→ Heath Morgan
Technical Director – Environment

Inland Waters: conceptual models as the foundation

Welcome

Acknowledgement & respect

Overview

- Diversity of disciplines and guidance
- Interconnection and timing of studies
- Components of a conceptual model
- Timing and benefits

Inland Waters

Environmental objective:

*To maintain the **hydrological regimes** and **quality** of groundwater and surface water so that **environmental values** are protected.*

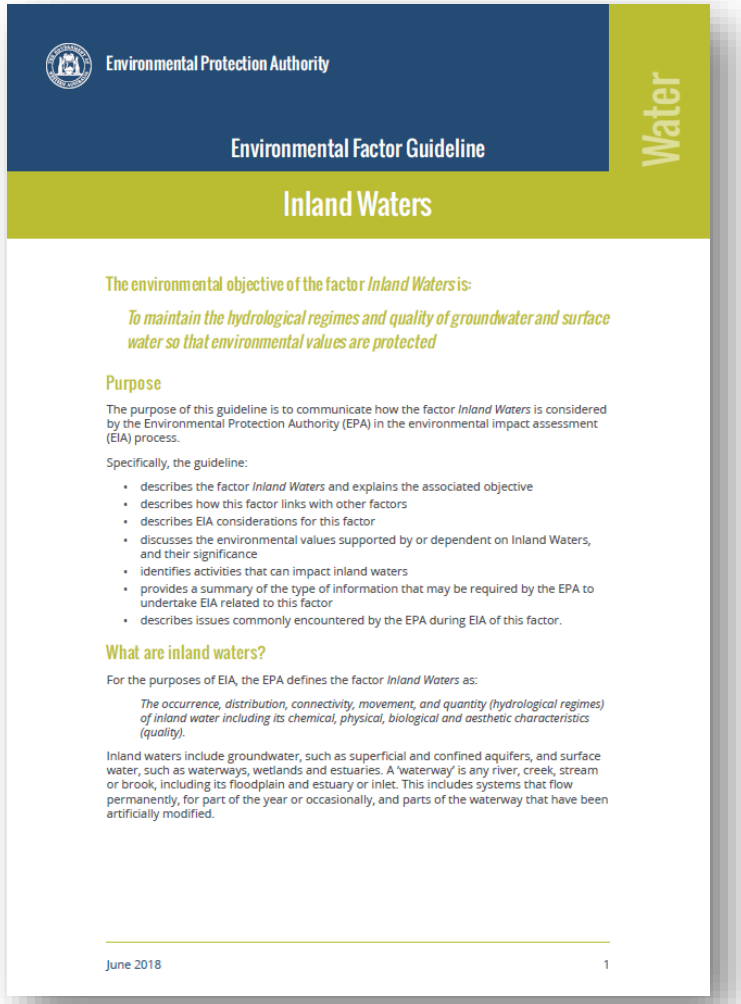
Inland waters definition:

The occurrence, distribution, connectivity, movement, and quantity (hydrological regimes) of inland water including its chemical, physical, biological and aesthetic characteristics (quality).

Technical disciplines

Component	Subcomponent	Expertise
Hydrological regimes	Surface water	Hydrology
	Groundwater	Hydrogeology
	Surface-groundwater interactions	Can be specialised / research
	Mixing and dispersion	Hydrodynamics
Water quality	Measurement	Can be specialised
	Water quality interactions	Hydrochemistry, geochemistry
	Erosion / sedimentation	Geomorphology, civil / environmental engineering
Environmental values	Environmental water requirements	Specialised / research
	Water / nutrient / salt balances	Hydrology, hydrogeology, civil / environmental engineering
	Ecological / human health risk assessment	Toxicology, can be specialised

The guidance



Environmental Protection Authority

Environmental Factor Guideline

Inland Waters

Water

The environmental objective of the factor *Inland Waters* is:

To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected

Purpose

The purpose of this guideline is to communicate how the factor *Inland Waters* is considered by the Environmental Protection Authority (EPA) in the environmental impact assessment (EIA) process.

Specifically, the guideline:

- describes the factor *Inland Waters* and explains the associated objective
- describes how this factor links with other factors
- describes EIA considerations for this factor
- discusses the environmental values supported by or dependent on Inland Waters, and their significance
- identifies activities that can impact inland waters
- provides a summary of the type of information that may be required by the EPA to undertake EIA related to this factor
- describes issues commonly encountered by the EPA during EIA of this factor.

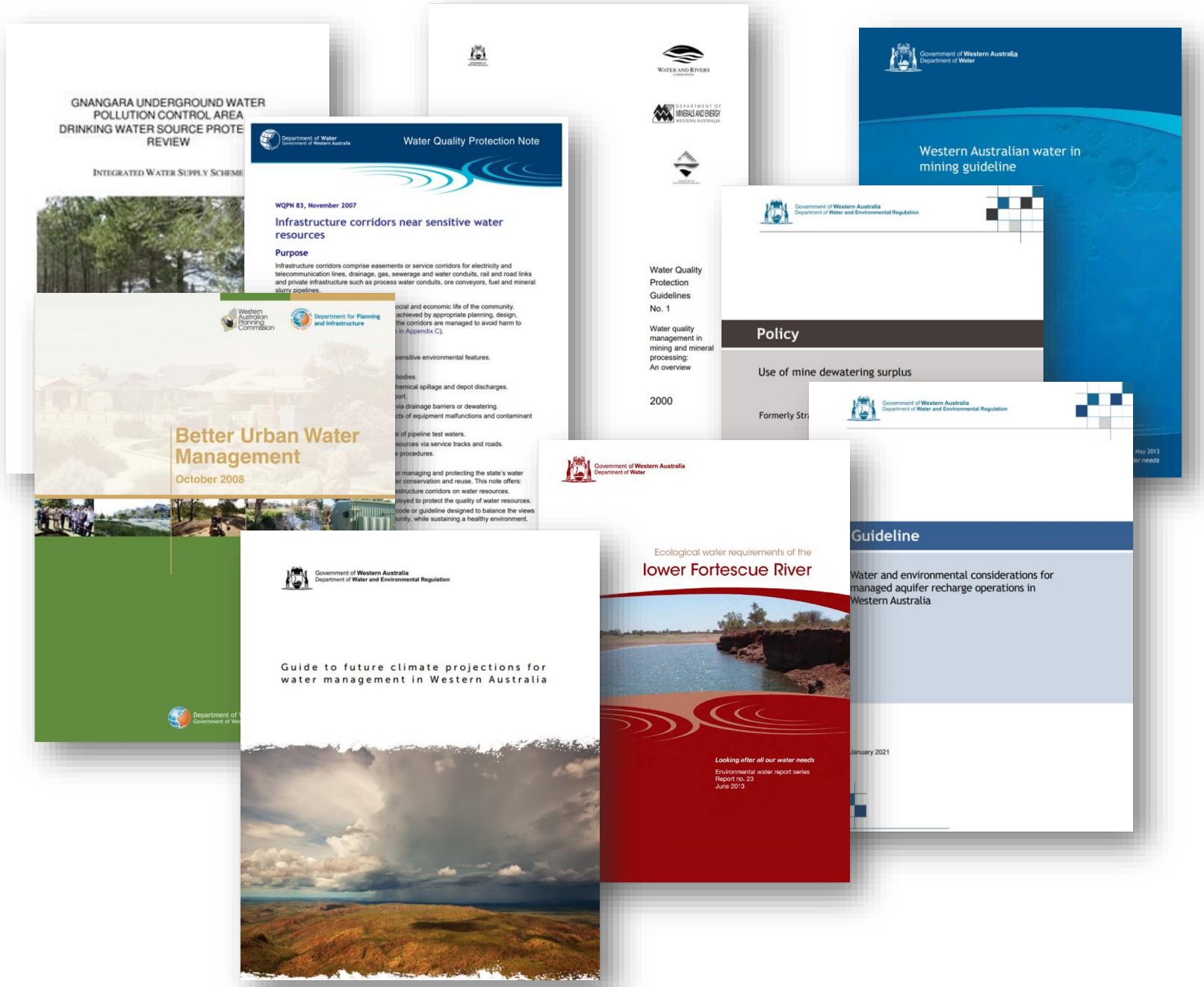
What are inland waters?

