

SCOTTISH ENVIRONMENT PROTECTION AGENCY

A PRESENTATION TO THE SCOTTISH CONTAMINATED LAND FORUM

MAY 2020



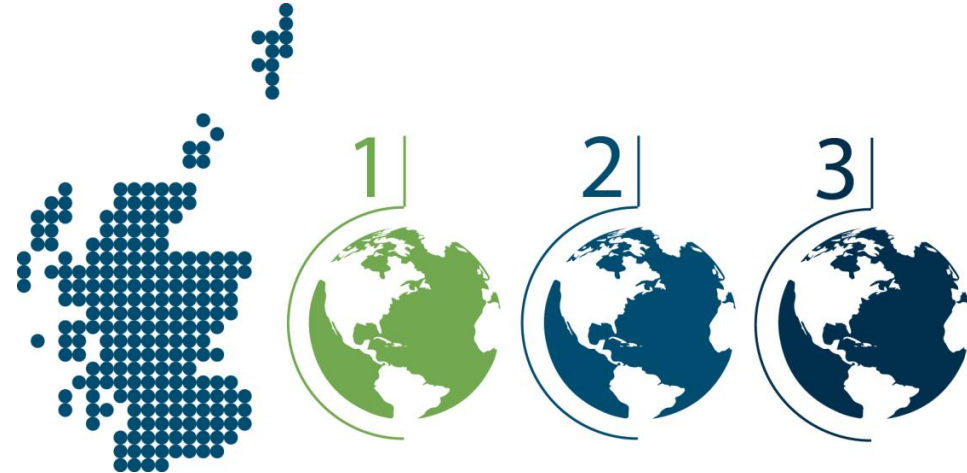
Scottish Environment
Protection Agency

Buidheann Dion
Àrainneachd na h-Alba



THE SCALE OF THE CHALLENGE

If everyone lived as we do in Scotland, we would need three planets to sustain ourselves. Businesses, societies and nations which will thrive in the 21st century are those which have developed ways to prosper within our environmental capacity.



“ The scale of environmental challenges facing humanity is enormous, with a real urgency to act. Poor leaders are going to pretend it isn’t a problem, good leaders will face the reality of the situation. Only great leaders will understand that it is an opportunity for their businesses and organisations. ”

Quote attributed

ONE PLANET PROSPERITY

Every day SEPA works to protect and enhance Scotland's environment, helping communities and businesses thrive within the resources of our planet. We call this **One Planet Prosperity**.

In every sector we regulate, this means we will have two simple aims. We will:

1. ensure that every regulated business fully meets their compliance obligations;
2. ensure as many regulated businesses as possible will go beyond the compliance standards. Regulating across whole sectors will help to tackle compliance issues and identify opportunities.



Terry A'Hearn, EPA Network, Edinburgh



INTERACTIONS WITH LAND CONTAMINATION

16 plans developed
17 in development

Cross cutting theme

Stated Actions

Metals Sector
understand historic pollution

Housing Sector
Responsibilities for River Basin Management Plans and
securing remediation of contaminated land

Water Supply and Waste Water sector
Reduce water treatment by protecting reservoir, river and
groundwater quality

