RISK BASED CATCHMENT SCREENING (RBCS)

The Challenges of Ensuring an Industry Approach - Risk Based Catchment Screening

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WONDERFUL ON TAP

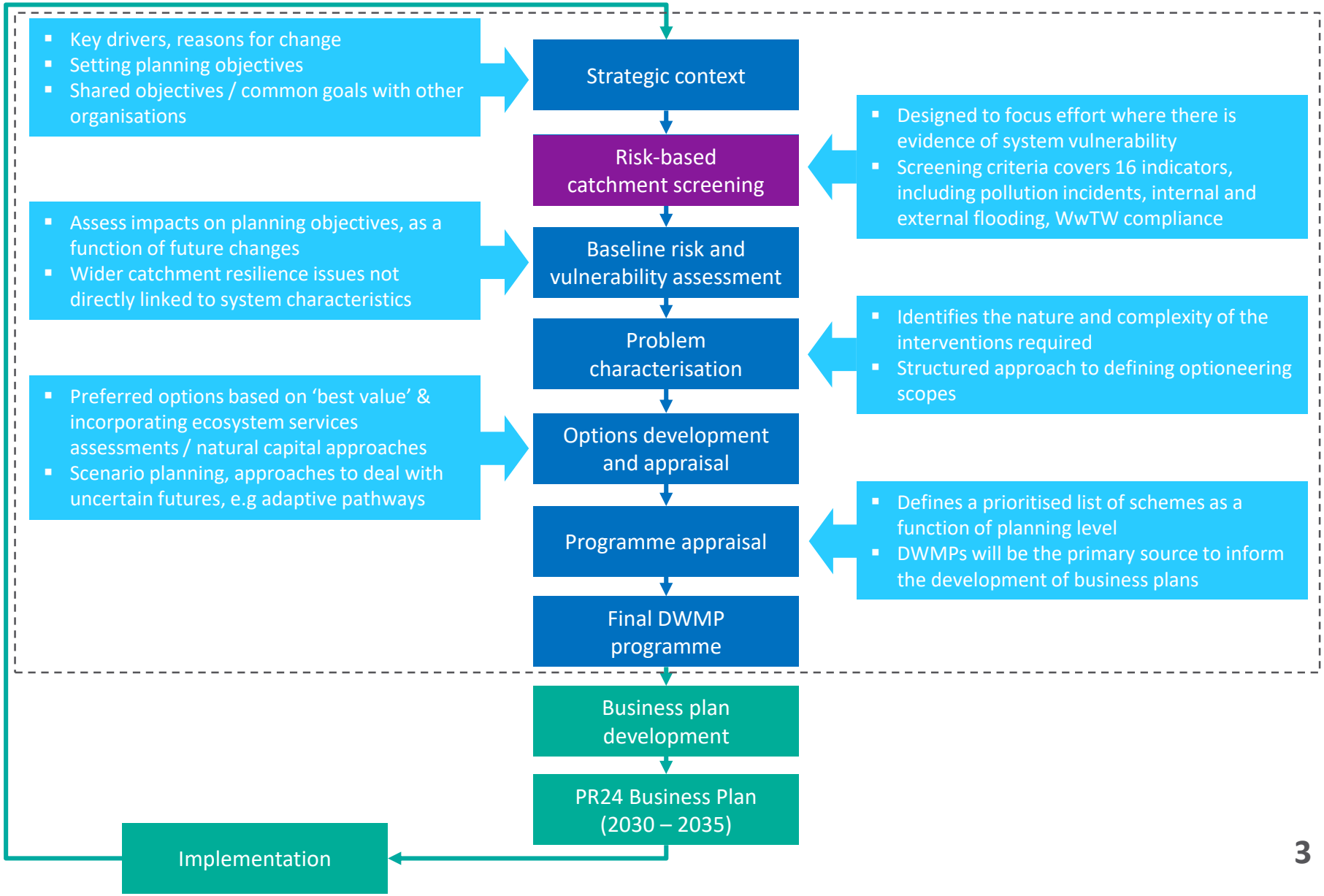
HAFREN DYFRDWY
SEVERN TRENT

Photo: Minworth sewage treatment works

CONTENT

- Overview of RBCS indicators
- Defining Planning Areas
- Geospatial Processing of Data
- Indicative Outputs
- Explanation of Breakout Session

DWMP PROCESS STEPS



RISK BASED CATCHMENT SCREENING (RBCS)

- A total of 16 indicators outlined in Appendix B of DWMP Framework:
  1) Wastewater 1 in 50 year resilience
  2) Intermittent discharge impacts upon bathing or shellfish waters.
  3) Continuous or intermittent discharge impacts upon other sensitive receiving waters.
     Part A (Remedies) & Part B (Threats)
  4) Storm Overflow Assessment Framework (SOAF)
  5) Capacity Assessment Framework (CAF)
  6) Internal sewer flooding
  7) External sewer flooding
  8) Pollution incidents (category 1, 2 and 3)
  9) WwTW quality compliance
  10) WwTW flow compliance
  11) Storm overflow spills
  12) Other RMA drainage systems
  13) Planned residential new development
  14) WINEP
  15) Sewer collapses
  16) Sewer blockages

RISK BASED CATCHMENT SCREENING (RBCS)

Indicator	Measure	Description	Proceed to DWMP Baseline Risk and Vulnerability Assessment?		
			Calculation/statement	Yes	No
Catchment characterisation (stage 2 of the wastewater resilience metric methodology). **(Tier 2 indicator)[2]**	Catchment characterisation score from the PR19 common performance commitment.	Provides a mechanism to understand the vulnerability of the catchment/sub-catchments to sewer flooding as a result of an extreme wet weather event.	Condition is based on the catchment vulnerability score (i.e. score from 1-5 based on catchment characteristics). Metric has a size exclusion principle for PR19 but it is anticipated that all catchments irrespective of size will be considered at PR24. As such it is considered that this indicator can be applied to all catchments in AMP7 (2020-2025).	Catchment vulnerability score = 4 or 5 (out of 5).	Catchment vulnerability score <4 (out of 5).
Intermittent discharge impacts upon bathing or shellfish waters.		Mechanism to understand the significance of any impact of water company operations on environmental receptors (bathing or shellfish waters).	Any of the intermittent discharges within the catchment.	For intermittent discharges with existing quantitative spill frequency trigger permit conditions, event duration monitoring (EDM) results indicate that investigations are likely to be triggered: > For intermittent discharges impacting upon designated bathing waters, EDM spill frequency records 5 spills per bathing season for any bathing season in the previous 5 years. Or model predictions (if available) indicate that these are likely to be crossed within the next 5 years. > For intermittent discharges impacting upon designated shellfish waters, EDM spill frequency records 14 spills per annum for any year in the previous 5 years. Or model predictions (if available) indicate that these are likely to be crossed within the next 5 years. The above spill frequencies are defaults relating to standard permit conditions (3 spills per bathing season for bathing waters, 10 spills per annum for shellfish waters), where different values are in the permit then they are to be amended accordingly.	

