

### **SUMMARY**

When left to nature a proportion of road surface area will support tree growth as productive as the adjacent undisturbed area. The difficulty has been determining the proportion. LiDAR enables the entire landbase and road network to be analyzed.

For TFL 37, LiDAR indicates the road area not covered by tree crowns at least 10m tall is much less than assumed in the MP #10 Base Case. The results show that the THLB could be 1.2% - 2.2% larger due to less growing site lost to roads.

### **PROCESS**

A review of LiDAR data and orthophotos was conducted to update the lines representing roads within TFL 37. Figure 1 shows a spur road in a 45 year old stand.



Figure 1 – Example road and orthophoto

Apply MP #10 buffers. Figure 2 superimposes the MP 10 uniform buffer width of 10m (5 m per side).



Figure 2 – Road buffer and orthophoto

Intersect road buffers with forest cover so have forest age. Then intersect through crown height model (CHM).

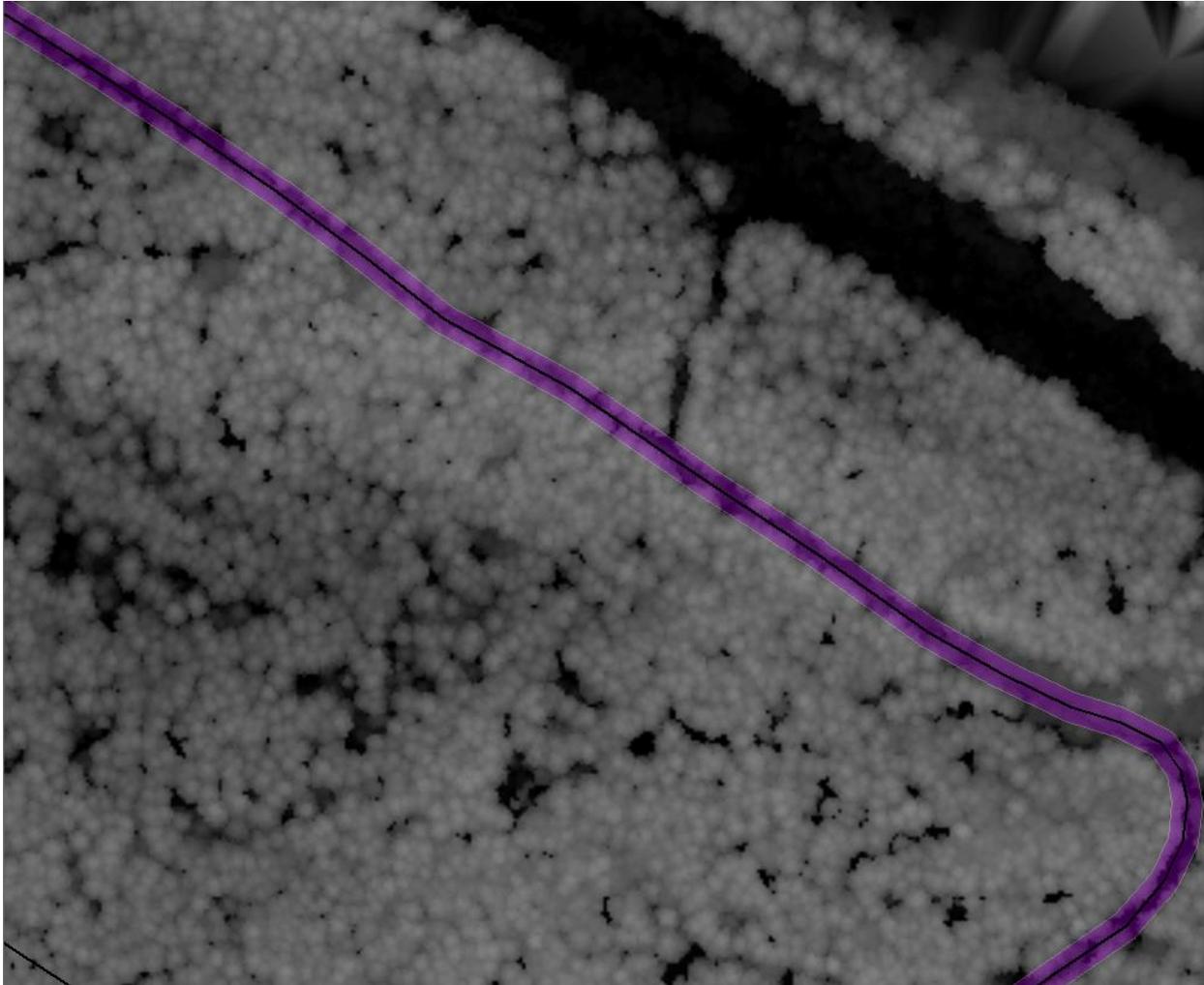


Figure 3 – Road buffer with crown height model

Figure 3 presents the same area with the crown height model in monochrome.

Create polygon where CHM < 10m and determine percentage of road buffer polygon where trees cover is less than 10m tall.

