Catchment Characterisation

The Desk-based Assessment

November 2021

Local Authority Waters Programme
vibrant communities | catchment assessment | healthy waters

Donal Daly

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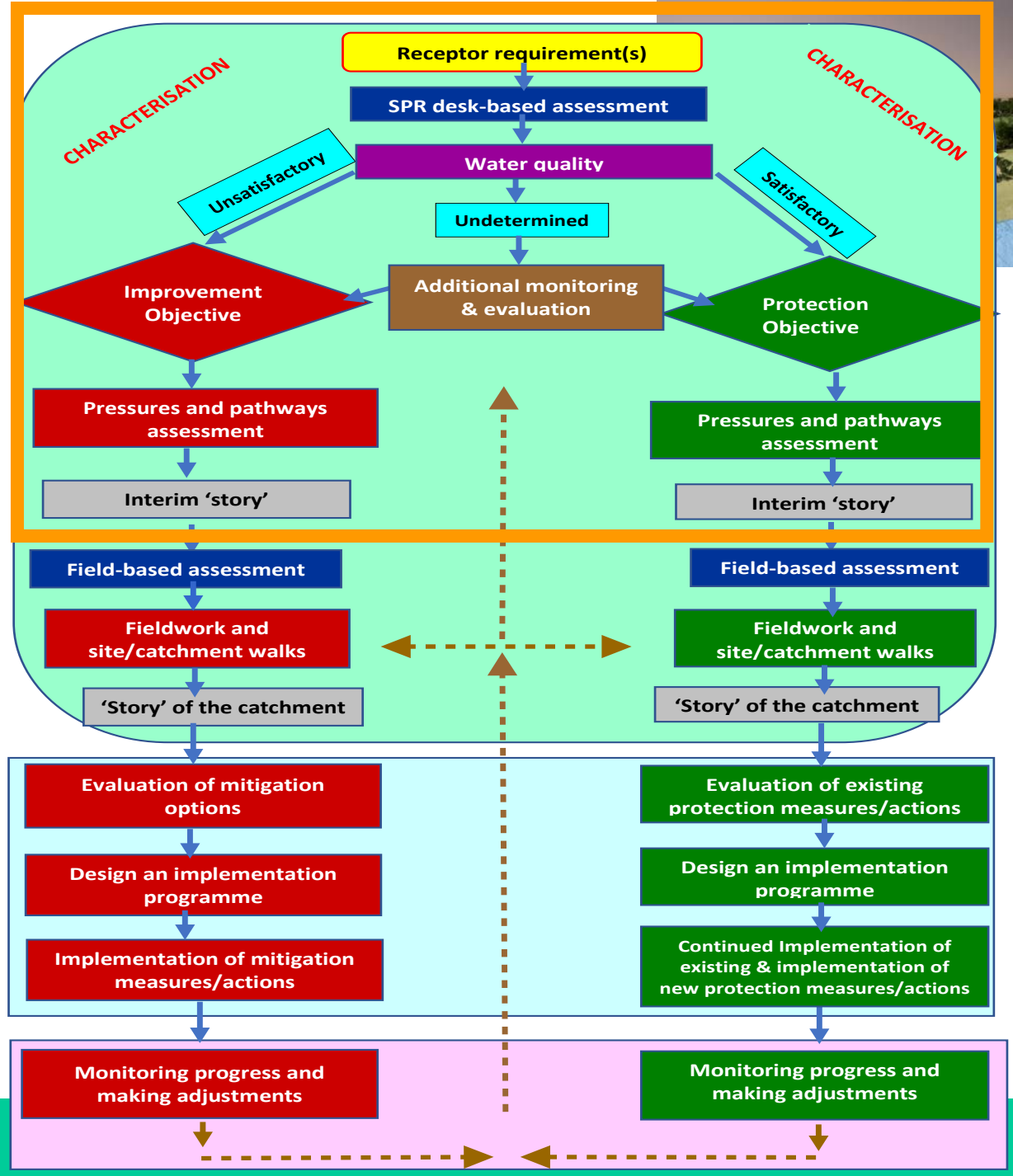
Valued water resources supporting vibrant communities

Recommended process

- 3 broad stages:

1. Characterisation.
2. Protection & mitigation actions
3. Monitoring progress and making adjustments



Objectives for this session

- To give an overview of what is involved in doing a desk-based assessment.
- To recommend and describe a sequence for undertaking the desk-based assessment:
  1. Compilation of background information.
  2. An evaluation of receptor information, followed by a conclusion on the *significant issue(s) or* potential pollutants.
  3. An examination of the pressures, followed by a decision on whether there are *significant pressures* and, if not, on any potential pressures.
  4. Compilation and evaluation of relevant information (mainly maps) that enable a description and understanding of water and pollutant movement in the landscape.
  5. Writing the "story" of the subcatchment.
  6. Concluding on the work plan.

Reference material

- See Section 10 of Volume 1

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Catchment Science and Management

A Guidance Handbook

Volume 1:
An Overview of Catchment Science and Management

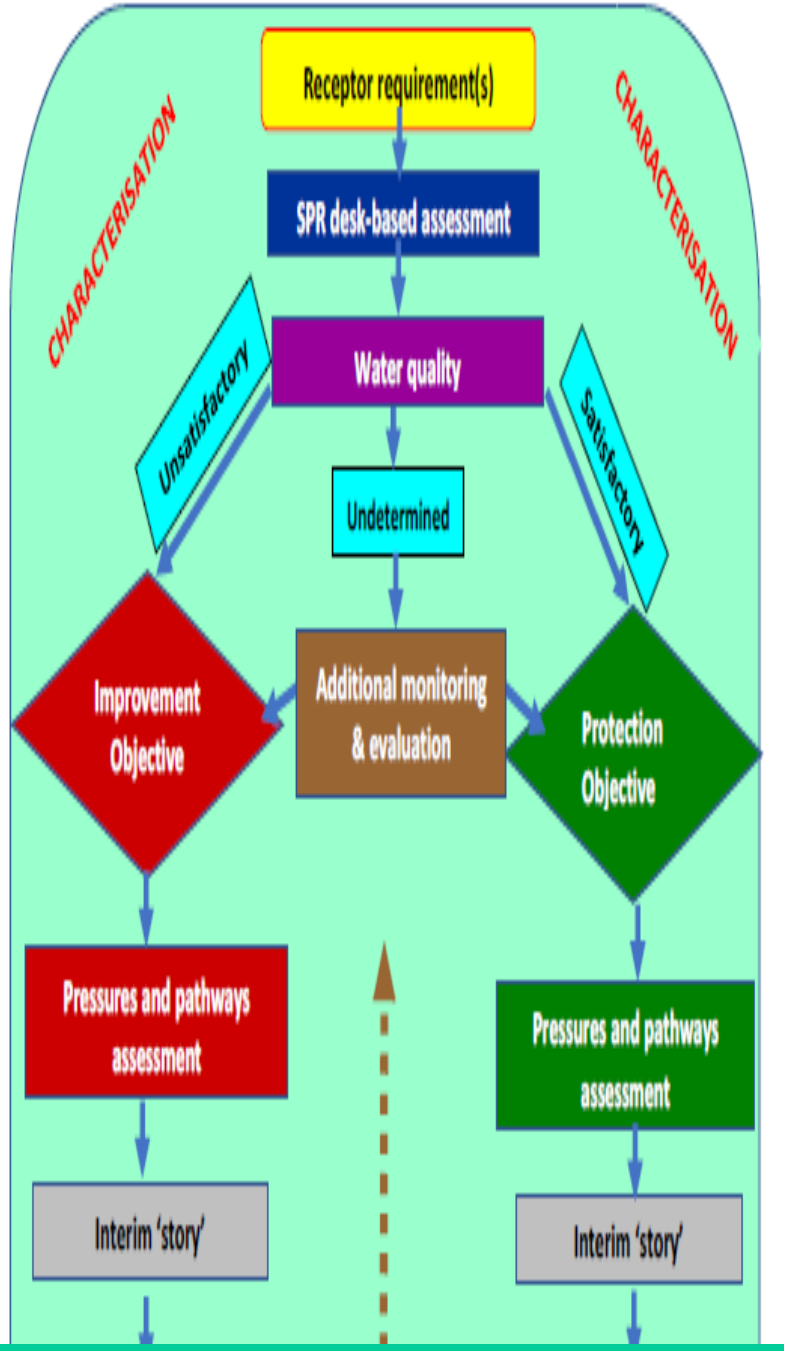
November 2021
Version no. 2

Some key overriding points

1. The Desk Study analysis and report provides the basis and the plan of action for further work, i.e. a critical but also limited remit - it is the first step.

2. The overall objective will either be to 'improve/restore' or 'maintain/protect' the receptor water quality, depending on the circumstances.

3. Therefore the starting point and 'driver' is the receptor water quality monitoring information.



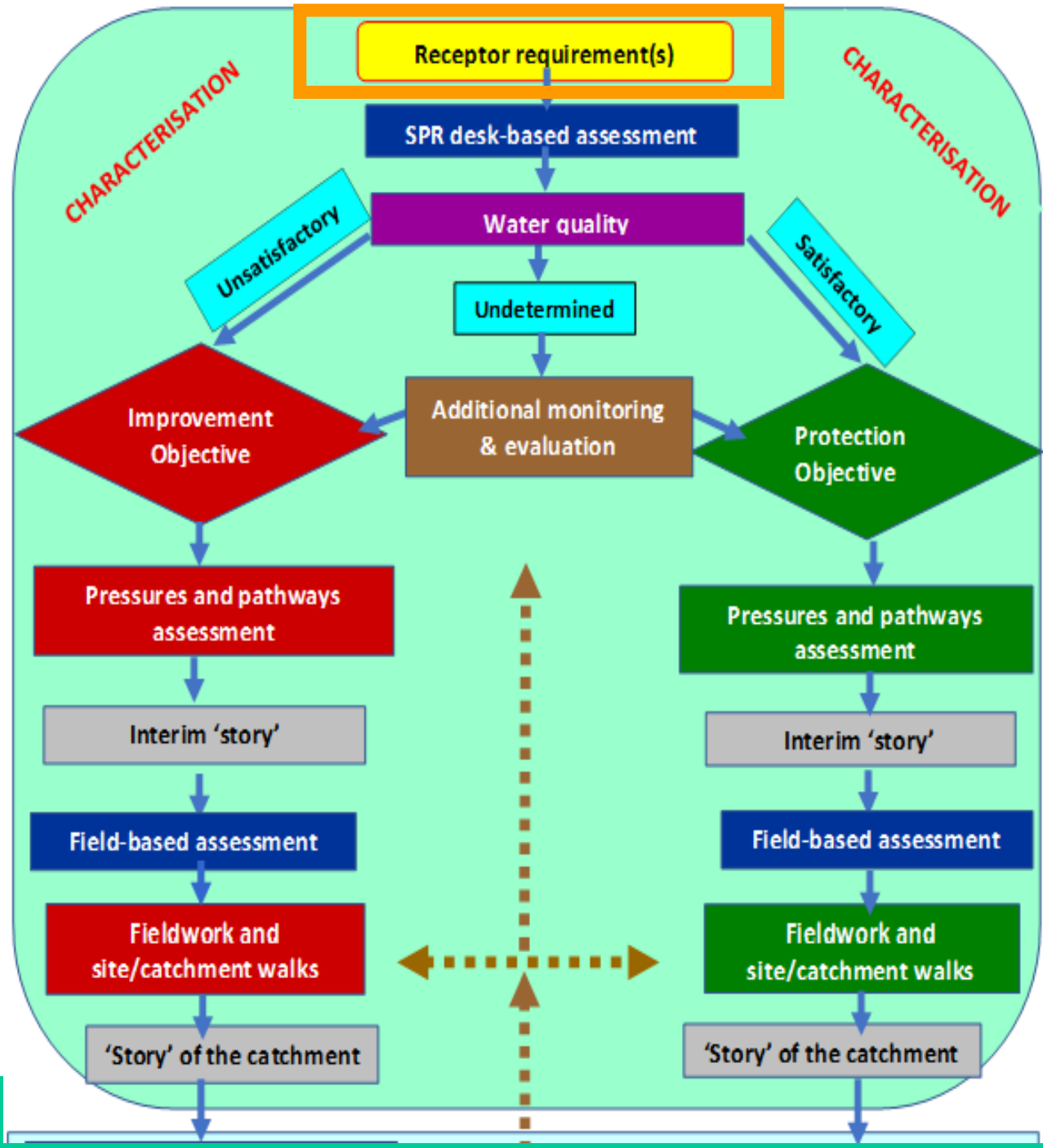
Desk-based Activities

1. Decision on the receptor objectives & the associated water quality requirements/metrics.
2. Monitoring (if needed)
3. Assessment of monitoring data
   - 'Satisfactory' Vs 'unsatisfactory'
   - Trends
   - Significant issues/pollutants where unsatisfactory
   - Potential pollutants where satisfactory.
4. Delineate/check catchment area/ZOC.
5. Mapping & assessment of pressures
   - Diffuse & point
   - Loadings analysis where relevant & feasible.
6. Pathway analysis & characteristics
   - Susceptibility, vulnerability, soil drainage
   - Location of CSAs or possible future CSAs
7. Interim 'story'/initial risk assessment

Characterisation

❑ Receptor Requirement?

- ❖ Good or High WFD status
- ❖ A reducing trend in pollutant concentrations.
- ❖ Satisfactory untreated water quality in a drinking water source.
- ❖ Compliance with a licence or Regulation.
- ❖ Satisfactory water quality in vicinity of an inspected potential pollution source.
- ❖ **Vital to ask & answer this question to ensure that efforts and resources are targeted.**



What is the objective? The starting point.

- **General assumption for this presentation:**
  - Situation is a subcatchment with WBs that are impacted from either a WFD or drinking water perspective, e.g. an *At Risk*, moderate status WB or a drinking water source with WQ values above the 'guide values'. There may be some associated *Not at Risk* WBs.
  - That there is some MP information.
  - Diffuse and small point sources are the *significant pressures*.
- To decide on what the *significant issue(s)* and *significant pressure(s)* are.
- To locate where the issues and pressures are arising. (Getting the precise locations is likely to require fieldwork, but the desk study should 'signpost' the likely areas.)
- To start to consider what mitigation strategies, measures and actions are needed.

The outlined approach can be adapted to other specific situations that may be relevant, e.g. a small headwaters stream or a ZOC for a well or where the objective is to 'protect'.

