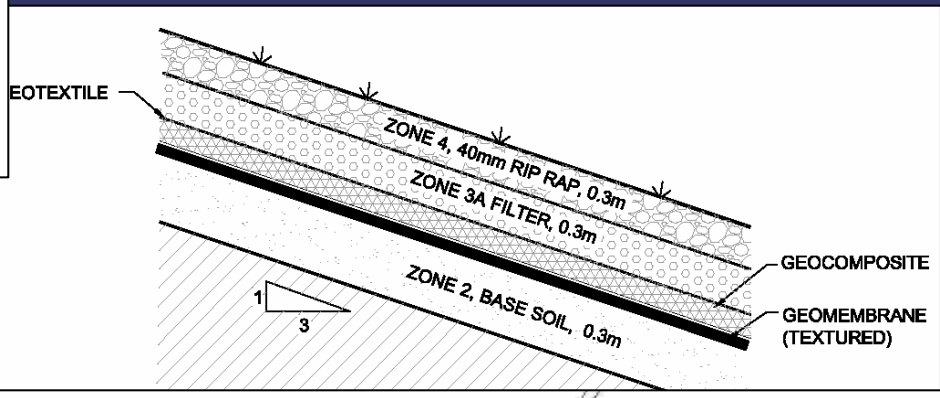
- Length of the vegetative section limited due to drainage constraints.
- Geocomposite drain for capacity and ease of construction.

Cover Design
Typical Section



- Top edge ditch to collect and divert water from the drainage area.
- Top edge ditch discharges down the slope at several designed sections.
- Perimeter ditch to convey water to discharge locations