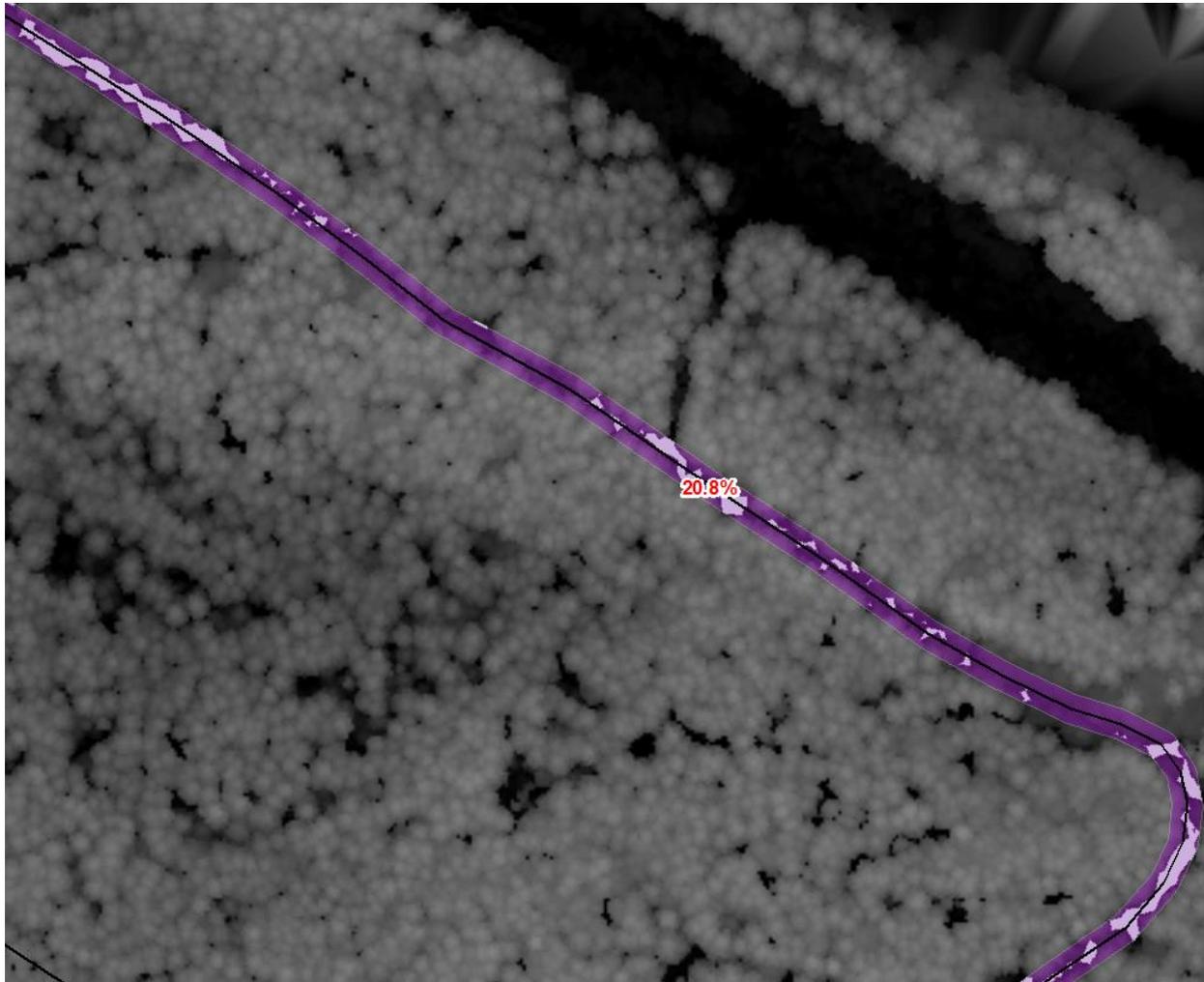


Figure 4 – Percentage of road buffer with crowns less than 10m tall

Figure 4 illustrates polygons assigned to crown openings inside the uniform buffer. In this example 20.8% of the road buffer polygon has crown cover less than 10 m tall. In other words a 2m buffer would accurately represent this area.

## RESULTS

The data is summarized two ways:

1. Using all current roads to represent the perpetual impact of roads on the landbase.
  - a. In this scenario site disturbance of all recent harvesting up to 40 years is included in the assessment.
2. Using only roads within 40 – 140 year old stands to indicate the extent to which trees will occupy road buffer areas.
  - a. In this scenario the 0-40 year old cohort is excluded to more closely approximate stands at or near rotation age.

When all current roads are considered, the LiDAR data indicates that 2,802 ha are not covered with crowns at least 10 m tall (see Table 1). After deducting the landbase lost to Highway 19, 3,837 ha are removed from the THLB by roads applying the Base Case assumptions. The LiDAR data indicates that the actual area lost is roughly 2,802 ha, or 1,035 ha less. This reduction to road buffers would increase the THLB by 1.2%.

Table 1 – LiDAR derived road buffers using all roads

Road Class	Length (km)	Buffer width (m)	Buffer Area (ha)	Proportion with crown cover < 10m tall	Implied Netdown Area (ha)	Implied width (m)
