Post-classification refinements were implemented in a decision tree to adjust the thresholds of object features for each misclassified land cover based on the automated classification results. For example, natural forests and planted forests could be mixed up, a customised feature RE Ratio (Red Edge Ratio) was useful in separating natural and planted forests. The RE Ratio values generally ranged between 0.19 and 0.22 for planted forests and over 0.23 for natural forests, hence it was used as a criterion to separate planted forest or natural forest. Moreover, REGNDVI which is a vegetation index incorporating Red Edge and Green band was found very useful in differentiating vegetation and non-vegetation classes. Together with LiDAR derived canopy height information (e.g. Mean CHM), they were used often to separate between vegetated land cover classes. Furthermore, the spectral and textural values between natural forests and shrubland were similar. Therefore, after reviewing many "truthing" points on aerial photos, it was decided that a cut-off canopy height of 8 metres was used to differentiate natural forest and shrubland. A full description of the post-classification refinement can be found in the figure below. The figure provides a structure of the steps undertaken to reduce the classification errors.

```
                                    ┌─────────────────┐      ┌──────────────┐
                              ┌────▶│  REGNDVI < 0.1  │────▶ │    Water     │
                    ┌──────────┤    └─────────────────┘      └──────────────┘
                    │ Bare ground │  ┌─────────────────┐      ┌──────────────┐
                    └──────────┘  └─▶│ REGNDVI > 0.3 & │────▶ │  Grassland   │
                                     │  Mean CHM < 3m  │      └──────────────┘
                                     └─────────────────┘

                                     ┌─────────────────┐      ┌──────────────┐
                              ┌─────▶│ Mean NIR <1000 &│────▶ │    Water     │
                    ┌──────────┤     │  Mean CHM <1m   │      └──────────────┘
                    │ Grassland │    └─────────────────┘      ┌──────────────┐
                    └──────────┘  └─▶│ REGNDVI < 0.25 &│────▶ │  Bareground  │
                                     │  Mean CHM <1m   │      └──────────────┘
                                     └─────────────────┘
```

- Bare ground
  - REGNDVI < 0.1 → Water
  - REGNDVI > 0.3 & Mean CHM < 3m → Grassland
- Grassland
  - Mean NIR <1000 & Mean CHM <1m → Water
  - REGNDVI < 0.25 & Mean CHM <1m → Bareground
- Natural Forest
  - RERatio <0.23 & Mean CHM >8m → Planted Forest
  - Legth/Width>=5 &CHM-CV <0.3 → Planted Forest
  - Mean CHM <8m → Shrubland and Scrub
  - Brightness > 900 & Mean CHM<2m → Grassland
- Planted Forest
  - RERatio>0.22 & GLCM Dissimilarity >16 &Mean CHM >8m → Natural Forest
  - RERatio>0.22 & Mean CHM >8m → Shrubland and Scrub
  - Brightness > 900 & Mean CHM<2m → Grassland
- Shrubland and scrub
  - RERatio<0.23 & RGNDVI>0.6 → Planted Forest
  - Mean CHM >8m → Natural Forest
  - Brightness > 900 & Mean CHM<2m → Grassland
- Water
  - GLCM StdDev <=20 & Density <=0.6 → Bareground
  - Mean NIR > 1800 & REGNDVI>0.3 → Grassland

CART (RE+LiDAR) classified classes