For the purposes of EIA, the EPA defines the factor *Inland Waters* as:

> *The occurrence, distribution, connectivity, movement, and quantity (hydrological regimes) of inland water including its chemical, physical, biological and aesthetic characteristics (quality).*

Inland waters include groundwater, such as superficial and confined aquifers, and surface water, such as waterways, wetlands and estuaries. A 'waterway' is any river, creek, stream or brook, including its floodplain and estuary or inlet. This includes systems that flow permanently, for part of the year or occasionally, and parts of the waterway that have been artificially modified.

June 2018 1



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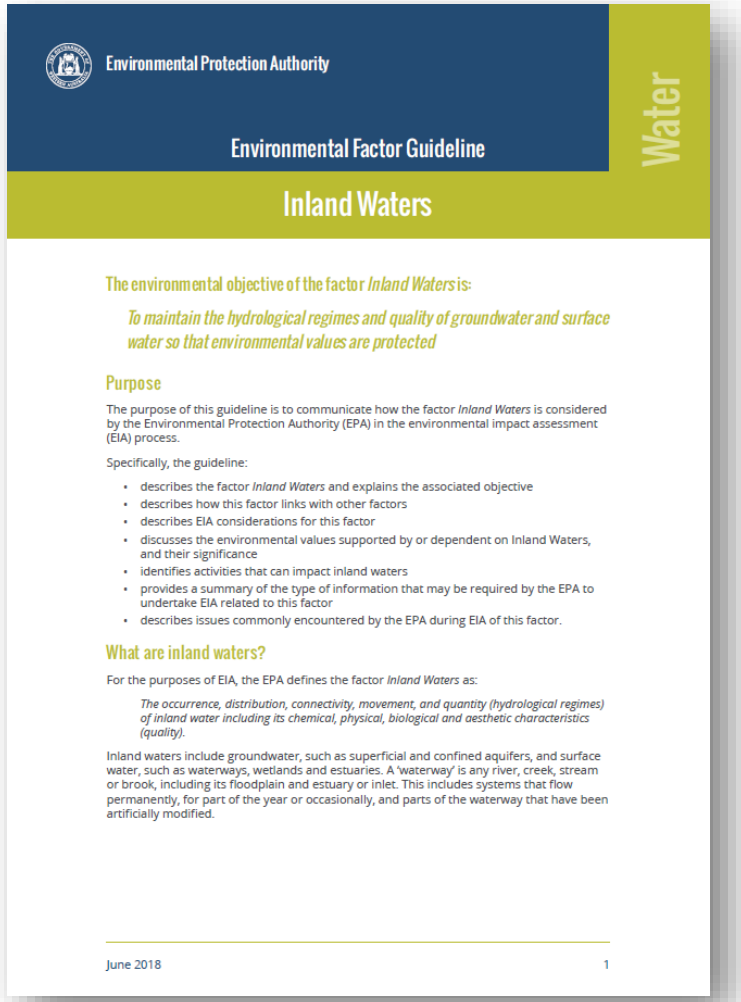

