ENVIRONMENT AGENCY

Steve Fletcher
National Groundwater & Contaminated Land Centre

Summary

- Nature of the Directive
- What is an aquifer?
- Quantitative status
- What's gone wrong?
- Groundwater bodies

Purpose of the Water Framework Directive

- … purpose… is to establish a framework for the protection of inland surface waters, transitional waters, coastal waters, and groundwater which:
- protects and enhances….aquatic ecosystems…with regard to their water needs…terrestrial ecosystems and wetlands …
- enhanced protection of the aquatic environment … …reduction of discharges …hazardous substances
- promotes sustainable water use…
- ensures progressive reduction of pollution of groundwater…
- mitigates effects of floods and droughts…

Whereases 34 of 53

For the purposes of environmental protection there is a need for greater integration of the qualitative and quantitative aspects of both surface waters and groundwaters

Note!

NGWCLC 19/03/02

Whereases 25

Common definitions of status of water in terms of quality and where relevant for the purpose of environmental protection, quantity should be established

Whereases 19

…control of quantity is an ancillary element in securing good water quality and therefore measures on quantity, serving the objective of ensuring good water quality, should also be established

Whereases 20

… quantitative status of a body of groundwater may have an important impact on the ecological quality of surface waters and terrestrial ecosystems associated with that groundwater

Whereases 40

For water quantity, overall principles should be laid down for control on abstraction and impoundment in order to ensure the environmental sustainability of the affected water systems

Quantity Rules OK

Triptych 1

- *"**Groundwater**" means all water that is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil*

Surface Water

"inland waters except groundwater"

- What is recharge in the unsaturated zone?
- What is perched groundwater?

Triptych 2

*"**Aquifer**" means a subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater*

What is significant?

One

A significant flow is one which, were it to be removed would prevent the achievement of the objectives of Article 4 for the associated surface water or terrestrial ecosystem

SWF

Whereases 37

The late arrival at the ball

MS should identify waters used for abstraction of drinking water and ensure compliance with the DWD 1980

Drinking Water

Article 7 requires the identification of :-

- **all bodies of water used for abstraction of water intended for human consumption providing more than 10m3/d on average or serving more than 50 persons.**
- **those bodies of water intended for such future use**
- **Where does this come from?**

Drinking Water Directive

Member states may exempt from the provisions:-

…water intended for human consumption from an individual supply providing less than 10m3/d as an average or serving less than 50 persons …

Drinking Water

Member states shall monitor, in accordance with Annex 5, those bodies of water which according to Annex 5, provide more than 100 m3/d as an average

What is significant?

Two

- all rocks which supply >10m3/d on average are therefore aquifers and therefore have to be characterised as groundwater bodies – the UK?

- Ignore?
- Discuss!

Triptych 3

- *"**Body of groundwater**" means a distinct volume of groundwater within an aquifer or aquifers.*

Groundwater Bodies

- Characterise
- Further Characterise if at risk
- Programme of measures if at risk
- Manage

