

**Lower Harbour - Mica Lake / Adams River
Visual Impact Assessment
RDI Resource Design Inc
February, 2022**

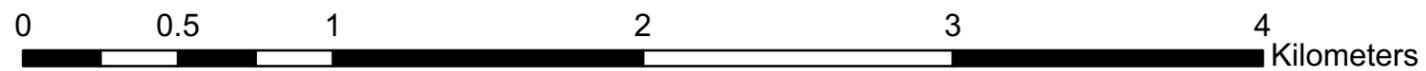
Legend

- Mica_Adams_VPs_2022
- CTR_Clip
- South_Harbour_Feb_2022_Block_Shapes
- Adams0-CC
- A89160_Viewpoints
- April_20_2020_Road
- Road_Adams_River
- TRIM_WATER_LINES
- Roads
- A89160_Block_Shapes
- April_9_2020_A89160_WTRA's
- Mica_Lake
- Lakes
- South_Harbour_Feb_2022_WTRA_Shapes
- ExistingWTRA
- April_9_2020_A89160_WTRA's
- Main_River
- TA_PEP_SVW_polygon
- 1405692_2012
- TRIM_EBM_WATERBODIES
- A89160_Block_Shapes
- TRIM_WATER_LINES
- Roads_for_RDI_July_23_2013

RC_VM_VLI

EVQO_CD

- NVS
- M
- MM
- P
- PR
- R
- TRIM_EBM_WATERBODIES
- TRIM_EBM_WATERCOURSES
- 20kbcgrid
- 082m084vri
- RDI_trim_transportation
- RDI_TRIM_watercourse



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Findings and Conclusions

Visual Assessment – Southwest Harbour Area – Mica Lake - North Adams Cutblocks SBAGL, SBAFQ, and SPAFP

Shapefiles for the cutblocks and a related WTRA were received from Ches Clem on February 8, 2022. RDI utilized the previously built ArcMap and Visual Nature Studio projects, and updated the forest VRI obtained directly file from the BC Data Catalogue.

SBAGL is located in VSU 293 (VLI_No 1009). This upper landform has a Modification VQO. The remaining two cutblocks are located within VSU 338 (VLI_No 1018). This lower landform has a Partial Retention VQO. All cutblocks and VSUs for the 2022 project are located within Mapsheet 082M054.

Ches Clem provided excellent photography in September, 2020 from the three Mica Lake viewpoints (Mica 1, Mica 2, and Mica 3) and the Adams River viewpoint (Adams 0) directly east of the lake (see key map, page 1).

Findings

Only a narrow sliver of SB8GL will be potentially seen from any of the viewpoints. The other two cutblocks will be hidden by intervening terrain and forest cover.

A small sliver of SB8GL will likely be seen through the trees from Mica 2 and Adams 0 viewpoints as confirmed by photography from these viewpoints (see each viewpoint sheet). The proposed openings are seen in conjunction with the A89160 cutblocks SB7LS, SB7LN, and SB7LL.

The large 2012 opening 1405692 just above SBAGL was addressed in the A89160 2020 VIA. Tyson Leudtke estimated that regen heights would average 2m by the end of 2020. RDI performed a slope analysis using the Procedures for Factoring Visual Resources into Timber Supply Analysis, Table 6, page 9. The resulting weighted average indicated that Visually Effective Green-up could be achieved at 4.5m VEG height, a full m less than indicated in the “A First Look” Visually Effective Greenup study by the Ministry, 1994. The results pages from RDI’s study are presented on pages 10 and 11 of this study for easy reference.

The 0.8% additional contribution from SBAGL in the landform, constituting 3.24% of all alteration in the partially obscured landform (southern portion only) will bring the percent alteration in the landform of 25%, 20% of which is due to the 2012 opening. The 2020 study found that Adams 0, a viewpoint with greater coverage of the landform than Mica 2, would have 15% alteration in perspective view, with 9% attributed to the 2012 opening as seen from the Adams 0 viewpoint, if it was all nonVEG, thereby easily meeting the Modification VQO. With regard to these results, only Mica 2 will exceed the Modification VQO limit of 18%.

Visibility - Lower Harbour Cutblocks 2022				
Viewpoint	SBAFP	SBAFQ	SBAGL	Photo Interpretation; Percent Alteration Calculation Indicated
Mica 1	NVS	NVS	Sliver	No 2022 Blocks Visible (no coverage of south portion of landform in photos); No Percent Alteration calculated.
Mica 2	NVS	NVS	Sliver	Minor sliver of SBAGL likely visible per photos; Percent Alteration calculated.
Mica 3	NVS	NVS	NVS	No 2022 Blocks Visible (no coverage of south portion of landform in photos); no Percent Alteration calculated.
Adams 0	NVS	NVS	Sliver	Minor sliver of SBAGL likely visible per photos; Percent Alteration estimated from 2020 findings.

Conclusions

Percent alteration calculations from Mica 2 viewpoint are predicted to rise by under 1% with the addition of SBAGL, leaving the upper landform still in need of green-up in order to meet the Modification VQO. When 50% of the 2012 opening achieves VEG, the total percent alteration would be reduced to 15%, easily with the Modification VQO limit, thereby allowing SBAGL to proceed without restriction. According to Tyson Leudtke, brushing in 2020 would likely expose more bare ground, setting VEG back somewhat.

In RDI’s 2020 VIA report for A89160, it was suggested by RDI that the Adams 0 viewpoint should take precedence over Mica 2 when considering the effect of the 2012 harvesting on VEG, given the much broader coverage of the landform from Adams 0 compared to Mica 2 (see each viewpoint page). If so, the 15% alteration, plus the sliver of SBAGL of approximately 0.5% would already be within the Modification VQO limit.

RDI also noted in the 2020 report that “... the future dates for advanced sale and harvesting commencement work in favour of VEG being achieved by that time.”