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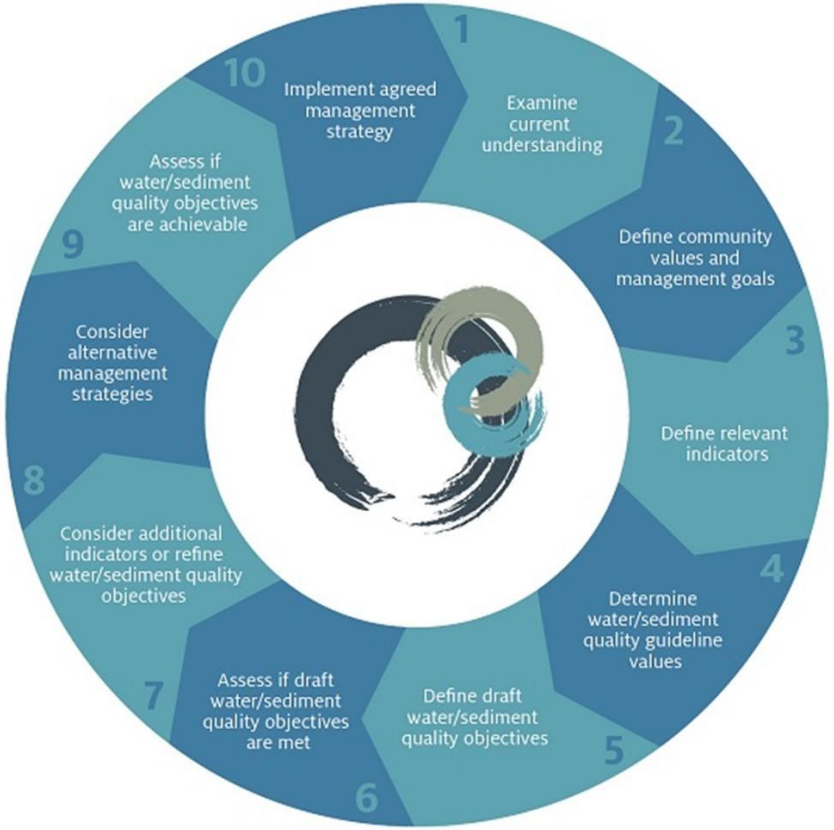
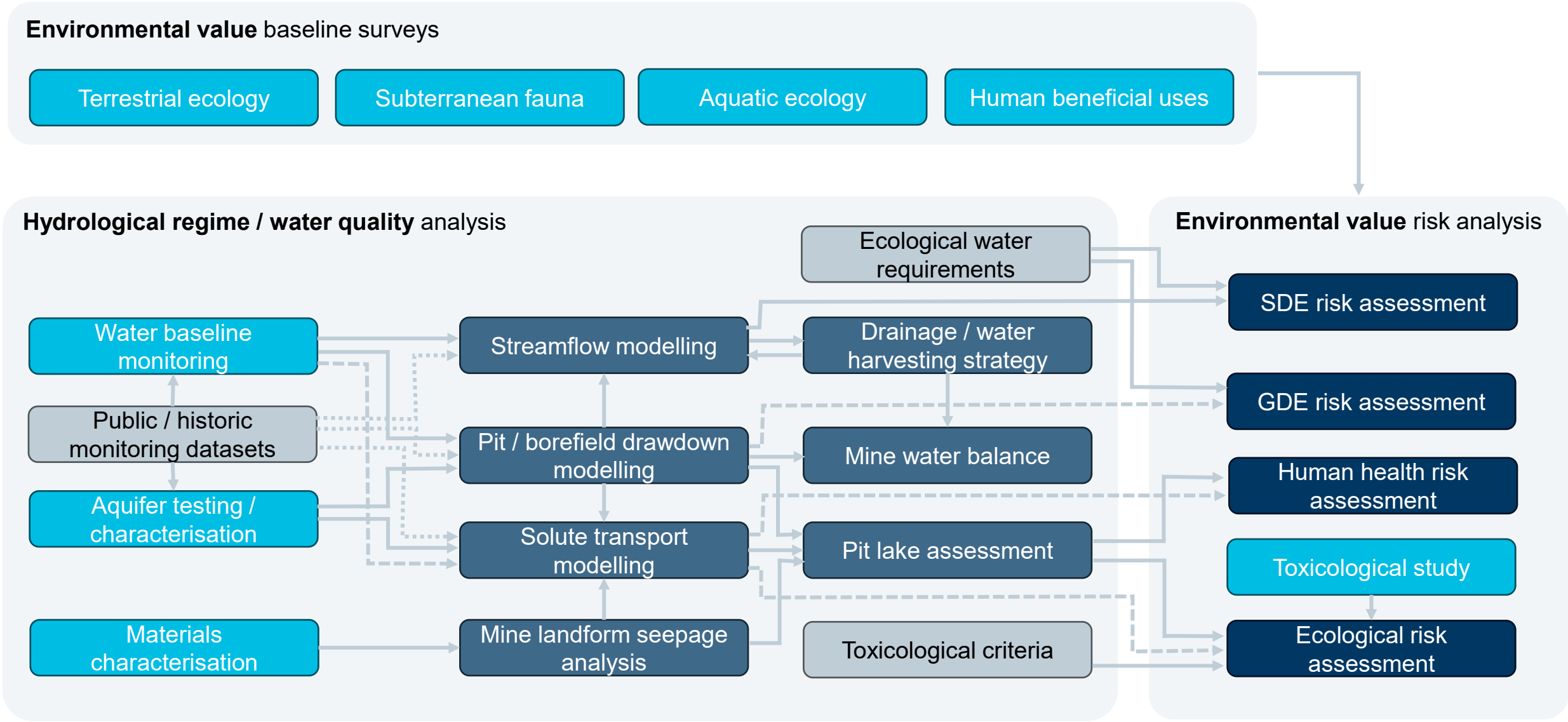


Disciplines and guidance are diverse and variable

→ **Study teams require coordination and guidance for EIA outcomes**

Diverse, interconnected studies



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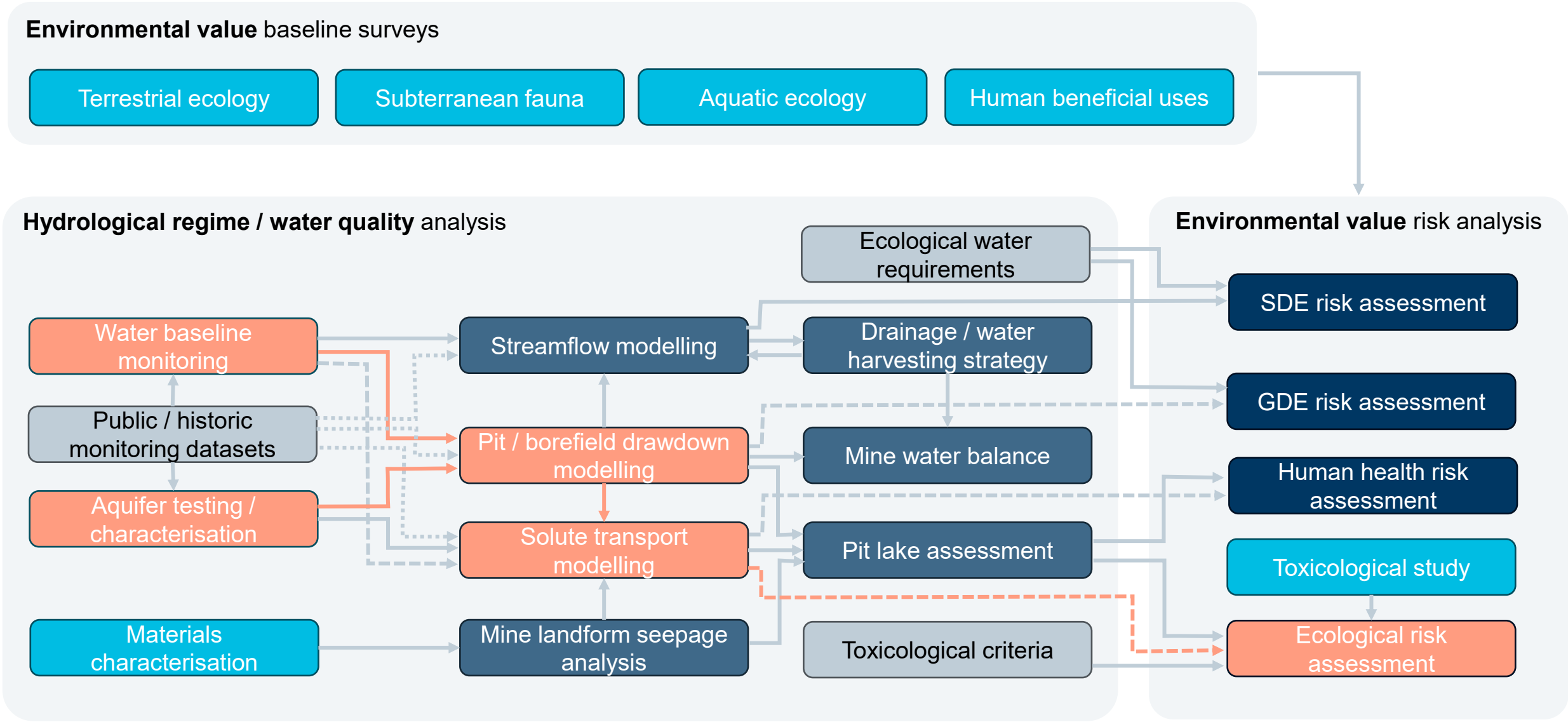

