Conceptual surface water management strategy and water balance

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Scope

- Describe surface water management objectives
- Describe surface water management concepts
- Demonstrate that the proposed water management concepts will be effective, through a water balance model

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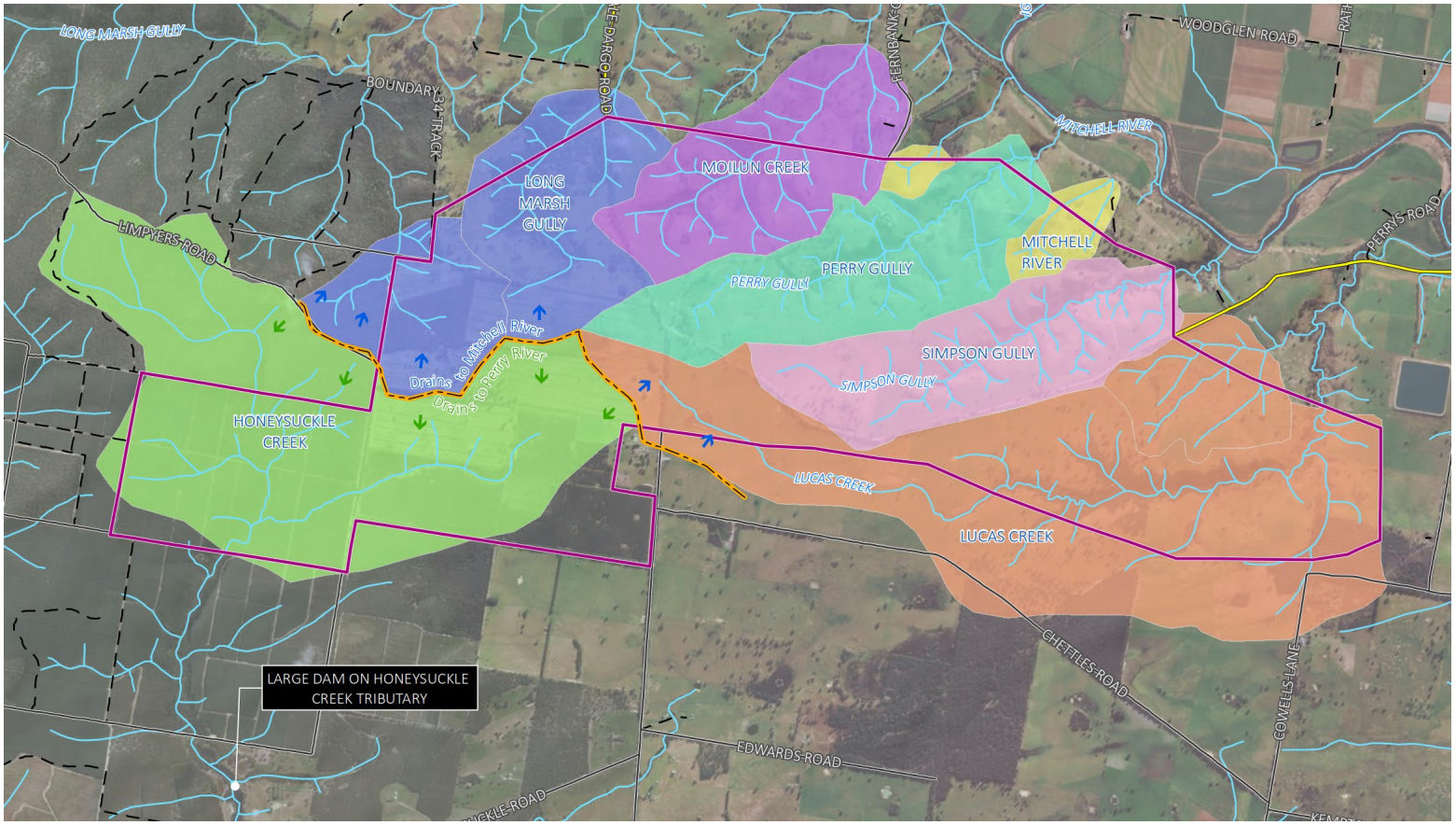
Surface water catchments



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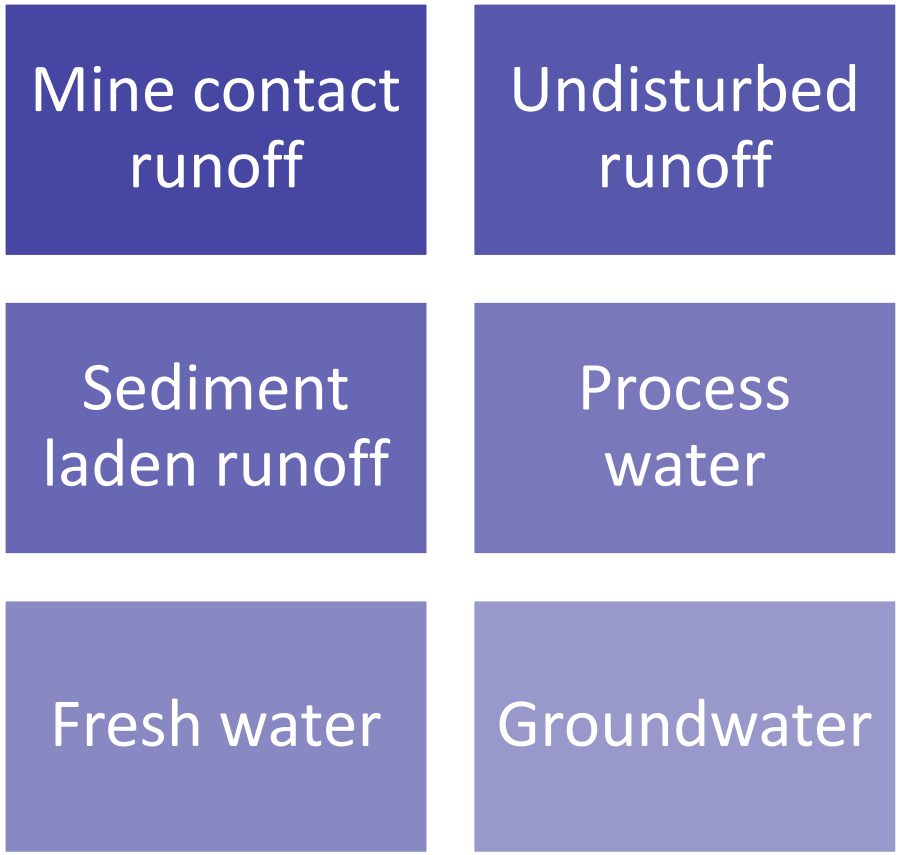
Water management objectives

- Segregate water according to water quality



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Water management objectives

- Manage discharges from the site based on sensitivity of the receiving environment

Mitchell River

Perry River

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Water management objectives

- Maintain downstream flows

Mitchell River

Perry River

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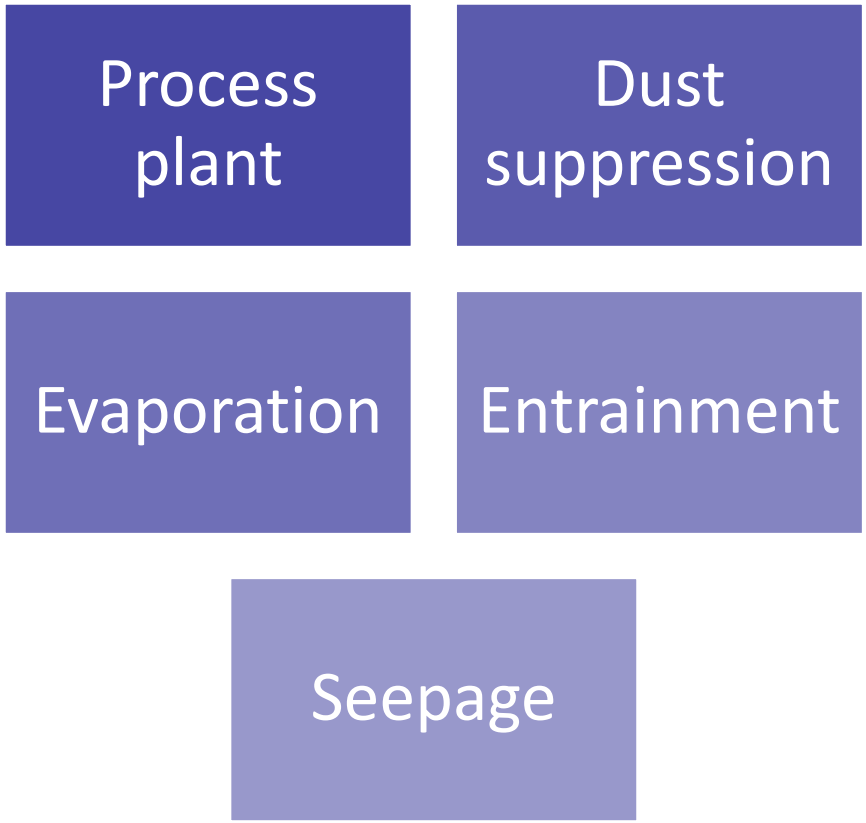
Water management objectives