Development Cycle for Conceptual models

Best Conceptual Model

Better Conceptual Model

First Conceptual Model

Initial ideas

Process

Development Cycle for Conceptual models

Best Conceptual Model

Better Conceptual Model

First Conceptual Model

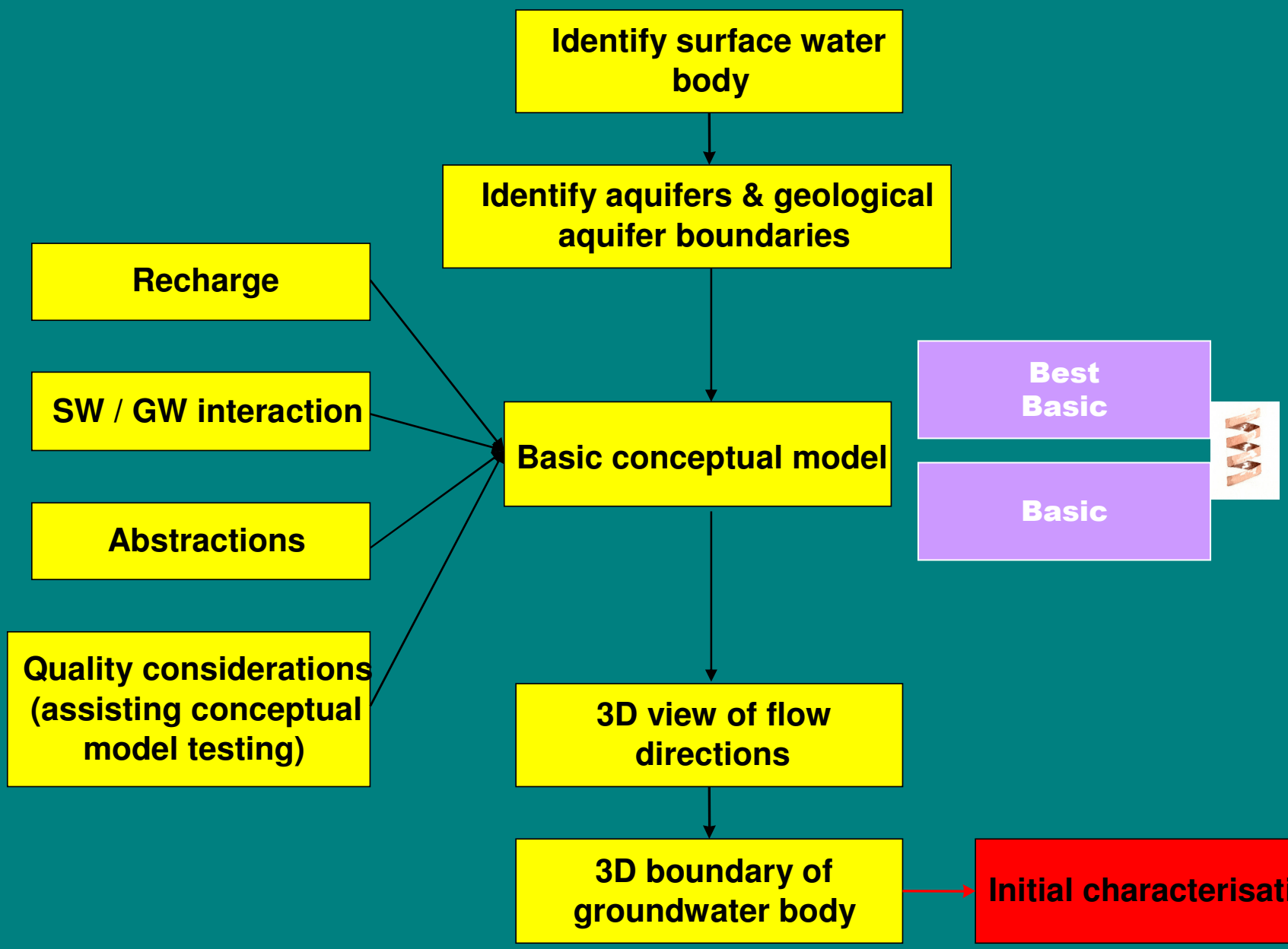
Initial ideas

Best Basic

How far do you have to go