Ken B. Fairhurst, PhD, RPF
RDI Resource Design Inc
February 21, 2022

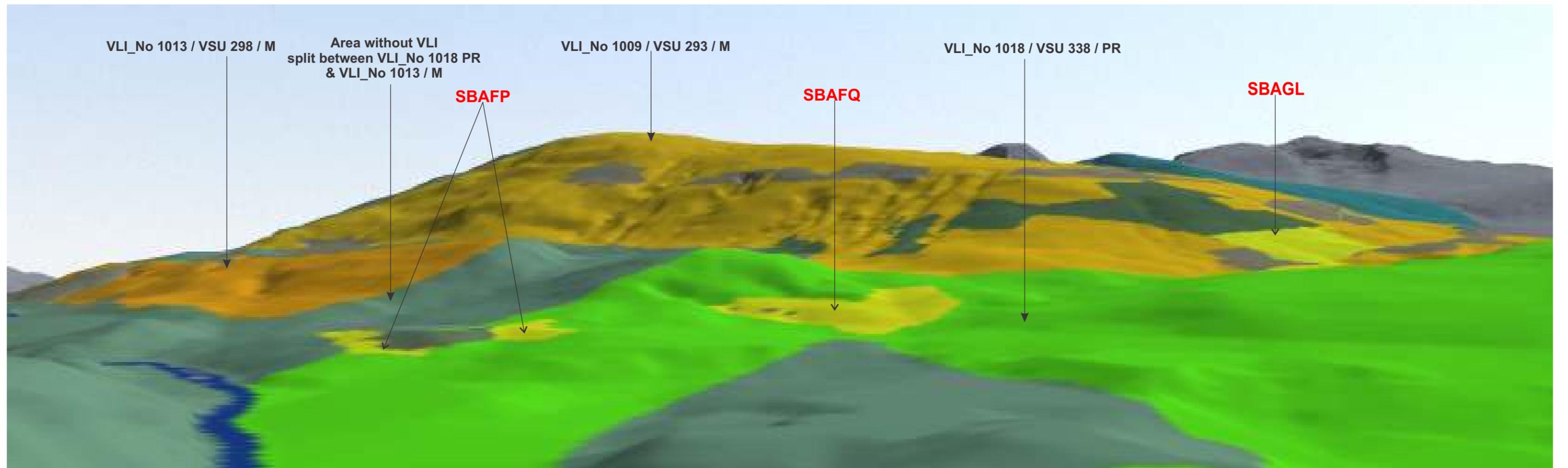
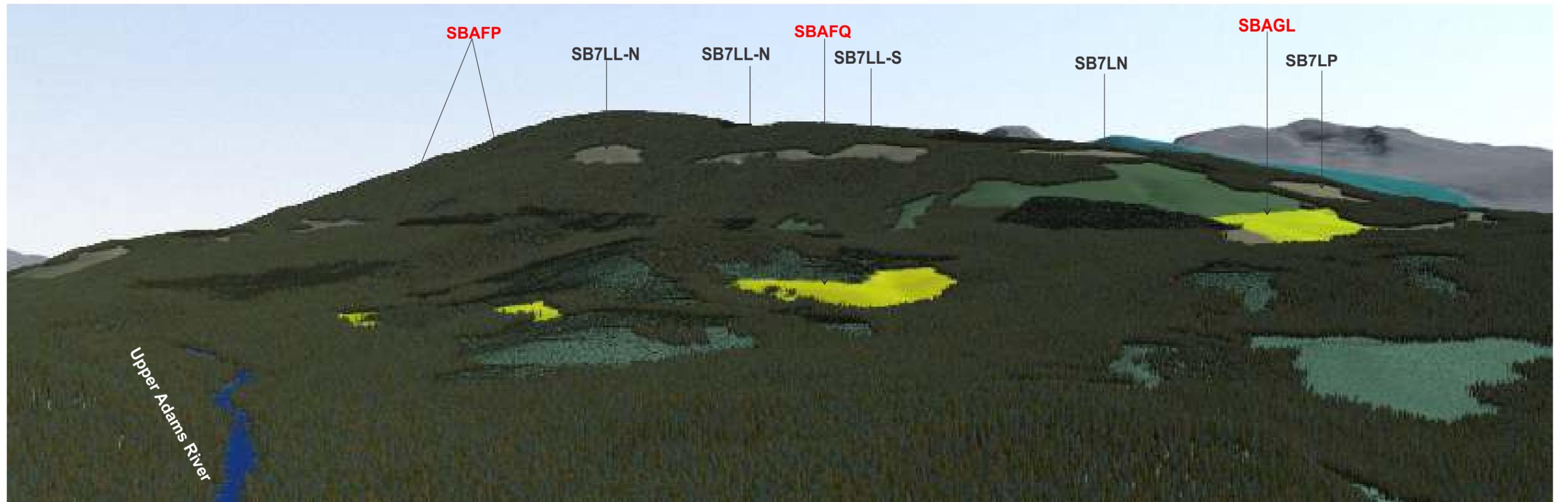
RDI 2022 Calculations - Mica 2 Viewpoint

Percent Alteration from Mica 2 Viewpoint		
NAME	AREA2	% Alt
VSU 293 M	196075.56	
SBAGL	1586.20	0.81%
SB7LP	1519.59	0.78%
SB7LN	158.73	0.08%
SB7LL	5835.66	2.98%
SB7LN	91.42	0.05%
E2012	38511.77	19.64%
E2012	1231.61	0.63%
Sum Alt	48934.98	24.96%

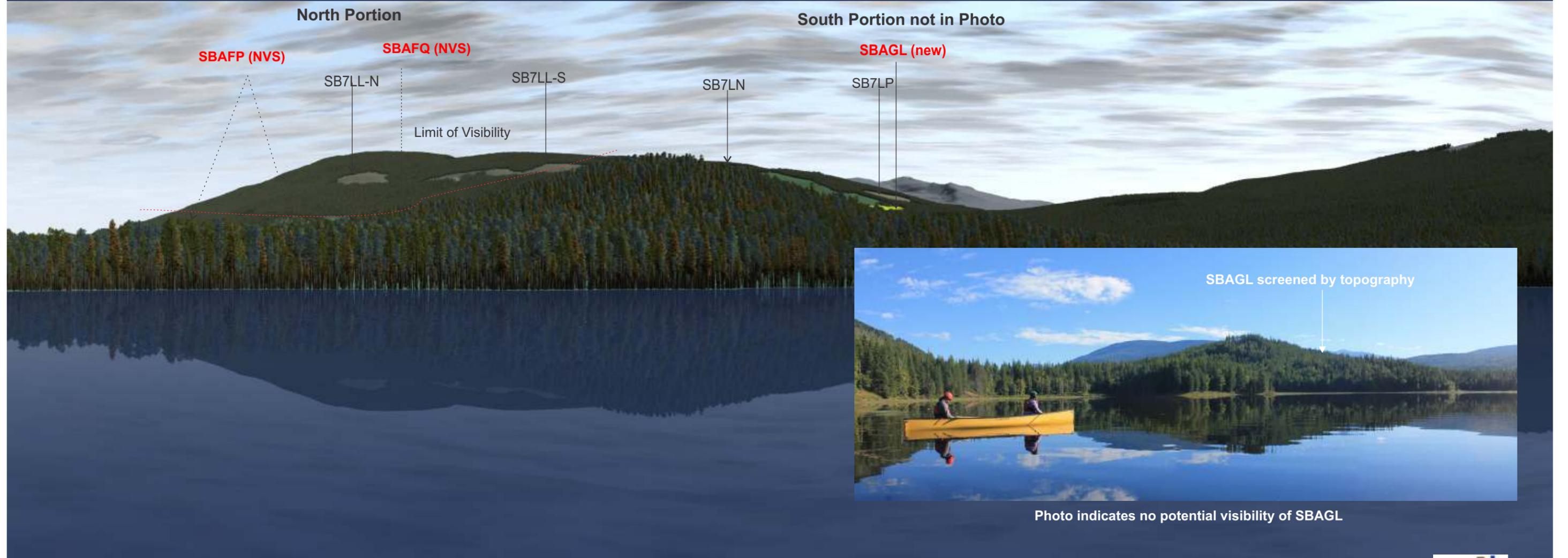
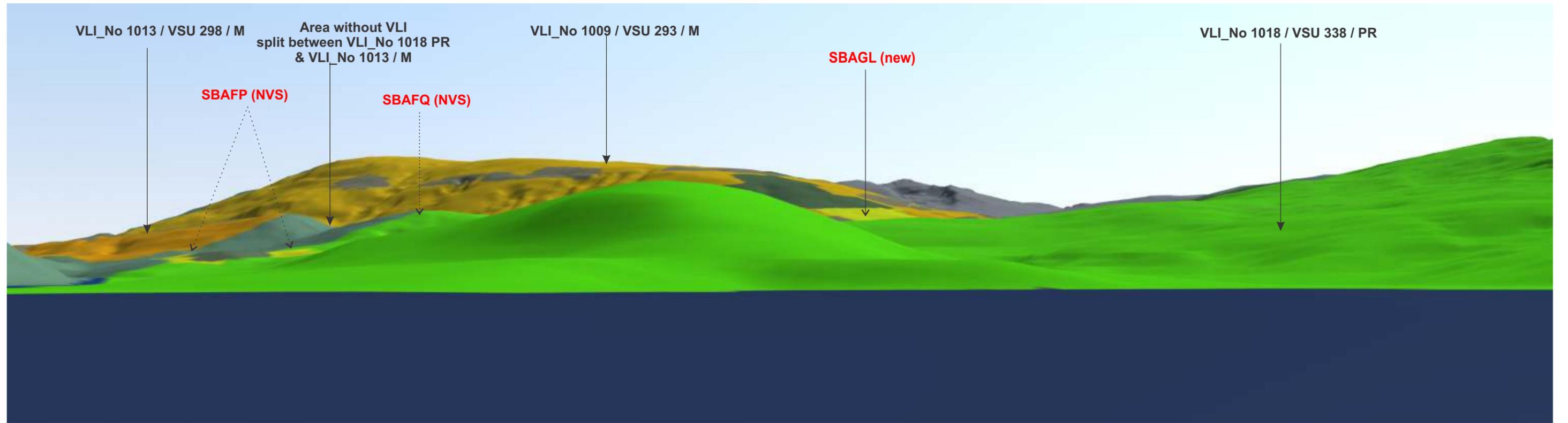
RDI 2020 Calculations - Adams 0 Viewpoint