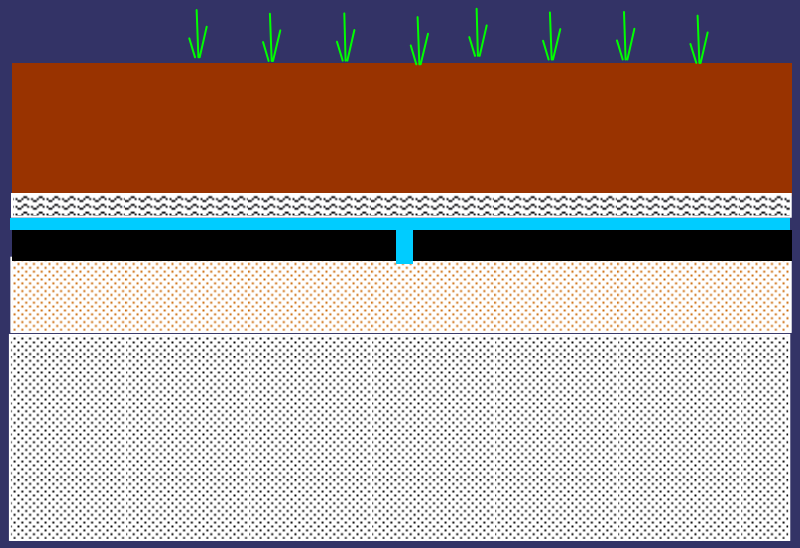


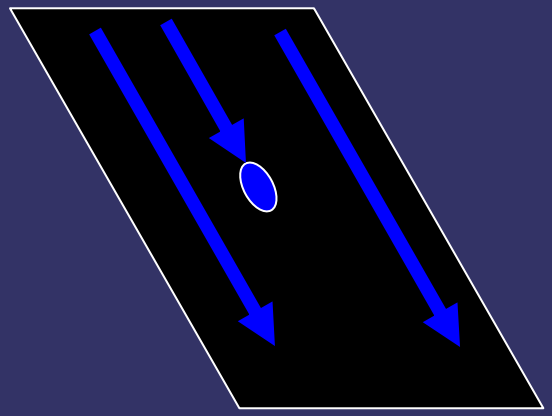


WASTE ROCK PILE

PERIMETER DITCH

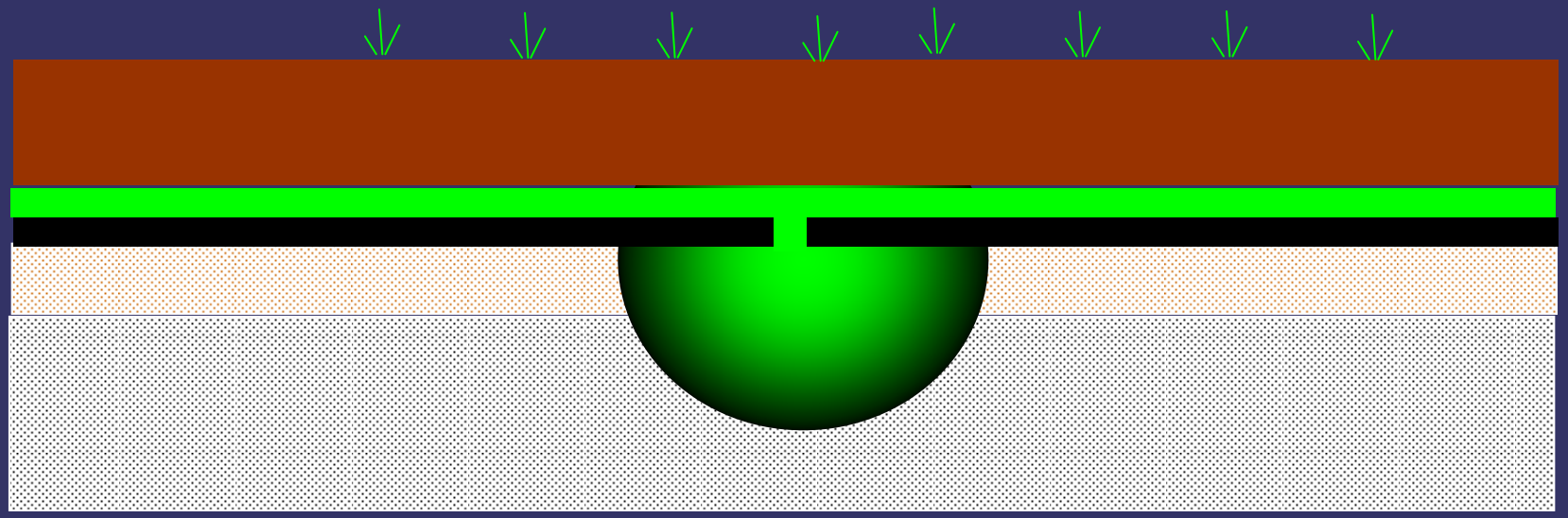
Cover Design
Infiltration





- Defects only allow infiltration when there is water in the drainage layer.
- Only water coming in contact with the defect can potentially infiltrate.
- Predicted infiltration 10 mm/a or <1%.

Cover Design
Oxygen



- Relatively fine grained wastes – diffusion dominates
- Point source oxygen diffusing into the waste.
- Sulphide depletion in the vicinity of the defect will gradually result lengthening of the pathway for oxygen diffusion.

Benefits Timeline

i. Plant Site Operations
ii. Cessation of Operations
iii. Transition Stage
iv. Closure Stage
v. Very Long Term

Benefits

Cessation of Operations

Estimated Volume of Water Treated:

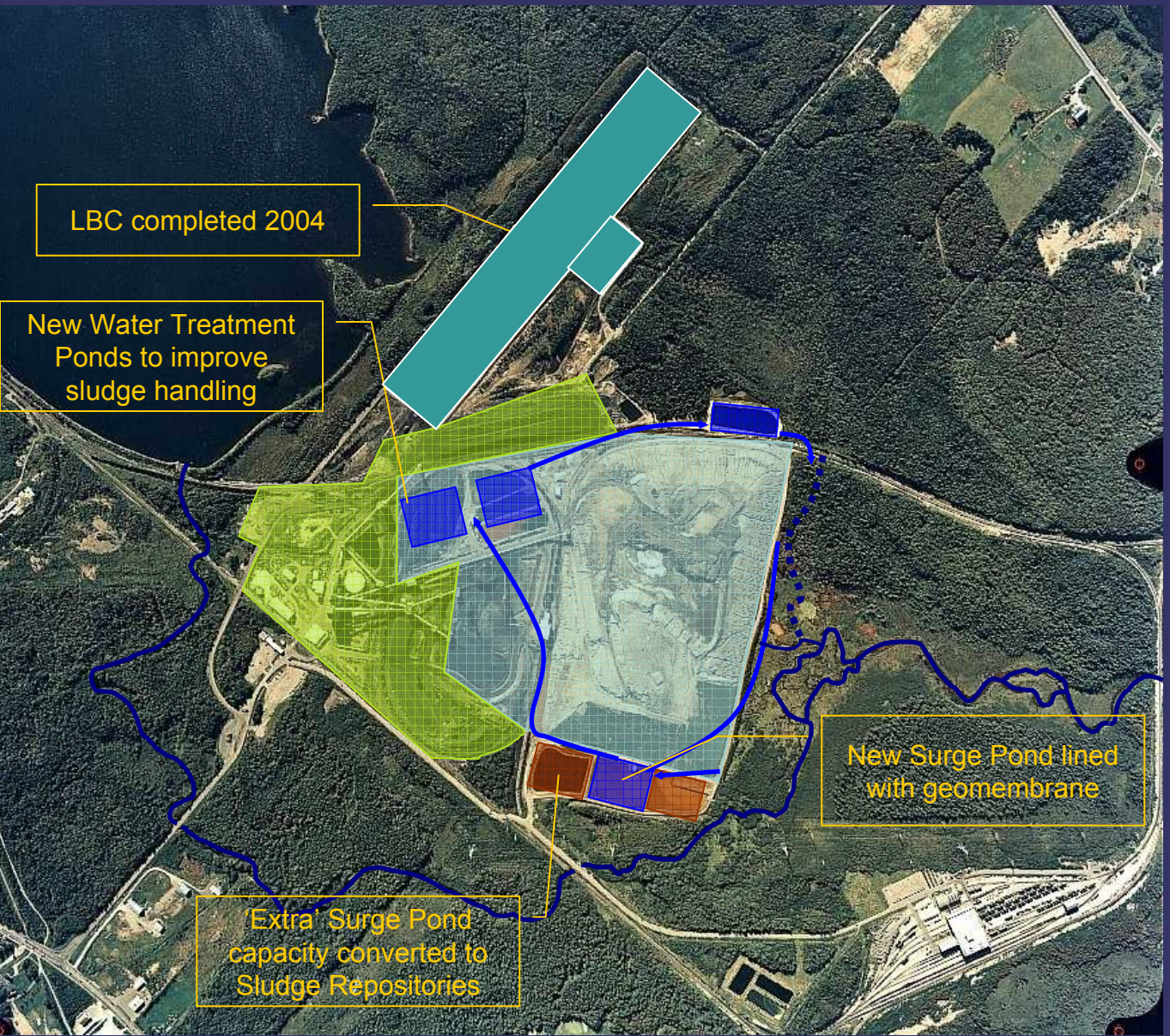
600,000 m^3/a

Estimated Volume of Sludge Generated:

8,000 m^3/a

(based on 4,000 m^3 for 276,000 m^3 Mar-Sept. 2004)

