



WAT-PS-10: Assigning Groundwater Assessment Criteria for Pollutant Inputs – You Said, We Did

November 2021

1. Purpose

This document provides an analysis of the responses received to the *WAT-PS-10: Assigning groundwater assessment criteria for pollutant inputs* consultation. It summarises the views we received and explains the actions we are taking in response.

2. Consultation responses and our reply to them

There were 19 responses to this consultation from industry, local authorities, and others including industry groups. A summary of the questions we asked, the responses received and our reply to them is set out below.

It is recommended that this document is read in conjunction with the associated consultation response documents regarding the Scottish Government consultation on the new standards and the SEPA consultation on the revised *Land contamination and impacts on the water environment* guidance document.

2.1: Annex 1 sets out the background to the standards. We have not significantly changed the approach set out in section A1.4 “What is an input and a discharge?” from our previous version of this guidance. This is because we think it works well. Do you agree that no changes are required?

- 63% of respondents agreed that no changes are required
- 16% were not sure
- 16% disagreed
- 5% did not answer this question.

The majority of respondents agreed with our approach. Those that disagreed did so because there were concerns regarding some of the terminology and how it tied in with guidance on potential future groundwater resources. One respondent questioned why the approach differed from the regulatory guidance in other parts of the UK. They disagreed with our approach to direct discharges, suggesting it posed a potential barrier to development.

There were requests for additional clarification regarding what legally constitutes an input and a discharge, the use of engineered barriers, and in relation to radiological substances authorisations. The use of illustrative figures was suggested by some respondents.

We plan to retain the current approach because we consider it works well for most situations. We propose to provide additional detail in our definitions of inputs and discharges, and hazardous and non-hazardous substances. We will also provide additional clarification with respect to future groundwater resources, engineered barriers, and radiological substances authorisations. We will add illustrative figures where appropriate.

Although SEPA recognise that our proposed new guidance does not wholly align with guidance in other sections of the UK, we believe that some deviation is necessary considering Scottish hydrogeology as well as current Scottish legislation.

2.2: Section A1.5 sets out how compliance and assessments points can differ. This reflects the current guidance. Do you agree that we should continue to set out how assessment and compliance points differ in this way?

- 84% of respondents agreed we should continue to set out how they differ
- 11% were not sure
- No one disagreed
- 5% did not answer this question.

The responses to this question were predominantly favourable. However, several respondents requested further clarification with respect to compliance points for hazardous substances, given it is not usually practical to monitor the assessment point at the base of the unsaturated zone. Several respondents requested further clarification regarding choice of assessment points for new area-based spatial standards.

A few respondents required clarification of assessment points for historical land contamination pressures. One respondent queried why the previous, less stringent assessment for urban groundwater was no longer included in the guidance.

One respondent suggested including a requirement to include details of the assessment and compliance points in the 'Brown Booklet' list of types of data in submissions.

We plan to retain the previous approach that assessment and compliance points may differ.

Note that we consider there are two separate questions: the first being whether there is entry of hazardous substances or groundwater pollution (or if this is likely to occur in future), and the second being what regulatory action is required (considering relevant exemptions). We aim to protect and restore polluted groundwater, including that in urban areas. Our pollution criteria are therefore set to protect all groundwater and groundwater-dependent receptors. However, we recognise that that this may be technically infeasible sometimes. We also appreciate that

there may be important sustainability and socio-economic factors that will influence regulatory decision making on a site-specific basis. See also section 2.15.

We propose to provide additional clarification regarding the choice of assessment and compliance points and include the requirement for details of assessment and compliance points in the list of data to be included in submissions.

2.3: Section A1.7 sets out the basis for the threshold values. The Scottish Government consultation asks if you agree with the approach to assess pollution using threshold values. In this consultation we are asking if you agree with the hierarchy set out to decide which value to use?

- 63% of respondents agreed with the proposed hierarchy
- 11% were not sure
- 16% disagreed
- 10% did not answer this question.

The majority of respondents responded positively to our proposed approach. Those that disagreed did so because they disagreed with the use of 50% and 75% of potable limit when setting standards. They raised concerns regarding whether Threshold Values were more an early warning flag rather than definitive evidence of significant pollution.

Several respondents were uncertain about the use of taste and odour criteria for petroleum hydrocarbons in the absence of robust published data regarding typical concentrations at which taste and odour are likely to be observable. However, several respondents recognised that taste and odour were important criteria to be taken into consideration when assessing risks to potable supplies. One respondent suggested only considering taste and odour in areas where groundwater was likely to be used for potable supply.