- Maintain water supply for the mining operation



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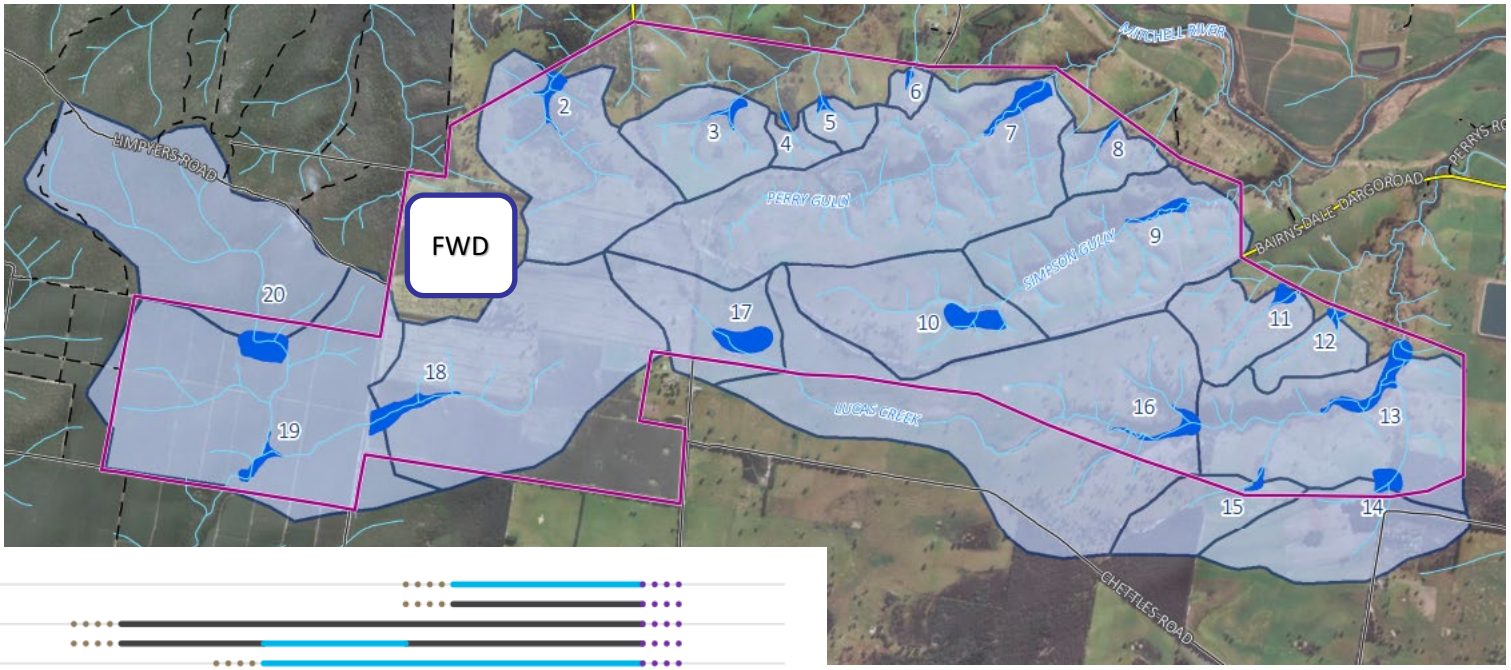
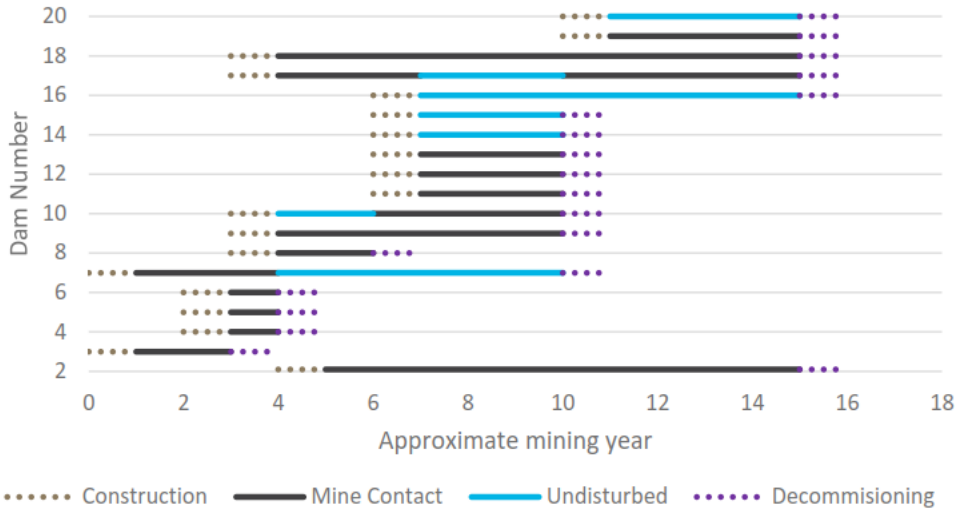
Water management dams





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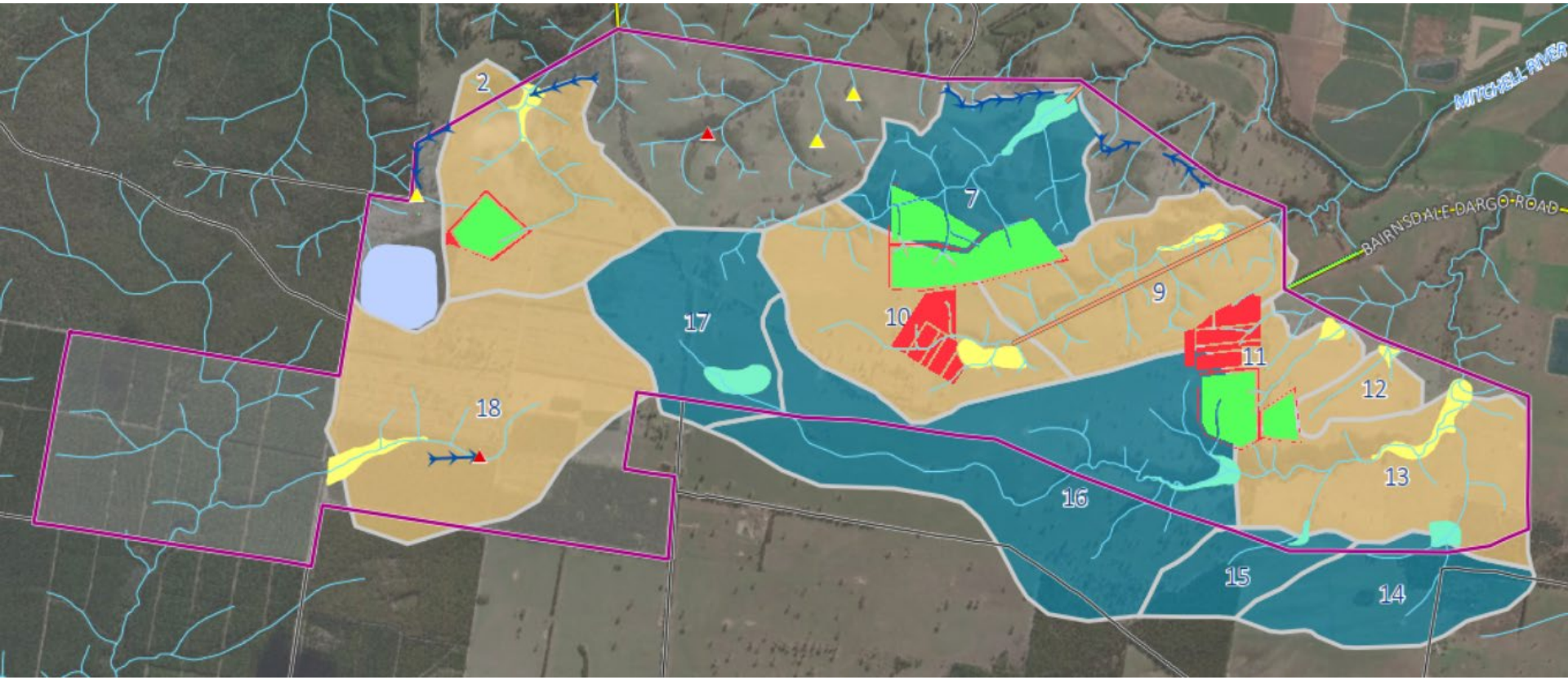
Water management dams – Year 8



