

# **GUIDELINE FOR ENVIRONMENTAL IMPACT STUDIES FOR SYSTEM DESIGN UNDER THE BC SEWERAGE SYSTEM REGULATION**

**GUIDANCE DOCUMENT**

**VERSION 1**

**CANADIAN ONSITE TECHNICAL RESOURCE ASSOCIATION**

**COTRA**

**20<sup>TH</sup> JULY 2026**

## **BACKGROUND**

---

In British Columbia, regulatory guidelines require that professionals must consider environmental impacts, including cumulative impacts, when designing onsite sewerage systems under the Sewerage System Regulation.

Current practice guidance for design of onsite sewerage systems in BC does not specifically address this requirement.

This guideline recommends a process for professionals to evaluate risks and then select a scope, or “tier”, of environmental impact study suitable for the risk.

COTRA intends that this guide will help to build consensus in the industry and with stakeholders, helping to improve future versions.

## PRINCIPAL AUTHORS

---

Ian Ralston, Bryer Manwell, Michael Payne.

## ACKNOWLEDGEMENTS

---

All COTRA members advised and commented on this guideline.

## CONTEXT

---

COTRA guidelines and papers are focused on technical issues, and in some cases present defensible options. COTRA does not advise on how to comply with regulations. No regulatory body has endorsed or adopted this guideline.

Readers must exercise their own judgment about whether this guideline applies to any particular circumstance or situation.

Many professionals, technicians and practitioners in BC are registered with a body that regulates practice under the BC *Professional Governance Act*. These professionals and practitioners must always follow requirements of their registering body regardless of any advice or suggestions in this guideline. Considering Registered Onsite Wastewater Practitioners (ROWPs) as one example, ASTTBC's 2021 Practice Bulletin (PPB-2021-OW-001) states "*Where deviations from critical standards (SPM Volume II Standards) are necessary, the ROWP must seek guidance and documented support from a SSR Professional or refer the project to a SSR Professional.*"

## DISCLAIMER

---

This Guideline is provided for informational and educational purposes only by the COTRA. It does not constitute legal advice, engineering advice, or a mandatory standard of practice.

Users are solely responsible for exercising their own professional judgment, complying with all applicable laws, regulations, and obtaining site-specific advice from qualified professionals where appropriate.

COTRA, its contributors, and authors make no representations or warranties, express or implied, regarding the accuracy, completeness, applicability, or suitability of this Guideline for any particular project or site. Reliance on this document is at the user's own risk.

In no event shall COTRA or its contributors be liable for any direct, indirect, incidental, consequential, or punitive damages arising out of the use of, or inability to use, this Guideline.

## ENVIRONMENTAL IMPACT STUDIES UNDER THE SEWERAGE SYSTEM REGULATION

This guideline recommends a process for assessing environmental and health risks from sewerage systems filed under the Sewerage System Regulation (SSR). The procedure guides selection of a tier of environmental impact studies (EIS) based on pre-assessment of risk.

**TABLE 1 RECOMMENDED TIERS FOR ENVIRONMENTAL IMPACT STUDY**

| OPTIONAL TIERS | TOTAL EFFLUENT DISCHARGE CONSIDERED |                                |                          |
|----------------|-------------------------------------|--------------------------------|--------------------------|
| RISK FACTOR    | Between 5,000 and 9,100 L/Day       | Between 9,100 and 22,700 L/Day | 22,700 L/day and greater |
| Low Risk       | No EIS                              | Minor EIS                      | Minor EIS                |
| Moderate Risk  | Minor EIS                           | Minor EIS                      | Moderate EIS             |
| High Risk      | Minor EIS                           | Moderate EIS                   | Major EIS                |

**Total effluent discharge:** The sum of all the individual system peak day discharge to ground design flows (daily design flows or DDF) expected to combine in the immediate receiving environment.

**Risk factors:** Based on assessing: (1) risk to the environment and to human health, (2) the nature of the receiving environment; (3) density of contributing population, and (4) the design approach.

**EIS level of effort:** An EIS will typically study potential impacts based on site evaluation and available background data, will validate system performance, and will recommend monitoring. Table 1 recommends a Tier System for EIS that ranges from none to major based on potential impacts to the receiving environment. For the highest risk level and highest cumulative flow rate, we recommend aligning the Major EIS with requirements of the Municipal Wastewater Regulation (MWR).

# GUIDELINE FOR ENVIRONMENTAL IMPACT STUDIES FOR SYSTEM DESIGN UNDER THE BC SEWERAGE SYSTEM REGULATION

---

## 1 INTRODUCTION, REGULATORY AND PRACTICE CONTEXT

### 1.1 REGULATORY CONTEXT

The Sewerage System Regulation (SSR), under British Columbia's *Public Health Act*, focuses on protecting human health. The SSR does not require an EIS for onsite sewerage systems.

However, other regulations and guidelines, including the Engineers and Geoscientists BC (EGBC) Code of Ethics require that professionals “hold paramount the protection of the environment”. Environmental protection includes managing risks of contaminating receiving environments. Contamination can take many forms. Common concerns include nutrients (nitrogen and phosphorous), contaminants of emerging concern (such as organic chemicals), and pathogens.