RISK BASED CATCHMENT SCREENING (RBCS)

Indicator	Measure	Description	Proceed to DWMP Baseline Risk and Vulnerability Assessment?		
			Calculation/statement	Yes	No
Continuous or intermittent discharge impacts upon other sensitive receiving waters (part A).		Mechanism to understand the significance of any impact of water company operations on environmental receptors.	Any of the continuous or intermittent discharges within the catchment has a relevant water company:	> Action recorded as 'planned' or 'underway' on the Natural Resources Wales Actions Database. Or: > 'Remedy' on Natural England's Designated Sites system (associated with freshwater pollution discharges or freshwater drainage). Relating to improving or maintaining the condition of a SSSI, Natura 2000 or Ramsar site (where measures will not be completed prior to the DWMP base year, to address the issues). And/or: > Are included within a Nutrient Management Plan and/or a Diffuse Water Pollution Plan, requiring water company action to improve the discharge.	
Continuous or intermittent discharge impacts upon other sensitive receiving waters (part B). **(Tier 2 indicator)[2]**		Mechanism to understand the significance of any impact of water company operations on environmental receptors.	Any of the continuous or intermittent discharges within the catchment has a relevant water company:	> Action recorded as 'identified' on the Natural Resources Wales Actions Database. Or: > 'Threat' on Natural England's Designated Sites system (associated with water pollution). Relating to improving or maintaining the condition of a SSSI, Natura 2000 or Ramsar site (where measures will not be completed prior to the DWMP base year, to address the issues).	
Storm Overflow Assessment Framework (SOAF).		SOAF procedures: > Current activity instigated > Potential for future activity	Are any SOAF investigations ongoing in the catchment, or planned (i.e. EDM data has crossed the SOAF spill frequency investigation triggers), or are likely to be triggered?	Yes, or, model predictions (if available) indicate that SOAF spill frequency investigation triggers are likely to be crossed within next 5 years.	No
Capacity assessment framework (CAF).	The focus is on the outputs from either the Initial or Enhanced approaches for the 'present day' case. There are accepted issues around the confidence in outputs from the Initial model which does not include for surface water inputs; in this case some engineering judgement may be required to supplement the outputs.	Provides an indication of capacity constraints in the network as a leading indicator to service failure.	Assessment focuses on the 'present day' case. Any 10km hexagon covering the catchment that is:	Categorised as 4 or 5 (due to performance, in full or part, within the catchment being assessed). However, in making this overall assessment, companies can exclude hexagons on the peripheral of the catchment categorised as 4 or 5, where these do not represent a significant catchment constraint (potential for growth in the peripheral area needs to be considered). Companies have discretion to take through those that may be categorised as 3, dependent on confidence in the model or where catchments contain individual 1km hexagons representing a major constraint.	

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Indicator	Measure	Description	Proceed to DWMP Baseline Risk and Vulnerability Assessment?		
			Calculation/statement	Yes	No
Internal sewer flooding[3].	PR19 common performance commitment (internal sewer flooding)[4].	Historical measure that records the number of internal flooding incidents per year (sewerage companies only) indicative of capacity constraints. Note that this is a variation from the PR19 common performance commitment so the numbers considered in this assessment, as they exclude extreme events, will differ from figures reported for the performance commitment.	For small catchments < 2,000 pe.	> Number of incidents is > 1 in total over the last 3 years And, if the incidents have been caused by hydraulic overload only: > Measures have not been put in place to address sewer flooding risk (e.g. permanent solutions for hydraulic overload) for all properties that have experienced flooding incidents in the last 3 years.	
			For catchments >= 2,000 pe, and 3-year average performance at a company level (based on number per 10,000 connections[5]) is upper quartile.	Annual flooding incidents (number per 10,000 connected properties) in any of the preceding 3 years is greater than the company average. And: > The number of incidents is > 1 in total over the last 3 years And, if the incidents have been caused by hydraulic overload only: > Measures have not been put in place to address sewer flooding risk (e.g. permanent interventions for hydraulic overload) for all properties that have experienced flooding incidents in the last 3 years.	
			For catchments >= 2,000 pe, and 3-year average performance at a company level (based on number per 10,000 connections[5]) is not upper quartile.	> Annual flooding incidents (number per 10,000 connected properties) in any of the preceding 3 years is greater than the baseline value for upper quartile performance[7]. And: > The number of incidents is > 1 in total over the last 3 years And, if the incidents have been caused by hydraulic overload only: > Measures have not been put in place to address sewer flooding risk (e.g. permanent interventions for hydraulic overload) for all properties that have experienced flooding incidents in the last 3 years.	

RISK BASED CATCHMENT SCREENING (RBCS)

Indicator	Measure	Description	Proceed to DWMP Baseline Risk and Vulnerability Assessment?		
			Calculation/statement	Yes	No
External sewer flooding[3].	PR19 asset health performance commitment (external sewer flooding)[4].	Historical measure that records the number of external flooding incidents per year (sewerage companies only) indicative of capacity constraints.	For small catchments < 2,000 pe.	> Number of incidents is > 10 in total over the last 3 years And, if the incidents have been caused by hydraulic overload only: > Measures have not been put in place to address sewer flooding risk (e.g. permanent solutions for hydraulic overload) for all properties that have experienced flooding incidents in the last 3 years.	
			For catchments >= 2,000 pe, and 3-year average performance at a company level (based on number per 10,000 connections) is upper quartile.	Annual flooding incidents (number per 10,000 connected properties) in any of the preceding 3 years is greater than the company average. And: > The number of incidents is > 10 in total over the last 3 years And, if the incidents have been caused by hydraulic overload only: > Measures have not been put in place to address sewer flooding risk (e.g. permanent interventions for hydraulic overload) for all properties that have experienced flooding incidents in the last 3 years.	
			For catchments >= 2,000 pe, and 3-year average performance at a company level (based on number per 10,000 connections) is not upper quartile.	> Annual flooding incidents (number per 10,000 connected properties) in any of the preceding 3 years is greater than the baseline value for upper quartile performance. And: > The number of incidents is > 10 in total over the last 3 years And, if the incidents have been caused by hydraulic overload only: > Measures have not been put in place to address sewer flooding risk (e.g. permanent interventions for hydraulic overload) for all properties that have experienced flooding incidents in the last 3 years.	
Pollution incidents (Category 1, 2 and 3)[8].	As per the 2017 definition of the Environmental Performance Assessment (EPA).	Historical measure that identifies incidents of unexpected release of contaminants that have resulted in environmental damage.	Based on EPA data and thresholds.	> For any of the previous three years data, a category 1 or 2 incident has occurred. Or: > For any of the previous 3 years data the average annual performance for the catchment is classed as 'Amber' or 'Red' (for 2017, this being greater than 25 incidents per 10,000 km of sewer). And, where only one category 3 incident has been recorded in the last 3 years: > Measures have not been put in place to address pollution risk, i.e. there is a significant risk of re-occurrence of a pollution incident. For clarity, if for any two of the previous 3 years data the average annual performance for the catchment is classed as 'Amber' or 'Red', then the indicator is breached.	

