Carbon Credits (Carbon Farming Initiative—Emissions Abatement through Savanna Fire Management) Methodology Determination 2015

I, Greg Hunt, Minister for the Environment, make the following determination.

Dated 25 March 2015

Greg Hunt

Greg Hunt
Minister for the Environment

Contents

Part 1—Preliminary

1 Name

This is the *Carbon Credits (Carbon Farming Initiative—Emissions Abatement through Savanna Fire Management) Methodology Determination 2015*.

2 Commencement

This determination commences on the day after it is registered.

3 Authority

This determination is made under subsection 106(1) of the *Carbon Credits (Carbon Farming Initiative) Act 2011*.

4 Duration

This determination remains in force for the period that:

(a) begins when this determination commences; and

(b) ends on the day before this determination would otherwise be repealed under subsection 50(1) of the *Legislative Instruments Act 2003*.

5 Definitions

In this determination:

Act means the *Carbon Credits (Carbon Farming Initiative) Act 2011*.

baseline period, for a project area that is wholly within either the low rainfall zone or the high rainfall zone—see section 33.

calendar year means a period of 12 months starting on 1 January.

CO_2-e means carbon dioxide equivalent.

coarse fuel means vegetation fuel comprising dead twigs and branches of not less than 6 millimetres in diameter and not more than 50 millimetres in diameter.

earlier savanna-burning determination means either of the following:

(a) the *Carbon Farming (Reduction of Greenhouse Gas Emissions through Early Dry Season Savanna Burning) Methodology Determination 2012*;

(b) the *Carbon Credits (Carbon Farming Initiative) (Reduction of Greenhouse Gas Emissions through Early Dry Season Savanna Burning—1.1) Methodology Determination 2013*.

early dry season—see section 7.

fine fuel means vegetation fuel comprising grass, leaf litter, bark and dead small twigs of less than 6 millimetres in diameter.

fire management means fire management carried out with the objective of abating greenhouse gas emissions from fire without increasing greenhouse gas emissions from other sources such as livestock or decomposition of organic carbon.

fire season means the early dry season or the late dry season.

fuel size class means the vegetation fuel belonging to a given size class.

GIS means geographic information system.

GPS means global positioning system.

heavy fuel means vegetation fuel comprising dead branches and logs of greater than 50 millimetres in diameter.

high rainfall zone**—**see section 6.

late dry season—see section 7.

low rainfall zone**—**see section 6.

NAFI means the North Australian Fire Information website.

Note The NAFI can be accessed at www.firenorth.org.au.

NGER Regulations means the *National Greenhouse and Energy Reporting Regulations 2008*.

project commencement means the first day of the project's first reporting period under the determination.

raster format, in relation to a map, means a map that has been divided into a grid of pixels that cover a geographical space and can be coded according to characteristics of, or relating to, the area represented by the pixel.

savanna means a tropical or sub-tropical vegetation formation with continuous grass cover occasionally interrupted by trees and shrubs.

savanna fire management project—see section 8.

SavBAT 2 means the web-based information technology tool known as the Savanna Burning Abatement Tool, that is published from time to time on the website http://savbat2.net.au with a statement that:

(a) it is SavBAT 2 for this determination; and

(b) if it differs from the version that was on the website at the time of commencement of this determination—the differences consist only of:

  (i) updates which are of a minor nature; or

  (ii) updates which are necessary or incidental to such updates.

Note SavBAT 2 automates some processes required under this determination and provides reports that meet some of the reporting and record-keeping requirements of this determination.

shrub fuel means components of a living plant that are less than 6 millimetres diameter, from vegetation with a stem diameter of less than 50 millimetres measured at a height of 1.3 metres.

vegetation fuel type means a vegetation fuel type listed in Schedule 1.

vegetation fuel type map means a vegetation fuel type map that complies with Division 2 of Part 4.

waypoint means a point in geographical space where information is collected, which is defined by a set of coordinates.

waypoint buffer means a circular area with a radius of 100 metres that surrounds a waypoint.

years-since-last-burnt value—see section 52.

Note Other words and expressions used in this determination have the meaning given by the Act. These include:

eligible offsets project

emission

greenhouse gas

methodology determination

offsets project

offsets report

project

project area

project proponent

Regulator

reporting period

6 Meaning of *high rainfall zone* and *low rainfall zone*

In this determination:

high rainfall zone means the area of land indicated as the high rainfall zone on the Savanna Fire Management High Rainfall Zone spatial data layer as published on the Department's website at the date of commencement of this determination.

low rainfall zone means the area of land indicated as the low rainfall zone on the Savanna Fire Management Low Rainfall Zone spatial data layer as published on the Department's website at the date of commencement of this determination.

Note These spatial data layers can be found at www.environment.gov.au.

7 Meaning of *early dry season* and *late dry season*

In this determination:

early dry season or ***EDS*** means the period in a calendar year that:

(a) begins on 1 January; and

(b) ends on 31 July.

late dry season or ***LDS*** means the period in a calendar year that:

(a) begins on 1 August; and

(b) ends on 31 December.

Note Each year in northern Australia, there is also a wet season, which occurs approximately from November to April. For the purposes of this determination, the definitions of the early and late dry seasons overlap with the wet season, as fire generally does not occur during the wet season.

Part 2—Savanna fire management projects

8 Savanna fire management projects

(1) For paragraph 106(1)(a) of the Act, this determination applies to an offsets project that:

(a) aims to reduce the emission of methane and nitrous oxide from fire by using fire management primarily in the early dry season; and

(b) is carried out in a savanna that includes land in either or both of the following:

(i) the high-rainfall zone;

(ii) the low-rainfall zone.

(2) A project covered by subsection (1) is a ***savanna fire management project***.

Part 3—Project requirements

Division 1—General

9 General

For paragraph 106(1)(b) of the Act, to be an eligible offsets project, a savanna fire management project must meet the requirements in this Part.

Division 2—Additionality

10 Requirement in lieu of newness requirement

(1) For subparagraph 27(4A)(a)(ii) of the Act, the requirement in subsection (2) is in lieu of the newness requirement for a project to which this determination applies.

(2) The project must be a savanna fire management project.

11 Requirement in lieu of regulatory additionality requirement

(1) For subparagraph 27(4A)(b)(ii) of the Act, the requirement in subsection (2) is in lieu of the regulatory additionality requirement for a savanna fire management project.

(2) A project area must not include land where fire management for the primary purpose of reducing emissions from fire is required to be carried out by or under a law of the Commonwealth, a State or a Territory.

Division 3—Project area

Note A savanna fire management project may be declared with one or more project areas.

For reporting purposes, the proponent may choose to divide the project and give the project areas different reporting schedules, provided that they all satisfy the reporting period requirements under the Act.

However, whatever the reporting schedule for each project area, the method under this determination requires that the abatement calculations are made for each year of the crediting period, and reported on.

12 Requirement to be in high or low rainfall zone

Every part of each project area must be:

(a) in the high rainfall zone; or

(b) in the low rainfall zone.

Note A project may be carried out on both land in the high rainfall zone and land in the low rainfall zone.

13 Requirement to have specified vegetation fuel types

A part of a project area that is in:

(a) the high rainfall zone; or

(b) the low rainfall zone;

must contain at least one of the vegetation fuel types listed for that zone in Schedule 1.

14 When separate project areas in different rainfall zones are needed

A project area for which the project proponent intends to calculate net annual project abatement without using SavBAT 2 must be wholly within either the high rainfall zone or the low rainfall zone.

15 Variations to project areas

(1) This section applies to a savanna fire management project if:

(a) the Regulator has declared that the project is an eligible offsets project; and

(b) the project proponent proposes to vary the declaration after lodging the first offsets report.

(2) The project, as it is proposed to be varied, is not an eligible offsets project if it would include a project area that overlaps, but is not identical with, a project area identified in the declaration.

Note 1 The effect of this section is that project areas may be added to a project, but that an existing project area cannot be divided, or increased or reduced in size.

Note 2 In the case of a project to which the Regulator approved the application of this determination under subsection 130(2) of the Act, the declaration would identify the project area of the project under the relevant earlier savanna-burning determination.

