KEEPING THE BALANCE

Feature-based water balance in the planning process

Introduction and Overview

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Environment Canada Environnement Canada

Toronto and Region Conservation Authority

Acknowledgements

Land acknowledgement

Funding acknowledgement

Overview of day

9:30 - 10:15 – Introduction and overview

10:15 - 10:25 – Morning break

10:25 - 11:10 – Session 1: How do I know if I have to do a FBWB? Why, and when, do I need to monitor?

11:10 - 12:00 – Session 2: How is a FBWB scoped? [Breakout exercise]

12:00 - 1:00 – Lunch

1:00 - 1:45 – Session 3: How does modeling inform development design?

1:45 - 2:30 – Conclusion: post-development

Workshop overall objectives

Provide overview of:

- What feature-based water balance (FBWB) is and why it's important
- How FBWB is identified as a potentially required study
- Guidance available to provide decision support for scoping FBWB studies and completing technical components
- How FBWB studies help municipalities to satisfy provincial planning policy objectives for wetlands and provide other co-benefits

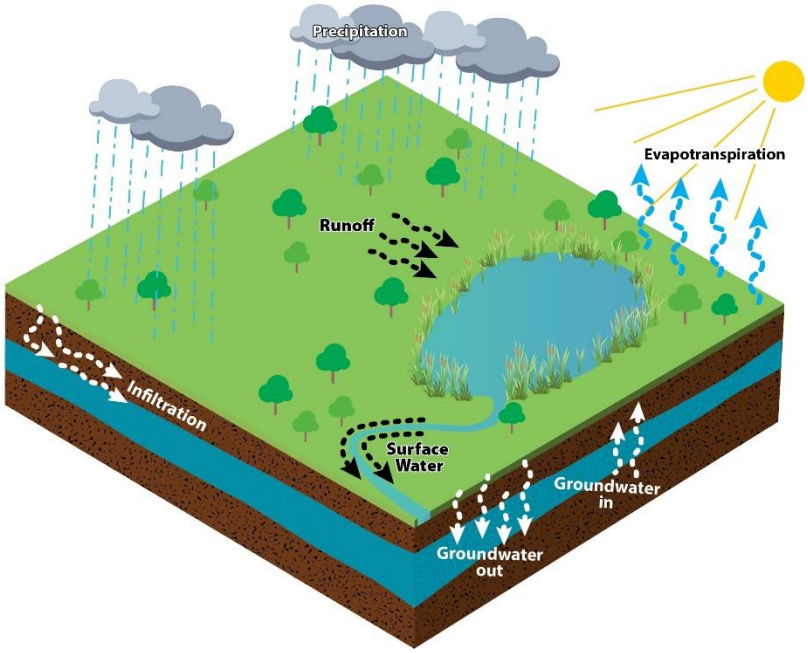
Level of detail

- Broad audience:
  - Municipal staff
  - Conservation authority staff
  - Development planning, engineering, natural heritage…
  - Requires multi-disciplinary collaboration!
- Focus on planning and policy context, overview of technical elements but not the focus
- TRCA staff can answer more technical questions between sessions
- Discussion welcome!

What is feature-based water balance?

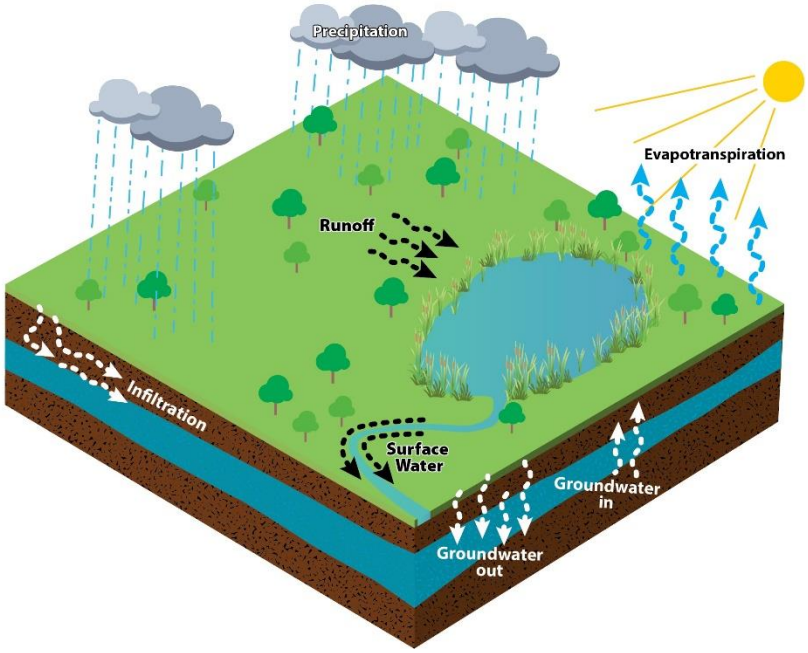
- Quantity and timing of water flowing into/out of a given area (e.g. lake, watershed, wetland) referred to as its *water balance*

$$\frac{\text{(Precip. + Runoff + GW-in)} - \text{(ET + SW-out + GW-out)}}{\text{Change in Storage}}$$



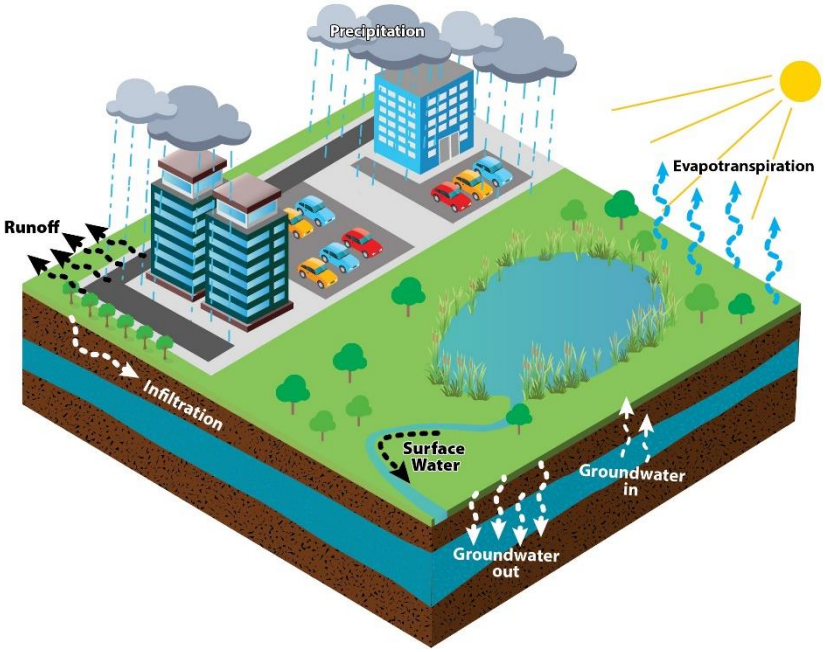
What is feature-based water balance?

