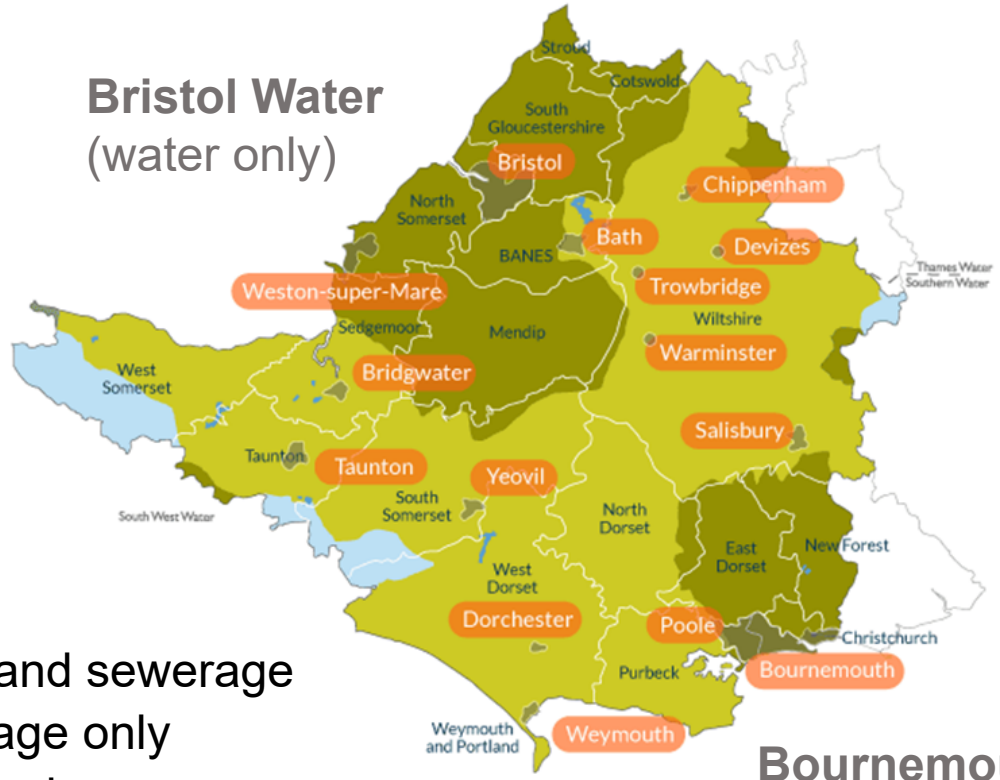
Somerset Council Climate and Place Scrutiny Committee

18th October 2023

Wessex Water
YTL GROUP

What we do

Bristol Water
(water only)



- Water and sewerage
- Sewerage only
- Water only

Bournemouth Water
(water only)

Sewerage services

- 2.8m people and 57,000 businesses
- 34,966km of sewers
- 2,129 pumping stations
- 400 water recycling centres

Water recycling centres (WRCs)

- Physical, physico-chemical and biological processes to treat sewage to a standard that the environment can accommodate and assimilate
- The discharge standards required are set and enforced by the Environment Agency

Water recycling centres

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- Typical parameters for a water discharge permit

Quantity	Quality
Dry Weather Flow (m^3/d)	Ammoniacal nitrogen (mg/l)
Flow Passed Forward (l/s)	Suspended Solids (mg/l)
	Biochemical Oxygen demand (mg/l)
	Total phosphorus (mg/l)

It’s all about the LOAD

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Flow x concentration = LOAD

m^3/day x mg/l (or g/m^3) = mg/day

- Dry Weather Flow (measured in m^3/day) reflects the volume of foul sewage from the upstream population

- Concentration (measured in mg/l) reflects the level of pollutants in a volume

Water discharge permits

- These set an allowable future dry weather flow (based on a predicted level of new development) and a concentration that must be achieved

- In other words – permits are set conservatively so that treatment is always in excess of what the environment requires

- This means new development can be accommodated and outperformance headroom gradually shrinks

Example: Taunton Water recycling centre

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Date	Dry Weather FLOW permit (m^3/d)	CONCENTRATION permits (mg/l)			
		Biochemical Oxygen Demand	Ammonia	Suspended solids	Phosphorus
1987	20,300	25	15	40	-
2005	21,680		10		
2010	30,595	15	3	30	2
2015					
2018					
2020					1

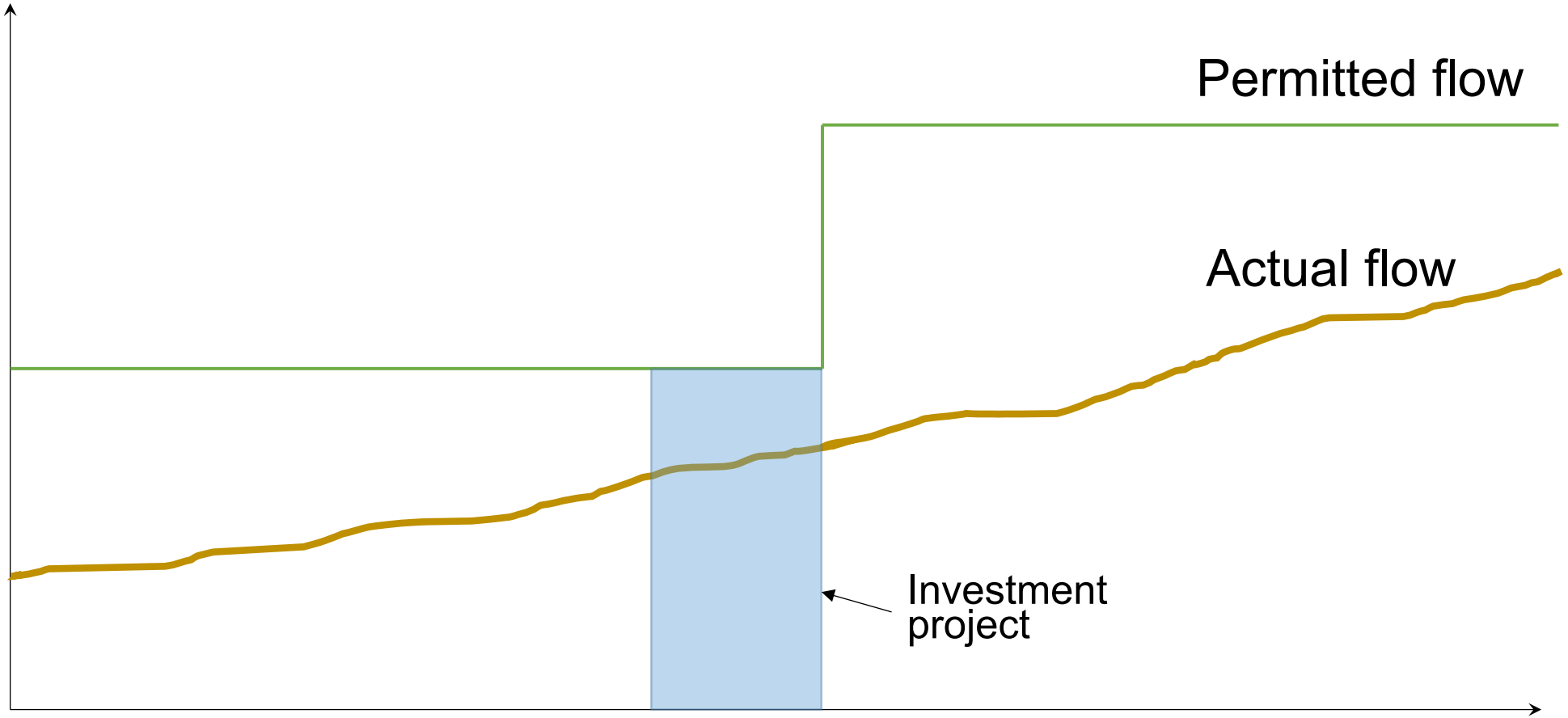
Required by the Urban Wastewater Treatment Directive

Required by the Water Framework Directive

Permit: Flow x Concentration = 30,595 m^3/d x 1 mg/l = 30.6kg/day
Actual: Flow c14,000m^3/d x concentration 0.89 mg/l = 12.5kg/day

