VCS Module

VMD0016

Methods for stratification of the project area (X-STR)

Version 1.1

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Sectoral Scope 14

Module developed by:

AVOIDED DEFORESTATION PARTNERS.org
Protecting the Climate by Saving Forests

CLIMATEFOCUS

Silvestrum

WINROCK INTERNATIONAL
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TerraCarbon LLC

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1 SOURCE

This module is one of numerous modules that constitute the VCS methodology *VM0007 REDD+ Methodology Framework (REDD-MF)*.

This module uses the latest version of following methodology:

- *VM0006 Methodology for Carbon Accounting for Mosaic and Landscape-scale REDD Projects*

2 SUMMARY DESCRIPTION OF THE MODULE

This module provides guidance on stratifying the project area into discrete, relatively homogeneous units to improve accuracy and precision of carbon stock, carbon stock change and GHG emission estimates.

Different stratifications may be required for the baseline and project scenarios to achieve optimal accuracy of the estimates of net GHG emissions or removals. The procedures that are described in this module are:

1. Stratification of aboveground biomass
2. Differentiation of peatland from non-peatland
3. Stratification of the peatland area into discrete units of relatively homogenous emission characteristics
4. Stratification of the peatland area based on peat thickness
5. Establishment of a buffer zone

In the equations used in the accompanying modules, the suffix i is used to represent a stratum and the suffix M for the total number of strata (M_{WPS} for the project scenario and M_{BSL} for the baseline scenario).

3 DEFINITIONS

Definitions are set out in in VCS document *Program Definitions*, and methodology *REDD-MF*. This module does not set out any further definitions.

4 APPLICABILITY

Any module referencing strata i must be used in combination with this module.

In case of REDD, above-ground biomass stratification is only used for pre-deforestation forest classes, and strata are the same in the baseline and the project scenario. Post-deforestation land uses are not stratified. Instead, average post-deforestation stock values (eg, simple or historical area-weighted approaches are used, as per module *BL-UP*).

For peatland rewetting and conservation project activities this module must be used to delineate non-peat versus peat and to stratify the peat according to peat depth and soil emission characteristics, unless it can be demonstrated that the expected emissions from the soil organic carbon pool or change in the soil organic carbon pool in the project scenario is *de minimis*,

In the case of peatland rewetting and conservation project activities, the project boundary must be designed such that the negative effect of drainage activities that occur outside the project area on the project GHG benefits are minimized.

5 PROCEDURES

The project area may be stratified *ex ante*, and this stratification may be revised *ex post* for monitoring purposes. Established strata may be merged if reasons for their establishment have disappeared or have proven irrelevant to key variables for estimating net GHG emissions or removals.

A map displaying the final delineation of strata must be included in the PD. Areas of individual strata naturally sum to the total project area; any discrepancies must be reconciled.

5.1 Stratification of Above Ground Biomass in REDD Project Activities

Pre-stratification (prior to inventory) of the project area is not required, however, pre-stratification may serve to avoid requirements for post measurement stratification later (below). It is not expected that the project proponent will begin with high resolution, spatially explicit, biomass measurement information for the project area and leakage belt. Thus, it is acceptable practice to base strata on ancillary data that can serve as a proxy for potential biomass classes (eg, vegetation class maps, interpretation of aerial photographs or high resolution satellite imagery; see module *BL-UP*). The areas of strata delineated prior to allocation of inventory plots using stratified sampling are known exactly and require no accuracy assessment.

At the project start and whenever biomass stocks are re-measured (ie, at least every 10 years), the project proponent must demonstrate after inventory that within the project area there are no unidentified (ie, not previously stratified) discrete clusters of sample plots/points representing >10% of samples in the project area that consistently differ (ie, each sample plot/point estimate) from the overall project mean by ±20%. In the event that such a cluster of points is identified, a new stratum will be delineated. Area limits of the new stratum, encompassing the cluster, can be determined on the basis of existing vegetation class maps, interpretation of aerial photographs or high-resolution satellite imagery.

Stratification of Above-ground Biomass Using Remote Sensing

When using remote sensing, data must be georeferenced into a common geodetic system, for example using the UTM system using best-practice methods in remote sensing (see eg, Congalton 1991; Congalton *et al*., 2008). Semi-automated image classification approaches may be applied. Strata must be validated by reference data collected in the field, other official documentation or from recent independent higher resolution remote sensing imagery.