In July of 2025, the Ministry of Health and the Ministry of Environment and Parks published a guidance document titled *The Sewerage System Regulation and Municipal Wastewater Regulation: Jurisdictional Flow Divide for Onsite Sewerage Systems* (July 2025). That guidance refers to situations where a professional files a design for a sewerage system with a maximum daily discharge rate near to 22.7 cmpd or for adjacent systems, each with maximum daily discharge flow rate less than 22.7 cmpd, with a cumulative flow rate exceeding 22.7 cmpd. That document states that professionals should consider environmental risks as well as health risks, *including risks of cumulative impacts on the environment*.

### 1.2 PURPOSE AND LIMITATIONS OF THIS GUIDELINE

For professionals managing risks to the receiving environment (groundwater and surface water), this guideline outlines a tiered EIS approach. This is a risk-based framework to assist professionals in assessing environmental and health impacts from onsite sewerage systems, including cumulative impacts, for systems regulated under the Sewerage System Regulation (SSR).

This document does not create new regulatory obligations. It is intended to supplement and align with, not replace, the Ministry of Health Sewerage System Standard Practice Manual (SPM), the EGBC Professional Practice Guidelines – Onsite Sewerage Systems (PPG-OSS), and other applicable regulatory requirements.

Variations in site conditions, evolving regulatory interpretations, and new scientific information may require approaches different from those described in this guideline. Professionals should consult current versions of referenced documents and applicable authorities. Professionals must exercise independent professional judgment in every case and document the rationale for decisions made.

The PPG-OSS and SPM emphasize site-specific assessments to mitigate risks, including cumulative impacts. This guideline is not a substitute for site-specific hydrogeological assessment, legal advice, or consultation with regulatory authorities. Local governments, Health Authorities, and other regulators may impose additional requirements.

All assessments conducted using this guideline involve inherent uncertainties in subsurface conditions, future land use, climate, and system performance. No assurance can be provided that following this guideline will prevent all environmental impacts or regulatory non-compliance. Screening and risk assessment criteria are not intended to replace site specific assessment, and do not provide guarantee of non-impact.

It is recommended that professionals advise clients of residual risks.

## 2 PROCEDURE SUMMARY

This guideline specifies the following step wise procedure to select an EIS level, referring to sections of this guideline. Professionals should document each of the following steps:

1. Estimate the peak day effluent discharge rate for the planned project.
2. Define the immediate receiving environment (Section 4).
3. Estimate nearby peak day effluent discharge rates expected to combine in the immediate receiving environment (Section 4).
4. Then calculate the Total Cumulative Discharge Flow Rate being the sum of these flow rates.
5. Screen for cumulative impact. Using Table 2 in Section 5, evaluate the Risk Factor as either Low, Moderate, or High.
6. Using Table 1, select the appropriate Tier. For example, "Moderate EIS".
7. Consider the elements of each Tier of EIS (Section 6).
8. Use Section 8 to create a checklist of minimum requirements for the EIS.
9. Study the environmental impacts, write a summary memo or report, and check that the study and the summary include the minimum elements in the checklist.
10. Keep records of your assessment following Section 7.

## 3 CUMULATIVE IMPACTS

In some cases, treated percolate from separate onsite systems will combine while flowing via groundwater or surface water. This may cause cumulative impacts if the onsite wastewater system plans do not effectively manage risks. The systems that combine may be large or small, individually, and may be on the same parcel of land or separate parcels. Over time, higher housing density can potentially contaminate a sensitive receiving environment even though each contributing system meets applicable standards.

The EIS Tier table (Table 1) uses the combined peak day discharge (daily design flow rate) for the systems. When using Table 1, a professional should consider existing systems, the planned new system or systems, and may consider future systems (for example, based on current zoning or development plans).

This guideline is for relatively small sewerage systems, that is, individual systems with a design flow rate smaller than 22,700 Lpd and therefore governed by BC's SSR. We do not intend this guideline to apply to regional scale, aquifer scale or watershed level cumulative impact assessments. We encourage regulators to manage these larger scale risks following a One Water approach.

#### **4 CUMULATIVE DISCHARGE FLOW RATE SCREENING**

Following Section 2, the first step is to screen for cumulative impact and estimate combined sewage flow rates for use with Table 1.

Table 1 has the following flow rate classes: 5,000-9,100 L/day; 9,100-22,700 L/day; and >22,700 L/day. This is the combined peak-day design ground discharge flow rate, the sum of each system's DDF as defined in the SPM. This includes sewerage and wastewater systems expected to contribute treated percolate to the same immediate receiving environment.

When assessing which systems to include when selecting cumulative flow rate class, consider the immediate receiving environment for the system's discharge areas.

For this guideline this "immediate receiving area" for screening purposes is the receiving environment within 60 m down gradient from the discharge area.

The down-gradient treated percolate flow path is the probable direction of flow of the treated percolate plume from the discharge area of a system or a probable future system. Consider whether this overlaps with a treated percolate plume from other systems within the immediate receiving area.

For sewage systems above vulnerable aquifers (as defined by BC ENV), assess the number of existing systems and probable future systems within 60 m, combining all those within a 60 m circle centered around the system being assessed.

Add the design flows (DDF) for these systems (existing, planned, and probable future) to obtain the “cumulative discharge class”.

