#

**Guidance on Assessing the Impacts of Development on Groundwater Abstractions**

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# Guidance on Assessing the Impacts of Developments on Groundwater Abstractions

## Introduction

This guidance sets out SEPA’s expectations for the assessment of impact of developments on groundwater abstractions, both public and private water supplies. This guidance applies to all developments requiring an Environmental Impact Assessment (EIA) provided any temporary or permanent dewatering abstractions are unlikely to exceed 10 m3/day1. It is intended for developers and Local Authorities, and Determining Authorities.

SEPA expect developments and infrastructure to be designed and constructed such that the water environment, including groundwater abstractions, are protected. The applicant should seek to avoid adverse impacts on groundwater abstractions through the detailed design of the development and by implementing best practice construction techniques. The potential for impacts will vary depending on the scale and location of the development as well as on the proximity of the groundwater abstraction.  SEPA does not offer guidance on the detailed design of infrastructure or prescribe a specific method or technique for construction as environmental conditions and engineering constraints will be site-specific and construction techniques will require a tailored approach to negate risks to identified sensitive receptors.

Dewatering or drainage may change the quantity of groundwater supplying abstractions. Discharges to ground may change the quality of groundwater. These activities are controlled via The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) as amended. See the CAR Practical Guide for further information.

Note also this guidance does not cover assessment of impacts to existing surface water abstractions or impoundments.

**SEPA will not provide comment on potential impacts to private water supplies unless the assessment has progressed to Step 3 (Detailed quantitative risk assessment).**

The matrix below shows how both the scale of the effects and the importance of the abstraction must be considered when assessing potential impacts.

| **How much is it affected** |  |
| --- | --- |
|  |  | **Substantially** | **Moderately** | **Slightly** | **Negligibly or** **not at all** |  |
| **How Important is it** | **High/****Important** | Major | Major  | Medium  | Negligible/no effect |  |
| **Moderately Important** | Major | Medium | Low | Negligible/no effect |  |
| **Low Importance** | Medium  | Low | Low | Negligible/no effect |  |
| **Unimportant** | Unimportant effect | Unimportant effect | Unimportant effect | Negligible/no effect |  |

Factors recommended to be considered when assessing potential effects include:

* Extent
* Magnitude
* Duration, frequency, and reversibility
* Likelihood
* Cumulative effects, including both impact interactions and additive impacts and considering both intra- and inter-project effects.

When assessing potential importance of groundwater abstractions, SEPA suggest:

* Scottish Water abstractions are assessed as being of High importance
* Private water abstractions for human consumption are likely to be of Moderate importance
* Other non-potable abstractions are likely to be Low to Moderate importance, depending on the purpose of the abstraction.

## Roles & Responsibilities

Developers are responsible for obtaining the relevant information required to support the impact assessment and for designing and undertaking the site works in accordance with the relevant regulations and published guidance.

Owners/operators of existing groundwater abstractions are responsible for compliance with the relevant regulations regarding abstraction and water supply and for maintaining their abstraction infrastructure. See the SEPA guidance on good practice for water abstraction boreholes [An applicant’s guide to water supply boreholes (sepa.org.uk)](https://www.sepa.org.uk/media/34501/an-applicant-s-guide-to-water-supply-boreholes.pdf).

The Determining Authority may be the Planning Authority or relevant Scottish Government departments (e.g. Energy Consents Unit) depending on the nature of the development.

Planning Authorities are required to exercise their functions to secure compliance with the Water Framework Directive and the Groundwater Directive as now applicable to Scotland. This includes functions under the Town and Country Planning (Scotland) Act 1997. This requirement is set out in the Water Environment and Water Services (Scotland) Act 2003 and The Water Environment (Relevant Enactments and Designation of Responsible Authorities and Functions) (Scotland) Order 2011.

Scottish Water are responsible for provision of public water supplies.

Local Authorities are responsible for assessing private groundwater abstractions used for potable supply in accordance with the Private Water Supplies (Scotland) Regulations 2006.

SEPA are responsible for assessing groundwater body status and for regulating activities that may impact on the water environment in accordance with CAR.

Note that in applying this guidance, SEPA will only consider the groundwater component of abstractions. It is not SEPA’s role to protect surface run-off that may directly supply the abstraction or enter the abstraction headworks or associated infrastructure due to poor construction. Advice on the protection of these components of the supply should be sought from the Local Authority.