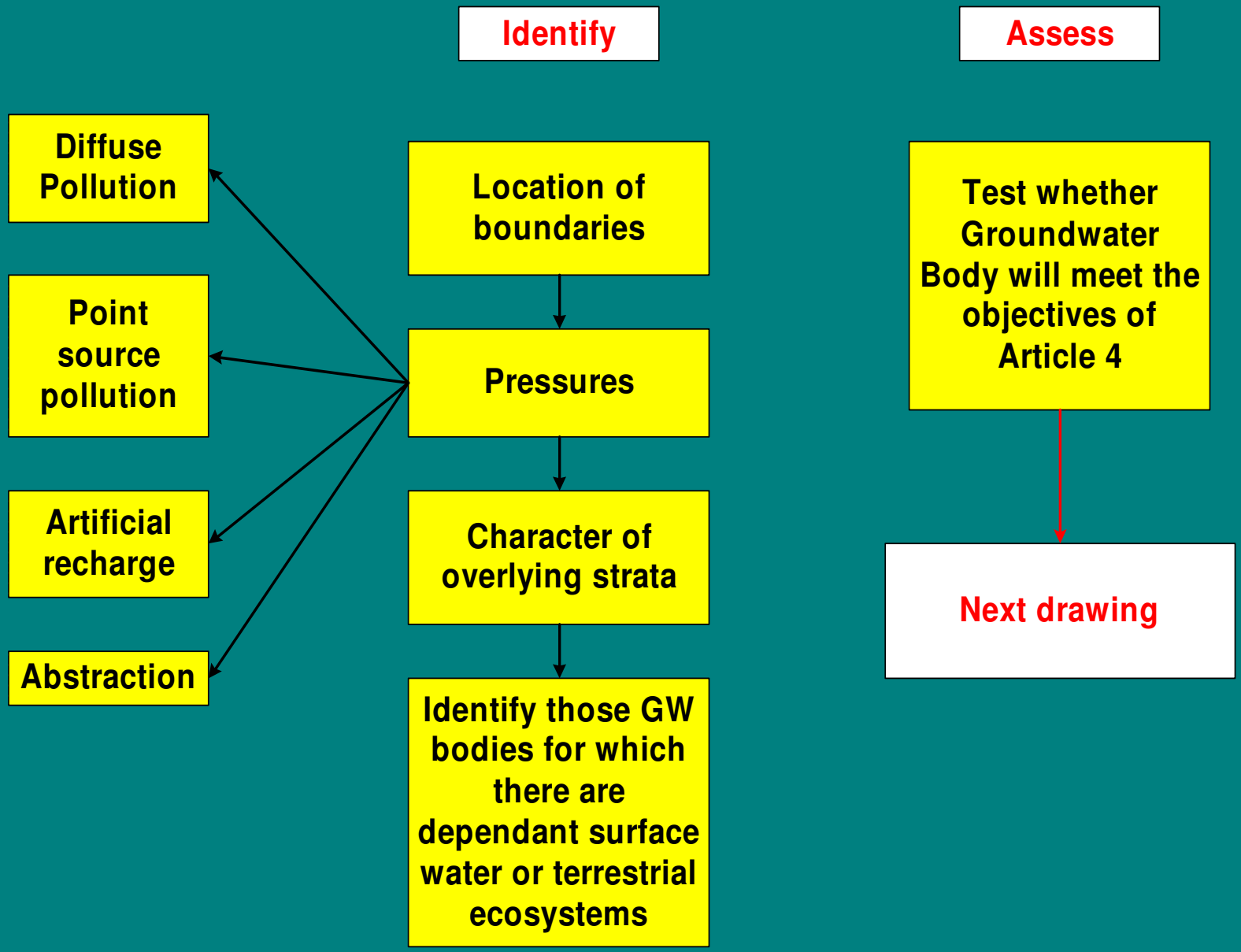
Basic

Delineation of Groundwater bodies

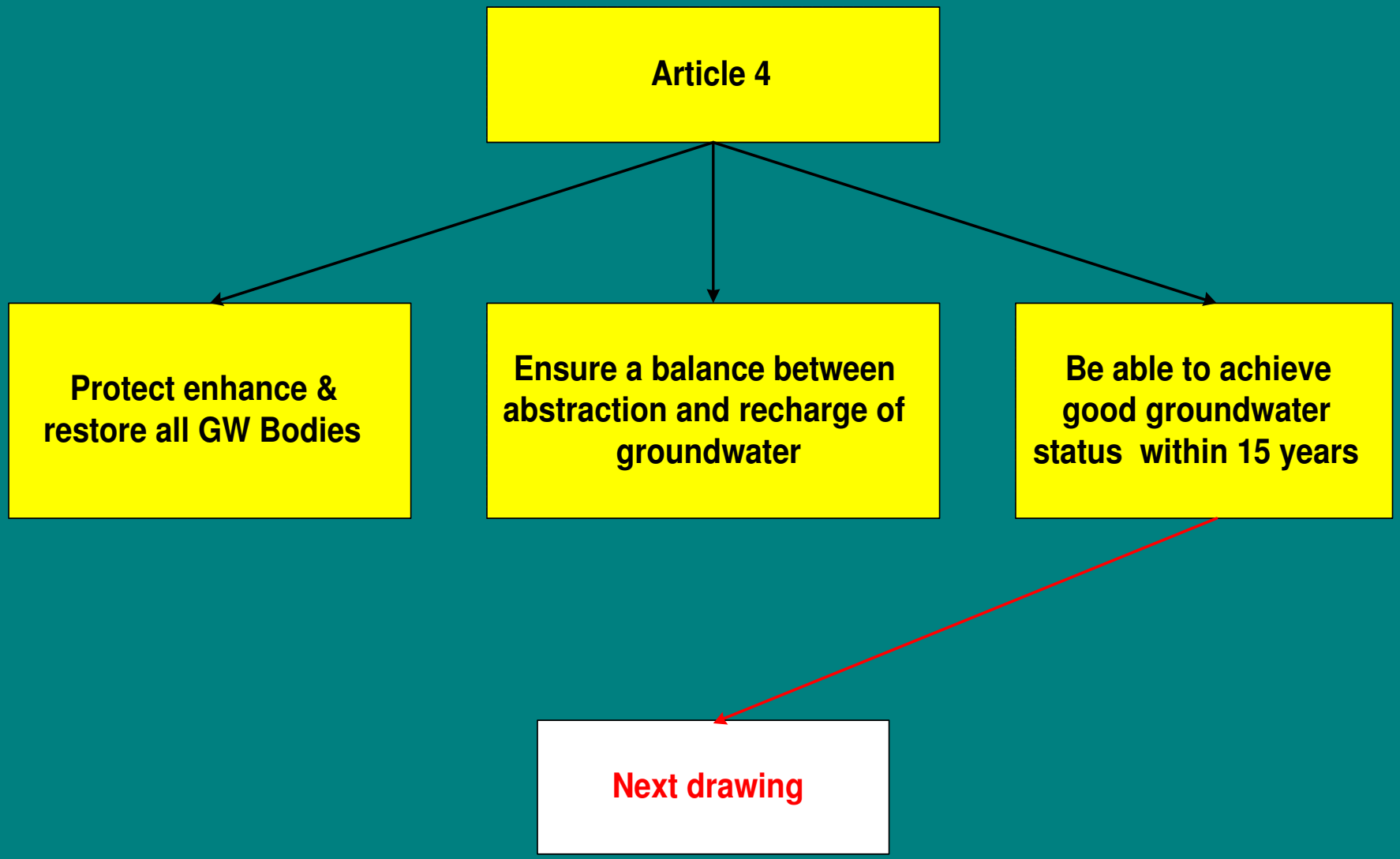


Annex 2

Initial Characterisation



What is in Article 4



Definitions

- *"**Groundwater Status**" is the general expression of the status of a body of groundwater determined by the poorer of its quantitative status and its chemical status*

