Cumberland County, Cape Fear Basin

The preliminary checkpoint spreadsheets were received from NCGS on February 8, 2002. Two spreadsheets were included which compared the independent QA/QC survey checkpoints with the interpolated LIDAR "Z" value as provided by the contractors. The spreadsheet summaries included:

1. All the checkpoints with the RMSE calculation for combined land cover
2. 95% of the checkpoints with the RMSE calculation (5% of points having the largest error removed)

All data was reviewed and further analyzed to assess the quality of the data. The review process examined the statistics for the combined land cover and the trends for each specific land cover type. The following graphs and figures illustrate the data quality as per the RMSE criteria.

Table 1 summarizes the RMSE using:

- 100% of the checkpoints
- 95% of the checkpoints
- Checkpoints categorized by land cover type

Table 1. RMSE by Land Class

%	RMSE (cm)	# of Points	Land Class	RMSE Criteria (cm)
100	36.7	153	All	
95	**13.4**	**145**	**All**	**25**
16	13.0	25	Grass	
16	13.1	25	Weeds/Crop	
16	13.4	24	Scrub	
32	14.8	49	Forest	
14	10.3	22	Built-up	

The LIDAR data for Cumberland County, Cape Fear Basin meets the specification as per the RMSE criteria of 25 cm.

All figures represent the data with the 95% data set. The data is of good quality.

Figure 1 illustrates the RMSE by specific land cover type.

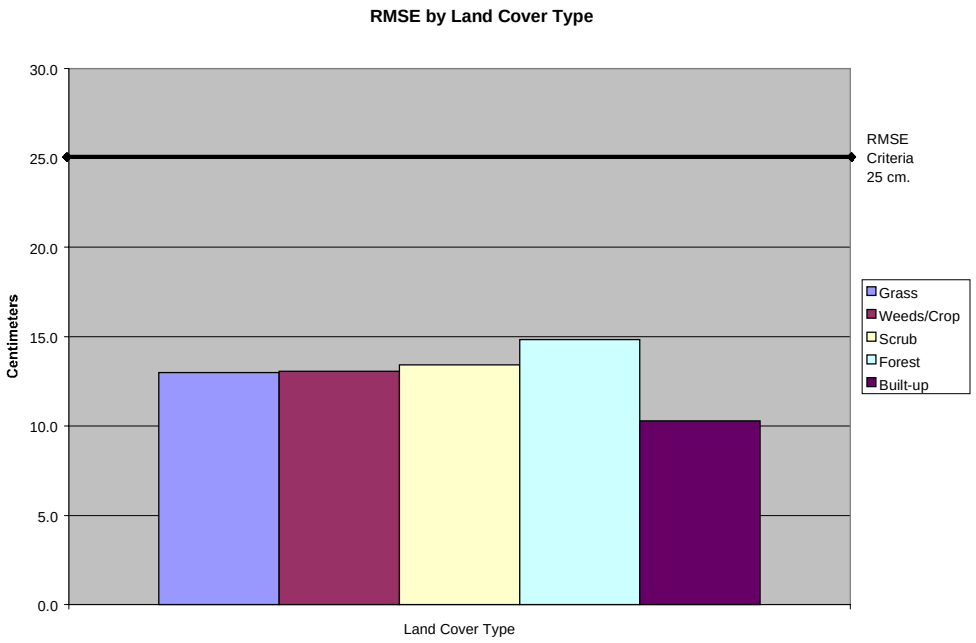

Figure 1

Figure 2 illustrates the magnitude of the differences between the checkpoints and LIDAR data by specific land cover type and sorted from lowest to highest.