Spur	2,649	10	2,649	0.700	1,855	7.0
Mainline	908	12	1,090	0.799	870	9.6
Railway	100	11	110	0.707	77	7.8
<b>Total</b>	<b>3,657</b>	-	<b>3,849</b>	<b>0.728</b>	<b>2,802</b>	-

Results when only roads within stands 40 – 140 years old are considered are shown in Table 2. When only stands in this age range are considered the buffers applied in the Base Case are roughly twice as wide as indicated by the LiDAR data. This indicates the extent to which trees encroach on road beds. Applying the resulting buffers to the entire road network indicates a road netdown of 1,918 ha. This is one-half of the Base Case netdown area and would result in approximately 2.2% more THLB.

Table 2 – LiDAR derived road buffers within 40 – 140 year old stands

Road Class	Buffer width (m)	Buffer Area (ha)	Proportion with crown cover < 10m tall	Implied width (m)	Total Length in TFL (km)	Implied netdown to total road length (ha)
Spur	10	514.8	0.433	4.3	2,649	1,147
Mainline	12	350.2	0.656	7.9	908	715
Railway	11	21.3	0.509	5.6	100	56
<b>Total</b>	-	<b>886.3</b>	-	-	<b>3,657</b>	<b>1,918</b>

**DISCUSSION**

When left to nature, a proportion of roads will support tree growth indistinguishable from the adjacent area. Figure 5 and Figure 6 provide an example of roads hardly identifiable in air photos. This example is a 63 year old stand.