Division 4—Project activity

16 Project activity

(1) The project must be one in which:

(a) fire management is carried out in each project area in the early dry season; and

(b) fire management may also be carried out in each project area in the late dry season.

(2) The fire management must be carried out with the intention of ensuring that, in each project area, the early dry season burn for a year in the crediting period is greater than the average early dry season burn during the baseline period.

(3) The fire management may be combined with natural or constructed barriers to extinguish fires or reduce their spread.

(4) The project must not be one in which the project proponent attempts to increase the proportion of the annual area burnt by all fires in a project area in the early dry season by a method other than fire management.

Example The project cannot be one in which stocking densities are deliberately increased in or adjacent to the project in the late dry season for the primary purpose of reducing fuel loads.

(5) For subsection (2), the ***early dry season burn*** for a particular project area and for a particular calendar year is the ratio of the area burnt within that project area during the early dry season to the total area burnt within that project area during that year.

Part 4—Net abatement amount

Division 1—Preliminary

17 Operation of this Part

For paragraph 106(1)(c) of the Act, this Part specifies the method for working out the carbon dioxide equivalent net abatement amount for a reporting period for a savanna fire management project that is an eligible offsets project.

18 Simplified outline

This section sets out a simplified outline of the method specified in this Part.

- ***First***, the project proponent must develop and validate a vegetation fuel type map in accordance with Division 2. There is an exception to this requirement for projects that are transitioning from an earlier savanna-burning determination, in which case the project proponent is able to rely on existing vegetation maps for those parts of the project that are transitioning.

- ***Second***, the project proponent must calculate the carbon dioxide equivalent net abatement amount for the relevant reporting period—see Division 3 and, where the calculation is to be performed manually, see also Division 4. This involves the following:

  (a) The carbon dioxide equivalent net abatement amount, A, is calculated by summation of the adjusted net annual project abatement, $A_{A,y}$, for all years y in the relevant reporting period—see Subdivision 1 of Division 3.

  (b) The adjusted net annual project abatement, $A_{A,y}$, is calculated, for each year y, as a function of the net annual abatement for that year, A_y, and the 'uncertainty buffer' for the previous year, R_{y-1}—see Subdivision 2 of Division 3.

  (c) The net annual abatement for year y, A_y, can be calculated either by using the offsets reporting functionality of SavBAT 2 or, in many cases, by following the steps set out in Division 4—see Subdivision 3 of Division 3.

  (d) The net annual abatement for year y, A_y, is a function of several variables. One variable is the annual fossil fuel emissions in calendar year y for fossil fuel type i and greenhouse gas j, $E_{Fo,y,i,j}$, which must be calculated manually, in accordance with Subdivision 4 of Division 3, regardless of whether A_y is calculated using SavBAT 2 or by following the steps set out in Division 4.

- The project proponent is only able to calculate the net annual abatement for year y, A_y, without using SavBAT 2, if the relevant project area is wholly within either the high rainfall zone or the low rainfall zone.

- If the project consists of more than one project area, then:

(a) the project proponent must carry out the steps set out in Division 3 and, where appropriate, Division 4 separately for each project area; and

(b) the carbon dioxide equivalent net abatement amount for the reporting period is the sum of the carbon dioxide equivalent net abatement amounts, A, for each project area.

19 Overview of gases accounted for in abatement calculations

When making calculations under this Part:

(a) the greenhouse gases listed in Table A must be taken into account in relation to the specified project activities; and

(b) no other gases or project activities may be taken into account.

Table A—Greenhouse gases accounted for in abatement calculations

Project activity	**Greenhouse gas**
Fires in the or each project area during the baseline period and crediting period	Methane (CH_4) Nitrous oxide (N_2O)
Fuel use to establish and maintain the project; for example, for helicopters and other energy-consuming equipment or drip torches	Carbon dioxide (CO_2) Methane (CH_4) Nitrous oxide (N_2O)

20 References to factors and parameters from external sources

(1) If SavBAT 2, or a calculation in this determination, includes a factor or parameter that is defined or calculated by reference to another instrument or writing, the factor or parameter to be used for a reporting period is the factor or parameter referred to in, or calculated by reference to, the instrument or writing as in force at the end of the reporting period.

(2) Subsection (1) does not apply if:

(a) the determination specifies otherwise; or

(b) it is not possible to define or calculate the factor or parameter by reference to the instrument or writing as in force at the end of the reporting period.

Division 2—Vegetation fuel type map

21 Requirement to create vegetation fuel type map

(1) Subsection (2) applies:

(a) when an application is made under section 22 of the Act; and

(b) when an application is made, in accordance with regulations or legislative rules made for the purposes of section 29 of the Act, to vary a declaration under section 27 of the Act.

Note Subsection (2) does not apply when an application is made under section 128 of the Act.

(2) The project proponent must:

(a) create a vegetation fuel type map in accordance with this section; and

(b) conduct a validation survey in accordance with section 22; and

(c) validate the map in accordance with section 23; and

(d) if the map is not valid:

(i) re-interpret and re-classify the map; and

(ii) validate the re-interpreted and re-classified map in accordance with section 23.

(3) When re-interpreting and re-classifying the map, the project proponent must not use the waypoints that were used to validate the map, nor information from them.

(4) The map must:

(a) cover the area referred to in subsection (5); and

(b) be in raster format; and

(c) consist of pixels that represent:

(i) for a map that is to be used in SavBAT 2—250 metres by 250 metres; and

(ii) otherwise—250 metres by 250 metres or less.

(5) For paragraph (4)(a), the area is the following:

(a) for a map prepared because of paragraph (1)(a)—the project area, or all project areas;

(b) for a map prepared because of paragraph (1)(b)—any project area under the declaration as so varied for which the requirement under subsection (2) has not previously been met.

Note A single vegetation fuel type map may cover more than one project area.

(6) The project proponent must assign to each pixel a code as follows:

(a) if the area represented by the pixel is dominated by a particular vegetation fuel type—the code for that vegetation fuel type;

(b) otherwise—‘ineligible’.

Meaning of ***dominated***

(7) For this section, an area of land is ***dominated*** by a vegetation fuel type if the area occupied by that vegetation fuel type is:

(a) greater than the area of land occupied by any other vegetation fuel type; and

(b) greater than the area of land that is not occupied by a vegetation fuel type.

Transitional rule

(8) If:

(a) a person was the project proponent for a project that was declared eligible under an earlier savanna-burning determination; and

(b) a vegetation map was validated in accordance with that determination (the ***transitioning vegetation map***); and

(c) the Regulator approves the application of this determination to that project under section 130 of the Act;

then:

(d) the transitioning vegetation map is taken to be a vegetation fuel type map that complies with this Division; and

(e) the vegetation class in the transitioning vegetation map referred to in Table B is taken to refer to the corresponding code referred to in the table.

Note The vegetation fuel type name in the table is provided for information only.

Table B—Correspondence between vegetation class and vegetation fuel type code

Vegetation class	Vegetation fuel type code	Vegetation fuel type name
EOF	hOFM	Open Forest Mixed
EW	hWMi	Woodland Mixed
SW	hWHu	Woodland Hummock
SH	hSHH	Shrubland Hummock

22 Validation survey

(1) To validate a vegetation fuel type map, the project proponent must conduct a survey with a set of waypoints that satisfies this section.

(2) The validation survey must be conducted:

(a) no earlier than three years before project commencement; and

(b) no later than submission of the first offsets report that relates to the area covered by the map.

(3) The set of waypoints:

(a) must:

(i) be collected from the area covered by the map that is being validated; and

(ii) be independent of any waypoints that were part of the calibration process used to classify or re-classify the vegetation type fuel map; and

(iii) be identified by a unique label; and

(iv) be selected having regard to transects that intersect, or a grid that intersects:

(A) all vegetation fuel types in the area covered by the map that is being validated; and

(B) if the area covered by the map that is being validated corresponds to land in different project areas—each such project area; and

(b) may be selected randomly or systematically.