5.2 Differentiation of Peatland from Non Peatland

Available maps, field observations, remote sensing data and other official documentation may be used to differentiate peatland from non-peatland and thus to estimate the total area of peat within the project area or proxy areas (*Ap*). The most recent available (peat) maps must be used. Creation of a map based on field or remote sensing data can be carried out in combination with creation of the peat depth map following procedures outlined below.

Stratification of the Peatland Area in Discrete Units of Relatively Homogenous Emission Characteristics

GHG emissions from the peat soil are assessed by proxies. Proxies include land use type, land management practices, vegetation cover, micro-topography, water table depth and subsidence rate.

The area of channels and ditches ($A_{ditch\text{-}WPS}$ for the project scenario and $A_{ditch\text{-}BSL}$ for the baseline scenario) must be quantified and expressed as portion of the project area (cf. IPCC 2013 – Section 2.2.2.1), but do not have to be explicitly mapped. Emissions from shallow peat strata (see 4 (a) below), where the entire peat layer is above the water table depth are determined by peat depth rather than water table depth and must be treated accordingly. Similarly, strata that have alternating peat and mineral soil layers above the water table must be treated separately, eg, by conservatively treating them as shallow peat strata defined by the thickness of the top layer of peat. Both shallow and interlayered strata can conservatively be treated as mineral soil strata. If strata are defined on the basis of water table depth it is allowed to define emission classes (eg, ~0 cm defining a level of zero emission, a deep water table defining the high end of emissions, and arbitrary classes in between). Water table depth data can be derived from measurements (see M-PEAT for procedures), from (local) expert judgment or land management handbooks, or from proxies, like canal water levels, distance to canals or land cover, land management practices and vegetation. Also hydrological modeling may be used to derive spatially and temporally specific estimates of water table depths.

5.3 Stratification of the Peatland Area Based on Peat Thickness

Stratification of the project area by peat thickness is required as follows:

1. When in more than 5% of the project area peat is absent or the thickness of the peat is below a threshold value (eg, 50 cm); the map only needs to distinguish where peat thickness exceeds this threshold. It is conservative to treat shallow peat strata as mineral soil strata.
2. When, using a conservative (high) value for subsidence rates, in more than 5% of the project area less peat is available at t=100 years in the project scenario than in the same strata in the baseline scenario, the peat thickness map only needs to distinguish these strata.
3. When, using a conservative (high) value for subsidence rates, in the baseline scenario in more than 5% of the project area the project crediting period exceeds the peat depletion time (PDT); the peat thickness map must distinguish with a resolution of 50 cm strata where peat will be depleted within the project crediting period. Peat strata

that will be depleted can be further stratified according to their peat depletion time. Areas where peat will not be depleted need not be further stratified.

No stratification on the basis of peat thickness is required if the peat thickness in 95% or more of the project area exceeds the required minimum peat depth for all of the above conditions.

Stratification of peat depth must be based on existing peat depth maps and/or on field assessment and/or in combination with remote sensing data, and a thickness accuracy of at least 50 cm[1]. Interpolation techniques such as Kriging can be used to derive conservative peat depth maps. When using existing peat depth maps or data, these must be corrected, in a conservative way, for peat subsidence. When, after correction, strata exceed the required minimum peat depth by less than 50 cm, these strata must be verified using field observations, eg, using a peat auger, following the procedures outlined below.

In domed peatlands height above datum is a good measure of peat depth (Jaenicke *et al*. 2008). A height model or digital terrain model (DTM) can be established using field methods or remote sensing. Remote sensing based models can be established using eg, STRM (Shuttle Radar Topography Mission) data or LiDAR data. To obtain soil surface height, these data must be corrected for vegetation height. The forest canopy height for different strata of peat swamp forests can be derived from literature or by comparing vegetation height to terrain height on vegetated and non-vegetated areas or through representative field measurements of canopy height or a combination of these. When using LiDAR data of sufficient point density, the point cloud can moreover be filtered to separate surface and canopy points. Applicability of forest height data must be justified, accuracy indicated and conservativeness demonstrated.