Sector plans

Crop production sector plan



Dairy processing sector plan



Dairy production sector plan



Landfill sector plan



Leather sector plan



Metals sector plan



Nuclear power generation and
decommissioning sector plan



Oil and gas decommissioning sector plan



Scotch Whisky sector plan



Strategic infrastructure (transport and
utilities) sector plan



Tyre sector plan



Water supply and waste water sector plan



Consultations

Chemicals manufacturing sector plan



Consultation closed

Finfish aquaculture sector plan



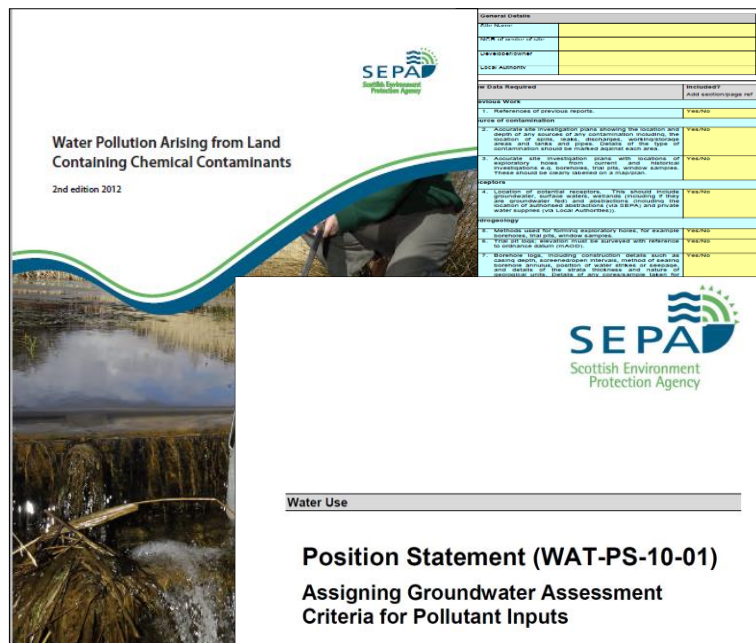
Consultation closed

Forestry and wood processing sector plan



Consultation

LAND CONTAMINATION REPORT WRITING – WATER ENVIRONMENT RISK ASSESSMENT Early Career Training Webinar Series



Aim

- Provide training on Water Environment Risk Assessment for early years professionals

Content

- Consider SEPA key guidance documents

The outcome

- Have a framework within which to undertake Water Environment Risk Assessment
- Know common issues that affect the quality of your submission

Benefits

- Effectively scope, specify, interpret and report your projects
- Give time for innovation and beyond compliance opportunities

CONTEXT

Water Environment Risk Assessment

Part IIA of the Environmental Protection Act 1990

- Significant pollution of the Water Environment
- Significant possibility of significant pollution of the Water Environment

- Suitable for Use approach – water environment

Planning – Planning Advice Note 33

- Suitable for Use approach – water environment
- In the developers interest for a site not to be Part IIA land

Not relevant for:

- PPC Site Condition Reports or
- PPC or WML site surrender reports
- Landfills and re-use of Waste
- Controlled Activities Regulations
- Radioactive Contaminated Land

SEPA Role

Advice to Local Authorities on Pollution of the Water Environment

Regulation of Special Sites

3 STAGE PROCESS

Develop Conceptual Site Model to identify possible sources, receptors, and pollutant linkages

Determine Assessment Points & Assessment Limits appropriate to each receptor

Establish if any linkage is resulting in, or could result in, significant pollution of the water environment

Developing the Initial CSM

Desk Study

Relevant Information:

- Site history/ layout –
- Geology
- Hydrogeology
- Water Environment Receptors
- Water Quality
- Water Body Status
- Preferential flow paths – drainage, sewers, pipes

Water Environment Receptors

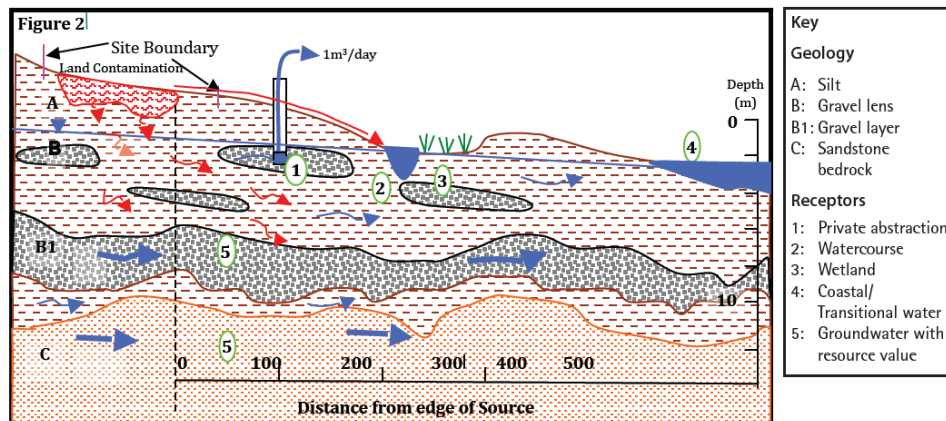
Surface waters (classified and unclassified)

- Rivers (freshwater)
- Transitional waters (marine)
- Coastal waters (marine)