(4) Each waypoint must possess the following attributes:

(a) a unique label;

(b) time of collection;

(c) date of collection;

(d) latitude and longitude coordinates.

(5) The project proponent must:

(a) survey an area of approximately 1 hectare around each waypoint, using information derived from GPS, using either or both of the following:

(i) ground surveys;

(ii) aerial surveys; and

(b) for each waypoint, assign a code that corresponds to:

(i) if the area surveyed is dominated by a particular vegetation fuel type—the code for that vegetation fuel type; and

(ii) otherwise—‘ineligible’.

(6) For this section, ***dominated*** has the same meaning as in section 21.

23 Validation

(1) This section sets out how to validate a vegetation fuel type map for the purposes of section 21.

(2) The project proponent must:

(a) convert a copy of the map into vector format (the ***vectorised vegetation fuel type map***), without simplifying or smoothing the polygon boundaries; and

(b) assign a code to each polygon representing the code of the pixel or pixels that comprise the polygon; and

(c) select an ***assessment set*** of waypoints from the set referred to in section 22, having regard to:

(i) all vegetation fuel types in the area covered by the map that is being validated; and

(ii) if the area covered by the map that is being validated corresponds to land in different project areas—each such project area.

(3) The assessment set:

(a) must not include any waypoints whose waypoint buffers overlap; and

(b) may be selected randomly or systematically.

(4) For an area being validated with a size indicated in Table C, the assessment set must have at least the number of waypoints indicated in the table.

Table C—Minimum number of waypoints

Size of area	Minimum number of waypoints
> 20,000 km^2	500 plus 1 waypoint for every 100 km^2 over 20,000 km^2
10,000 km^2–20,000 km^2	500
< 10,000 km^2	250

(5) A vegetation fuel type map is validated in accordance with this section if the map has an accuracy of 80 per cent or greater.

(6) When validating a map that has been re-interpreted and re-classified for the purposes of subparagraph 21(2)(d)(ii), the project proponent may use the assessment set that was used when seeking to validate the map referred to in paragraph 21(2)(a), and may also add further waypoints.

(7) For this section, the ***accuracy*** of the map is given by the following formula:

$$\text{accuracy} = \frac{\text{number of verified waypoints}}{\text{number of assessed waypoints}} \times 100 \text{ per cent}$$

where:

assessed waypoint means a waypoint in the assessment set.

verified waypoint: a waypoint in the assessment set is a ***verified waypoint*** if, when the vectorised vegetation fuel type map is overlaid with a map that shows the waypoint buffers:

(a) the waypoint buffer of the waypoint overlaps with one or more polygons of the vectorised vegetation fuel type map; and

(b) the code assigned to the waypoint is the same as the code assigned to at least one of those polygons.

Division 3—Calculation of carbon dioxide equivalent net abatement amount—general

Subdivision 1—Carbon dioxide equivalent net abatement amount

24 Carbon dioxide equivalent net abatement amount

Carbon dioxide equivalent net abatement amount—single project area

(1) The carbon dioxide equivalent net abatement amount, A, for the project in relation to a reporting period, and for a particular project area, is calculated using Equation 1.

$$A = \sum_{y=1}^{N} A_{A,y}$$	Equation 1

Where:

$A =$ the carbon dioxide equivalent net abatement amount for the project in relation to a reporting period, in tonnes CO_2-e.

$A_{A,y} =$ adjusted net annual project abatement, in tonnes CO_2-e, in calendar year y in the crediting period—from Subdivision 2.

$N =$ the number of years in the crediting period that are being reported on in that reporting period.

Carbon dioxide equivalent net abatement amount—multiple project areas

(2) If the project has more than one project area, the carbon dioxide equivalent net abatement amount, A, is calculated by:

(a) applying Equation 1 to each project area; and

(b) summing each of the values so calculated.

Subdivision 2—Calculation of adjusted net annual project abatement

25 Outline

This section outlines the calculation of the adjusted net annual project abatement, $A_{A,y}$, that is performed under this Subdivision.

- The adjusted net annual project abatement, $A_{A,y}$, is calculated by adjusting the net annual project abatement, A_y, to manage the risk of the project containing some year(s) in which emissions are higher than the average annual baseline emissions. This is achieved by means of a 'uncertainty buffer', R_y, which is added to in years in which net annual abatement is greater than zero and subtracted from in years in which net annual project abatement is less than zero. The value of the uncertainty buffer is calculated at the end of each calendar year. At the beginning of the project, including transitioning projects, the value of the uncertainty buffer is zero.

- The amount stored in the uncertainty buffer is capped at a maximum, R_C, which is equal to 5 per cent of the average annual baseline emissions. The uncertainty buffer is only added to if the uncertainty buffer in the preceding year is less than the maximum value, and where net annual project abatement is greater than zero.

- If SavBAT 2 includes the functionality to calculate adjusted net annual project abatement, the project proponent may either use SavBAT 2 to perform the calculation, or may perform it manually. If SavBAT 2 does not include that functionality, the project proponent must perform the calculation manually, in accordance with this Subdivision.

26 Calculation of adjusted net annual project abatement

(1) Subject to subsection (2), for each calendar year in the crediting period, the project proponent must calculate adjusted net annual project abatement, $A_{A,y}$, in accordance with this section.

(2) The project proponent may use SavBAT 2 to calculate adjusted net annual project abatement if SavBAT 2 includes the functionality to perform that calculation.

(3) For the first year reported on under this determination ($y = 1$):

(a) calculate the net annual project abatement, A_1, in accordance with Subdivision 3; and

(b) determine which set of conditions set out in Table D is satisfied; and

(c) calculate $A_{A,1}$ in accordance with the corresponding row of the table; and

(d) calculate the uncertainty buffer, R_1 (to be used in the calculation of $A_{A,2}$ for the following calendar year), in accordance with the corresponding row of the table.

Table D—Calculation of adjusted net annual project abatement for first year

Conditions	$A_{A,1}$	R_1
$A_1 < 0$	0	A_1
$A_1 \geq 0$	$0.9 \times A_1$	$0.1 \times A_1$

(4) For each subsequent year, y, reported on under this determination (that is, for $y \geq 2$):

(a) calculate the net annual project abatement, A_y, in accordance with Subdivision 3; and

(b) determine which set of conditions set out in Table E is satisfied; and

(c) calculate $A_{A,y}$ in accordance with the corresponding row of the table; and

(d) calculate the uncertainty buffer, R_y (to be used in the calculation of $A_{A,y+1}$ for the following calendar year), in accordance with the corresponding row the table.

Table E—Calculation of adjusted net annual project abatement for subsequent years

Conditions	$A_{A,y}$	R_y
$A_y < 0$	0	$R_{y-1} + A_y$
$A_y \geq 0$ and $R_{y-1} < 0$ and $\left(A_y + R_{y-1}\right) < 0$	0	$R_{y-1} + A_y$
$A_y \geq 0$ and $R_{y-1} < 0$ and $\left(A_y + R_{y-1}\right) \geq 0$	$0.9 \times (A_y + R_{y-1})$	$0.1 \times (A_y + R_{y-1})$
$A_y \geq 0$ and $R_{y-1} \geq 0$ and $R_{y-1} < R_C$	$0.9 \times A_y$	$R_{y-1} + \left(0.1 \times A_y\right)$
$A_y \geq 0$ and $R_{y-1} \geq 0$ and $R_{y-1} \geq R_C$	A_y	R_{y-1}

(5) In subsection (4), R_C is equal to 5 per cent of:

(a) if the project proponent calculates net annual project abatement without using SavBAT 2—$\bar{E}_B$; and

Note For $\bar{E}_B$, see section 34, Equations 4A and 4B.

(b) otherwise—the average annual baseline emissions in tonnes CO_2-e, $\bar{E}_B$, as calculated using SavBAT 2.

Subdivision 3—Calculation of net annual project abatement

27 Net annual project abatement

(1) The project proponent must calculate net annual project abatement, A_y, for calendar year y in the reporting period either:

(a) using the offsets report functionality of SavBAT 2; or

Note In SavBAT 2, the output for net annual project abatement is 'Net annual project abatement' in Table 28.