Definitions

- *"**Quantitative Status**" is an expression of the degree to which a body of groundwater is affected by direct and indirect abstractions*

Definitions

- ***"Good quantitative status"*** *is the status defined in table 2.1.2 of Annex V*

Whereases 28

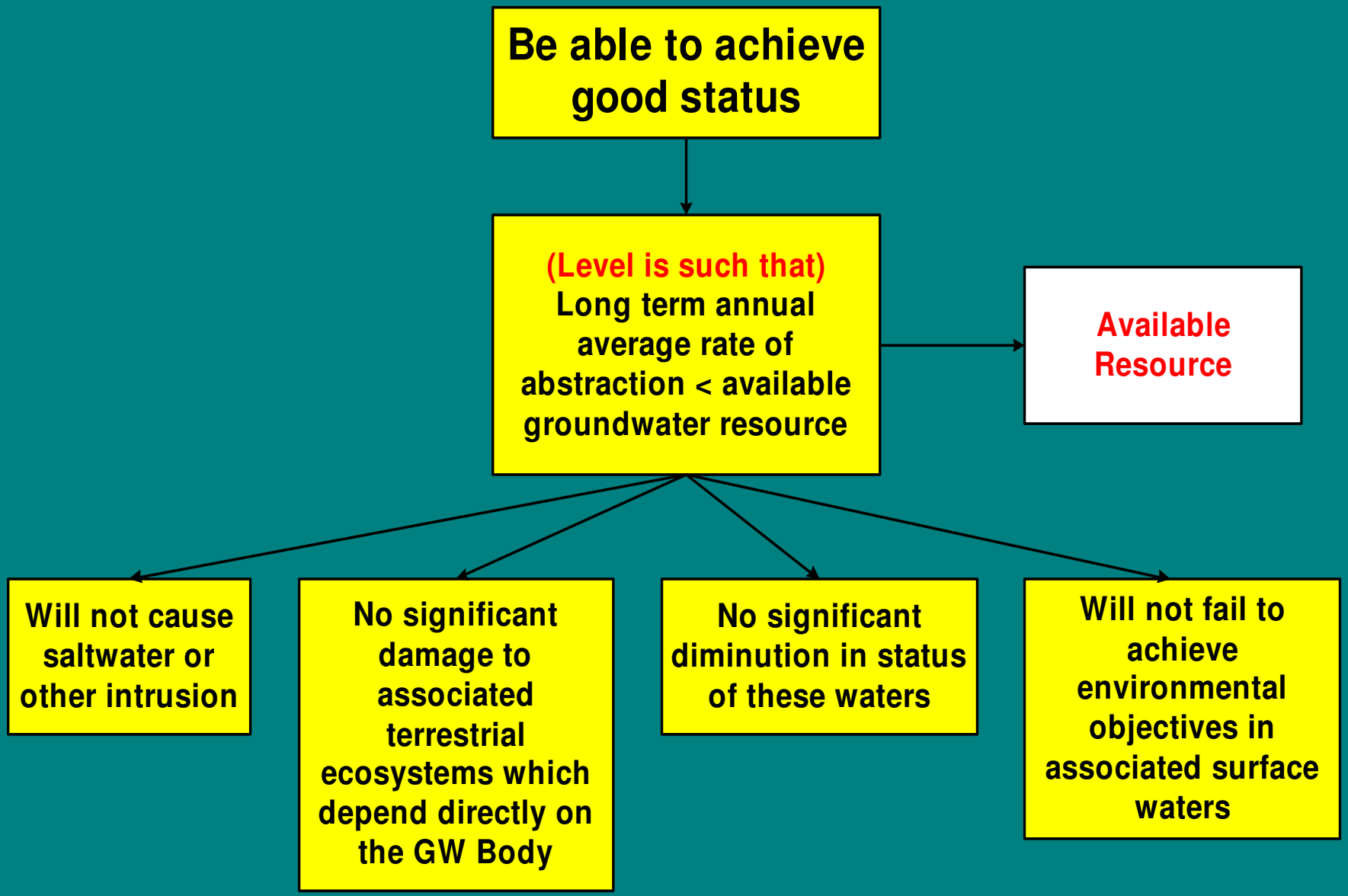
SW & GW are in principle renewable natural resources….