Permit changes to accommodate development when river already meets EQS

Flow x concentration = LOAD



EQS = Environmental Quality Standard

Permit changes to accommodate development when river meets EQS

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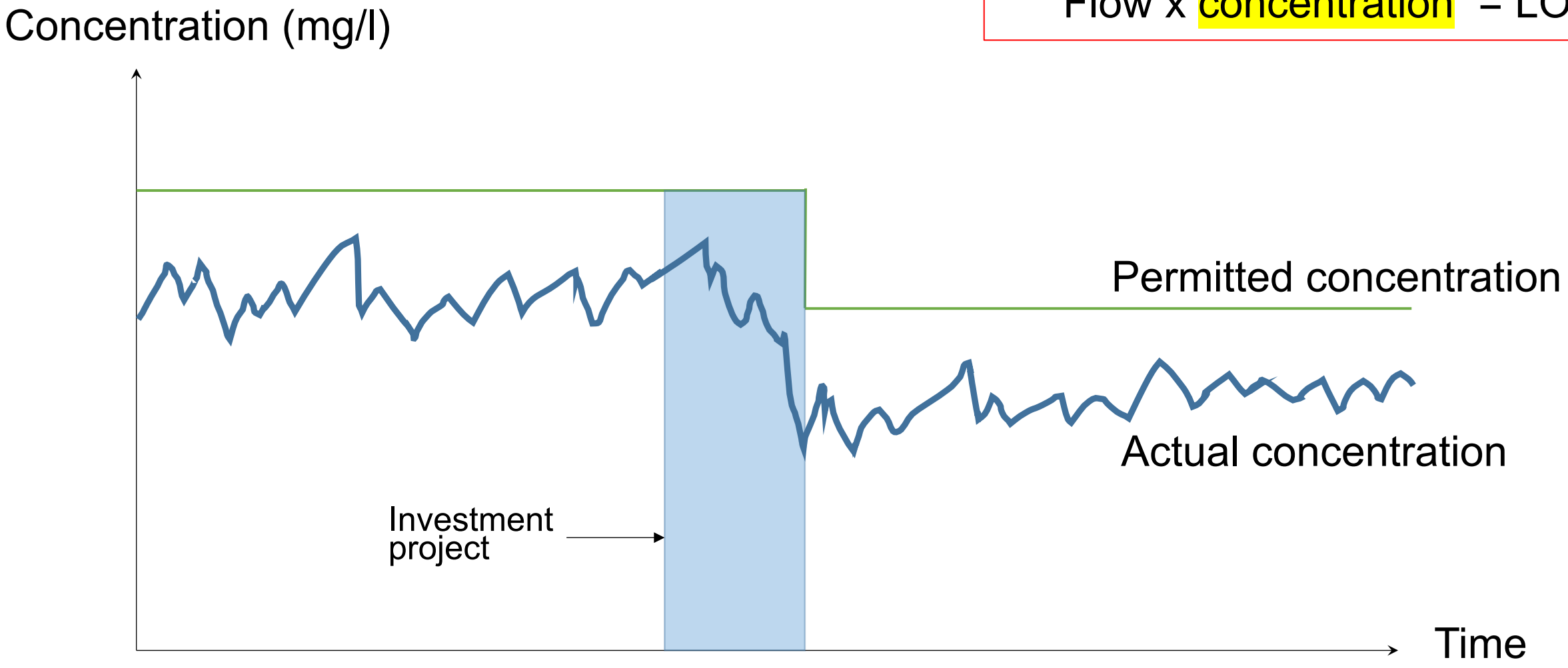

Permit changes to accommodate development when river meets EQS

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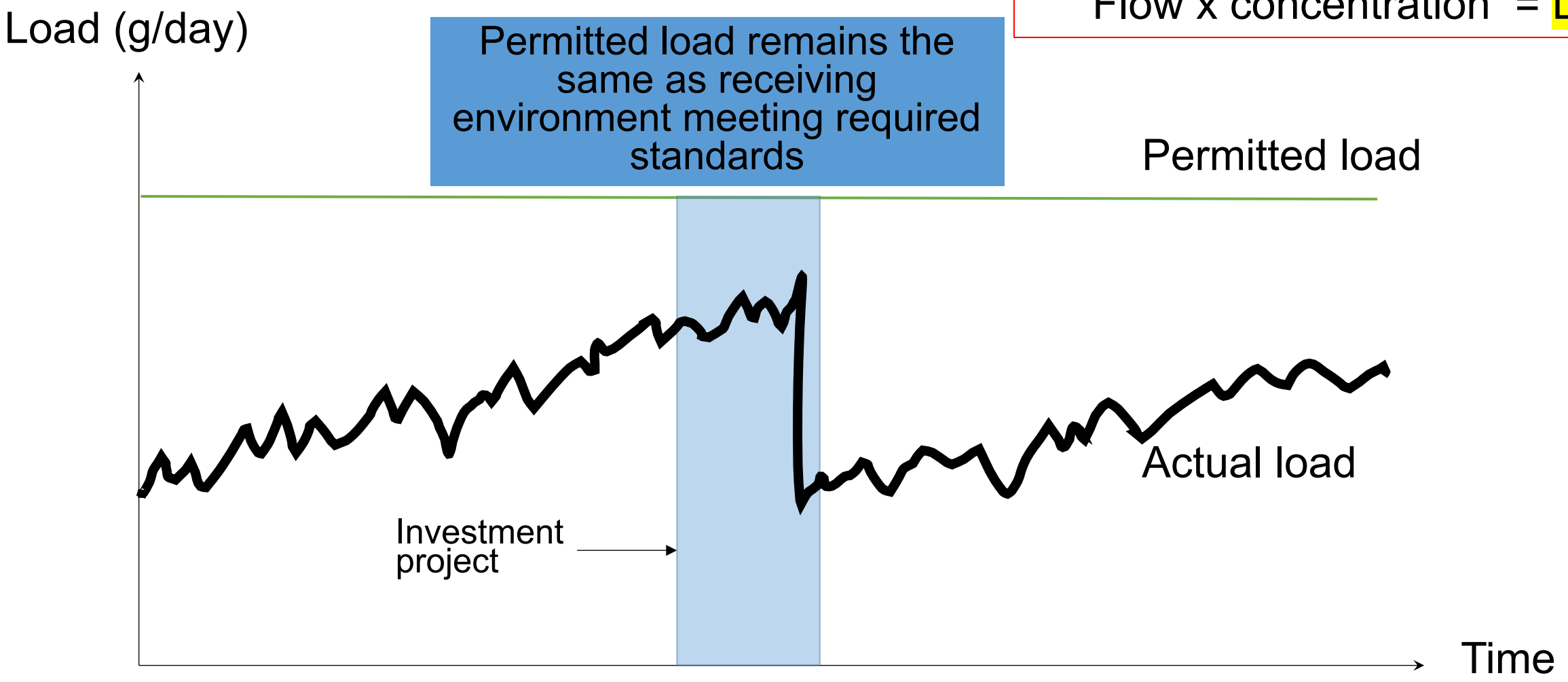
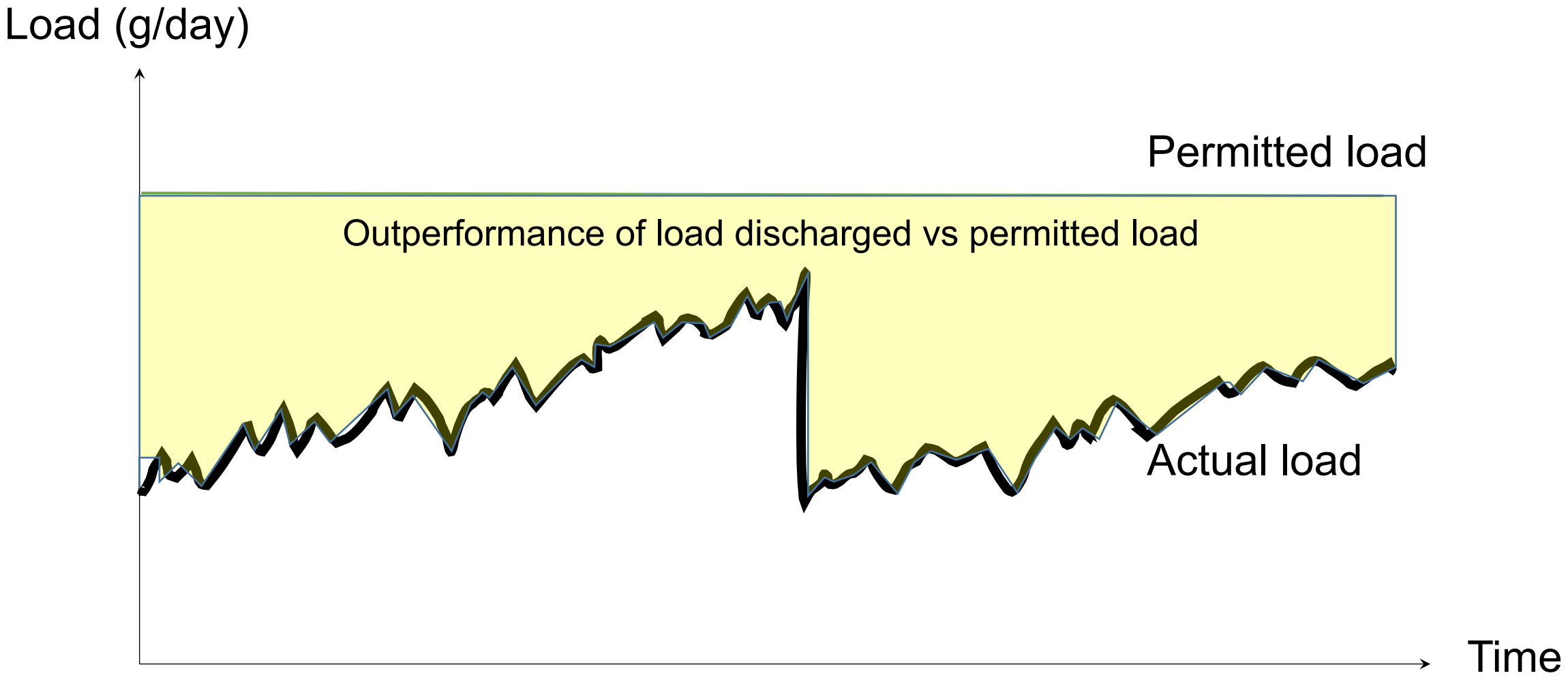