RISK BASED CATCHMENT SCREENING (RBCS)

Indicator	Measure	Description	Proceed to DWMP Baseline Risk and Vulnerability Assessment?		
			Calculation/statement	Yes	No
WwTW quality compliance.	As per the 2017 definition of the Environmental Performance Assessment (EPA).	Historical measure relating to the performance of the treatment works (discharge permit compliance (numeric)).	Based on EPA criteria.	> In any of the previous 3 years, the WwTW discharge has been confirmed as failing and was included as such in the calculation of overall permit compliance. And: > Measures have not been put in place, or are not required (subject to Natural Resource Wales / Environment Agency agreement), to address the cause(s) of compliance failure.	
WwTW dry weather flow compliance.	Based on measured flow volumes where available and calculated flows where measured flows are not available.	Historical measure of compliance with flow permits.	Where flow measurement is undertaken, using all available flow data has the Q90 of the measured yearly flows exceeded the dry weather flow permit condition on two consecutive years in the last 5 years?	> Yes, with no measures in place to address compliance risk (or required by the Environment Agency / Natural Resources Wales). > Yes, measures have been put in place that address compliance risk but are considered temporary/short-term solutions.	No Or: Yes, measures have been put in place that address compliance risk and are considered permanent long-term solutions
			Where no flow measurement is in place, or in respect of maximum flows, do headroom calculations indicate the works is at risk of exceeding its flow permit conditions?	Yes	No
Storm overflows.	The focus is on using available data to examine permit risks that have not been captured by other indicators. Where monitoring is not in place consideration will need to be given to reported concerns.	Examines issues associated with all storm overflows not captured by other indicators (e.g. issues to be considered include non-compliance with pass forward flow conditions, storm storage conditions (where relevant) and screening requirements).	Is there evidence to indicate that over the last 3 years any overflow is not operating in accordance with permit conditions?	Yes	No

RISK BASED CATCHMENT SCREENING (RBCS)

Indicator	Measure	Description	Proceed to DWMP Baseline Risk and Vulnerability Assessment?		
			Calculation/statement	Yes	No
Risks from interdependencies between RMA systems.		A mechanism to understand risk posed by other RMA assets in the catchment.	Risk to be based on developing an understanding of whether there have been historical issues in the catchment through engagement with relevant stakeholders. Fluvial, coastal and surface water flooding potentially impacting on sewer networks (e.g. locking of outfalls) may be assessed through use of Environment Agency flood risk maps overlaid on the catchment area.	Yes, where it is considered that significant risks arise from interaction with other RMA drainage systems / receiving waterbodies.	No
Planned residential new development.		Uses predicted residential population growth forecasts to target catchments requiring investigations for potential future capacity constraints.	Company specific existing long-term forecasts.	Planned residential new development (including committed and infill (e.g. latter based on historical growth patterns)) predicted to be greater than the thresholds shown in Figure B-1 and Table B-3.	
WINEP.	WINEP sets out the actions that companies will need to complete to meet their environmental obligations.	Details the specific drivers for mitigating measures.	Known WINEP drivers for specific drainage and wastewater catchments. Investigations, option appraisals and scheme drivers to be included. 'Monitor only' drivers are to be excluded from the indicator, but recorded in the narrative (to ensure recognition for funding). Only drivers related to wastewater activities to be included. Clean water activities are to be considered on a case by case basis for those that impact/have potential to impact on wastewater activities.	There are known WINEP drivers impacting the specific Level 3 catchment (it is noted that the DWMP methodology will outline approaches to delivery of WINEP outcomes (e.g. river catchment based permitting) which could include assessment of specific Level 3 catchments which may not have been progressed to detailed DWMP methodology assessments).	

RISK BASED CATCHMENT SCREENING (RBCS)

Indicator	Measure	Description	Catchment prioritisation criteria	
			Calculation/statement	
Sewer collapses.	PR19 common / asset health performance commitment (sewer collapses)[4].	Historical measure that identifies risks to the integrity of the sewer system.	For catchments <2,000 pe.	**Higher priority:** > Sewer collapses are > 2 per year in any of the preceding 3 years and measures have been put in place designed to reduce sewer collapse risk, but they are considered temporary/short-term solutions **Lower priority:** > Sewer collapses are > 2 per year in any of the preceding 3 years and measures have been put in place designed to resolve sewer collapse risk, and they are considered long-term (permanent) solutions Or: > Sewer collapses are <= 2 per year in any of the preceding 3 years
			For catchments >2,000 pe.	If the number of collapses (normalised by sewer length) in any of the preceding 3 years is greater than the average for the company over the last year.
Sewer blockages.	PR19 asset health performance commitment (sewer blockages)[4].	Historical measure that records obstructions in a sewer (that require clearing) which causes a reportable problem (not caused by hydraulic overload), such as flooding or discharge to a watercourse, unusable sanitation, surcharged sewers or odour.	For all catchments.	If the number of blockages (normalised by sewer length) in any of the preceding 3 years is greater than the company average.