Overall approach to the desk-based assessment

1. Use the source-pathway-receptor (SPR) framework as the thought process.

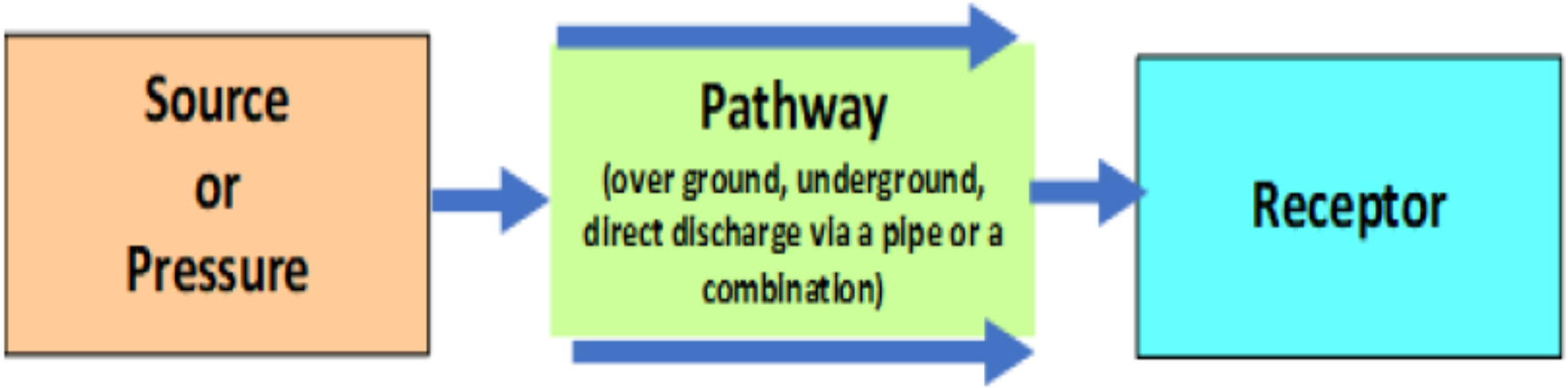


Figure 1-2: The source-pathway-receptor (SPR) model for environmental management.

Overall approach to the desk-based assessment

2. Think in terms of the **catchment area** of the watercourse.

3. As the work is being undertaken, consciously develop a **mental model** of the situation, which will evolve as more information becomes available.

4. Only collect and evaluate information that is relevant.

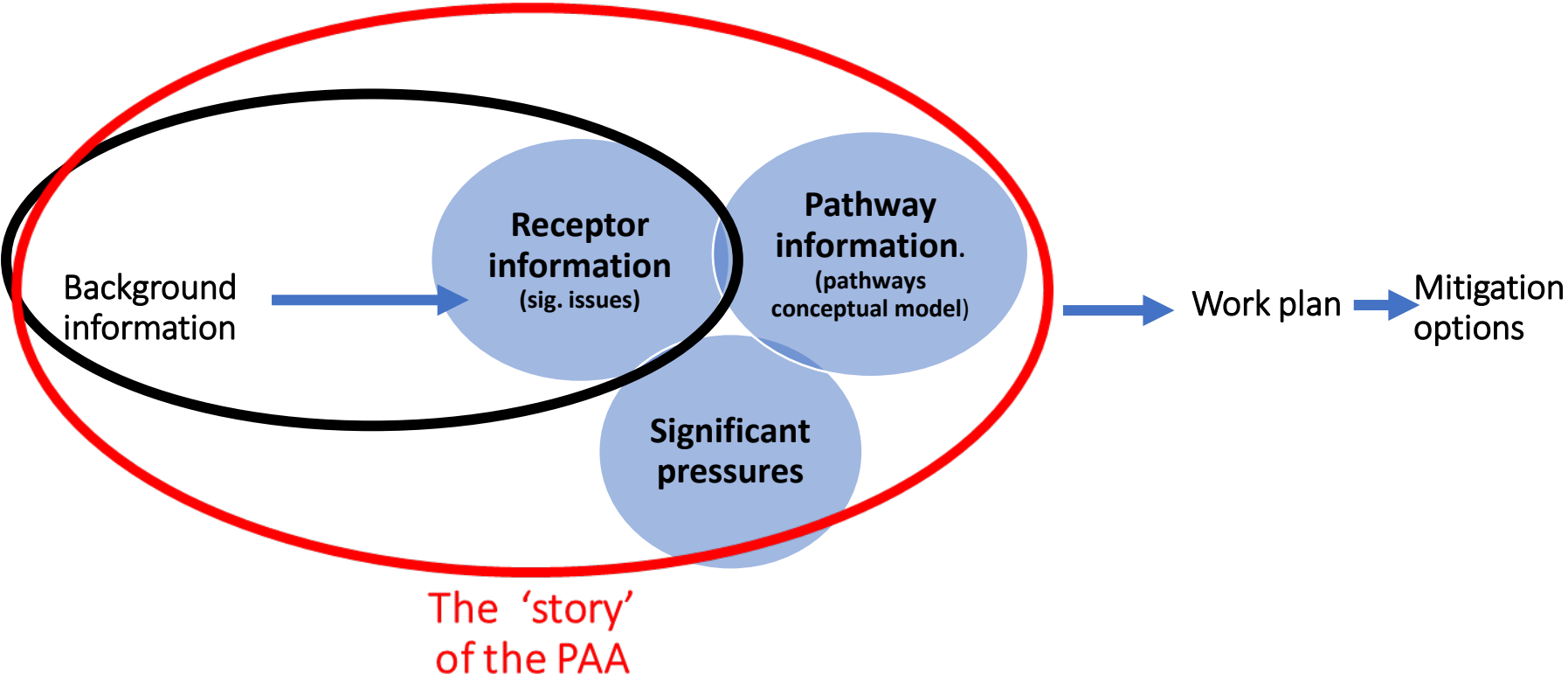
5. Use the information in the WFD App as the starting point.

6. Check for and use other existing relevant data in your own organization.

Overall approach to the desk-based assessment

7. For *Not at Risk* WBs, assess water quality trends.
8. For catchment areas of *Review* water bodies, additional monitoring needed.
9. Developing a pathways conceptual model (PCM) is recommended.
10. Integrate all the relevant information as the interim 'story' (or interim risk assessment).

The General Framework for the Desk-based Assessment



These become the headings for the Desk Study.

The Background Information

Summary table in a LAWPRO desk study derived from **the WFD App**

Section Break (Next Page)

WB·Code	WB·Name	WB· Type	Risk	Status· obj.	2009	2012	2015	Pressure· Category	Pressure·Subcategory	Significant· Pressure	Action
IE_	Xx_010	River	*Not·at· Risk*	Good	M	M	G	Agriculture	Pasture	No	None
IE_	Xx_020	River	*Review*	High	Unassi gned	Unassi gned	Unassi gned	/	/	/	IA8·High·status· RWB·pressures
IE_	Xx_030	River	*At·Risk*	High	H	H	M	Agriculture	Pasture	Yes	IA7·
								HYMO	Embankments	Yes	IA8·High·status· RWB·pressures
								HYMO	Channelisation	Yes	IA8·High·status· RWB·pressures
IE_	XX_ 040	Lake	*Review*	Good	Unassi gned	Unassi gned	Unassi gned	/	/	/	IA1·Provision·of· Information

- **For each WB, the WFD App gives information on:**
  - **Risk category.**
  - **Status, including for different dates.**
  - **Possible pressures.**
  - **Whether the pressures are *significant* and therefore need to be dealt with.**

Surface water body status map

https://gis.epa.ie/EPAMaps/Water

Water

WATER, LAND & SOIL | PROTECTED AREAS | MONITORING & FLOW | STATUS & RISK | PRESSURES & ACT

Results

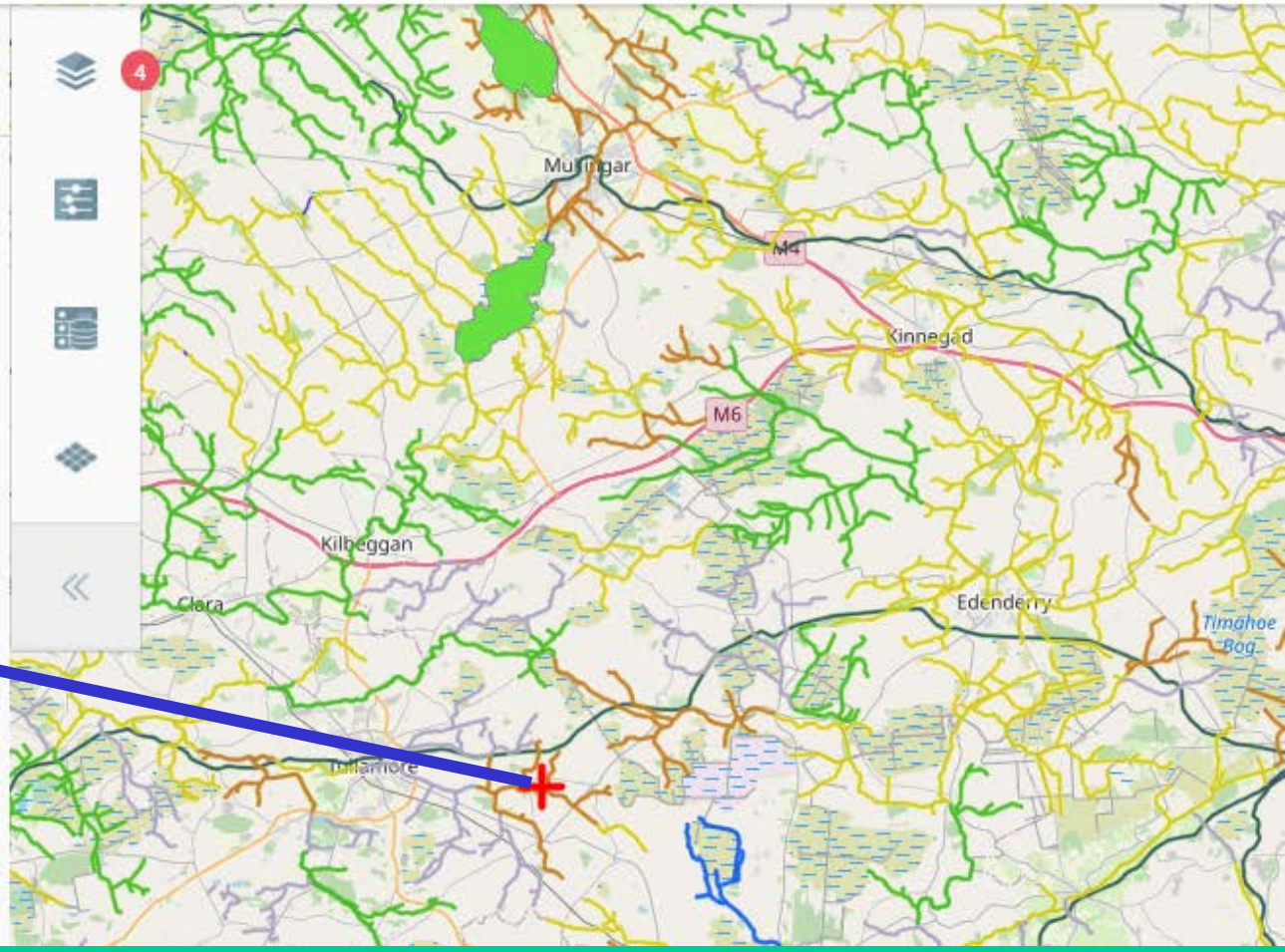
Keep Previous Results

River Waterbodies
IE_SH_25T030100

River Waterbody WFD Status 2013-2018
IE_SH_25T030100

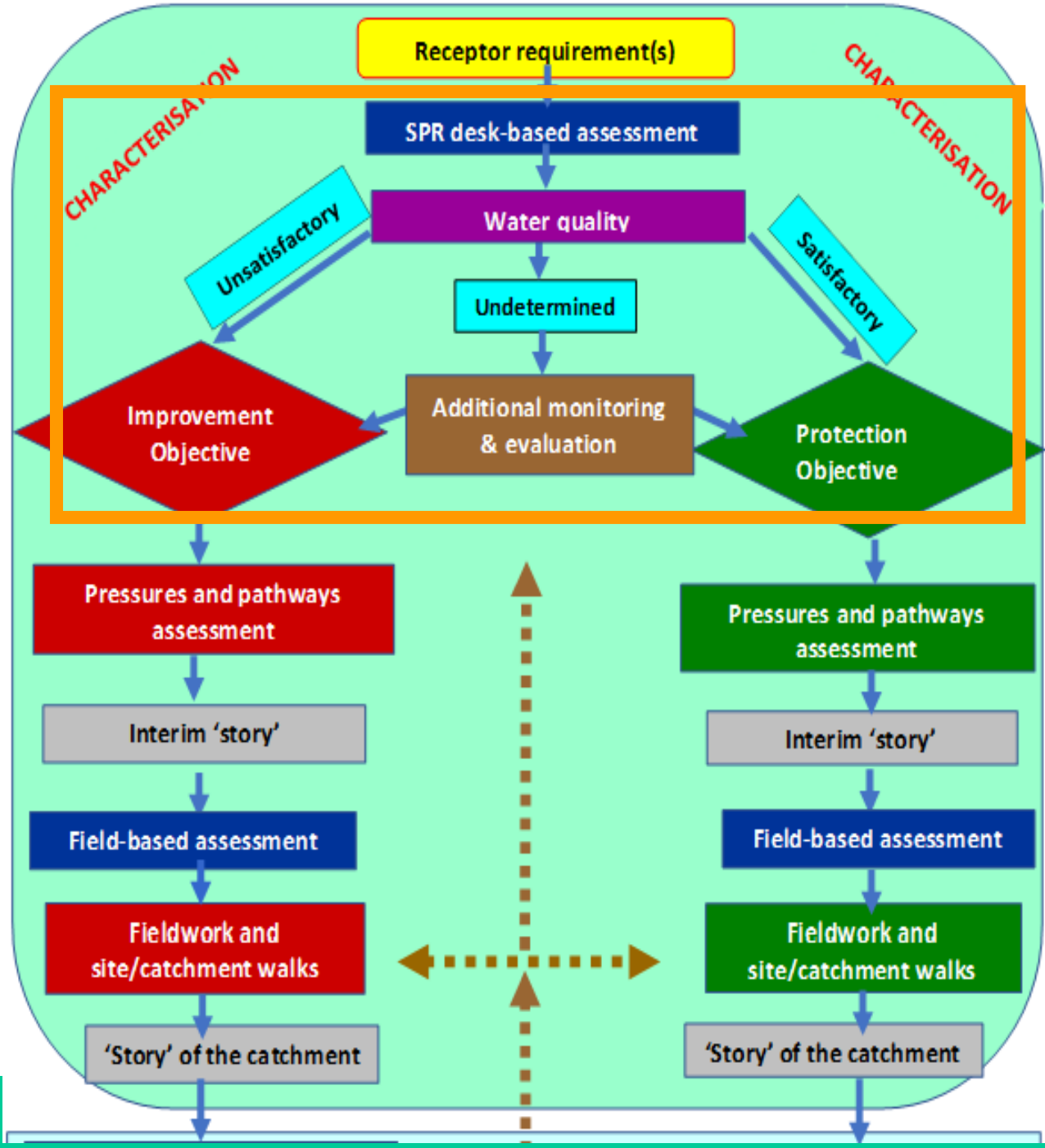
European_Code	IE_SH_25T030100
Name	TULLAMORE_020
Status	Poor
Period_for_WFD_Status	SW 2013-2018

EXPORT



Characterisation Desk-based Assessment

- The water quality assessment determines:
  - Status – e.g. if less than Good, situation Unsatisfactory.
  - Whether situation is Satisfactory, Unsatisfactory or Undetermined.
  - Whether the objective is IMPROVE/RESTORE or PROTECT.
  - *Significant issue(s)* or potential future sig issues, e.g. PO4.



