



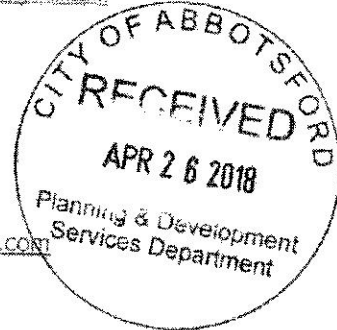
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Re: Lot 253 Locarno Court, Abbotsford – Streamside Setback Assessment

Per your request, I have assessed the reach of Gill Creek that flows east to west through the subject property at Locarno Court (Figure 1; Appendix 1). You had previously met with the City's Environmental Coordinator, who indicated the riparian setback for the creek would be 15 m from top of bank (TOB) under the current stream protection bylaw SPB. However, it has also been presented that the 15 m SPB setback does not permit a *reasonable development footprint*^a to be achievable on this *Greenfield* lot due to:

- Topographic constraints – The slope of the southwest corner is between 45 - 60%, comprised of bedrock outcrops, and precludes *reasonable development*;
- Spatial constraints – Although the lot area is over 3,000 m², the net buildable area outside of 15 m from TOB, and which is not constrained by steep slope conditions, is ~230 m². By comparison, the average footprints of nearby developments are 250 – 490 m²; and
- The preceding constraints are unique characteristics on this lot, which was created prior to 2005 and prior to current riparian setback bylaws. The unique characteristics are contributory to this lot remaining undeveloped while all lots around the site have been developed for many years.

1.0 Background

Under the City's SPB, development setbacks are determined by the width of Streamside Protection and Enhancement Areas (SPEAs) applicable on either side of a watercourse(s). The Vegetation Category, Stream Permanency, and Fish Presence characteristics of the watercourse are used to determine the SPEA width for proposed new development or re-development of the site.

The SPEA boundary is referenced from the location of the TOB of the *Stream*. Therefore, a site reconnaissance was undertaken to verify the location of the TOB and to include the TOB and High Water Mark (HWM), where applicable, on a topographic survey.

^a The term *reasonable development footprint* is described in Appendix 1 of the Draft RAR Variance Protocol, 2009: Where the development footprint is less than 30% of the developable area, an Undue Hardship exists.

2.0 Methods

Our assessment focused on determining the width of the SPEA(s) for the mapped watercourse (upstream reach of Gill Creek), by defining the following four conditions:

- the existing or potential vegetation (EPV) conditions on either side of the watercourse, measured from the TOB and perpendicular to flow;
- the fish bearing status of the watercourse;
- the permanency of the watercourse; and
- the width of the ravine confining the watercourse (if applicable).

The definition for TOB used for this assessment was that provided by Fisheries and Oceans Canada (DFO) Pacific Region's Habitat Definitions^b, and which is similar to the definition used within the City's SPB and the Riparian Areas Regulation (RAR).

The watercourse assessment was undertaken by a Qualified Environmental Professional (QEP) - Howard Ratzlaff, *P.Ag.*, of HCR Environmental Consulting carried out the site assessment on February 27, 2018. An Orthophoto of the study area was obtained from the City's Webmap, which included the approximate centerline of Gill Creek; contours; and the property lines superimposed (Figure 2; Appendix 1). Photographic documentation of site conditions was carried out using an Olympus TG-820 digital camera (Selected Photographs; Appendix 2). The City's Drainage and Engineering Infrastructure Layers were reviewed to determine surrounding drainage infrastructure and easements, and to determine the length of storm sewer carrying Gill Creek downstream.

The widths of existing or potential vegetation (EPV) assemblages were established following the RAR Simple Assessment Methodology, which is an equivalent method used for stream assessments under the SPB. The relevant sections of the RAR Methodology Version 3.3 are included in Appendix 3. The EPV width assessment methodology determines the average potential vegetation width using a total of 11 measurements, taken from the TOB to the closest permanent structures, over a stream assessment length of 400 m (i.e., 200 m upstream and 200 m downstream of the property's center). However, the stream at this location is not long enough to produce the required 11 measurements at a minimum of 40 m from each other, so the assessment method was modified to suit site conditions.

The watercourse is piped downstream and upstream of the subject parcel, and the width and character of the flow path through the lot is not comparable to daylight sections of the creek downstream. The average of the potential vegetation widths was obtained within the bounds of the open section of channel to determine the appropriate vegetation category, as per Table 2-2 of the RAR Methodology, which is then compared to a Matrix (Table 2-4; Appendix 3) to determine the SPEA width. The SPEA width will be a minimum of 15 m to a maximum of 30 m under this methodology.