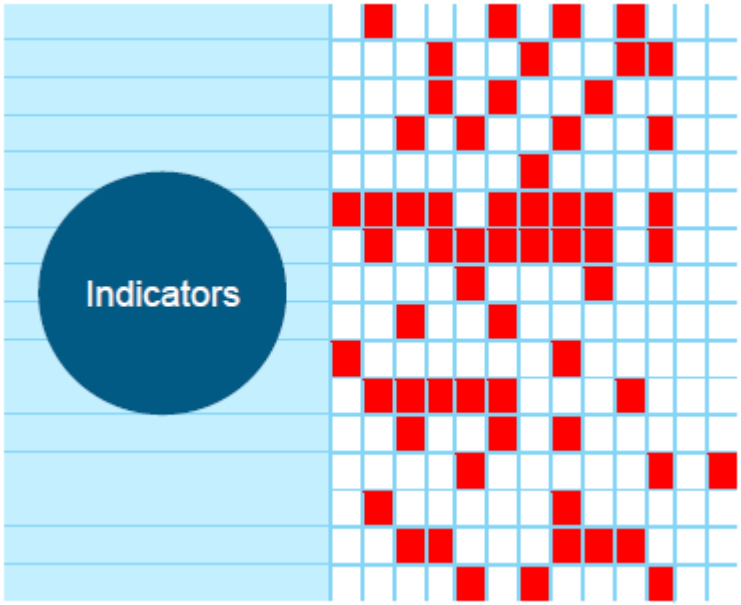
RISK BASED CATCHMENT SCREENING (RBCS)

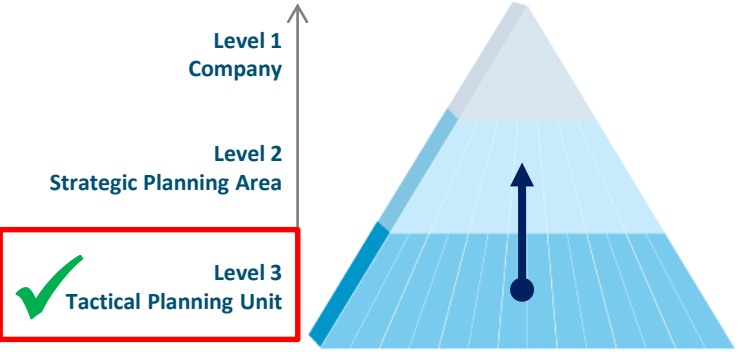
BRAVA triggered if either:

a) ***two or more*** indicators are breached (excluding sewer collapses and blockages)

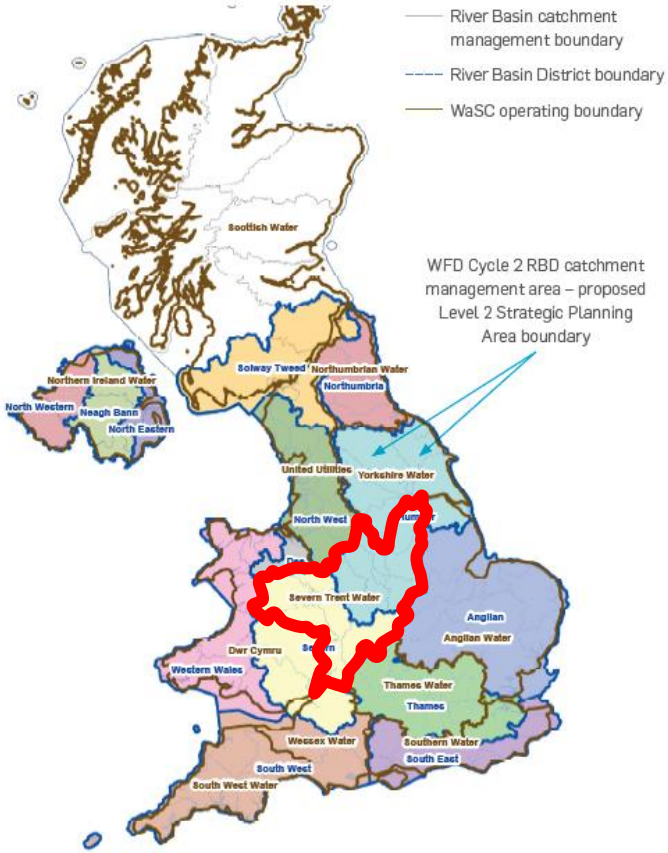
b) **one** indicator is breached (again excluding sewer collapses and blockages) where the indicator is included in the first tier.

If **only** sewer collapses and/or blockages indicators fail then these alone do not trigger a breach.