Mining activity

Fine tailings cells

Catchment area - mine contact

Catchment area - undisturbed

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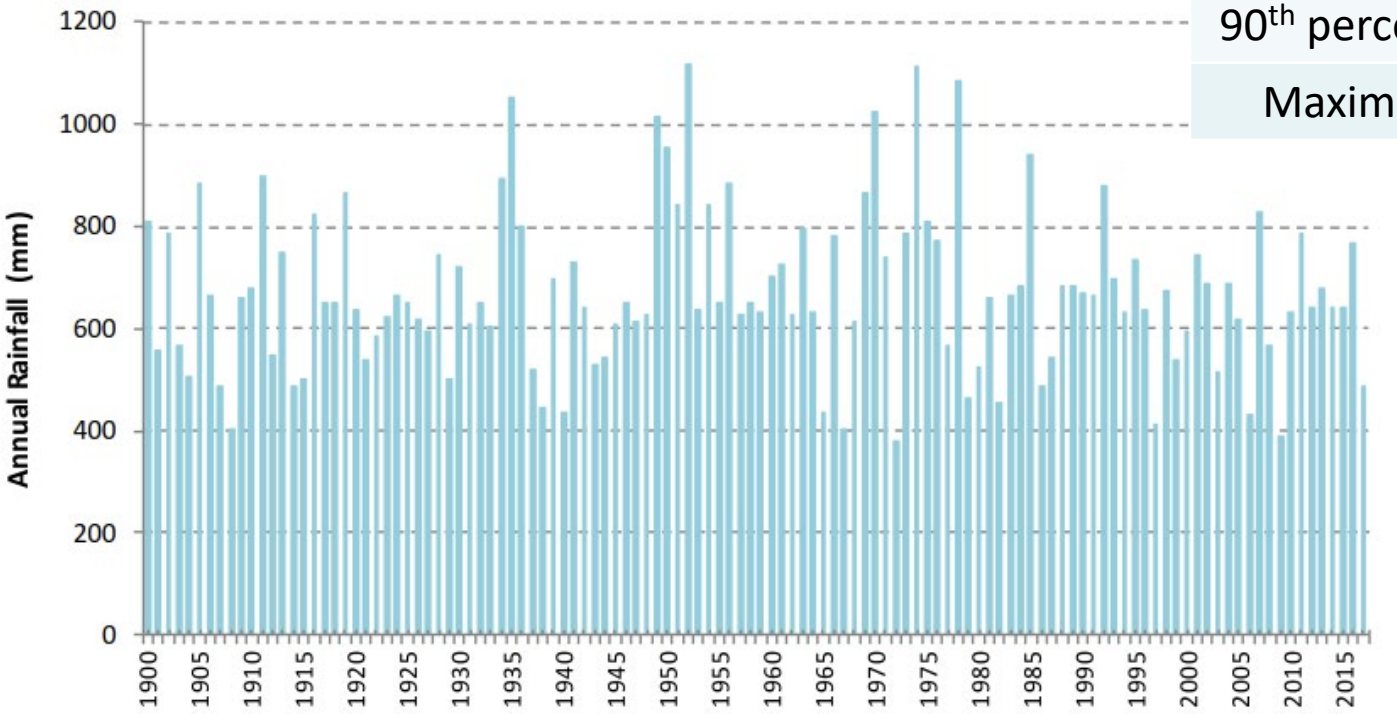
Data used in the water balance model

- 8 Mt product / 15 years
- Climate data 1901-2017

Rainfall (mm/year)	
Minimum	379
10th percentile	486
50th percentile	650
90th percentile	880
Maximum	1,118



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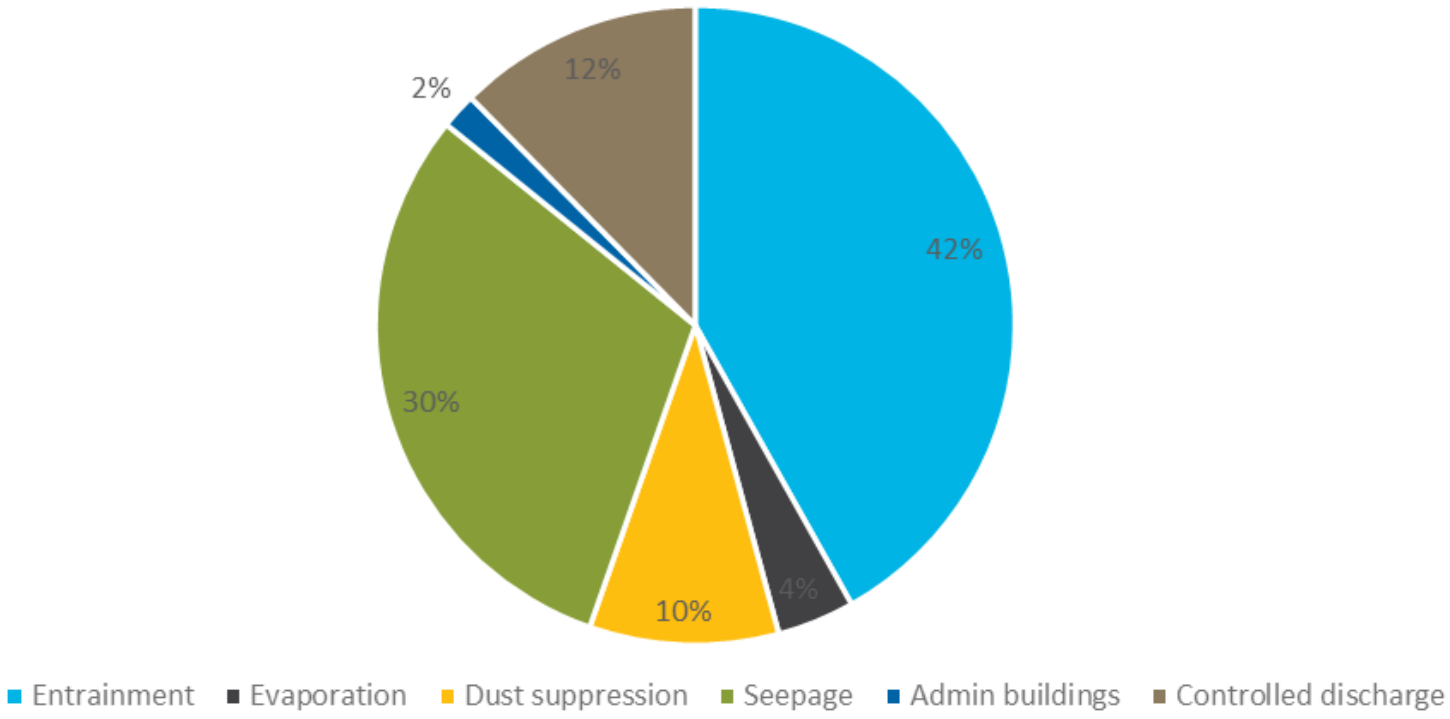
Typical water volumes Out



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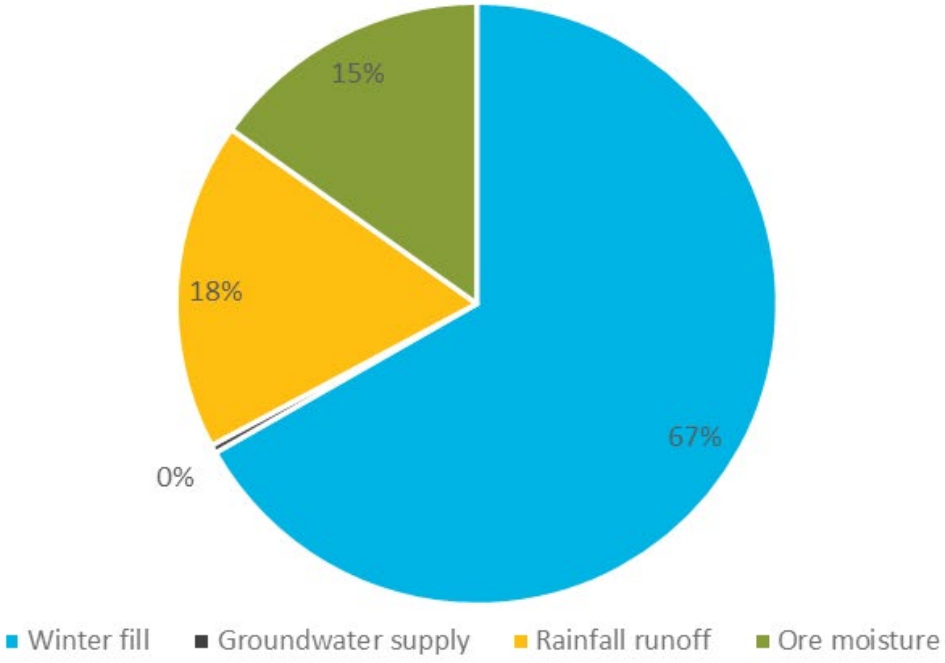
Typical water volumes In