^b Available at: http://www.pac.dfo-mpc.gc.ca/habitat/Glossary_glossaire_eng.htm



2.1 Results

As can be seen in Figure 2 (Appendix 1), Gill Creek flows through developed lands both upstream and downstream of the subject property within a piped storm drainage system. Within the assessed reach of the watercourse, EPV Conditions along the south (left) bank of the creek, within 50 m of the TOB, included:

- Park and green space east of the subject parcel, comprised of young (30 – 80 years) broadleaf forest to a distance of more than 50 m; and
- The undeveloped subject parcel, comprised of young mixed forest and shrub understory, to a distance of approximately 49 m. The nearest adjacent residence at 2660 Locarno was approximately 49 m from TOB.

The EPV conditions along the north (right) bank of the creek, within 50 m of the TOB, included:

- Maintained sanitary and utility corridor/trail from TOB to 10 m from TOB with minimal tree coverage; and
- Single family development at 2680 Locarno at a distance of approximately 15 m from TOB, with retaining walls and landscaping between the trail and the residence.

The average EPV width for the assessed corridor was greater than 30 m for the south side and greater than 15 m for the north side. The south side conditions are relevant to the proposed development. According to Table 2-2 (Appendix 3), where EPV conditions extend equal to or greater than 30 m from TOB, the Vegetation Category is 1. The applicable SPEA width for Vegetation Category 1, for a non-permanent and non-fish-bearing status is 15 m (min.) to 30 m (max.) from TOB.

In accordance with the City's SPB, the applicable vegetation conditions along the south side of Gill Creek are most closely representative of Condition (1) (b): *limited but continuous areas of Existing Vegetation or Potential Vegetation equal to 30 metres wide or discontinuous but occasionally wider areas of Existing or Potential Vegetation between 30 and 50 metres wide.*

2.2 Fish-Bearing Status

Gill Creek fish-use classification is 'Unknown' according to the City's web map. Downstream of the site, after flowing through more than 1,300 m of storm sewer, the flow daylights as Gill Creek at 2498 Marquet Court (off McMillan Road). Downstream of this location, the watercourse is intermittently piped and daylighted, and the classification remains as 'Unknown' until there is a confluence with Marshall (Lonzo) Creek at Highway 1 adjacent the Southern Rail corridor. Downstream of this confluence, the fish-use classification changes to 'Unrecorded'.

Through assessments conducted for other projects along the same railway corridor, HCR is aware the railway portion of Marshall Creek should be classified as 'fish-bearing'. This would suggest the railway portion of Gill Creek is also 'fish-bearing', as there are no gradient barriers between the confluence and flow within the railway corridor. However, due to the significant length of culverting and closed pipe sections between the subject site and the railway corridor, and the storm pipe gradients within Glenn Mountain, it is our opinion the reach of Gill Creek within the subject parcel is



to be classified as non-fish-bearing. Gill Creek does contribute to downstream fish habitat as a 'source of food, nutrient or cool water supplies to downstream fish populations'.

2.3 Stream Permanency

The assessed reach of Gill Creek was approximately 0.5 m in average width, from HWM to HWM. The stream meandered within an overall width which was closer to 1.5 m when measuring from outer bend to outer bend of the meanders. During previous site visits (December 14, 2017) we observed no flow in the watercourse. We anticipate the stream flows for less than 6 months in a year, making it a *Non-permanent Stream* under the SPB.

2.4 Ravine Width

Gill Creek was contained within a narrow but relatively steep sided ravine through the assessment area, comprised of bedrock outcrops on the south side and modified terrain (i.e., servicing corridor) along the north side. The TOB to TOB width of the stream corridor was less than 60 m. Therefore, the 'Ravine Width' is not a factor in determining the SPEA width.

2.5 Resultant SPEA Width – Gill Creek at Lot 253 Locarno Court

According to the conditions provided in Section 2.1 to 2.4, and consistent with the SPB and RAR simple assessment methodology, the minimum SPEA width for Gill Creek at the subject parcel would be: **15 metres wide, measured perpendicularly away from the TOB**. This is consistent with a setback for a stream which is non-fish-bearing, non-permanent flowing, and where the average EPV conditions are typically Category 1 (i.e., 30 – 50 m).

The 15 m wide SPEA is illustrated on the Survey Plan (Figure 3; Appendix 4). Under the RAR Detailed Assessment Methodology, based on an average channel width of less than 3 m, the minimum applicable SPEA width for this reach of Gill Creek would be 10 m, measured from the HWM. This has also been shown on Figure 3, as this will determine the minimum SPEA width for consideration under a stream setback variance application.

3.0 Recommendations for Stream Setback Variance Approval

The 15 m TOB SPEA width at this lot is impractical as it creates an *Undue Hardship* case, where a *reasonable development footprint* cannot be achieved if the bylaw-derived setback is imposed.