- Certain types of natural features (e.g. wetlands) may be significantly impacted by urban development / land use change even where no development activities occur within the feature itself



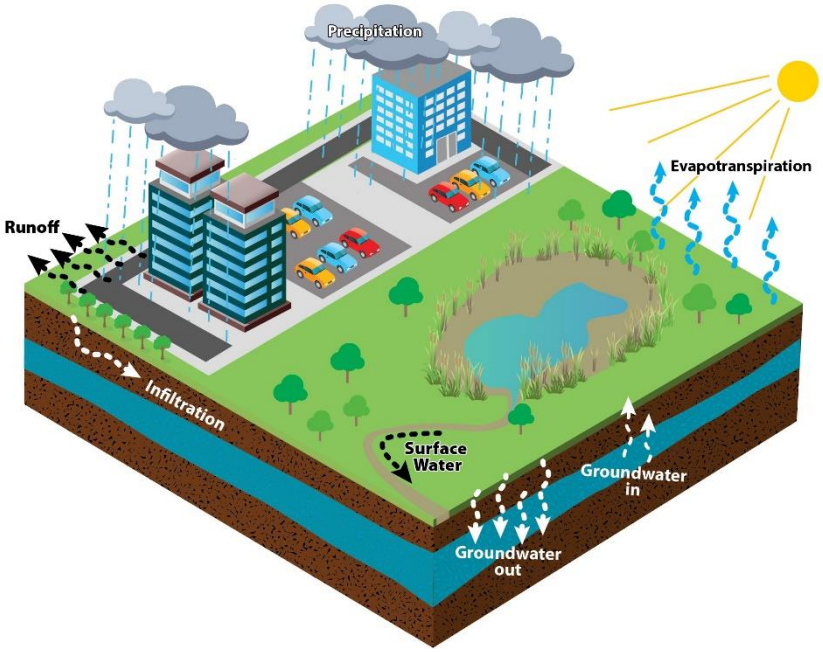
What is feature-based water balance?

- Changes to land surface draining to feature (*catchment*) due to addition of impervious surfaces or changes to catchment grade may alter the *water balance* of a feature



What is feature-based water balance?

- Altering the *water balance* creates risk of degradation if conditions become too wet/dry at wrong time, resulting in:
  - loss of species or ecological functions
  - potential for hazardous site conditions (tree die-back, nuisance flooding of adjacent areas)



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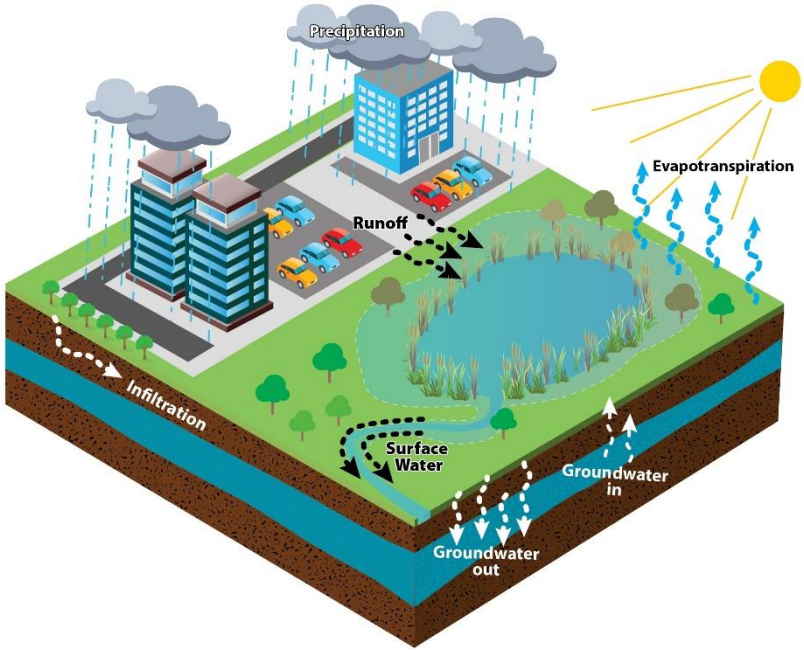


What is feature-based water balance?

- What happens when feature-based water balance is not given due consideration?

Summer 2013

May 2019

What is feature-based water balance?

- What happens when feature-based water balance is not given due consideration?

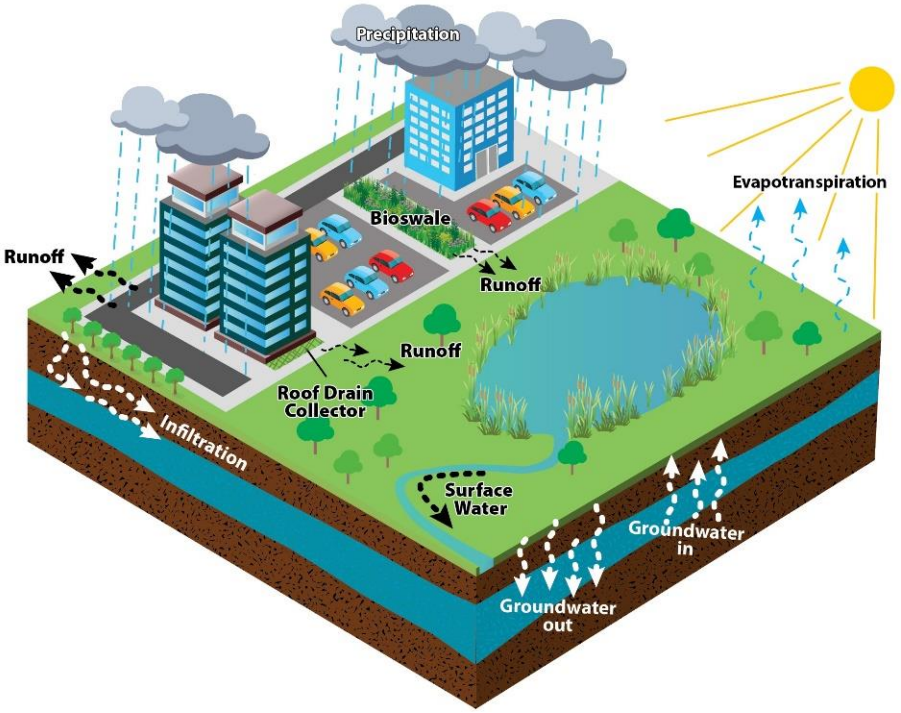
May 2019

What is feature-based water balance?