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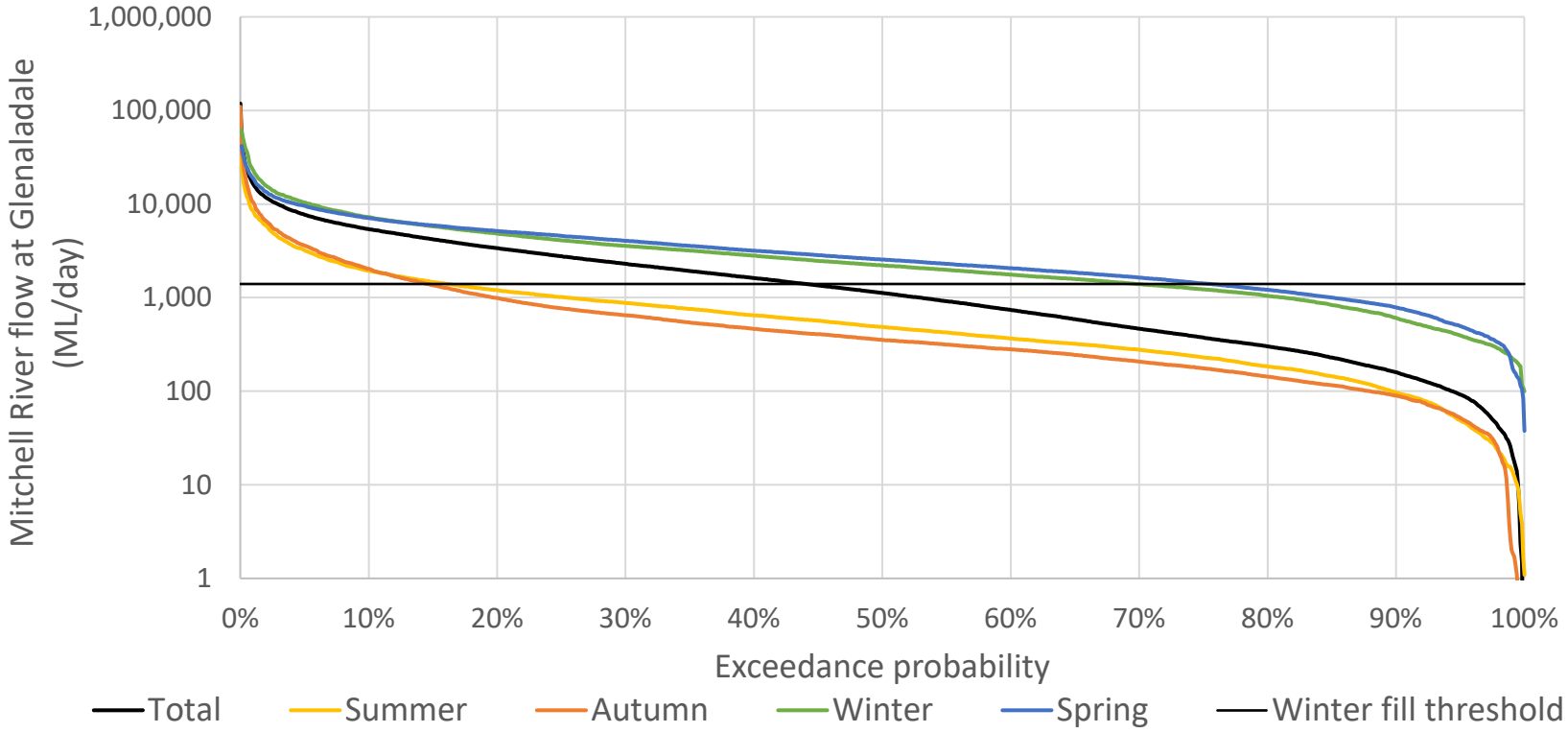
Data used in the water balance model

- Mitchell River flow data from 1938-2017



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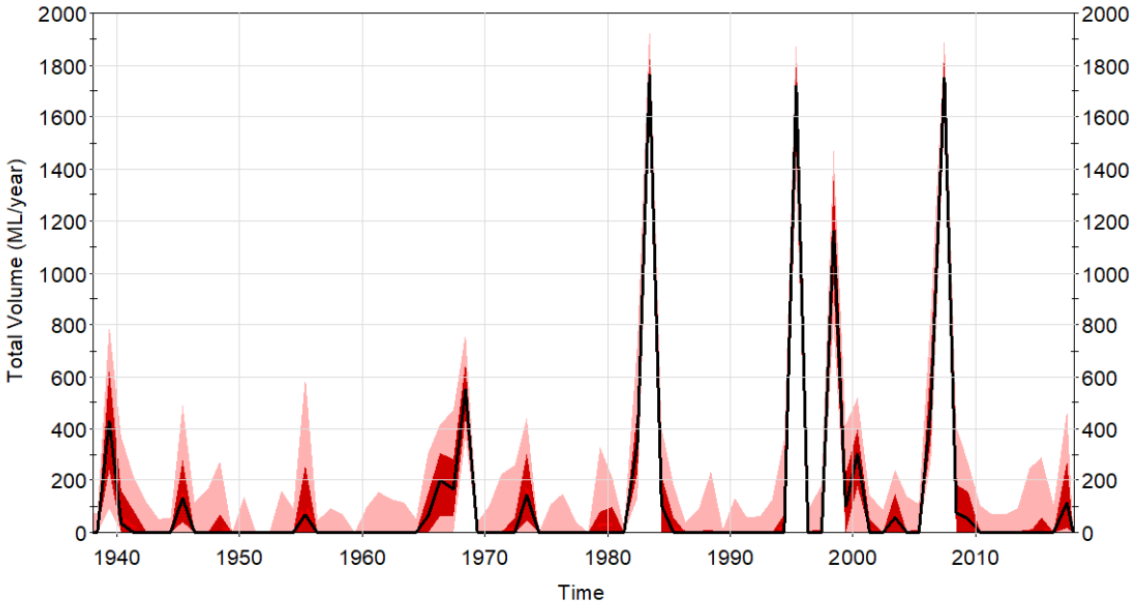
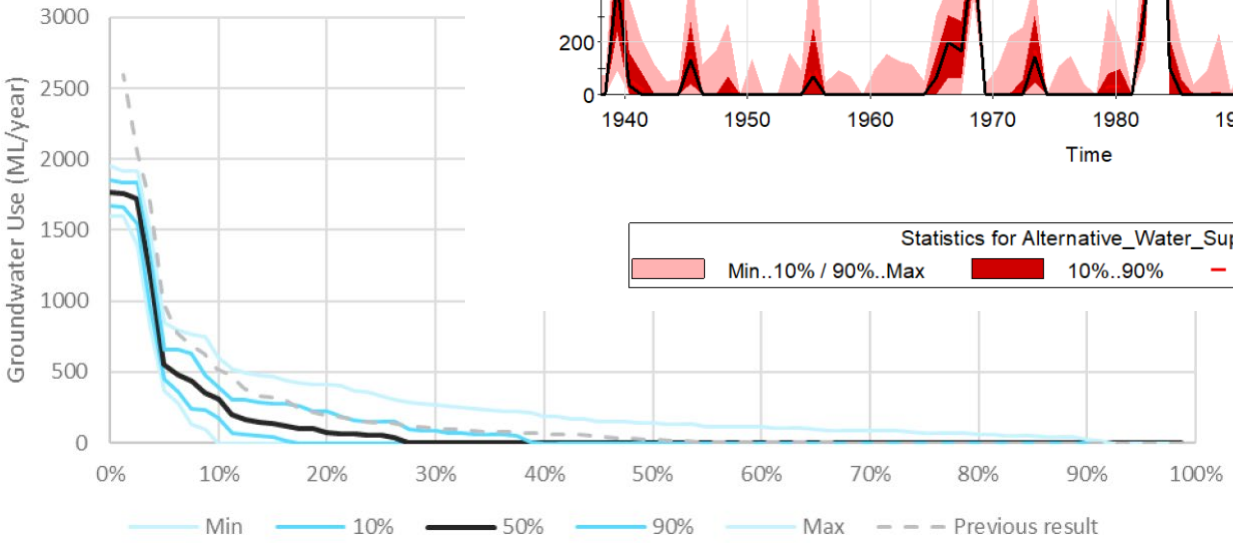
Groundwater use