Receptor Assessment

Evaluate the water quality data

Produce graphs to show variations and trends

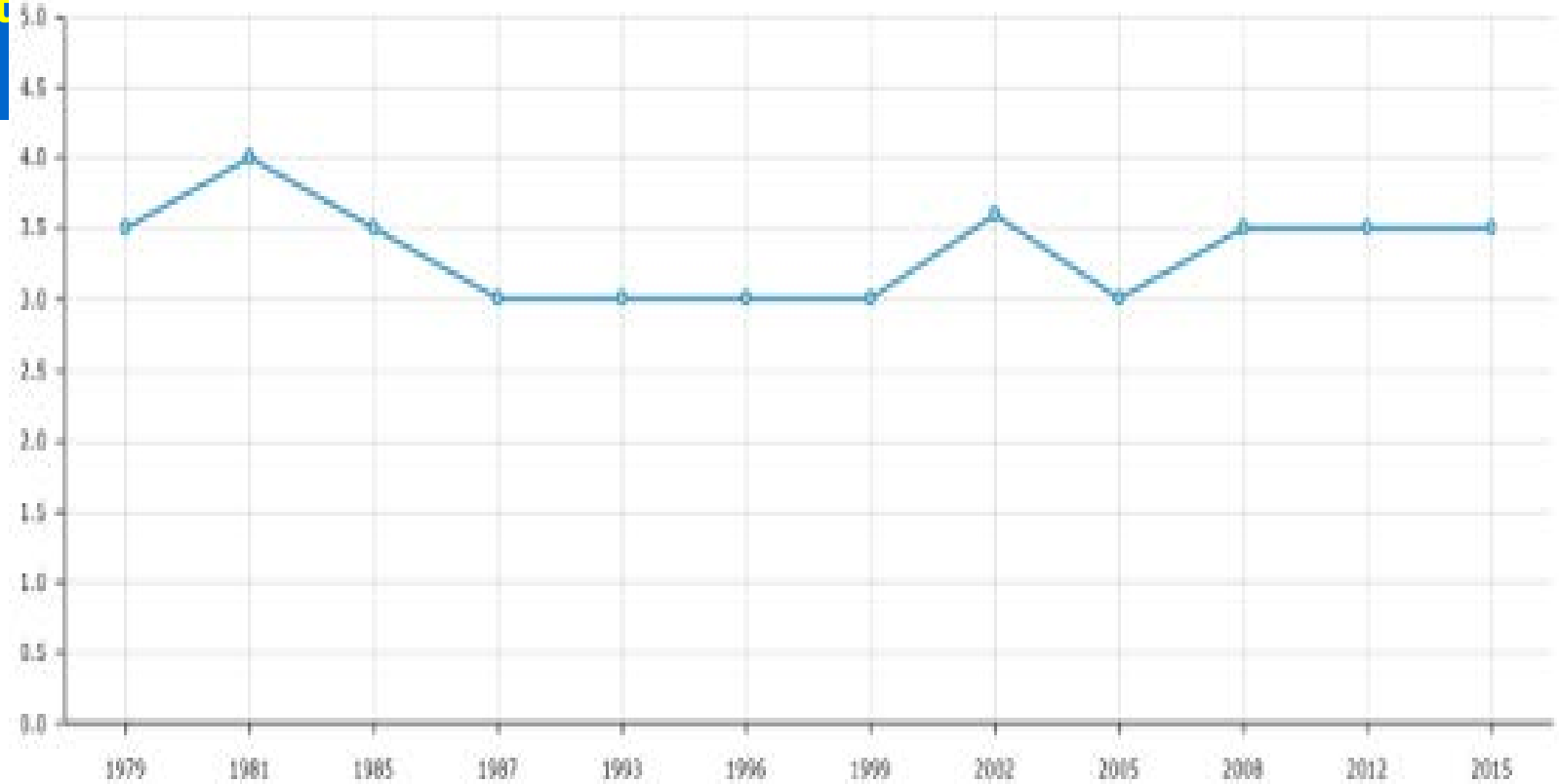


Figure 4 Q-Values recorded at Pope's Bridge Monitoring Station

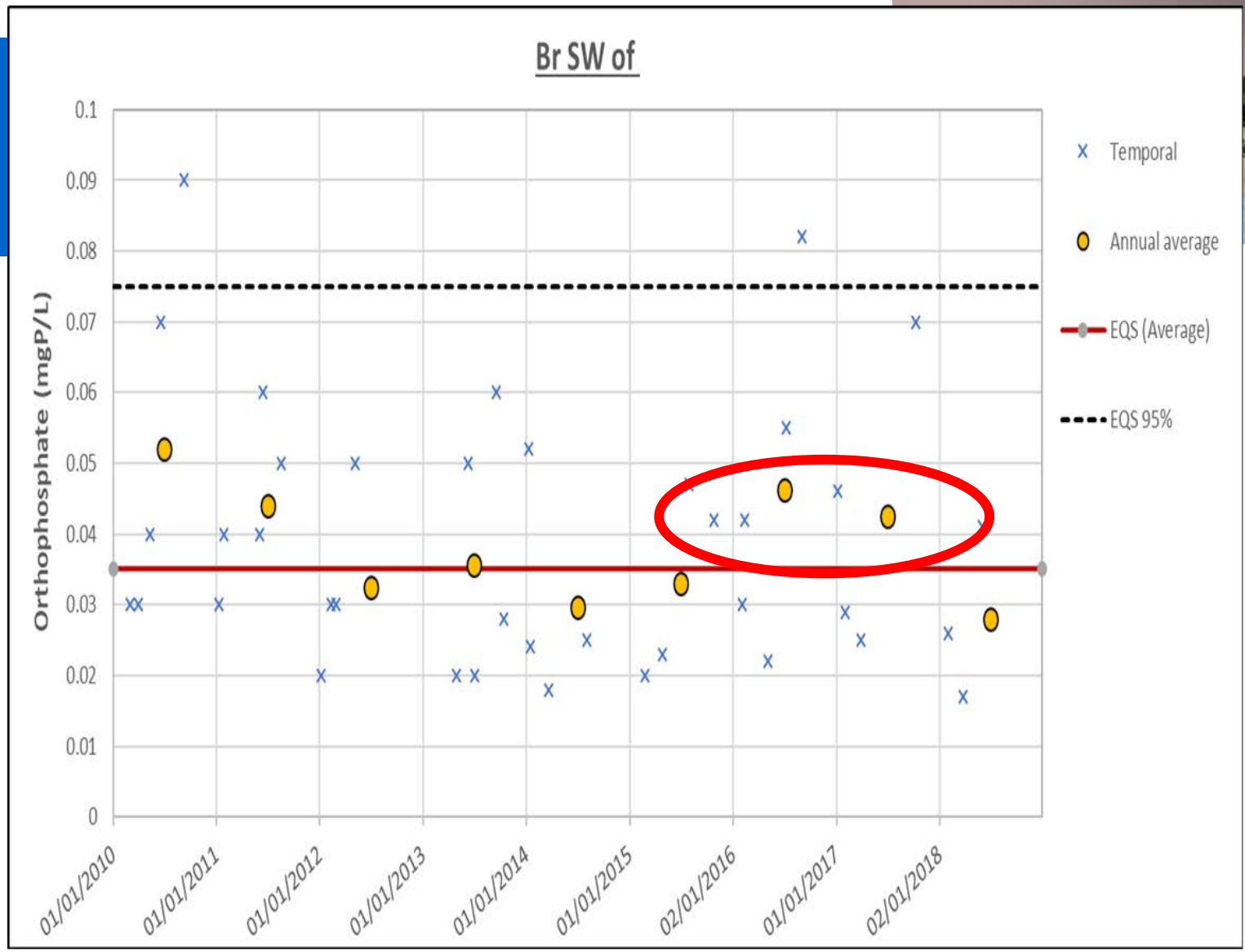
Source: WFD App & LAWPRO

Good, moderate & poor status during different monitoring periods.

Receptor Assessment

Evaluate the water quality data

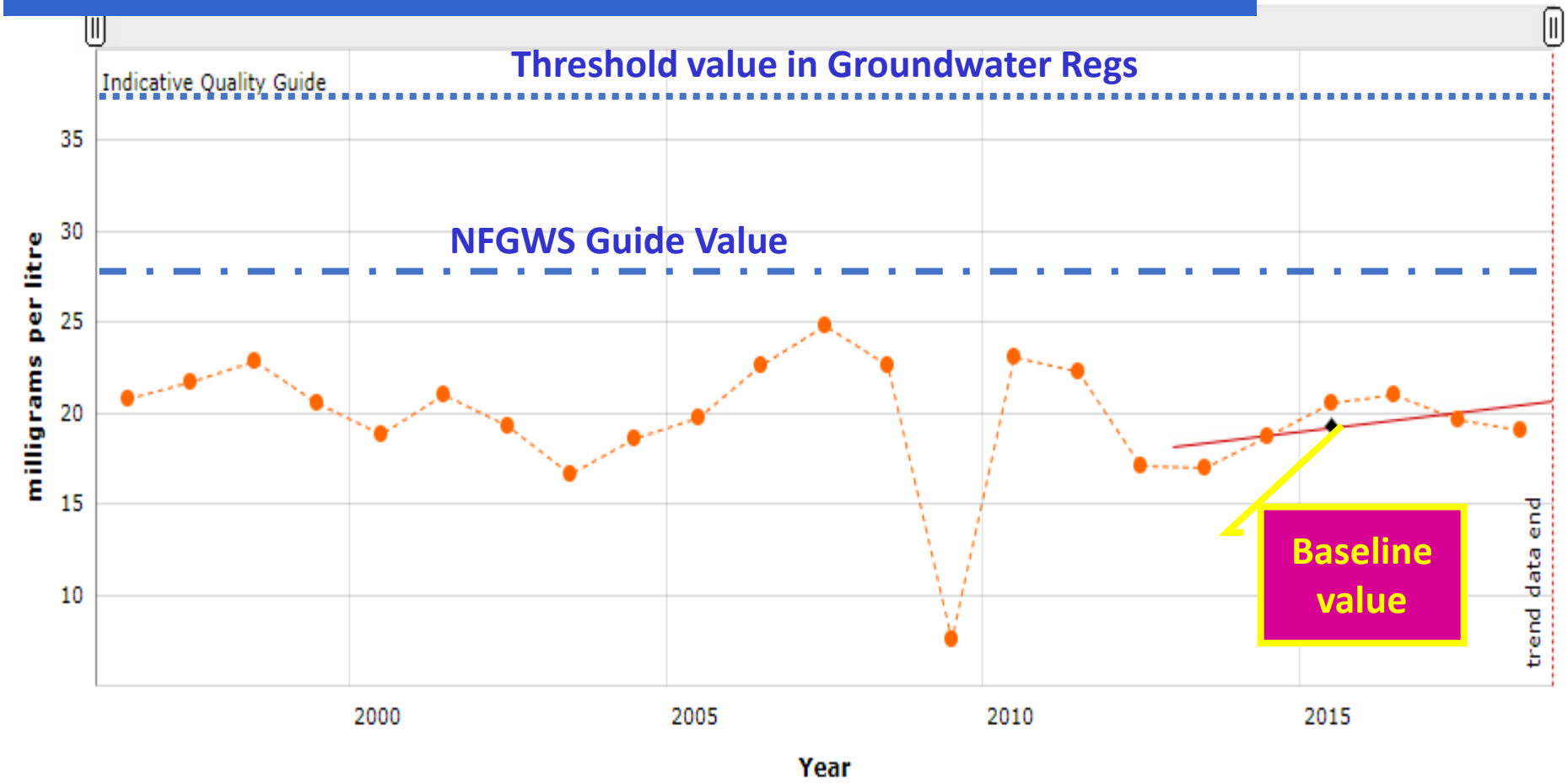
- Produce graphs to show variations and trends



This watercourse is Moderate status with phosphate the *significant issue*.

Source: LAWPRO

Example of graph of nitrate concentrations at Tully well in the Tullamore WB downloaded from www.catchments.ie



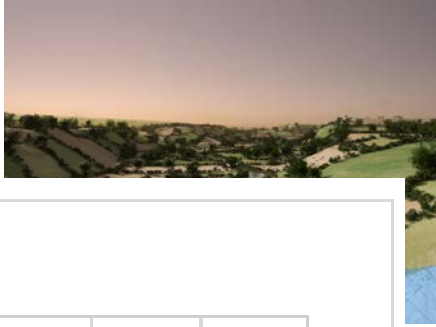
https://www.catchments.ie/data/#/waterbody/IE_SH_G_232?_k=rqlmsj

Water quality sorter

- The "Water Quality Sorter" was designed to condense the processing and analysis of the CSV data into a simple "Run" button.
- The sorter takes the raw CSV data from the WFD App and organises it into a formatted excel table. The table is organised by sample date and collates all available historical data (2007-2021) for all measured parameters at each monitoring point.
- A graph generating template was also developed to accompany the formatted table. The template generates summary statistics from the water chemistry dataset (i.e. annual average concentrations).
- The graph structure is editable and can be tailored by the user to suit their needs. A short "how to" video is provided at the link below, while Figure 10.4 shows an excerpt of the modelled results for the TOLKA_10 waterbody.
- The link to the Sorter is available on the LAWPRO website under the 'Local Authority Catchment Science and Management Course' link.