This may be an iterative process. Field work and analysis may lead a professional to re-assess which system(s) will most likely combine with others. In other cases, a designer might change the design, for example by re locating the system to reduce risks of percolate combining in the receiving environment.

Selection of a cumulative flow rate class is a screening tool only, intended for entry to Table 1 and density assessment. Impact on the receiving environment is assessed in the EIS on a site specific basis.

## 5 RISK FACTORS

Following this guideline, a professional will assess risk factors (low, moderate, and high) based on a **combination** of factors including **hydrogeologic setting**, site capability (soil permeability, groundwater depth, proximity to water bodies, slope, and climate), density and **design approach**. EGBC’s Professional Practice Guidelines discuss design approaches and related risk assessment for performance based design.

Cumulative discharge flow rate also depends on population density for residential settings. Risk factor assessment in Table 2 includes the following categories as a simplified density assessment based on either cumulative discharge or residential density:

- Low density, up to 5 residences per Ha or <9100 L/day cumulative discharge flow rate.
- Medium density, 6 to 10 residences per Ha or 9100 to 22700 L/day cumulative discharge flow rate.
- High density, 11 or more residences per Ha or >22700 L/day cumulative discharge flow rate.

A professional should assess risks conservatively. If either hydrogeologic or design approach elements indicate high risk, the overall classification defaults to high.

Table 2, below, lists considerations when assessing risks. Locations refer primarily to dispersal areas. However, a professional might also consider risks resulting from leaking sewers, pipelines, and tanks.

Section 9 defines terms in these tables, including “sensitive receiving environments”.

**TABLE 2 RISK FACTOR ASSESSMENT**

| Category                                                                                        | Consideration                                                                   | Risk Factor |
|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-------------|
| Design Approach (see EGBC's Professional Practice Guidelines)                                   | SPM compliant                                                                   | Low         |
|                                                                                                 | Guided performance based                                                        | Moderate    |
|                                                                                                 | Custom performance based                                                        | High        |
| Flood plain and riparian areas                                                                  | Not in flood plain or riparian assessment area                                  | Low         |
|                                                                                                 | In 1:200 flood plain or riparian assessment area                                | Moderate    |
|                                                                                                 | In 1:20 flood plain or within streamside protection and enhancement area (SPEA) | High        |
| Sensitive immediate receiving environment, for systems with SPM compliant horizontal separation | Low density                                                                     | Low         |
|                                                                                                 | Medium density                                                                  | Moderate    |
|                                                                                                 | High density                                                                    | High        |
| Sensitive immediate receiving environment, for systems with custom horizontal separation        | Low density                                                                     | Moderate    |
|                                                                                                 | Medium or high density                                                          | High        |

Risk factors and considerations must be considered, and may need to be adjusted, on a site specific basis. Table 2 illustrates selection of risk factors, but does not guarantee protection against all potential impacts.

## 6 STANDARD TIERS OF ENVIRONMENTAL IMPACT STUDY (EIS)

This guideline recommends a simple matrix approach in the EIS Tier table, Table 1.

In the table, EIS Tier = function of risk level + discharge class. For example:

- Low risk + low discharge = No EIS.
- Escalation for higher risk and or higher discharge.

This section summarizes recommended minimum components or tasks for a complete Environmental Impact Study. Refer to Section 8 for detailed checklists. All designs must comply with the Sewerage System Regulation including filing of documents with the applicable health authority.

Professionals should use the decision matrix (Table 1) during early project planning. If site data is uncertain, default to higher tiers for preliminary design.

Consult local health authorities and other relevant regulators for site-specific requirements. For example, a local government may have established requirements for an aquifer protection development permit area.

### 6.1 No EIS

“No EIS” means relying on SPM Standards and Guidelines only.

- **Criteria:** Low overall risk; the treated percolate poses negligible threat when following the SPM.
- **Minimum Requirements:** Follow the SPM Standards and Guidelines.

### 6.2 MINOR EIS

A Minor EIS is a desktop study that follows EGBC Professional Practice Guidelines. It typically uses a combination of standard techniques and literature values. A Minor EIS may include detailed testing to confirm results of the desktop study.

- **Criteria:** The assessor identified a risk of minor impacts but expects to mitigate impacts using a custom, performance-based design. This approach uses well

established and reliable methods in system design, or in the immediate receiving environment, or both.

- **Minimum Requirements:** See Section 8.2.
- **Documentation:** This EIS Report should include with plans, mitigation strategies, basis for performance validation, and should specify of validation monitoring.

### 6.3 MODERATE EIS

A "Moderate EIS" is a substantial study with modeling, for a setting with moderate to high risks.

- **Criteria:** This applies after identifying a risk of noticeable impacts. Mitigation commonly includes engineering controls. Examples include treatment with nutrient removal, Type 3 treatment and permeable reactive barriers.
- **Minimum Requirements:** This is a comprehensive assessment that builds on requirements of a minor EIS. See Section 8.3.

**Documentation:** The EIS report commonly includes a risk matrix, measures to mitigate risks, a simple Receiving Environment Monitoring Plan (REMP), and may include offsets.

### 6.4 MAJOR EIS

A Major EIS is a rigorous study comparable to an EIS under the Municipal Wastewater Regulation.