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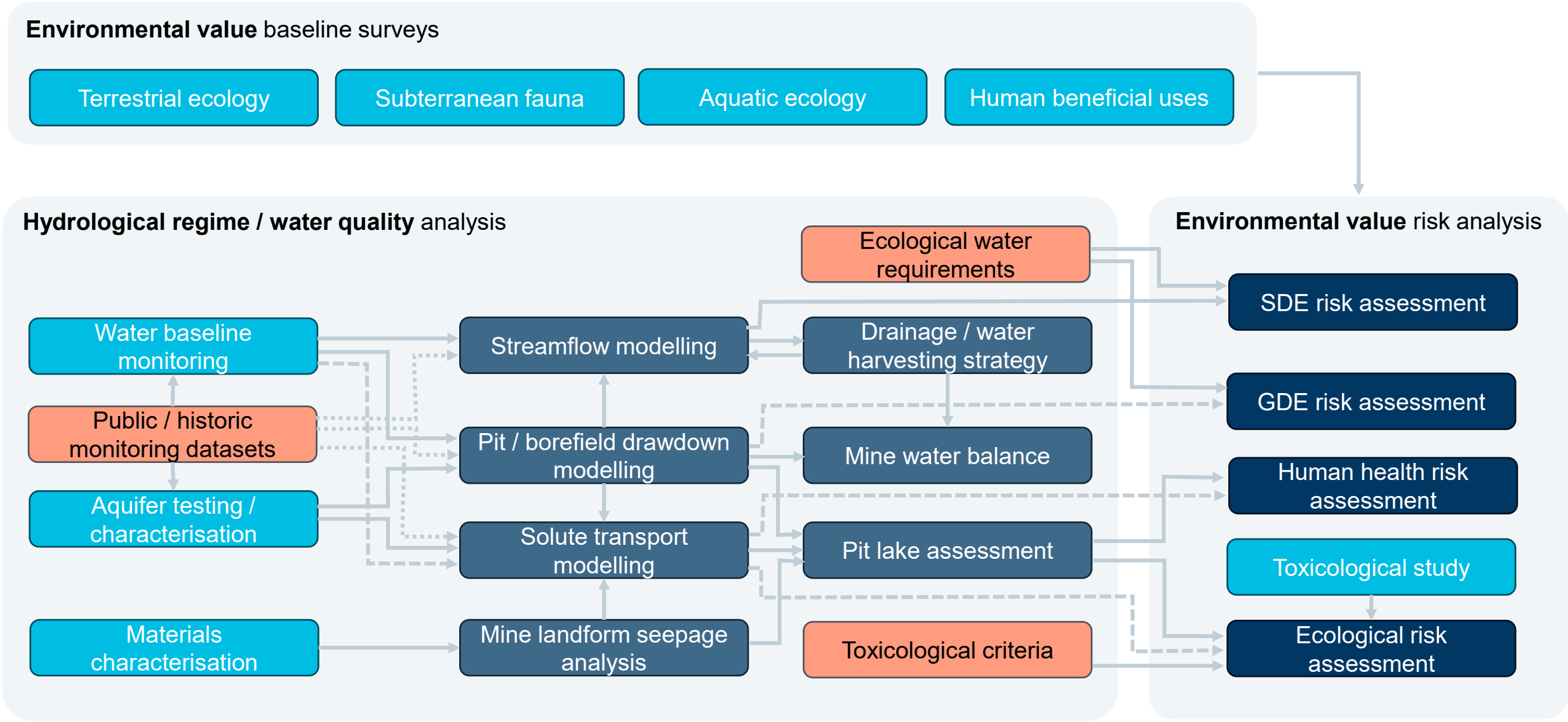