Benefits
Transition Stage



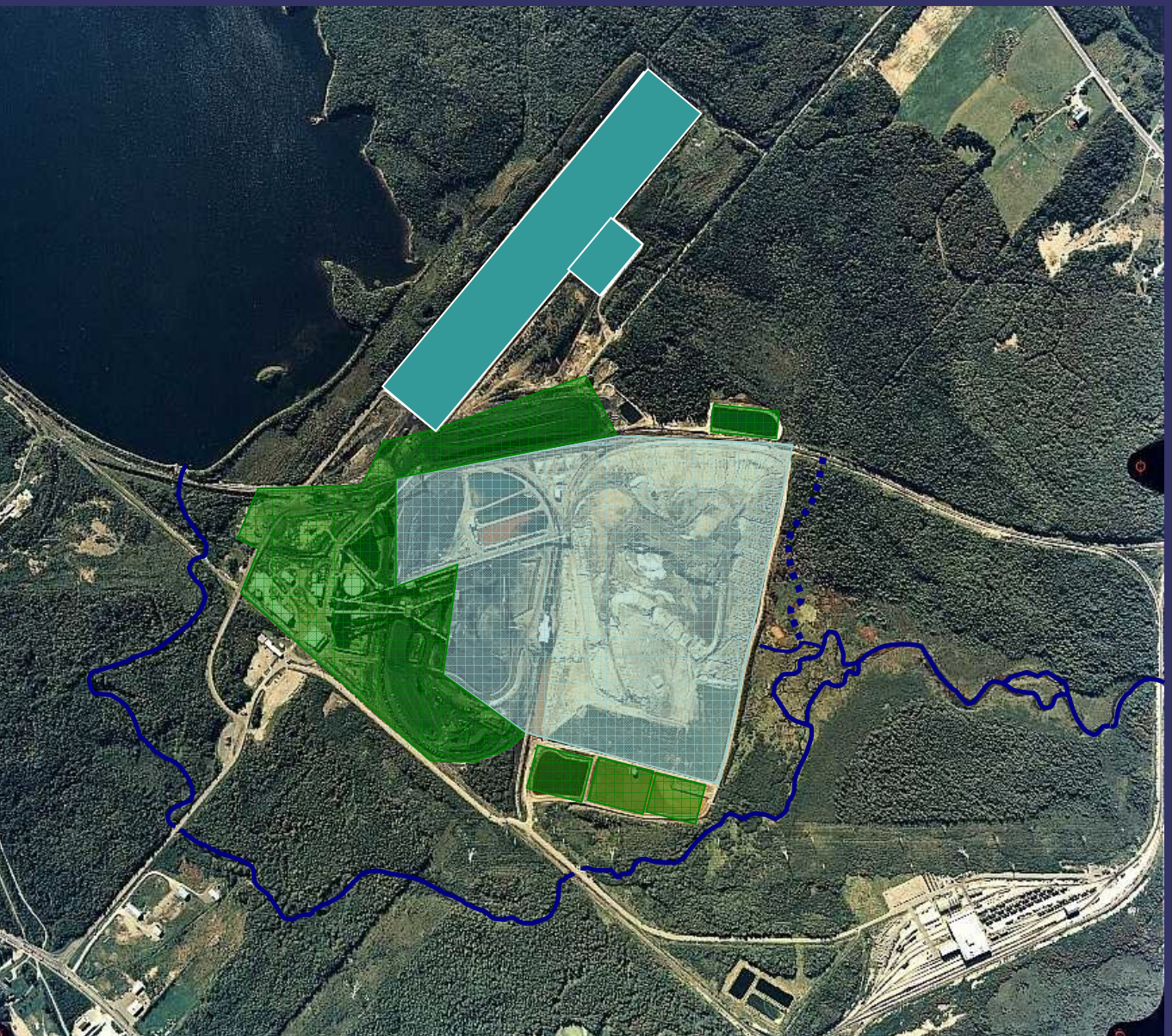
Estimated Volume of Water Treated:

100,000 m^3/a

Estimated Volume of Sludge Generated:

1,500 – 3,000 m^3/a

Benefits
Closure Stage



Estimated Volume of Water Treated:

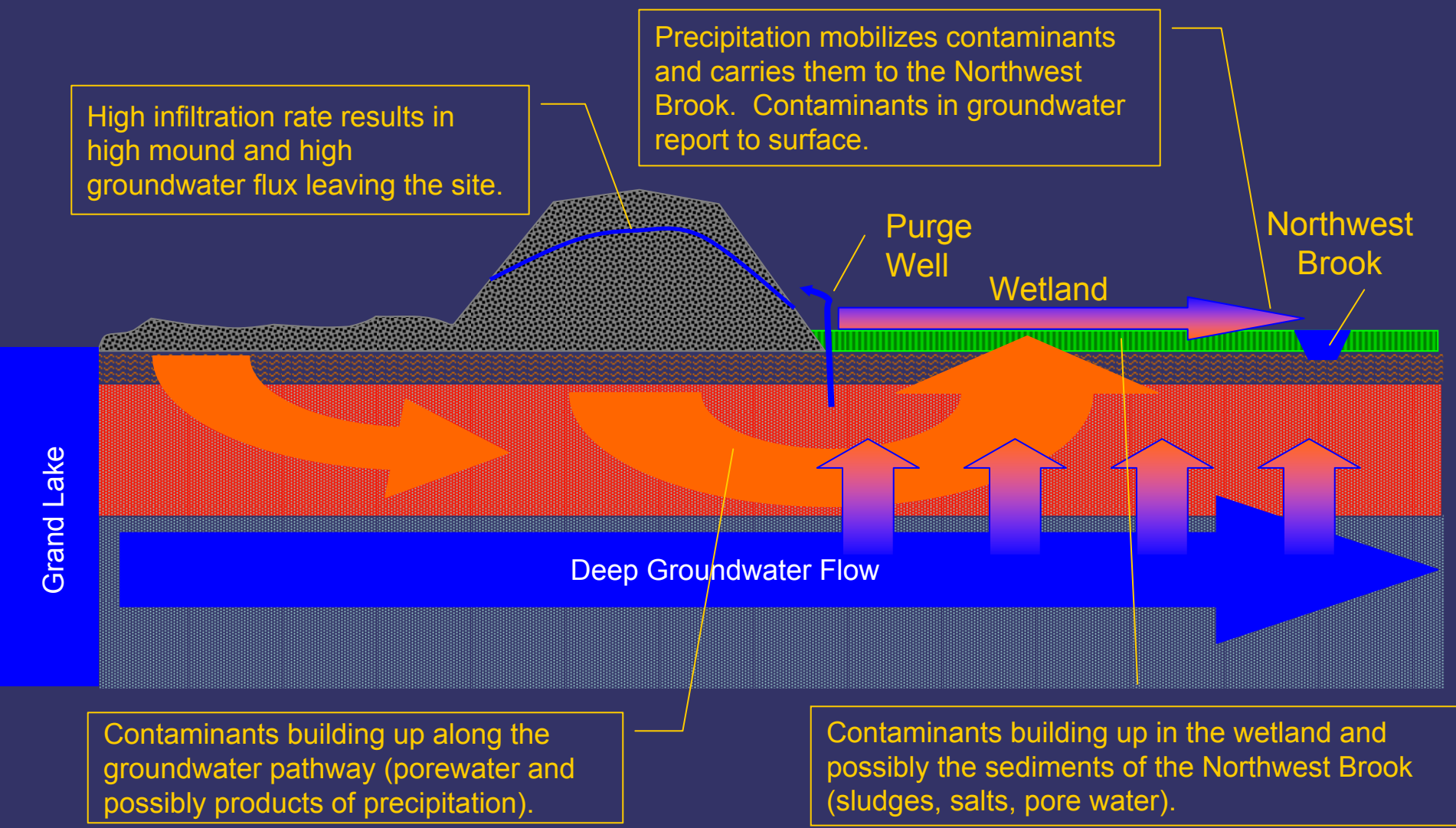
0 m^3/a

Estimated Volume of Sludge Generated:

0 m^3/a

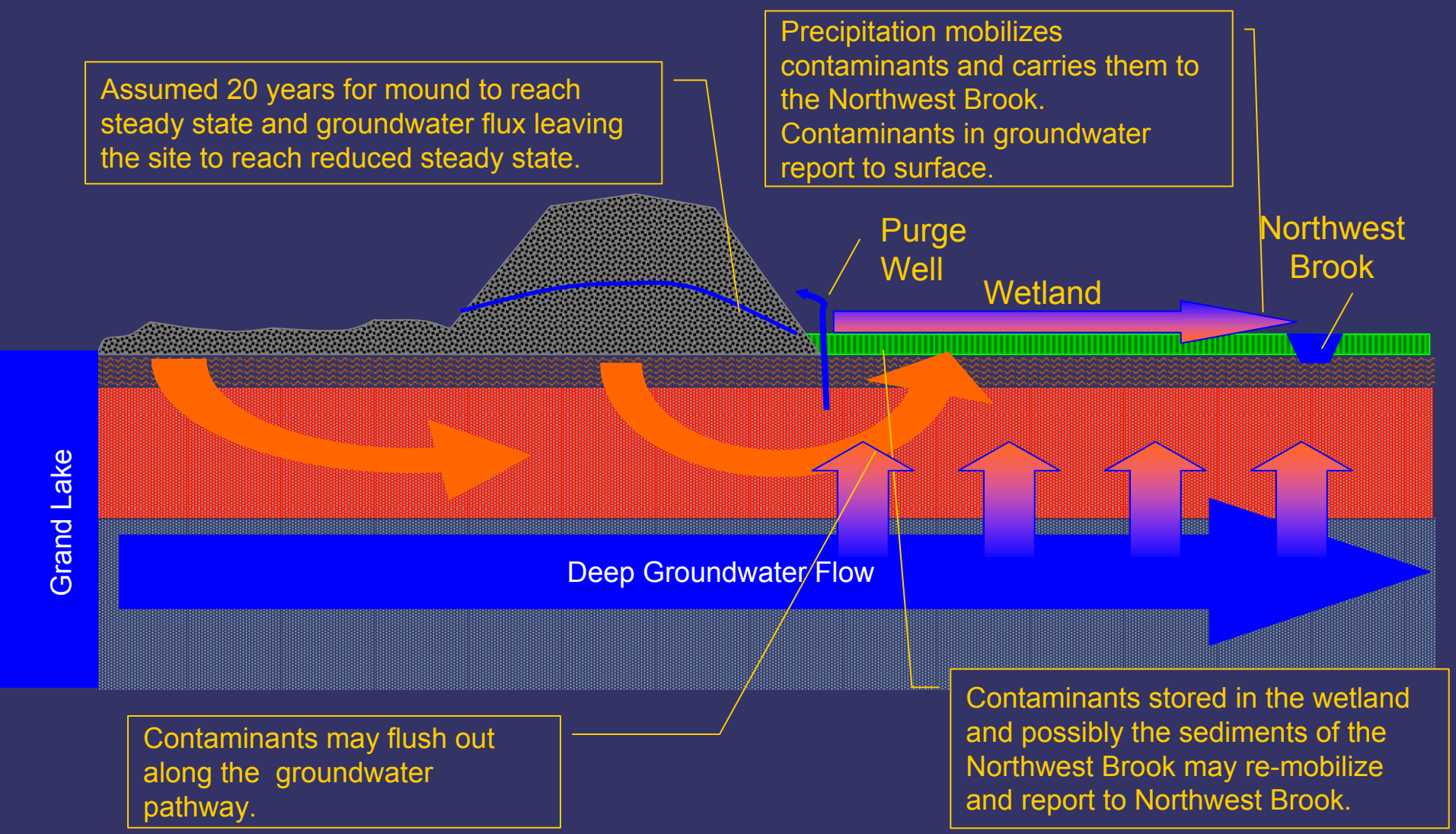
Benefits

Current Conditions



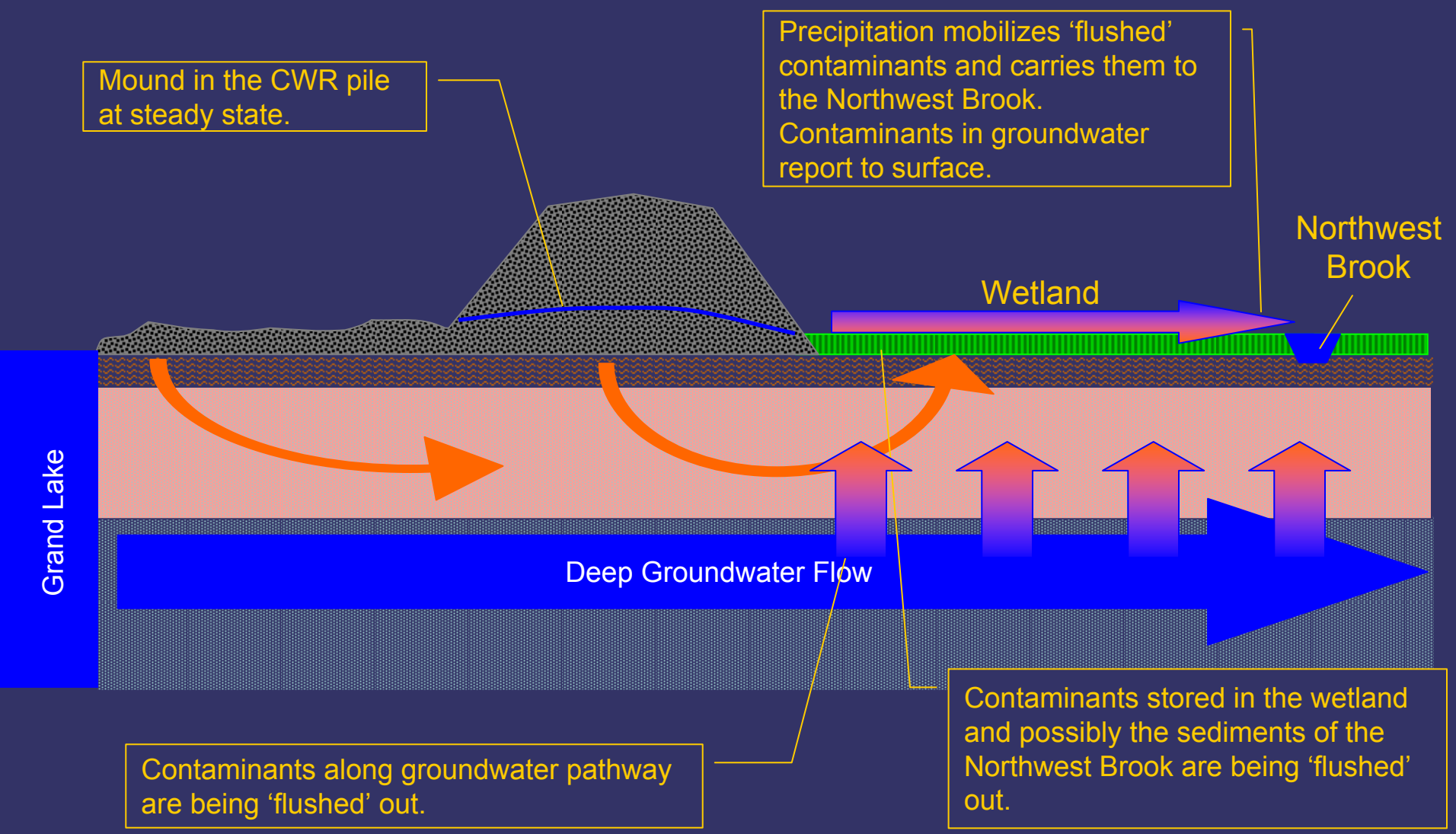
Benefits

Transition Stage 1

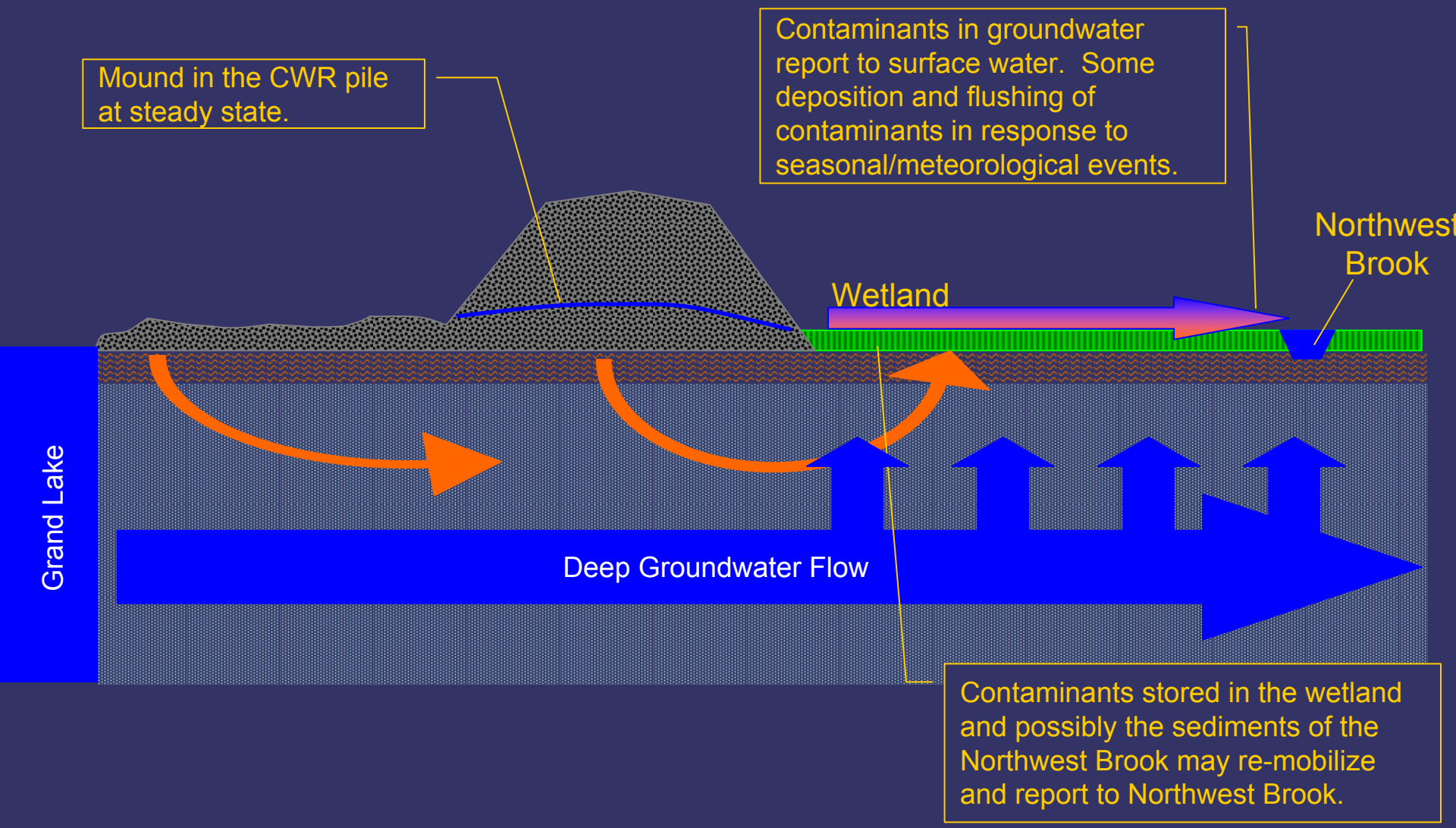


Benefits