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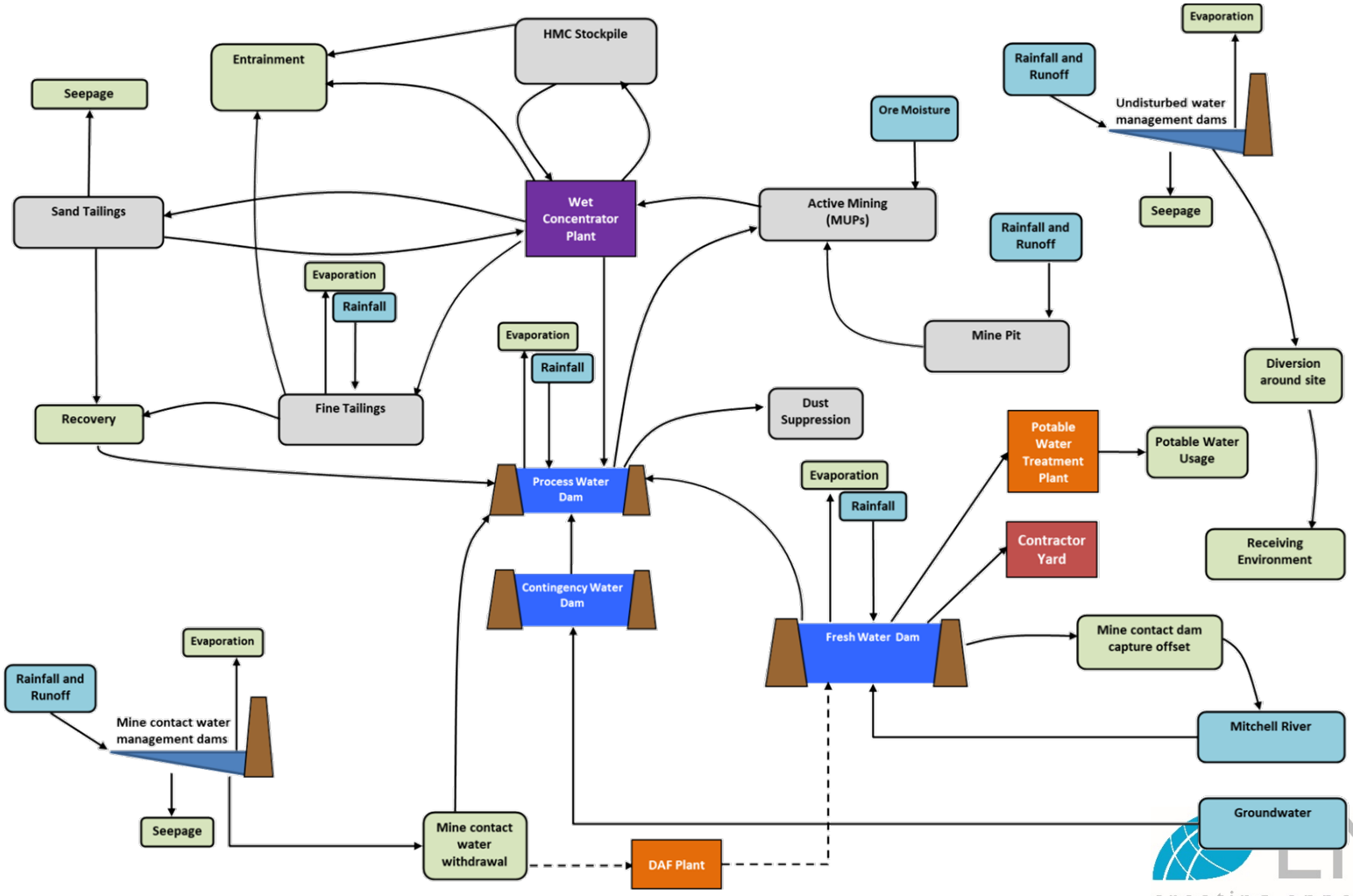
Water management components



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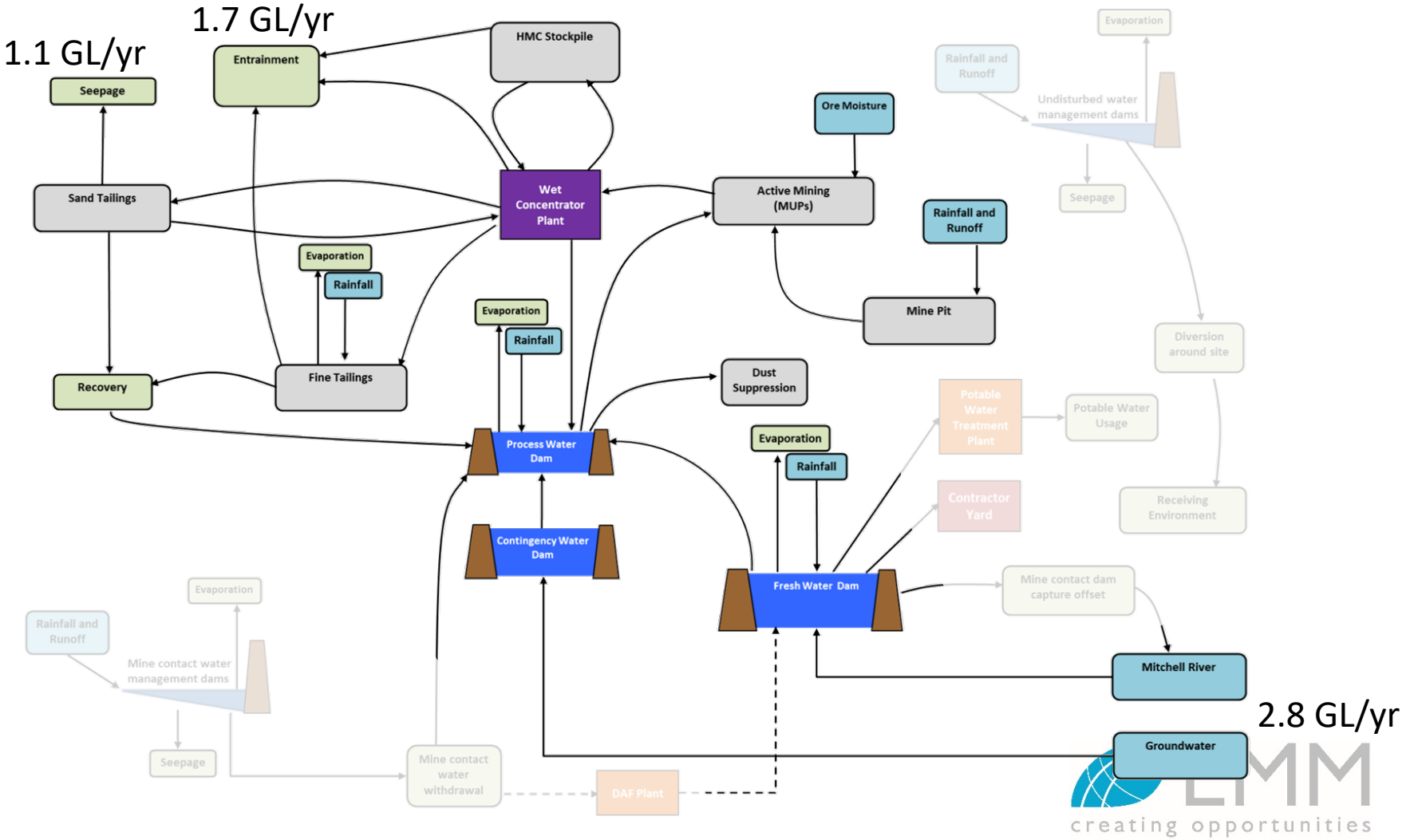
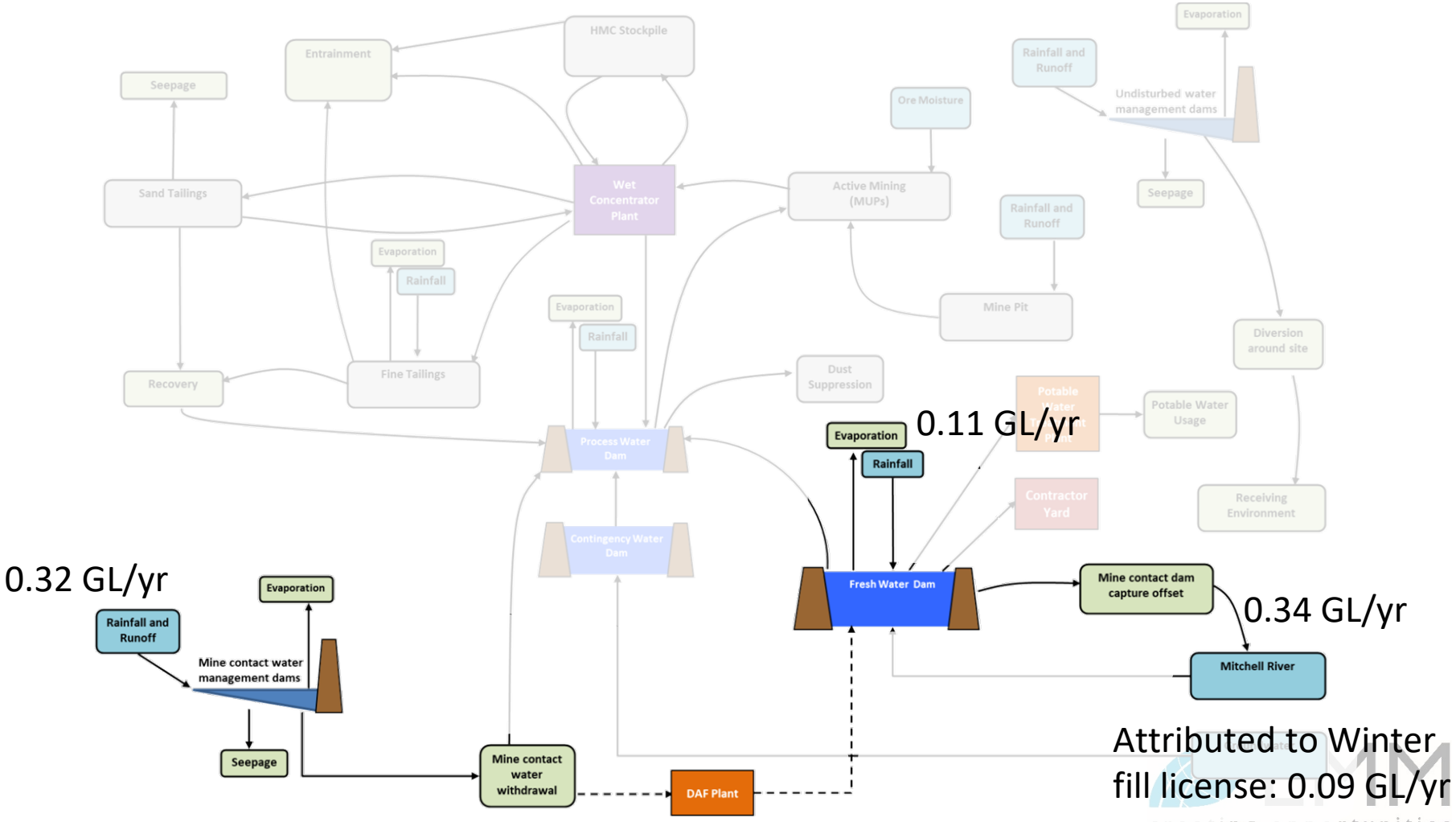
Mine water supply components