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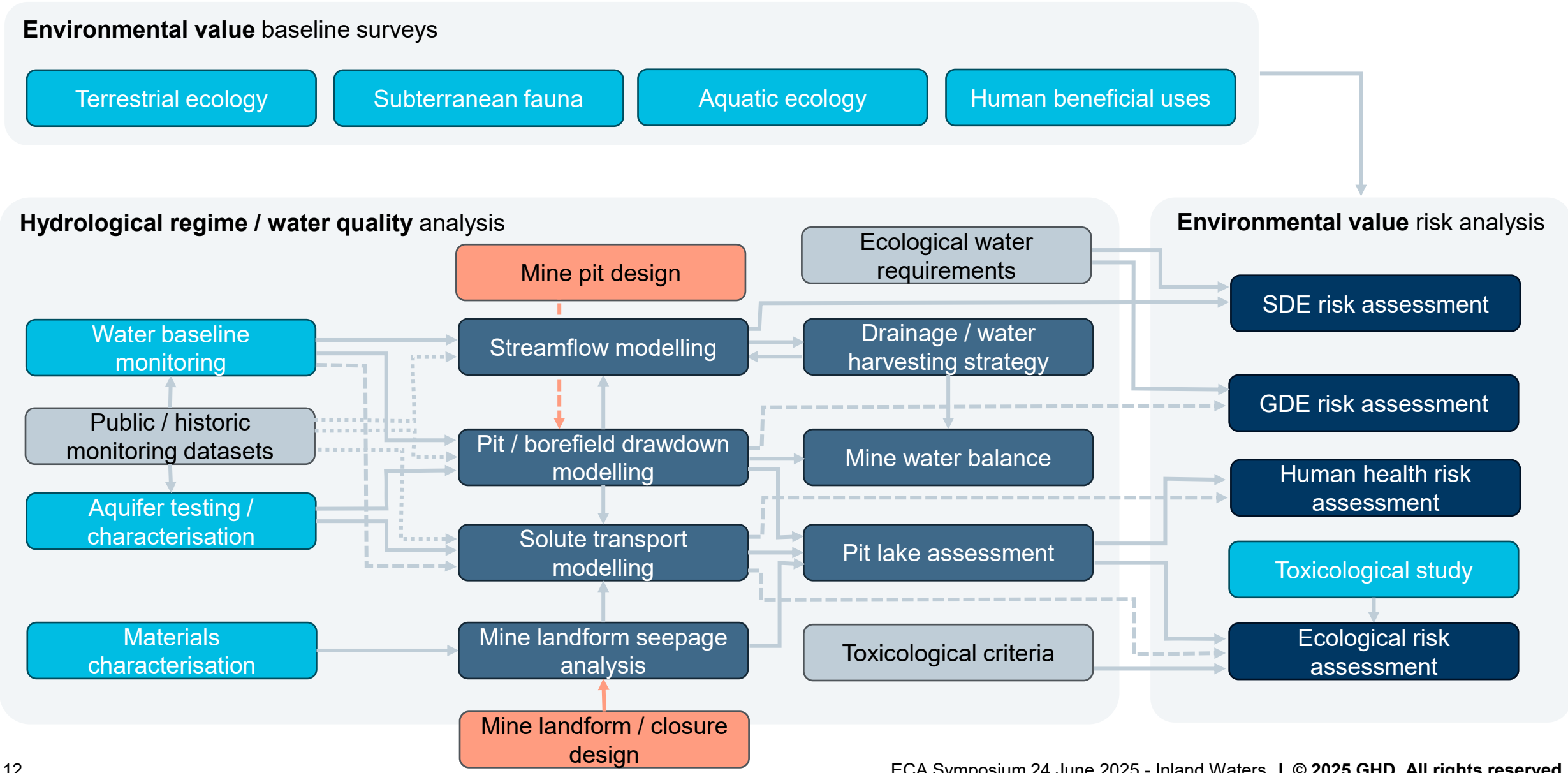
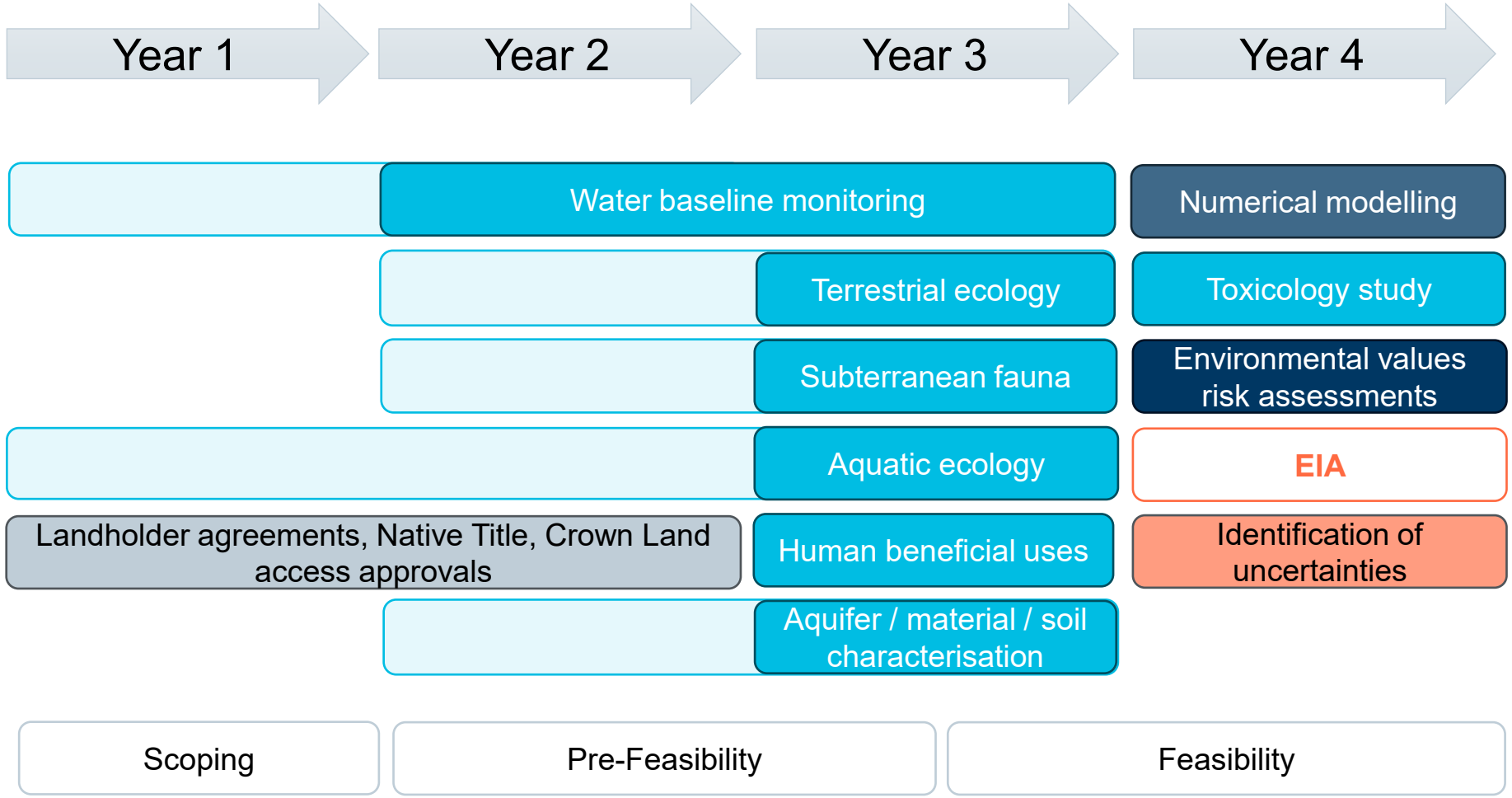