The height model must be combined with data from peat corings to generate a spatially explicit map of peat strata that fulfil the above requirements. The required peat depth at each sampling location must be determined with a resolution of at least 0.5 m using a peat corer or auger (such as an Eijkelkamp corer). Peat coring locations must be selected using representative random sampling or systematic sampling. It is acceptable to conduct corings along transects that run perpendicular to the perimeter of the peat dome. Sampling intervals must range from 500 to 1500 m depending on the size of the peat dome, terrain accessibility, observed peat thickness and the observed slope in subsequent peat thickness assessments along the transect.

If observed peat thickness is >50 cm larger than required for two subsequent corings along a transect and if the height model indicates a slope ≥0 in the same direction, than it is allowed to assume peat thickness will remain sufficient to fulfil peat depletion and permanence criteria further along the transect until the slope becomes <0.

A cross-section of the dome can be established using corings along the same transect but starting from the opposite margin and following the same rules. A spatially explicit peat depth map can be attained from the peat depth data using spatial interpolation, such as Kriging.

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[1] In the drained baseline situation peat subsidence typically amounts to up to 5 cm yr^{-1}; the 50 cm accuracy criterion thus relates to the minimum monitoring interval of 10 year; in the project scenario subsidence rates will be considerably lower (ideally 0 cm) and the 50 cm accuracy criterion will amount to <5% error on the 100 y permanence criterion.

In highly inaccessible areas, the peat surface elevation provides a conservative estimate of peat thickness (cf. Jaenicke *et al*. 2008) and peat corings are not required.

5.4 Area of Peatland Eligible for Crediting

The maximum eligible quantity of GHG emission reductions by rewetting is limited to the difference between the remaining peat carbon stock in the project and baseline scenarios after 100 years (total stock approach), or the difference in cumulative carbon loss in both scenarios over a period of 100 years since project start (stock loss approach). If a significant difference at the 100-years mark cannot be demonstrated, strata are not eligible for carbon crediting. The assessment must be executed *ex ante* using conservative parameters.

5.4.1 Total Stock Approach

The difference between peat carbon stock in the project scenario and baseline scenario at t=100 is estimated as:

$$C_{WPS-BSL,t100} = \sum_{i=0}^{M_{WPS}} \left(C_{WPS,i,t100} \times A_{WPS,i}\right) - \sum_{i=0}^{M_{BSL}} \left(C_{BSL,i,t100} \times A_{BSL,i}\right) \tag{1}$$

$$C_{WPS,i,t100} = Depth_{peat\text{-}WPS,i,\ t100} \times C_{vol\_lower,WPS} \times 10 \tag{2}$$

$$C_{BSL,i,t100} = Depth_{peat\text{-}BSL,i,\ t100} \times C_{vol\_lower,BSL} \times 10 \tag{3}$$

$$Depth_{peat-BSL,i,t100} = Depth_{peat-BSL,1,t0} - Sub_{initial-BSL,i} - \sum_{t=1}^{t=100} Rate_{peatloss-BSL,i,t} \tag{4}$$

$$Depth_{peat-WPS,i,t100} = Depth_{peat-WPS,1,t0} - \sum_{t=1}^{t=100} Rate_{peatloss-WPS,i,t} \tag{5}$$

Where:

$C_{WPS\text{-}BSL,i,t100}$	Difference between peat carbon stock in the project scenario and baseline scenario in peat depth stratum i at t=100 (t C ha^{-1})
$C_{WPS,i,t100}$	Peat carbon stock in the project scenario in peat depth stratum i at t=100 (t C ha^{-1})
$C_{BSL,i,t100}$	Peat carbon stock in the baseline scenario in peat depth stratum i at t=100 (t C ha^{-1})
$A_{WPS,i}$	Area of project stratum i (ha)
$A_{BSL,i}$	Area of baseline stratum i (ha)
$Depth_{peat\text{-}BSL,i,t100}$	Average peat depth in the baseline scenario in stratum i at t=100 (m)
$Depth_{peat\text{-}WPS,i,t100}$	Average peat depth in the project scenario in stratum i at t=100 (m)
$Depth_{peat\text{-}BSL,i,t0}$	Average peat depth in the baseline scenario in stratum i at project start (m)
$Depth_{peat\text{-}WPS,i,t0}$	Average peat depth in the project scenario in stratum i at project start (m)
$Sub_{initial\text{-}BSL,\ i}$	Subsidence in the initial years after drainage in stratum i, deemed 0 for RDP projects (m)