- **Criteria:** This applies if the assessment identifies a risk of significant or irreversible effects to human health, or a risk of pollution leading to ecosystem harm in riparian zones and surface waters.
- **Minimum Requirements:** See Section 8.4. Typically, a hydrogeologist will direct or consult on the Major EIS.

- **Documentation:** The EIS report should summarize the assessment, include a Receiving Environment Monitoring Program (REMP), and may include mitigation or offsets (e.g., restoring wetlands).

#### **6.4.1 MWR aligned EIS**

A “MWR Aligned EIS” is a special case of “Major EIS” that meets the requirements of the MWR, for example at the request of a regulator. A hydrogeologist should undertake or direct this study.

### **6.5 OTHER SOURCES**

In many cases the receiving environment is affected by sources of nutrients or pollutants other than sewerage system dispersal areas. This may include point and non point sources such as industrial wastes, agricultural inputs, road runoff. A professional may also consider cumulative risks resulting from leaking sewers, pipelines or tanks.

The professional will consider these inputs when selecting an EIS tier as well as in the EIS.

## **7 DOCUMENTATION**

For all studies described above, professionals should retain relevant documents following EGBC guidelines. This should include the risk assessment approach used, and a record of each step followed in Section 2 of this guideline. Use the recommended checklists to develop documentation.

When following this guideline, the Authorized Person should summarize their analysis in documents filed with the Health Authority. Note that the Authorized Person filing these documents may be a different person than the professional who completed the Environmental Impact Study.

This will provide background information for any review by the Health Authority, and for any future designer working in the area. Documents filed with the health authority should include a summary of the following:

- Describe the area or locations considered, and systems considered, when screening cumulative impacts.
- State the cumulative discharge design flow used for screening.
- Identify receptors considered in the design.
- List the EIS tier selected.
- Identify how the designer validated performance as part of the design (for example, "the design adheres to SPM standards").
- How to monitor the sewerage system or the environment during operation.
- For Minor or higher tier EIS, include monitoring requirements in the system maintenance plan. For Moderate or higher tiers, include monitoring of the receiving environment.

Records kept by professionals should clearly state that the EIS tier selection and associated analysis represent the professional's opinion based on information available at the time and are subject to the limitations inherent in hydrogeological assessments.

The professional should document their rationale for any departures from recommended approaches. Consider peer review for Moderate and Major EIS where appropriate.

## 8 CHECKLISTS FOR ENVIRONMENTAL IMPACT STUDIES

The following checklists summarize the level of effort for each EIS tier. Professionals should use these checklists while recognizing that some sites may require additional measures. The Assessor is the professional who documents the EIS.

For further details, particularly for higher tiers, refer to the *Environmental Impact Study Guideline* (BC Ministry of Environment, 2000). EGBC's Professional Practice Guidelines, Onsite Sewerage Systems (PPG-OSS), do not advise on environmental impact studies. However, the PPG-OSS does advise on cumulative impacts and managing nutrients, refer to Sections 6.15.1 and 8.3.4.3, Section 6.10 and Table A-3 and A-4 of the EGBC guidelines.

The following checklists indicate a recommended minimum level of effort for each EIS tier.

For further details refer to the *Environmental Impact Study Guideline* (BC Ministry of Environment, 2000).

An EIS includes many of the same elements as performance based design, refer to guidance and checklists in Section 8.3.4 of the EGBC PPG-OSS. The EGBC PPG-OSS also includes guidance related to cumulative impacts and nutrient management, refer to Sections 6.15.1 and 8.3.4.3, Section 6.10 and Table A-3 and A-4.

## 8.1 BASE CONSIDERATIONS

Consider the following for all environmental impact studies (EIS):

- ☐ Characterize the planned discharge, including:
  - ☐ Peak day discharge (DDF)
  - ☐ Average daily discharge (including analysis of any seasonal flows)
  - ☐ Sewage quality, including nitrogen and phosphorous levels, pathogen indicator levels.
  - ☐ Source control measures.
- ☐ Evaluate site and soil, following SPM standards.
- ☐ Assess the site and receiving environment topography and interpret groundwater flow direction.
- ☐ Assess information on the aquifer(s) below the site and wells within 180 m of the planned discharge location. Include information on any aquifers identified as sensitive, or sites with wellhead protection plans in place.
- ☐ Assess surface water bodies in the receiving environment. Identify any environments designated as sensitive.

- ☐ Assess other sources of contaminants moving to the receiving environment in the area under consideration.
- ☐ Establish the location of the planned discharge in topographic and groundwater flow context, with locations of water bodies and wells.
- ☐ Delineate SPM standard setback distances for wells, water bodies, breakout and other receptors.
- ☐ Establish the location of existing or proposed discharges within the area defined in Section 3 of this guideline.
- ☐ Assess potential cumulative treated percolate flow rates in the immediate receiving environment resulting from the discharge together with other existing or probable future discharges.
- ☐ Estimate contaminant mass loading to the immediate receiving environment from the other contributing systems or from other sources of contaminants.
- ☐ Establish performance objectives for treated percolate moving from the system toward the receiving environment, at the base of the design retained vertical separation and at other boundary points identified in the design.
- ☐ Document rationale validating the design measures intended to meet these objectives and to manage risk of negative impact on human health or the environment. Including evaluation of:
  - ☐ Treatment system performance, with consideration of reliability risk.
  - ☐ Soil based treatment performance.
- ☐ Record expected effluent quality, including cBOD<sub>5</sub>, TSS, nitrogen species, phosphorous and pathogen indicator levels.
- ☐ Incorporate the following into the system Maintenance Plan as filed with the Health Authority:
  - ☐ Operational and maintenance measures to maintain effectiveness of the design.