…in particular…the task of ensuring good status of groundwater requires early action…

… natural time lag in its formation(*sic*) and renewal

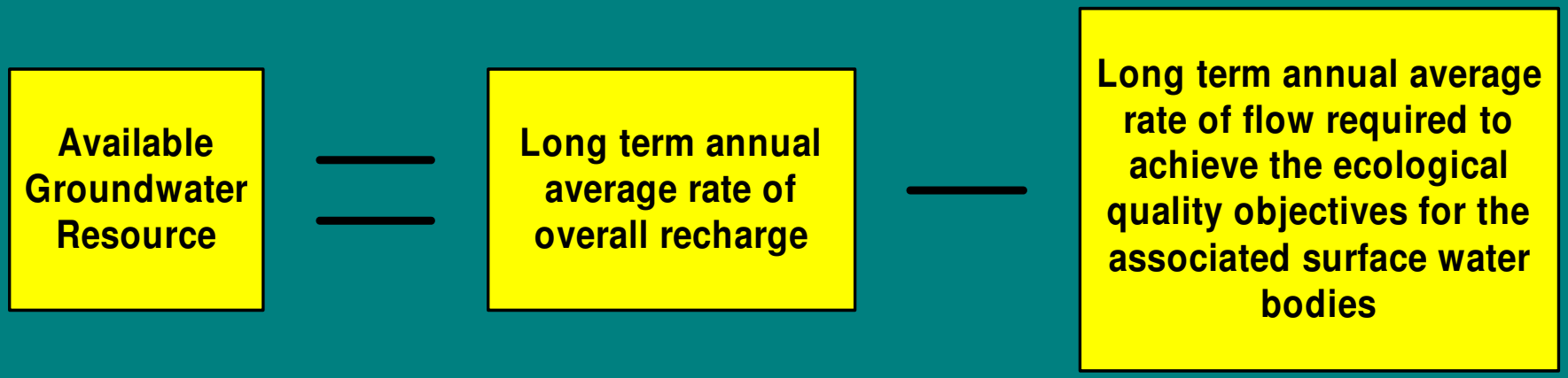
Annex 5

Achieving Good Status



Article 2

Available Groundwater Resource



Quantitative Status

- Level cannot indicate quantitative status unless you have long runs of data
- Level can only indicate a decrease in status after it has happened and after ecological damage has occurred
- Against the spirit of the Directive

Groundwater Monitoring Network

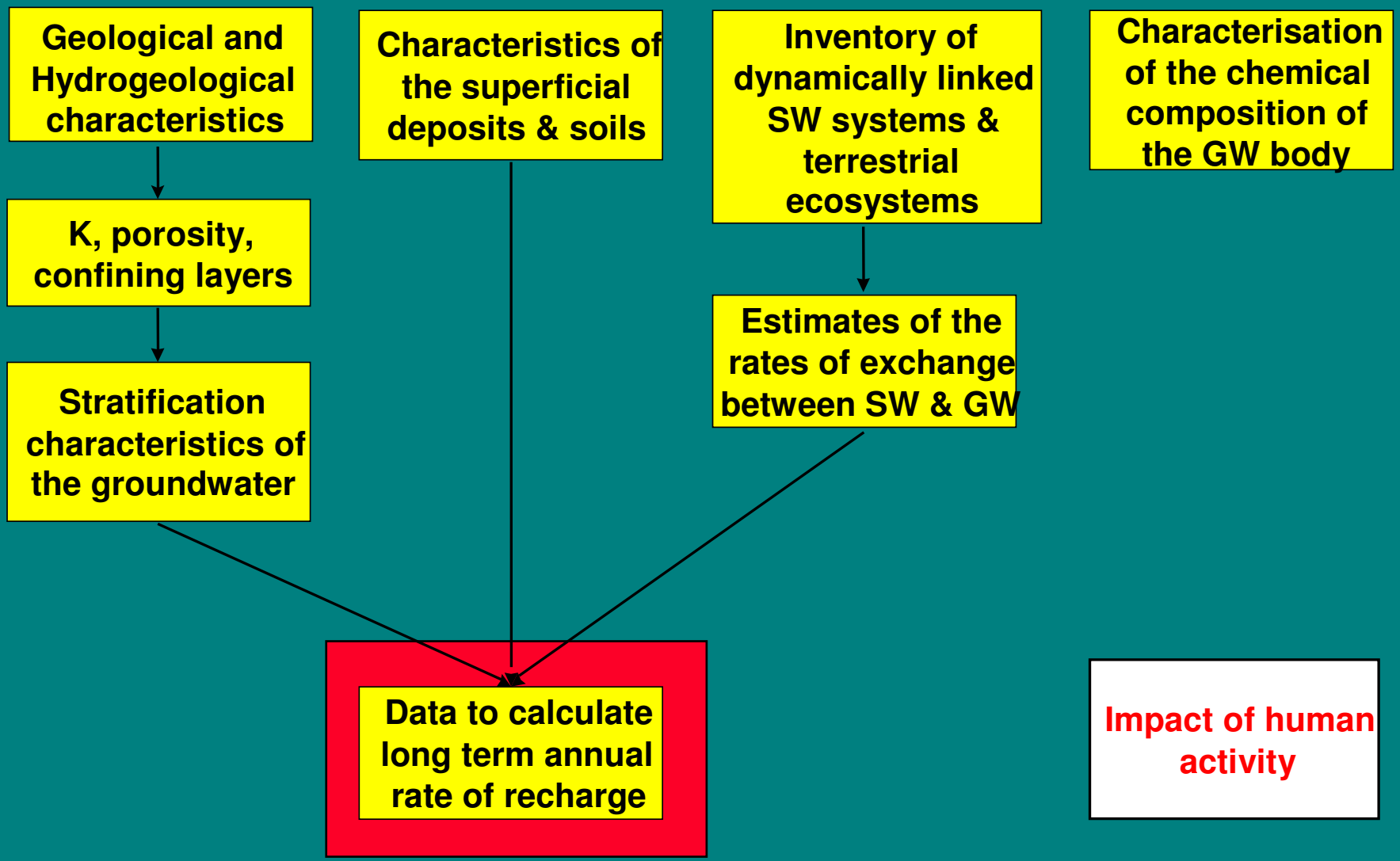
Designed so as to provide a reliable assessment of the quantitative status … including assessment of available groundwater resource