## Recommended assessment approach

SEPA recommends adopting a phased approach to the assessment of risks to groundwater abstractions, with greater detail being required for higher risk sites or activities. Our recommended approach is summarised below.

SEPA expect the assessments to be undertaken by suitably qualified and experienced specialists.

The checklist in Appendix A provides a summary of the information required in support of the Environmental Statement.

### Step 1 Identify any existing groundwater abstractions

This covers both public and private water supply groundwater abstractions, both within and outwith the site boundary. **It is critical that it is the actual source of the abstraction, and not the property that it supplies, that is identified**.

The relevant buffer zones for groundwater abstractions for all proposed infrastructure, both temporary and permanent and provided expected dewatering rates do not exceed 10m3/day, are:

a) 10m for all activities

b) 100m radius of all subsurface activities less than 1m in depth;

c) 250m of all subsurface activities deeper than 1m.

Scottish Water hold information regarding public water supplies. The Local Authority holds records of private water supplies. Note that the information held by the Local Authority will sometimes relate to the property served by the private water supply, rather than the location of the source itself (e.g. the house rather than the borehole or spring). Therefore, the details of each private water supply source require confirmation, including a site walkover survey.

**If there are no groundwater abstractions within the buffer zones, SEPA will not provide comment on this topic in our planning response.**

Otherwise, proceed to Step 2.

During the determination process if a stakeholder considers the location of an individual groundwater abstraction has been wrongly assessed during Step 1, this should be raised with the Determining Authority. The Determining Authority will determine whether further information is required from the developer to confirm the exact locations. If this is after the determination process, then the stakeholder should consult with the relevant Planning Authority.

### Step 2 Qualitative impact assessment

A conceptual site model (CSM) should be provided as part of the Environmental Statement. This should include interpretation of the hydrogeological setting, including the groundwater flow regime. This may be supported, as appropriate, by intrusive ground investigation, groundwater monitoring, or groundwater modelling.

Qualitative assessment of the potential impacts to any groundwater abstractions identified within the relevant buffer zones is required. This should consider the expected extent, magnitude, likelihood, and duration, frequency, and reversibility of any potential impacts.

The impact assessment should consider the impacts to each groundwater abstraction individually, including any potential cumulative effects if the groundwater abstraction is near multiple parts of the proposed development.

An iterative approach is recommended, using the impact assessment findings to inform the design process. Consider modifying the development proposals to avoid significant risks as far as possible (i.e. by moving proposed activities outwith the relevant buffer zones).

**If the potential impacts to groundwater abstractions are Low or Unimportant, then no further risk assessment is required. SEPA will not provide comment on this topic in our planning consultation response.**

Otherwise, proceed to Step 3.

During the determination process, if a stakeholder does not agree with the impact assessment findings after Step 2, this should be raised with the Determining Authority. The Determining Authority will determine whether further information or assessment is required, including whether to escalate the assessment to Step 3. If this is after the determination process, then the stakeholder should consult with the relevant Planning Authority.

### Step 3 Detailed quantitative risk assessment

Undertake detailed quantitative risk assessment (DQRA) to determine the potential effects on the groundwater abstractions within the buffers.

The DQRA is expected to be supported by appropriate characterisation of the ground conditions at both the relevant infrastructure location(s) and the groundwater abstraction(s), plus the pathway(s) in between if appropriate. This will require ground investigation, including groundwater level and quality monitoring.

The DQRA should quantify the potential change(s) in groundwater levels or flow regime. The modelling approach, input parameters and assumptions should be justified. The hydrogeological modelling predictions should inform the assessment of the risks to the groundwater abstractions.

If the DQRA confirms the potential impacts are Major or Medium, then provide details of the site-specific mitigation measures proposed to avoid or offset the potential impacts. The nature of the mitigation measures required will depend on both the development and the groundwater abstractions.

Then refine the DQRA to confirm whether any residual impacts to the groundwater abstractions remain once the proposed mitigation measures are in place.

## Monitoring & contingency planning

If the DQRA during Step 3 confirmed there are potential impacts to groundwater abstractions, then SEPA recommend monitoring of the relevant abstractions is undertaken to demonstrate the effectiveness of the proposed site-specific mitigation measures.

The developer or Determining Authority may choose to widen the scope of the monitoring further to include monitoring of all abstractions within the buffers.