Actual performance better than required



Permit changes to meet tighter river environmental quality standards

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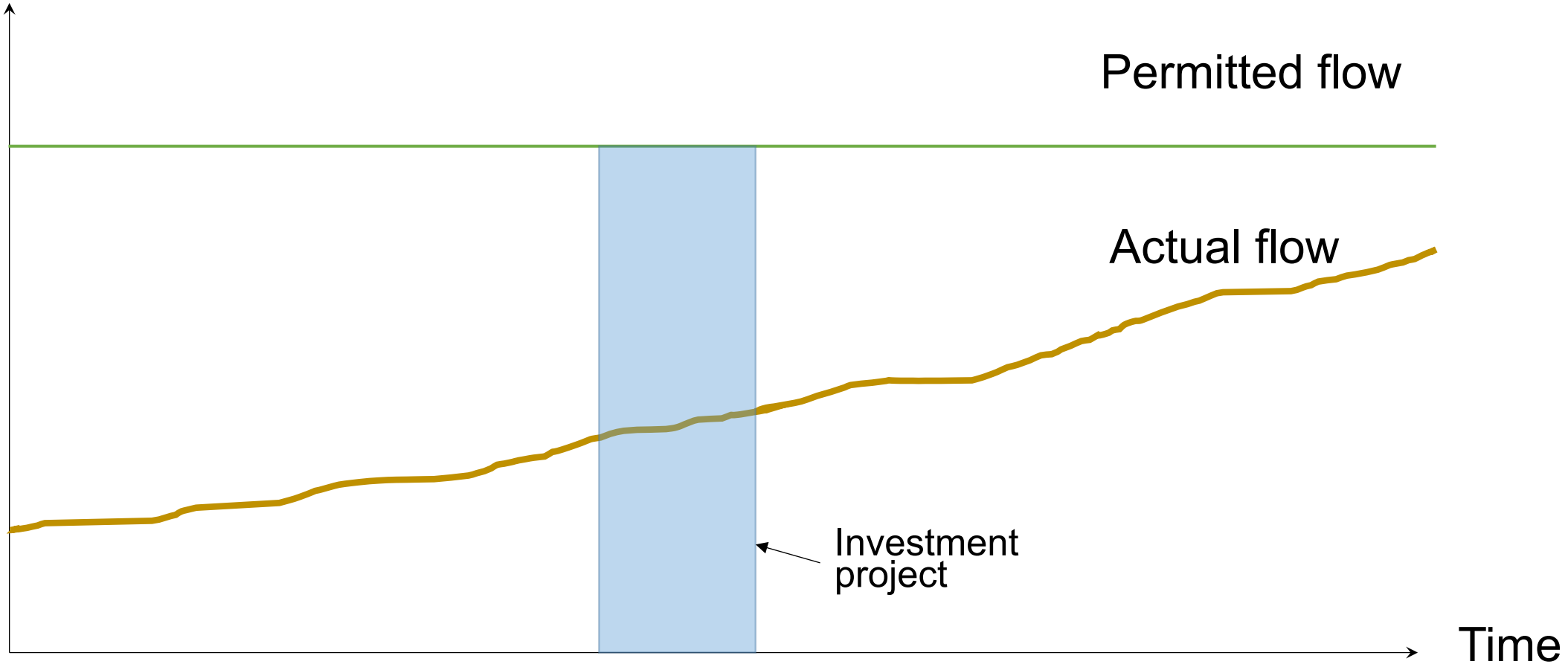
Flow (m3/day)

Flow x concentration = LOAD



Permit changes to meet tighter river environmental quality standards

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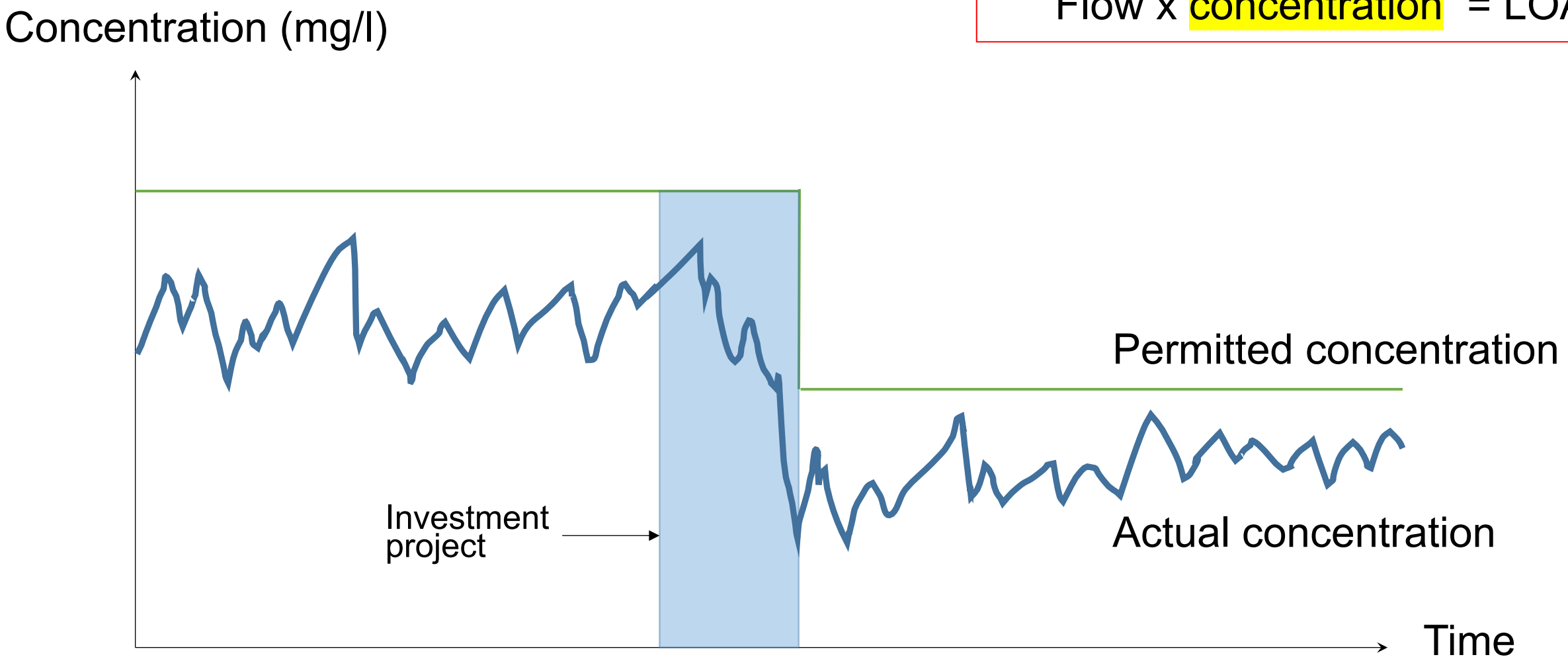