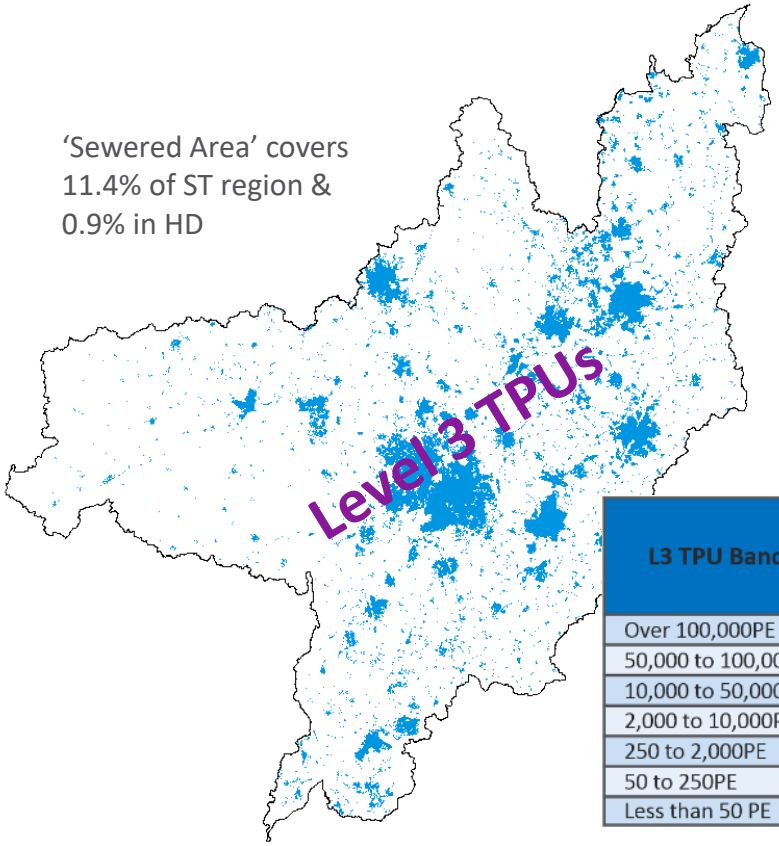




DEFINING PLANNING AREAS

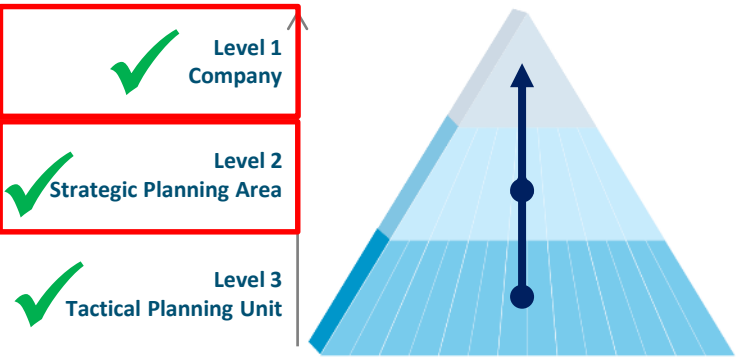


WFD River Basin Management Districts

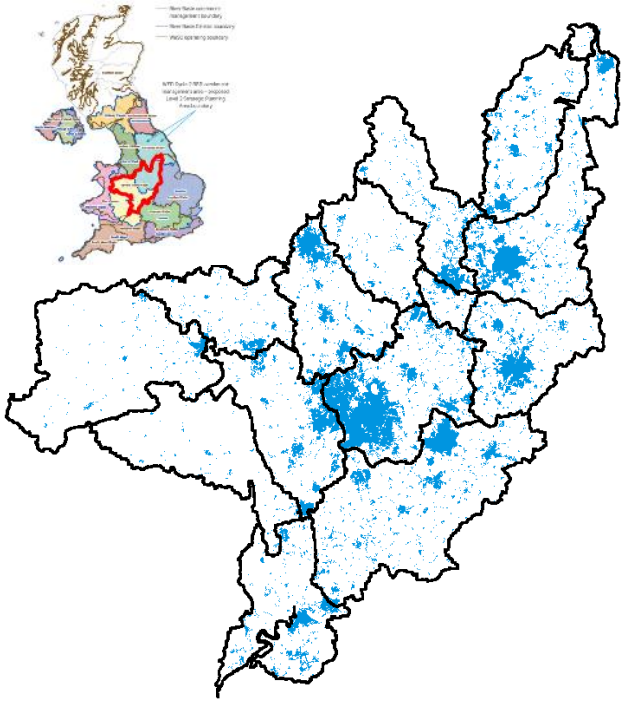


L3 TPU Band	Nr of L3 TPUs
Over 100,000PE	19
50,000 to 100,000PE	17
10,000 to 50,000PE	85
2,000 to 10,000PE	139
250 to 2,000PE	283
50 to 250PE	234
Less than 50 PE	231

1008 WwTW catchments



DEFINING PLANNING AREAS



River Basin Management Districts overlaid on top of WwTW boundaries

Tweaking to avoid SPA overlap

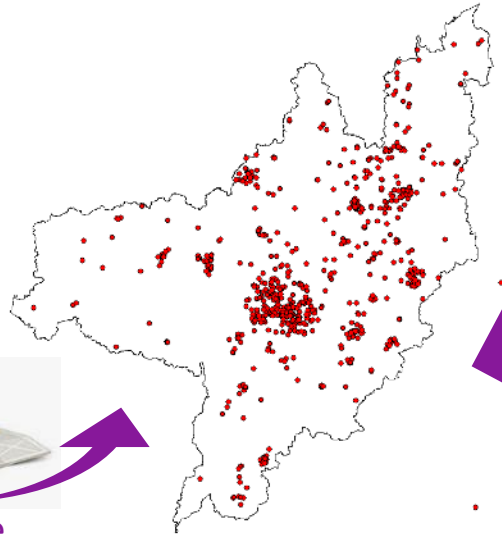
Level 1 Company

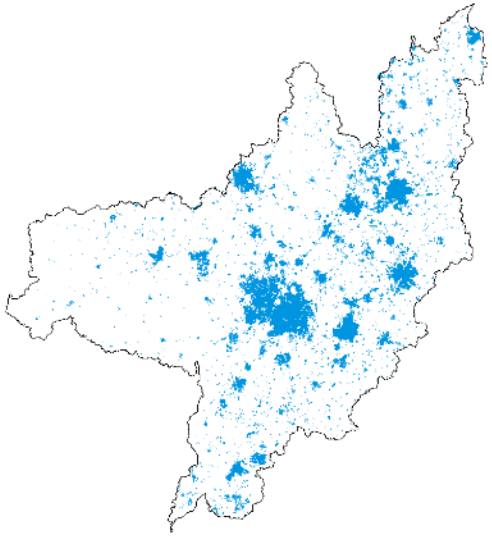
14 Level 2 Strategic Planning Areas

SPATIAL DATA ANALYSIS

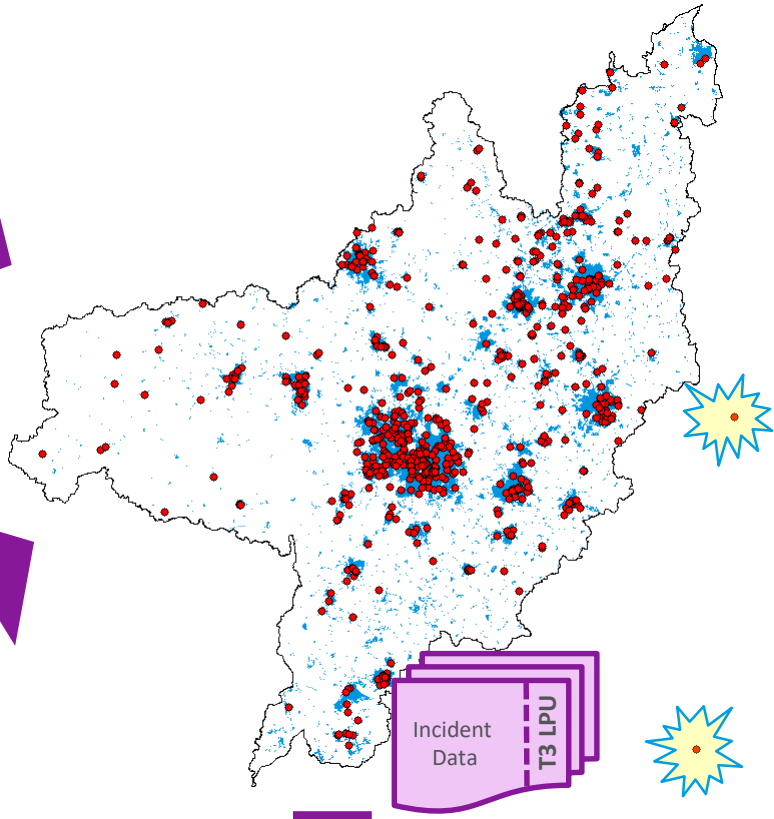
Raw Incident Data

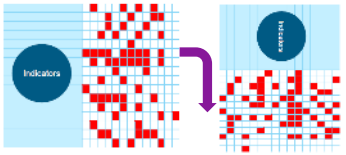
Geocode





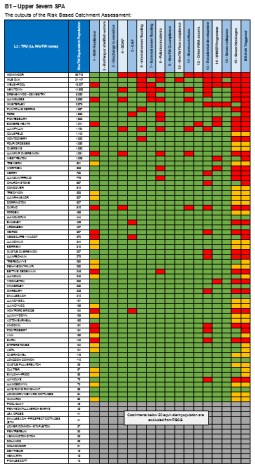
Level 3 Tactical Planning Unit
(aka WwTW catchments)