- ☐ A risk management approach related to system reliability
- ☐ Monitoring for verification of system performance.
- ☐ Document the EIS.

## 8.2 MINOR EIS

For the Minor EIS tier, follow the base checklist.

Many aspects are likely to be based on desktop analysis and may follow semi-prescriptive standards (the SPM standards), literature study or simple modeling checks.

As an example of level of effort, documentation of rationale validating design measures would typically be based on direct reliance on SPM standards for retention of vertical separation and pathogen attenuation, adding any nutrient attenuation modeling necessary to address the project specific nutrient performance objectives.

## 8.3 MODERATE EIS

Follow the base considerations checklist, plus the following items:

- ☐ Include additional site and soil evaluation to establish groundwater flow directions in the planned discharge and immediate receiving area. This may include installing and monitoring piezometers or monitoring wells.
- ☐ Where appropriate, implement large scale testing or extended hydraulic conductivity testing to estimate the natural discharge capacity and shallow groundwater flow rates. This may include a water table mounding test (see Payne & Ralston, 2024, and Ralston & Payne, 2025).
- ☐ Follow the EGBC “guided performance based design” approach as a check when documenting design measures intended to achieve objectives, even if following SPM standards.
- ☐ Reference all scientific studies or past monitoring that support the analysis.
- ☐ Document testing of up-gradient and pre-discharge water quality to provide a baseline for future monitoring.

- ☐ Where appropriate, solicit a biologist's opinion on vulnerability of water bodies and on selected performance objectives.
- ☐ Identify and document aquifer(s) and wells within 300 m of the site. This may include soliciting a hydrogeologist's opinion on vulnerability of the aquifer(s) or specific wells and on aquifer water quality objectives.
- ☐ Include the following in the sewerage system Maintenance Plan filed with the Health Authority:
  - ☐ An Effluent Monitoring Plan.
  - ☐ A Receiving Environment Monitoring Program (REMP) Plan.
  - ☐ Procedures for follow-up by the Assessor.

As an example of level of effort, documentation of rationale validating design measures would typically be based on modeling checks on retention of vertical separation (required by the SPM for DDF over 9100 L/day in any case), pathogen attenuation and nutrient attenuation and may include large scale testing or more extensive soil hydraulic conductivity testing to validate design assumptions related to retention of vertical separation.

## 8.4 MAJOR EIS

Follow a two-stage approach with base data assessment at preliminary design, similar to a Minor EIS, to guide implementation of a second stage.

The second stage will consider the same base considerations, but includes detailed analysis with background water quality and environmental testing, and more detailed validation, followed by a more formal and detailed verification process. Either follow the BC Ministry of Environment Environmental Impact Study Guidelines or follow the Moderate EIS checklist, plus the following items:

- ☐ Undertake additional assessment of receiving aquifer(s) or water bodies, and of any riparian areas, in consultation with a hydrogeologist and the project biologists.

- ☐ Install up and down gradient monitoring wells to measure pre-discharge background water quality.
- ☐ Install, survey, and monitor piezometers to characterize groundwater flow directions and flow rates.
- ☐ Document detailed validation of the design, with analysis of expected groundwater quality in the immediate receiving environment prior to each receptor of concern:
  - ☐ Based on modeling and/or challenge testing together with scientific studies and previous monitoring data.
  - ☐ May include tracer testing.
  - ☐ With consideration of pathogens, nutrients, heavy metals and other contaminants of concern.
  - ☐ Resulting in establishment of surrogates for performance verification.
  - ☐ Identifying risks related to reliability and multiple risk barriers.
  - ☐ May include sensitivity analysis for models.
  - ☐ May consider changes to groundwater flow direction induced by discharge.
  - ☐ May include quantified microbial risk assessment (QMRA).
- ☐ Write a detailed management plan related to reliability and ongoing stability of the planned process, including of the soil-based treatment system.
- ☐ Develop a Receiving Environment Monitoring Program (REMP) that is consistent with the MWR Section 20.
- ☐ Where appropriate, specify ongoing monitoring to verify impact of other sewerage systems that may be discharging toward the same immediate receiving environment.
- ☐ Recommend management structures and protocols to address the outcomes of verification monitoring and to provide for ongoing oversight.

## 8.5 EMA OR MWR ALIGNED EIS

Similar considerations to the Major EIS, with a level of effort equal to that required under the MWR. Refer to Section 3.4 of the BC Ministry of Environment *Environmental Impact Study Guideline*.

## 8.6 VERIFICATION MONITORING AND OVERSIGHT DURING OPERATION

### 8.6.1 *Verification of performance*

The EIS should include a monitoring program to verify system performance. This normally includes both the performance of system components (for example, Log Reduction Values achieved by a treatment plant or an UV unit) and environmental performance.