which is:-

- **the long term annual average rate of overall recharge**
- **the long term annual rate of flow required to achieve the ecological quality objectives for associated surface waters**

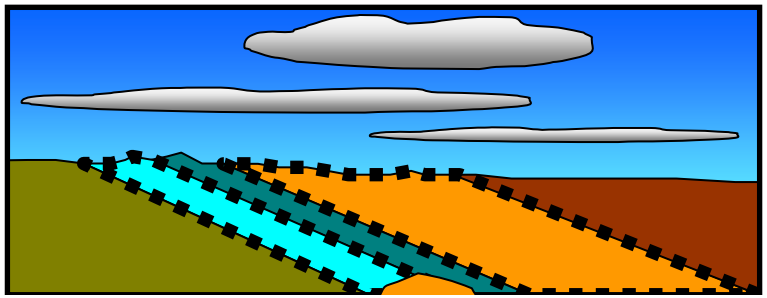
Annex 2

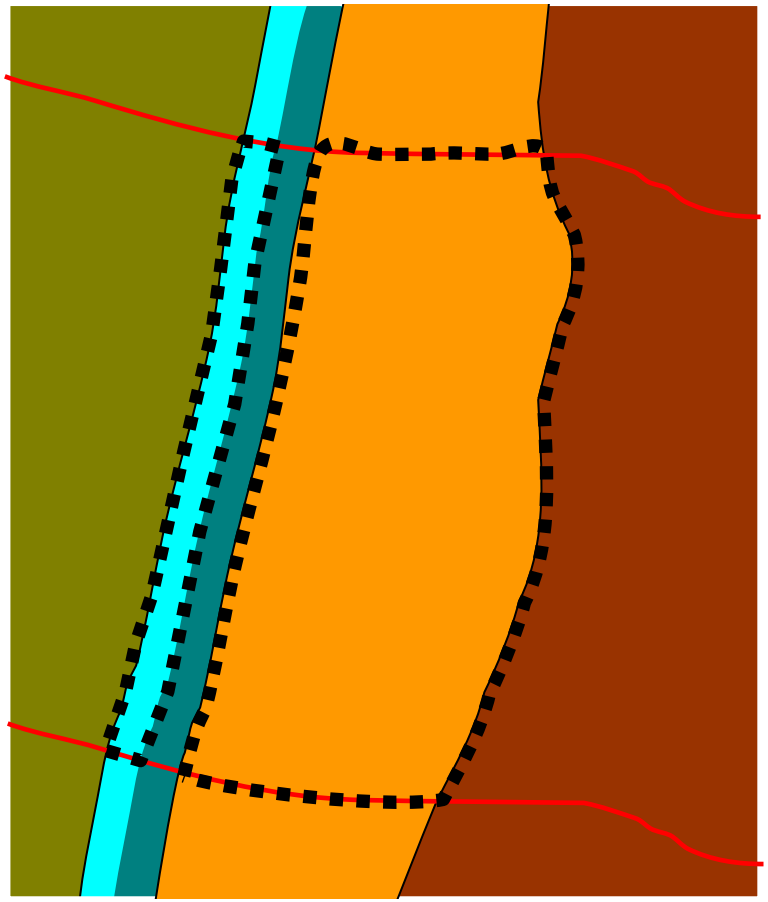
Further Characterisation



Defining Groundwater Bodies

Figure1
Using Geological Boundaries