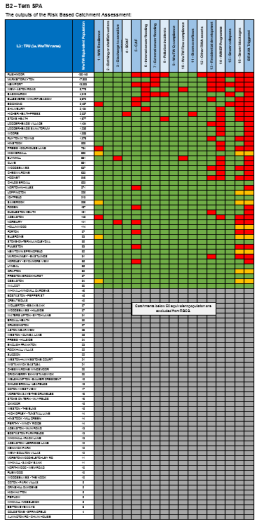


RBCS SAMPLE OUTPUT

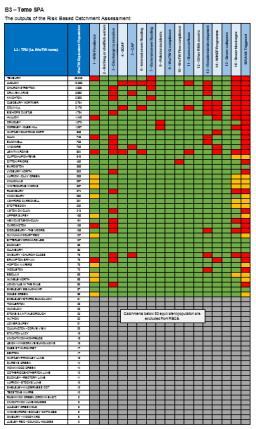
1: Upper Severn



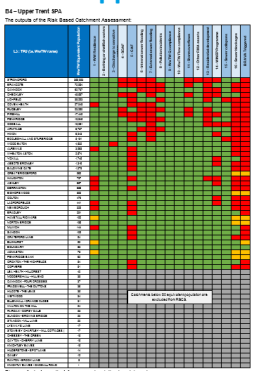
2: Tern



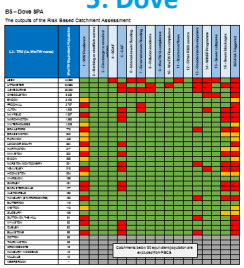
3: Teme



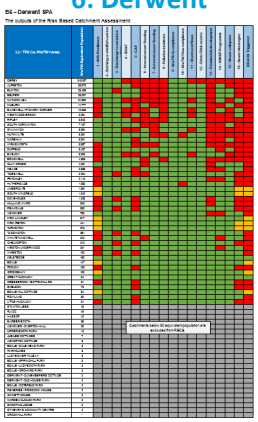
4: Upper Trent



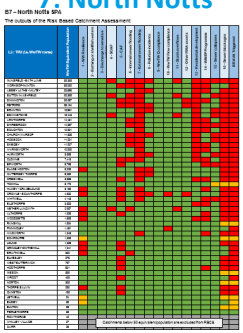
5: Dove



6: Derwent

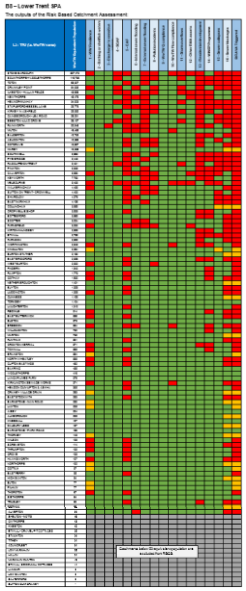


7: North Notts

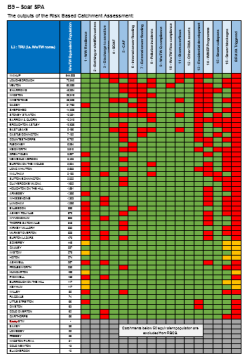


Catchments below 50 PE greyed out

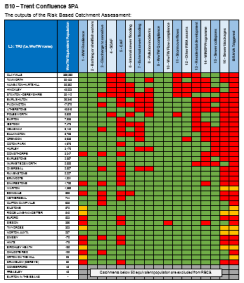
8: Lower Trent