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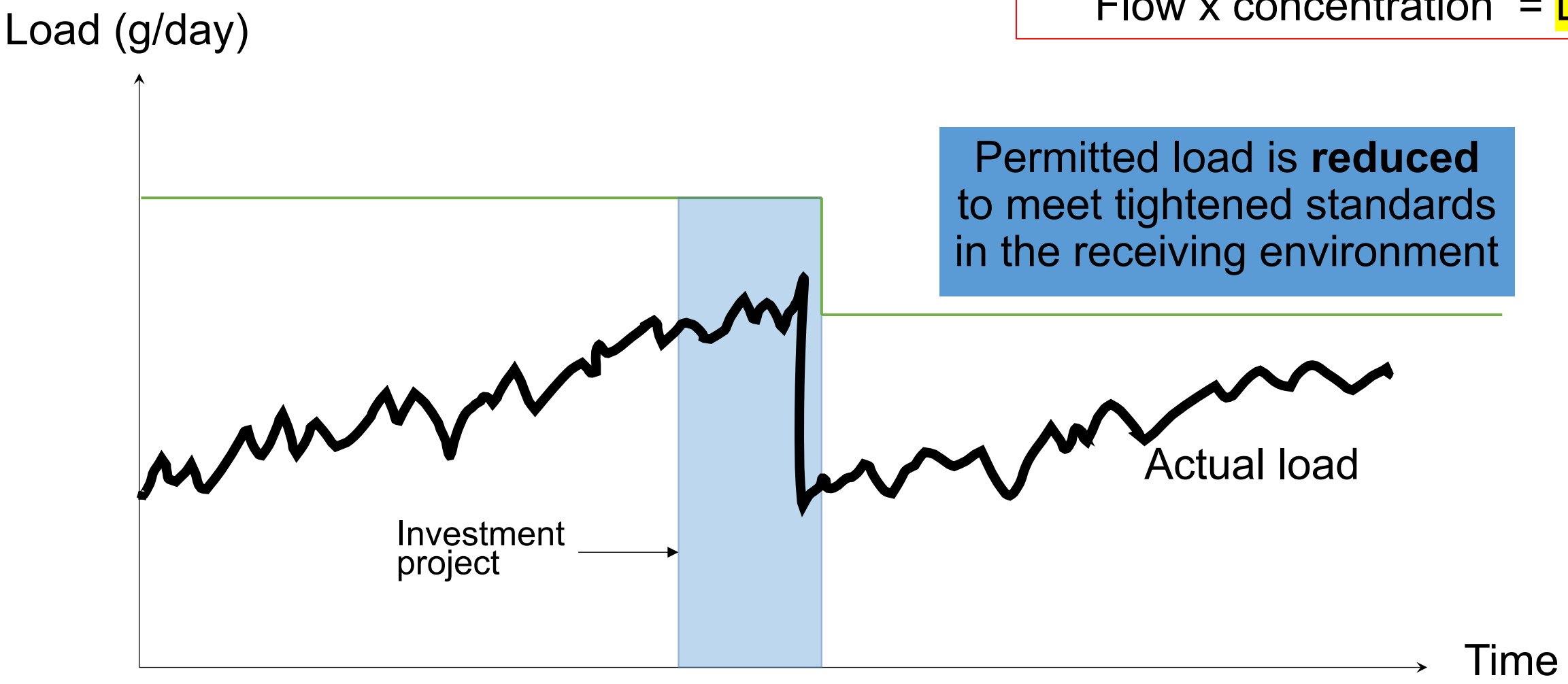
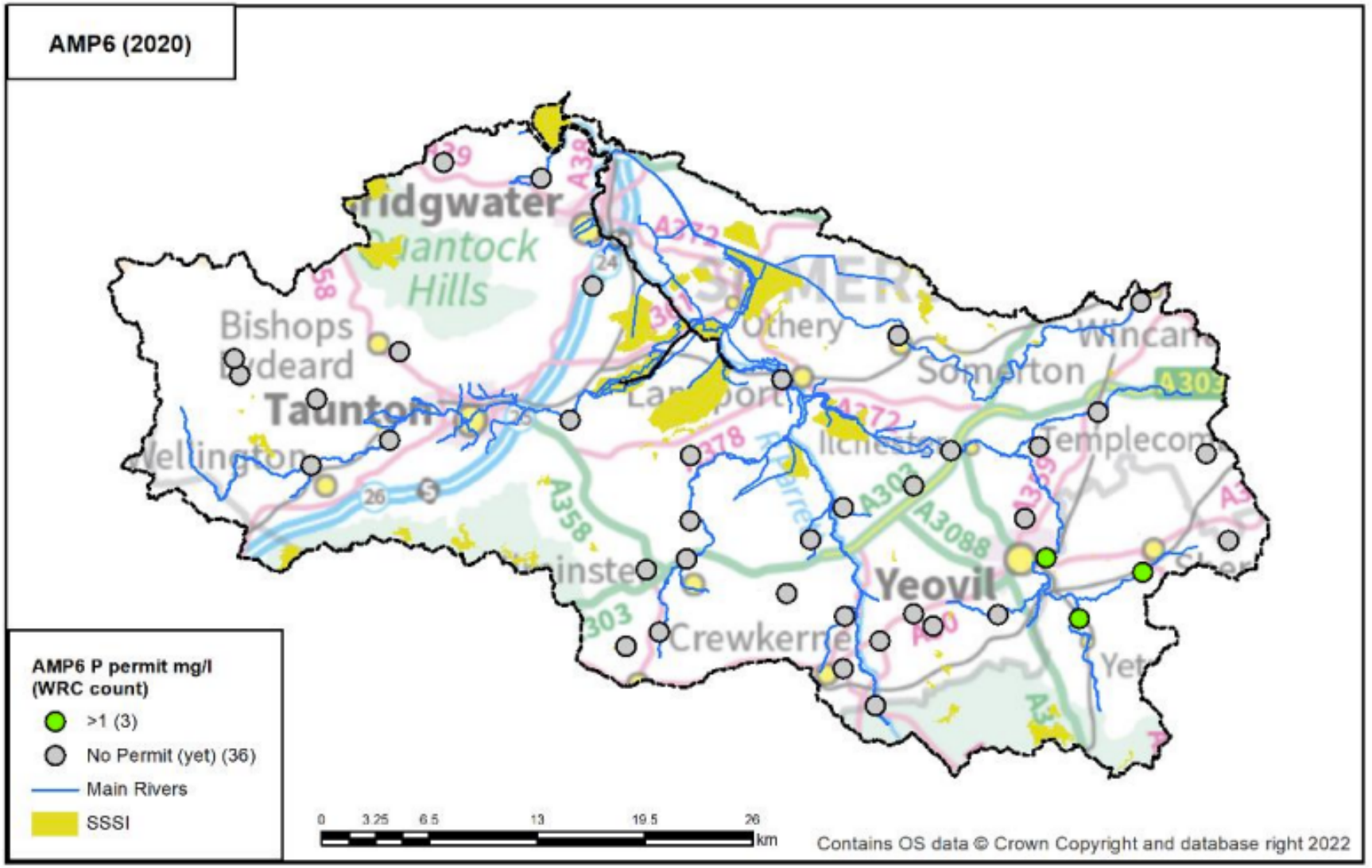