Percent Alteration Adam0-Ches		
NAME	AREA2	%Alt
Landform	156524.10	
SB7LL-N	2801.87	1.79%
SB7LL-S1	1173.00	0.75%
SB7LL-S2	3509.70	2.24%
SB7LN	522.56	0.33%
SB7LS	697.63	0.45%
L2012	14210.79	9.08%
L2012	259.99	0.17%
Leave	-300.80	-0.19%
Sum Alt	22874.74	14.61%

Add 0.5% approx. for SBAGL



Overview from above Mica Lake



Viewpoint Mica Lake 1

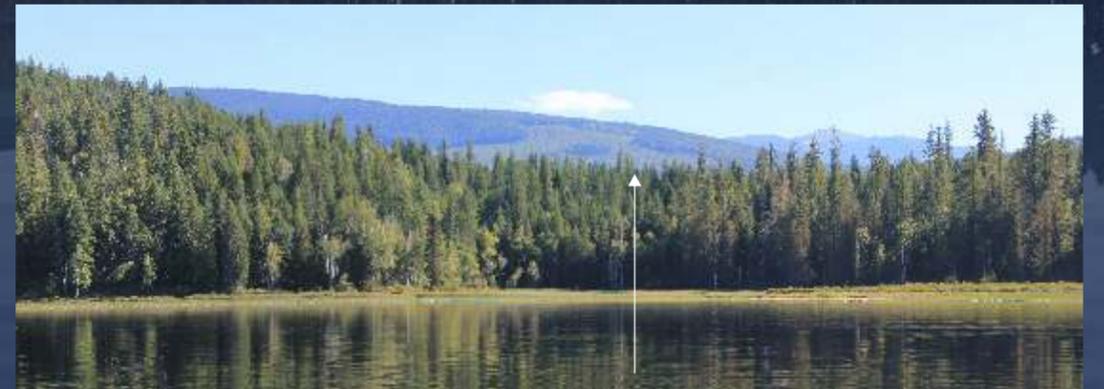
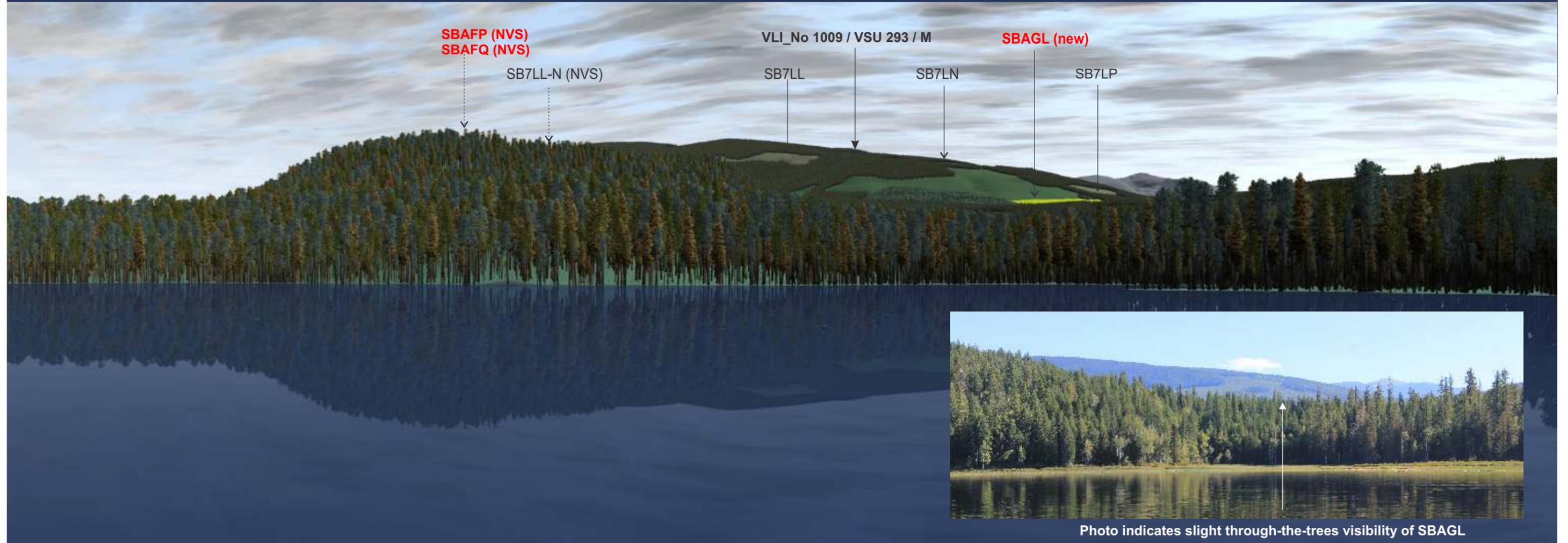
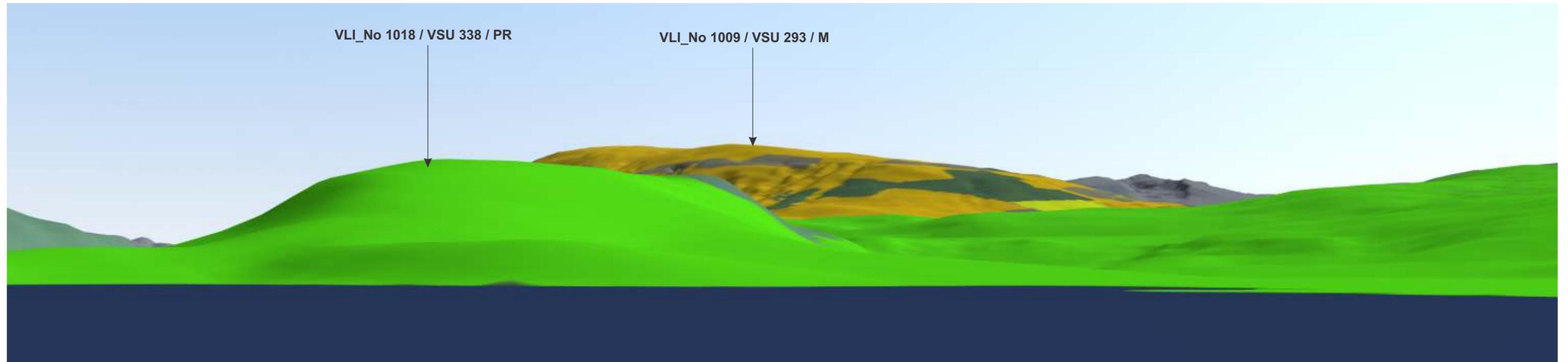
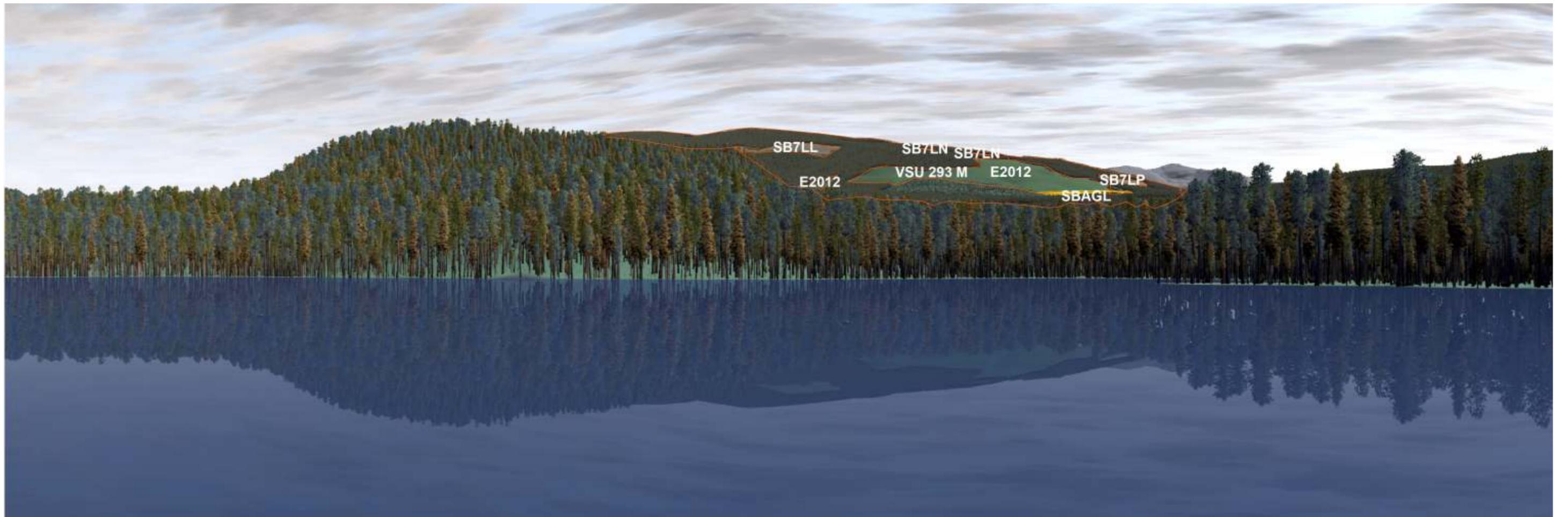