(b) so long as the project area in relation to which the net annual project abatement is being calculated is wholly within either the high rainfall zone or the low rainfall zone—in accordance with Division 4.

(2) In calculating net annual project abatement, the project proponent must:

(a) calculate annual fossil fuel emissions, $E_{Fo,y,i,j}$, for each year y for fossil fuel type i and greenhouse gas j in accordance with Subdivision 4; and

(b) if using the offsets report functionality of SavBAT 2—enter the fossil fuel emissions so calculated into SavBAT 2 as fuel usage details; and

(c) if calculating net annual project abatement without using SavBAT 2—use the fossil fuel emissions so calculated in performing the calculations under Subdivision 9 of Division 4 (Equation 15).

Subdivision 4—Calculation of annual fossil fuel emissions by fuel type and greenhouse gas

28 Annual fossil fuel emissions—by fuel type and greenhouse gas

Annual fossil fuel emissions $E_{Fo,y,i,j}$ in tonnes CO_2-e, in calendar year y in the reporting period, for fossil fuel type i and greenhouse gas j, are calculated using Equation 2

$$E_{Fo,y,i,j} = \frac{FC_{y,i} \times EC_i \times EF_{j,i,oxec}}{1000}$$	Equation 2

Where:

$E_{Fo,y,i,j}$ = annual fossil fuel emissions, in tonnes CO_2-e, in calendar year y, for fossil fuel type i and greenhouse gas j (see section 19 for the greenhouse gases that may be accounted for).

$FC_{y,i}$ = amount of fossil fuel used in calendar year y, of type i, in kilolitres or gigajoules.

EC_i = the energy content of fossil fuel type i, which is:

(a) if the amount of the fossil fuel used is estimated in gigajoules—1; and

(b) otherwise—the amount, in gigajoules per kilolitre, from the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*.

$EF_{j,i,oxec}$ = emission factor, in kilograms CO_2-e per gigajoule, for each greenhouse gas j that includes an oxidisation factor for each fossil fuel type i—from the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*.

Division 4—Calculation of net annual project abatement without using SavBAT 2

Subdivision 1—Preliminary

29 Application of Division

This Division applies only if a project proponent calculates net annual project abatement, A_y, without using SavBAT 2.

30 Simplified outline

This section sets out a simplified outline of how the net annual project abatement for year y of the crediting period being reported on, A_y, is calculated without using SavBAT 2.

Note Calculations under this Division can only be performed for a project area that is wholly within either the high rainfall zone or the low rainfall zone. They cannot be performed for a project area that includes land within the high rainfall zone and land within the low rainfall zone. For such project areas, the offsets report functionality of SavBAT 2 must be used.

- Subdivision 2 sets out how to calculate the net annual project abatement for year y of the reporting period, A_y.
- The net annual project abatement is a function of the average annual baseline emissions, $\bar{E}_B$. To calculate this amount, the project proponent must determine a baseline period and calculate the average annual baseline emissions in accordance with Subdivision 3.
- The net annual project abatement is also a function of the total annual project emissions for that calendar year of the reporting period, $E_{P,y}$. This amount is calculated in accordance with Subdivision 4.
- Both $\bar{E}_B$ and $E_{P,y}$ are a function of the annual fire emissions, $E_{F,y}$. For $\bar{E}_B$, fire emissions in the baseline period are taken into account. For $E_{P,y}$, fire emissions in the crediting period are taken into account. In either case, $E_{F,y}$ is calculated in accordance with Subdivision 5. This calculation involves:

  (a) calculating the fire scar area, $S_{F,y,v,s}$, which is done in accordance with Subdivision 6; and

  (b) calculating the potential fire emissions, $E_{Po,y,s}$, which is done in accordance with Subdivision 7 and Subdivision 8.
- $E_{P,y}$ is also a function of the annual fossil fuel emissions, $E_{Fo,y}$. These are calculated in accordance with Subdivision 9, and take account of the fossil fuel emissions by fuel type and greenhouse gas, which are calculated in accordance with Subdivision 4 of Division 3.

Subdivision 2—Calculation of net annual project abatement

31 Net annual project abatement

Net annual project abatement, A_y, is calculated using Equation 3 for calendar year y in the crediting period.

$A_y = \bar{E}_B - E_{P,y}$	Equation 3

Where:

$A_y =$ net annual project abatement, in tonnes CO_2-e, in calendar year y.

$\bar{E}_B =$ average annual baseline emissions, in tonnes CO_2-e—from Equation 4A or 4B (see Subdivision 3).

$E_{P,y} =$ total annual project emissions, in tonnes CO_2-e, in calendar year y—from Equation 5 (see Subdivision 4).

Subdivision 3—Baseline period and average annual baseline emissions

32 Requirement to determine baseline period and calculate average annual baseline emissions

For section 31 (Equation 3), to calculate average annual baseline emissions, $\bar{E}_B$, the project proponent must:

(a) determine a baseline period for the project in accordance with section 33; and

(b) using that baseline period, calculate the value of $\bar{E}_B$ in accordance with section 34 (Equation 4A and Equation 4B).

33 Baseline period

Baseline period—general rule

(1) Subject to subsection (2):

(a) the baseline period for a project area is:

(i) for a project area in the low-rainfall zone—15 years; and

(ii) for a project area in the high-rainfall zone—10 years; and

(b) the last year of the baseline period is:

(i) for a project area that is added to the project after project commencement—the calendar year before the day on which the project area is added; and

(ii) otherwise—the calendar year before project commencement.

Baseline period—transitioning projects

(2) If:

(a) the project area was the project area of an eligible offsets project under an earlier savanna-burning determination; and

(b) an offsets report was submitted that related to that determination;

the baseline period for that area is the 10-year period that is determined in accordance with that determination that was reported on in offsets reports on that project.

34 Average annual baseline emissions

Average annual baseline emissions are calculated:

(a) if the project area is in the low-rainfall zone—using Equation 4A; and

(b) if the project area is in the high-rainfall zone—using Equation 4B.

$\bar{E}_B = \dfrac{\sum_{y=1}^{15} E_{F,y}}{15}$	Equation 4A

$\bar{E}_B = \dfrac{\sum_{y=1}^{10} E_{F,y}}{10}$	Equation 4B

Where:

$\bar{E}_B$ = average annual baseline emissions in tonnes CO_2-e.

$E_{F,y}$ = fire emissions in calendar year y of the baseline period in tonnes CO_2-e—from Equation 6.

Subdivision 4—Total annual project emissions

35 Total annual project emissions

For section 31 (Equation 3), total annual project emissions, $E_{P,y}$, in calendar year y in the crediting period are calculated using Equation 5.

$E_{P,y} = E_{F,y} + E_{Fo,y}$	Equation 5

Where:

$E_{P,y}$ = total annual project emissions, in tonnes CO_2-e, in calendar year y.

$E_{F,y}$ = annual fire emissions, in tonnes CO_2-e, in calendar year y—from Equation 6.

$E_{Fo,y}$ = annual fossil fuel emissions, in tonnes CO_2-e—from Equation 15.

Subdivision 5—Baseline and project fire emissions

36 Fire emissions

For section 34 (Equation 4A and Equation 4B) and section 35 (Equation 5), fire emissions, $E_{F,y}$, are calculated for a year y in the baseline period or the crediting period using Equation 6.

$E_{F,y} = \sum_{\substack{\text{both fire} \\ \text{seasons } s}} E_{F,y,s}$	Equation 6

Where:

$E_{F,y} =$ fire emissions, in tonnes CO_2-e, in calendar year y.

$E_{F,y,s} =$ fire emissions, in tonnes CO_2-e, in calendar year y for fire season s—from Equation 7.

37 Fire emissions—by fire season

For section 36 (Equation 6), fire emissions, $E_{F,y,s}$, in calendar year y in the baseline period or the crediting period for fire season s are calculated using Equation 7.

$$E_{F,y,s} = \sum_{\substack{\text{all vegetation} \\ \text{fuel types } v}} E_{Po,y,s} \times S_{F,y,v,s}$$	Equation 7

Where:

$E_{F,y,s} =$ fire emissions, in tonnes CO_2-e, in calendar year y for fire season s.