Phosphorus removal investment 2015-2020

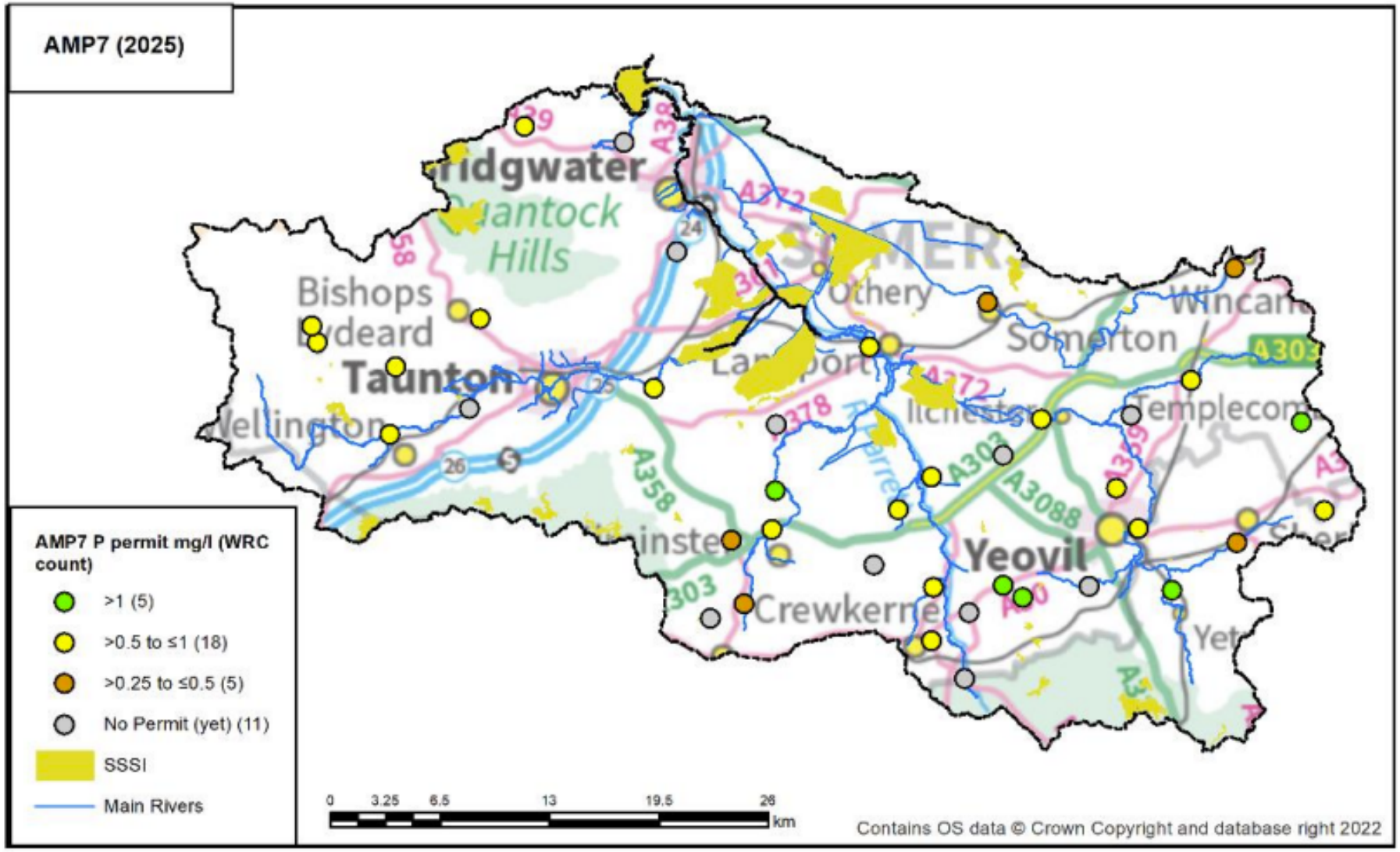
- e.g. river Parrett catchment



- More info [Business plan 2025-2030]
- Document: WSX16
- Page 135pp

Phosphorus removal investment 2020-2025

- e.g. river Parrett catchment



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Phosphorus removal investment 2025

- e.g. river Parrett catchment

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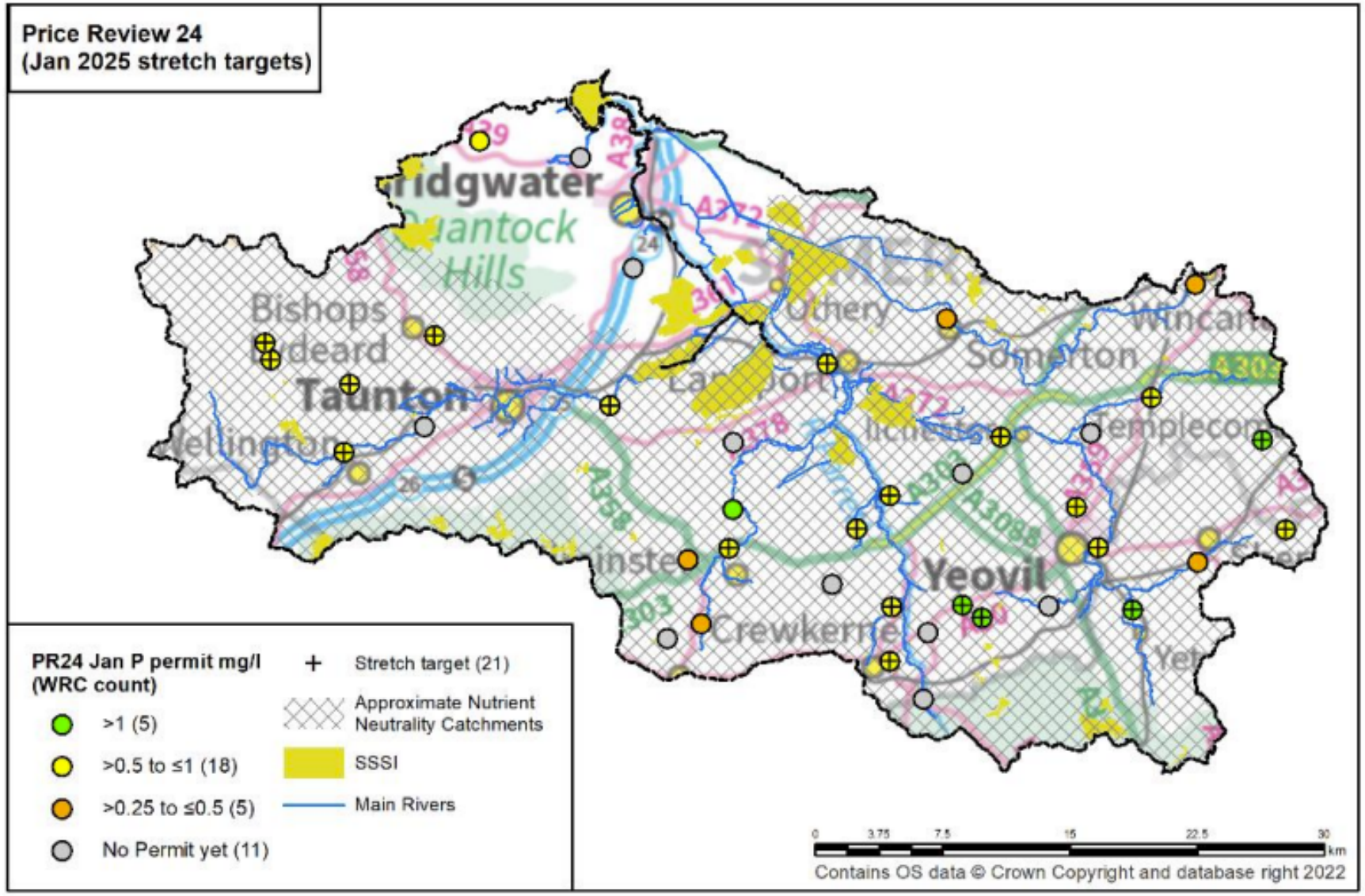
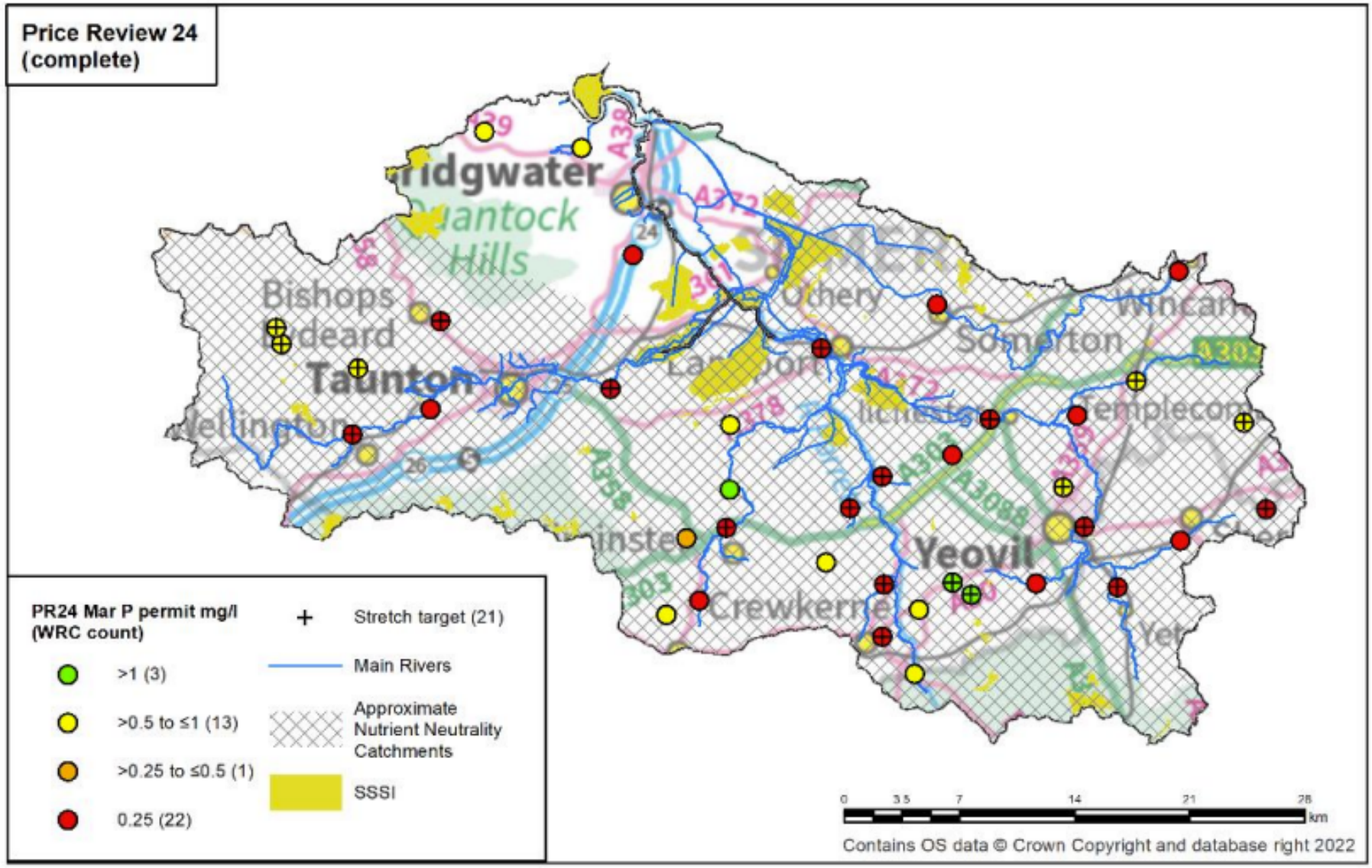