Groundwater

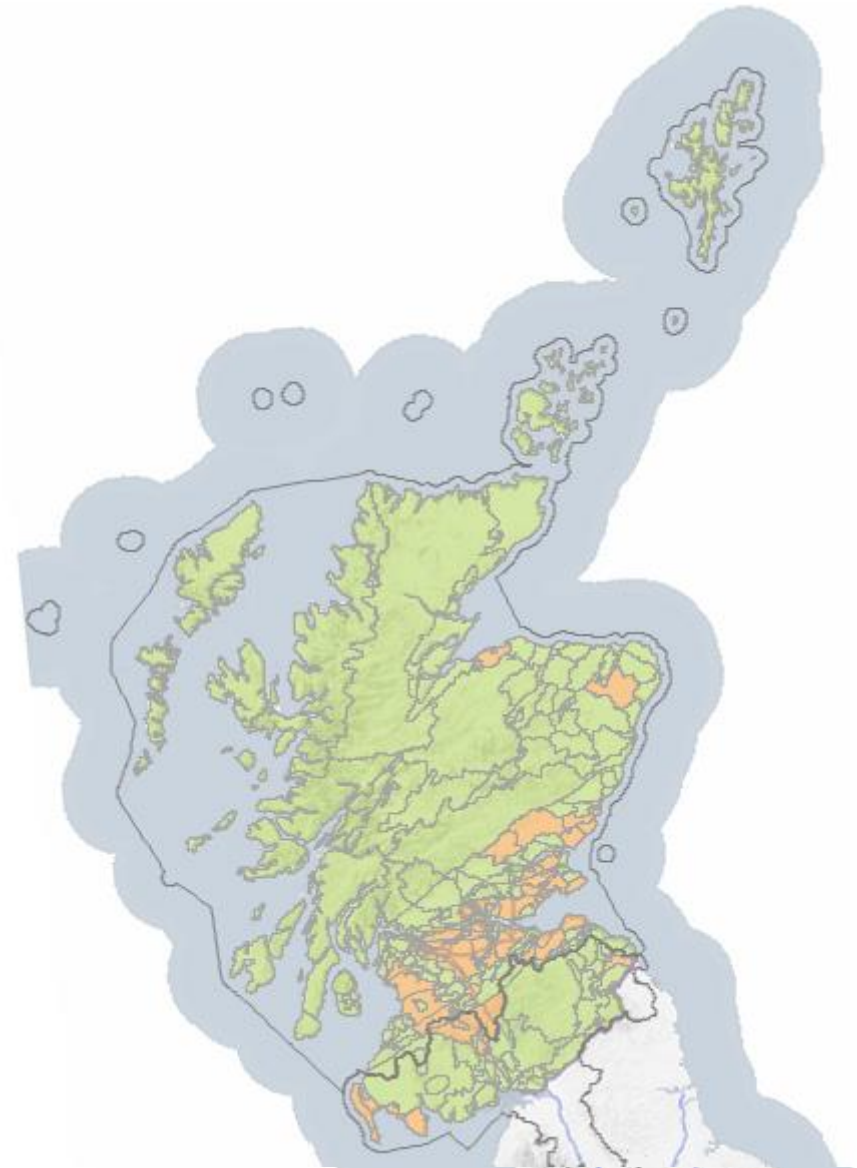
- Current Use (CAR Licences and Private Water Supplies)
- Future groundwater resource

Groundwater Dependent Terrestrial Ecosystems (GWDTE)



WHAT IS A GROUNDWATER BODY

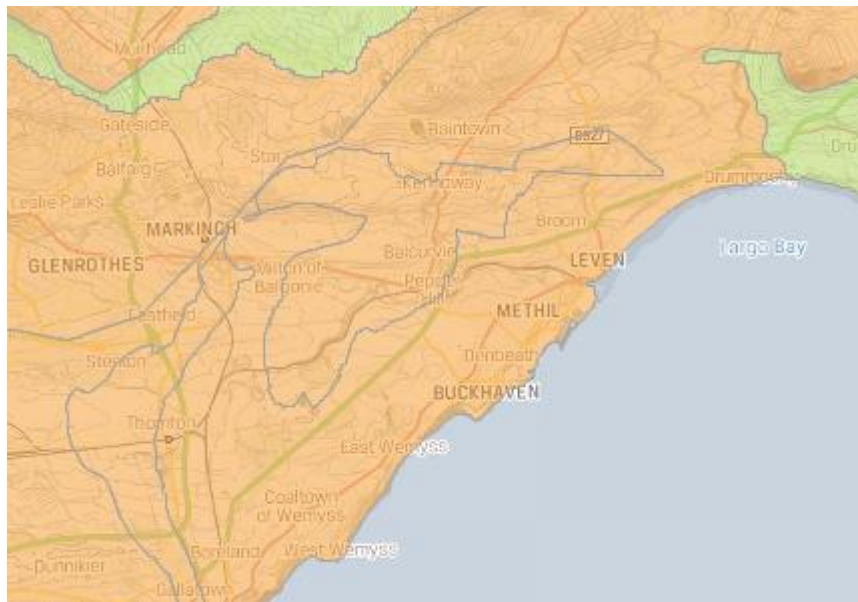
- Groundwater bodies, according to Article 2.12 of the WFD, are defined as “a distinct volume of groundwater within an aquifer or aquifers”
- UKTAG defines a GW body as being of sufficient scale to supply 10 m³/d (or 50 people)
- SEPA has applied this definition and mapped groundwater bodies.
- Some superficial aquifers
- All bedrock aquifers
- **WFD requires that we protect present and future resource potential of groundwater.**



WHEN IS GROUNDWATER A RECEPTOR?

