

Compliance Points for the Protection of Aquatic Receiving Environments

This document provides environmental consultants with guidance on the appropriate use of the Contaminated Sites Regulation (the Regulation) Schedule 6 aquatic life water use standards (aquatic life standards) and the British Columbia Water Quality Guidelines (water quality guidelines) in proximity to surface water bodies containing aquatic life. This guidance sets out terms of compliance and can be used as an aid when assessing remediation strategies at contaminated sites.

Schedule 6 aquatic life standards

Section 12 (2) of the Regulation states that “for the purpose of using the standards in this regulation, the surface water uses or groundwater (GW) uses which apply, at any given time, to a particular site or part of a site are based on:

- (a) the uses of the surface water or groundwater at the site or on neighbouring sites, and
- (b) the potential for the groundwater or surface water to cause pollution.

The aquatic life standards in Schedule 6 of the Regulation contain generic numerical water standards for the protection of aquatic life. They apply to both groundwater and surface water prior to its discharge into an aquatic receiving environment.

For the most part, aquatic life standards are derived from the Approved and Working water quality guidelines. These guidelines reflect the

safe level of substances for the protection of a given water use (e.g., aquatic life, drinking water, recreational uses, and agricultural uses). In the case of the protection of water use for aquatic life, the water quality guidelines would be applied to areas supporting aquatic life, such as surface water or sediment pore water.

Based on the Contaminated Sites Standards Taskgroup protocols for deriving environmental standards, the majority of the substances, the aquatic life standards are 10 times the water quality guidelines. These standards were set with the assumption that impacted water on site will be diluted 10-fold by the time it reaches the aquatic receiving environment. The aquatic life standards are protective of groundwater that eventually discharges to aquatic receiving water, while the water quality guidelines are directly protective of aquatic receiving water.

Groundwater – Surface water interaction and compliance points

The dynamic nature of groundwater and the presence of complex transition zones between groundwater and surface water make it challenging to determine when and where the aquatic life standards and water quality guidelines apply. The application of aquatic life standards and water quality guidelines in the context of this guidance can generally be determined in three areas of compliance: groundwater, surface water and the ecologically active zone existing in the transition zone between these two (Figures 1 and 2).

Groundwater

It is assumed that groundwater will dilute to 1/10th of the initial concentration in the last 10 metres from the ecologically active zone and thereby meet the water quality guidelines upon discharge. Thus, the aquatic life standards are applied to groundwater located from 300 m to within 10 m of the ecologically active zone from the closest surface water containing aquatic life (See Figure 1 and Technical Guidance 6).

To ensure compliance, representative groundwater samples that target worst case concentrations of groundwater contaminants are required to determine whether applicable standards have been met. In addition, contamination sources should be contained and groundwater plumes must be at steady state. Tidal influences and seasonal variation in chemical concentrations must also be considered.

Where aquatic life standards are met in groundwater at distances greater or equal to the 10 metre setback from the ecologically active zone and it has been determined that the groundwater contamination plume is stable or shrinking, no further investigation is warranted.

Ecologically active zone

The United States Environmental Protection Agency has described the area where groundwater transitions to surface water as the “region beneath the bottom of the surface water body where conditions change from a groundwater dominated to a surface-water dominated system within the substrate” and is commonly termed a “transition zone” (US EPA 2008. Publication 928536-17. EPA-540-R-06-072). The transition zone contains an ecologically active area where a variety of important ecological and physicochemical conditions and processes occur.

The ministry has characterized the top 1 metre of sediment (Figure 1) as being ecologically active. In the ecologically active zone the water quality guidelines apply. Therefore, the 1:10 dilution must occur before the groundwater contaminants enter the ecologically active zone (Figure 1).

To ensure that the ecologically active zone is adequately protected, water quality guidelines must be met 1 metre inland of the high water mark (Figure 1) or at the last groundwater well before the receiving water body. In cases where shorelines are lined with rip rap, or some other type of material that may be used as a substrate to support aquatic life, the compliance point is 1 metre inland commencing at the point where the rip rap or substrate meets the land.

Representative groundwater samples that target worst case concentrations of contaminants are required to determine whether applicable standards have been met. There may be circumstances where site conditions limit the ability to install groundwater wells within or near 1 metre of the high water mark and/or where ecologically active zones do not extend appreciably inward from the high water mark (e.g., steep banks with groundwater seepage faces). In these circumstances, investigations of shallow groundwater at the point of discharge to the ecologically active zone or receiving water body using appropriate sampling devices and locations may be acceptable for measuring compliance of groundwater concentrations with the water quality guidelines.

Surface water

The water quality guidelines apply to all surface water that supports aquatic life. However, there are certain circumstances where the aquatic life standards would apply to surface water. Some general examples include:

- (a) pooled water on a site located 10 m from the ecologically active zone, that does not contain aquatic life, but is hydraulically connected (through groundwater flow) to a receiving water body that contains aquatic life (Figure 1); and
- (b) water on a site that does not support aquatic life and is hydraulically connected by surface flow to an aquatic receiving environment, but is not considered an aquatic receiving environment itself (e.g., maintained watercourse; Figure 2).

Where possible, it should be demonstrated that water quality guidelines are met at the point of discharge where water from the maintained watercourse meets the aquatic receiving

environment (Figure 2). In the case where an artificial watercourse has succeeded and now supports aquatic life, the water quality guidelines apply (Figure 2).