Ideally, the Assessor will have an ongoing role in reviewing the results of monitoring, verifying the conclusions of the EIS, updating the REMP where necessary, and making recommendations to address any performance issues.

Under the SSR, the owner is responsible for maintenance of the system following the Maintenance Plan. If the Assessor is to be involved, the owner will need to retain the Assessor and have their maintenance provider collect the required information and provide that to the Assessor, who will then report to the owner.

The SSR requires that a professional perform or supervise maintenance I for large flow and Type 3 systems. In these cases, it is recommended that the professional, if not the original Assessor, work with the Assessor to provide an opportunity for this review.

Ideally, local government sewerage system maintenance programs would require reports on verification monitoring.

### 8.6.2 Receiving Environment Monitoring Program

A Receiving Environment Monitoring Program (REMP) specifies in an REM Plan monitoring of the receiving environment affected by effluent discharge from the planned sewerage system. The REM Plan may include a form of background monitoring. In the context of cumulative impacts, a REM Plan may include monitoring to quantify input of contaminants from other sewerage systems.

The objectives of a REM Plan are as follows:

- Specify a plan with procedures for verification monitoring, and measurements of changes in environmental water quality.
- Specify reporting and inform system owners of how well the system is operating.
- Inform decisions on changes to the system or system operation.

The following checklist highlights the key components of a REM Plan and REM Plan:

- ☐ Specify a term for the REM Plan.
- ☐ Summarize system configuration and context:
  - ☐ Provide key contacts.
  - ☐ Identify background reports and drawings.
  - ☐ Describe the wastewater system, including source, process steps and system components.
  - ☐ Describe the receiving environment.
  - ☐ Describe any other sewerage systems expected to influence the immediate receiving environment as a cumulative impact.
- ☐ Identify wastewater quality objectives and other targets or considerations:
  - Influent sewage quality.
  - Effluent quality prior to discharge.
  - Where used, Log Reduction Targets for contaminants for process steps.

### Seasonal considerations.

- ☐ Identify receiving environment water quality objectives, including any seasonal objectives.
- ☐ Identify verification monitoring surrogates and their relationship to Log Reduction Targets.
- ☐ Record background or pre discharge water quality monitoring data and other relevant pre discharge conditions.
- ☐ Specify the scope of verification monitoring for groundwater and surface water, as appropriate, with locations and frequency:
  - ☐ Continuous monitoring
  - ☐ Field measurements
  - ☐ Laboratory tests
  - ☐ Identification of background monitoring
  - ☐ Map or plan showing locations
  - ☐ Coordinates of locations.
- ☐ Specify procedures for monitoring, such as:
  - ☐ Installation and sampling of monitoring wells
  - ☐ Surface water sampling
  - ☐ Quality control (e.g., field duplicates)
  - ☐ Field testing methods
  - ☐ Lab sample shipment and handling
  - ☐ Lab testing methods

- ☐ Specify review of the REMP and REMP Plan by the Assessor at a defined interval, with reporting to the owner and any other defined recipients, including at minimum:
  - ☐ Review of operation and maintenance information.
  - ☐ Review of verification monitoring data.
  - ☐ Evaluation of performance of the process and overall environmental performance.
  - ☐ Recommend repairs, upgrades and or changes to management practices.
  - ☐ Where appropriate, evaluation of contribution of other sewerage systems to cumulative impact in the immediate receiving area.
  - ☐ Summarize review and recommendations.
  - ☐ Update the REMP and REMP Plan.

Evaluate appropriate methods and intensity for monitoring, considering the specific project and level or risk. For example; continuous versus interval monitoring, monitoring of surrogates versus direct measurement of contaminant levels.

## 9 DEFINITIONS

### 9.1 GENERAL

Refer to the SPM and the EGBC Professional Practice Guidelines, Onsite Sewerage Systems for general definitions. Also refer to the appendix, Section 11.

**The Assessor** is the professional who documents the EIS.

**One Water** means an integrated management approach that recognizes the interconnected nature of all types of water within a watershed, including drinking water, rainwater, surface water, groundwater, wastewaters. EGBC PPG One Water Risk Management Plans (<https://tools.egbc.ca/Registrants/Practice-Resources/Guidelines-Advisories/Document/01525AMW3L24LQCAAWYBFLZK3LWL4CXCIF/Guidelines%20f>

[or%20the%20Preparation%20of%20One%20Water%20System%20Risk%20Managem  
ent%20Plans%20in%20British%20Columbia\)](#)

**Percolate** means water moving through the soil or sand media below a dispersal system.

**Receiving environment** means the natural environment that receives treated percolate from the system. Receiving environments include water bodies, wetlands, aquifers and the surface of land. For onsite sewerage systems, common **receptors** include aquifers, water wells, watercourses and water bodies, and surface breakout.

**Treated percolate** means percolate that has completed soil based treatment to meet the design objectives defined for the system. These design objectives are typically aligned with water quality objectives or standards such as the SPM objective for pathogen attenuation in soil vertical separation (refer to the SPM Volume IV). The SPM and EGBC Professional Practice Guidelines establish that this treated percolate is no longer effluent, in the context of the SSR, if it meets water quality objectives.