$E_{Po,y,s} =$ potential fire emissions, in tonnes CO_2-e per hectare, in calendar year y for fire season s—from Equation 9.

$S_{F,y,v,s} =$ area burnt, in hectares, in calendar year y for vegetation fuel type v for fire season s—from Equation 8.

38 Area burnt

For section 37 (Equation 7), the area burnt, $S_{F,y,v,s}$, in calendar year y in the baseline period or the crediting period for vegetation fuel type v for fire season s is calculated using Equation 8.

$$S_{F,y,v,s} = S_{y,v,s} \times P_s$$	Equation 8

Where:

$S_{F,y,v,s} =$ area burnt, in hectares, in calendar year y for vegetation fuel type v for fire season s.

$S_{y,v,s} =$ fire scar area, in hectares, in calendar year y for vegetation fuel type v for fire season s—from Subdivision 6.

$P_s =$ the appropriate patchiness for fire season s—from Table J in Schedule 2.

Subdivision 6—Calculating fire scar area

39 Method for calculating fire scar area

For section 38 (Equation 8), to calculate the fire scar area for calendar year y for vegetation fuel type v for fire season s, $S_{y,v,s}$, the project proponent must:

(a) either:

(i) source monthly fire maps from the NAFI that cover the project area; or

(ii) create monthly fire maps in accordance with section 40; and

(b) use those monthly fire maps to produce seasonal fire maps, for each fire season s of calendar year y, in accordance with section 41; and

(c) if the project proponent did not source the monthly fire maps from the NAFI—validate the seasonal fire maps in accordance with sections 42, 43 and 44; and

(d) use those seasonal fire maps to calculate, for each calendar year y, each vegetation fuel type v and each fire season s, the fire scar area, $S_{y,v,s}$ in accordance with section 45.

40 Monthly fire maps

(1) If the project proponent does not source monthly fire maps from the NAFI, the project proponent must create monthly fire maps that:

(a) cover the project area; and

(b) are geospatial maps in raster format; and

(c) have a pixel size of 250 metres by 250 metres or less.

(2) However, if satellite imagery products of 250 metres by 250 metres or less are not available for a particular month, a monthly fire map may have a pixel size of 1 square kilometre or less.

(3) The project proponent must assign to each pixel a code as follows:

(a) if more than half of the area of the pixel burnt in that calendar month—'burnt';

(b) otherwise—'unburnt'.

(4) The 12 monthly fire maps that are used to create the seasonal fire maps for a particular year must be derived from a single satellite imagery product.

41 Seasonal fire maps

(1) Each seasonal fire map must:

(a) be a geospatial map in raster format; and

(b) have the finest possible resolution allowed for by the monthly fire maps.

(2) The project proponent must assign, to each pixel, a code as follows:

(a) if the code for that pixel in any of the monthly fire maps is 'burnt'—'burnt';

(b) otherwise—'unburnt'.

42 Validation of seasonal fire maps if monthly fire maps not sourced from NAFI

(1) If one or more of the monthly fire maps are not sourced from the NAFI, for each seasonal fire map in which such monthly fire maps were used, the project proponent must:

(a) conduct a validation survey in accordance with section 43; and

(b) validate the seasonal fire map in accordance with section 44 and

(c) if the map is not valid:

(i) re-interpret and re-classify the monthly fire maps; and

(ii) validate the seasonal fire map based on the re-interpreted and re-classified monthly fire maps, in accordance with section 44.

(2) When re-interpreting and re-classifying a map, the project proponent must not use the waypoints that were used to validate the map, nor information from them.

43 Validation survey for seasonal fire maps

(1) To validate a seasonal fire map, if required to do so, the project proponent must conduct a survey with a set of waypoints that satisfies this section.

(2) The set of waypoints:

(a) must:

(i) be collected from the project area; and

(ii) be independent of any waypoints that were part of the calibration process used to classify or re-classify the monthly fire maps; and

(iii) be collected and surveyed:

(A) for a seasonal fire map that relates to the early dry season—between April and July of that season; and

(B) for a seasonal fire map that relates to the late dry season—between September and December of that season; and

(iv) be identified with a unique label; and

(v) be selected having regard to transects that intersect, or a grid that intersects:

(A) both burnt and unburnt areas in the project area in the relevant fire season; and

(B) if there is more than one project area—all project areas; and

(b) may be selected randomly or systematically.

(3) Each waypoint must possess the following attributes:

(a) a unique label;

(b) time of collection;

(c) date of collection;

(d) latitude and longitude coordinates.

(4) The project proponent must:

(a) survey an area of approximately 1 hectare around each waypoint, using information derived from GPS, using either or both of the following:

(i) ground surveys;

(ii) aerial surveys; and

(b) based on the result of that survey, assign to the waypoint a code as follows:

(i) if more than half of the area surveyed is burnt—‘burnt’;

(ii) if less than half of the area surveyed is burnt—‘unburnt’;

(iii) if not readily apparent—‘unknown’.

44 Validation of seasonal fire maps

(1) This section sets out how to validate a seasonal fire map.

(2) The project proponent must:

(a) convert a copy of the map into vector format (the ***vectorised seasonal fire map***), without simplifying or smoothing the polygon boundaries; and

(b) assign a code to each polygon representing the code of the pixel or pixels that comprise the polygon; and

(c) select an ***assessment set*** of waypoints from the set referred to in section 43, having regard to:

(i) both burnt and unburnt areas in the project area; and

(ii) if there is more than one project area—all project areas.

(3) The assessment set:

(a) must not include any waypoints whose waypoint buffers overlap; and

(b) may be selected randomly or systematically.

(4) For an area being validated with a size indicated in Table F, the assessment set must have at least the number of waypoints indicated in the table.

Table F—Minimum number of waypoints

Size of area	**Minimum number of waypoints**
> 20,000 km^2	500 plus 1 waypoint for every 100 km^2 over 20,000 km^2
10,000 km^2–20,000 km^2	500
< 10,000 km^2	250

(5) A seasonal fire map is validated in accordance with this section if the map has an accuracy of 80 per cent or greater.

(6) For this section, the ***accuracy*** of the map is given by the following formula:

$$\text{accuracy} = \frac{\text{number of verified waypoints}}{\text{number of assessed waypoints}} \times 100 \text{ per cent}$$

where:

assessed waypoint means a waypoint in the assessment set.

verified waypoint: a waypoint in the assessment set is a ***verified waypoint*** if, when the vectorised seasonal fire map is overlaid with a map that shows the waypoint buffers:

(a) the waypoint buffer of the waypoint overlaps with one or more polygons of the vectorised seasonal fire map; and

(b) the code assigned to the waypoint is the same as the code assigned to at least one of those polygons.

45 Calculating fire scar area

For paragraph 39(d), to calculate the fire scar area, the project proponent must, using GIS software:

(a) overlay the vegetation fuel type map with each seasonal fire map; and

(b) using that combined map, calculate the fire scar area, $S_{y,v,s}$, in hectares, for:

(i) each vegetation fuel type; and

(ii) each fire season; and

(iii) each calendar year in the baseline period; and

(iv) each calendar year in the crediting period.

Subdivision 7—Calculation of potential fire emissions

46 Potential fire emissions

For section 37 (Equation 7), potential fire emissions $E_{Po,y,s}$ in calendar year y of the baseline period or the crediting period for fire season s are calculated using Equation 9.

$E_{Po,y,s} = E_{Po,CH_4,Fi,y,s} + E_{Po,CH_4,y,s} + E_{Po,N_20,Fi,y,s} + E_{Po,N_20,y,s}$	Equation 9

Where:

$E_{Po,y,s}$ = potential fire emissions, in tonnes CO_2-e per hectare, in calendar year y for fire season s.

$E_{Po,CH_4,Fi,y,s}$ = potential methane emissions, in tonnes CO_2-e per hectare, from fine fuels in calendar year y for fire season s—from Equation 10.

