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Memorandum

To: Cortes Forestry General Partnership

Cc: Matt Cuscianna

From: Ione Brown, RPF

Date: August 25, 2017

Re: Proposed Road Crossing Assessment for Carrington Development area

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The Cortes Forestry General Partnership is proposing to develop access to the Carrington Operating Area where plans will be developed over the next few months for a longer-term selective harvest operation. The proposed road is approximately 500 metres in length with one proposed crossing structure. On August 23, 2017 I visited the proposed Carrington development area with Mark and Matt to review the plans for harvesting and as a priority, the proposed road location to access the Carrington area.

After review of the area in the field (see pictures below), I would like to offer the following comments regarding this proposed crossing and methods used for assessment:

View downstream from proposed crossing location

- **Step one** of an evaluation of a crossing is to determine the quality of the potential fish habitat (if any) at the crossing site

- **Step two** is to determine the appropriate crossing structure, and

- **Step three** would be to determine if any further approvals or assessments are necessary

View upstream from crossing location

Step One:

Indicators for fish habitat include biological and physical characteristics at the crossing as well and upstream and downstream of the crossing.

1. Flow – flow of water in this area is occasional only, although the area may flood periodically, there is no defined channel and no pooling of water in the vicinity of the crossing
2. Current – the permanent vegetation cover throughout this area indicates that water velocity would be very low and very occasional.
3. Cover – permanent vegetation cover throughout this area
4. Channel depth – channel is discontinuous and not defined
5. Channel width – channel is less than 2.5 metres where visible, not defined and only intermittently above ground
6. Substrate – organic materials where any type of channel is above ground; no gravel or stable debris, and no undercut banks or deep pools that would indicate fish habitat
7. General habitat type – no habitat for fish other than a low potential for fish passage at higher water levels
8. Gradient of stream – 0 – 6% (less than 3% at crossing level)

Step Two:

The choice of crossing structure will depend on specific conditions at the site; the following matrix is provided by the "Fish-Stream Crossing Guidebook" (Government of British Columbia, revised September 2012), which is still the basis for professional decision-making by Professional Biologists and Professional Foresters when constructing road:

Decision Matrix for Crossing Structure Type:

Stream Gradient	Critical	Important	Marginal
➢ 6%	OBS[a]	OBS[a]	OBS[a]
3 – 6%	OBS[a]	OBS[c] recommended	CBS[b], note "d" below
< 3%	OBS[a]	OBS[c] recommended	CBS[b], note "d" below

Notes:

a. Open-bottomed structures (OBS) include bridges and open-bottomed culverts
b. Closed-bottomed structures (CBS) include embedded corrugated metal pipes
c. Seek a review under the Fisheries Act
d. Necessary conditions include meeting the criteria for "marginal habitat" described above and that any CBS installed be embedded to replicate streambed inside pipe.

Using the method of assessment provided above, a site visit and further discussions with a well-respected colleague of mine who has been a Registered Professional Biologist on the Coast of British Columbia for 20+ years, I, as the signing professional on the Road Permit application, offer the following recommendation for this proposed crossing.

The proposed crossing meets the criteria for marginal fish habitat, as the highest possible standard for the area. It is unlikely that this site will contain fish at any time, but providing fish passage (not habitat) is not unreasonable for the area. I recommend a 600mm corrugated metal pipe (closed bottom structure) be installed and local material embedded in the pipe during construction. Further, that the construction should occur through this area when the site is reasonably dry, meaning there is no water flow through the area.

No further actions are recommended.

Please let me know if you have any questions regarding the information provided above.

Sincerely

Ione Brown
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