CHECK OUR MAPS: <https://www.sepa.org.uk/data-visualisation/water-classification-hub>

BEDROCK



SUPERFICIAL

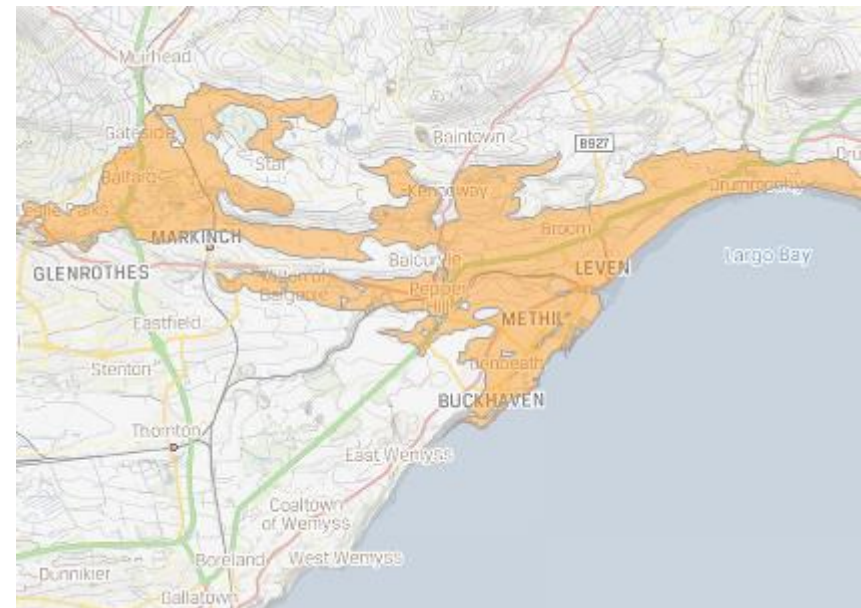
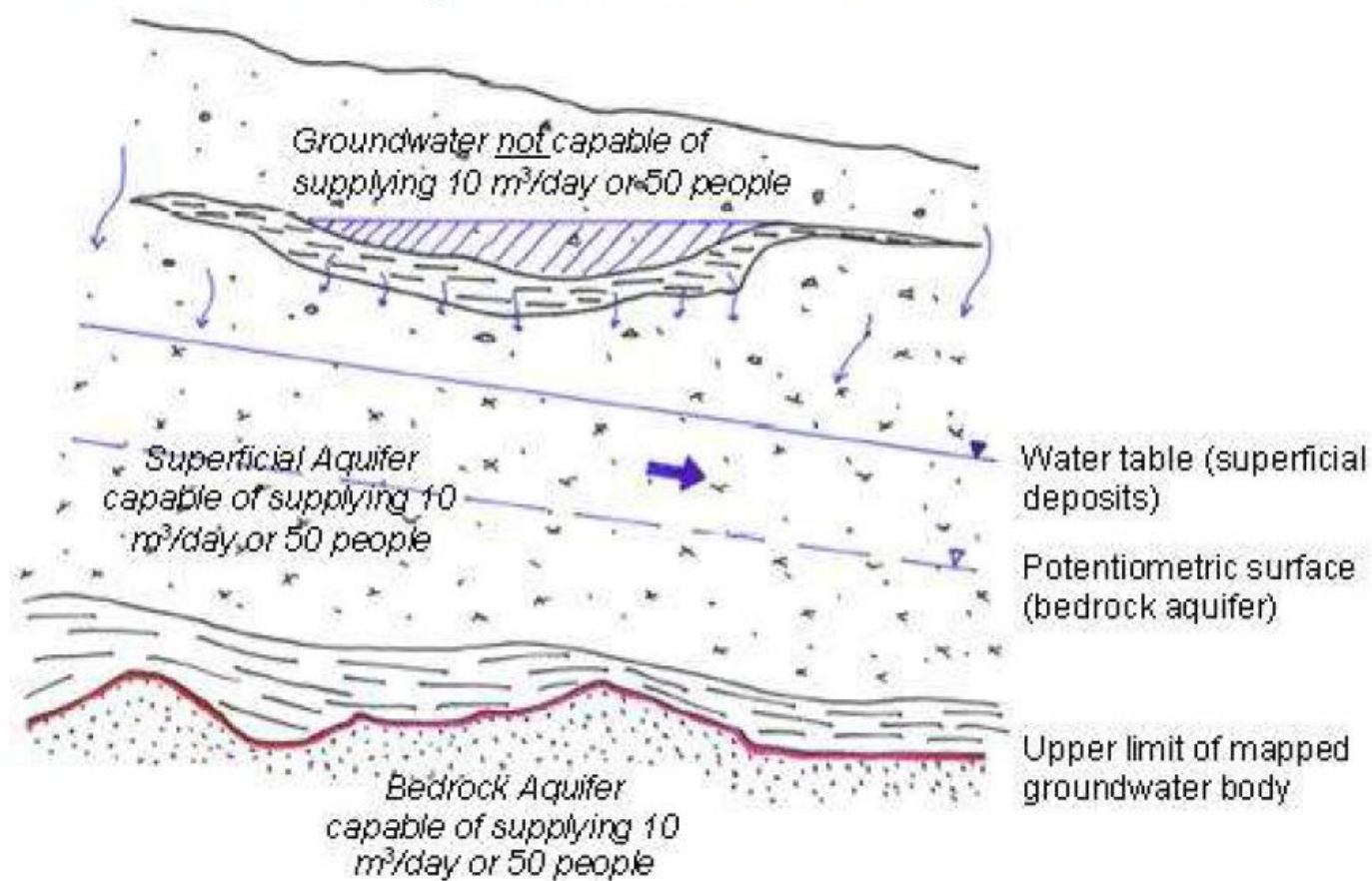