$Rate_{peatloss\text{-}BSL,i,t}$	Rate of peat loss due to subsidence and fire in the baseline scenario in stratum *i* in year *t*; a conservative (high) value may be applied that remains constant over time; Subsidence in the initial years after drainage is not included in this rate (m yr^{-1})
$Rate_{peatloss\text{-}WPS,i,t}$	Rate of peat loss due to subsidence and fire in the project scenario in stratum *i* in year *t*; alternatively, a conservative (low) value may be applied that remains constant over time (m yr^{-1})
$C_{vol\_lower,WPS}$	Volumetric carbon content of the peat below the water table in the project scenario; in case of RDP projects, this is the same as $C_{vol\_lower,BSL}$ (kg C m^{-3})
$C_{vol\_lower,BSL}$	Volumetric carbon content of the peat below the water table in the baseline scenario (kg C m^{-3})
t_{100}	100 years since project start
10	Conversion from kg m^{-2} to t ha^{-1}

If a conservative constant subsidence rate is applied, a possible negative outcome is substituted by zero.

The volumetric carbon content in peat can be taken from own measurements within the project area or from literature involving the project or areas of equal vegetation cover and water table depth. In case of CUPP projects, when initial high subsidence rates are expected, $VC_{peat,BSL}$ must be derived from a peatland area under the baseline land use that has undergone this initial subsidence, not from the peat in the project area itself. In the case of RDP projects and CUPP projects where initial high subsidence rates have already occurred, $Sub_{initial\text{-}BSL,\ i}$ is zero and $VC_{peat,WPS}$ and $VC_{peat,BSL}$ are treated as identical and can be derived from field measurements in the project area (see module *M-PEAT*). In case of CUPP projects, $Sub_{initial}$ must be estimated from literature data pertaining to peatland areas in the same region that underwent equal land use development as projected for the baseline scenario. $Rate_{peatloss}$ for the project scenario must be determined by measurements in the project area; $Rate_{peatloss}$ constitutes the sum of $Rate_{subs}$ and $D_{peatburn}$ (see module *M-PEAT*), for the baseline scenario, it must be derived either from measurements in areas under the same land use or from literature pertaining to such areas. $C_{WPS,i,t100}$ must be adjusted for leakage (see module LK-ECO).

The difference between peat carbon stock in the project scenario and baseline scenario at t=100 ($C_{WPS\text{-}BSL,t100}$) is significant if:

$$\sum_{i=0}^{M_{WPS}} \left(C_{WPS,i,t100} \times A_{WPS,i}\right) \geq 1.05 \times \sum_{i=0}^{M_{BSL}} \left(C_{BSL,i,t100} \times A_{BSL,i}\right) \tag{6}$$

Where:

$C_{WPS,i,t100}$	Peat carbon stock in the project scenario in peat depth stratum *i* at t=100 (t C ha^{-1})
$C_{BSL,i,t100}$	Peat carbon stock in the baseline scenario in peat depth stratum *i* at t=100; t C ha^{-1}
$A_{WPS,i}$	Area of project stratum *i* (ha)
$A_{BSL,i}$	Area of baseline stratum *i* (ha)

If not measured directly, $Rate_{peatloss,i,t}$ can be derived as follows:

$$Rate_{peatloss,i,t} = \frac{\sum_{i=1}^{M}(E_{peatsoil,i,t} + E_{peatburn,i,t})}{A_i \times C_{vol\_lower,i,t}} \times 10 \times \frac{12}{44} \quad (7)$$

Where:

$Rate_{peatloss,i,t}$	Rate of peat loss due to subsidence and fire in stratum *i* in year *t* (m yr^{-1})
$E_{peatsoil,CO2,i,t}$	CO_2 emissions from the peat soil in stratum *i* in year *t* (t CO_2e yr^{-1})
$E_{peatburn,CO2,,i,t}$	CO_2 emissions from burning of peat in stratum *i* in year *t* (t CO_2e yr^{-1})
A_i	Area of stratum *i* in baseline or project scenario (ha)
$C_{vol\_lower,i,t}$	Volumetric carbon content of the peat below the water table in stratum *i* in year *t* (kg C m^{-3})
12/44	Factor to change from t CO_2e yr^{-1} to t C yr^{-1}
10	Conversion from kg m^{-2} to t ha^{-1}