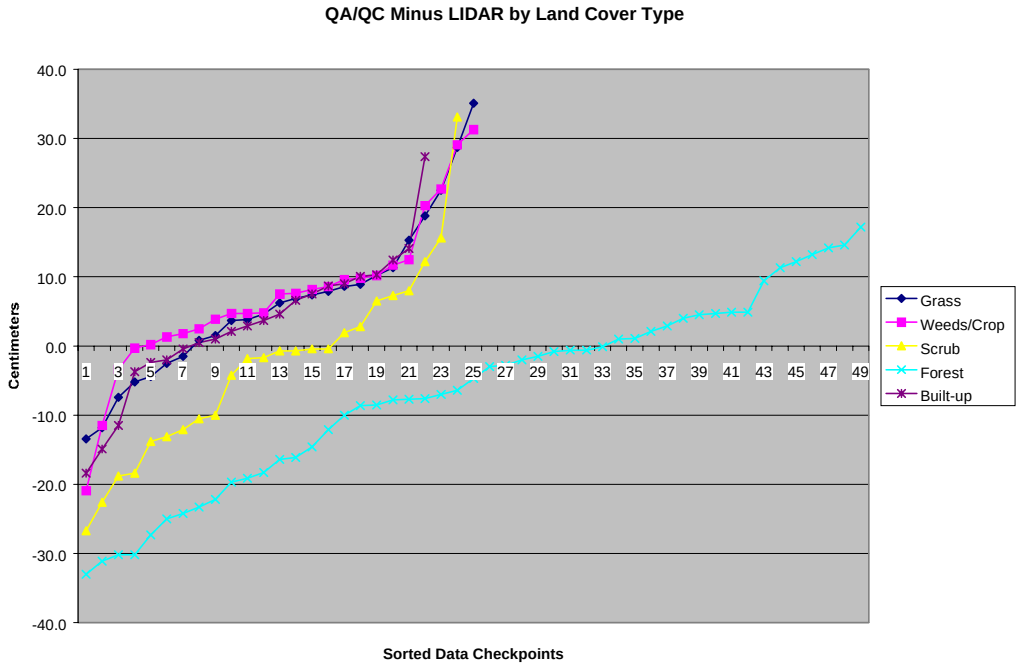

Figure 2

Table 2 illustrates the Delta between the QA/QC survey checkpoints and that of the interpolated LIDAR.

Table 2. Elevation Delta	
Delta (cm)	**Land Cover**
-13.4	Grass
-11.8	Grass
-7.4	Grass
-5.2	Grass
-4.4	Grass
-2.5	Grass
-1.5	Grass
0.8	Grass
1.5	Grass
3.7	Grass
3.8	Grass
4.6	Grass
6.2	Grass
6.9	Grass
7.4	Grass
7.9	Grass
8.6	Grass
8.9	Grass
10.2	Grass
11.3	Grass
15.3	Grass
18.8	Grass
22.5	Grass
28.7	Grass
35.1	Grass
-20.9	Weeds/Crop
-11.5	Weeds/Crop
-3.4	Weeds/Crop
-0.3	Weeds/Crop
0.2	Weeds/Crop
1.3	Weeds/Crop
1.8	Weeds/Crop
2.5	Weeds/Crop
3.9	Weeds/Crop
4.7	Weeds/Crop
4.7	Weeds/Crop
4.8	Weeds/Crop
7.5	Weeds/Crop
7.6	Weeds/Crop
8.2	Weeds/Crop
8.6	Weeds/Crop
9.6	Weeds/Crop
9.8	Weeds/Crop
10.2	Weeds/Crop
11.7	Weeds/Crop
12.5	Weeds/Crop
20.3	Weeds/Crop
22.7	Weeds/Crop
29.1	Weeds/Crop
31.3	Weeds/Crop
-26.7	Scrub
-22.6	Scrub
-18.8	Scrub
-18.4	Scrub
-13.8	Scrub
-13.1	Scrub
-12.1	Scrub
-10.5	Scrub
-10.0	Scrub
-4.2	Scrub
-1.8	Scrub
-1.7	Scrub
-0.7	Scrub
-0.7	Scrub
-0.4	Scrub
-0.4	Scrub
1.9	Scrub
2.8	Scrub
6.5	Scrub
7.3	Scrub
8.0	Scrub
12.2	Scrub
15.6	Scrub
33.1	Scrub
-33.0	Forest
-31.1	Forest
-30.2	Forest
-30.2	Forest
-27.3	Forest
-25.0	Forest
-24.2	Forest
-23.3	Forest
-22.2	Forest
-19.7	Forest
-19.1	Forest
-18.3	Forest
-16.4	Forest
-16.1	Forest
-14.6	Forest
-12.1	Forest
-10.0	Forest
-8.6	Forest
-8.5	Forest
-7.8	Forest
-7.7	Forest
-7.6	Forest
-7.0	Forest
-6.4	Forest
-4.7	Forest
-3.0	Forest
-2.8	Forest
-2.0	Forest
-1.5	Forest
-0.8	Forest
-0.6	Forest
-0.6	Forest
-0.1	Forest
1.0	Forest
1.1	Forest
2.1	Forest
2.9	Forest
4.0	Forest
4.5	Forest
4.7	Forest
4.9	Forest
4.9	Forest
9.4	Forest
11.3	Forest
12.2	Forest
13.2	Forest
14.2	Forest
14.6	Forest
17.2	Forest
-18.4	Built-up
-14.9	Built-up
-11.5	Built-up
-3.7	Built-up
-2.4	Built-up
-2.0	Built-up
-0.4	Built-up