Phosphorus removal investment 2025-2030

- e.g. river Parrett catchment



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Summary

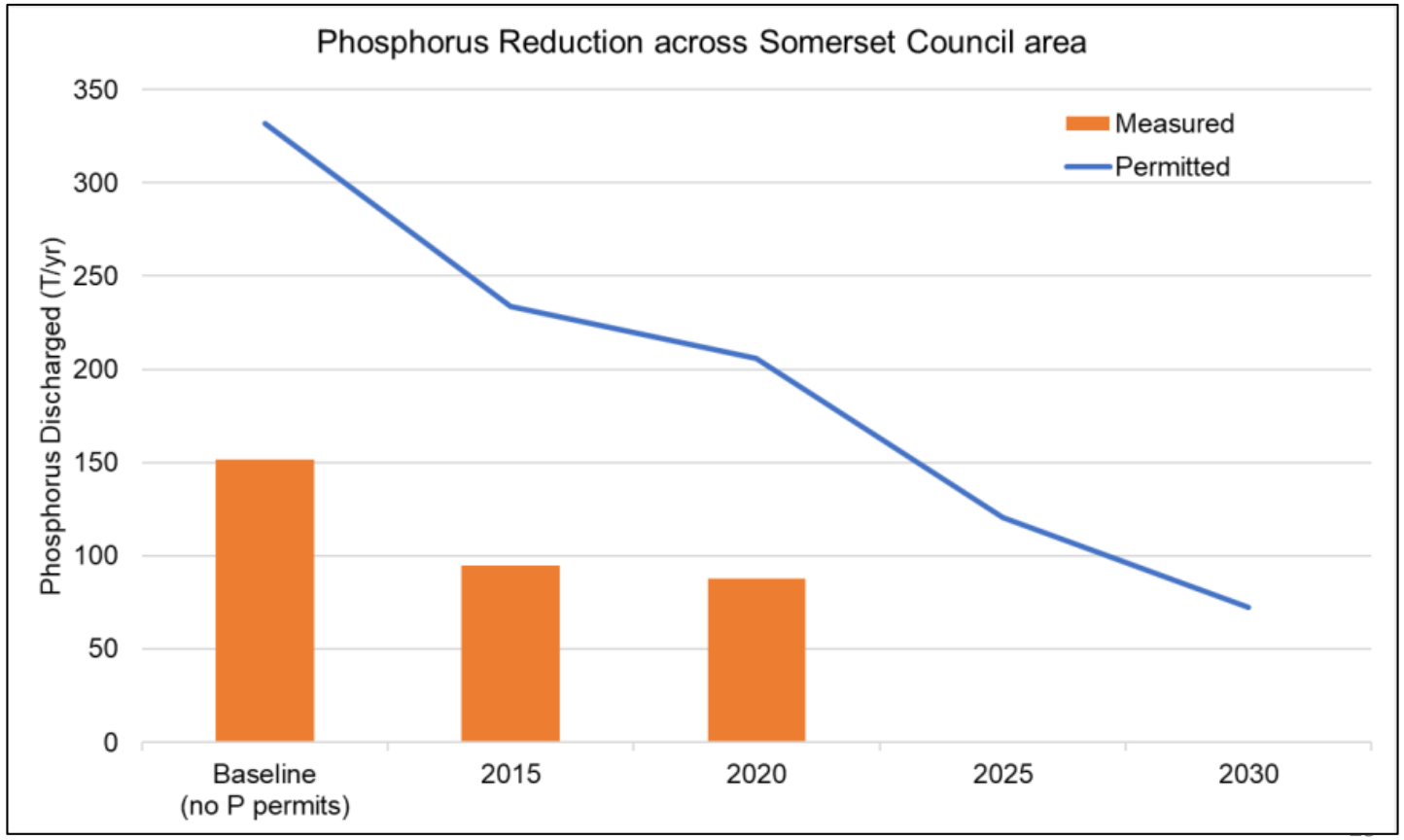
History demonstrates that Wessex Water:

- delivers investment projects before the deadlines that are set
- outperform the permits that are set

Concentration

2023 summary against concentration permits	Number of WRCs with P permits
< 50% of permit	62
50-80% of permit	15
80-90% of permit	1
>90% of permit	0