**Validation** is performance-based analysis of a to confirm system performance within a design validation envelope. It may be desktop based or may include field validation testing of a full or pilot scale system.

**Verification** is intended to confirm that the operating system meets design expectations and is operating within the design validation envelope, during operation on an ongoing basis. See Section 8.6.1.

## 9.2 CUMULATIVE IMPACT AND IMMEDIATE RECEIVING ENVIRONMENT

Refer to Sections 3 and 4 for definition of Cumulative Impact and immediate receiving area for use with this guideline. Also refer to the appendix, Section 11.

## 9.3 SENSITIVE RECEIVING ENVIRONMENT

The following provides guidance on identifying a sensitive receiving environment. These examples are only a guide to screening. A professional may use site specific and

project specific information, including information from the project biologists or other specialists, or may refer to a local regulator with specific policies or requirements.

For a fresh water body, a starting point is to follow the MWR Section 97 and 98, which identifies the following sensitive water bodies:

- Okanagan Basin
- Christina Lake Basin
- Thompson River
- Cowichan River
- Nicola River
- Cheakamus River
- A lake with a surface area of less than 100 hectares

Consider the ocean environment to be sensitive if used for shellfish harvesting or is the estuary of a river. For an aquifer, refer to the BC Ministry of Environment and Parks mapping of aquifers, which defines high vulnerability aquifers at <https://apps.nrs.gov.bc.ca/gwells/>

A receiving environment with existing pollution (water quality does not comply with applicable guidelines) is a sensitive receiving environment.

A receiving environment is sensitive if studies show a risk of short circuiting to a water body or aquifer. For example, a karst environment.

## **10 BACKGROUND INFORMATION ON CUMULATIVE IMPACT AND ONSITE SEWERAGE SYSTEMS**

*COTRA is writing a discussion paper that will include background information, rationale, discussion of cumulative impacts, and commentary on the One Water approach.*

Please direct your comments to the COTRA at <https://onsitetechnicalresource.com/>

## 11 APPENDIX: INTRODUCTIONS TO CONCEPTS

This guideline is intended for professionals. However other interested parties may refer to this guideline to learn about the concepts and terms used.

A typical onsite sewerage (wastewater) system with ground discharge will consist of the following process steps between raw sewage and water recycled to the environment:

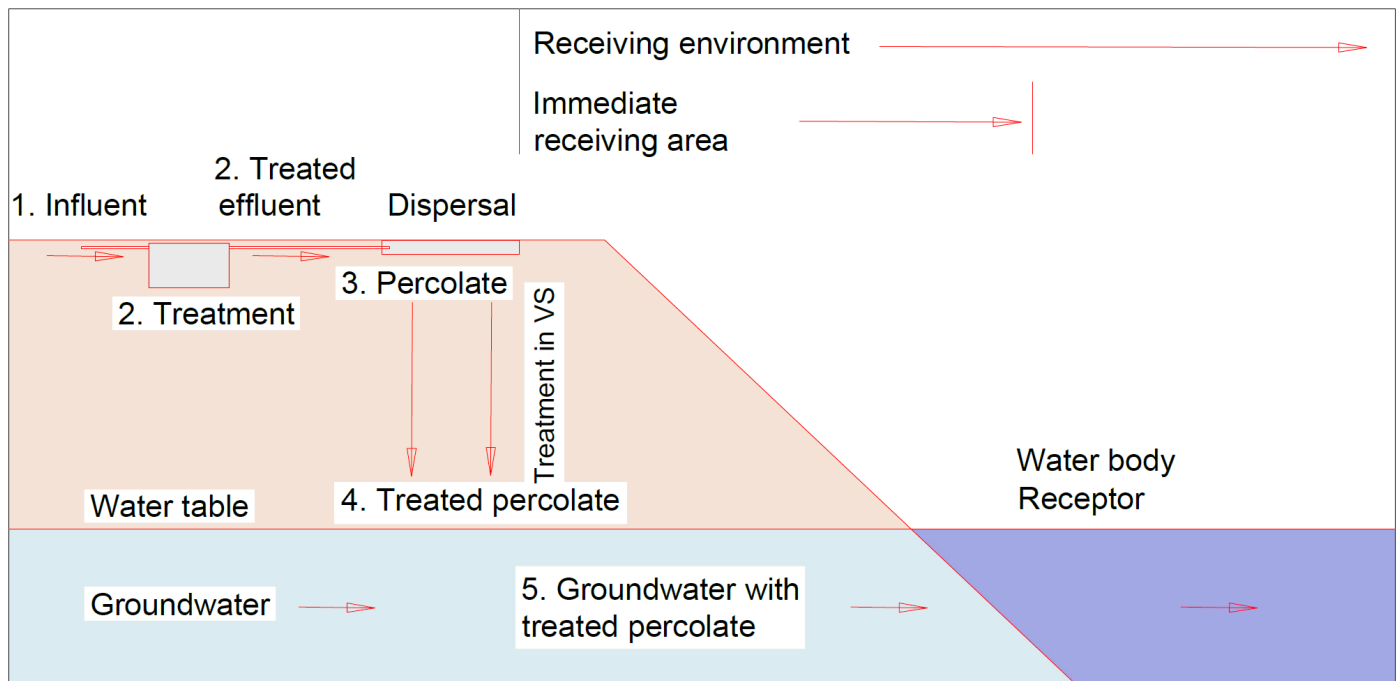
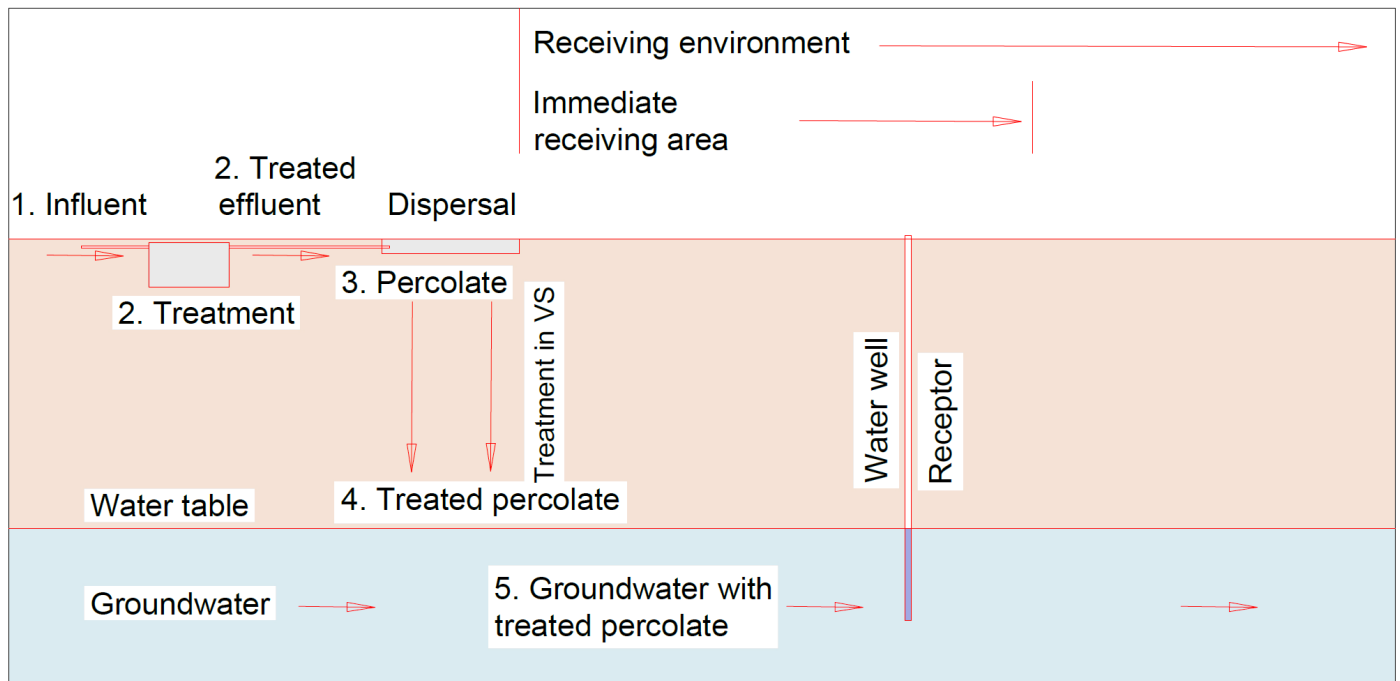
1. Raw wastewater, also termed influent, collected by a sewer from building plumbing.
2. Treatment of wastewater by a Type 1, 2 or 3 treatment system, resulting in treated effluent.
3. Infiltration of treated effluent to soil or sand media, by a dispersal system, resulting in percolate flowing through unsaturated soils or sand below the dispersal system.
4. Soil or sand media based treatment of percolate in these soil or sand layers, resulting in treated percolate.
5. Treated percolate flow as or in shallow groundwater prior to reaching the receiving environment, with dilution and further contaminant attenuation.

The SPM standards are based on a health risk management objective of achieving recreational water quality at the completion of step #4. Custom designs will be based on project specific performance objectives for outcomes of steps #2 and #4, together with objectives for water quality in the receiving environment at a specific performance boundary—defining the edge of step #5.

Common receiving environments and receptors include aquifers and water wells, water bodies, wetlands and water intakes, and surface breakout. The assessor must consider probable effects on human health **and** the receiving environment.

In step #5, percolate plumes flowing from more than one sewerage system may combine in the immediate receiving area, resulting in a risk of cumulative impact.

The following diagrams illustrate these steps.



VS = vertical separation, the depth of unsaturated, permeable, soil and or sand media below the infiltrative surface (point at which treated effluent is applied) and the water table or restrictive horizon. This unsaturated soil transforms effluent to treated percolate. This vertical separation can reliably reduce pathogen risk.

The diagram, below, shows an example of assessment of cumulative flow rate class, based on three systems, with a lake identified as the controlling receptor. The diagram illustrates measurement 60 m down gradient from the dispersal field for each system.

Percolate from dispersal systems 1 and 2 combines in the immediate receiving area. Discharge flow rates for these two systems would be combined when selecting a cumulative discharge flow class following this guideline. Dispersal system 3 would not combine with either 1 or 2.