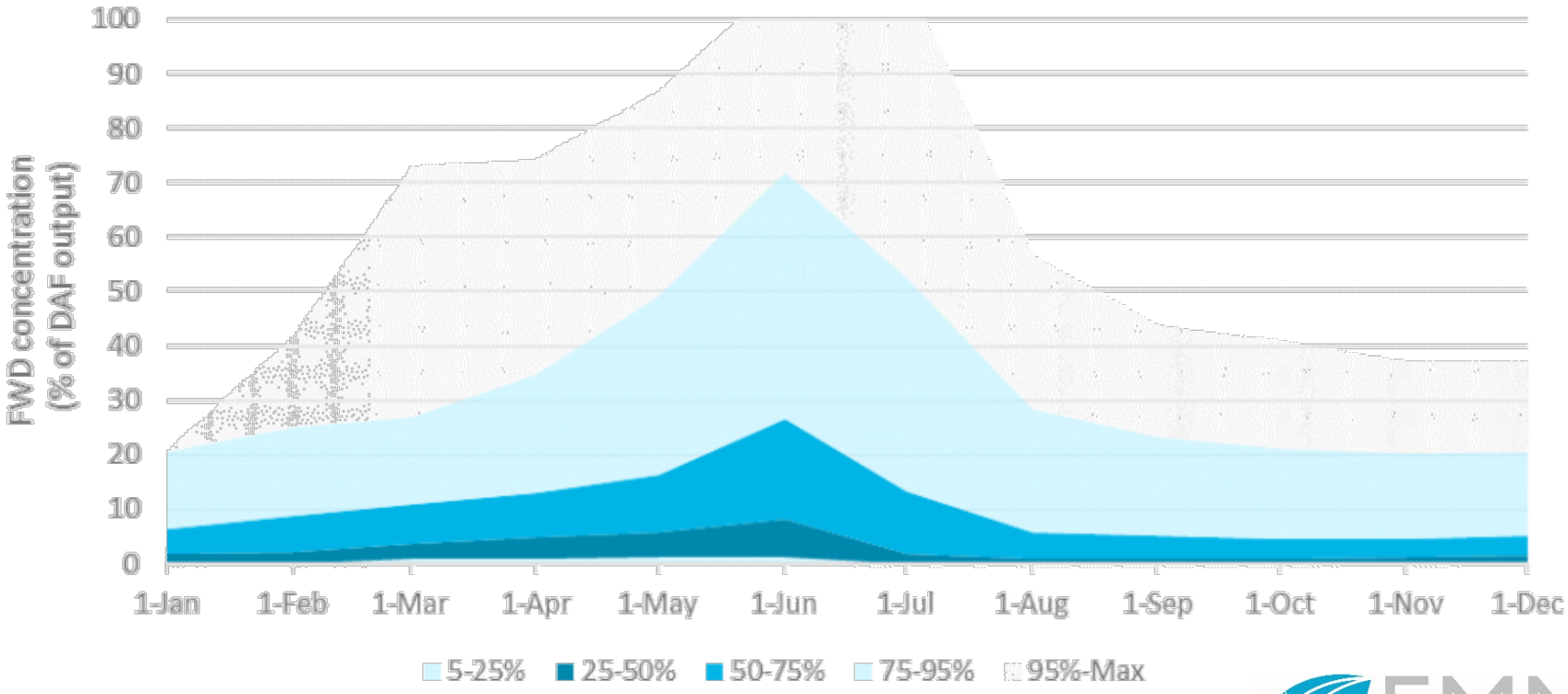


Mine contact runoff components



Treated mine contact water dilution

- Treated water assumed suitable for discharge



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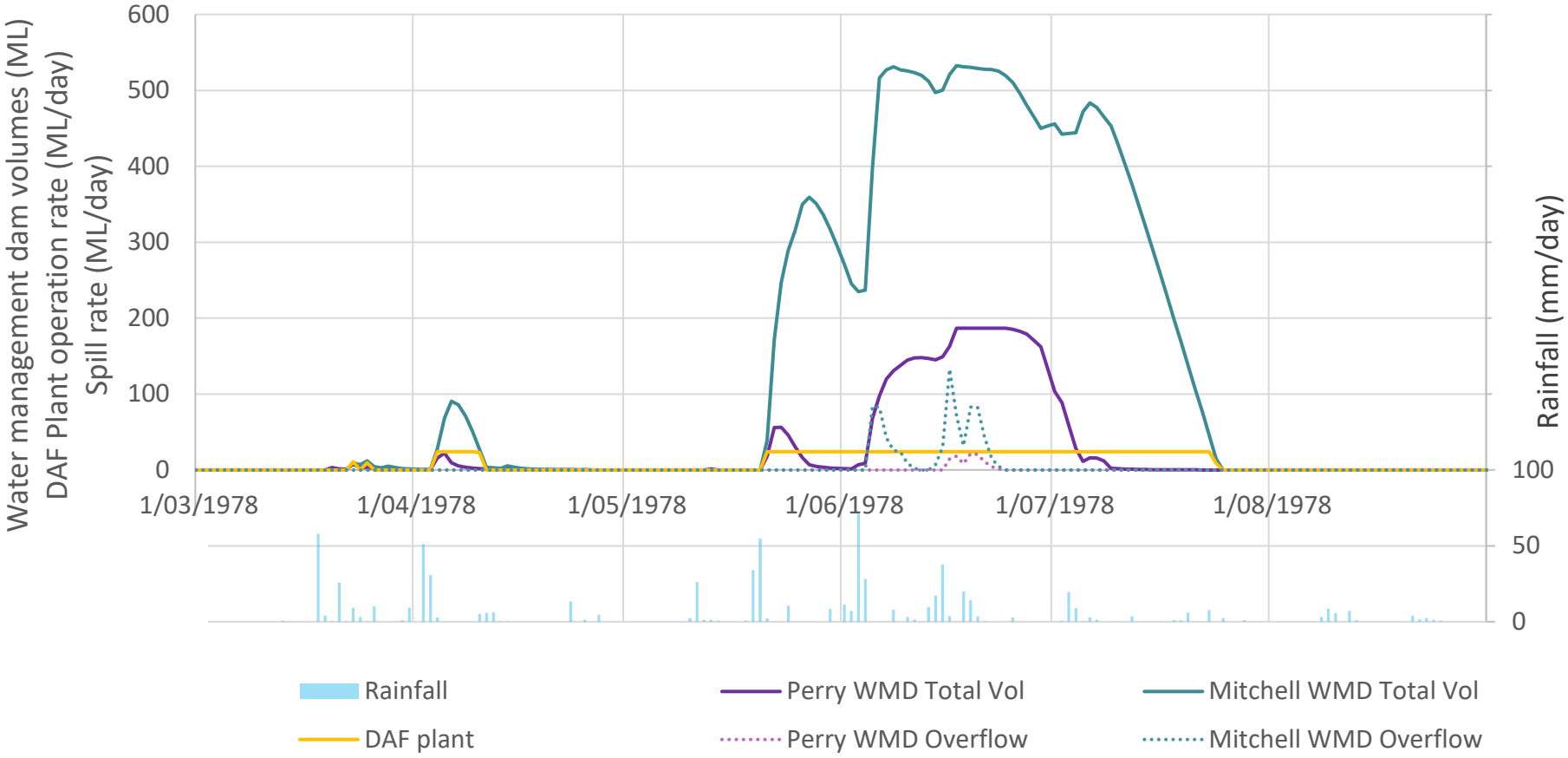
Probability of spill

- Four years in the historical record had rainfall sequences which would cause Mitchell River catchment water management dams to spill for the year 8 layout