- What happens when feature-based water balance is not given due consideration?

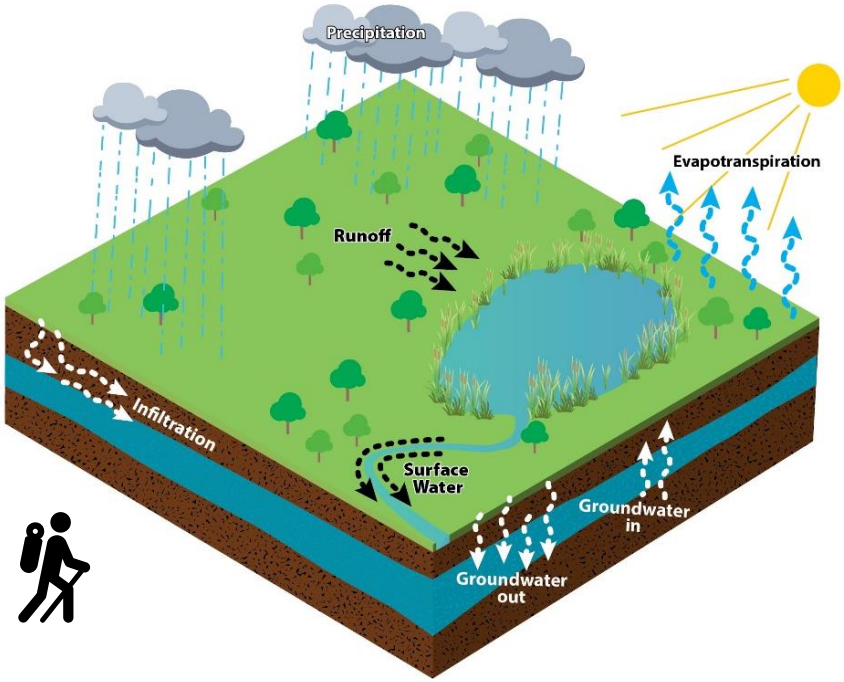
What is feature-based water balance?

- Consideration of FBWB in development design:
  - Reduces the risk of these types of negative impacts
  - Helps fulfil the wetland conservation objectives outlined in the Provincial Policy Statement, other provincial legislation, municipal Official Plans and TRCA's Living City Policies



What is feature-based water balance?

- If implemented well, FBWB helps maintain not only ecological functions but also landscape-level services:
  - Groundwater recharge
  - Stream baseflows
  - Flood attenuation
  - Water quality attenuation
  - Heat island mitigation
  - Aesthetic enjoyment of greenspace



Provincial policy context

Provincial Policy Statement (2014)

- 2.1.4 *Development* and *site alteration* shall not be permitted in… *significant wetlands* …unless it has been demonstrated that there will be no *negative impacts* on the natural features or their *ecological functions*
- Planning Act applications are subject to the provisions of the Provincial Policy Statement which requires, among other things, that no negative impact to significant wetlands and other significant natural heritage features be demonstrated through development or site alteration applications.

Provincial policy context

Provincial Policy Statement (2014)

- 2.2.2 *Development* and *site alteration* shall be restricted in or near *sensitive surface water features* and *sensitive ground water features* such that these features and their related hydrologic functions will be protected, improved or restored.
- Mitigative measures and/or alternative development approaches may be required in order to protect, improve or restore *sensitive surface water features*, *sensitive ground water features*, and their hydrologic functions.

Provincial policy context

Oak Ridges Moraine Conservation Plan (2017)

- Wetlands considered both *key natural heritage feature* and *key hydrologic feature*

Greenbelt Plan (2017)

Niagara Escarpment Plan (2017)

A Wetland Conservation Strategy for Ontario: 2017-2030 (2017)

Stormwater management context

TRCA Stormwater Management Criteria (2012) Objectives:

- Water quantity (flooding)
- Water quality
- Erosion
- Water balance

Site water balance (first 5 mm runoff)

Groundwater recharge

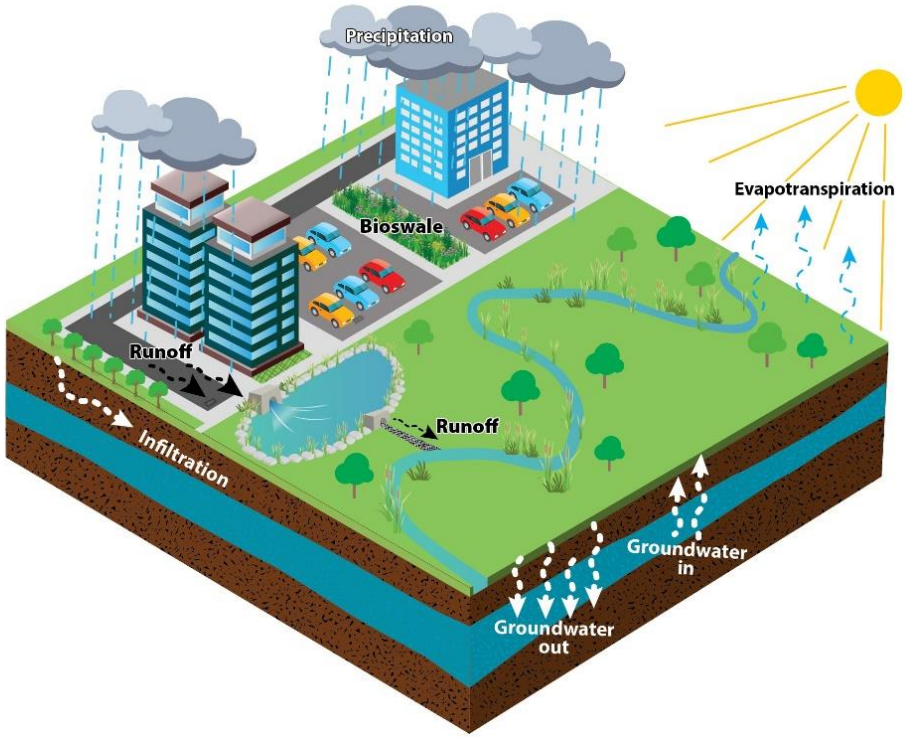
Protection of natural features
(i.e. Feature-based water balance)