Figure 9 Groundwater and groundwater bodies

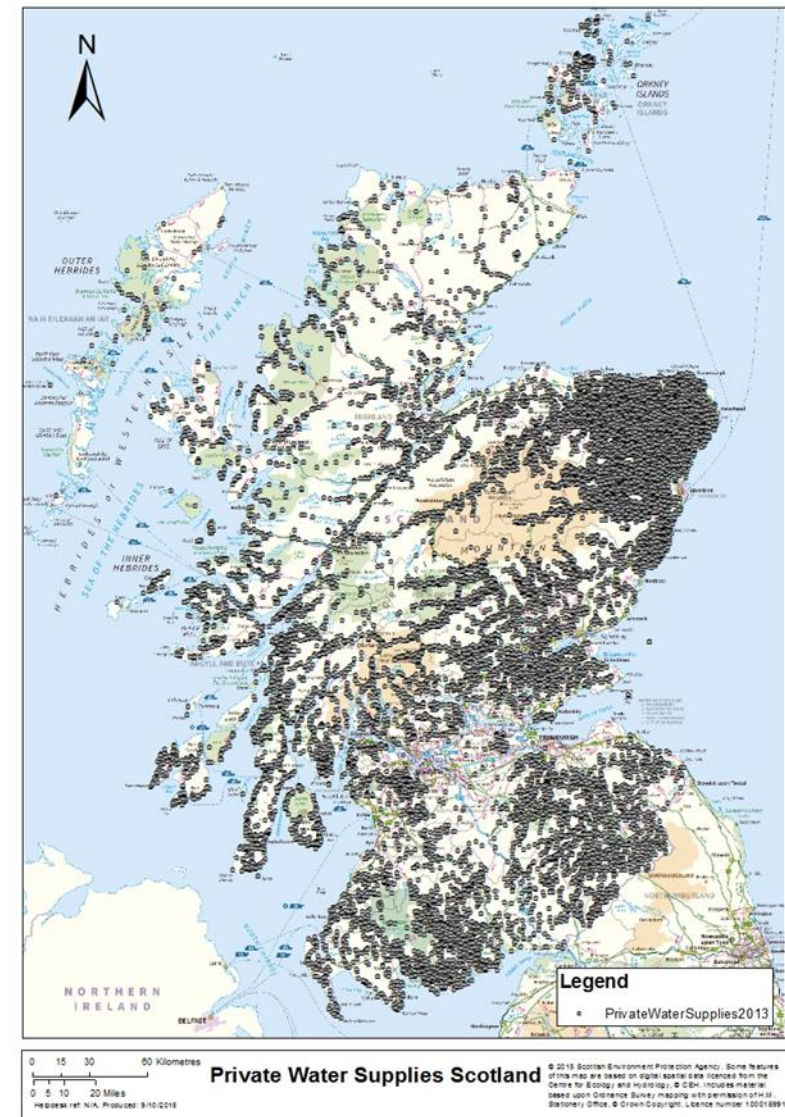


WHAT ABOUT UN-MAPPED SUPERFICIAL GROUNDWATER BODIES?