Figure 5 - Example of roads barely identifiable in photo



Figure 6 – Road locations

Figure 7 presents the road locations on the crown height model from LiDAR data. There is no discernible variation in the height of the trees growing along the roads compared to the trees growing in the adjacent area.

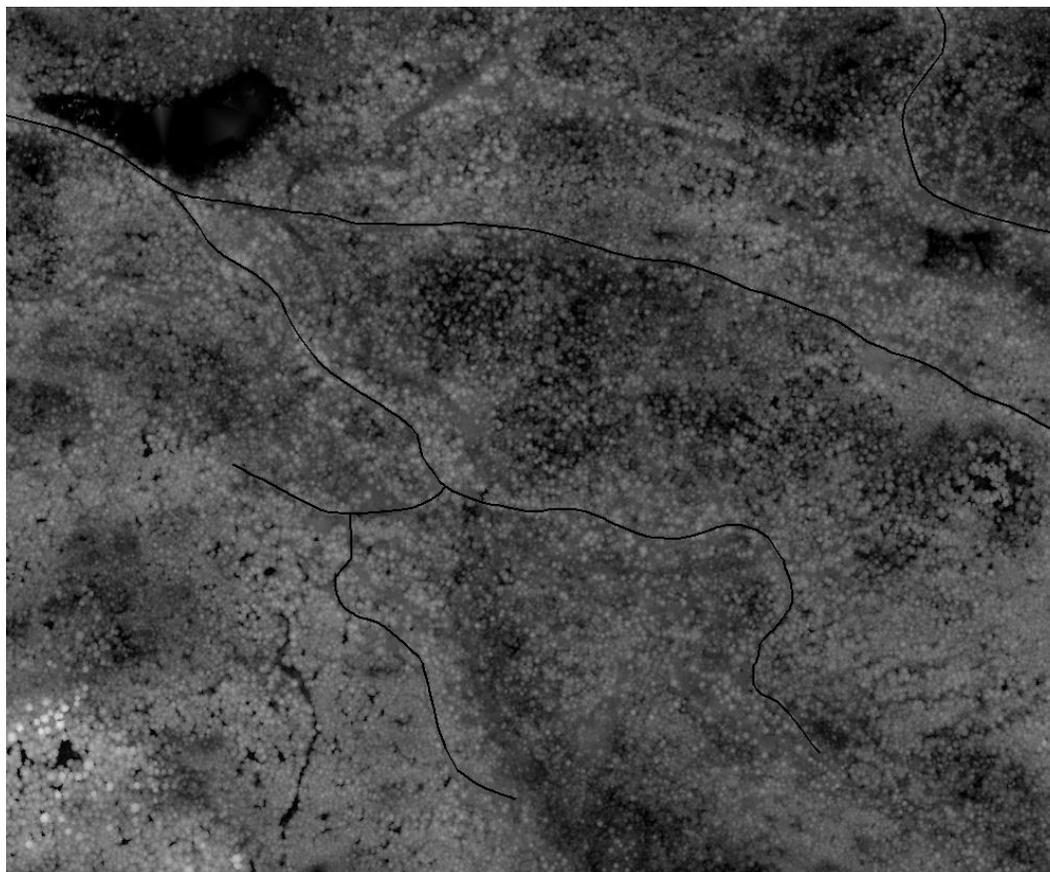


Figure 7 – Road locations on crown height model

The challenge has been to quantify the degree to which trees occupy road corridors. LiDAR enables the entire landbase to be reviewed and to measure (rather than estimate) the road area not supporting tree growth.

Assuming the current road footprint within TFL 37 represents the perpetual road footprint (not unreasonable given the development history within the TFL), LiDAR data indicates that the THLB is underestimated by 1,035 ha or 1.2%. However by including the 0-40 year old stands the time factor of site utilization/occupancy at “rotation age” is not considered.

Alternatively, if the area of roads within 40-140 year olds stands not covered by crowns at least 10m tall represents the impact roads have on the amount of growing site, the THLB is underestimated by roughly 1,918 ha or 2.2%.