One respondent asked for additional guidance regarding the difference between assessment criteria and remediation criteria, especially for sites with historical land contamination.

We propose to amend our hierarchy in relation to the application of taste and odour criteria given the concerns raised. However, drinking water-based values for some hydrocarbons are significantly above the limits of solubility. Allowing inputs at this drinking water-based value would result in non-aqueous phase liquids (NAPL) being present in the groundwater. Whilst this may not pose a risk to health it could adversely affect the use of the groundwater or groundwater-dependent receptors such as surface waters. Therefore, we propose to include a requirement that the standards should be capped at the limit of effective solubility should a drinking water based standard result in NAPL. We plan to judge whether current potable abstractions have been impacted by comparison to drinking water standards. Note that the Scottish drinking water standards include taste and odour criteria.

We propose to provide additional guidance regarding remediation criteria. Note that remediation criteria, like compliance criteria, may be different from assessment criteria. We consider there are two separate questions: the first being whether there is entry of hazardous substances or groundwater pollution (or if this is likely to occur in future), and the second being what regulatory action is required (considering relevant exemptions), considering the relevant exemptions.

2.4: Annex 2 sets out the groundwater standards concentrations. A list of standards for common substances is linked from A2.1. Do you think the layout of this table is clear?

- 89% of respondents agreed the layout of the table is clear
- 6% were not sure
- No one disagreed
- 5% did not answer this question.

Most of the respondents were satisfied with the general layout of the table. However, there were several suggestions about creating an electronic version that would be more readily searched. Several respondents also considered that the terminology used in the table requires

more explanation, particularly if the list were to be used in a standalone format. Clarification is also required on the reference to the 50m rule and regarding the use of bioavailability data. There were also several requests to provide more detail on the sources of information used to derive standards. One respondent queried whether the list can be updated as and when new information is published.

We propose to create a readily searchable version of the list of numeric values for the standards based on the methodology set out in the Scottish Government directions. We will provide additional explanations for terminology used in the table and more detail on the sources of information used to derive standards.

2.5: Do you think there is any information missing from the list of standards for common substances?

- 37% of respondents agreed that some information is missing
- 26% were not sure
- 26% disagreed
- 11% did not answer this question.

The majority of respondents considered there to be some information missing from the table. There were several requests to provide more detail on the sources of information used to derive standards. One correspondent requested more clarity on standards to be used for the assessment of drinking water abstractions.

Several respondents noticed a discrepancy with respect to trichloroethane.

Several respondents referred to the CL:AIRE guidance on petroleum hydrocarbons with respect to the standards for aromatic / aliphatic TPH fractions, which are based on WHO guidance. They expressed a preference for the new Scottish standards to align with the CL:AIRE recommendations.

One respondent referred to the DWI 2021 guidance on perfluorinated compounds.

In response, we will provide more detail on the sources of information used to derive standards and include a cross-reference to the published drinking water standards.

We will fix the discrepancy for trichloroethane.

See also our response in section 2.3 above regarding the use of taste and odour criteria.

The DWI guidance on perfluorinated compounds is primarily aimed at water companies. Thus, we do not intend to refer to it explicitly when setting standards as it does not align with our current hierarchy. However, we propose to take it into account in regulatory decision making as and when appropriate, such as when setting site-specific compliance limits.

2.6: We have not set out a generic temperature standard for groundwater. Instead, we propose that the temperature in groundwater must not be high or low enough to cause adverse direct or indirect impacts in groundwater-dependent receptors including surface waters, wetlands, or abstractions. Do you agree with this approach?

- 53% of respondents agreed with the proposed approach
- 26% were not sure
- 16 % disagreed
- 5% did not answer this question.

There was a mixed response to this question. There was general agreement that setting a single temperature standard was not the best approach. However, several respondents suggested setting a range for temperature, rather than a single temperature standard, or at least providing guidance on typical range for Scottish groundwaters. Several respondents also suggested setting a target based on amount or percentage of variation from baseline. The majority of respondents wanted more detailed guidance to be provided to ensure consistency in the assessment of temperature effects. Several respondents noted that heat is a potential resource requiring management.

We do not propose to set a generic temperature standard as this parameter varies naturally in groundwater across a range that may exceed what might be locally acceptable at individual receptors. Groundwater temperature is influenced by depth, geology, the groundwater flow regime, and anthropogenic influences such as mining. Based on our experience, most Scottish groundwaters that are currently used for potable supply, or which provide baseflow to surface waters or GWDTEs have temperatures in the range 5 to 25°C.