5.4.2 Stock Loss Approach

As $Depth_{peat\text{-}BSL,i,t0} = Depth_{peat\text{-}WPS,i,t0}$ the assessment can also be based on cumulative subsidence up to *t*=100 as follows:

$$C_{WPS-BSL,t100} = \sum_{i=0}^{M_{BSL}}\left(C_{peatloss-BSL,i,t100} \times A_{BSL,i}\right) - \sum_{i=0}^{M_{WPS}}\left(C_{peatloss-WPS,i,t100} \times A_{WPS,i}\right) \quad (8)$$

$$C_{peatloss-BSL,i,t100} = 10 \times \left(\sum_{t=1}^{t100}(Rate_{peatloss-BSL,i,t} \times C_{vol\_lower})\right) \quad (9)$$

$$C_{peatloss-WPS,i,t100} = 10 \times \left(\sum_{t=1}^{t100}(Rate_{peatloss-WPS,i,t} \times C_{vol\_lower})\right) \quad (10)$$

Where:

$C_{WPS\text{-}BSL,i,t100}$	Difference between peat carbon stock in the project scenario and baseline scenario in subsidence stratum *i* at *t*=100 (t C ha^{-1})
$C_{peatloss\text{-}BSL,i,t100}$	Cumulative peat carbon loss due to subsidence and fire in the baseline scenario in subsidence stratum *i* at *t*=100 (t C ha^{-1})
$C_{peatloss\text{-}WPS,i,t100}$	Cumulative peat carbon loss due to subsidence and fire in the project scenario in subsidence stratum *i* at *t*=100 (t C ha^{-1})
$A_{WPS,i}$	Area of project stratum *i* (ha)
$A_{BSL,i}$	Area of baseline stratum *i* (ha)
$Rate_{peatloss\text{-}BSL,i,t}$	Rate of peat loss due to subsidence and fire in the baseline scenario in stratum *i* in year *t*; alternatively, a conservative (low) value may be applied that remains constant over time. Subsidence in the initial years after drainage is not included in this rate (m yr^{-1})

$Rate_{peatloss\text{-}WPS,i,t}$	Rate of peat loss due to subsidence and fire in the project scenario in stratum *i* in year *t*; alternatively, a conservative (high) value may be applied that remains constant over time (m yr^{-1})
C_{vol_lower}	Volumetric carbon content of the peat below the water table in the baseline scenario (kg C m^{-3})
t_{100}	100 years after project start
10	Conversion from kg m^{-2} to t ha^{-1}

When $Rate_{peatloss}$ is not assessed directly,

$$C_{peatloss,i,t100} = \sum_{t=1}^{t100} E_{peatsoil,CO2,i,t} + E_{peatburn,CO2,i,t} \times \frac{12}{44} \qquad (11)$$

Where:

$C_{peatloss,i,t100}$	Cumulative peat carbon loss due to subsidence and fire in subsidence stratum *i* at *t*=100 (t C ha^{-1})
$E_{peatsoil,CO2,i,t}$	CO_2 emissions from the peat soil in stratum *i* in year *t* (t CO_2e yr^{-1})
$E_{peatburn,CO2,i,t}$	CO_2 emissions from burning of peat in stratum *i* in year *t* (t CO_2e yr^{-1})
t_{100}	100 years after project start
12/44	Factor to change from t CO_2-e yr^{-1} to t C yr^{-1}

High rates of subsidence in the initial years after drainage are not separately taken into account, as carbon losses are comparable to later years and the main effect is on total peat depth, which is not considered in this approach. Using short-term or historic subsidence rates for the entire period of 100 years is conservative since subsidence rates are likely to decline over time (Stephens *et al.* 1984).