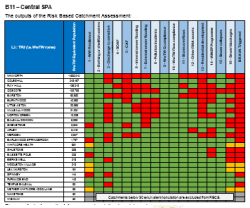
9: Soar



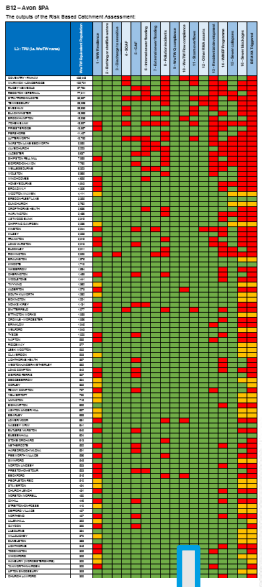
10: Trent Confluence



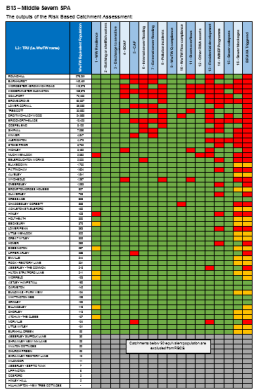
11: Central



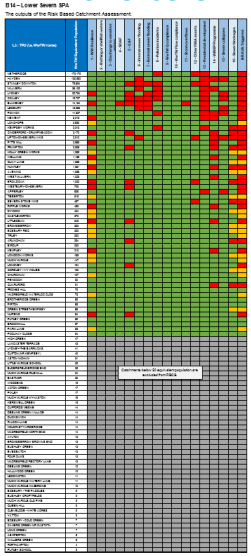
12: Avon

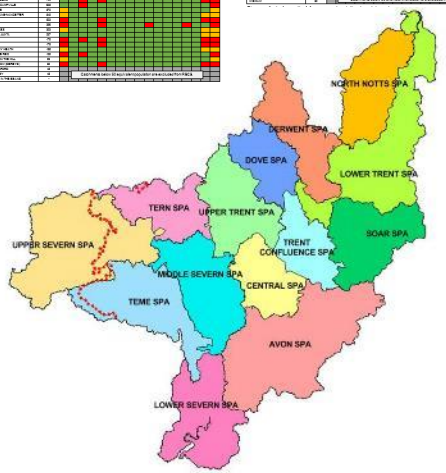


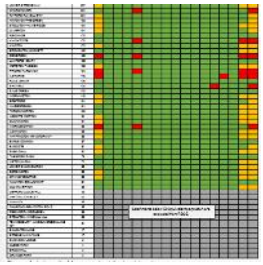
13: Middle Severn



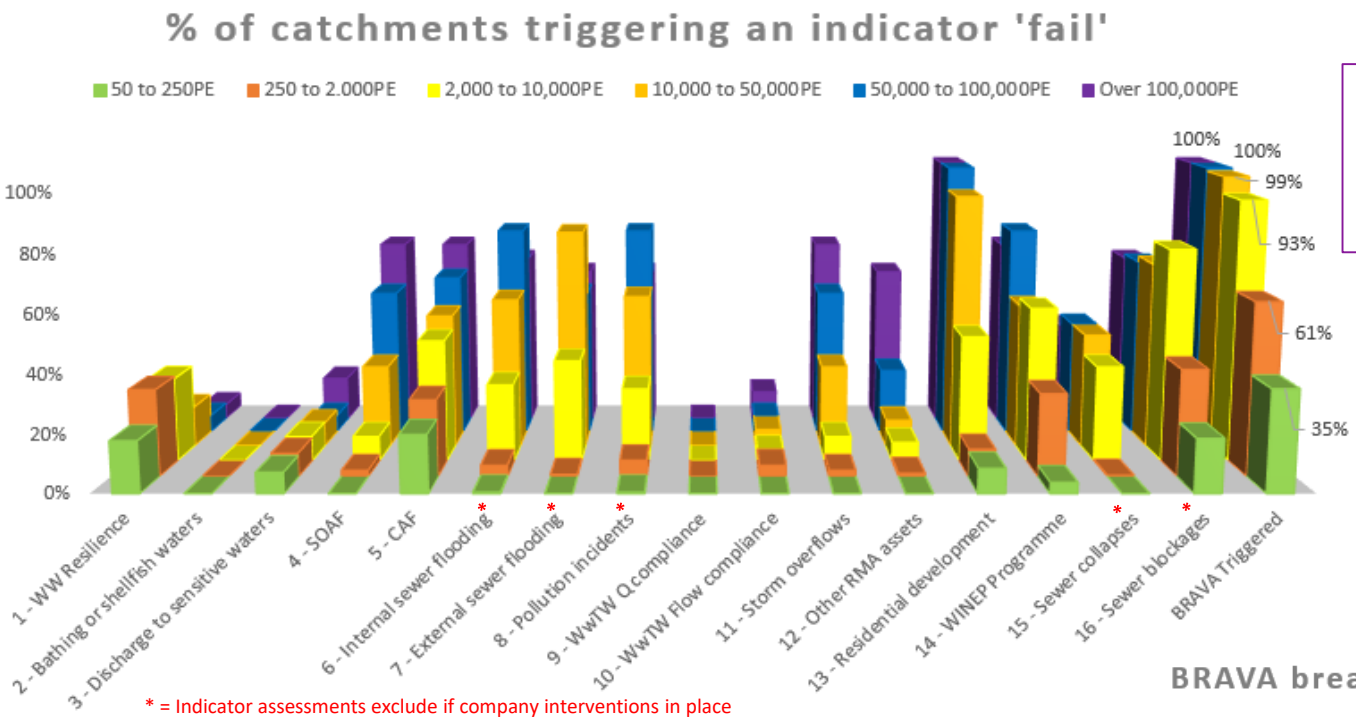
14: Lower Severn





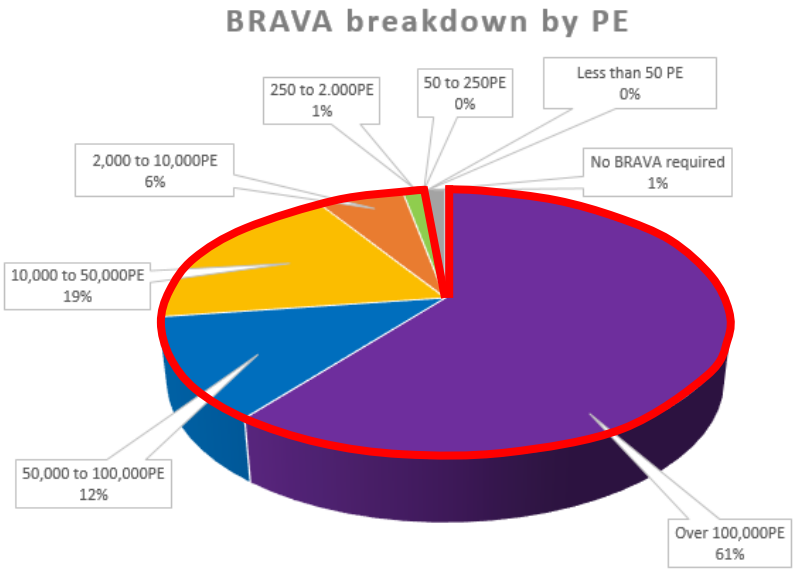


RBCS STATISTICS



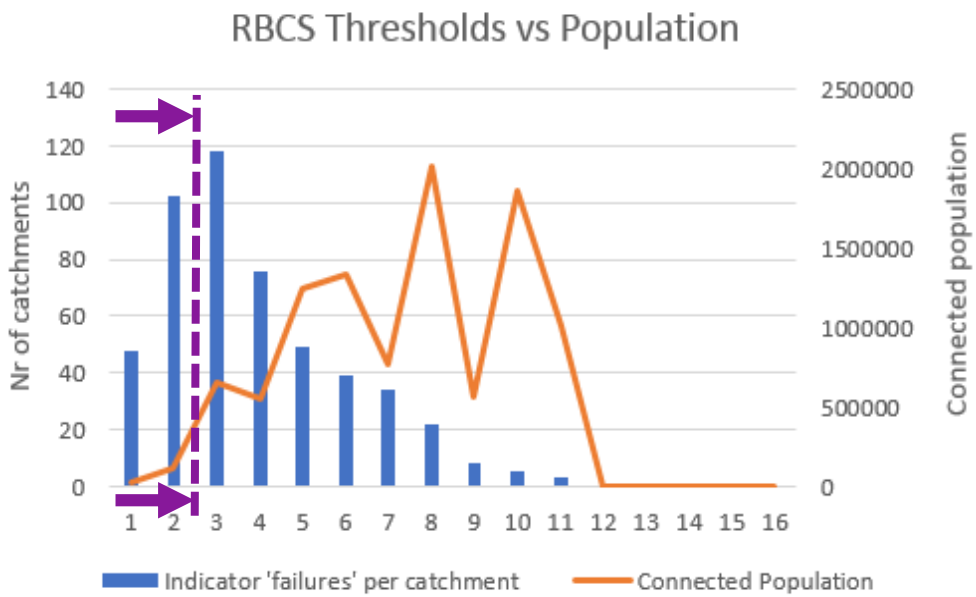
504

L3 TPUs triggering BRAVA
(99% of connected population)