Stormwater Management Criteria

Site Water Balance

- Objective: retain first 5 mm of runoff onsite – hydromodification
- Reduces impacts to erosion within a receiving watercourse, provides minor flood risk reduction benefits, improves water quality, and reduces related impacts to natural features.
- Note that:

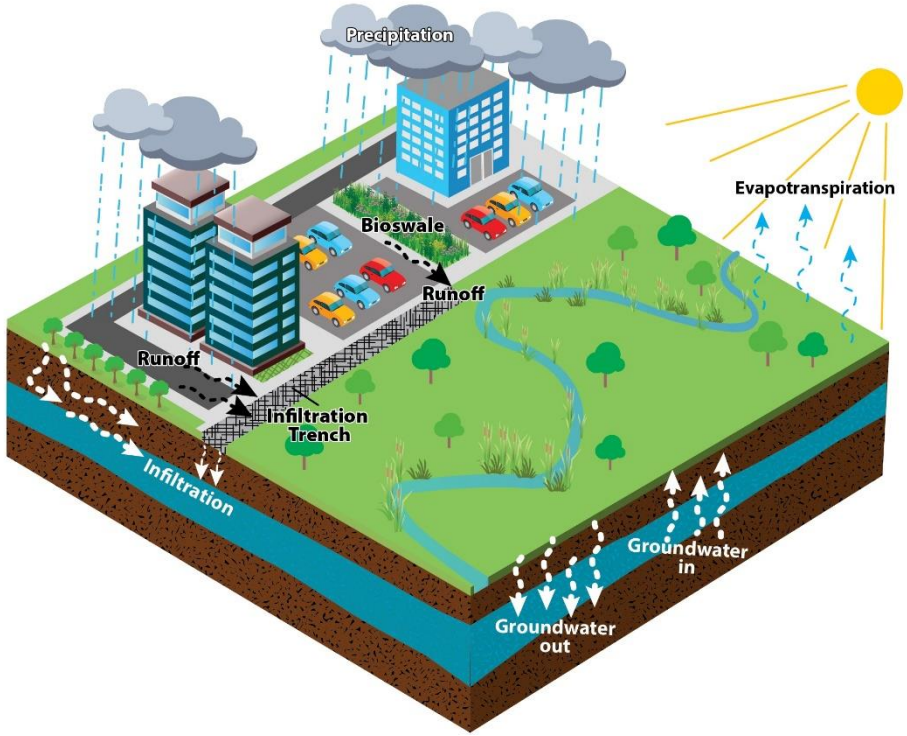
5 mm runoff ≠ 5 mm rainfall



Stormwater Management Criteria

Groundwater Recharge

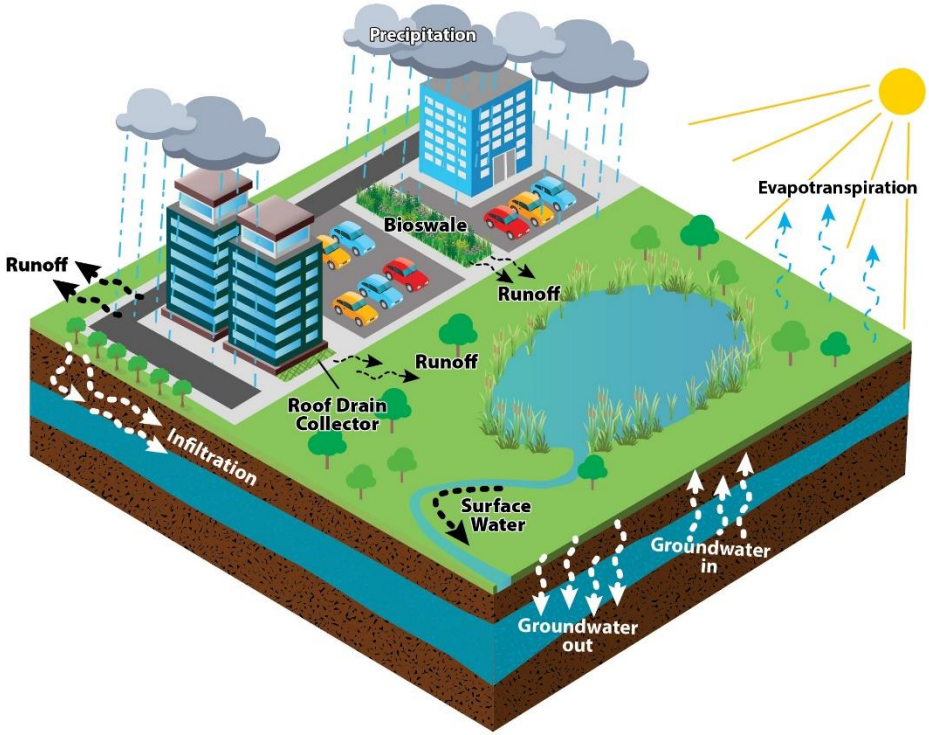
- Objective: maintaining annual recharge volumes in areas mapped as *significant groundwater recharge areas*
- Reduces impacts to regional groundwater resources supporting communities and ecosystems
- May be additional requirements for municipal drinking water in Source Water Protection plans