Groundwater Flow Line

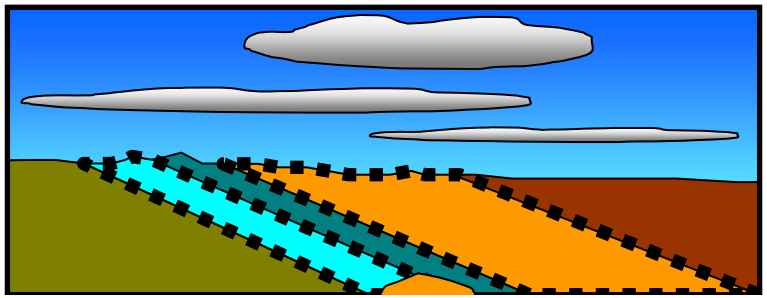
Impermeable Geological Fault

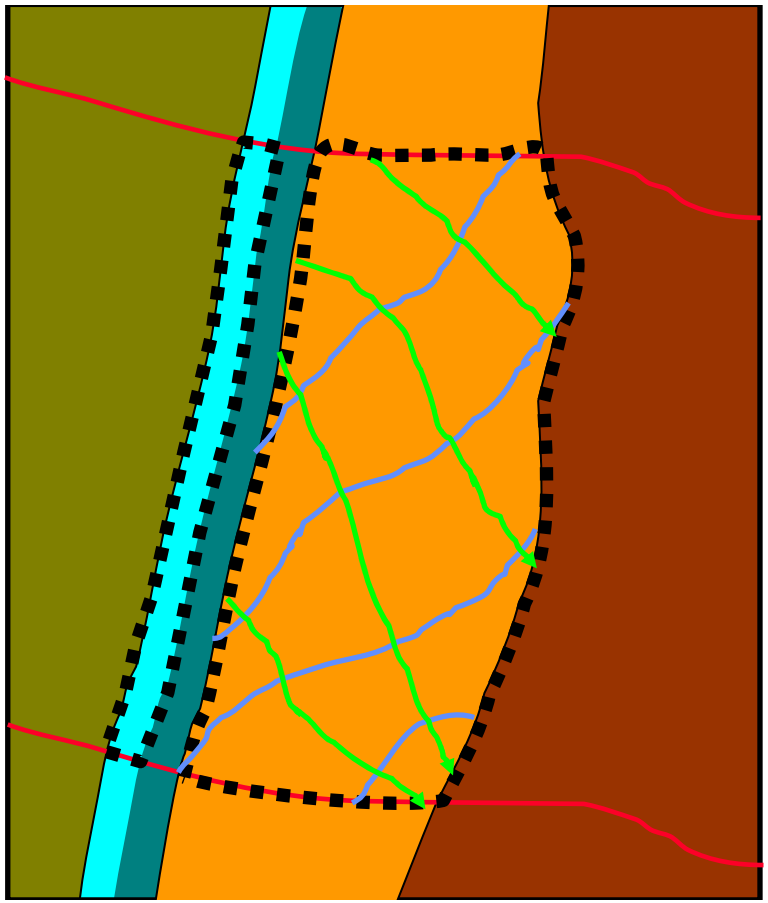
Contours

Groundwater Bodies

Defining Groundwater Bodies

Figure 2
Groundwater Flow Lines





Groundwater Flow Line

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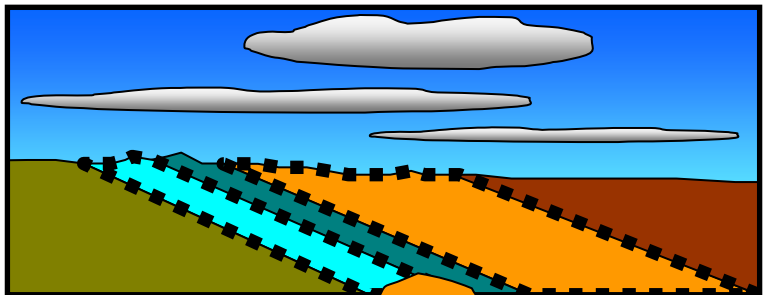
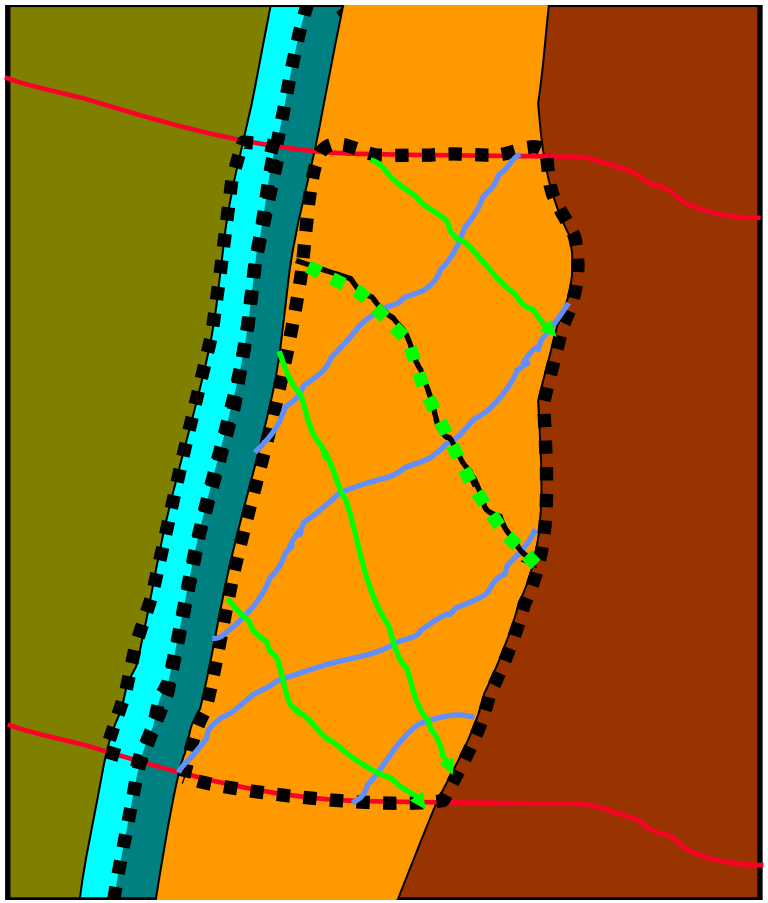
Contours