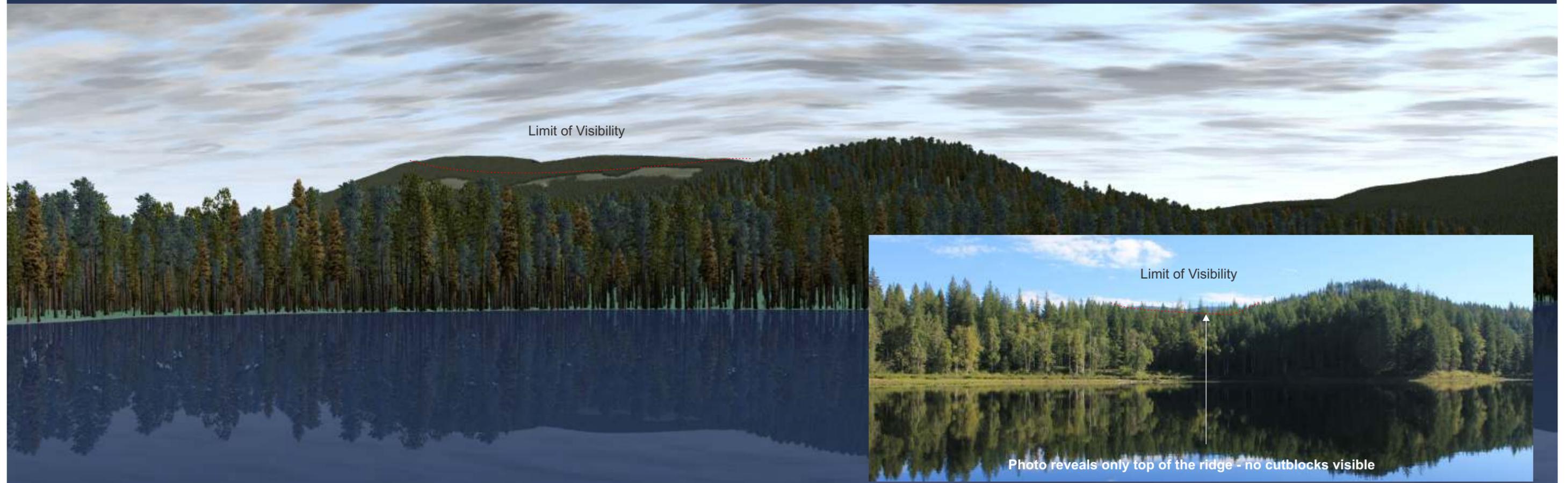
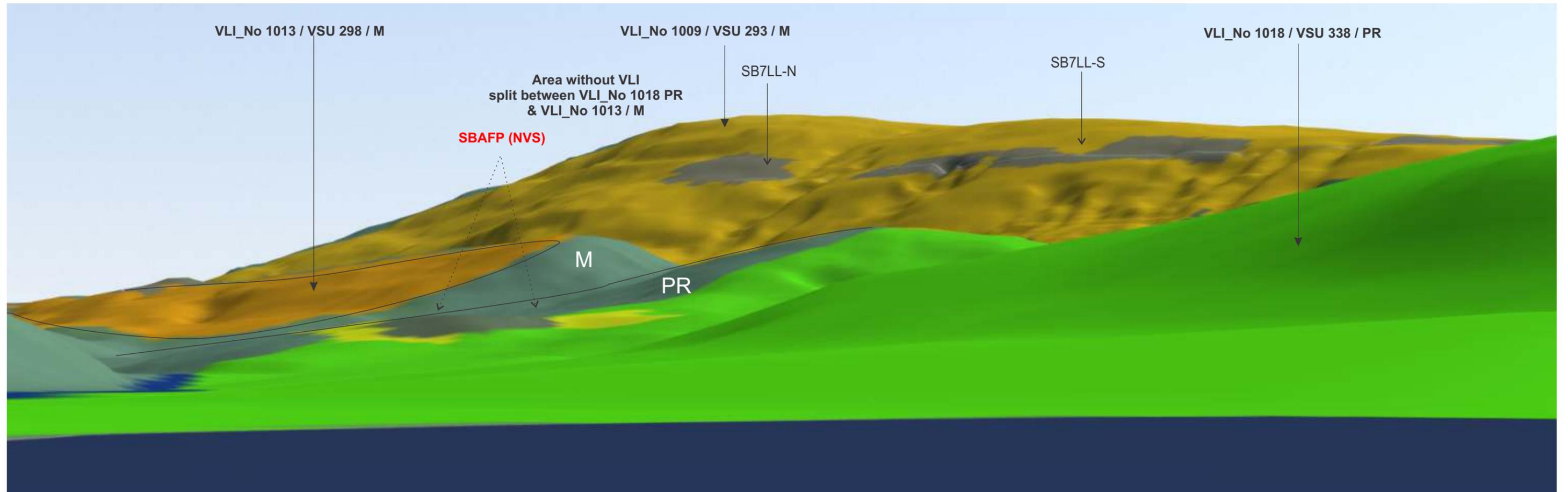
Photo indicates slight through-the-trees visibility of SBAGL