Load



Thank you for listening

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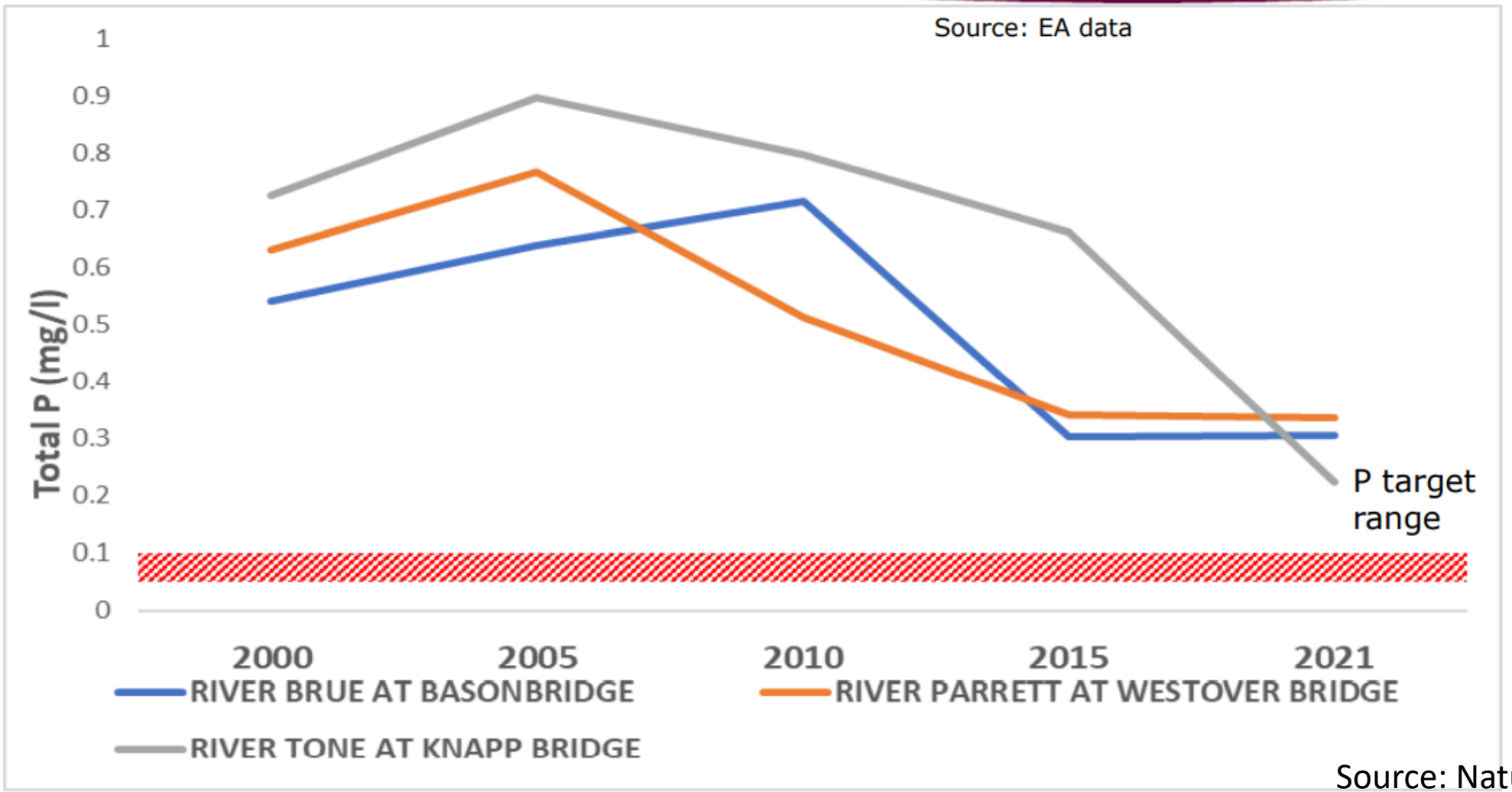
Trends in Phosphorus in Somerset rivers feeding the SLMs



Source: Natural England

Action underway – WRC investment

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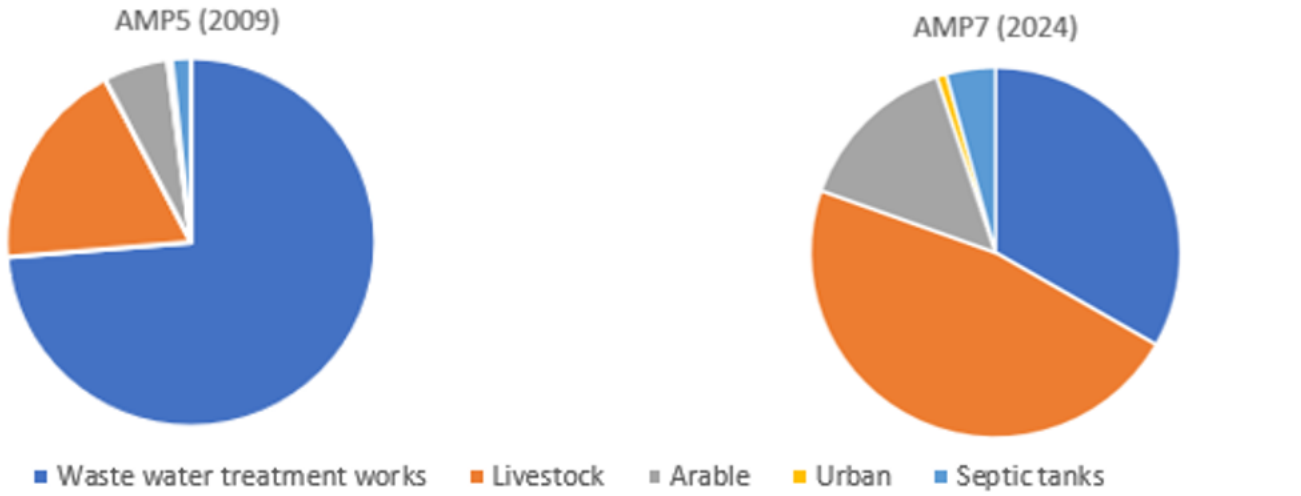
New phosphorus removal

Site	Approx Phosphorus removed (at 2020) (tonnes/year)	Additional Phosphorus removed by 2024 (tonnes/year)	Approximate Cost (£m)
Brue & Axe			
Upper Brue	2.3	0.6	**8**
Lower Brue	7.1	2.9	
Sheppey	12.9	5.6	
West Somerset Coastal Streams			
Stogursey Brook		0.4	**0.8**
Parrett			
Cary		6.0	**44**
Isle, Fivehead and West Sedgemoor		15.6	
Lower Parrett		3.5	
Lower Parrett Western Streams		1.5	
Parrett Headwaters		14.4	
Yeo	25.5	14.5	
Parrett (Tone)			
Lower Tone	55.8		**4**
Northern Tone		3.7	
Upper Tone	4.1	1.4	
Total	**107.7**	**70.1**	**56.8**

Natural England's Somerset Levels & Moors SSSI Condition Assessment, May 2021.

Figure 4. Sources of Phosphate (Location Above Pomparles Bridge – South Drain). Percentage of phosphate sources in 2009 & predicted percentage sources in 2024 (following significant investment by Wessex Water)