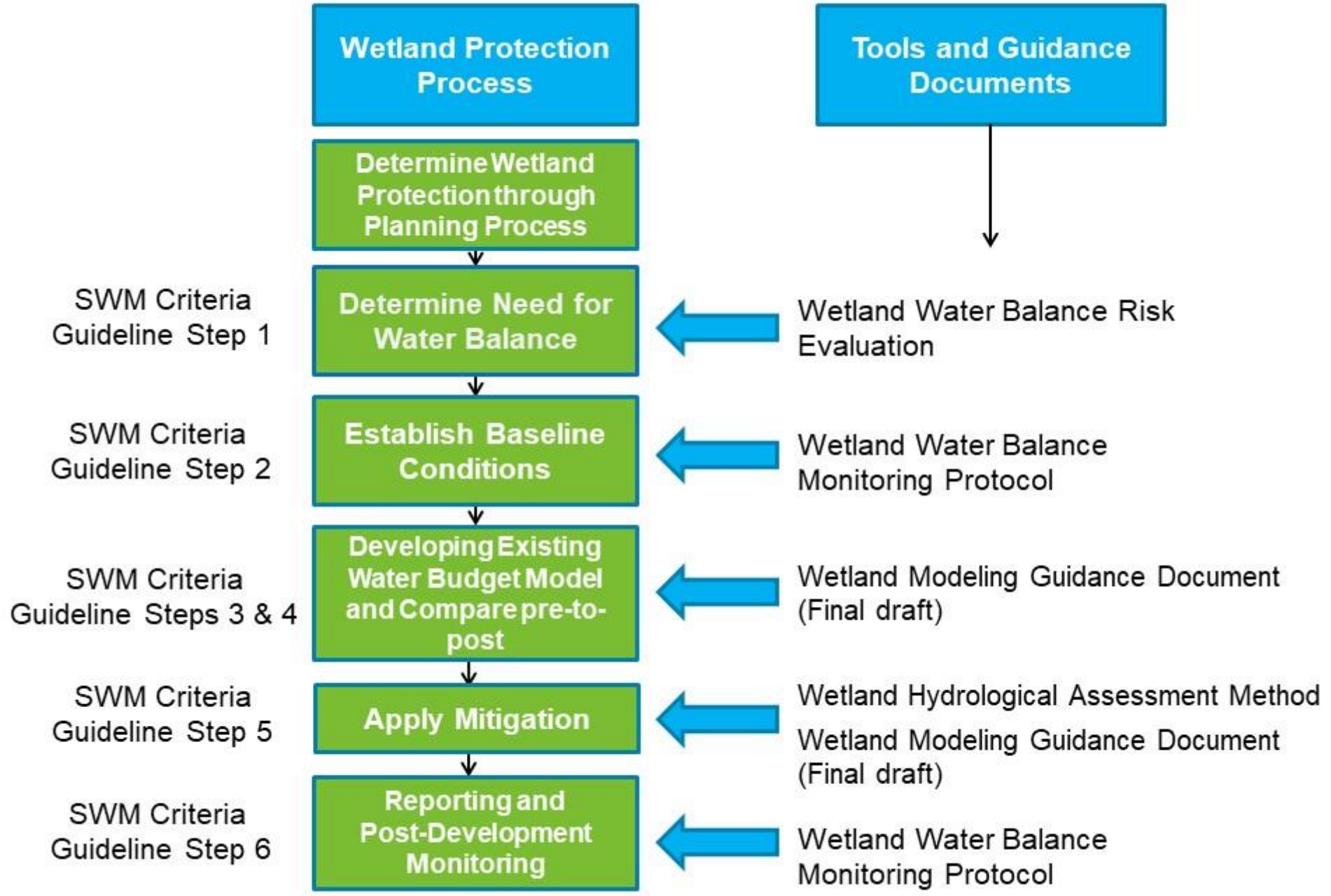
Stormwater Management Criteria

Feature-based Water Balance

- Objective: ensure that anticipated post-development changes to the *water balance* of a feature do not exceed its capacity to adapt
- Allows for feature to continue serving ecological + hydrological functions without moving towards degraded system; minimizes need for management/ intervention