The difference between peat carbon stock in the project scenario and baseline scenario at *t*=100 ($C_{WPS\text{-}BSL,t100}$) is significant if:

$$\sum_{i=0}^{M_{BSL}} \left(C_{peatloss-BSL,i,t100} \times A_{BSL,i}\right) \geq 1.05 \times \sum_{i=0}^{M_{WPS}} \left(C_{peatloss-WPS,i,t100} \times A_{WPS,i}\right) \qquad (12)$$

Where:

$C_{peatloss\text{-}BSL,i,t100}$ Cumulative peat carbon loss due to subsidence and fire in the baseline scenario in subsidence stratum *i* at *t*=100 (t C ha^{-1})

$C_{peatloss\text{-}WPS,i,t100}$ Cumulative peat carbon loss due to subsidence and fire in the project scenario in subsidence stratum *i* at *t*=100 (t C ha^{-1})

$A_{WPS,i}$	Area of project stratum *i* (ha)
$A_{BSL,i}$	Area of baseline stratum *i* (ha)

5.5 Stratification According to Peat Depletion Time

Drained peat is subject to oxidation and subsidence and areas with peat at *t*=0 may lose all peat before the end of the crediting period. The time at which all peat has disappeared is referred to as the PDT. Peat depletion may be accelerated by peat fires. The PDT for a stratum in the baseline scenario equals the period during which the project can claim emission reductions from rewetting and is, per stratum *i*, estimated at the project start Date as follows:

$$t_{PDT\text{-}BSL,i} = Depth_{peat\text{-}BSL,i} \,/\, Rate_{peatloss\text{-}BSL,i} \quad (13)$$

Where:

$t_{PDT\text{-}BSL,i}$	Peat depletion time in the baseline scenario in stratum *i* in years elapsed since the project start (yr)
$Depth_{peat\text{-}BSL,i}$	Average peat depth in the baseline scenario in stratum *i* at project start (m)
$Rate_{peatloss\text{-}BSL,i}$	Rate of peat loss due to subsidence and fire in the baseline scenario in stratum *i*; a conservative (high) value may be applied (m yr^{-1})

Peat depth must be derived as described in this module. Depth of burn scars is assessed following procedures in module *M-PEAT*.

Note that $Rate_{peatloss\text{-}BSL,i}$ is not used to determine baseline emissions but solely to determine $t_{PDT\text{-}BSL,i}$.

5.6 Establishment of a Buffer Zone

Under the applicability condition of this methodology, the project boundary must be designed such that the negative effect of drainage activities that occur outside the project area on the project GHG benefits are minimised (eg, enhanced drainage, groundwater extraction, and changing water supply). This can be achieved either by an appropriate design (eg, by establishing an impermeable dam) or by a buffer zone within the project boundary. This buffer zone, if employed, must be mapped. The bufferzone must be determined on the basis of quantitative hydrological modeling, literature references or expert judgment. Procedures outlined under 1 – 4 above also apply to the buffer zone. Alternatively, the bufferzone can conservatively be omitted from accounting.

Procedures for buffer zones to avoid ecological leakage are provided in module *LK-ECO*.

6 DATA AND PARAMETERS

6.1 Data and Parameters Available at Validation

Data / Parameter	$A_{BSL,i}$ or A_i
Data unit	ha
Description	Area of baseline stratum *i*
Equations	1, 6, 8, 12 or 7
Source of data	Own assessment
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	GIS coverages, ground survey data and/or remote imagery (satellite or aerial photographs), as outlined in Chapter 5.
Purpose of Data	Calculation of baseline emissions

Comments	N/A

Data / Parameter	$Depth_{peat\text{-}BSL,i,t0}$ and $Depth_{peat\text{-}WPS,i,t0}$
Data unit	m
Description	Peat depth in the baseline scenario and the project scenario in stratum *i* at project start
Equations	2, 3, 4, 5
Source of data	Existing peat depth maps and/or field assessment and/or in combination with remote sensing data.
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	Procedures for monitoring peat depth are given in module M-PEAT and in this module. Peat depths can be derived from Existing peat depth maps Literature involving the project or similar areas. Field measurements, eg, using a peat corer Remote sensing to derive height of the peat surface above datum.
Purpose of Data	Calculation of baseline emissions
Comments	N/A

Data / Parameter	$Sub_{initial\text{-}BSL,\ i}$
Data unit	m yr^{-1}
Description	Subsidence in the initial years after drainage in stratum *i*
Equations	4
Source of data	Default factor from scientific literature or field assessments in peatland areas in the same region that underwent equal land use development as projected for the baseline scenario.
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	Deemed 0 for RDP projects. Procedures for measuring soil subsidence are described in module *M-PEAT*
Purpose of Data	Calculation of baseline emissions
Comments	N/A