However, we will clarify when more quantitative assessment of potential temperature impacts might be required. We consider this is only likely to be required in relation to specific activities that have the potential to significantly influence groundwater temperatures. It will also depend on the duration of the activity and the proximity of sensitive receptors.

2.7: The Scottish Government consultation asks if you agree with the proposed changes to the standards. Does Table 1 set out the standards clearly?

- 63% of respondents agreed it was clear
- 21% were not sure
- 11 % disagreed
- 5% did not answer this question.

Most respondents thought that Table 1 was clear enough given the complexity of conveying a significant volume of information. There were some minor comments regarding formatting and use of footnotes.

A few respondents suggested the use of accompanying flow charts to help illustrate the process. Several respondents suggested an interactive decision tree tool might be beneficial.

Several respondents thought the accompanying figures required improvement. One respondent suggested there was a need for area-based figures in addition to cross-sections.

We will reformat Table 1 to reduce the requirement for footnotes and amend the accompanying figures plus include additional figures or diagrams.

2.8 Do you agree with our tier-based system to assessing impact?

- 68% of respondents agreed with the system
- 32% were not sure
- No one disagreed or did not answer this question.

The majority of respondents agreed with continuing to use a tier-based approach to assessing impact.

Several respondents asked for additional guidance with respect to the use of leachability and solubility data. One respondent raised concerns regarding the assessment of the potential future exceedance of the standards. One respondent requested clarification regarding how the tiers might differ for sources above and below the water table. Several respondents queried whether the EA's RTM could be utilised.

One respondent disagreed with our approach to the hyporheic zone, suggesting this should be considered on a site-specific basis depending on the value of the ecological habitat.

One respondent was disappointed that the proposed approach did not include a waiver for the need for DQRA for brownfield developments deemed to be low risk.

We will retain our tier-based system but will provide additional clarification of what is required at each tier. We will provide additional guidance in relation to NAPLs and leachability data.

We have internally consulted with SEPA ecologists regarding our approach to the hyporheic zone. They agreed with our approach as being precautionary for the protection of surface water ecosystems. We thus propose to retain the proposed approach.

We consider that the EA's RTM can be used as a general guide when undertaking DQRA as it includes many useful pointers. However, as the English and Scottish approaches and

standards differ, the RTM can only be used as a starting point. The use of the EA's spreadsheet tool is acceptable to SEPA, but the choice of standards (both in terms of concentrations and assessment points) need to be modified to fit the Scottish standards.

Brownfield sites are very variable with respect to both type and concentrations of potential contaminants. Therefore, it is difficult to develop generic rules as to when a development is low risk. The variation between brownfield sites means the risks to groundwater are not readily predicted without site-specific assessment and any generic screening would involve considerable uncertainty. We can provide some high-level guidance, but some site-specific assessment will be required. Whether a DQRA is required for a brownfield site will depend on the findings of the site characterisation and ground investigation.

2.9: Section A.3.1.5 sets out guidance on calculating annual average concentrations. Do you agree with our approach to dealing with limits of detection?

- 42% of respondents agreed with the proposed approach
- 26.5% were not sure
- 26.5% disagreed
- 5% did not answer this question.

There was a mixed response to this question. Several respondents preferred the use of $0.5 * \text{LOD}$ when generating statistics. There were also several comments regarding the need for further clarification on what should be done when the LOD exceeds the relevant standard. One respondent noted that LOD may be affected by external factors outwith the control of the operator / applicant such as salinity. A few respondents recommended providing additional guidance in relation to the treatment of outliers.

In response, we propose to amend the guidance to refer to the use of $0.5 * \text{LOD}$ when calculating annual average statistics. We will provide additional guidance regarding the

recommended approach where an LOD exceeds the default standard. We will provide additional guidance regarding outliers in the dataset.

2.10: Section A.3.1.5 sets out guidance on calculating annual average concentrations. We have not specified a minimum number of data points.

Do you agree with this approach?

- 53% of respondents agreed with the proposed approach
- 26% were not sure
- 16% disagreed
- 5% did not answer this question.

Most respondents agreed that the guidance should not specify a minimum number of data points. However, there were several requests for additional guidance on what is considered sufficient data to aid regulatory consistency. Several respondents asked for clarification as to whether SEPA would require 12 months of data to calculate an annual average.

In response we propose to amend our guidance to provide additional details as to our expectations regarding dataset sufficiency.

SEPA do not consider that 12 months of data is always essential for calculating an annual average concentration. A shorter duration dataset may be adequate. This will depend on the hydrogeological setting, plume dynamics, and the degree of uncertainty that can be tolerated from a regulatory perspective.