FBWB – Overview of process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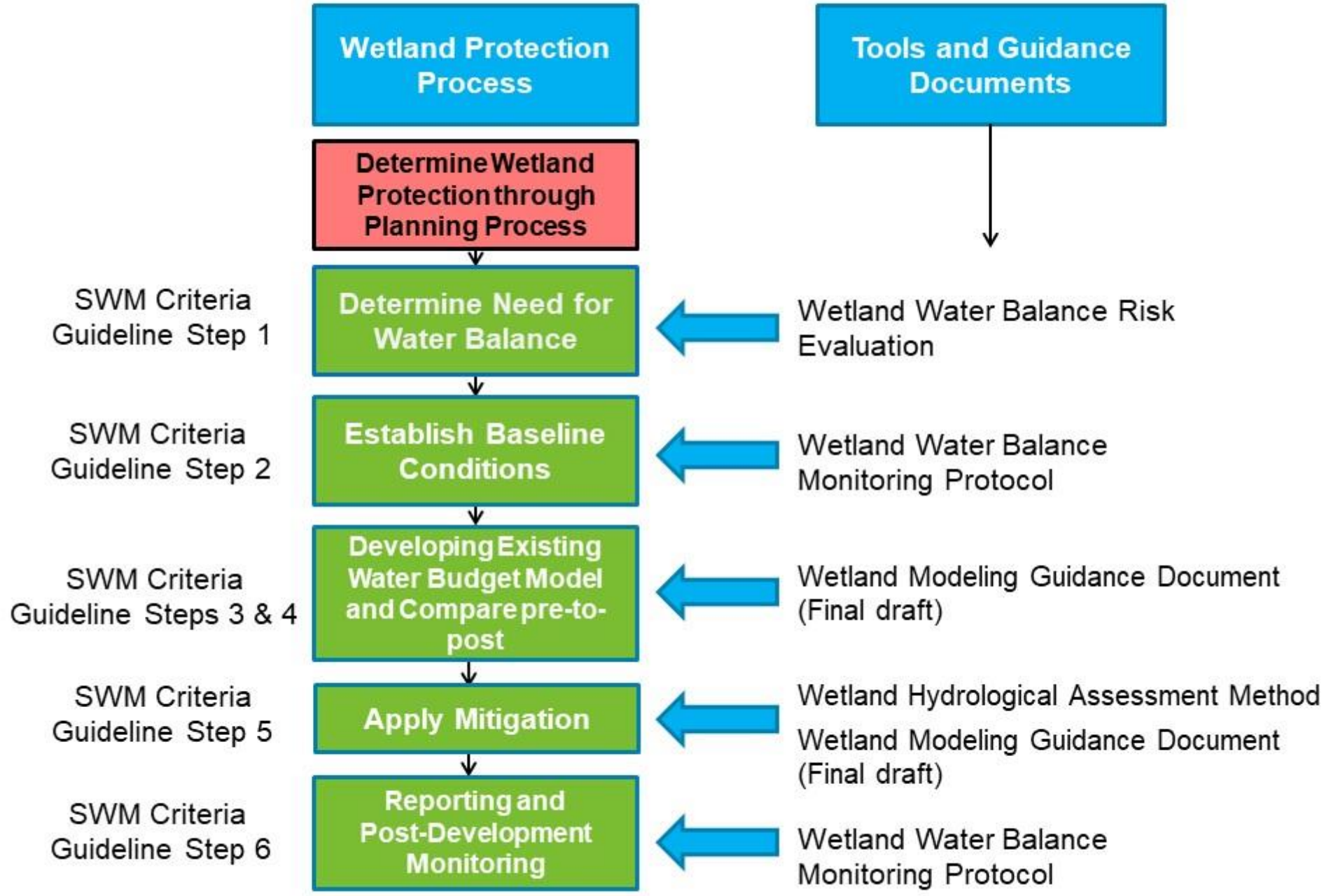
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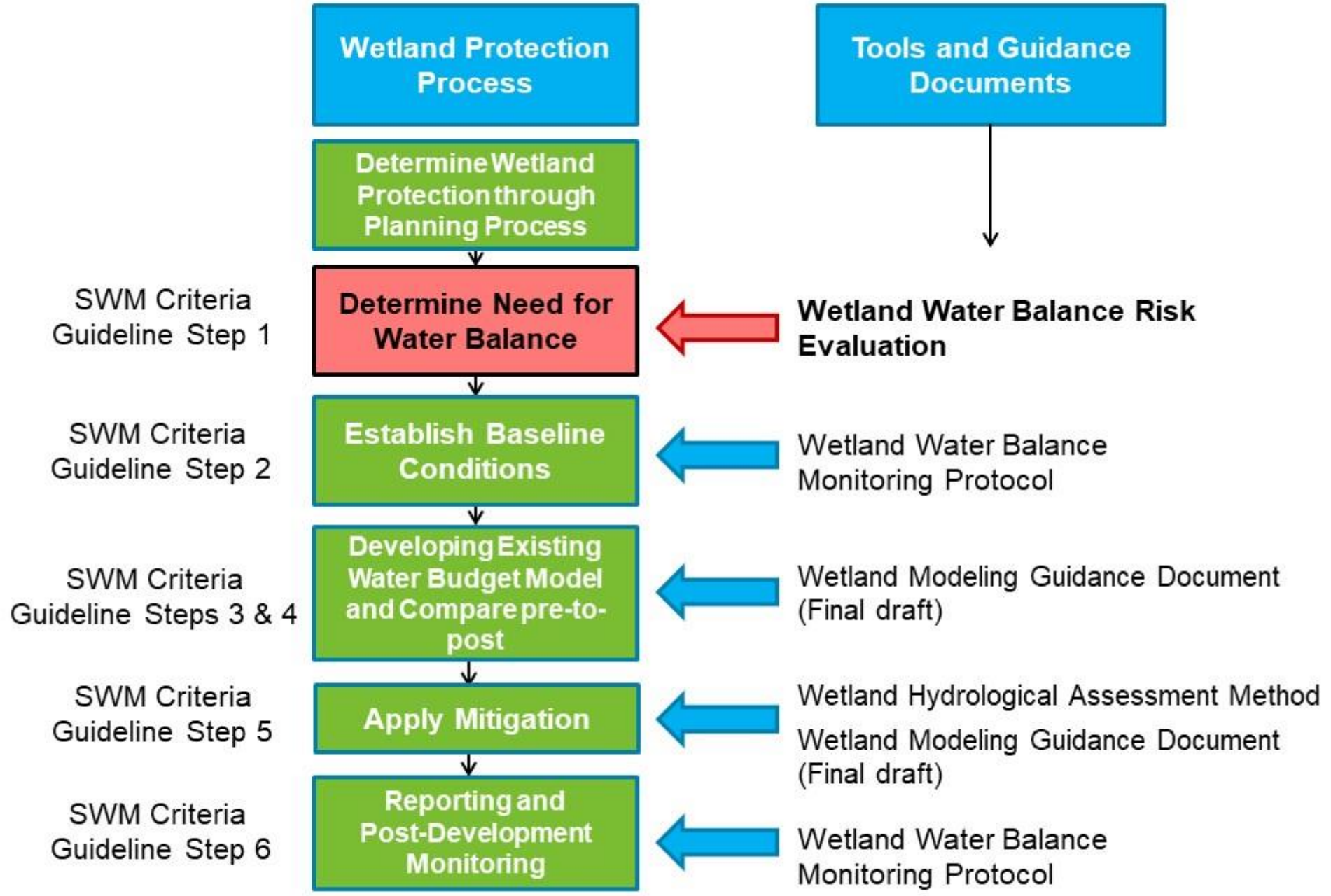
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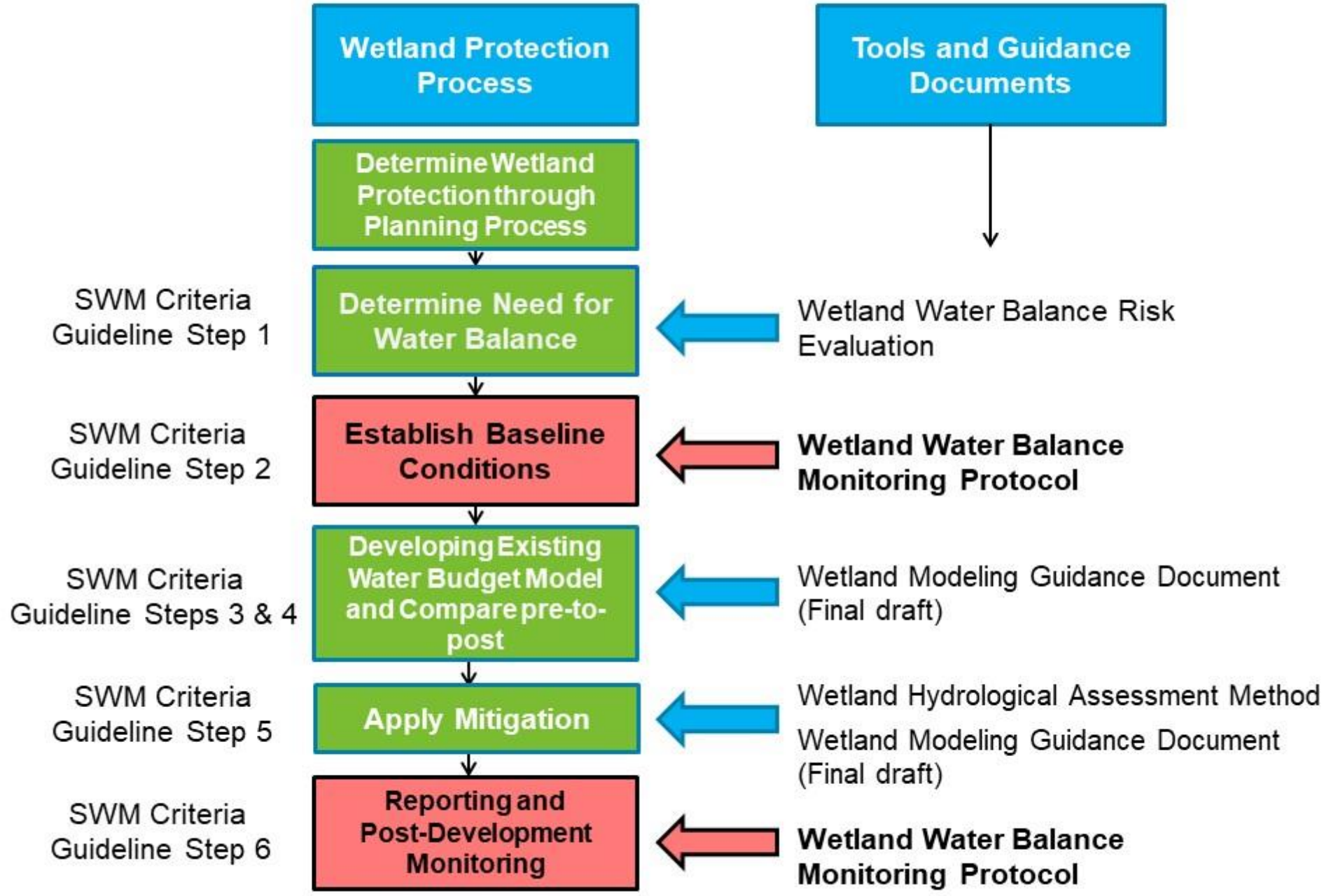
