environment, forestry
& fisheries

Department:
Environment, Forestry and Fisheries
**REPUBLIC OF SOUTH AFRICA**

**Calculation in the MRV tool**

The calculations for emissions/removals from the change in carbon stock in living biomass are based on the IPCC 2006 Tier 1 Biomass Stock-Difference Method (IPCC 2006 volume 4, chapters 2 and 4). Emissions/removals are calculated based on the following equations (Equation 2.8 in IPCC 2006 volume 4, chapters 2):

$$\Delta C_B = \frac{(C_{t_2 - c_{t_1}})}{(t_2 - t_1)}$$

$$C = \sum_{i,j} \{A_{i,j} \times V_{i,j} \times BCEF_{S_{i,j}} \times (1 + R_{i,j}) \times CF_{i,j}\} \qquad \text{**Equation C.6**}$$

Where:

- $\Delta C_B$ = annual change in carbon stocks in biomass (the sum of above-ground and below-ground biomass terms) in land remaining in the same category (e.g. *forest land remaining* forest land), tonnes C yr$^{-1}$

- $C_{t_2}$ = total carbon in biomass for each land sub-category at time $t_2$, t C

- $C_{t_1}$ = total carbon in biomass for each land sub-category at time $t_1$, t C

- C = total carbon in biomass for $t_1$ to $t_2$, t C

- A = area of land remaining in the same land-use category, ha

- V = merchantable growing stock volume (over bark), m$^3$ ha$^{-1}$

- i = ecological zone i (*i*=1 to n)

- j = climate domain j (*j*=1 to m)

- R = ratio of below-ground biomass to above-ground biomass, t dm below-ground biomass (t d.m. above ground biomass)$^{-1}$

- CF = carbon fraction of dry matter, tonne C (t d.m.)$^{-1}$

- $BCEF_S$ = biomass conversion and expansion factor for expansion factor for expansion of merchantable growing stock volume to above-ground biomass, t above-ground biomass (m$^3$ growing stock volume)$^{-1}$

As indicated in 2013 Kyoto Protocol (KP) Supplement, when using this method for a specific activity, it is important to ensure that the area of land in that activity at times $t_1$ and $t_2$ is identical, to avoid confounding changes in stock caused by area changes. If the forest area is changing, then carbon stock changes can occur as a result of the transfer of land between activities. Indeed, if the area subject to an activity increases from the beginning to the end of the reporting year, then the reported carbon stocks reflect the transfer of area (and the associated carbon stocks) into the activity; similarly, carbon stocks will decrease, if area is removed from an activity. The issue is of particular concern when areas outside the scheme enter into the reporting system.

It is good practice to implement the calculations of annual carbon stock changes in the following sequence: (1) for any carbon pool of each activity and for each area, the annual carbon stock change should be calculated for the year of interest on the area at time $t_2$, (2) these stock changes should be