Table S1. SWOT analysis – retention and detention systems

Strengths	Weakness
▪ Relatively low-cost structures which can often be constructed without needing resource consents (e.g., bunds <3 m high, catchment <50 ha). ▪ Enable productive land use between events. ▪ Can achieve both water quantity and quality (reduced sediment, particulate, and faecal microbe) control. ▪ Can be targeted to manage localised gullying, bank erosion, and flooding. ▪ Can provide water for stock drinking, firefighting, and irrigation in rural areas. ▪ Can provide water for non-potable uses in urban areas, such as for passive urban cooling.	▪ Limited relative storage capacity in very large events. ▪ Require large numbers distributed across the landscape to moderate widespread flooding. ▪ Require rolling but not-too-steep landscapes that facilitate sufficient ponding with minimal earthworks. ▪ Take areas of land out of production. ▪ Require regular sediment removal to retain storage capacity and limit scouring and remobilisation of accumulated sediments during large storms.
Opportunities	**Threats**
▪ Can be linked with constructed wetlands to improve performance across a wider range of contaminants and provide a wider range of ESs and benefits. ▪ Can be used networked within a catchment and provide aquifer recharge. ▪ Promotion of biodiversity, reduction of forest fire risk if retention ponds are sited in forests. ▪ Can support biodiversity. ▪ Can be used as exemplars when established (e.g., Te Arawa Lakes).	▪ Can increase water temperatures and reduce downstream water quality and aquatic biodiversity. ▪ Capture of small ephemeral flows reduces downstream intermittent and low-order stream length and the ecological values these provide. ▪ Infiltration practices in urban areas can cause groundwater contamination and, where there is high groundwater, can exacerbate flood risk.

Table S2. SWOT analysis – bioretention systems

Strengths ▪ Bioretention and remediation of contaminants. ▪ Reduced sediment loads and transport. ▪ Pluvial flood regulation through volume and peak flow attenuation. ▪ Relatively low cost of implementation. ▪ Well documented guidance available. ▪ Improve biodiversity in urban areas.	**Weakness** ▪ Potential failure of the system if not properly maintained. ▪ Can be part a flood mitigation strategy but will not suffice on its own. ▪ Ongoing maintenance costs. ▪ Potential for maladaptation.
Opportunities ▪ Co-benefits could include the following: ▪ Heat regulation, air quality improvement, carbon storage. ▪ Job creation, recreational and educational opportunities. ▪ Increased biodiversity.	**Threats** ▪ May increase vector breeding in the case of stagnant water (i.e., system failure). ▪ Financial barriers and uncertain responsibilities for ongoing management and maintenance.

Table S3. SWOT analysis – landcover management

Strengths ▪ Landcover change can be used to increase infiltration, canopy interception, and evapotranspiration, and thus reduce the magnitude and temporal response of flood peaks. ▪ Forest cover can provide carbon sinks for carbon sequestration. ▪ Green corridors and similar can lead to habitat creation and passage for birds and fish and improvements in water quality (e.g., biodiversity, visual clarity, etc.).	**Weakness** ▪ Long start-up time related to vegetation growth period, during which space may be more vulnerable to flooding. ▪ Land acquisition can be challenging. ▪ Initial capital costs could be prohibitive to private landowners.
Opportunities ▪ Increased vegetation cover is particularly useful in upper catchments areas or strategically targeted to areas of known high runoff. ▪ Increased green space has co-benefits for amenity value and biodiversity. ▪ Planting opportunities can be used to introduce culturally significant plant species.	**Threats** ▪ Use of monoculture plant assemblages could have negative impact on local biodiversity and increases the risk of soil erosion and flooding after harvesting. ▪ Expansion of forestry for flood risk mitigation could be at cost of carbon rich and biodiverse native ecosystems, and local land rights.

Table S4. SWOT analysis – river naturalisation

Strengths	**Weakness**
▪ Increased stormwater storage and conveyance capacity in system (flood plain, stream courses). ▪ Encourages greater biodiversity. ▪ Can become self-maintaining. ▪ Aesthetic value increased. ▪ Possible improvements to water quality and ecosystem health.	▪ Land acquisition may be required to extend river and riparian areas. ▪ Creation of new riverscapes can be expensive (if engineering required) and take time to stabilise. ▪ Maintenance costs for ongoing river widening, weed clearance, sediment removal, riverbank repair.
Opportunities	**Threats**
▪ Can provide multiple opportunities to increase biodiversity via increasing the integrity of existing habitat and the creation of new habitat types.	▪ May behave unpredictably in very large floods.

Table S5. SWOT analysis – river floodplain restoration and estuary management

Strengths	**Weakness**
▪ Floodplain connection can decrease the magnitude and duration of downstream floods. ▪ Multiple co-benefits associated with habitat creation.	▪ Impact depends on floodplain to catchment size ratio. ▪ Need surface and channel data. ▪ Floodplain roughness data critical for planning.
Opportunities	**Threats**
▪ Can assist flood plain wetland restoration. ▪ Can contribute to carbon sequestration.	▪ Floodplain complexity in large catchments can make their dynamics hard to predict.

Table S6. SWOT analysis – natural wetlands

Strengths	Weakness
▪ Integral part of the natural landscape. ▪ Provide a wide range of regulatory and provisioning and cultural ESs, including flow moderation, contaminant retention and transformation, wildlife habitat, and mahinga kai. ▪ Historical wetland areas are generally located where water preferentially flows and are often amenable to hydrological restoration. ▪ Relatively low ongoing maintenance requirements. ▪ Will regenerate themselves with low level of effort if previous wetland area is retired from productive land use.	▪ Restoration of historical wetland water levels can impact drainage, flooding, and the productivity and viability of surrounding farmland. ▪ Wetland boundaries need to be able to expand to accommodate flood flows. ▪ Past agricultural development and weed invasion can make it difficult to restore historical wetland values, e.g., elevated nutrients can leach from inundated agricultural fields.
Opportunities	**Threats**
▪ Can integrate with a wide range of co-benefits from wetland restoration (social, economic, cultural, environmental).	▪ Increased protection of natural wetlands may limit opportunities to optimise flood storage and increase consent requirements and compliance costs.

Table S7. SWOT analysis – constructed wetlands

Strengths	Weakness
▪ Potential to design for specific storage targets. ▪ Can be sited in strategic locations. ▪ Provide wide range of co-benefits, including contaminant reduction, habitat, biodiversity, mahinga kai, and aesthetic and cultural benefits. ▪ Less expensive than conventional wastewater treatment options.	▪ Vegetated wetlands generally require large areas of relatively shallow water (0.3–0.4 m) but will survive short periods (days to weeks) of deeper inundation. ▪ Risk of maladaptation or poor design. ▪ Risk of exceedance in severe events.
Opportunities	**Threats**
▪ Rolling landforms provide lower-cost construction opportunities. ▪ Combine with detainment bunds to increase temporary detainment.	▪ May be damaged by large flooding events, requiring repair.