2.11: Section A3.3.1 sets out how to calculate input loading. Do you agree with our approach to assessing source input loading rates where the source is below the water table?

- 53% of respondents agreed with the proposed approach
- 37% were not sure
- 5% disagreed
- 5% did not answer this question.

The majority of respondents were generally supportive of our approach, but there was a significant proportion who were unsure. Several respondents asked for additional clarification regarding mixing zone thickness. Several respondents asked for clarification regarding use of literature values, particularly in relation to recharge. A few respondents requested clarification regarding how to assess loading for more complex situations, such as if the source straddles the water table, if the source extends beyond more than one hydrogeological unit, or if there are preferential pathways for contaminant migration (such as mine workings). One respondent raised concerns regarding the difficulties of accurately delineating source geometry and requested additional guidance regarding levels of acceptable uncertainty.

In response, we propose amending our guidance to provide additional information. This will include providing additional guidance in relation to:

- Mixing zone thickness.
- Assessing complex situations.
- Use of literature values.
- SEPA's expectations regarding managing uncertainty.

Note that this guidance will be general and may not cover every possible scenario. Professional judgement will be required when undertaking site-specific DQRA.

2.12: Section A3.3.3 sets out guidance on assessing the impact on the future groundwater resource. We have set out equivalent assessment point distances for the future groundwater resource. Do you think these tables are useful?

- 47.5% of respondents agreed that the tables are useful
- 21% were not sure
- 26.5% disagreed
- 5% did not answer this question.

There was a mixed response to this question.

Several of the respondents disagreed with the inclusion of the tables or indicated that they could be confusing. They suggested that the tables did not adequately account for dispersivity and aquifer heterogeneity. The assessment distances in the table were considered potentially over-precautionary for the lower end of the source width ranges. It was suggested that the person undertaking the risk assessment should justify the choice of assessment point on a site-specific basis. Several respondents raised concerns regarding the potential complexity of defining the source term, particularly where it extends beyond the site boundary. Several respondents raised concerns regarding large source areas, such as landfills, where the assessment point would be within the source area.

Considering the concerns raised, we propose to remove the tables of generic equivalent assessment point distances. Instead, we propose requiring justification of the choice of assessment point. To support this, we will provide additional guidance to aid calculation of assessment points, including for use in 2-D modelling tools. We will provide additional guidance on how to approach assessing source zones that straddle more than one site.

We will also provide additional guidance on how to approach assessing large source zones that exceed area-based standards in size. Consideration of the potential scale of the source

and plume will be required. The consequent predicted impact on the groundwater body as a whole may be required, which is likely to require discussion with SEPA. Note that regulation of large sources will normally require exemptions to be considered.

2.13: Section A3.3.3 sets out guidance on assessing the impact on the future groundwater resource. We have set out equivalent assessment point distances for the future groundwater resource. Do you agree with our upper limits to equivalent assessment point distances?

- 21% of respondents agreed with the proposals
- 47.5% were not sure
- 21% disagreed
- 10.5% did not answer this question.

There was a mixed response to this question.

Several respondents questioned the derivation of the maximum assessment distances. A few questioned whether maximum assessment distances were required. One respondent queried whether the maximum assessment distances were appropriate for fracture flow or karstic aquifer scenarios. Again, concerns were raised regarding sites with source zones that extend beyond the site boundary and sites with multiple source zones with overlapping plumes.

We propose to retain the proposed maximum assessment distances, which were chosen based on consideration of typical Scottish topography, geology, and hydrology. We consider that it is important to have maximum assessment distances to ensure a nationally consistent approach. However, we will provide additional guidance on assessment distances for sites with multiple source zones.

2.14: A3.3.4, A3.3.5 and A3.3.6 set out how to assess the impact on surface waters, GWDTE and abstractions. This approach has not significantly changed to that set out in current guidance. Do you agree that no changes are required?

- 74% of respondents agreed no changes are required
- 21% were not sure
- No one disagreed
- 5% did not answer this question.

Most respondents agreed with our proposal to retain the current approach on assessing surface waters, GWDTE and abstractions. However, clarification was requested regarding the choice of assessment point for small watercourses.

Several respondents asked for mapping of tidal limits to be made available. However, note that mapping of tidal limits on watercourses is shown on Ordnance Survey mapping.

We propose retaining our previous approach but will provide additional guidance regarding the choice of assessment points for small watercourses such as tributaries of water bodies.

We will also amend our guidance to refer to NatureScot rather than SNH.