Transition Stage 2

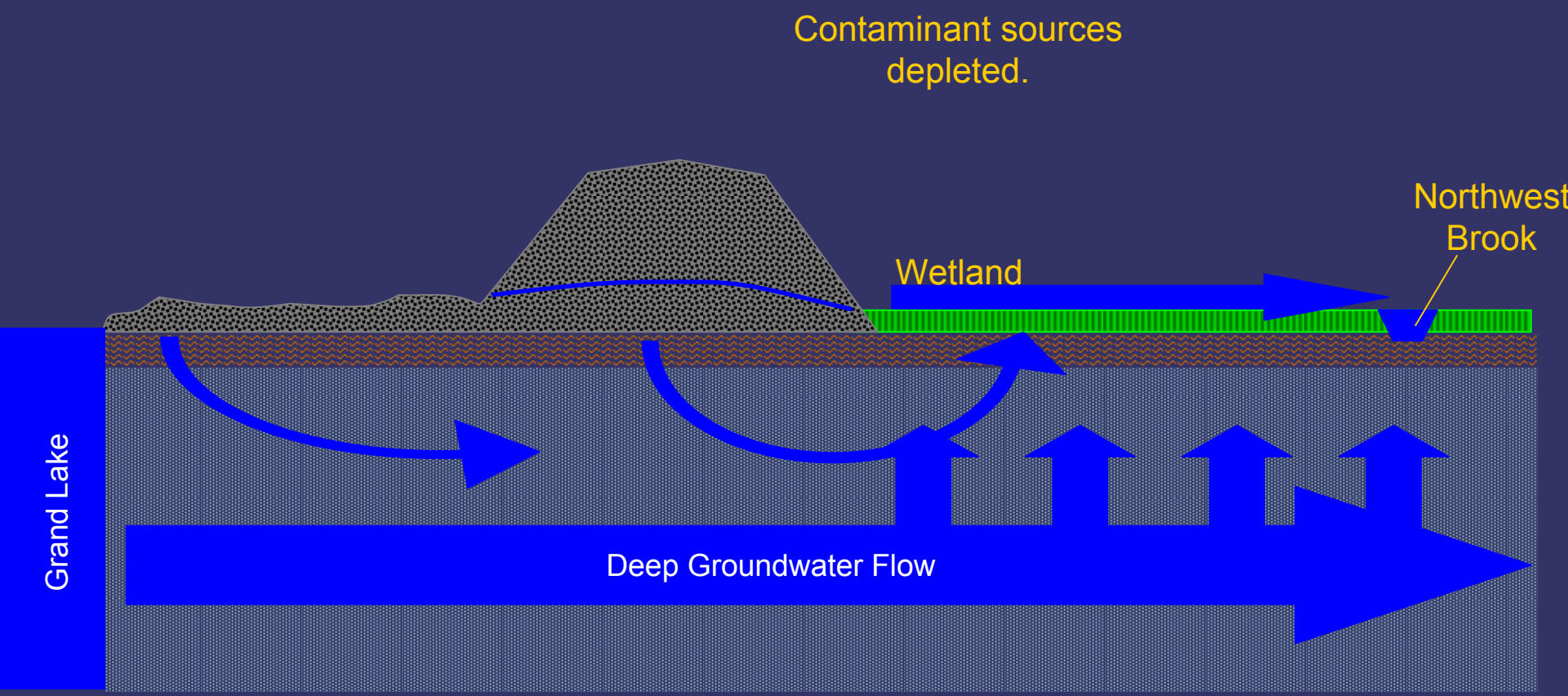


Benefits
Closure Stage



Benefits

Very Long Term



Benefits

Reduction in Loadings Leaving the Site

- Benefit

Parameter	**Cessation of Operations**	**Closure Stage** *40 mm/a through geomembrane*
Sulphate (kg/a)	1,301,800	116,500
Iron (kg/a)	82,200	32,300
Aluminium (kg/a)	11,700	4,000

- On the order of $20-30/m^2 for the 'cover' alone