Water quality sorter was developed by Eoin McAleer and Cormac McConigley, LAWPRO

Water quality sorter graph output



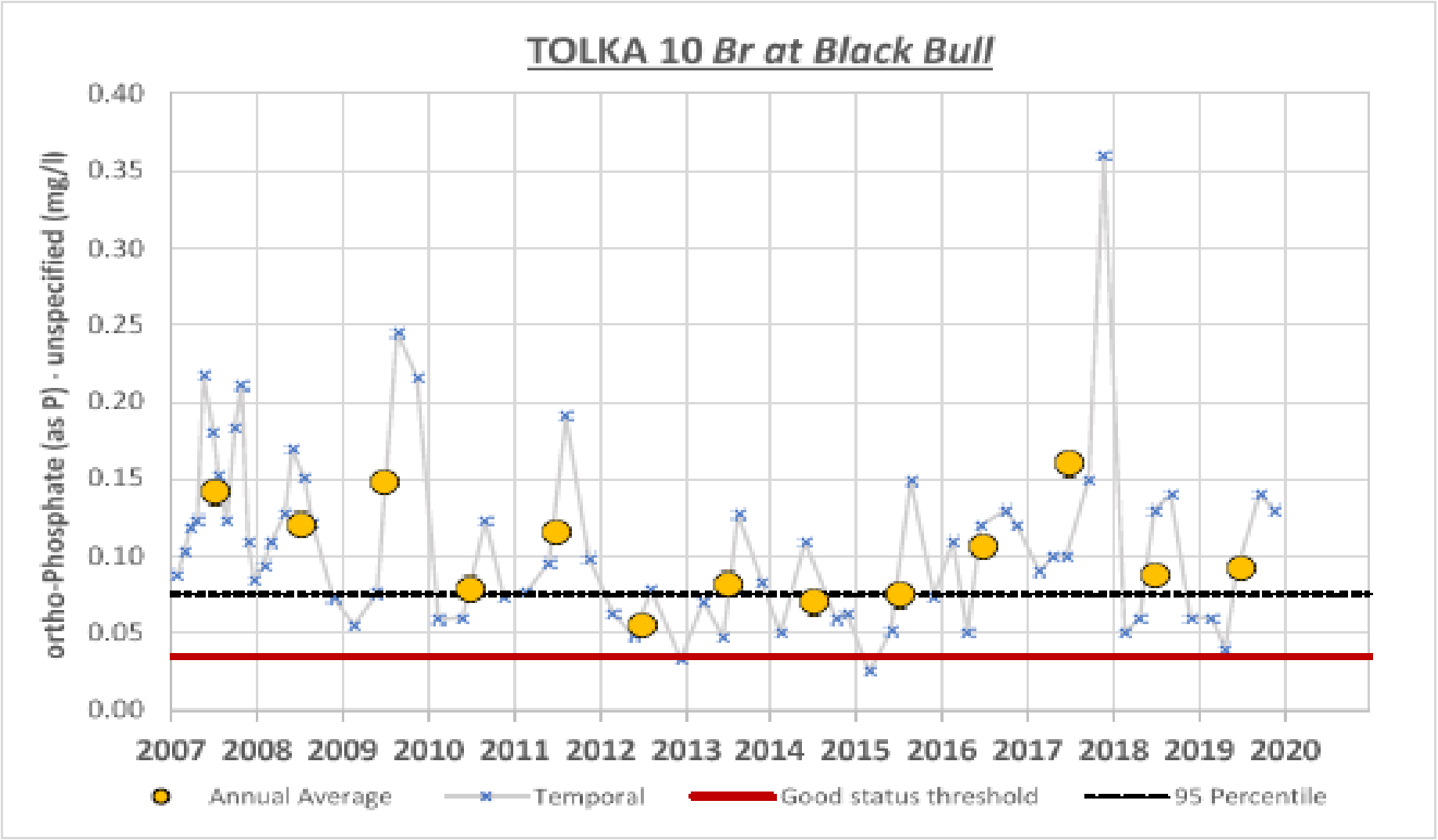
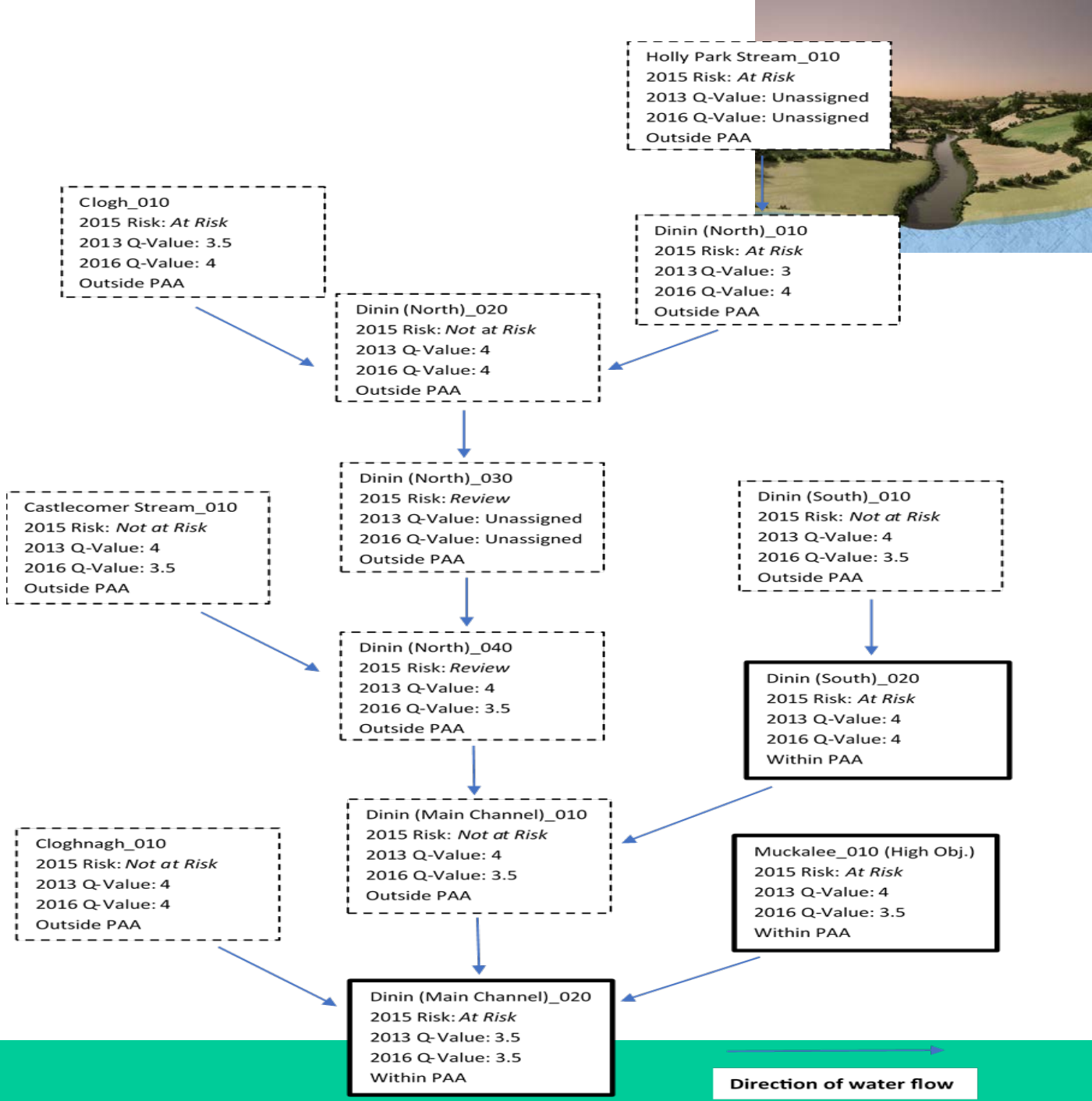


Figure 10.4: Example of the Water Quality Sorter and Graph Generator results for the TOLKA_10 waterbody.

Surface water receptor Assessment

Some recommendations

- For complicated situations, draw out a 'story board'.



Source: LAWPRO

Sub-Catchment Storyboard: 26A_5 (Shannon (Upper) SC_010)

[illegible]	(07-09)	(10-12)	T1	2013/2014 Data
Bio	[illegible] (Inverts)	[illegible] (Inverts)	At Risk	2014 Bio = [illegible]
Ecol	[illegible] (Inverts)	[illegible] (Inverts)	TPM = No	
Chem	No chemistry data. Estimated P concentration 0.005mg/l.			
T1 Risk	At Risk	Change	No	
Pressures	Feature (SGAR (v1.0) CDA P), Forestry (SFN P, Biologist's SCOP. Biological indicators point to occasional acute episodes due to suspected forestry activities in the upper Owennyale (E1); grab assessments for WFD monitoring programme passed). Mines (Lisdiagh Glebe Mine (H_MINE1011), Ballybrack WB_MINE0009), Fuel (13% P)			
LA Queries (LA/CN)	Are these mines located within the water body?			

[illegible]	Unassigned (WB (LM))
Pressures	NA
Risk Change?	Yes. Change to [illegible]
LA Queries	Any issues?

[illegible]	Unassigned (WB (LM))
Pressures	All
Risk Change?	Yes. Change to [illegible]
LA Queries	Any issues?

[illegible]	Unassigned (WB (CN))
Pressures	NA
Risk Change?	Yes. Change to [illegible]
LA Queries	Any issues?

[illegible]	(07-09)	(10-12)	T1	2013/2014 Data
Bio	[illegible]	Unassigned	[illegible]	2014 Bio = Good
Ecol	[illegible]	Unassigned	FWPM: No	
Chem	Status (10-12)	Trend	Value	T1
Ortho-P (P) RS26OT0100 (D) (inc)	high	U (N/N)	0.012 (F) H	Not At Risk
TON (N)	high	U (N/N)	0.07 (F) G	2013/2014 Data
Tot Am (N)	high	U (N/N)	0.028 (F) H	2013 P=0.01 TON=0.08 Am=0.07 2014 P=0.01 TON=0.04 Am=0.02
T1 Risk	[illegible]	Change	Yes. Change to Not At Risk as Bio Good and tot/ortho low	
Pressures	Abstraction (Dowdall GWS, Lough Ramelton (Tents Lough), 03DGPR12015)			
LA Queries (LA/CN)				

[illegible]	(07-09)	(10-12)	T1	2013/2014 Data
Bio	High	High	[illegible]	2014 Bio = High
Ecol	[illegible] (HYMO)	[illegible] (HYMO)	FWPM: No	
Chem	Status (10-12)	Trend	Value	T1
Ortho-P (P) RS26OT0100 (D) (inc)	High	D (N/N)	0.010 (F) H	Not At Risk
TON (N)	High	U (N/N)	0.073 (F) G	2013/2014 Data
Tot Am (N)	High	U (N/N)	0.034 (F) H	2013 P=0.01 TON=0.07 Am=0.033 2014 P=0.01 TON=0.05 Am=0.02
T1 Risk	[illegible]	Change	No. check HYMO data with Biologists	
Pressures	WTP (Towers FWS, SH_WTP0002), Historical landfill (S22-01567) (Note: EPA Biologists note at biomonitoring site that substrate impacted)			
LA Queries (LA/CN)				

[illegible]	Unassigned (WB (LM/CN))
Pressures	Estimated P concentration 0.005mg/l. Feature (SGAR (v1.0) TON P), CDA (Towers Water Works, 4G0M.01), Fuel (Design PE 176, Agg PE 130, Secondary and AR treatment, 14% P)
Risk Change?	Yes. Change to [illegible]
LA Queries	Any chemistry data for RS26S020100 or RS26S020400? Any SGRS stores?

Lough Allen
IE_SE_26_716
Shannon (Upper)_SC_020 (26A_3)
[illegible] status
AT RISK

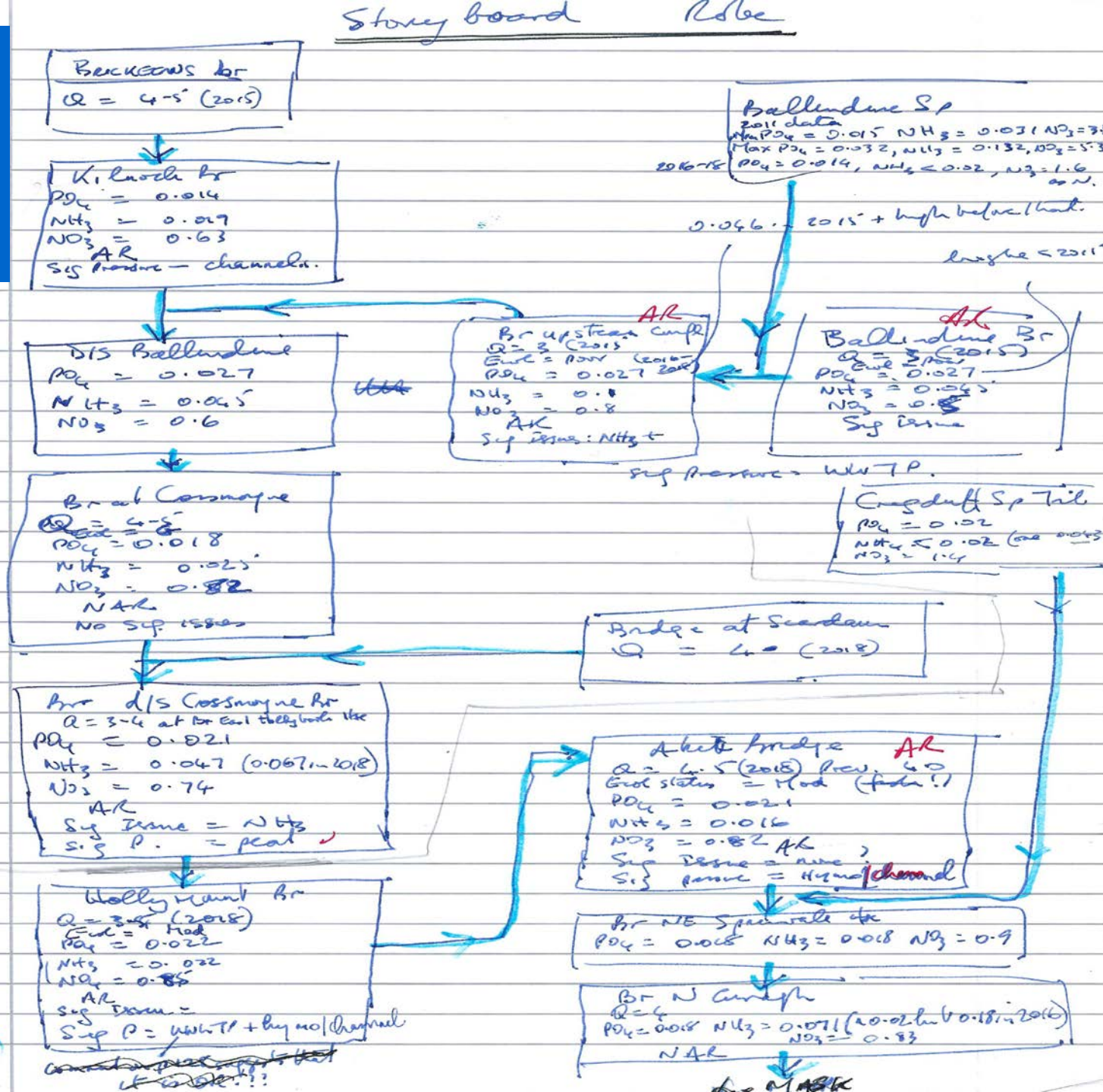
[illegible]	(07-09)	(10-12)	T1	2013/2014 Data
Bio	[illegible] (Inverts)	High	Not At Risk	2014 Bio = High 2010/2100 = Q4 2010/2200 = Q4.5
Ecol	[illegible] (Inverts)	High	FWPM: No	
Chem	Status (10-12)	Trend	Value	T1
Ortho-P (P) RS26S020100 (D) (inc) RS26S020200 (D) (inc)	High	U (N/N) U (N/N)	0.016 (F) H 0.011 (F) H	Not At Risk
TON (N)	High	D (N/N) D (N/N)	0.14 (F) G 0.08 (F) G	2013/2014 Data
Tot Am (N)	High	U (N/N) U (N/N)	0.043 (F) G 0.019 (F) H	2013 P=0.01 TON=0.17 Am=0.027 P=0.01 TON=0.05 Am=0.02 2014 P=0.01 TON=0.05 Am=0.03 P=0.027 TON=0.04 Am=0.02
T1 Risk	Not At Risk	Change	No	
Pressures	NA			
LA Queries (N/CN)	Nl note any issues?			