Viewpoint Mica Lake 2

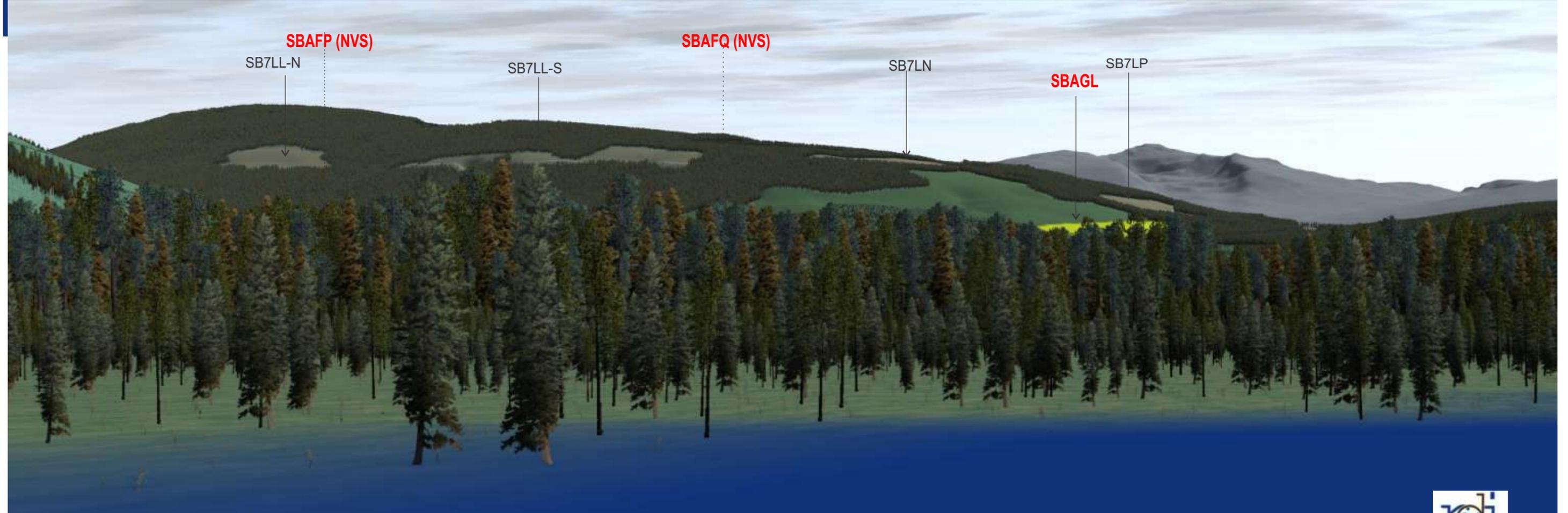
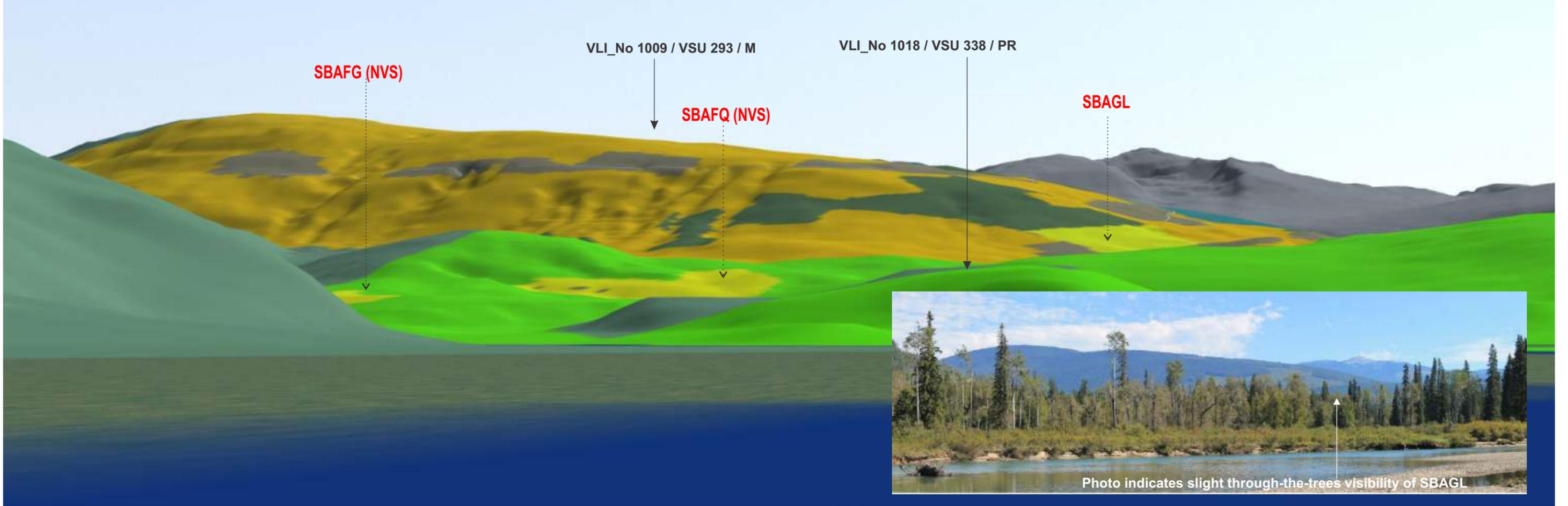