Groundwater Bodies

Defining Groundwater Bodies

Figure 3
Subsidiary Flow Line Boundary





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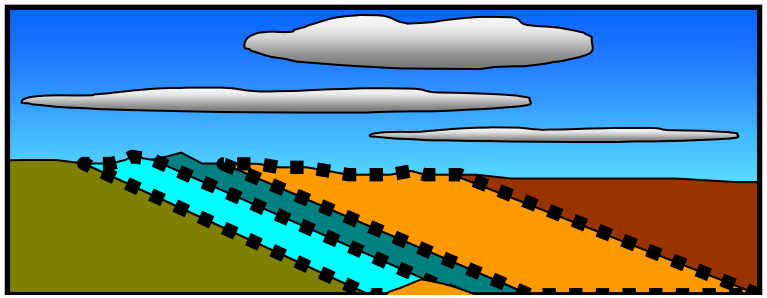
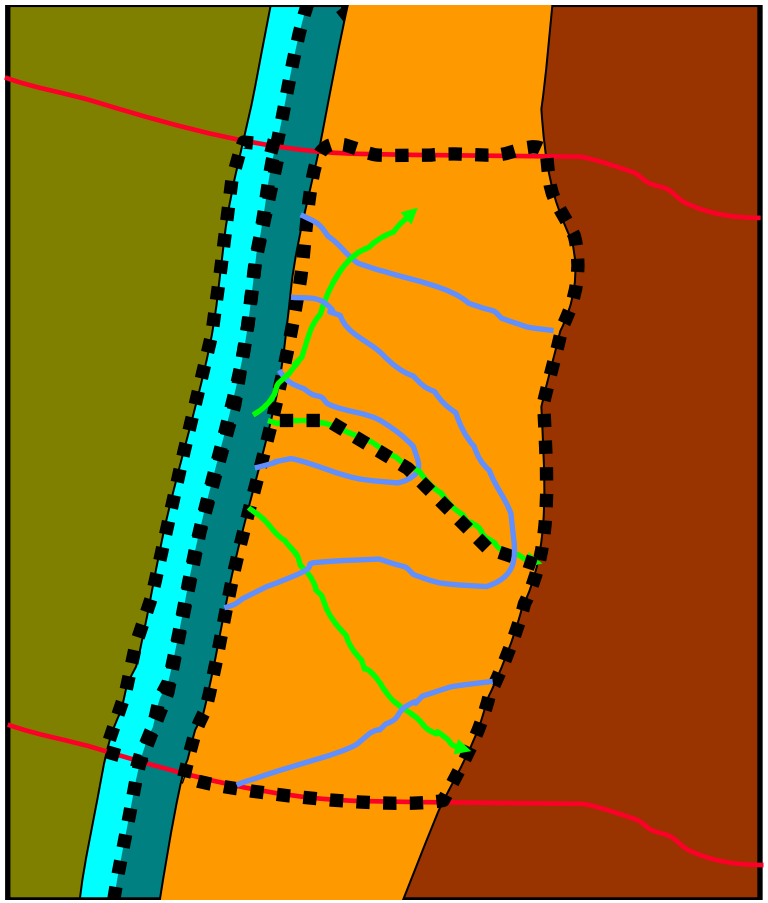
Groundwater Bodies

Defining Groundwater Bodies

Figure 4
Subsidiary Flow Line Boundary Along Groundwater "ridge"





Groundwater Flow Line

Impermeable Geological Fault

Contours

Groundwater Bodies

ENVIRONMENT AGENCY

The End