[illegible]	(07-09)	(10-12)	T1	2013/2014 Data
Bio	[illegible] (Inverts)	Good	Not At risk	2014 Bio = Good
Ecol	[illegible] (Inverts)	Good	FWPM: No	
Chem	Status (10-12)	Trend	Value	T1
Ortho-P (P) RS26BT0100 (PreWFD) (trib) RS26D230140(D) (trib) RS26D030300(D) (inc)	High	U (N/N) U (N/N) U (N/N)	0.011 (F) H 0.011 (F) H 0.011 (F) H	Not At risk
TON (N)	High	U (N/N) D (N/N) D (N/N)	0.06 (F) G 0.17 (F) G 0.04 (F) G	2013/2014 Data
Tot Am (N)	High	U (N/N) U (N/N) U(N/N)	0.022 (F) H 0.022 (F) H 0.023 (F) H	2013 RS26D030300 P=0.01 TON=0.05 Am=0.02 2014 RS26D030300 P=0.01 TON=0.07 Am=0.02
T1 Risk	Not At risk	Change	No	
Pressures	Abstraction (Glangevlin GWS, Glangevlin Springs, 03DGPR12018)			
LA Queries (CN)				

[illegible]	(07-09)	(10-12)	T1	2013/2014 Data
Bio	High	High	[illegible]	2014 Bio = High
Ecol	High	High	FWPM: No	
Chem	Status (10-12)	Trend	Value	T1
Ortho-P (P) RS26B120120(D) (inc)	High	U (N/N)	0.011 (F) H	Not At Risk
TON (N)	High	U (N/N)	0.086 (F) G	2013/2014 Data
Tot Am (N)	High	U (N/N)	0.024 (F) H	2013 P=0.01 TON=0.04 Am=0.023 2014 P=0.011 TON=0.04 Am=0.02
T1 Risk	[illegible]	Change	Yes. Change to Not At Risk as Bio remains High	
Pressures				
LA Queries (CN)				

Surface water receptor Assessment Some recommendations

- A rough drawing can be effective in gaining an understanding of complicated sub-catchments.



Receptor Assessment
Some recommendations

- **Summarise monitoring info on a table** (example for a surface water body).

Table 10-1: Summary of receptor information for a single water body

Factor		Figures Tables	Details
Monitoring station type			Operational
Risk Category		F. 1-2	*At Risk*
Biological Status	2010-2015	F.2-5	3 (Poor)
	2016-2018	F. 2-5	3 (Poor)
	Trends in Q values		No change since 2008
Hydrochemistry Data			
Ortho-P (mg/l P)	Baseline	F. 2-7	2016-2018: 0.047 mg/l
	Indicative quality		Moderate
	Trends - significant?		Upwards - No
NH4-N (mg/l N)	Baseline	F. 2-8	2016-2018: 0.033 mg/l
	Indicative quality		High
	Trends - significant?		Downwards - No
TON (mg/l N)	Baseline		2016-2018: 2.2
	Trends - significant?		No
Supporting Conditions	Chemical conditions?		Good
	Oxygenation Conditions		Pass
	Acidification Conditions		Pass
Hydromorphology			
	RHAT		N/A
	Evidence of Arterial drainage		No
Ecological Status (2013–2018)			Poor
Trends (2013-2018)			No change
Protected Areas			No
WFD Objective			Good
EPA biologist notes (if any)			------
Condition of water quality			Unsatisfactory
Significant issue			Orthophosphate

Acknowledgment: Table is based on one by LAWPRO.

Source: LAWPRO

Surface water receptor Assessment Some recommendations

- If more than one MP on a channel, try to fit on the table to see changes going downstream

Table 2: Receptor information for Yyyyyy_010, Yyyyyy_020 and Yyyyyy_030 water bodies

Factor	Figures Tables	IE_XX_ Yyyyyy_010	IE_XX_ Yyyyyy_020	IE_XX_ Yyyyyy_030
Risk Category	N	*At Risk*	*Not at Risk*	*Review*
Biological Status Monitoring Station(s) with Q-Values 2009-2015 Status Trends in Q value since 2009 2016-2018 Q value data				
Hydrochemistry Data Monitoring Station(s) with data Existing New				
Summary & Trends in PO_4, NH_3 and NO_3 In App All available data Other water quality data Baseline Concentration (mg/l) Other relevant values Distance to threshold Indicative Quality	Table x			
Supporting Conditions Chemical conditions? Oxygenation Conditions Acidification Conditions				
Hydromorphology RHAT Score Evidence of arterial drainage				
Ecological Status (2010-2015) Trends 2010-2015	Fig. z			
Protected Areas				
WFD Objective				
EPA biologist notes (if any)				
Significant issue				

Source: LAWPRO

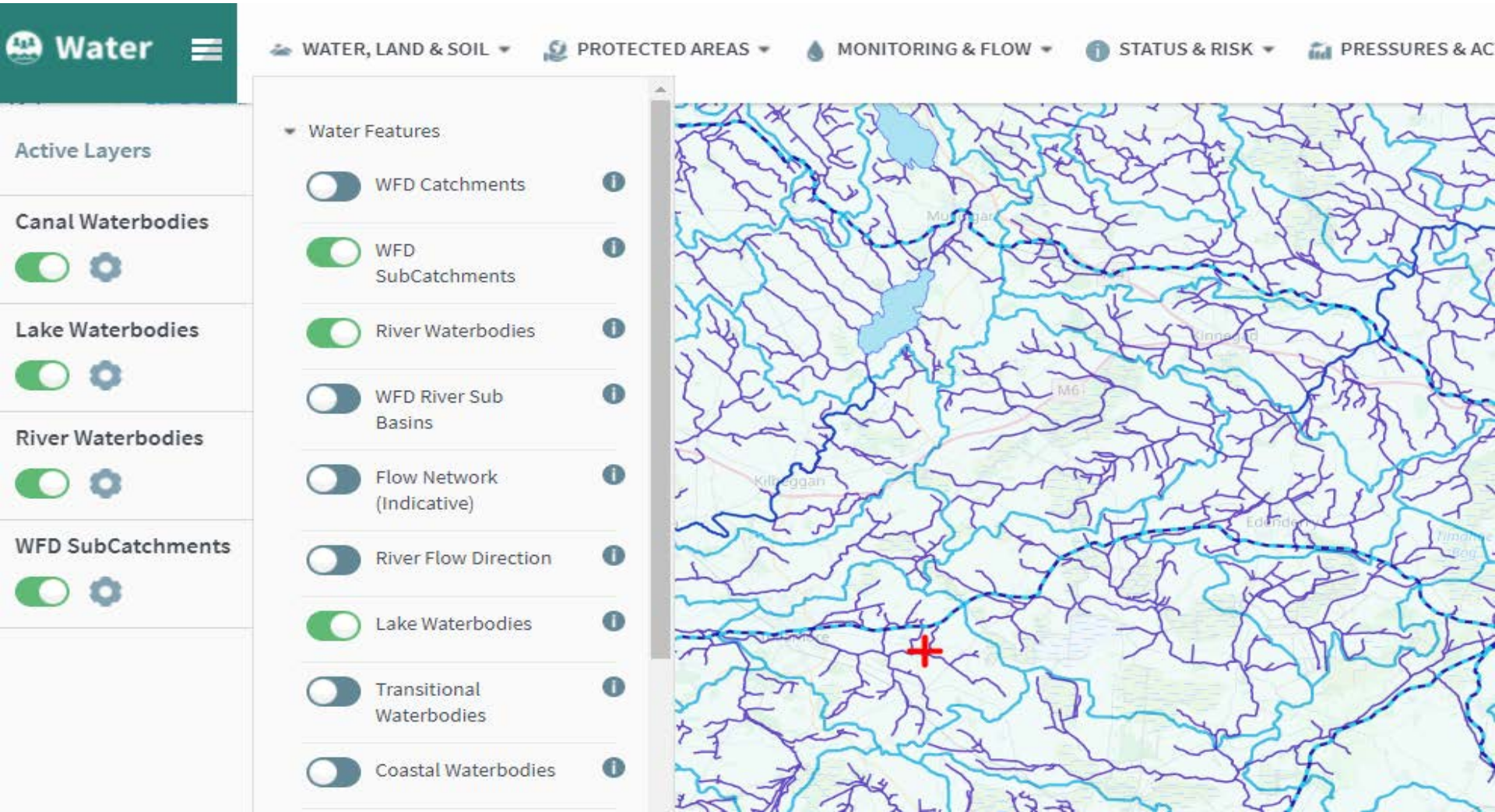
Receptor Assessment
Some recommendations

- The key outcome of the receptor assessment is a conclusion on the *significant issue(s):*
  - PO4, NH4, NO3, Sediment, Habitat conditions, Pesticide, etc
  - Don't know.
  - None.
- Suppose you know at this stage the *Significant Issue(s)* (usually this will be the case).

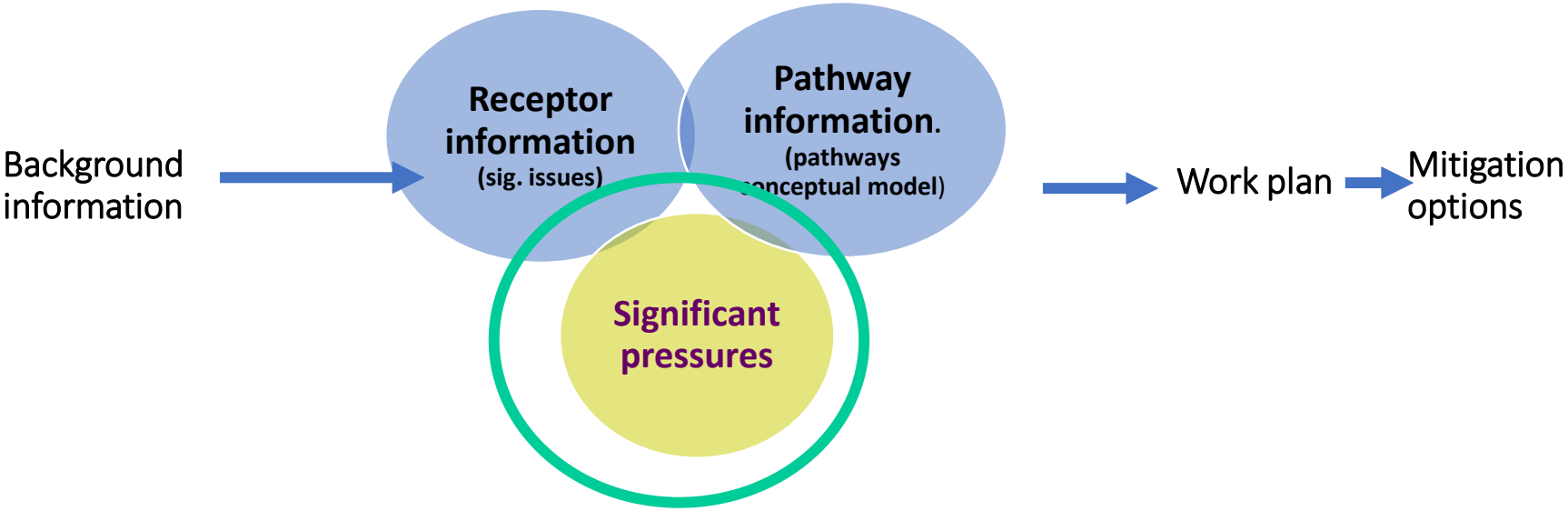
Then the next step is to decide on the *significant pressure*.
The WFD App is the starting point, but keep in mind that the new/additional information you collect & analysis you undertake might update this.

Check/locate the catchment area

- Need to know the all the catchment areas to upstream waterbodies, if this is applicable.



The General Framework for the Desk Study



Significant Pressure Information

- A *Significant Pressure* is a pressure that leads to a WB not achieving the WFD objective (such as Good status) or drinking water objective.

- Arises for *At Risk* WBs & drinking water sources where restoration/improvement is the objective.

- *Significant pressures* have been designated in *At Risk* WBs by the EPA Initial Characterisation process.

- Once a pressure is designated as "significant", mitigation actions are needed to achieve the WFD objective (or it could be the drinking water quality objective).

How do did the EPA Catchments Unit determine the significant pressures?