Study timeframes

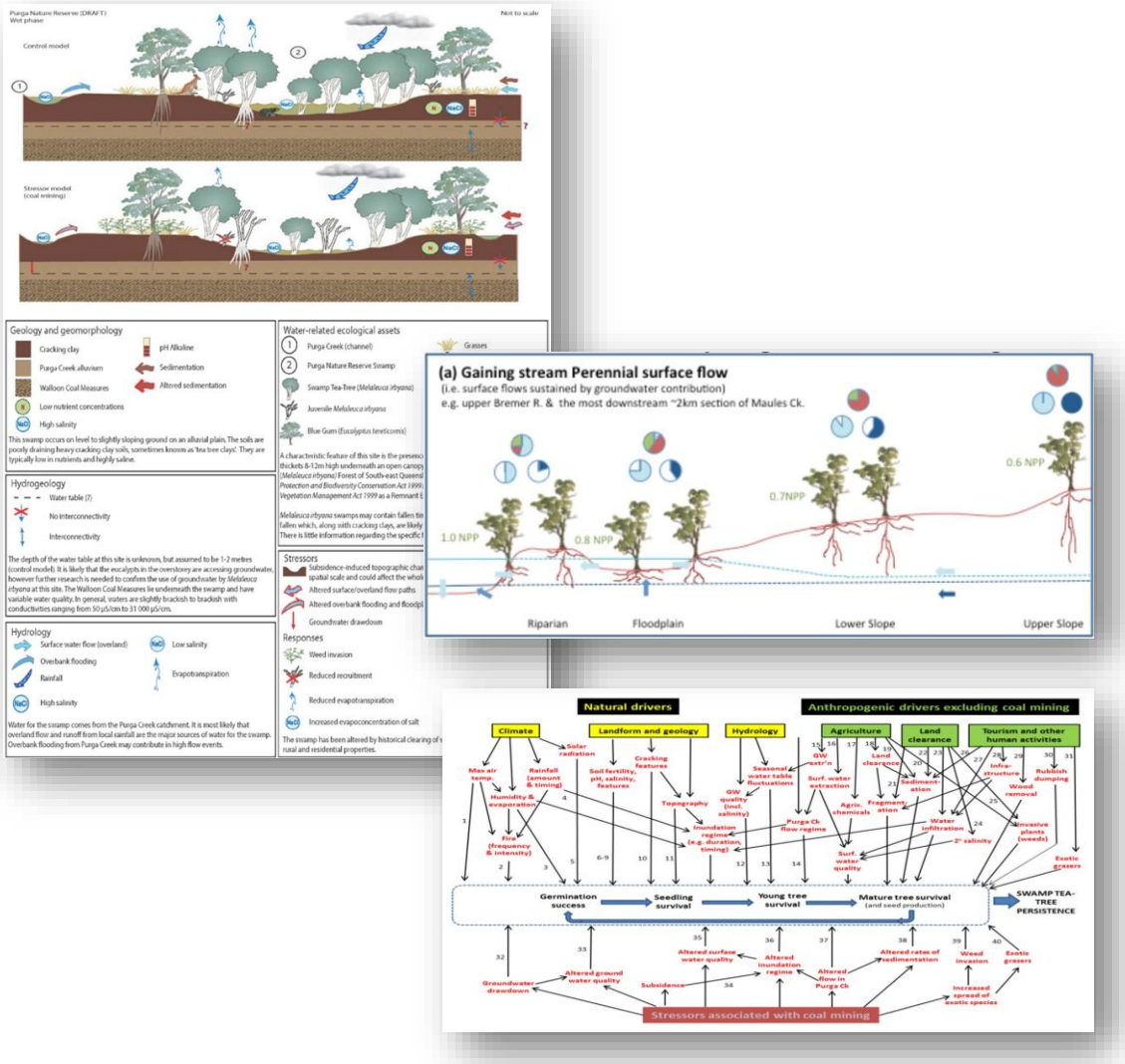


Studies can be interconnected and long-lead

→ **Basis of studies and uncertainties requires early identification**

Conceptual model components

- Diagrammatic and tabular
- Stressor model relevant for EIA
- Can be built on existing system models
- Refined and expanded over time
- Adjusted for audience



