Carteret - Neuse Basin combined with Carteret - White Oak Basin

Due to the limited number of checkpoints submitted for the LIDAR verification process for Carteret County - Neuse Basin, the checkpoints have been combined with Carteret County - White Oak Basin. This will allow the statistics to represent the entire county rather than the county based solely on the basin. Table 1 will reflect the initial 20 checkpoints for Neuse Basin followed by the combined statistics of the checkpoints for both Neuse and White Oak basin for the remaining figures and tables.

The preliminary checkpoint spreadsheets were received from NCGS on December 19, 2001. 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 of the initial 20 checkpoints using:

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

Table 1. RMSE by Land Class For Neuse Basin

%	RMSE (cm)	# of Points	Land Class	RMSE Criteria (cm)
100	13.5	20	All	
95	**11.2**	**19**	**All**	**20**
15	7.0	3	Grass	
15	5.6	3	Weeds/Crop	
10	12.6	2	Scrub	
40	12.9	8	Forest	
15	12.8	3	Built-up	

Table 2 summarizes the RMSE of the initial 20 checkpoints (Neuse portion) combined with 100 checkpoints of the White Oak Basin portion using:

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

Table 2. RMSE by Land Class For Neuse & White Oak Basins Combined				
%	RMSE (cm)	# of Points	Land Class	RMSE Criteria (cm)
100	21.1	120	All	
95	**15.6**	**114**	**All**	**20**
15	10.3	18	Grass	
15	17.4	17	Weeds/Crop	
10	18.7	16	Scrub	
40	17.2	45	Forest	
15	9.3	18	Built-up	

The LIDAR data for Carteret County, Neuse Basin <u>meets the specification</u> as per the RMSE criteria of 20 cm.

All figures represent the data with the 95% data set of the combined basins checkpoints. The data is of good quality for both the Neuse Basin portion and the combined Neuse, White Oak Basins.

Figure 1 illustrates the RMSE by specific land cover type.

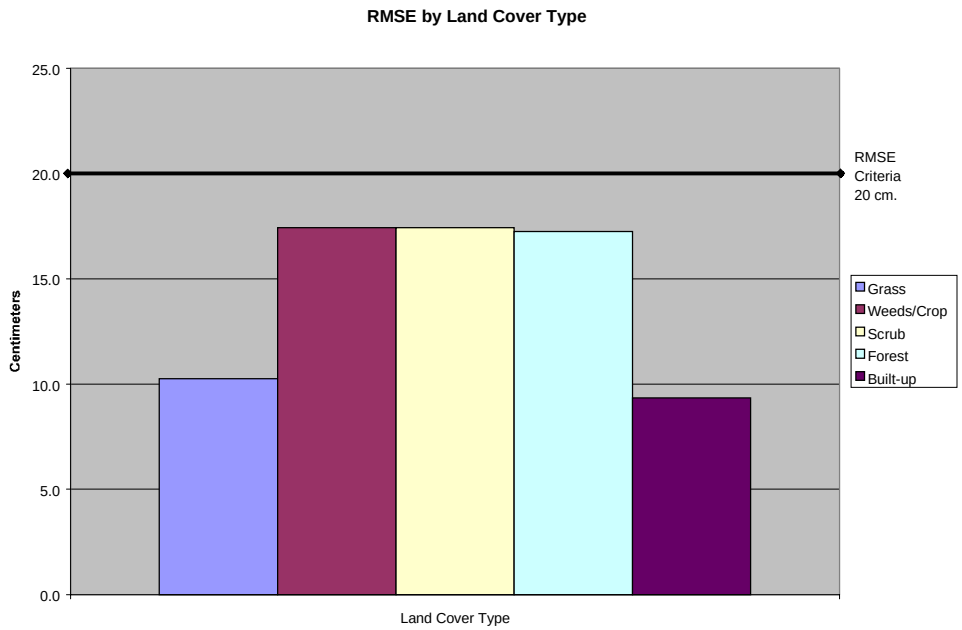

Figure 1

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.