1. Desk based assessment using the S-P-R model (140 datasets at a range of scales)
2. Nutrient modelling tools
   - Source Load Apportionment Model
   - Load reduction calculations, and stream profiles
   - Pollution Impact Potential Maps for diffuse agriculture
   - TraCs team estuary models, GW load models
3. Local knowledge and data from a range of EPA colleagues
4. Workshops and discussions with LAs and IFI, incorporating their data and knowledge.
5. External review by public sector pressure owners at the Regional workshops (up to 30 public agencies)

➢ **More than one pressure may be significant**

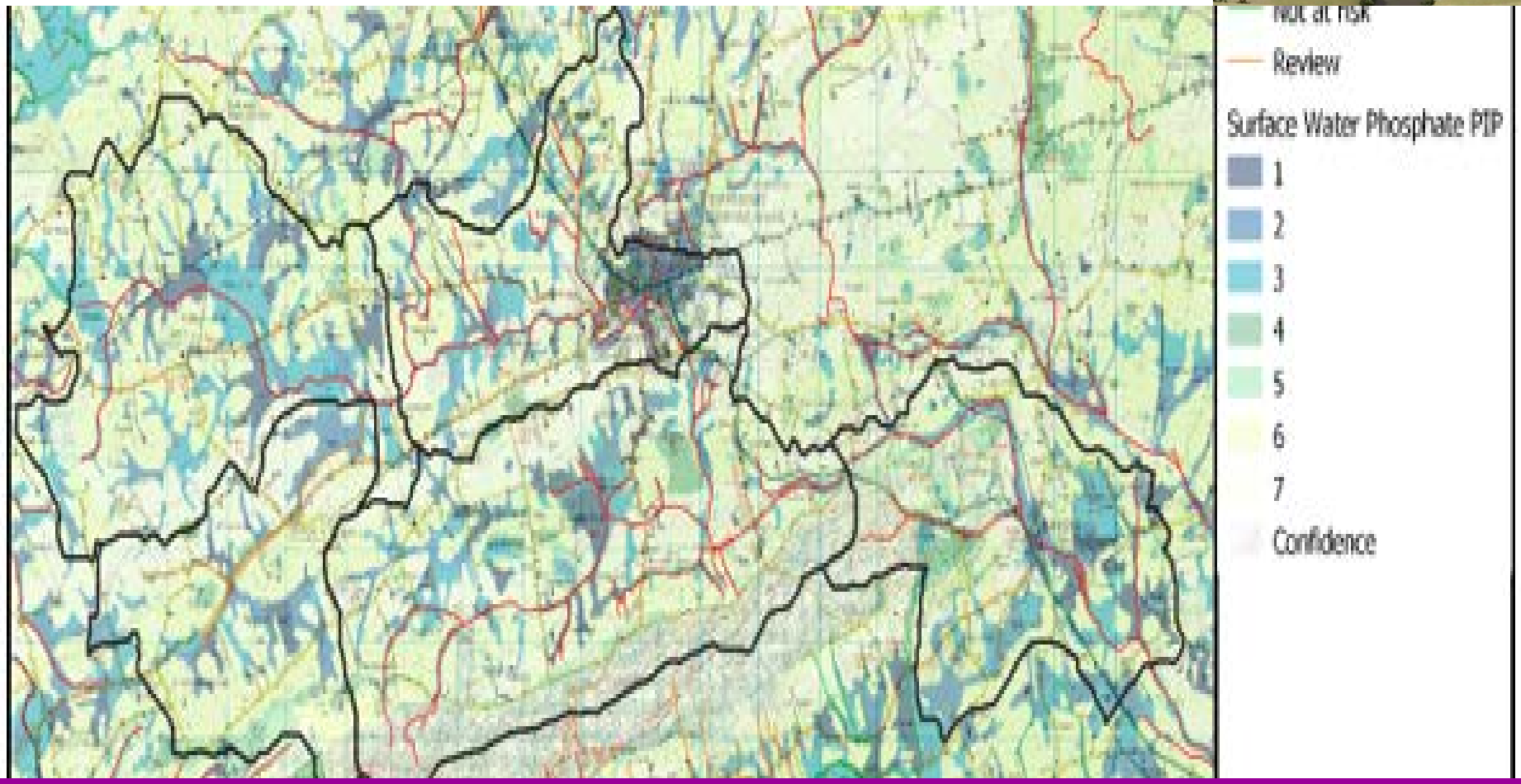
Keep in mind ….

- PO4, NO3 and MCPA issues from diffuse farming will arise in <u>different</u> physical settings:
  - PO4 and MCPA arise in poorly-draining areas and the main **pathways** are **overland and shallow subsurface or in land drains**.
  - NO3 arises in freely-draining areas and the main **pathway** is **underground** via groundwater.
- Therefore, fields contributing PO4 to water will not generally contribute NO3, and vice versa.
- The challenge for the desk study is to locate the likely different areas that are contributing these pollutants.

Sources of Information on Pressures

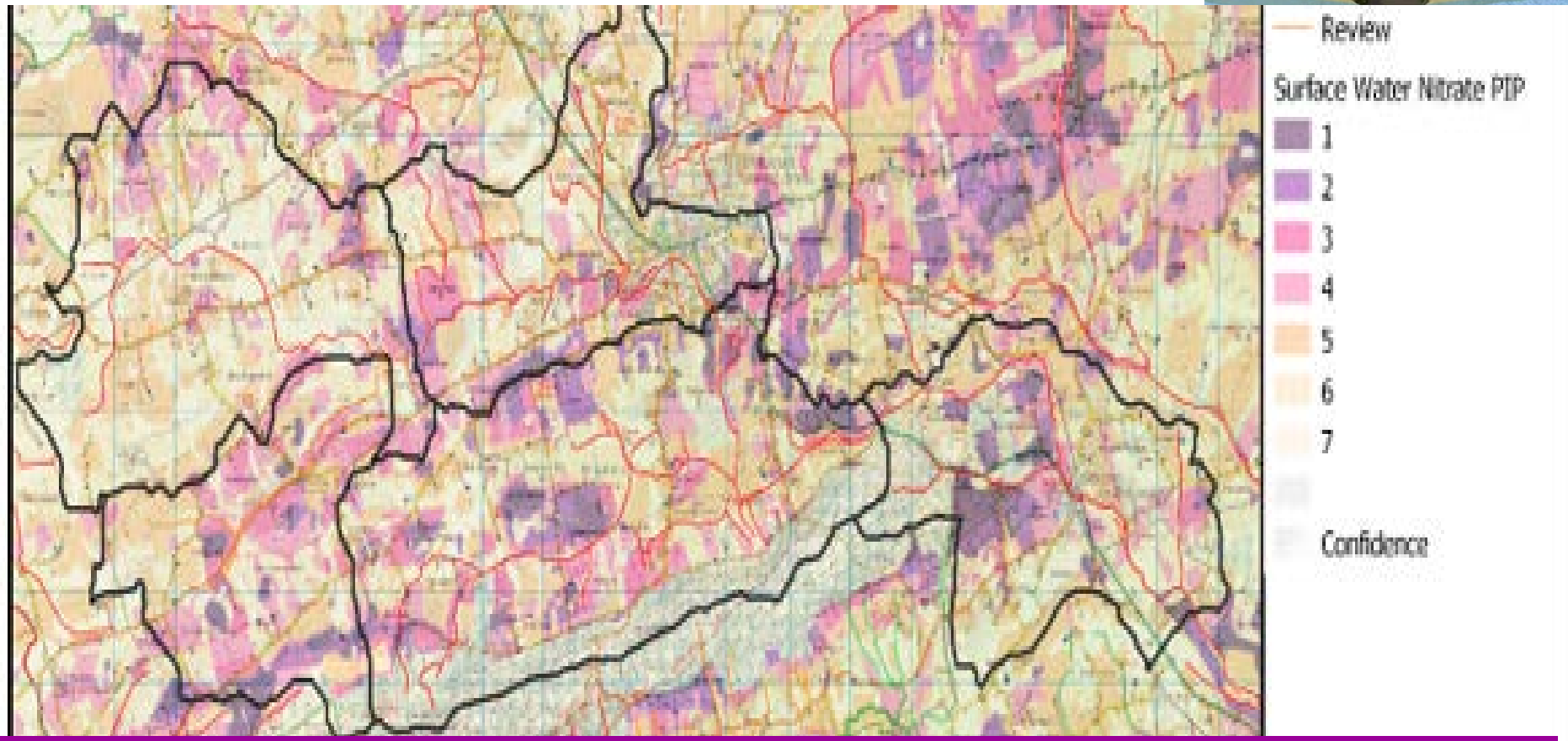
- Local authority files
- www.catchments.ie & https://gis.epa.ie/EPAMaps/Water
- WFD Application, which can be accessed on EDEN (https://wfd.edenireland.ie/)
- EPA Pollutant Impact Potential (PIP) maps for phosphate and nitrate.

PO4 PIP map



The areas of darker blue are likely to be contributing most of the PO4 to surface water. Therefore, these are the areas for targeted catchment walks, perhaps some sampling, and the mitigation measures.

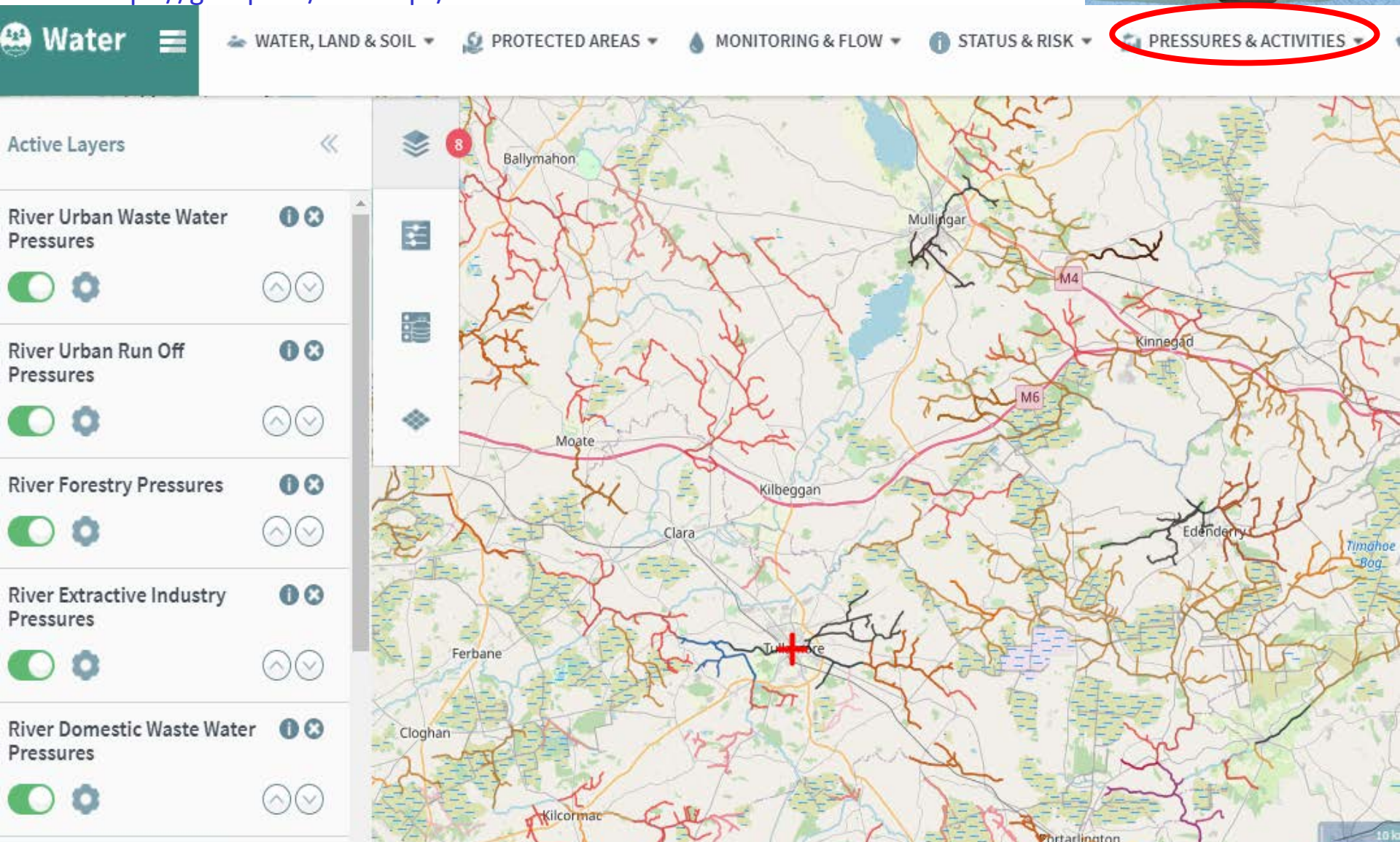
NO3 PIP map



The areas of darker colour are likely to be contributing most of the NO3. Therefore, these are the areas for targeted catchment walks and mitigation measures.

Map of *Significant* Pressures

https://gis.epa.ie/EPAMaps/Water



Loadings analysis?

- Where either PO4 or NO3 are significant issues and there are sufficient monitoring data, undertaking loading and load reduction analysis enables:
  - An estimation of the approx. load reduction of a particular nutrient needed from a pollution source to achieve the required objective – a target value to aim at.
  - Comparisons of loads coming from different sources, e.g. WWTP Vs farming (called source load apportionment).
  - Comparison of loads coming from different tributaries or different river stretches or different wells, thereby enabling targeting of mitigation actions to where improvements are needed.

Example PO4 load and load reduction calculation for a watercourse

- Q-value = Moderate.
- *Significant issue*/pollutant = PO4
- Catchment area = 3,000 ha (30 km^2)
- Mean flow = 710 l/s (source: EPA Hydrotool)
- Phosphate Load and Load Reduction Assessment
  - 2015-2017 average conc: 0.05mg/l (note: EQS = 0.035 mg/l)
  - Load = (710 x 86400 x 365) x 0.05/1000000 = ~1,120 kgP/yr
  - P load reduction target = (710 x 86400 x 365) x 0.05-0.03mg/l)/1000000 = ~450 kg/year
  - Approx. 20% area (600ha) = high Pollution Impact Potential (PIP) or high risk area (estimated from EPA PIP map)
  - Therefore, reduction needed in kg/ha = ~0.75 kg/ha/year

When considering possible mitigation Actions, this gives a target value to aim at.

Let us assume …

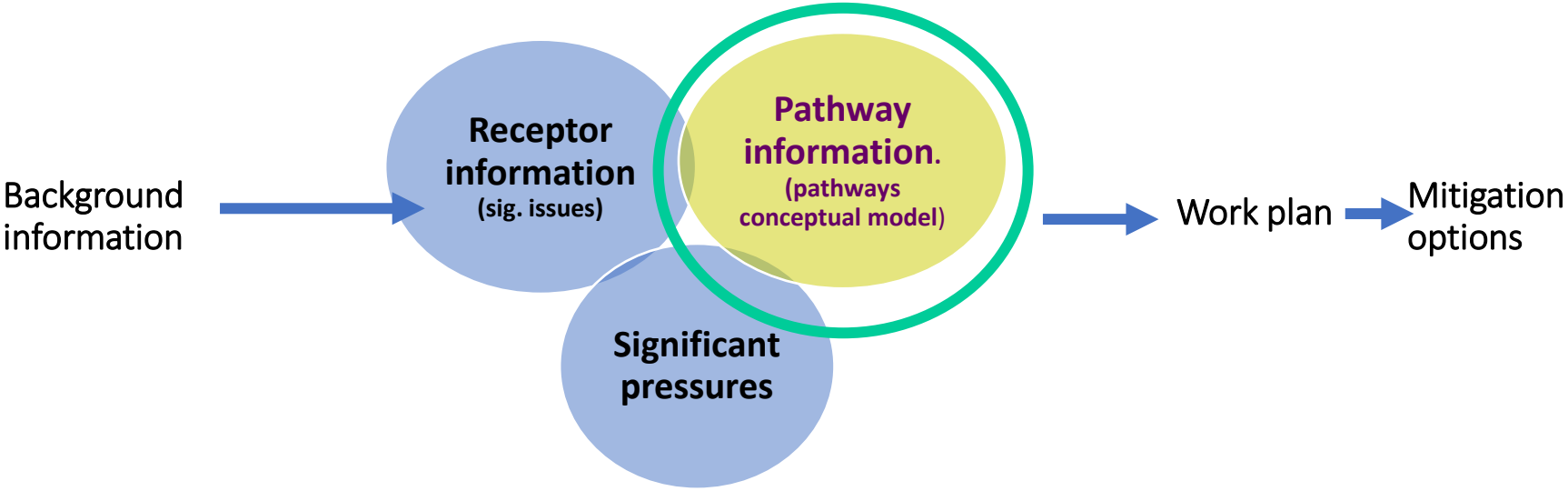
Suppose we know at this stage that the *significant issues* are PO4 and NO3 and that the *significant pressures* are diffuse + small sources?