Data / Parameter	$Rate_{peatloss\text{-}BSL,i,t}$
Data unit	m yr^{-1}
Description	Rate of peat loss due to subsidence and fire in the baseline

	scenario in stratum *i* in year *t*
Equations	4, 9
Source of data	Default factor from scientific literature or field assessments in peatland areas that are similar to the project area (proxy area)
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	See Section 5. Subsidence in the initial years after drainage is not included in this rate.
Purpose of Data	Calculation of baseline emissions
Comments	N/A

Data / Parameter	C_{vol_lower}
Data unit	kg C m^{-3}
Description	Volumetric carbon content of the peat below the water table in the baseline scenario
Equations	9, 10
Source of data	Module *M-PEAT*
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	See module *M-PEAT*
Purpose of Data	Calculation of baseline emissions Calculation of project emissions
Comments	N/A

Data / Parameter	$E_{peatsoil,CO2,i,t}$
Data unit	t CO_2e yr^{-1}
Description	CO_2 emissions from microbial decomposition of the peat soil in stratum *i* in year *t*
Equations	7 11
Source of data	Module *BL-PEAT*
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	See module *BL-PEAT*
Purpose of Data	Calculation of baseline emissions

Comments	N/A

Data / Parameter	$E_{peatburn,CO2,i,t}$
Data unit	t CO_2e yr^{-1}
Description	7,11
Equations	CO_2 emissions from burning of peat within the project boundary in the project scenario in stratum *i* in year *t*
Source of data	Module *BL-PEAT*
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	See module *BL-PEAT*
Purpose of Data	Calculation of baseline emissions
Comments	N/A

6.2 Data and Parameters Monitored

Data / Parameter:	$A_{WPS,i}$ or A_i
Data unit:	ha
Description:	Area of project stratum *i*
Equations	1, 6, 8, 12 or 7
Source of data:	Own assessment
Description of measurement methods and procedures to be applied:	GIS coverages, ground survey data and/or remote imagery (satellite or aerial photographs), as outlined in Chapter 5.
Frequency of monitoring/recording:	At each monitoring event
QA/QC procedures to be applied:	See Section 9.3 of *REDD-MF* or other VCS methodology that uses this module.
Purpose of data:	Calculation of project emissions
Calculation method:	N/A
Comments:	N/A

Data / Parameter:	$Rate_{peatloss\text{-}WPS,i,t}$
Data unit:	m yr^{-1}
Description:	Rate of peat loss due to subsidence and fire in the project scenario in stratum *i* in year *t*
Equations	5, 10

Source of data:	Module *M-PEAT*
Description of measurement methods and procedures to be applied:	See module *M-PEAT*
Frequency of monitoring/recording:	See module *M-PEAT*
QA/QC procedures to be applied:	See module *M-PEAT*
Purpose of data:	Calculation of project emissions
Calculation method:	N/A
Comments:	N/A

Data / Parameter:	$E_{peatsoil,CO2,i,t}$
Data unit:	t CO_2-e yr^{-1}
Description:	CO_2 emissions from microbial decomposition of the peat soil in stratum *i* in year *t*
Equations	7, 11
Source of data:	Module *M-PEAT*
Description of measurement methods and procedures to be applied:	See module *M-PEAT*
Frequency of monitoring/recording:	See module *M-PEAT*
QA/QC procedures to be applied:	See module *M-PEAT*
Purpose of data:	Calculation of project emissions
Calculation method:	N/A
Comments:	N/A

Data / Parameter:	$E_{peatburn,CO2i,t}$
Data unit:	t CO_2e yr^{-1}
Description:	CO_2 emissions from burning of peat within the project boundary in the project scenario in stratum *i* in year *t*
Equations	7, 11
Source of data:	Module *M-PEAT*
Description of measurement methods and procedures to be	See module *M-PEAT*

applied:	
Frequency of monitoring/recording:	See module *M-PEAT*
QA/QC procedures to be applied:	See module *M-PEAT*
Purpose of data:	Calculation of project emissions
Calculation method:	N/A
Comments:	N/A

7 REFERENCES

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DOCUMENT HISTORY

Version	Date	Comment
v1.0	3 Dec 2010	Initial version
v1.1	9 Mar 2015	The module was updated to include activities on peatlands.