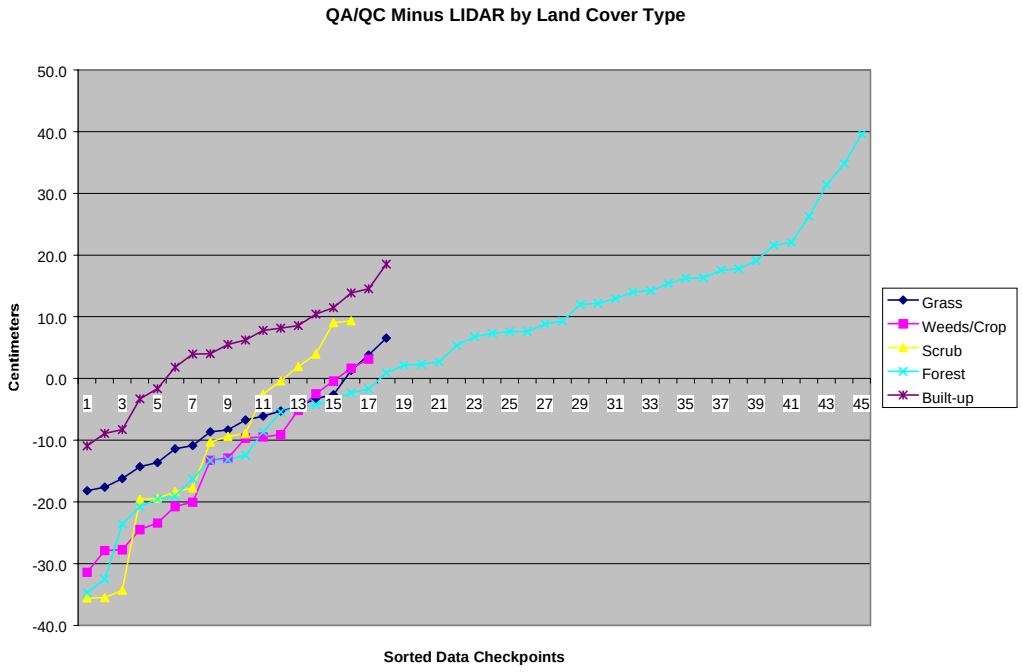

Figure 2

Table 3 illustrates the Delta between the QA/QC survey checkpoints and that of the interpolated LIDAR.