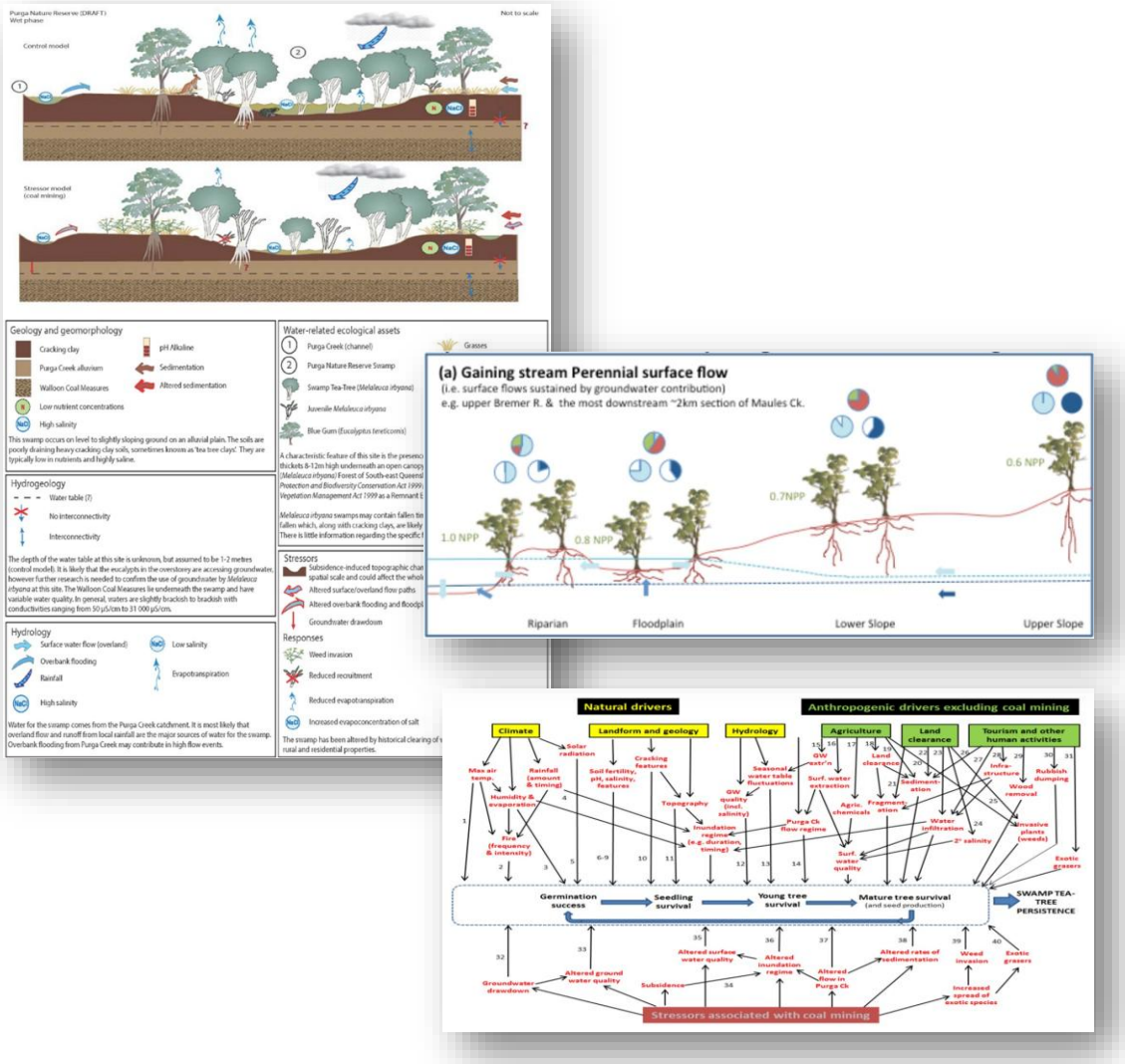
Conceptual model components

Identify:

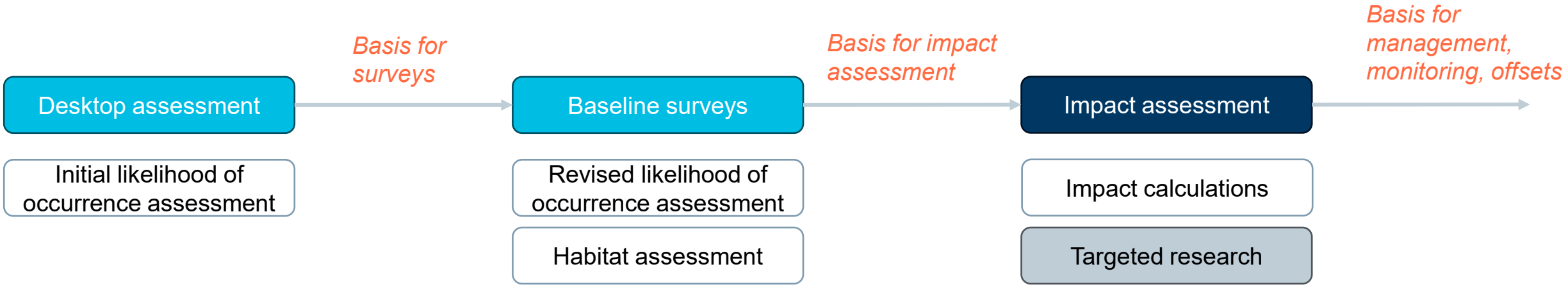
- Key hydrological regimes & quality characteristics
- Key environmental values & associated stakeholders
- Project impact pathways
- Existing and future stressors
- Available datasets

Key outputs:

- Basis for studies – baseline, modelling, research
- Key linkages and dependencies – critical path
- Key uncertainties – strategies to address
- Basis for stakeholder engagement



Timing of conceptual models



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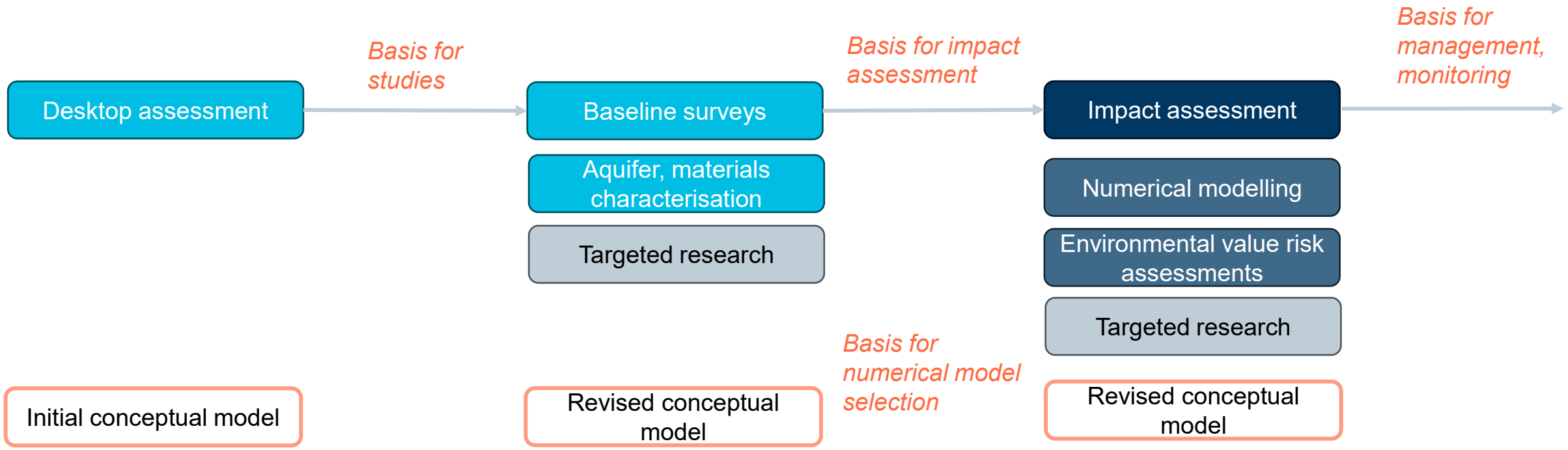