A site-specific monitoring plan should be provided. The scope of the monitoring is expected to include groundwater monitoring (levels and quality) and monitoring at the groundwater abstractions. The monitoring plan should include detailed justification of why the proposed scope is fit for purpose. See Appendix B for further guidance on monitoring.

The monitoring plan is recommended to include:

* Monitoring point locations
* Monitoring suite
* Monitoring frequency
* Overview of the monitoring methods and associated QA/QC procedures that will be implemented to ensure the monitoring results are representative
* Site-specific compliance metrics that will be used to identify whether any adverse impact may be occurring /has occurred
* Contingency plans that will be implemented if adverse impacts are identified. These should include timescales for notification of relevant stakeholders, and for design and implementation of remedial actions.

Baseline monitoring is expected to commence at least 12 months ahead of the development works starting on site.

Monitoring is expected to continue during the construction phase, and for a minimum of 12 months post-construction.

The monitoring results must be regularly analysed and interpreted to identify whether any significant adverse impacts on the groundwater abstractions have occurred or are likely to occur.

The monitoring results should be reported to the Local Authority and the owner/operator of the existing abstractions. Reporting is expected at the end of the baseline period and then annually thereafter. **There is no requirement to routinely submit the monitoring data to SEPA. SEPA will not review the monitoring data unless the Local Authority has identified specific issues of significant concern.**

If any potential impacts are identified by the monitoring or through other means, the contingency plan should be implemented. Appropriate remedial measures are expected to be implemented as soon as possible if adverse impacts are identified.

Contingency plans involving the temporary or permanent replacement of a groundwater supply to provide security of supply (e.g. provision of a new borehole or connection to public supply) must be agreed with the owner /operator of the abstraction. **SEPA will not comment on the alteration or the provision of alternative supplies, the acceptance of which can only be agreed between the developer and the supply owner.**

## Appendix A Checklist of supporting information

As a minimum, all applications should include the following supporting information:

1. Plans on a base layer Ordnance Survey topographical map (1:10,000 scale if no groundwater abstractions identified within buffer plus also 1:2500 scale if groundwater abstractions are present, 10m contours) including the following information:
	1. All proposed infrastructure, including temporary works;
	2. Details of the spatial extent and depth of all proposed subsurface works;
	3. The relevant buffer zones around the proposed infrastructure (100m for subsurface activities <1m deep and 250m for subsurface activities >1m depth);
	4. Water features (rivers, streams, lochs, ponds, ditches, springs, wells, issues, collects, etc.); and
	5. The locations of all groundwater abstractions within the relevant buffer zones **OR** alternatively a statement confirming that no groundwater abstractions are present within the buffer zones.

Supplementing these plans with cross-sectional drawings is highly recommended.

If any groundwater abstractions are identified within the relevant buffer zones (during Step 1), then the following additional supporting information should also be provided:

1. Details of the existing groundwater abstractions, including:
	1. Source type (e.g. borehole, well, spring, etc)
	2. Logs / construction details of the abstraction source and associated infrastructure.
	3. Photograph(s) of abstraction source and associated headworks and infrastructure
	4. Water usage (e.g. potable supply, irrigation, industrial supply, etc); and
	5. Abstraction rates.
2. Conceptual site model. All assumptions should be justified.
3. Qualitative risk assessment (Step 2).

If any potentially significant risks to groundwater abstractions are identified (after Step 2), then the following additional supporting information should also be provided:

1. Characterisation of ground conditions for both the relevant infrastructure location(s) and groundwater abstraction(s) (plus pathway(s) in between if appropriate). This will usually include:
	1. Intrusive and/or non-intrusive ground investigation
	2. Groundwater monitoring data, both levels and quality.

The ground investigation and monitoring should be undertaken in accordance with BS5930:2015+A1:2020. All groundwater level data should be provided both in metres below ground level and in metres above Ordnance Datum. Both factual data and interpretation should be provided. Supplementing the interpretation with appropriate plans and sections is highly recommended. All assumptions should be justified.

1. An updated site plan (see Point 1 above) including groundwater level contours and flow directions.
2. Detailed quantitative risk assessment. Justification should be provided regarding the modelling approach adopted, model input parameters, and all assumptions.
3. Detailed description of proposed mitigation measures to offset any significant residual risks (if applicable). Supplementing this with appropriate plans or drawings is highly recommended.
4. Proposed monitoring plan (if applicable).