The City's SPB provides for an assessment to be undertaken in accordance with the RAR, and this process will define the minimum acceptable development setback which the City can approve through a variance process. A series of Figures illustrating the *Developable Area* calculations for this lot are provided in Appendix 5, which demonstrate the unique challenges of this lot. A summary of the calculations following the RAR Assessment methods for *Undue Hardship* cases is as follows:

1. The lot's Gross Developable Area (GDA), as measured between the property line setbacks, is ~1,830 m² (Figure 4). This is the gross area after accounting for the impact of a servicing easement situated at the north end.



2. The developable area is further reduced to ~712 m² (Figure 5) after applying the 15 m from TOB SPEA widths following the City's SPB.
3. Approximately 68% of the net developable area is in the southeast where steep slope conditions exist (i.e., >40%). The area in which reasonable developable might occur, is less than 230 m² (Figure 6). This equates to well less than 15% of the site's GDA, after removal of the footprint of the creek, when reviewed under the *Undue Hardship* criteria.
4. By comparison, the net developable area under the RAR assessment methodology is just over 320 m² (Figure 7). This equates to approximately 18% of the site's GDA, and still presents an *Undue Hardship* condition.

We understand that you met with the City to propose a setback variance application. We are carrying through with a description of the proposed variance in the following sections.

4.0 Proposed Development Envelope

The proposed development envelope maintains a maximum footprint of approximately 250 m², as presented in Figure 8, Appendix 6. According to the RAR Variance Protocol, the maximum development footprint includes: *the building and all other hard surface features, including sheds, gazebos, driveways, walkways, paths, patios and decks*. Permeable surfaces that permit unrestricted drainage through to the underlying soils, such as elevated open deck surfaces (which are not covered), do not count into the maximum development footprint. Impermeable surfaces are not generally permissible in any City-mandated buffer strip, so any walkways along the north side of the building must be created of permeable surface materials if located in the buffer area.

The proposed development envelope includes:

1. Approximately 168.3 m² encroachment into the 15 m SPB SPEA;
2. Provision of a 1.5 m wide buffer on the north end of the proposed residence, outside the 10 m wide RAR minimum SPEA width;
3. Dedication of approximately 1,850 m² of forested riparian area, including approximately 337 m² outside the 15 m SPB SPEA distance but within 30 m of the TOB. This dedication area does not include the trail dedication area at the north end of the parcel.

5.0 Proposed Habitat Compensation

Habitat compensation, at a 2:1 ratio, will be provided by increasing the stream protection area in the southeast corner of the parcel, where the existing riparian forest habitat extends south along the south-facing slopes. No planting or rehabilitation work would be required within the 337 m² of habitat compensation area. The additional riparian forest along the south west aspect of the site is contiguous with the south-facing forested slope outside the stream protection area. The forest is a mapped Non Sensitive or Modified Ecosystem as designated by the Metro Vancouver Sensitive Ecosystem Inventory (Figure 9; Appendix 7).

The proposed compensation complies with the City's habitat compensation requirements for SPEA variances.



2.4 Calculating the SPEA for the Simple Assessment

Once answers to the key questions are determined the SPEA can be determined from Table 2-4, except for Ravines greater than 60 meters in width where the SPEA is 10 meters beyond the top of the ravine bank (Section 2.5.4.1). For three combinations there are multiple outcomes that are based on the location of permanent structures (Figures 2-2 and 2-3).

Vegetation Category	Existing or potential streamside vegetation conditions	Streamside Protection and Enhancement Area Width*		
		Fish bearing	Non-Fish bearing	
			Permanent	Non Permanent
1	Continuous areas ≥ 30 m or discontinuous but occasionally > 30 m to 50 m	30 m		Minimum 16 m Maximum 30m Refer to Figure 2-2
2	Narrow but continuous areas ≥ 15 m or discontinuous but occasionally > 15 m to 30 m	Minimum 15 Maximum 30 Refer to Figure 2-2		15 m
3	Very narrow but continuous areas up to 5 m or discontinuous but occasionally > 5 m to 15 m	15 m		Minimum 5m Maximum 15 m Refer to Figure 2-3

Table 2-4: Streamside Protection and Enhancement Area Widths for the Simple Assessment

*SPEA is measured from Top of Bank or Top of Ravine Bank.

Assessment methods definition - top of bank -" means

- (a) the point closest to the boundary of the active floodplain of a stream where a break in the slope of the land occurs such that the grade beyond the break is flatter than 3:1 at any point for a minimum distance of 15 metres measured perpendicularly from the break, and
- (b) for a floodplain area not contained in a ravine, the edge of the active floodplain of a stream where the slope of the land beyond the edge is flatter than 3:1 at any point for a minimum distance of 15 metres measured perpendicularly from the edge.