0.5	Built-up
1.0	Built-up
2.1	Built-up
2.9	Built-up
3.7	Built-up

4.6	Built-up
6.6	Built-up
7.5	Built-up
8.7	Built-up
9.0	Built-up

10.1	Built-up
10.3	Built-up
12.4	Built-up
14.1	Built-up
27.4	Built-up

Table 3 illustrates the overall statistics for the checkpoint data.

Table 3. Overall Descriptive Statistics

	RMSE (cm)	Mean (cm)	Median (cm)	Skew	Std Dev (cm)	# of Points	Min (cm)	Max (cm)
Total	**13.4**	0.1	1.1	-0.1	13.4	145	-33.0	35.1
Grass	**13.0**	6.2	6.2	0.6	11.6	25	-13.4	35.1
Weeds/Crop	**13.1**	7.1	7.5	0.0	11.2	25	-20.9	31.3
Scrub	**13.4**	-2.9	-1.2	0.5	13.4	24	-26.7	33.1
Forest	**14.8**	-6.5	-4.7	-0.3	13.5	49	-33.0	17.2
Built-up	**10.3**	3.1	3.3	-0.1	10.1	22	-18.4	27.4

Figure 3 illustrates a histogram of the associated delta errors between the data checkpoints and the interpolated TIN values.

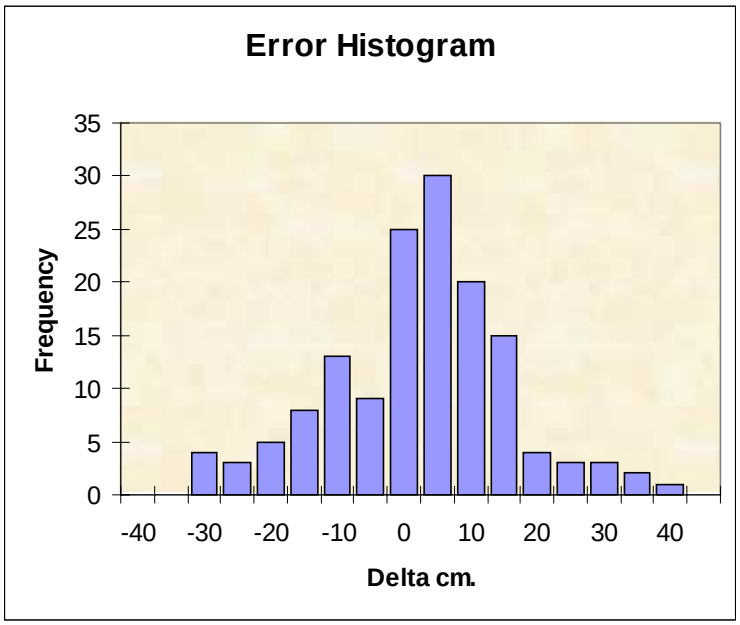

Figure 3