$E_{Po,CH_4,y,s}$ = potential methane emissions, in tonnes CO_2-e per hectare, from non-fine fuels in calendar year y for fire season s—from Equation 11.

$E_{Po,N_20,Fi,y,s}$ = potential nitrous oxide emissions, in tonnes CO_2-e per hectare, from fine fuels in calendar year y for fire season s—from Equation 12.

$E_{Po,N_20,y,s}$ = potential nitrous oxide emissions, in tonnes CO_2-e per hectare, from non-fine fuels in calendar year y for fire season s—from Equation 13.

47 Potential methane emissions—fine fuel size class

For section 46 (Equation 9), potential methane emissions from the fine fuel size class $E_{Po,CH_4,Fi,y,s}$ in calendar year y of the baseline period or the crediting period for fire season s are calculated using Equation 10.

$E_{Po,CH_4,Fi,y,s} = \sum_{\substack{\text{all vegetation} \\ \text{fuel types } v}} (BE_s \times W_{Fi,y,s,v} \times EF_{CH_4,v} \times CC_v \times 1.3333 \times GWP_{CH_4})$	Equation 10

Where:

$E_{Po,CH_4,Fi,y,s}$ = potential methane emissions, in tonnes CO_2-e per hectare, from fine fuels in calendar year y for fire season s.

BE_s = burning efficiency in fire season s—from Table I in Schedule 2.

$W_{Fi,y,s,v}$ = fine fuel load, in tonnes per hectare, of vegetation fuel type v in calendar year y for fire season s—from Equation 14 (see Subdivision 8).

$EF_{CH_4,v}$ = methane emission factor for vegetation fuel type v—from Table L in Schedule 2.

CC_v = carbon content for vegetation fuel type v—from Table M in Schedule 2.

GWP_{CH_4} = global warming potential of methane—from the NGER Regulations.

Note The factor 1.3333 represents the ratio of molecular to elemental mass for methane.

48 Potential methane emissions—coarse, heavy and shrub fuel size classes

For section 46 (Equation 9), potential methane emissions from the coarse, heavy and shrub fuel size classes $E_{Po,CH_4,y,s}$ in calendar year y of the baseline period or the crediting period for fire season s are calculated using Equation 11.

$$E_{Po,CH_4,y,s} = \sum_{\substack{\text{all vegetation} \\ \text{fuel types } v}} \sum_{k} (BE_{s,k} \times W_{v,k} \times EF_{CH_4,v,k} \times CC_{v,k} \times 1.3333 \times GWP_{CH_4})$$	Equation 11

Where:

$E_{Po,CH_4,y,s}$ = potential methane emissions, in tonnes CO_2-e per hectare, from non-fine fuels in calendar year y for fire season s.

$BE_{s,k}$ = burning efficiency for fire season s of coarse, heavy or shrub fuel size class k—from Table I in Schedule 2.

$W_{v,k}$ = fuel load, in tonnes per hectare, of vegetation fuel type v for coarse, heavy or shrub fuel size class k—from Table K in Schedule 2.

$EF_{CH_4,v,k}$ = methane emission factor of vegetation fuel type v for coarse, heavy or shrub fuel size class k—from Table L in Schedule 2.

$CC_{v,k}$ = carbon content of vegetation fuel type v for coarse, heavy or shrub fuel size class k—from Table M in Schedule 2.

GWP_{CH_4} = global warming potential of methane—from the NGER Regulations.

Note The factor 1.3333 represents the ratio of molecular to elemental mass for methane.

49 Potential nitrous oxide emissions—fine fuel size class

For section 46 (Equation 9), potential nitrous oxide emissions from the fine fuel class $E_{Po,N_20,Fi,y,s}$ are calculated in calendar year y of the baseline period or the crediting period for fire season s using Equation 12.

$$E_{Po,N_20,Fi,y,s} = \sum_{\substack{\text{all vegetation} \\ \text{fuel types } v}} (BE_s \times W_{Fi,y,s,v} \times EF_{N_20,v} \times CC_v \times NC_v \times 1.5714 \times GWP_{N_20})$$	Equation 12

Where:

$E_{Po,N_20,Fi,y,s}$ = potential nitrous oxide emissions, in tonnes CO_2-e per hectare, from fine fuels in calendar year y for fire season s.

BE_s = burning efficiency for fire season s—from Table I in Schedule 2.

$W_{Fi,y,s,v}$ = fine fuel load, in tonnes per hectare, in calendar year y of vegetation fuel type v for fire season s—from Equation 14 (see Subdivision 8).

$EF_{N_20,v}$ = nitrous oxide emission factor of vegetation fuel type v—from Table N in Schedule 2.

CC_v = carbon content of vegetation fuel type v—from Table M in Schedule 2.

$NC_v =$ nitrogen to carbon ratio of vegetation fuel type v—from Table O in Schedule 2.

$GWP_{N_20} =$ global warming potential of nitrous oxide—from the NGER Regulations.

Note The factor 1.5714 represents the ratio of molecular to elemental mass for nitrous oxide.

50 Potential nitrous oxide emissions—coarse, heavy and shrub fuel size classes

For section 46 (Equation 9), potential nitrous oxide emissions from the coarse, heavy and shrub fuel size classes $E_{Po,N_20,y,s}$ are calculated in calendar year y of the baseline period or the crediting period for fire season s using Equation 13.

$$E_{Po,N_20,y,s} = \sum_{\substack{\text{all vegetation} \\ \text{fuel types } v}} \sum_{k} BE_{s,k} \times W_{v,k} \times EF_{N_20,v,k} \times CC_{v,k} \times NC_{v,k} \times 1.5714 \times GWP_{N_20}$$	Equation 13

Where:

$E_{Po,N_20,y,s} =$ potential nitrous oxide emissions, in tonnes CO_2-e per hectare, from non-fine fuels in calendar year y for fire season s.

$BE_{s,k} =$ burning efficiency for in fire season s of coarse, heavy or shrub fuel size class k—from Table I in Schedule 2.

$W_{v,k} =$ fuel load, in tonnes per hectare, of vegetation fuel type v for coarse, heavy or shrub fuel size class k—from Table K in Schedule 2.

$EF_{N_20,v,k} =$ nitrous oxide emission factor of vegetation fuel type v for coarse, heavy or shrub fuel size class k—from Table N in Schedule 2.

$CC_{v,k} =$ carbon content of vegetation fuel type v for coarse, heavy or shrub fuel size class k—from Table M in Schedule 2.

$NC_{v,k} =$ nitrogen to carbon ratio of vegetation fuel type v for coarse, heavy or shrub fuel size class k—from Table O in Schedule 2.

$GWP_{N_20} =$ global warming potential of nitrous oxide—from the NGER Regulations.

Note The factor 1.5714 represents the ratio of molecular to elemental mass for nitrous oxide.

Subdivision 8—Fine fuels load

51 Method for calculating fine fuel load

For sections 47 (Equation 10) and 49 (Equation 12), to calculate fine fuel load $W_{Fi,y,s,v}$ for calendar year y of the baseline period or the crediting period, for fire season s and vegetation fuel type v, the project proponent must:

(a) produce a Years Since Last Burnt (YSLB) map for calendar year y in accordance with section 52, or source such a map from the NAFI; and

(b) use that map to determine, for years-since-last-burnt values $YSLB = 1$ to 6, for calendar year y, and for each vegetation fuel type v, the area burnt, $S_{YSLB,y,v}$, in accordance with section 53; and

(c) use those areas burnt to calculate the fine fuel load, $W_{Fi,y,s,v}$, for calendar year y, for fire season s and for vegetation fuel type v, in accordance with section 54.

52 Producing years since last burnt (YSLB) maps

(1) For paragraph 51(a), a YSLB map for calendar year y must:

(a) cover the project area; and

(b) be a geospatial map in raster format; and

(c) have the finest possible resolution allowed by the maps from which it was produced; and

(d) be produced:

(i) using GIS software; and

(ii) in accordance with this section.