The next step is to analyse and decide on the relevant pathways & produce a pathways conceptual model.

So, what do we want to know

- The poorly-draining areas where runoff of PO4 can occur.
- The freely-draining areas, groundwater-dominated areas where leaching of NO3 can occur.

The General Framework for the Desk Study



Pathway Analysis

- The critical and often 'difficult' element of the SPR framework.

- The often-used equation "**Pressure = Impact**" is <u>simplistic, often incorrect and a problematic concept.</u>

- If there is no pathway link between pressures and receptors, then there is no requirement for measures and actions!!

See Section 10.5 in Volume 1 of the Guidance Handbook.

Pathway information checklist

Maps that are relevant to evaluating the pathways for water and pollutants

Factor	Map Y/N	Description & relevance
Topography • Map • Aerial imagery		
Soil Soil drainage		
Subsoil		
Subsoil permeability		
Bedrock		
Aquifer		
Groundwater vulnerability		
Karst features (if present) Tracing		
Hydrology • Drainage density		
Susceptibility • PO_4 to SW • NO_3 to GW • NO_3 to SW		
Likely main pathway(s)		
Likely CSA(s)		

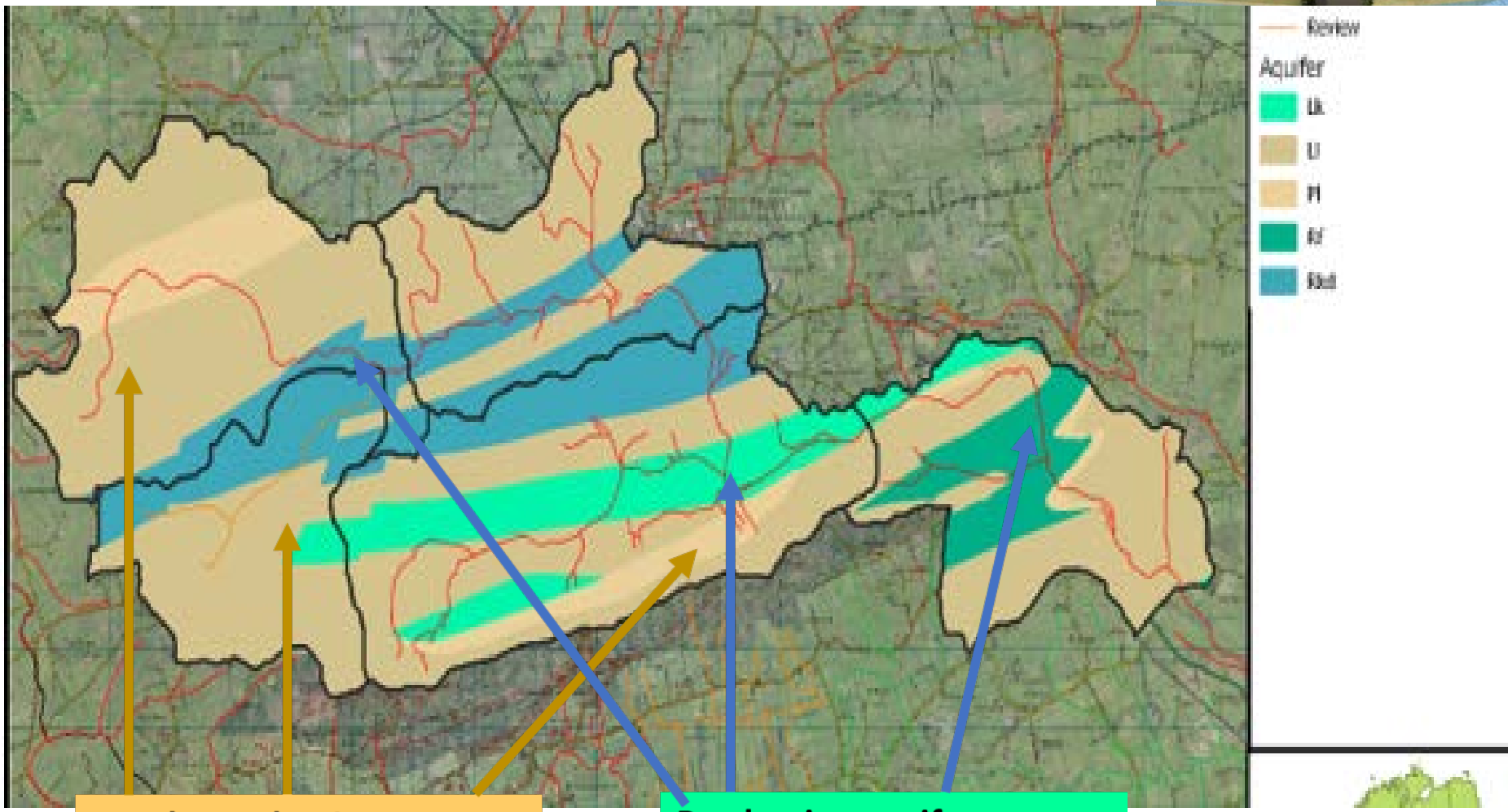
All these maps are readily available on either EPA or GSI websites.

The Pathways Conceptual Model

- Generally written text, summarising the understanding of the pathway components of the catchment, backed up by relevant maps.
  - The 'driver' for the CM is the info at the Monitoring Point, because it is here that improvement is needed.
  - Keep in mind the sig. issue(s), e.g. PO4, NH4, pesticide, NO3, sediment.
  - Suggest using brief bullet points.

- Generally means subdividing the subcatchment into flow pathway compartments that summarise water and pollutant movement as a precursor to focusing the fieldwork.

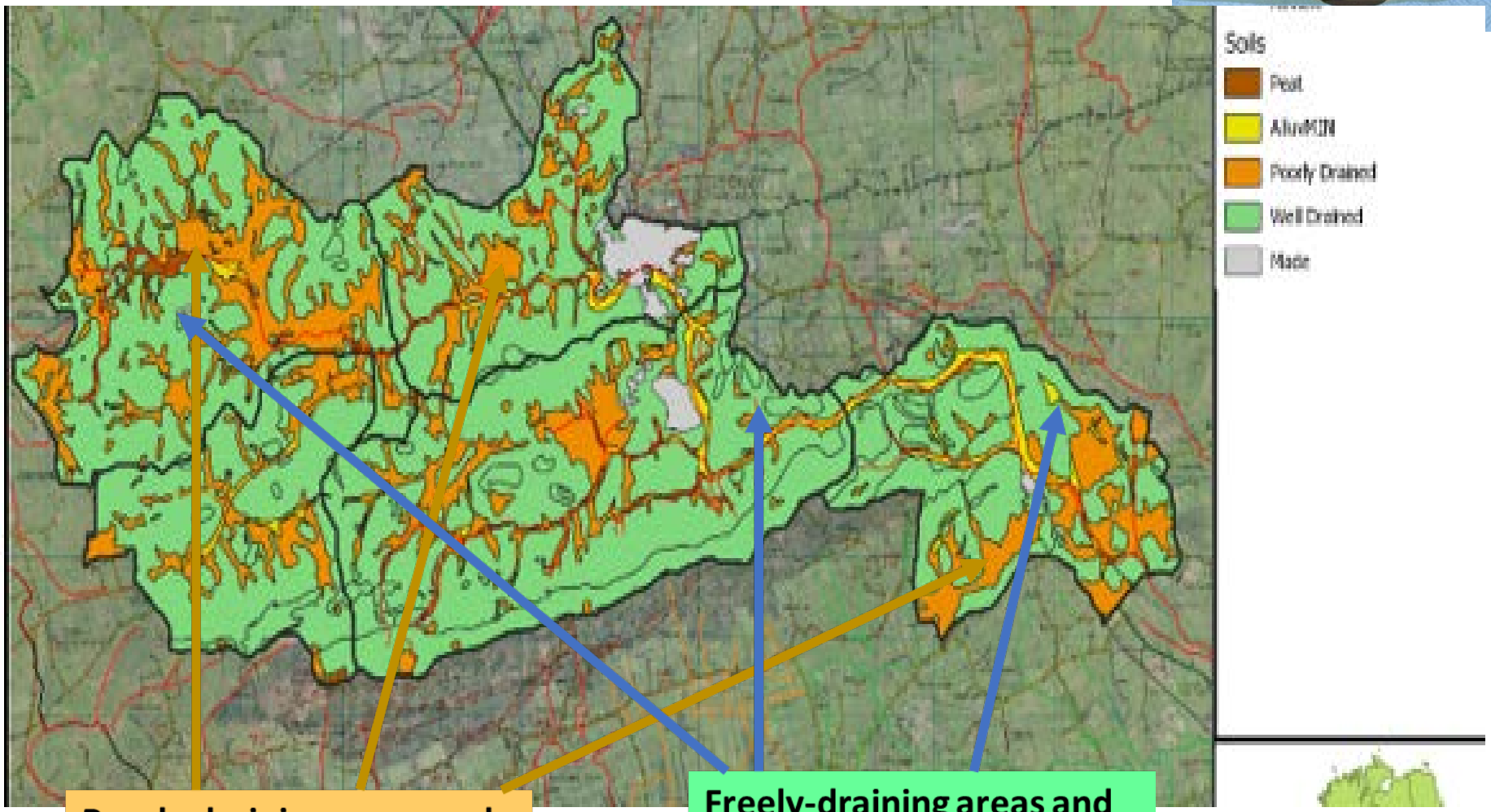
Aquifer map: a good starting point



Poorly productive aquifers, where surface runoff is dominant.

Productive aquifers, where groundwater is dominant.

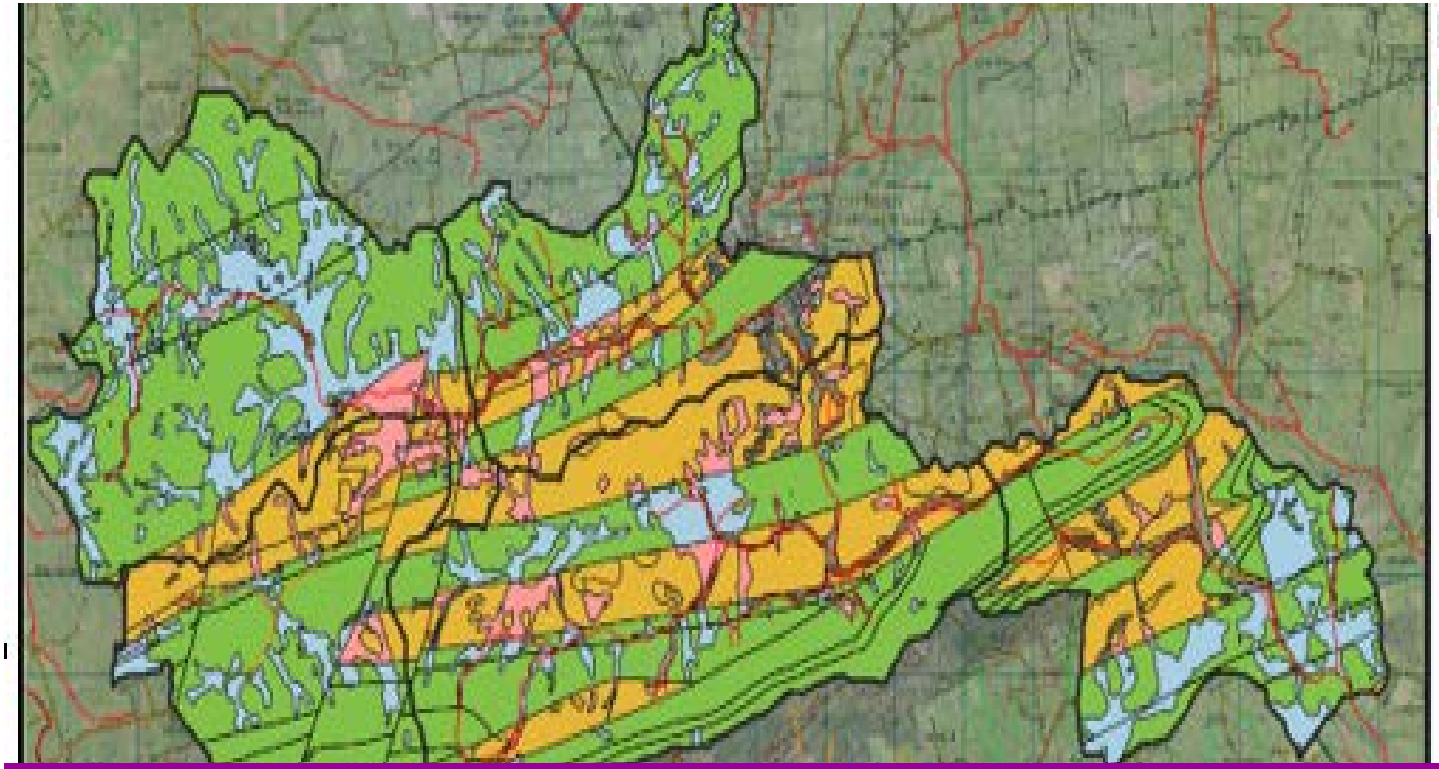
Soil drainage categories



Poorly draining areas and high PO4 susceptibility.

Freely-draining areas and high NO3 susceptibility.

4 sub-compartments



Subcompartment1A
Subcompartment1B
Subcompartment2A
Subcompartment2B

The main potential areas that could contribute PO4 to surface water are sub-compartments 1A and 2A.