## Appendix B Additional monitoring guidance

Monitoring must provide an evidence base which demonstrates that the construction and operation of infrastructure is proceeding as intended and that it has not resulted in a statistically significant quantitative or qualitative change to groundwater flows or quality that could impact the groundwater abstractions.

The monitoring should be designed and undertaken by appropriately qualified and experienced specialists.

SEPA recommend the monitoring includes the following as a minimum. Sites with complex hydrogeological settings, multiple or highly sensitive receptors, and/or where high-risk activities are proposed are likely to require considerably more monitoring.

1. **Each groundwater abstraction within the buffer zones** set out in Step 1.
2. **Groundwater level monitoring**. Water levels should be measured to at least 10mm accuracy and the data provided in both metres below ground level and metres above Ordnance Datum. Records should specify whether readings are representative of pumped or rest conditions. Flow rates should be monitored at springs. The use of dataloggers to allow more frequent monitoring is highly recommended to better characterise how groundwater levels respond to weather events.
3. **Groundwater quality sampling and analysis**. Appropriate sampling methods should be selected to ensure the water samples are representative and to avoid cross-contamination between monitoring points. Monitoring raw water quality is recommended.
4. **Rainfall monitoring**. Either a site-specific rain gauge should be established or alternatively rainfall data may be sourced from a third-party rain gauge (e.g. SEPA or Met Office) if the location is adequately representative for the site. Rainfall should be measured at least daily.

Additionally, SEPA consider it beneficial for the developer to also monitor additional locations between the development and the groundwater abstraction. These may include purpose-built monitoring boreholes, springs, and/or co-opted third party wells if suitable. Additionally, the groundwater monitoring network may be supplemented by surface water monitoring if appropriate for the hydrogeological setting.

Recommended minimum groundwater monitoring frequencies:

* **Baseline** – monthly for at least 12 months prior to construction commencing
* **During construction** – fortnightly whilst works are ongoing within the relevant buffers
* **Post construction** – monthly for at least 12 months

The water quality monitoring suites are recommended to include:

* pH, electrical conductivity, dissolved oxygen, redox, temperature (these parameters may be measured in the field)
* Chloride, alkalinity, sulphate
* Sodium, potassium, calcium, magnesium
* Ammoniacal nitrogen, nitrate, nitrite, orthophosphate
* Biological oxygen demand, chemical oxygen demand
* Iron, manganese (total and dissolved)
* Total suspended solids
* Dissolved organic carbon
* Colour, turbidity, taste, odour
* Other parameters relevant to the activities being undertaken or the hydrogeological setting e.g. hydrocarbons, metals, etc.

The **baseline monitoring report** is recommended to include:

1. Map showing locations of relevant infrastructure / activities, groundwater abstractions, and monitoring points.
2. Details of monitoring points. This should include logs / construction details, location co-ordinates and datum surveyed in to Ordnance Datum, and photographs.
3. Description of monitoring methods and associated QA/QC measures.
4. Factual data in electronic format (e.g. Excel or similar). Laboratory certificates should also be provided for the water quality analysis.
5. Interpretation of the data including statistical assessment of any spatial or temporal trends. The use of control charts[[1]](#footnote-2) is highly recommended.
6. Recommendations for any amendments to the scope of future monitoring.

Subsequent **annual monitoring reporting** is recommended to include:

1. A summary of monitoring undertaken, including detailed explanation of any amendments or omissions from the agreed scope of monitoring.
2. Factual data in electronic format (e.g. Excel or similar). Laboratory certificates should also be provided for the water quality analysis.
3. Photographs of monitoring points.
4. Interpretation of the data including statistical assessment of any spatial or temporal trends. This should include assessment of whether there are any statistically significant (P <0.05) changes compared with the baseline dataset. The use of control charts is highly recommended.
5. Summary of any exceedances of agreed compliance metrics.
6. Assessment of whether any significant impacts have occurred or are likely to occur at the groundwater abstractions. This should include interpretation as to the likely reason(s) why this has occurred.
7. Recommendations for any remedial works required to address any issues identified, including any associated additional monitoring. If any of the remedial actions have been implemented ahead of reporting, a summary of the works undertaken should be provided.

The monitoring results should be reported to the Local Authority and the owner/operator of the existing abstractions. **There is no requirement to submit the monitoring data to SEPA. SEPA will not review the monitoring data unless the Local Authority has identified specific issues of significant concern.**

1. [↑](#footnote-ref-2)