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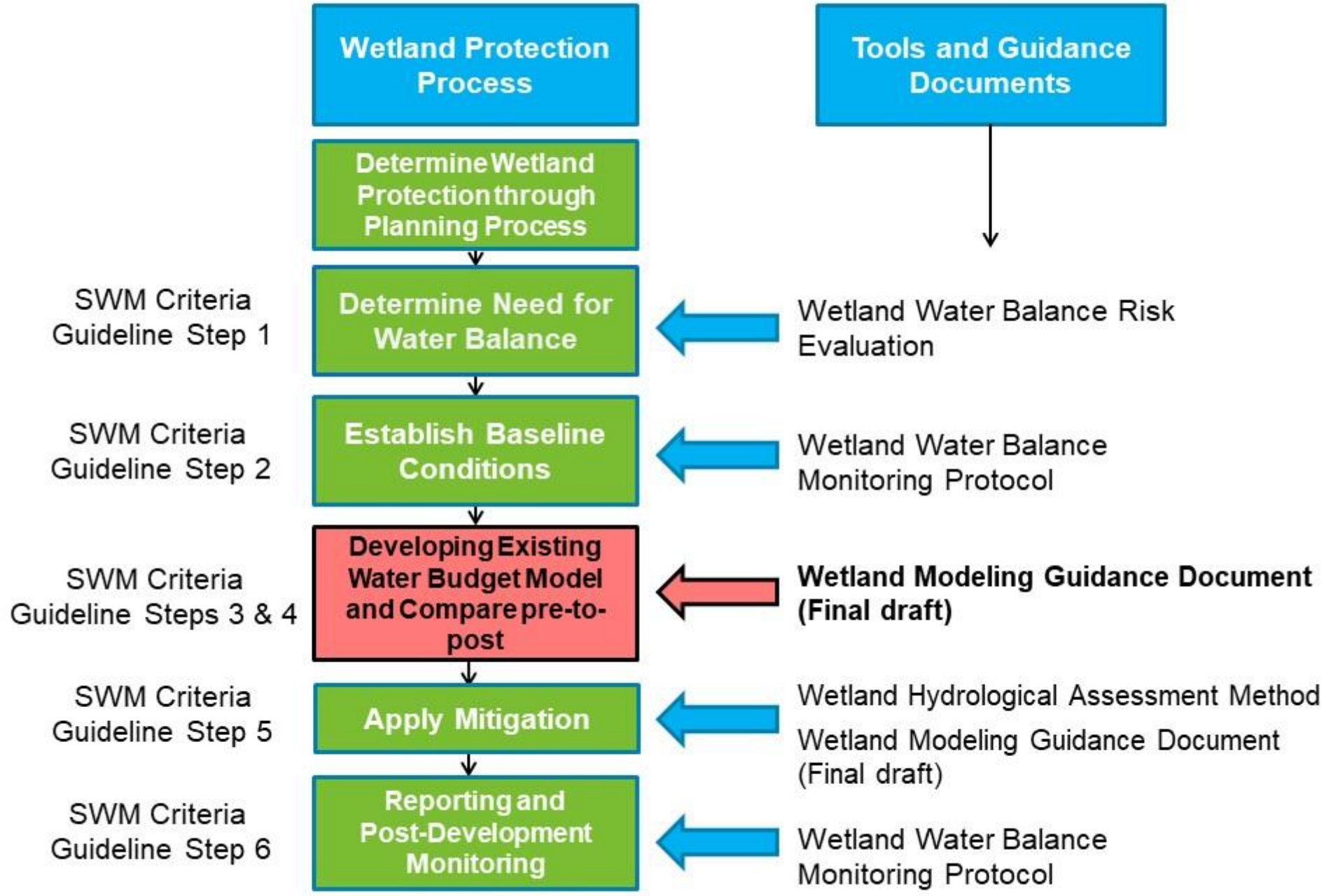
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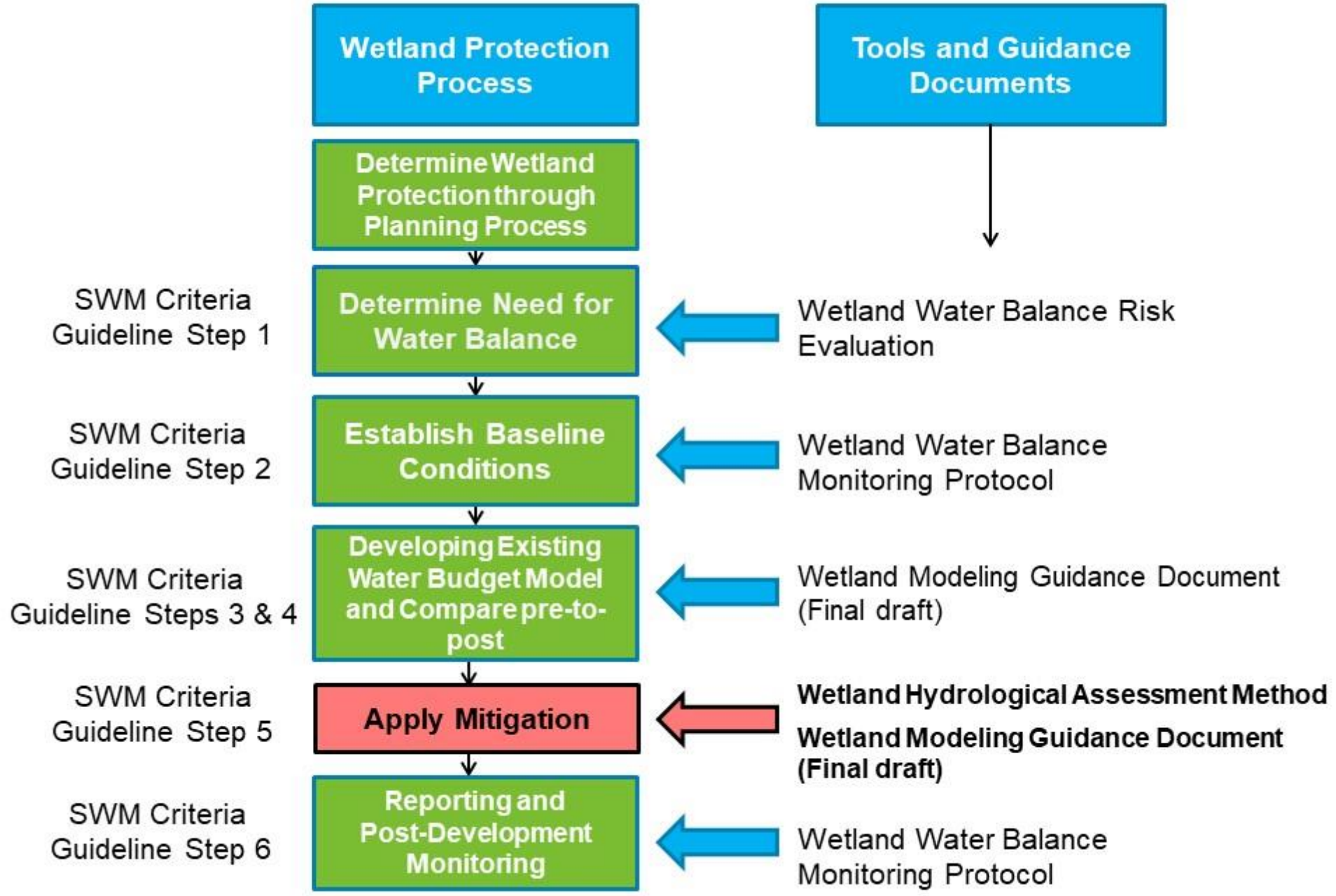
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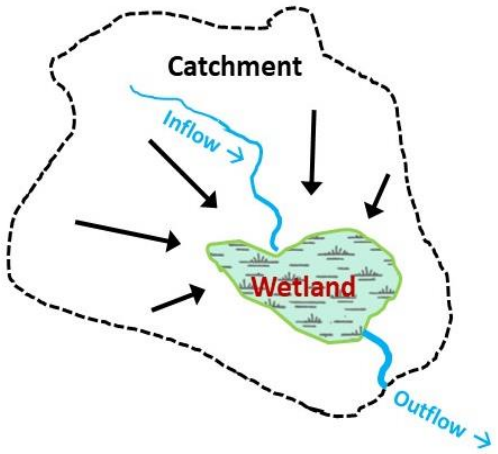
Wetlands vs. other natural features