- Always a receptor initially
- Utilise Annex 2 of WAT-PS-10-01 to infer that the strata provide more than 10m³/day
- 3 tiered approach:
 - Simply assuming that all groundwater has future resource potential
 - Drilling to characterise spatial extent of superficial deposits
 - Productivity testing

CURRENT OR FUTURE GROUNDWATER USE

- Controlled Activities Regulations (CAR): Registrations and Licences for Abstractions (both groundwater and surface water)
- Private Water supplies (not all have CAR registrations or licences as could be covered by the General Binding Rules).
- Local Authorities regulate and hold records of private supplies.
- Where no abstraction, groundwater bodies are protected as a future resource.



Stage 2 – Assessment Points and Assessment Limits

| Receptor | Assessment POINT | Assessment LIMIT |
|---|---|---------------------------------------|
| Groundwater abstraction | Raw water in the borehole | Resource Protection Value |
| Groundwater as a future resource | 50m downgradient of the source (default) | Resource Protection Value |
| Surface water (inland / transitional / coastal) | In the water course, following dilution | Environmental Quality Standards |
| Wetland | In groundwater body up gradient of wetland and hydraulically linked | Nitrate standards or agreed with SEPA |

Figure 15 Assigning assessment points and limits to surface water receptors

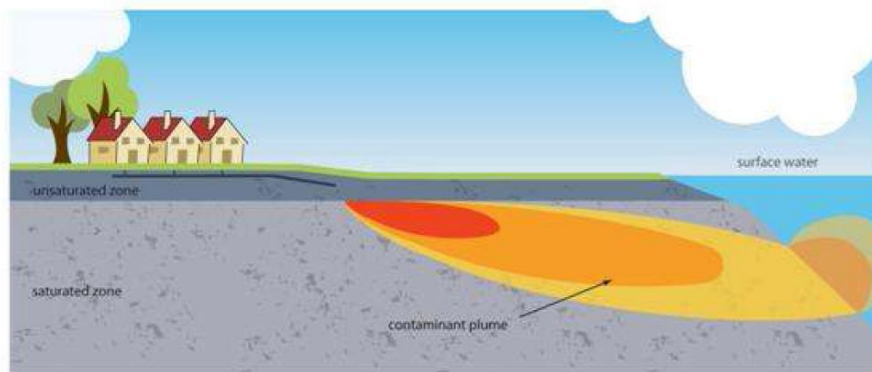


Figure 17 Assigning assessment points and assessment limits to current and future abstractions