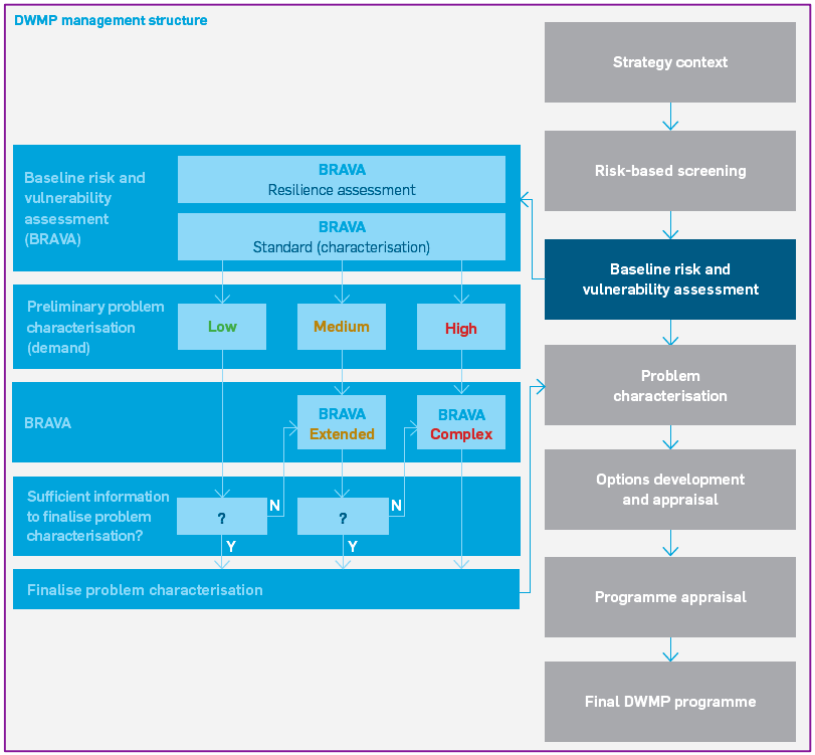
99% of connected population!

RBCS STATISTICS



- Raising the BRAVA trigger to 3 or more ‘failures could reduce catchments by 20% yet only 1.4% of PE affected
- But need to consider what indicators are triggering
- Need to align to BRAVA process

BRAVA



QUESTIONS

RBCS BREAKOUT

Breakout into 4 groups:

In your respective groups, the 16 indicators haven been split into 'Environmental' and 'Capacity' catchment needs. For each indicator, using *Post-it Sticky Notes,* can we please have your comments on:

A. What are the ***STRENGTHS*** of this metric?
(What do you like about this indicator? How will it drive the right behaviours?)

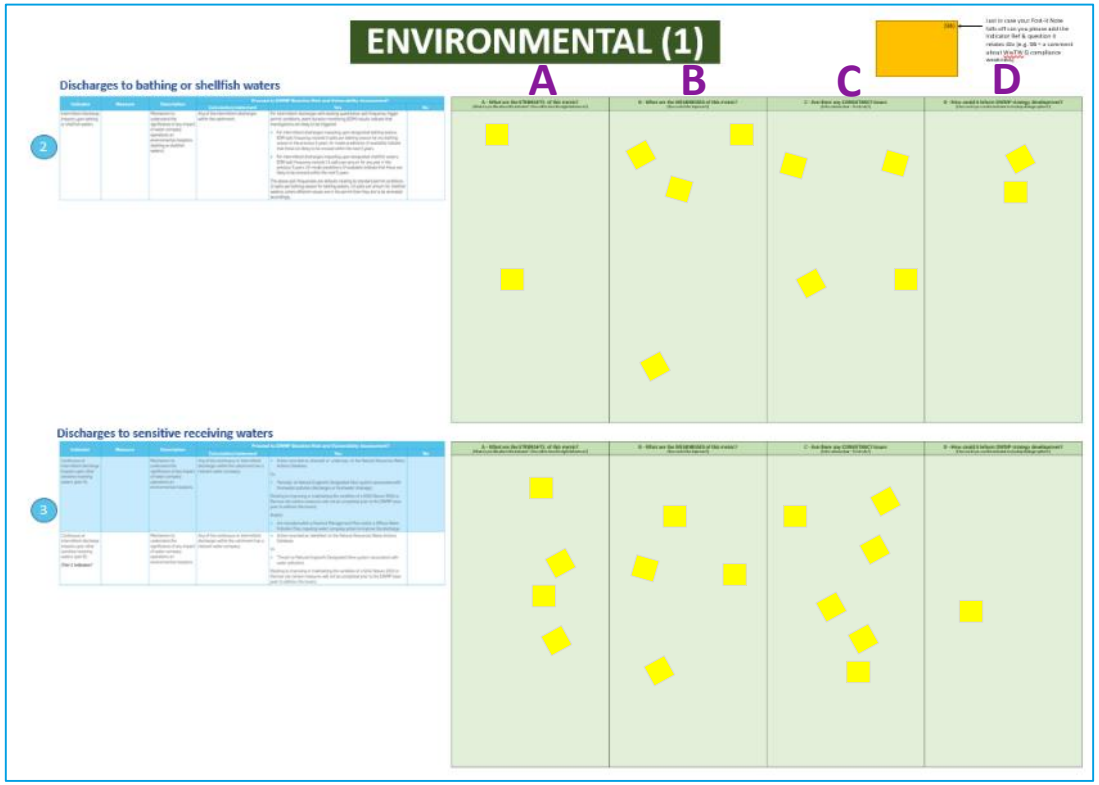
B. What are the ***WEAKNESSES*** of this metric?
(How could it be improved?)

C. Are there any ***CONSISTANCY*** issues
(Is the criteria clear – if not why?)

D. How could it inform DWMP ***strategy development***?
(How would you use this indicator to develop strategic options?)

Groups 1 & 3	Groups 2 & 4
2: Intermittent discharge impacts upon bathing or shellfish waters. **3: Continuous/intermittent discharges to sensitive waters.** **4: Storm Overflow Assessment Framework (SOAF)** **8: Pollution incidents (category 1, 2 and 3)** **9: WwTW quality compliance** **10: WwTW flow compliance** **11: Storm overflow spills** **14: WINEP**	**1: Wastewater 1 in 50 year resilience** **5: Capacity Assessment Framework (CAF)** **6: Internal sewer flooding** **7: External sewer flooding** **12: Other RMA drainage systems** **13: Planned residential new development** **15: Sewer collapses** **16: Sewer blockages**

BREAKOUT



A. What are the ***STRENGTHS***?

What do you like about this indicator?
How will it drive the right behaviours?

B. What are the ***WEAKNESSES***?

How could it be improved?

C. Any ***CONSISTANCY*** issues

Is the criteria clear – if not why?

D. How could it inform DWMP ***strategy development***?

How would you use this indicator to develop strategic options?