Table 3. Elevation Delta

Delta (cm)	Land Cover
-18.2	Grass
-17.6	Grass
-16.2	Grass
-14.3	Grass
-13.6	Grass
-11.4	Grass
-10.9	Grass
-8.6	Grass
-8.3	Grass
-6.7	Grass
-6.1	Grass
-5.2	Grass
-4.6	Grass
-3.3	Grass
-2.6	Grass
1.3	Grass
3.8	Grass
6.6	Grass
-31.4	Weeds/Crop
-27.8	Weeds/Crop
-27.7	Weeds/Crop
-24.5	Weeds/Crop
-23.4	Weeds/Crop
-20.7	Weeds/Crop
-20.1	Weeds/Crop
-13.3	Weeds/Crop
-12.9	Weeds/Crop
-9.6	Weeds/Crop
-9.5	Weeds/Crop
-9.1	Weeds/Crop
-5.1	Weeds/Crop
-2.5	Weeds/Crop
-0.4	Weeds/Crop
1.7	Weeds/Crop
3.1	Weeds/Crop
-35.6	Scrub
-35.5	Scrub
-34.3	Scrub
-19.6	Scrub
-19.4	Scrub
-18.4	Scrub
-17.8	Scrub
-10.3	Scrub
-9.4	Scrub
-8.9	Scrub
-2.6	Scrub
-0.4	Scrub
1.9	Scrub
4.0	Scrub
9.0	Scrub
9.4	Scrub
-34.7	Forest
-32.5	Forest
-23.6	Forest
-20.8	Forest
-19.6	Forest
-19.1	Forest
-16.3	Forest
-13.3	Forest
-13.2	Forest
-12.4	Forest
-8.7	Forest
-5.4	Forest
-4.7	Forest
-4.2	Forest
-3.5	Forest
-2.3	Forest
-1.7	Forest
0.9	Forest
2.1	Forest
2.3	Forest
2.7	Forest
5.4	Forest
6.8	Forest
7.3	Forest
7.6	Forest
7.6	Forest
8.8	Forest
9.3	Forest
12.0	Forest
12.2	Forest
12.9	Forest
14.0	Forest
14.2	Forest
15.4	Forest
16.2	Forest
16.3	Forest
17.5	Forest
17.7	Forest
19.1	Forest
21.6	Forest
22.0	Forest
26.2	Forest
31.4	Forest
34.8	Forest
39.7	Forest
-10.9	Built-up
-8.9	Built-up
-8.3	Built-up
-3.3	Built-up
-1.7	Built-up
1.8	Built-up
4.0	Built-up
4.0	Built-up
5.5	Built-up
6.2	Built-up
7.8	Built-up
8.1	Built-up
8.6	Built-up
10.4	Built-up
11.5	Built-up
13.9	Built-up
14.6	Built-up
18.5	Built-up

Table 4 illustrates the overall statistics for the checkpoint data.

Table 4. Overall Descriptive Statistics								
	RMSE (cm)	**Average (cm)**	**Median (cm)**	**Skew**	**Std Dev (cm)**	**# of Points**	**Min (cm)**	**Max (m)**
Total	**15.6**	-2.7	-2.6	0.05	15.4	114	-35.6	39.7
Grass	**10.3**	-7.6	-7.5	0.3	7.1	18	-18.2	6.6
Weeds/Crop	**17.4**	-13.7	-12.9	0.0	11.1	17	-31.4	3.1
Scrub	**18.7**	-11.7	-9.8	-0.3	15.0	16	-35.6	9.4
Forest	**17.2**	3.7	6.8	-0.2	17.0	45	-34.7	39.7
Built-up	**9.3**	4.5	5.8	-0.4	8.4	18	-10.9	18.5

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

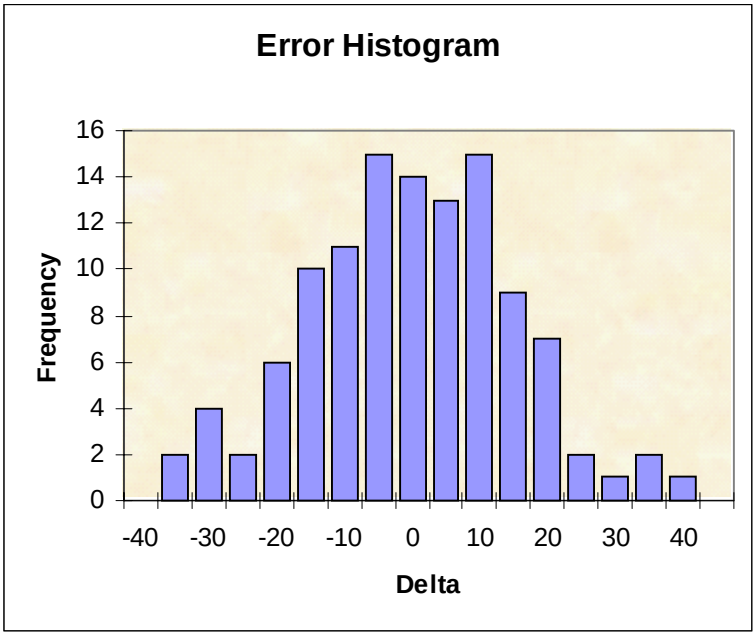

Figure 3