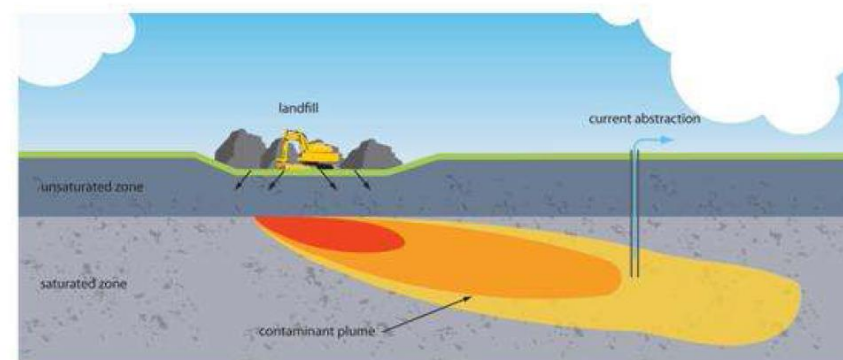
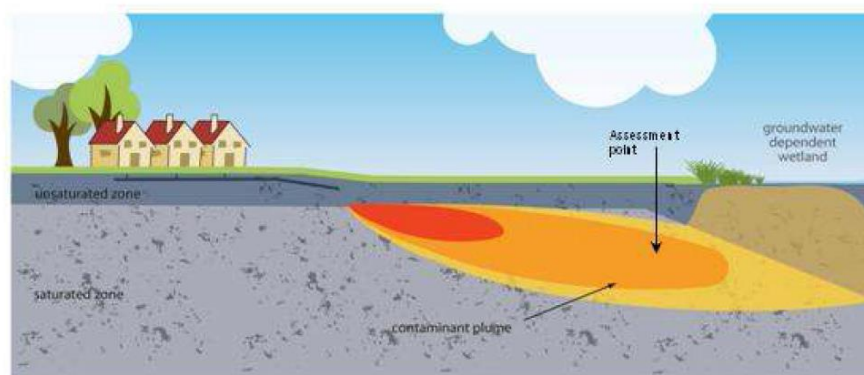
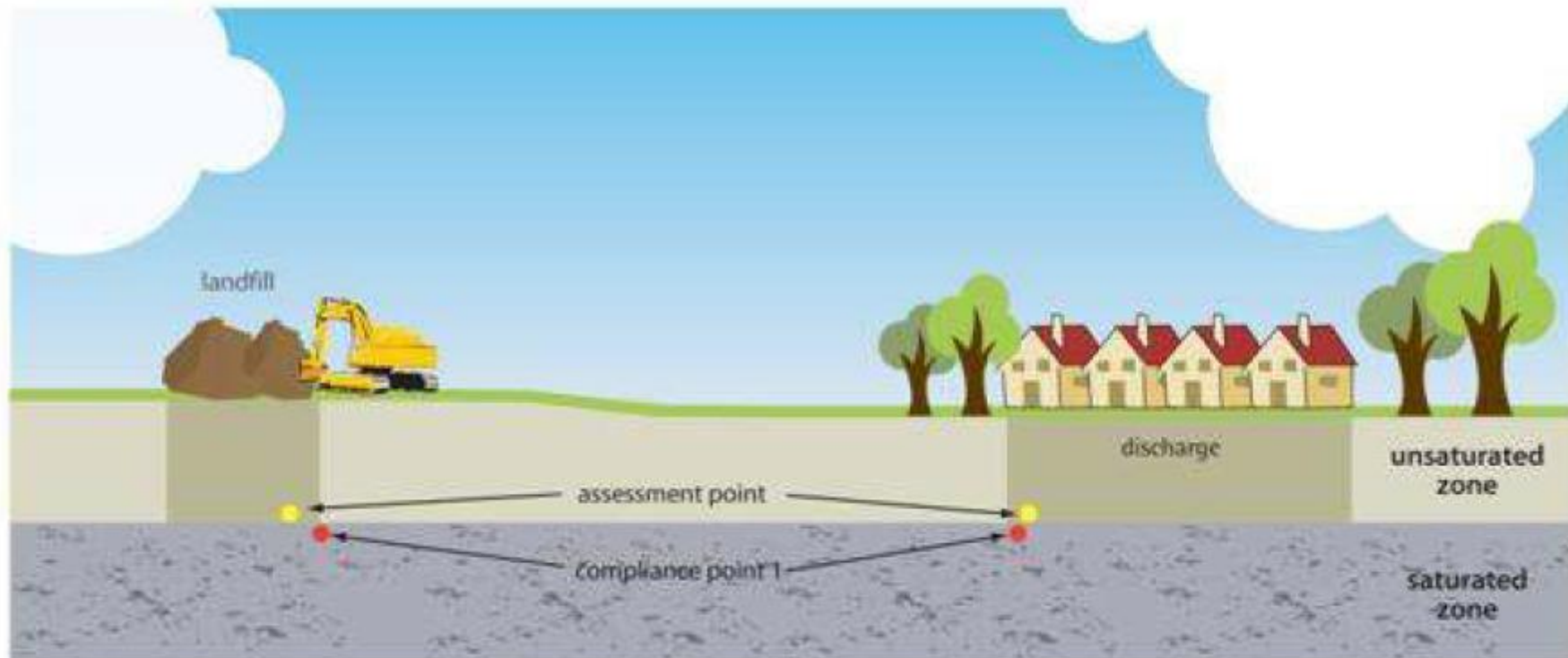