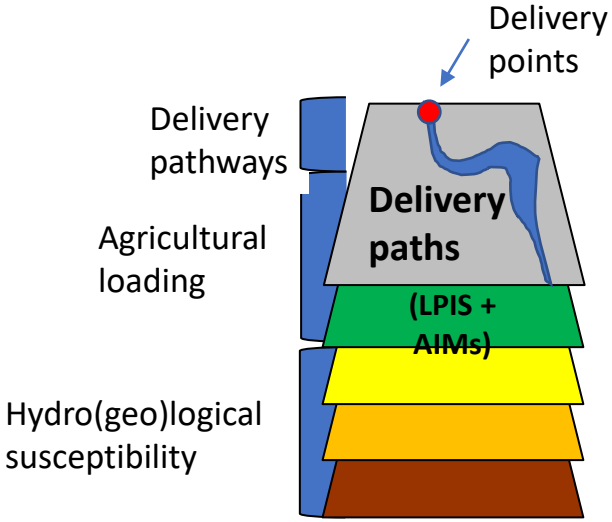
The main potential areas that could contribute NO3 to surface water are sub-compartments 2B.

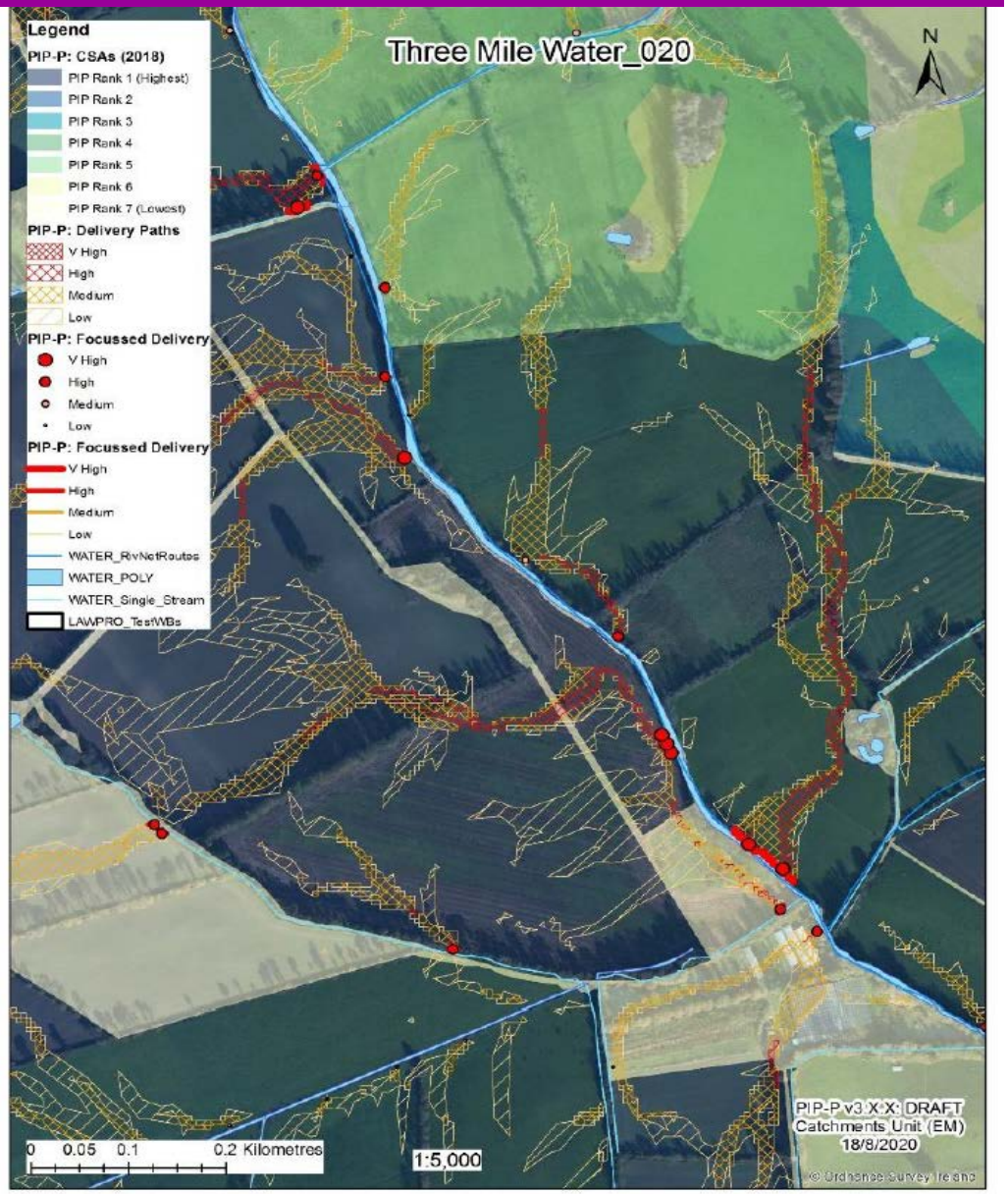
But, the degree of pressure (or pollutant load) is also relevant

- We know now the areas/subcompartments in this subcatchment that have the relevant physical settings to be capable of transmitting either PO4 or NO3.
- Now, we need to take account of the pollutant load.
- The Pollution Impact Potential (PIP) maps provide this, as they are based on loadings information overlain on pathway susceptibility.

NB. The delivery pathways and points shown are a guide. They need to be field checked.

The Phosphorus Pollution Impact Potential map (PIP-P) Model structure



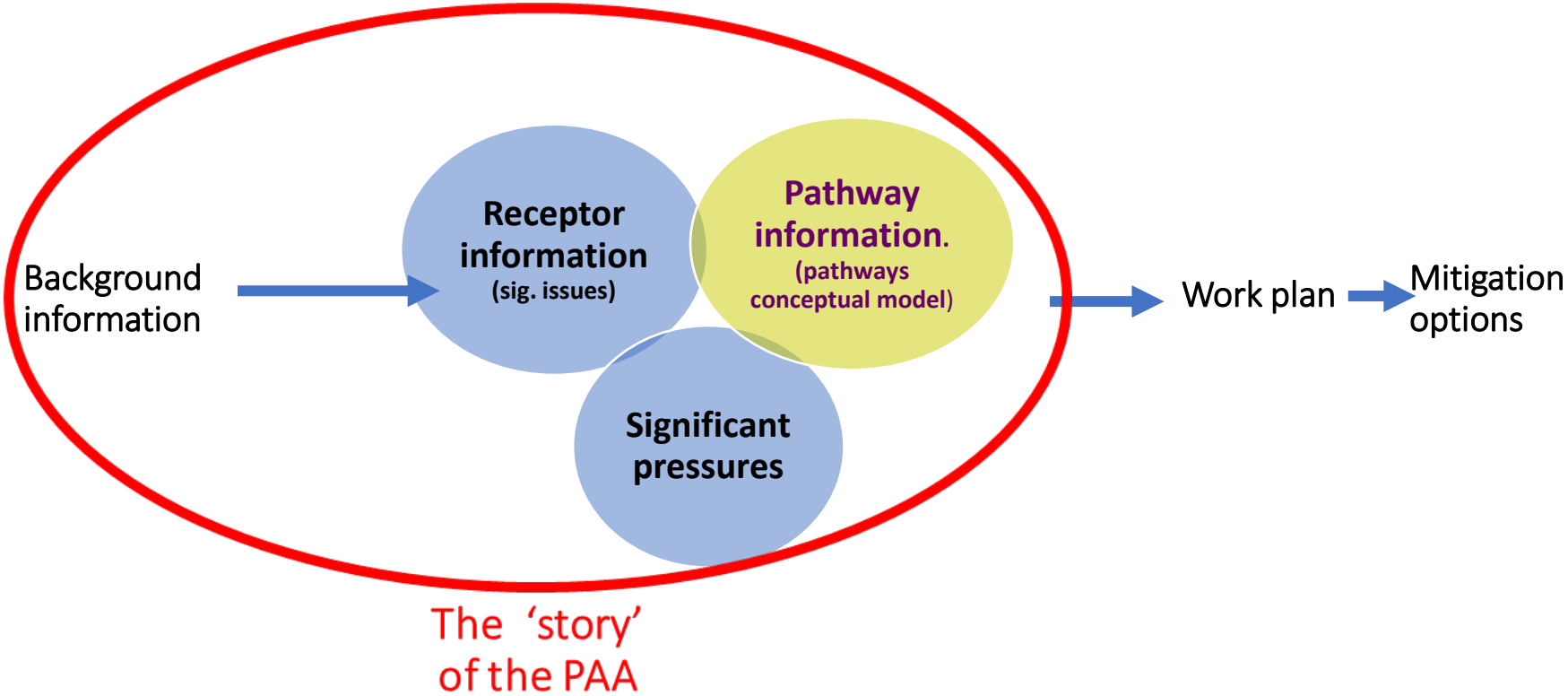


How to use PIP maps video:
https://www.catchments.ie/ifa-smart-farming-sources-and-solutions-the-link-between-our-soils-water-quality-and-how-to-use-the-pip-maps-on-catchments-ie/

Mockler, et al (2016); Mockler, et al (2017); Thomas et al (2016);

Slide source: EPA Catchments Unit

The General Framework for the Desk-based Assessment



Working out the Interim 'Story'

- **This is the key and most challenging component (because it means 'pulling it all together' and because the work plan is based on it)!**

- **Why?**
  - **Because it involves developing a conceptual understanding and 'mental model' that integrates all the components of the SPR framework. Therefore, it can be relatively complicated.**

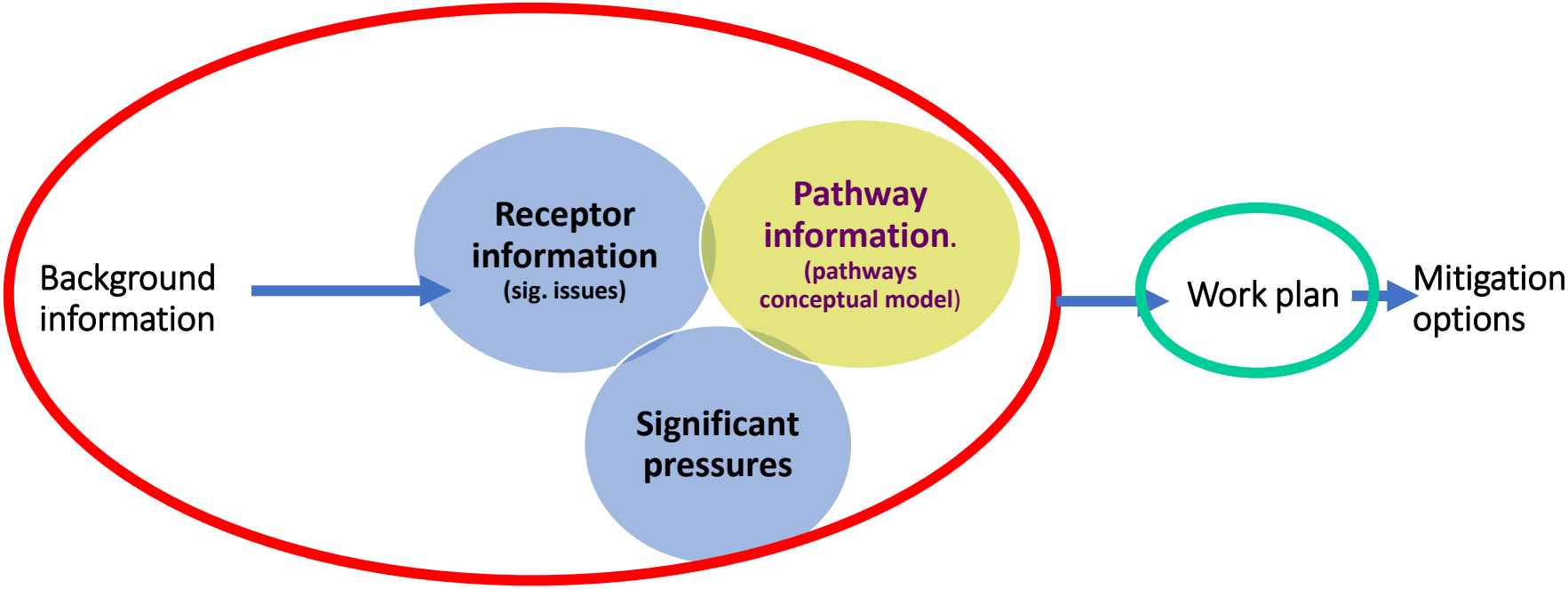
Writing the Interim 'Story'

- It starts as a mental exercise that synthesises, links and integrates all the receptor, pathway and pressure information together to arrive at an interim understanding & conclusions on the situation.
- As written down, it is the '**story**' (albeit interim) of the subcatchment (or drinking water source protection area), summarising and describing i) what the ***sig issue(s)*** is/are, ii) the **sig pressure**(s), iii) the **linkages** between them, iv) the main **pathways** (based on the conceptual model), v) the **CSAs** (the where question), vi) the **improvements** that are needed, etc.
- If diffuse & small point sources are the *Sig Pressures*, then as you are thinking it through, imagine you are standing at the MP, looking upstream keeping in mind the *significant issue*, ask yourself, what are the relevant pathways, where are they and the CSAs, and *Sig Pressures* that are causing the impacts.

The Interim 'Story' of the subcatchment (Section 10.6 in Vol 1)

- A summary, perhaps as brief bullet points, giving the following information.
  - Identification of the *significant issue(s)* and the *'significant' pressure(s)* <u>or</u> of the issues and pressures that could pose a threat unless managed. Conclude on whether the objective is 'protect' or 'improve'.
  - Location of large point sources where they are considered to be *significant pressures*.
  - A summary pathways conceptual model.
  - Description of the likely CSAs for diffuse and small point sources.
  - Estimates pf pollutant load reduction.
  - An evaluation of data gaps (e.g. water quality data, borehole efficiency, aquifer properties).
  - Maps and drawings to illustrate certain points and to highlight where the field work should be concentrated.
  - An overview

The General Framework for the Desk Study



The 'story' of the PAA

The Field-based Work Plan

- Give details on future fieldwork:
  - What should be done next?
  - How might it be done?
  - When should it be done?
  - Where should it be done?
  - What time and resources are needed?
  - Are more samples needed?
  - Has to be more than ‘bridge hops’ or SSISs.

Possible Mitigation & Protection Options for diffuse & small point sources

- Your conclusions in the 'Story' will have outlined usually the *significant issue*, relevant pathways and the *significant pressure,* if present.
- Based on this, do a review of possible mitigation options that could be relevant to the scenario in question so that you can think of these as you do the catchment walk.

- Alternatively, the conclusion may be that there are no significant issues or significant pressures, and that therefore objective is to 'protect' the existing situation.
- Based on this, do a review of possible pressures and their location that might pose a threat and, perhaps, decide to use existing measures such as inspections, the planning process, and community involvement to maintain the situation.

Lastly …..

We cannot emphasise enough that, in our view:

The <u>desk study</u> is the key to ensuring that the field-based assessment is focussed, efficient and effective.

It provides the foundation for the catchment walk and subsequent decision-making.

<u>But</u>, it is only the first step in the characterisation process.

Questions?

Comments?