(2) First, generate yearly fire maps, for calendar year y, and for each of the 5 preceding calendar years, by aggregating:

(a) monthly fire maps that are sourced from the NAFI for that year; or

(b) seasonal fire maps that:

(i) were created using monthly fire maps that were not sourced from the NAFI; and

(ii) have been validated in accordance with Subdivision 6.

Note The previous 5 calendar years are the years $y-1$, $y-2$, $y-3$, $y-4$ and $y-5$.

(3) Then, assign to each pixel of each yearly fire map a code as follows:

(a) if the code for that pixel in any of the maps used to create the yearly fire map is ‘burnt’—‘burnt’;

(b) otherwise—‘unburnt’.

(4) Finally, assign to each pixel of the YSLB map for year y a code (a ***years-since-last-burnt value***) as follows:

(a) if:

(i) the code for the corresponding pixel of the yearly fire map for year y is ‘burnt’; and

(ii) in at least one of the yearly fire maps of the previous 5 years, the code for the corresponding pixel is ‘burnt’; and

(iii) the most recent of those maps is for the year $y-N$;

the number N;

(b) if:

(i) the code for the corresponding pixel of the yearly fire map for year y is ‘burnt’; and

(ii) no other of those yearly fire maps has a code ‘burnt’ for the corresponding pixel;

the number ‘6’;

(c) if the code for the corresponding pixel of the yearly fire map for year y is ‘unburnt’—‘0’.

53 Calculating area burnt for each YSLB value

For paragraph 51(b), the area $S_{YSLB,y,v}$ is determined by overlaying the YSLB map for year y with the vegetation fuel type map (see Division 2).

54 Fine fuel load values

For paragraph 51(c), the fine fuel load $W_{Fi,y,s,v}$ in calendar year y in the baseline period or the crediting period for fire season s, of vegetation fuel type v is calculated using Equation 14.

$$W_{Fi,y,s,v} = \frac{\sum_{YSLB=1}^{6}\left(S_{YSLB,y,v} \times FA_{YSLB,v,s}\right)}{\sum_{YSLB=1}^{6} S_{YSLB,y,v}}$$	Equation 14

Where:

$W_{Fi,y,s,v}$ = fine fuel load, in tonnes per hectare, in calendar year y for fire season s, of vegetation fuel type v.

$S_{YSLB,y,v}$ = the area burned, in hectares, for years-since-last burnt value $YSLB$, in calendar year y, for vegetation fuel type v, from section 53.

$FA_{YSLB,v,s}$ = fine fuel accumulation value for years-since-last-burnt value $YSLB$, in tonnes per hectare, for vegetation fuel type v in fire season s—from Table P in Schedule 2.

Subdivision 9—Calculating fossil fuel emissions

55 Fossil fuel emissions

For section 35 (Equation 5), fossil fuel emissions, $E_{Fo,y}$, are calculated for each calendar year y in the crediting period using Equation 15.

$$E_{Fo,y} = \sum_{\substack{\text{all fossil} \\ \text{fuel types } i}} \sum_{\substack{\text{all greenhouse} \\ \text{gases } j}} E_{Fo,y,i,j}$$	Equation 15

Where:

$E_{Fo,y}$ = annual fossil fuel emissions, in tonnes CO_2-e, in calendar year y.

$E_{Fo,y,i,j}$ = annual fossil fuel emissions, in tonnes CO_2-e, in calendar year y, for fossil fuel type i and greenhouse gas j (see section 19 for the greenhouse gases that may be accounted for)—from Equation 2 (Subdivision 4 of Division 3).

Part 5—Reporting, record-keeping and monitoring requirements

Division 1—Offsets report requirements

56 Operation of this Division

For paragraph 106(3)(a) of the Act, this Division sets out information that must be included in an offsets report about a savanna fire management project that is an eligible offsets project.

Note Other reporting requirements are set out in rules made under the Act.

57 Information that must be included in offsets reports

(1) Each offsets report must include the following for the project:

(a) if the project proponent was required, under Division 2 of Part 4, to create a vegetation fuel type map:

(i) a copy of the map that was created and validated in accordance with that Division; and

(ii) a map combining that map and the spatial data layers referred to in section 6 showing in which rainfall zone or zones each area to which the map relates is located; and

(iii) any ERF audit report relating to the validation of the map;

(b) a description of the project activities undertaken, including location and timing of early dry season burning activities;

(c) a declaration to the effect that densities of livestock in lands owned or managed by the project proponent have not increased as a consequence of the project;

(d) if the project proponent used SavBAT 2 to calculate net annual abatement—a copy of each report produced by SavBAT 2 for each calendar year in the reporting period;

(e) if the project proponent calculated net annual abatement for any project area without using SavBAT 2:

(i) copies of each seasonal fire map mentioned in section 41; and

(ii) for each monthly fire map not sourced from the NAFI—any ERF audit report relating to the validation of the seasonal fire map for which that monthly fire map was used.

(2) For subparagraph (1)(e)(i), if each fire season is uniquely identified, a single map may show the area burnt in both fire seasons in a calendar year.

(3) If, in the circumstances described in paragraph 20(2)(b), a factor or parameter is defined or calculated for a reporting period by reference to an instrument or writing as in force from time to time, the offsets report about the project for the reporting period must include the following information for the factor or parameter:

(a) the versions of the instrument or writing used;

(b) the start and end dates of each use;

(c) the reasons why it was not possible to define or calculate the factor or parameter by reference to the instrument or writing as in force at the end of the reporting period.

(4) For this section, ***ERF audit report*** has the same meaning as it has in the *National Greenhouse and Energy Reporting Act 2007*.

Division 2—Monitoring

58 Operation of this Division

For paragraph 106(3)(d) of the Act, this Division sets out monitoring requirements for a savanna fire management project that is an eligible offsets project.

59 Fossil fuel use

(1) For each fossil fuel type, the project proponent must monitor the amount of fuel, in kilolitres, used when undertaking project activities in each project area in each calendar year in the crediting period reported on.

(2) The amount of fossil fuel may be monitored from the following:

(a) invoices;

(b) vehicle logbooks;

(c) aircraft logbooks;

(d) records of project activities;

(e) reports of calculated consumption based on hourly or per hectare consumption rates.

(3) If fossil fuel use for project activities cannot be monitored separately from fossil fuel use for non-project activities, estimates of fossil fuel use for project activities may be based on the time spent undertaking project activities and the known average fuel consumption of vehicles or machinery.

Division 3—Partial reporting

60 Partial reporting

For section 77A of the Act, an overall project may only be divided into parts that consist of one or more whole project areas.

Schedule 1—Vegetation fuel types

Sections 5, 13 and 21

The vegetation fuel type is defined by the structural formation (canopy height and foliage projected cover) of the dominant stratum and the grass type. The characteristic descriptors are used in making judgments about the appropriate classification.

Table G Vegetation fuel types—high rainfall zone

Vegetation fuel type code	Vegetation fuel type name	Dominant strata			Characteristic descriptors			
		Strata	**Canopy height**	**Foliage projected cover**	***Grasses***	***Canopy trees***	***Shrubs***	***Substrates***
hOFM	Open forest with mixed grass	Canopy Trees	Majority of trees >15 m	30-70 %	Dominated by native perennial and annual tussock grasses	Various *Eucalyptus* and *Corymbia* species (for example, *E.tetrodonta, E.miniata, C. nesophila, C. stockeri*)	Various species—well developed shrub layer may/may not be present	Well drained deep soils, often sandy loams
hWMi	Woodland with mixed grass	Canopy Trees	Majority of trees >8 m	10-30 %	Dominated by Native perennial and annual tussock grasses; may be associated with hummock grasses (*Triodia* species)	Various *Eucalyptus* (for example, *E. tetrodonta*) and *Corymbia* spp, often with other taxa (for example, *Erythrophleum, Terminalia, Callitris*)	Various species—well developed shrub layer may/may not be present	Various situations, from well-drained gravelly sites to those with impeded drainage
hWHu	Woodland with hummock grass	Canopy Trees	Majority of trees >8 m	10-30 %	Dominated by hummock (*Triodia*) grasses. A mixture of native perennial and annual tussock grasses may also be present	Various *Eucalyptus* and *Corymbia* often with other taxa (for example, *Erythrophleum, Terminalia, Xanthostemon*)	Various species—well developed shrub layer may/may not be present; where present, may include woody heath taxa as listed for SHH	Rocky shallow soils derived typically from sandstone (quartzite); also lateritic hills and plateau