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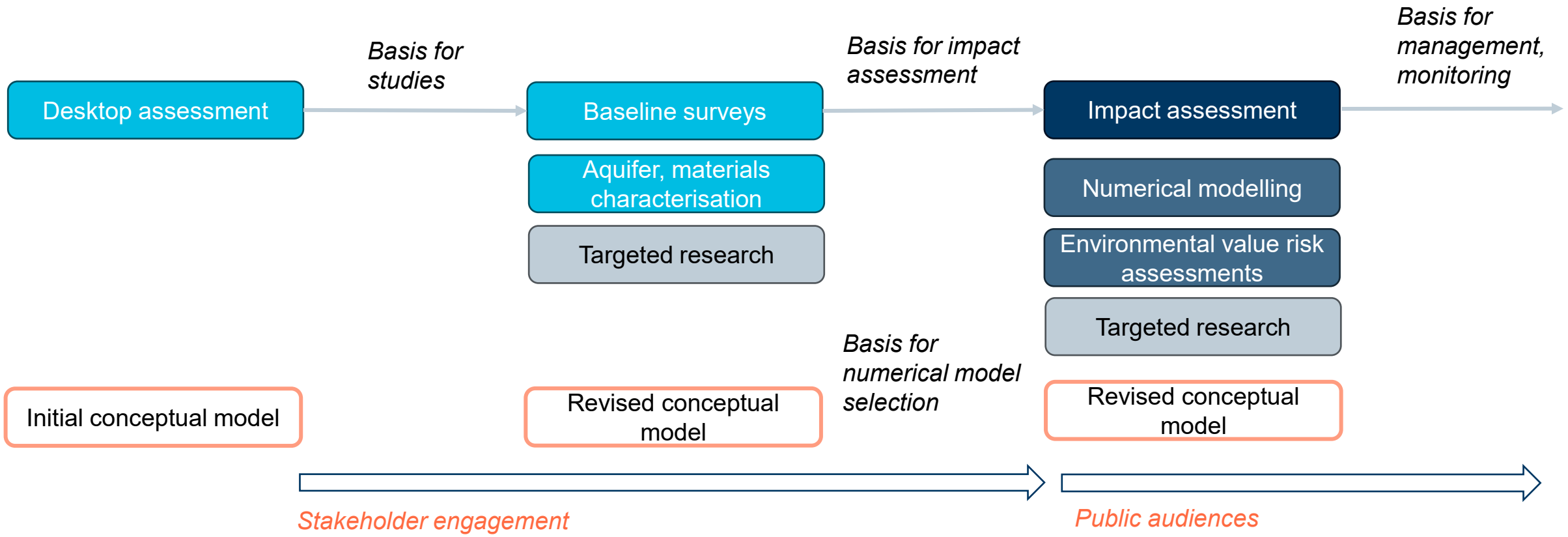

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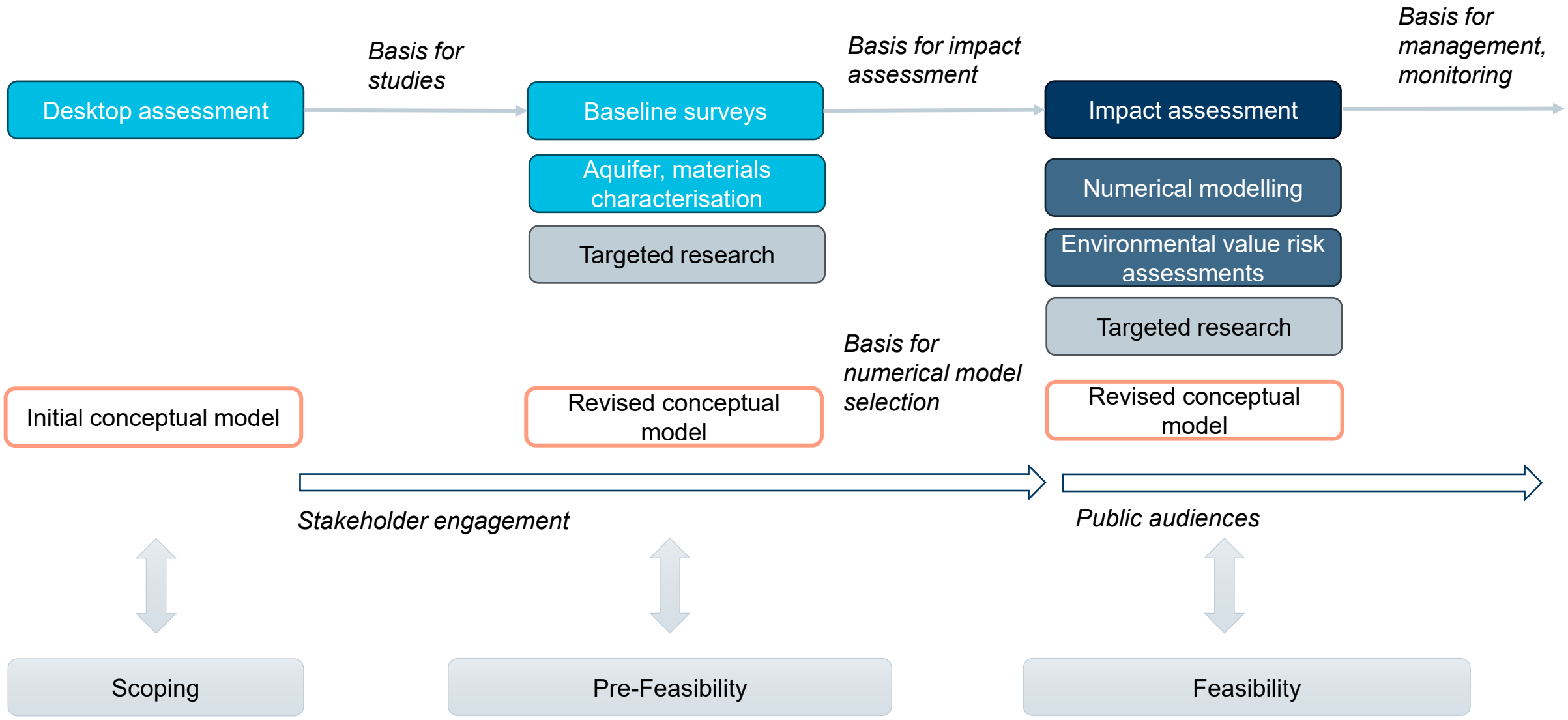

Recap and benefits

- Disciplines and guidance are diverse and variable
- Studies can be inter-connected and long lead

Recap and benefits

– Conceptual models can:
  - guide study team, project team, stakeholders, public review

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- Conceptual models can:
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  - be refined over time

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  - inform an argument outline

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- Conceptual models can:
  - guide study team, project team, stakeholders, public review
  - be refined over time
  - inform an argument outline
  - support digital EIA

Recap and benefits

- A conceptual model is the foundation for the EIA of Inland Waters
- **Start early!**

Thank you

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