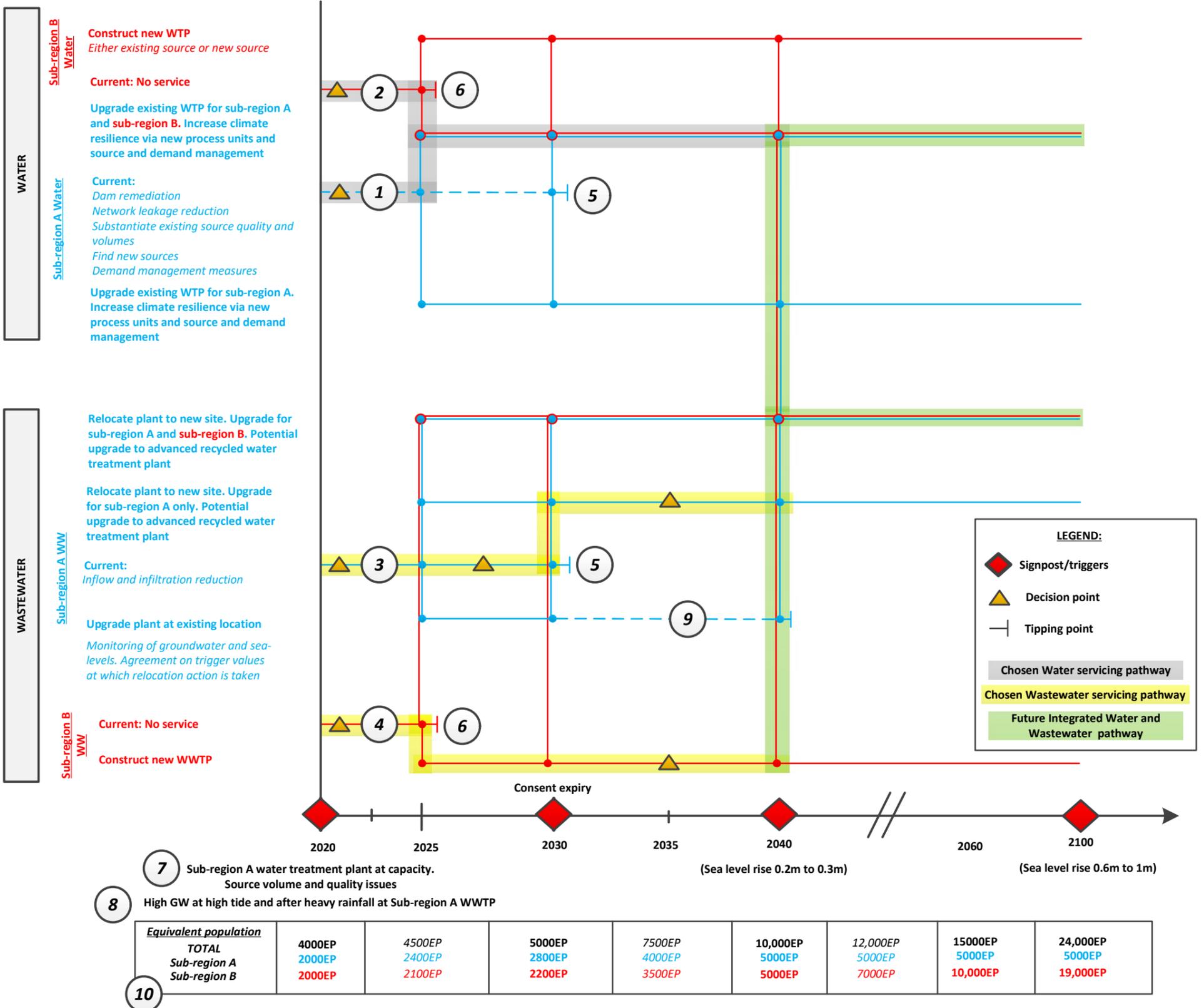


## ADAPTIVE WATER AND WASTEWATER INFRASTRUCTURE PLANNING:

Decision-making in water and wastewater infrastructure planning today requires long-term considerations of deep uncertainty due to climate change and population growth, as such infrastructure is typically long-lived (~100 year design and service life). Adaptive planning enables complex decision-making by generating multiple infrastructure options, rather than a single, static option. Therefore, short-term pathways can be selected that avoid locking in future solutions which may become unsuitable as environmental conditions, societal perspectives and preferences change. In this way, long-term plans are able to retain flexibility and adapt to a variable and deeply uncertain future to ensure water and wastewater services can continue for Aucklanders.

### A generic example of long-term water and wastewater infrastructure planning for two sub-regions facing population growth and climate triggers



#### Current pathways 1 2 3 4

Sub-region A has existing water and wastewater services. Sub-region B has no existing water or wastewater service

#### Tipping point where current pathway is no longer feasible

- 5 At Year 2030 for sub-region A water and wastewater treatment when the water take and treated effluent discharge consent expires
- 6 At Year 2025 for sub-region B water and wastewater servicing triggered by new development

#### Growth, capacity and climate triggers

- 7 Sub-region A water treatment plant (WTP) is at capacity. Raw water source to this WTP has declining volume and quality
- 8 Sub-region A wastewater treatment plant (WWTP) is low-lying and impacted by high groundwater levels at high tide and during wet weather events.
- 9 The groundwater table is expected to rise as sea level rises by approx. 0.3m in 2050 making upgrades at the existing location increasingly vulnerable to climate impacts
- 10 Population growth predictions for sub-region B forecast more than double the existing population in the next 20 years to 5000 people

#### Chosen future pathways at current decision point:

Combined water servicing at both sub-regions by upgrading the existing WTP within the next 5 years. This will enable addressing existing source volume and quality issues. A single larger water treatment plant is more cost effective for the higher level of treatment required to address declining raw water quality. Larger flows also provide opportunities for in-line hydropower generation technologies. This pathway retains the ability for future integrated water and wastewater management.

Separate wastewater servicing for each sub-region with a future option to integrate both services into a single advanced recycled water treatment plant in 2040. This pathway retains flexibility in current servicing for both sub-regions while leaving the option open for a future recycled water source to add resilience to the region's overall water supplies.