Grandfathering provisions

Site investigations conducted six months following (date of final document) are expected assess compliance near aquatic receiving environments in accordance with this guidance.

For more information, contact the Environmental Management Branch at site@gov.bc.ca

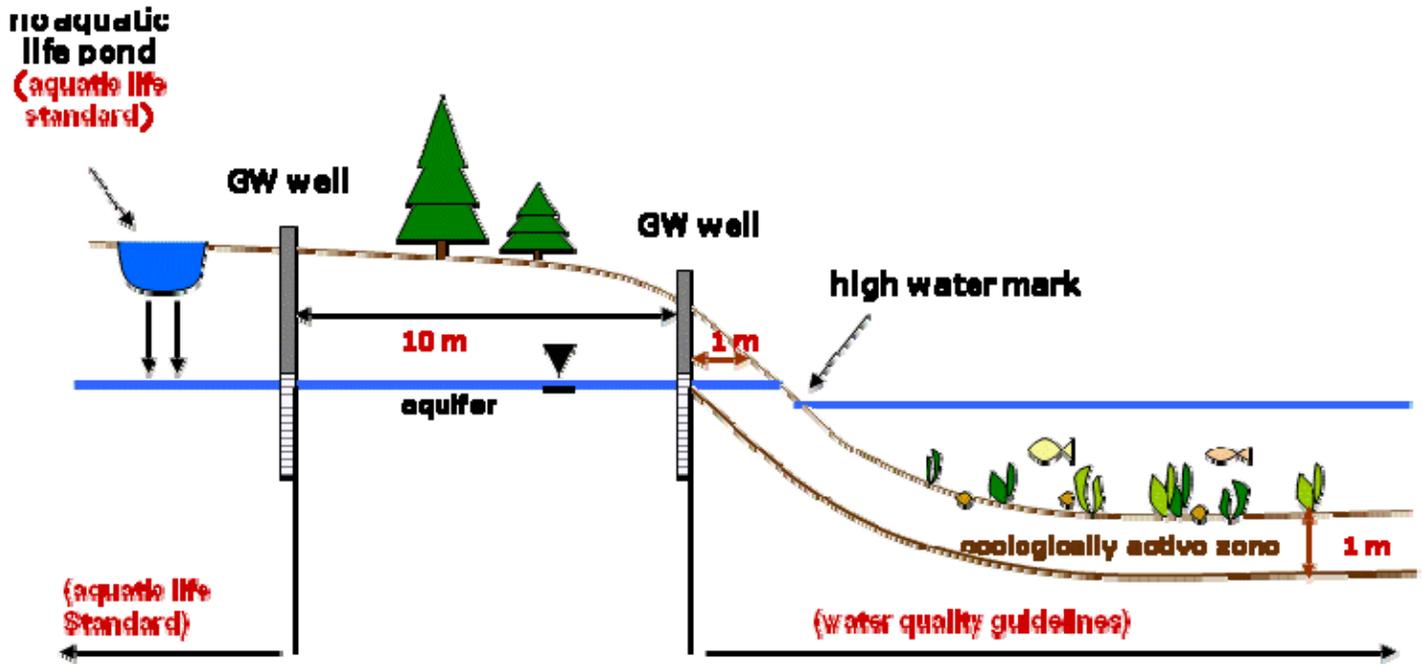


Figure 1. Illustration of the compliance points at 10 m setback from the ecologically active zone near a surface water body containing aquatic life.

Note. Red lettering indicates the applicable standards and guidelines for each water type. Illustration is not drawn to scale.

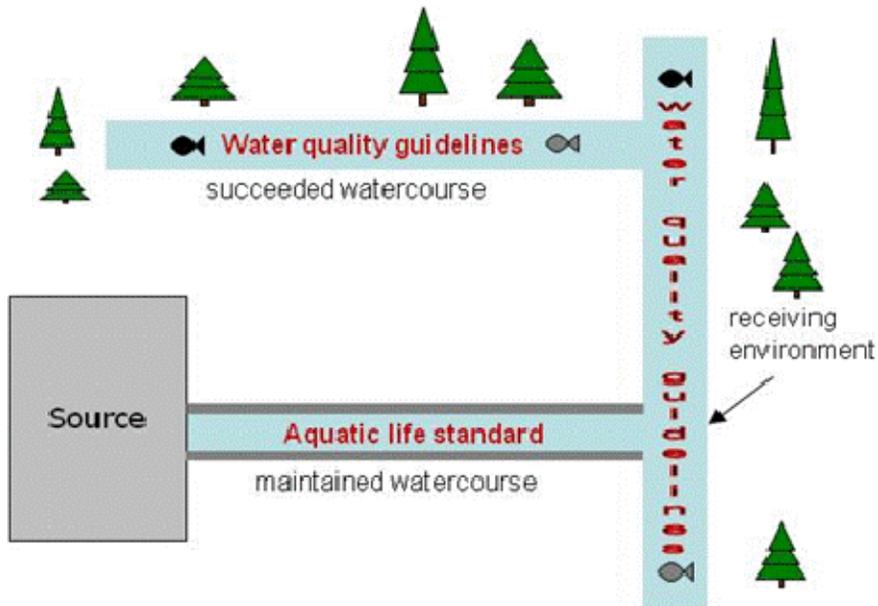


Figure 2. Illustration of a maintained watercourse (e.g. a drainage ditch) hydraulically connected to an aquatic receiving environment containing aquatic life.

Note. Illustration is not drawn to scale.