Year	Number of days spilling	Average discharge (ML/d)
1950	4	6.5
1974	2	6.5
1978	17	45.6
2007	8	6.3

1978 spill event dissection



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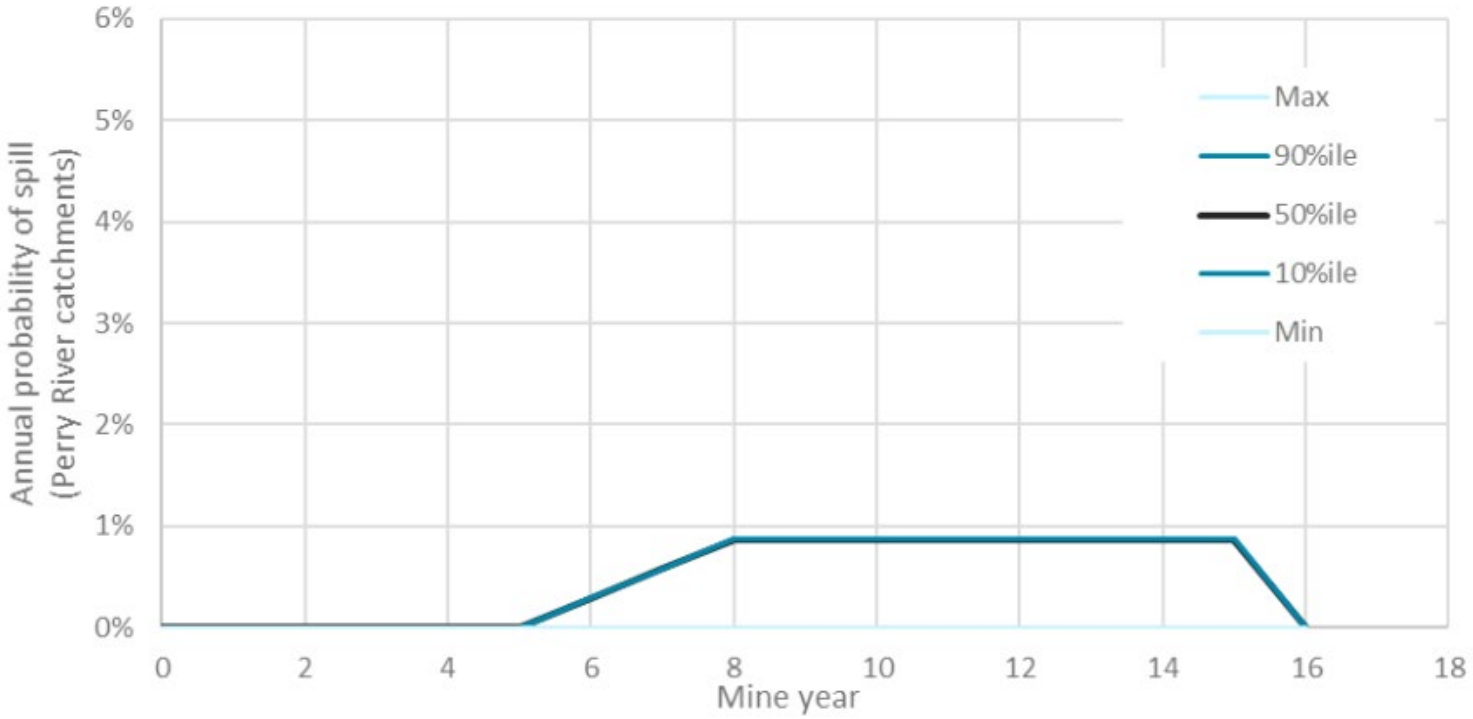
Probability of spill to the Perry River



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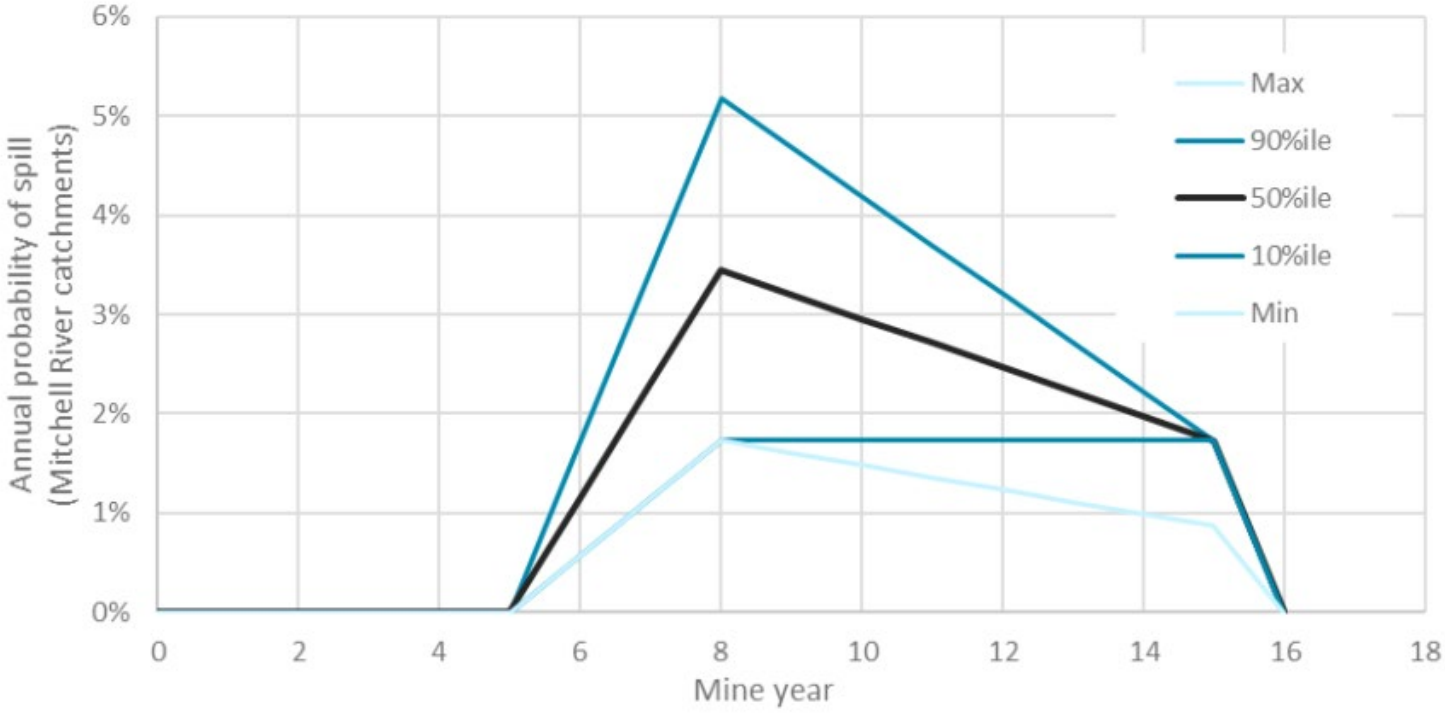
Probability of spill to the Mitchell River