Figure 18 Groundwater Dependent Terrestrial Ecosystems



| Substance | MRV µg/l | RPV µg/l | EQS µg/l | | | |
|----------------|-------------|-------------|---|---|----------------------|-----|
| | | | Freshwater | | Marine | |
| | | | AA | MAC | AA | MAC |
| Benzene | 1 | 1 | 10 | 50 | 8 | 50 |
| Benzo(a)pyrene | * | 0.01 | 1.7x 10 ⁻⁴ | 0.27 | 1.7x10 ⁻⁴ | 0.1 |
| Naphthalene | * | - | 2 | 130 | 2 | 130 |
| Cadmium | 0.1 | 5 | ≤0.08 (class 1) 0.08 (class 2) 0.09 (class 3) 0.15 (class 4) 0.25 (class 5) | ≤0.45 (class 1) 0.45 (class 2) 0.6 (class 3) 0.9 (class 4) 1.5 class 5) | 0.2 | |
| Lead | * | 10 | 1.2 | 14 | 1.3 | 14 |

Figure 13 Assessment and compliance points for hazardous substances



“through the planning regime or voluntary remediation, the assessment of pollution must incorporate consideration of the prevent and limit requirements of the GWDD”

Stage 3 - Establishing Linkages

List of the Types of Raw Data to be Included in Submissions to SEPA

Basic raw data which must be included in submissions to SEPA

To help ensure that adequate information is included in any submission.

Without this information we cannot initiate a review

Checklist Content summary

- Accurate Site Plans
- Accurate Site Investigation Plans
- Location of potential receptors
- Methods used for forming exploratory holes
- Trial Pit Logs & Borehole logs measured to (mAOD)
Including installation details
- Groundwater levels for individual boreholes
mbgl and mAOD reference location, response zone
- Water levels of surface water features
- Results of in-situ and lab testing hydraulic conductivity testing
- Information on Preferential flow pathways
- Environmental Quality monitoring information
- Field observations of Contamination

Stage 3 - Establishing Linkages – Data Interpretation

Interpretation

Groundwater contours/ flow directions

Calculate Permeabilities

Spatial presentation of data –
Plans
Cross sections

Generic Quantitative RA
Screen – Soil Samples
Leachability Samples,
Groundwater Samples

Detailed Quantitative RA
Modelling
CONSIM
RTM

Dilution in surface water

Considerations

- Uncertainty
- Site specific data vs literature data
- Sensitivity
- Justification for values used
- Choice of Model

PRESENTING EVIDENCE

- Use SEPA checklist of data requirements
- Include both raw and interpreted data
- Document fieldwork methodology adopted in practice – may differ from what was originally planned!
- Document QA/QC checks
- Cross-check between interrelated parameters / lines of evidence
- Reality check any automated results for hydrogeological plausibility – e.g. auto-generated contours
- Ensure all assumptions are clearly stated & justified
- Make sure there is a reason for everything

SOURCES OF UNCERTAINTY FROM SITE INVESTIGATION

- all potential sources investigated
- Distribution of investigation locations.
- borehole installations
- Analytical suite /limits of detection used
- observations of contamination & analysis
- Appropriate sampling - Water samples from trial pits
- appropriate purge method
- obstructions/underground tanks and pipes as pathways
- boreholes levelled to mAOD?
- permeability testing to inform interpretation? number of samples analysed?
- accurate sample references?
- Have potential pathways been created by the investigation
- Do plans show site investigations locations relative to historic land use features
- All Boreholes intact?
- Have interface probes been used?
- records of purging presented?
- Are GW depth records converted to mAOD?
- deviating samples
- Use of flow cells
- Basic geochemical indicators

SOURCES OF UNCERTAINTY IN REPORT

Desk Study

- Are previous reports referenced
- Use of Industry profiles and site history to Inform the Analytical Suite
- Use of site layout to inform investigation locations
- Use of CSM / Geology to inform depth of investigation and relevant location of response zone

Interpretation

- Groundwater flow direction/contours
 - Are they presented?
 - use boreholes from different strata
- Status of groundwater
- Is previous investigation data used
- Absence of contaminants in groundwater or surface water used as evidence for no pollution. - does not mean no possibility

SOURCES OF UNCERTAINTY DURING RISK ASSESSMENT

GQRA

- Inappropriate assessment limits for receptor
- Not including data from previous reports
- adjustments for bioavailability or hardness
- screening soil sources – leachability or partition calculations

DQRA

- Choice of model
- justification for values used
- literature values instead of site data
- Lack of field data permeability data
- Biodegradation without evidence

UNCERTAINTY = REDUCED CONFIDENCE IN RISK ASSESSMENT

Wastes time & money!

Summary

- Framework for risk assessment for Water Environment receptors.
- Include all Water Environment receptors
- Address common issues that create Uncertainty – Have a scientific reasoning
- Effectively scope, specify, interpret and report on your projects



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