Only South Portion of the large VSU 293 is Visible

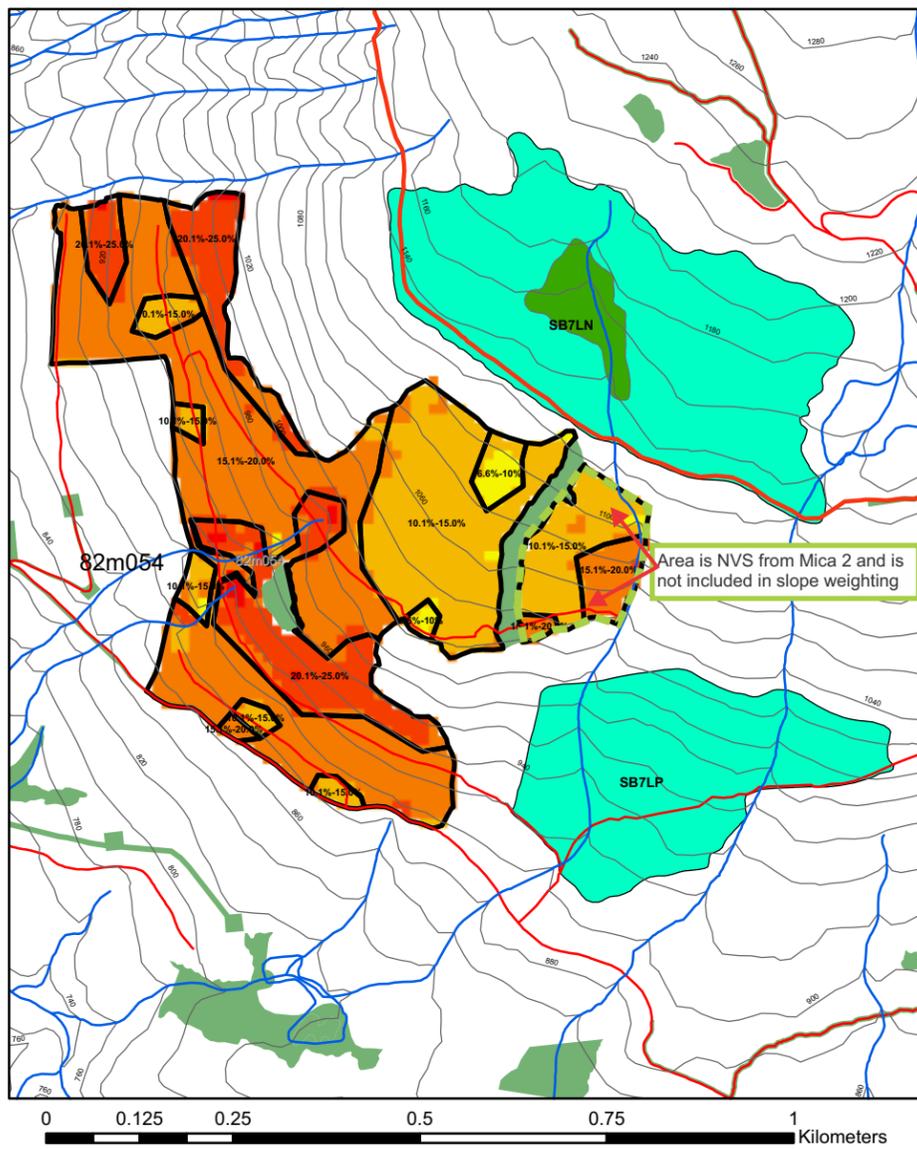
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SB7LP	1519.59	0.78%
SB7LN	158.73	0.08%
SB7LL	5835.66	2.98%
SB7LN	91.42	0.05%
E2012	38511.77	19.64%
E2012	1231.61	0.63%
Sum Alt	48934.98	24.96%



Viewpoint Mica Lake 3



Viewpoint Adams 0 (river)



**TSL A89160 Visual Assessment
RDI Resource Design Inc
April, 2020**

Legend

- A89160_Viewpoints
- April_20_2020_Road
- Road_Adams_River
- TRIM_WATER_LINES
- A89160_CTR_Clip
- Roads
- 2012slope
- Main_River
- Lakes
- TA_PEP_SWW_polygon
- TRIM_EBM_WATERBODIES
- April_9_2020_A89160_WTRA's
- A89160_Block_Shapes
- Existing_WTRA's_&_Road_PAS
- TRIM_WATER_LINES
- Roads_for_RDI_July_23_2013
- TRIM_EBM_WATERBODIES
- TRIM_EBM_WATERCOURSES
- 20kbcgrid

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- 25.000000001 - 30
- 082m084vri
- RDI_trim_transportation
- RDI_TRIM_watercourse



**Tree height required to meet VEG by percent slope for well stocked stands
(Source: B.C. Ministry of Forests, 1998, Procedures for Factoring Visual Resources into Timber Supply Analyses, Table 6, P. 9.)**

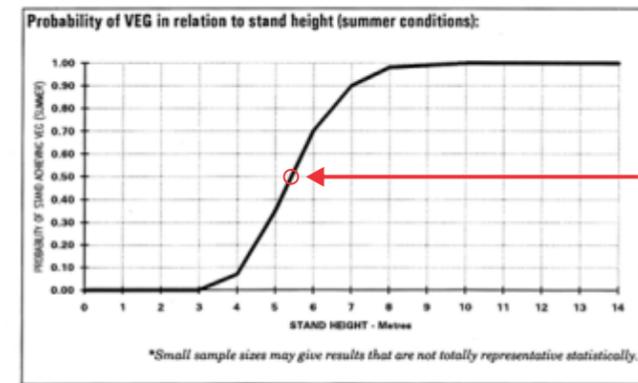
	Slope Class					
	1	2	3	4	5	6
Slope %	0-5	6-10	11-15	16-20	21-25	26-30
Regen. Height	3	3.5	4	4.5	5	5.5

Weighted Average Years to Achieve VEG, Considering Planimetric Area in Each Slope Class