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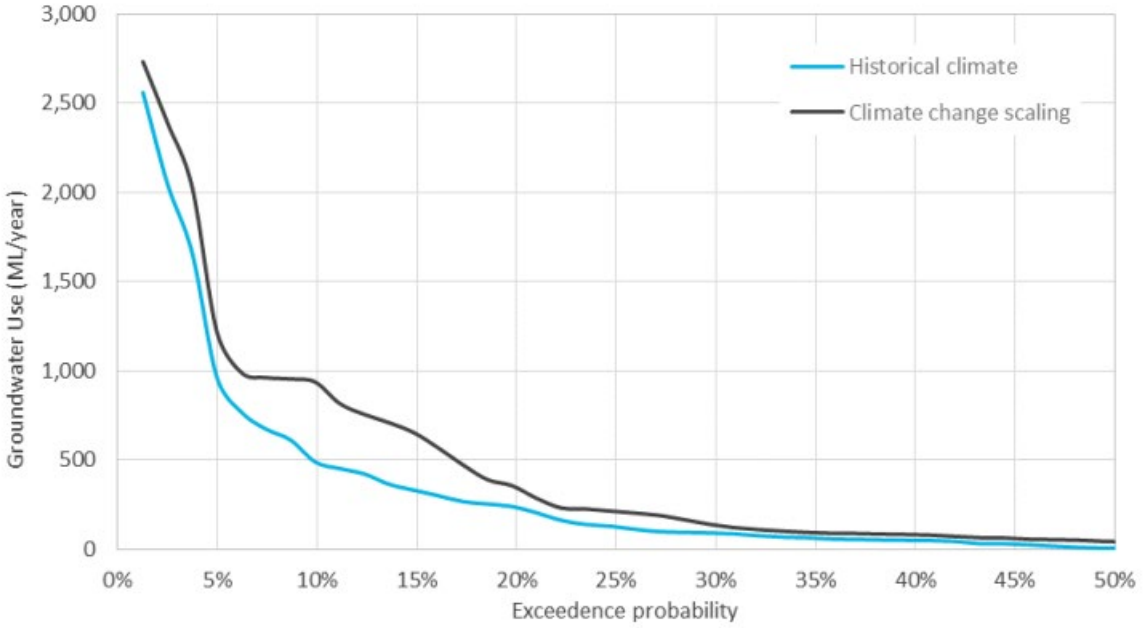
Climate change



	Existing conditions		Climate change scenario	
Climate Year	**Number of spillway discharge days per year**	**Average spillway discharge (ML/day)**	**Number of spillway discharge days per year**	**Average discharge spillway (ML/day)**
1978	13	13.7	12	14.5
2007	1	0.8	4	2.3

Conclave discussions

- Historical climate vs stochastic climate
- Evaluation of other climate change events other than the median

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Conclave discussions

- SW38: Surface water ponding on post-mining landforms will be avoided, where practicable, through appropriate slope profile design and topsoil treatments.

- SW39: The downhill side of containment structures, such as surface water drains and road batters, will undergo soil conditioning and be spread with topsoil and revegetated as soon as practicable to minimise erosion and sediment laden runoff.

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Prior to commencement of mining

- Update the model as new information becomes available, eg
  - Continue monitoring streamflow and site runoff
  - Revisit runoff calibration after winter rains
  - Include increased mine plan granularity
  - Include details of pipe and pump capacity as design engineering progresses
  - Include the results of any seepage rate investigations
  - Include the results of any centrifuge efficiency investigations
- Create a new model suitable for tracking and predicting day-to-day water movements during mine site operations

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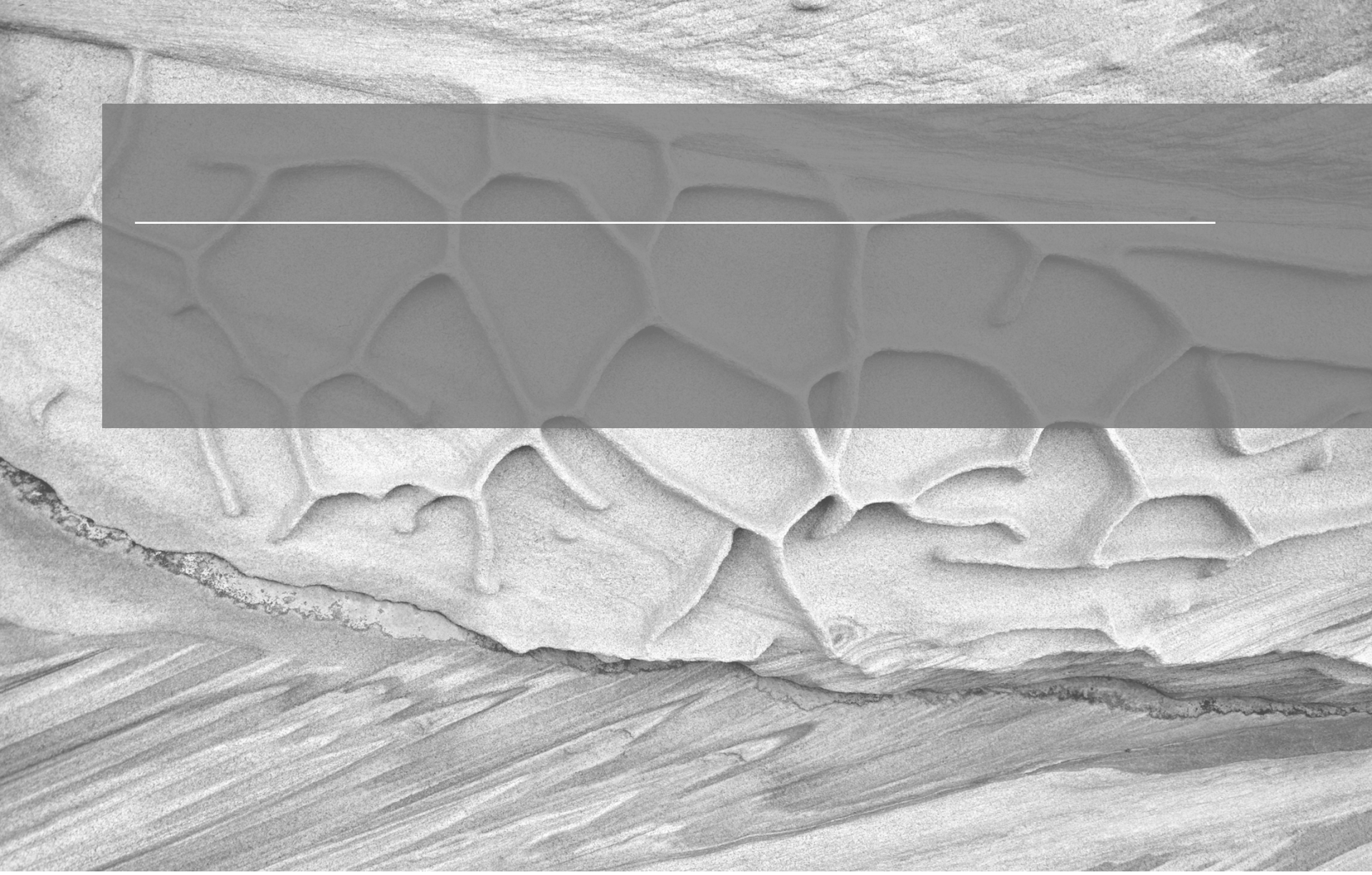

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