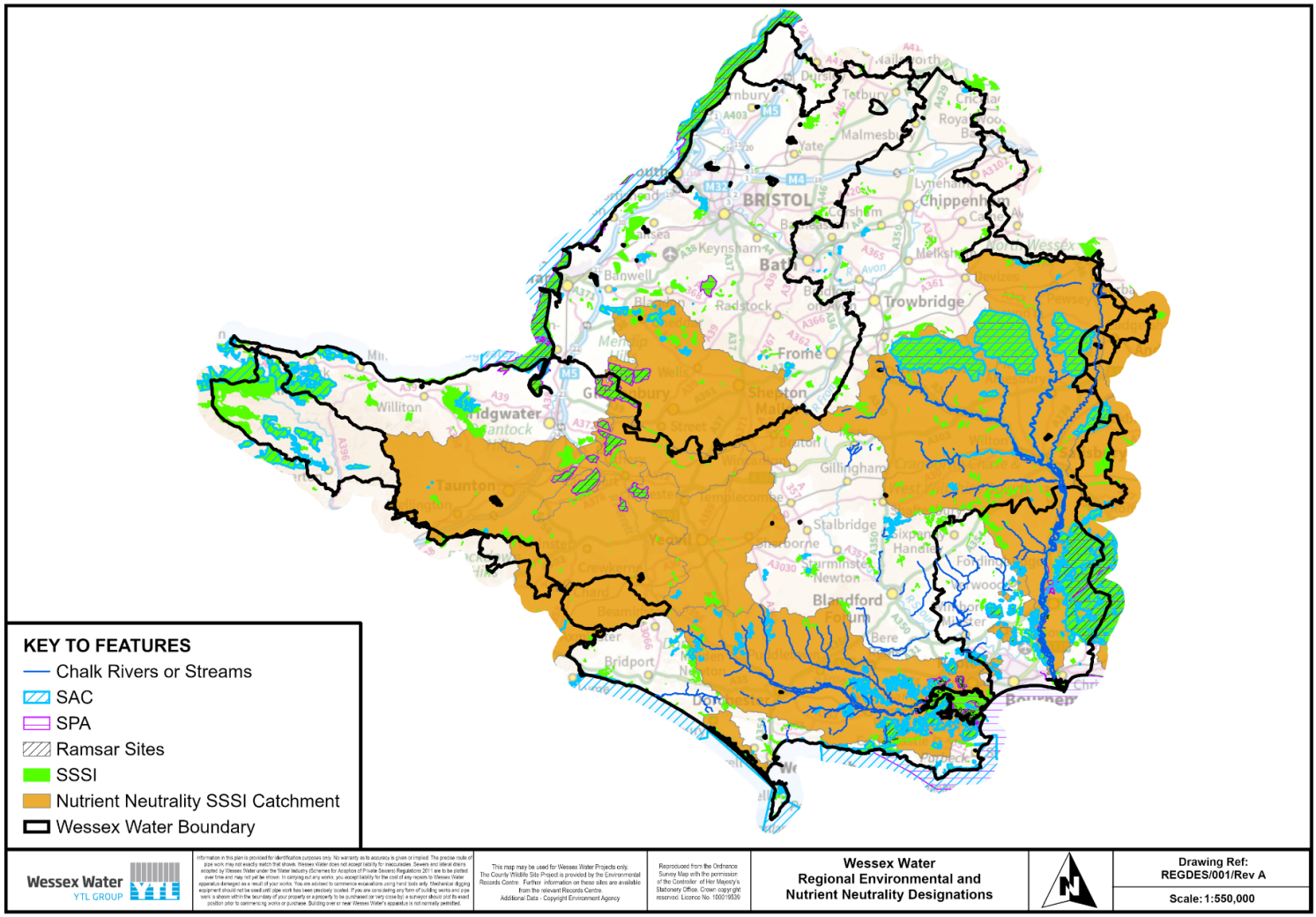


Most significant sources of phosphorus impacting the SSSI will be from agriculture following WW investment to 2024 - NE

Future Plans

- Over 50% of our region has some form of environmental designation, more than any other company.
- Watercourses (and land holdings) in these areas need to meet higher standards.
- 43% of our region is affected by nutrient neutrality.

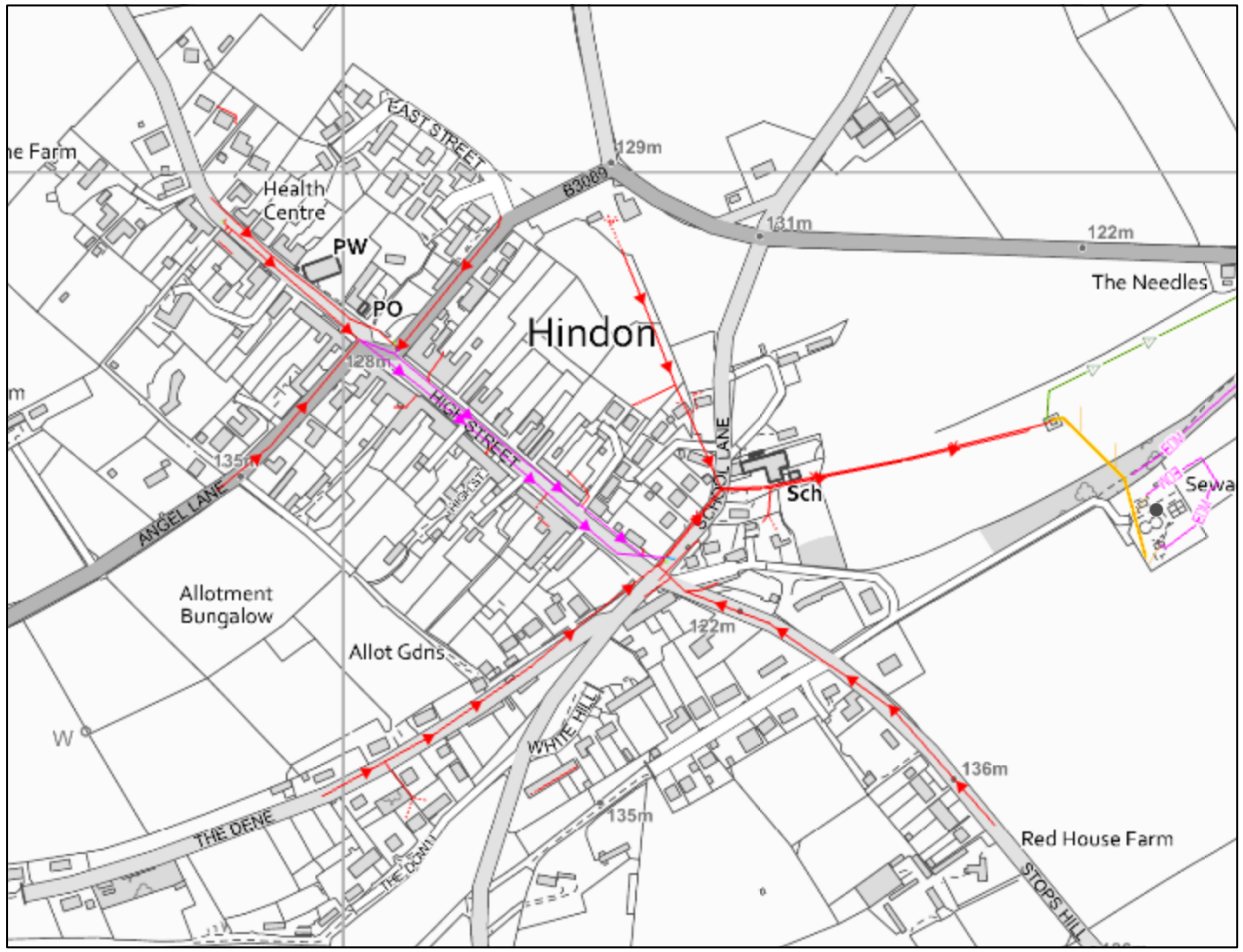
	Proportion of company area covered by nutrient neutrality
Wessex Water	43%
Southern	36%
Northumbrian	19%
United Utilities	17%
Anglian	7%
South West	5%
Dwr Cymru	4%
Severn Trent	3%
Thames	2%
Yorkshire	0%



Example of how to achieve the Technical Achievable Limit of 0.25mg/l at a small site

- Hindon WRC: Population **560**
- To meet the Technical Achievable Phosphorus Limit would require a complete rebuild (bottom-up estimate):
  - Capex: £9m
  - Opex: £140k/yr
  - Embodied Carbon: 689 tCO_2e
  - Operational Carbon: 190 tCO_2e /yr
- i.e. £15,000 per person

- OUTPUT: only 160kg/year P removal



Example: Hindon WRC

Assets	Reasons
New 6mm 2D inlet screen	Only has 1D bar screen (n.b. storm flows are 6mm 2D screened)
Mechanical mixing chamber	In sufficient hydraulic drop between inlet works and PST for ferric mixing
New auto desludge pumps for existing PSTs	Producing more sludge
New sludge transfer PS	To handle increased sludge production
New biological filter	To treat backwash flows from te rtiary filter
New humus settlement tank	Current lax solids permit. If retained, tertiary filter would be oversized as would need regular backwashing.
New recirculation PS	Because of the new biofilter
New mixed media filter (MMF) plus Feed PS, backwash tanks, Backwash PS etc. etc.	Given low P
New washwater system (package and mains)	To help keep lines flushed, etc.
New final effluent sampling chamber	Existing chamber suitable for spot samples but not for continuous monitoring
New ferric sulphate dosing	Coagulant for P removal
New alkalinity dosing	Need additional alkalinity (likely summer only) as removing P in PST could inhibit nitrification across the filters
New potable water supply to site plus emergency shower, eyebath	Safety concerns associated with ferric dosing
New standby generator	Given tight permit, unable to recover to annual average if any high sample
Instrumentation/Monitors	Given tight permit (including of iron), need accurate dosing control and also early sight of any deviation/trend away from permit.