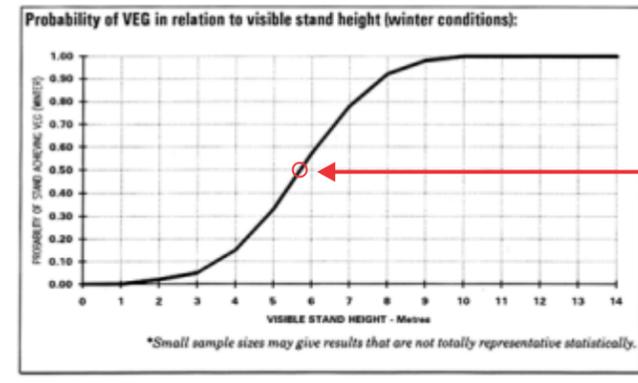
NAME	AREA2	Area % of Total	Weighting Factor	Required VEG Ht. by Slope Class (m)*	Weight (years) and Total Weighted Average (Years)
2012 Opening	404465.19				
CL2_ 6-10%	6918.11				
CL2_ 6-10%	1873.26				
Sum Class 2	8791.36	2.17%	0.0217	3.5	0.08
CL3_ 11-15%	88026.64				
CL3_ 11-15%	5464.32				
CL3_ 11-15%	2555.47				
CL3_ 11-15%	4095.08				
CL3_ 11-15%	2325.35				
CL3_ 11-15%	1809.69				
Sum Class 3	104276.56	25.78%	0.2578	4	1.03
CL4_ 16-20%	198372.63				
CL4_ 16-20%	2945.19				
Sum Class 4	201317.82	49.77%	0.4977	4.5	2.24
CL5_ 21-25%	22321.75				
CL5_ 21-25%	9880.00				
CL5_ 21-25%	57877.70				
Sum Class 5	90079.45	22.27%	0.2227	5	1.11
Sum Opening	404465.19	100.00%	1		4.46

Weighted Average

Visually Effective Green-up



Summer
50% Probability of achieving VEG at 5.5m



Winter
50% Probability of achieving VEG at 5.75m

Source: A first look at visually effective green-up in BC. Ministry of Forests 1994

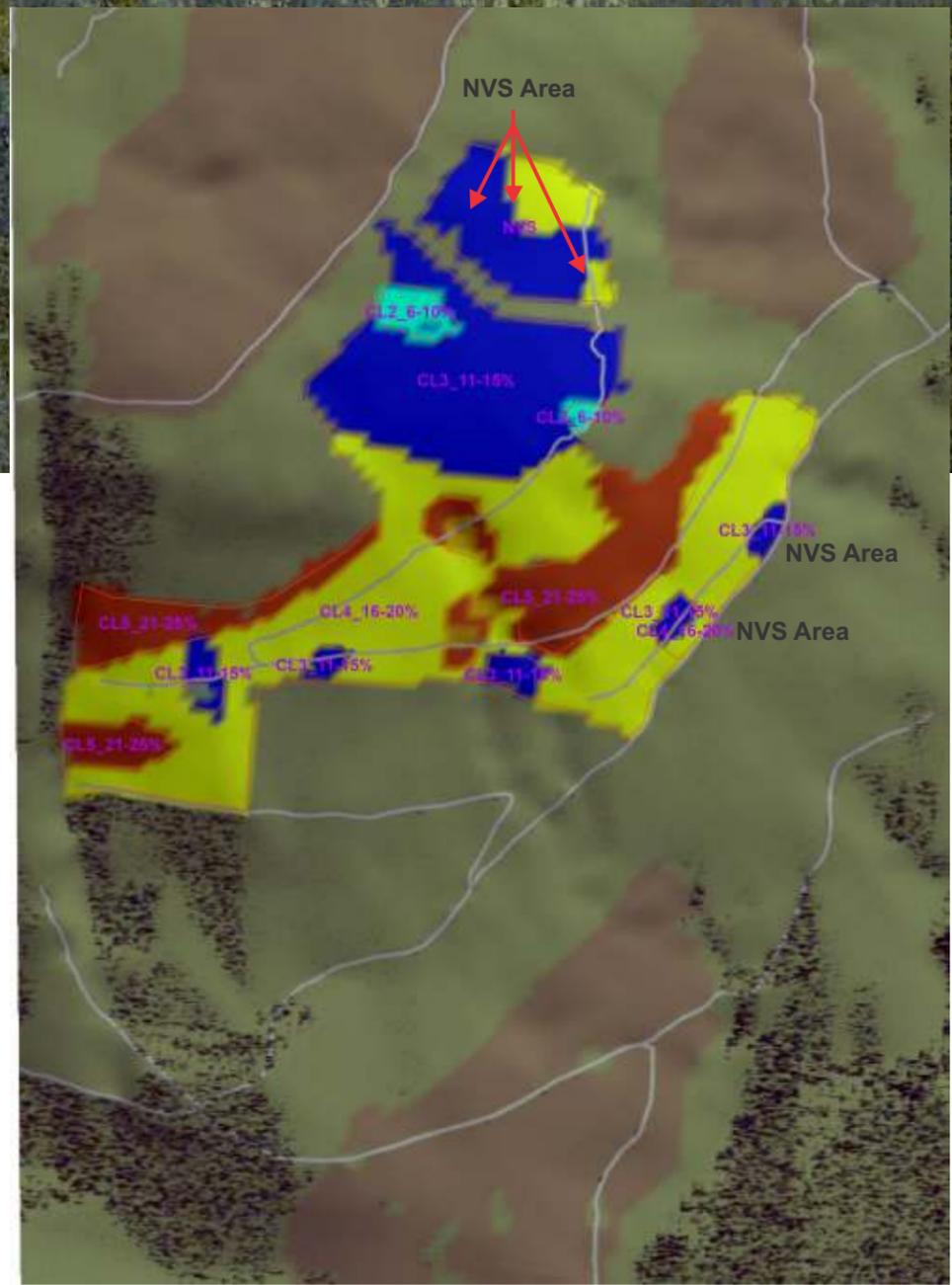
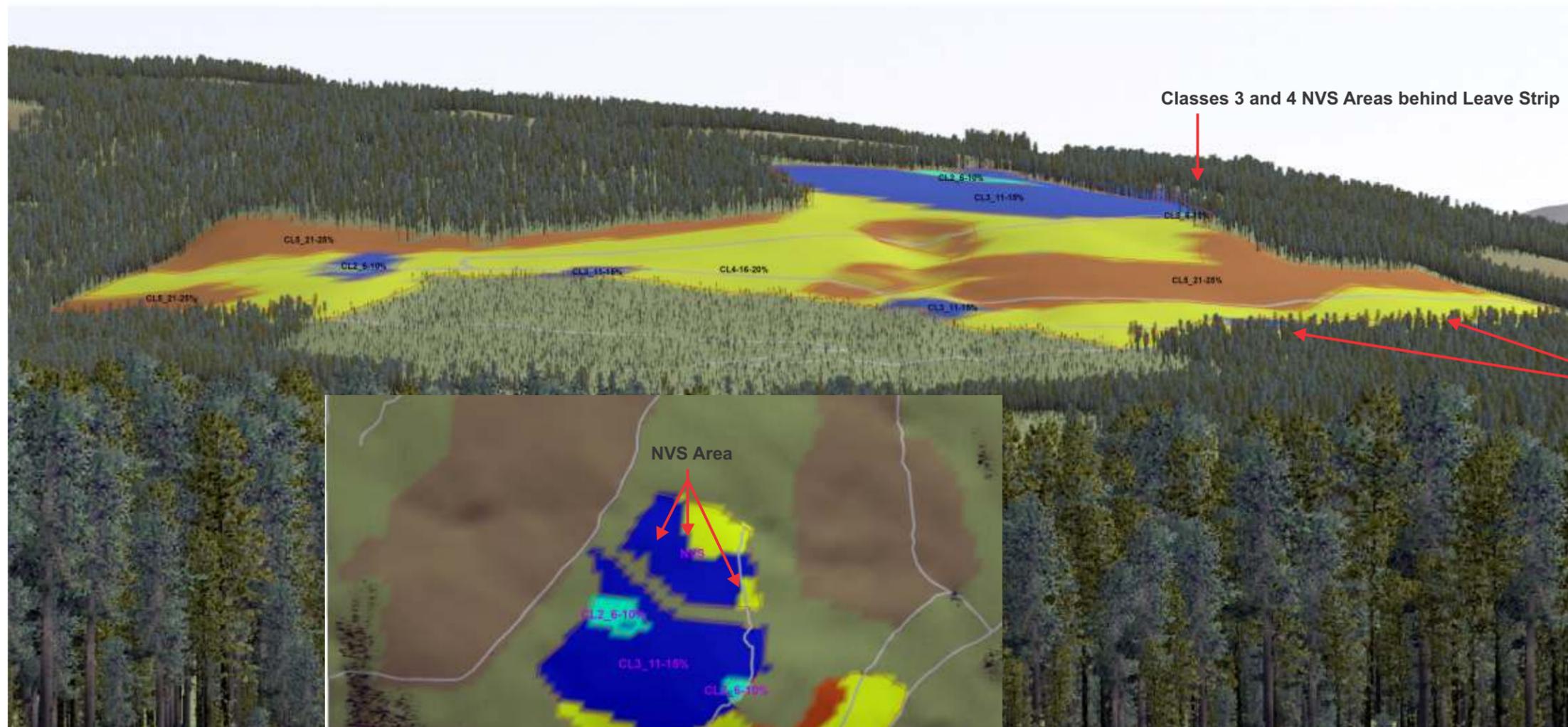
Notes:

1. The probability curves from the 1994 VEG study are the original "first look" at the topic. The authors of original study indicated a need for further studies, such as the relationship between Plan View and Perspective View (P2P), and the effects of slope, viewing angle, and angle of incidence on VEG. The viewing angle towards most of the photos of green-up used in the study were at elevation towards the opening or higher (superior), thereby reducing the visually effective coverage of trees within the opening as compared to the coverage as would be seen from lower (inferior) viewpoints typical of valley and water body viewing opportunities. Of the 21 representative summer photos presented in the report, by RDI's interpretation, 20 were either from level of higher (aerial). The selection of the mid-slope viewing opportunities was intended to be a control in the study, but is not representative of normal viewing as from Mica Lake. Further work on P2P was conducted for the Forest Practices Branch by Gerard Olivotto in 2001 and by A.F.L. Nemeč in 2002. The key take-away is that as the angle of incidence increases, whether by steeper slope or higher viewing angles, less screening is afforded by on-site trees for a given tree form and density, and more bare ground is seen, requiring greater tree heights to fill in the opening visually. The reverse is also true: the lower the AOI, the greater the screening cover afforded by a given tree height. The "first look" also was very limited in Biogeoclimatic subzone sampling, and produced just two Province-wide probability curves (one for summer and one for winter). The curves have neither been adjusted nor made more specific to each subzone's growth performance for over 2 1/2 decades.

2. The Procedures for Factoring Visual Resources into Timber Supply Analysis (1998) provides a more informed VEG application by stratifying the landbase (Green Area) by 5% slope classes to assign refined VEG heights by each slope class. As with the VEG "First Look" study, the viewing situation was assumed to be mid-slope and not exceeding 20% vertical angle. Therefore it may overestimate the amount of greenup height required to meet VEG, compared with inferior viewing situations that are more common, such as at Mica Lake. RDI compiled the amount of area in each slope class for the 2012 opening (see chart above). The weighted average for the entire opening is 4.45m. Even though calculated with mid-slope viewing, the height to achieve VEG using this method is a full metre shorter than the probability tables at 50% probability of VEG, and likely indicates the benefit of such refinement.

3. The Fairhurst 2010 PhD research applied angle of incidence from cumulative viewpoints, proving the procedure to be useful for visual resource planning for minimizing or avoiding visual impacts. However, no assessment was made for the effects on VEG in his study. While the slope class approach in #2 above does not provide for angle of incidence effects from the viewpoint, it is representative of that effect, particularly in this instance, as the aspect of the terrain faces directly towards the viewpoint (Mica 2). See next page for the Mica 2 P2P results.

Slope and VEG



Plan to Perspective Ratios by Slope Class				
Slope Class	Planimetric % of Area	Perspective % of Area	Plan./Pers.	Required Ht. to VEG (m)
CL2_6-10%	2.17%	1.95%	1.11	3.00
CL3_11-15%	25.78%	11.77%	2.19	3.50
CL4_16-20%	49.77%	51.15%	0.97	4.00
CL5_21-25%	22.27%	35.14%	0.63	4.50

See discussion of inferences regarding slope class and P2P in the Findings on Pages 3 and 4
See also Page 15 for slope and weighting procedures.

Page 17 from RDI's A89160-2020 VIA

Visual Quality - Categories of Alteration

Visual Quality Objectives are defined in Section 1.1 of the Forest Planning and Practices Regulation. Visual Quality research shows that percent alteration for clear cuts and volume/stems per hectare for partial cuts are also good predictors of visual quality if applied correctly.

Clear Cuts

Retention Harvest

Partial Cuts

Preservation: very small in scale, and not easily distinguishable from the pre-harvest landscape.
0% ground may be visible.



Retention: is difficult to see, small in scale, and natural in appearance
0 - 1.5% ground may be visible.



Partial Retention: easy to see, small to medium in scale, and natural and not rectilinear or geometric in shape.
1.6 – 7% ground may be visible.



Modification: is very easy to see, and is (A) large in scale and natural in its appearance, or (B) small to medium in scale but with some angular characteristics.
7.1-18% ground may be visible.



Maximum Modification: is very easy to see, and is (A) very large in scale, (B) rectilinear and geometric in shape, or (C) both
18.1-30% ground may be visible.



Percent Alteration	Per VQO
Preservation	0
Retention	0 - 1.5
Partial Retention	1.6 - 7.0
Modification	7.1 - 18.0
Max Modification	18.1 - 30.0

Note: % Alteration numbers must be applied to a readily distinguishable landform. They were not derived for application against entire landscapes.



Volume (Stems) Removed in %	Tree Height (Metres)									
	5	10	15	20	25	30	35	40	45	50
10	R	R	R	R	R	R	R	R	R	R
20	R	R	R	R	R	R	R	R	R	R
30	R	R	R	R	R	R	R	R	R	R
40	R	R	R	R	R	R	R	R	R	R
50	R	R	R	R	R	R	R	R	R	R
60	R	R	R	R	R	R	R	R	R	R
70	R	R	R	R	R	R	R	R	R	R
80	R	R	R	R	R	R	R	R	R	R
90	M	M	M	M	M	M	M	M	M	M

Note: The Partial Cutting table may be applied across the landscape as this measure is landform Independent.