2.15: We have tried to outline the circumstances when exemptions from meeting the objectives apply in Table 2. Do you agree with our guidance?

- 47% of respondents agreed with the guidance
- 26% were not sure
- 21% disagreed
- 5% did not answer this question.

There was a mix of responses to this question.

A few respondents queried our interpretation of specific exemptions or queried why we had not included all the possible exemptions, referring to the WFD, the GWDD and the EU CIS guidance.

Several respondents requested additional detail in the guidance on use of exemptions.

Several respondents raised concerns regarding the assessment of disproportionate cost. There was concern about how this could be consistently assessed and regulated in practice. One respondent was concerned that there would be a shift in effort from remediation towards assessment of disproportionate costs and queried whether this would achieve the stated objectives for groundwater. They were also concerned that this might discourage developers from tackling the more complicated sites. A few respondents were concerned that the disproportionate cost guidance in the draft document implied that remediation of plumes was assumed to be disproportionately costly.

Several respondents suggested taking sustainability and socio-economic considerations into account as part of the decision-making process for remediation of historical land contamination.

In response, we propose amending our guidance on the use of exemptions to provide additional detail to help inform regulatory decisions. As previously noted in section 2.2, we consider there are two separate questions: the first being whether there is entry of hazardous substances or groundwater pollution (or if this is likely to occur in future), and the second being what regulatory action is required (considering relevant exemptions).

We consider it important to take account of what is technically feasible. This will vary from site to site depending on local ground conditions, the surrounding environment, and the nature of the contaminants in question. Thus, some professional judgement will be required. In addition, scientific and engineering advances mean that technical feasibility may change over time. Regulatory decision-making also needs to account for what might be practicable to implement, particularly for existing authorised sites.

We agree that socio-economic factors are an important consideration during regulatory decision making. This is particularly the case for historical land contamination and for existing authorised sites. We also consider that it can be beneficial to consider risks to groundwater at an early stage in the development cycle, particularly at local plan or master planning stage.

We will provide additional high-level guidance in relation to the assessment of disproportionate cost. We will also consider options for developing more detailed guidance on disproportionate cost, but this will take time and thus will not be included in this iteration of WAT-PS-10. We would welcome the development of additional industry-led guidance on this topic.

We do not consider that remediation of groundwater plumes will always be disproportionately costly.

We also agree that sustainability can be an important factor when making regulatory decisions. This is at the heart of SEPA's One Planet Prosperity approach. Sustainability is particularly relevant when undertaking options appraisals for remedial methods.

2.16: Reading the document and annexes as a whole, do you find it clear and is there sufficient information for you to make an assessment?

- 37% of respondents agreed it was clear and that there is sufficient information
- 42% were not sure
- 16% disagreed
- 5% did not answer this question.

There was a mixed response to this question.

Several respondents commented negatively regarding the format of the document, particularly with respect to the use of annexes, tables, and footnotes. In addition, several respondents requested the inclusion of worked examples, flow charts, and illustrative figures to help explain the guidance. Associated training was also requested.

Several respondents were concerned that the guidance would result in greater effort and expenditure on site characterisation and risk assessment, and less actual remedial action.

Two respondents requested additional guidance specific to radiological substances.

A few respondents suggested referring to the National Quality Mark Scheme. This echoed comments elsewhere in the consultation responses regarding the need for DQRA to be undertaken by competent professionals.

We have also received subsequent feedback from a few consultees that climate change should be more explicitly considered in the assessment process.

We will refine our guidance to provide additional clarification on key points of uncertainty identified through the consultation process. However, we want to stress that our guidance is general and cannot cover every possible scenario. Site-specific assessments of risks to groundwater also require professional judgement.

We will revise the document formatting to try and aid readability.

We note the concerns regarding the balance of effort and expenditure between site assessment and remedial action. Remedial action is usually most effective when it is to be based on knowledge of the problem as well as consideration of the implications that the remediation will have.

Additional regulatory support regarding issues relating to radiological substances can be sought from SEPA's radiological specialists.

We agree that climate change should be considered when assessing risks to groundwater, particularly during development of the conceptual site model. We will provide additional guidance in relation to accounting for climate change in the assessment process.

We agree that groundwater risk assessments need to be undertaken by competent professionals. However, WAT-PS-10 is generic guidance covering a wide range of activities,

some of which require considerable specialist expertise. Therefore, it is difficult to refer to specific qualification requirements that would be applicable across all the various sectors. We will refer to the National Quality Mark Scheme in our guidance but do not intend to make adherence to this scheme mandatory.

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