- FBWB generally has been required for protection of wetlands, but has also been applied in some circumstances to sensitive woodlands, streams, even dry valleys
- Wetlands most pressing need → high historical rate of loss, low areal coverage in watersheds, intimate link b/w hydrology and ecology
- More detail in *Stormwater Management Criteria*

Supporting guidelines and tools

- **Risk Evaluation** – will the feature be impacted? If so, are monitoring and modeling required?
- **Monitoring Protocol** – what data to collect, and when?
- **Modeling Guidance** – how should pre- and post-development conditions be assessed?
  - Appendix of modeling case studies
- **Hydroperiod Guidance** (in progress) – what constitutes an impact of concern, and what level of mitigation is sufficient?
  - Tools to compare pre- to post-development

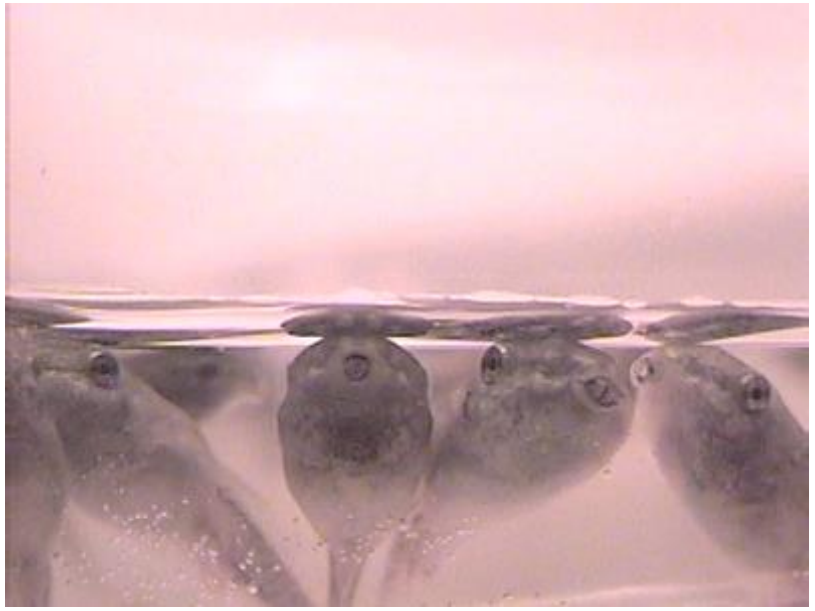


When might this be required?

- Definitions listed in *WWB Risk Evaluation* (TRCA 2017) (to be discussed extensively in module 1)
  - If change proposed to impervious cover / size of catchment of hydrologically sensitive natural feature recommended for retention on the landscape
  - Exceptions for features where water balance is dominated by larger watercourse, lakes
- Primarily geared towards greenfield development, but also applies to infill scenarios

Why require feature-based water balance?

- Ensure that lands set aside for natural heritage value retain more of the value for which they were originally set aside (maintain area and biodiversity of hydrologically sensitive habitats)
- Provide ecosystem services to local and downstream communities



Why require feature-based water balance?

- Satisfy provincial policy objectives around “no negative impacts” to wetlands and other hydrological/ecological features
- Secondary benefits: reduce risks to adjacent lands and infrastructure from erosion, nuisance flooding, hazard trees

Questions?