Vegetation fuel type code	Vegetation fuel type name	Dominant strata			*Grasses*	Characteristic descriptors		
		Strata	**Canopy height**	**Foliage projected cover**		***Canopy trees***	***Shrubs***	***Substrates***
hSHH	Shrubland (heath) with hummock grass	Shrubs	Majority of shrubs <5 m	0-30 %	Hummock (*Triodia*) grasses, and/or other perennial restios (*Lepyrodia*, *Dapsilanthus*) sedges (*Schoenus sparteus*) or graminoids (for example, *Lomandra*, *Xanthorrhoea*)	Sparse trees	Conspicuous cover of heathy shrubs (for example, *Acacia*, *Calytrix*, *Grevillea*, *Hibbertia*, *Hibiscus*, *Jacksonia*, *Tephrosia*, *Verticordia*)	Shallow to rocky substrates derived typically from sandstone, metamorphosed sandstone (for example, quartzite), sometimes laterised; sandsheets

Table H Vegetation fuel types—low rainfall zone

Vegetation fuel type code	Vegetation fuel type name	Dominant strata			*Grasses*	Characteristic descriptors		
		Strata	Canopy height	Foliage projected cover		*Canopy trees*	*Shrubs*	*Substrates*
lWTu	Woodland with tussock grass	Canopy Trees	Majority of trees >10 m	10-30 %	Native perennial and annual tussock grasses	Various *Eucalyptus* (for example, *E. tectifica*,) and *Corymbia* (for example, *C. opaca*) often with other taxa (for example, *Erythrophleum*, *Terminalia*)	Well developed shrub layer may/not be present.	Majority deep well drained soils to those with impeded drainage, typically on flat to undulating landtypes with fertile volcanic-derived substrates
lWMi	Woodland with mixed tussock / hummock grass	Canopy Trees	Majority of trees >10 m	10-30 %	Native perennial and annual tussock grass, may be associated with hummock (*Triodia*) grasses	Various *Eucalyptus* (for example, *E. tetrodonta*) and *Corymbia* spp, often with other taxa (for example, *Erythrophleum, Terminalia, Callitris*)	Well developed shrub layer may/may not be present.	Various situations including undulating to hilly landtypes on imperfectly to well drained soils
lWHu	Woodland with hummock grasses	Canopy Trees	Majority of trees >10 m	10-30 %	Hummock (*Triodia*) grasses usually dominant, tussock grasses may also occur	Various *Eucalyptus* and *Corymbia* often with other taxa (for example. *Erythrophleum, Terminalia, Xanthostemon*)	Well developed shrub layer may/may not be present; may include woody heath taxa	Rocky shallow soils derived typically from sandstone (quartzite); also lateritic hills and plateau
lOWM	Open woodland with mixed grass	Canopy Trees	Majority of trees <10 m	<10 %	Hummock (*Triodia*) grasses often dominant, or codominant with tussock grasses	Various *Eucalyptus* and *Corymbia*, including *C.dichromophloia*, *E.leucophloia*, *E. brevifolia*, *E.pruinosa*, *E.tectifica*	Well developed shrub layer may/may not be present. Where present, may include woody heath taxa	Shallow substrates on undulating stony rises and rocky hills

Vegetation fuel type code	Vegetation fuel type name	Dominant strata			*Grasses*	Characteristic descriptors		
		Strata	**Canopy height**	**Foliage projected cover**		***Canopy trees***	***Shrubs***	***Substrates***
lSHH	Shrubland with hummock grass	Shrubs	Majority of shrubs <5 m	<30 %	Hummock (*Triodia*) grass, and/or other perennial restios (*Lepyrodia*, *Dapsilanthus*) sedges (*Schoenus sparteus*) or graminoids (for example, *Lomandra*, *Xanthorrhoea*)	Sparse trees	Conspicuous shrub (heath) layer, commonly *Acacia* species and various other taxa (for example, *Calytrix*, *Grevillea*, *Hibbertia*, *Hibiscus*, *Jacksonia*, *Tephrosia*, *Veritcordia*)	Sand plains often over laterite, or rocky, shallow substrates derived from sandstone

Schedule 2—Tables

Table I Burning efficiency (proportion)

Sections 47, 48, 49 and 50

Rainfall zone	Fuel size class	Early Dry Season	Late Dry Season
High rainfall zone	Fine	0.7444	0.8604
	Coarse	0.1464	0.3571
	Heavy	0.1708	0.3093
	Shrub	0.2896	0.3934
Low rainfall zone	Fine	0.799	0.833
	Coarse	0.109	0.202
	Heavy	0.067	0.119
	Shrub	0.098	0.110

Note Table I is the same as Table 2 in SavBAT 2.

Table J Patchiness

Section 38

Fire season	Patchiness (proportion burnt)	
	High rainfall zone	Low rainfall zone
EDS	0.709	0.79
LDS	0.889	0.97

Note Table J is the same as Table 1 in SavBAT 2.

Table K Fuel loads (tonnes / hectare)

Sections 48 and 50

Vegetation fuel type	Fuel Size Class		
	Coarse	Heavy	Shrub
hOFM	1.4	4.8	1.5
hWMi	0.9	2.2	0.5
hWHu	1.2	3.4	1.7
hSHH	0.6	1.7	1.8
lWHu	1.85	1.15	1.84
lWMi	0.69	2.02	0.66
lWTu	1.39	1.25	0.27
lOWM	0.76	0.8	1.13
lSHH	0.73	0.17	0.87

Note Table K is the same as Table 13 in SavBAT 2.

Table L Emission factor for methane

Sections 47 and 48

Vegetation fuel type	Fuel size class			
	Fine	Coarse	Heavy	Shrub
hOFM	0.0031	0.0031	0.01	0.0031
hWMi	0.0031	0.0031	0.01	0.0031
hWHu	0.0031	0.0031	0.01	0.0031
hSHH	0.0015	0.0015	0.01	0.0015
lWHu	0.0015	0.0015	0.0158	0.0015
lWMi	0.0017	0.0017	0.0158	0.0017
lWTu	0.0016	0.0016	0.0158	0.0016
lOWM	0.0012	0.0012	0.0111	0.0012
lSHH	0.0013	0.0013	0.0111	0.0013

Note Table L is the same as Table 5 in SavBAT 2.

Table M Carbon content

Sections 47, 48, 49 and 50

Vegetation fuel type	Fuel size class			
	fine	coarse	heavy	shrub
hOFM	0.46	0.46	0.46	0.46
hWMi	0.46	0.46	0.46	0.46
hWHu	0.46	0.46	0.46	0.46
hSHH	0.46	0.46	0.46	0.46
lWHu	0.397	0.482	0.482	0.485
lWMi	0.397	0.482	0.482	0.485
lWTu	0.41	0.482	0.482	0.485
lOWM	0.399	0.482	0.482	0.485
lSHH	0.398	0.482	0.482	0.485

Note Table M is the same as Table 7 in SavBAT 2.

Table N Emission factor for nitrous oxide

Sections 49 and 50

Vegetation fuel type	Fuel size class			
	Fine	Coarse	Heavy	Shrub
hOFM	0.0075	0.0075	0.0036	0.0075
hWMi	0.0075	0.0075	0.0036	0.0075
hWHu	0.0075	0.0075	0.0036	0.0075
hSHH	0.0066	0.0066	0.0036	0.0066
lWHu	0.006	0.006	0.0146	0.006

lWMi	0.006	0.006	0.0146	0.006
lWTu	0.012	0.012	0.0146	0.012
lOWM	0.006	0.006	0.0146	0.006
lSHH	0.0059	0.0059	0.0146	0.0059

Note Table N is the same as Table 6 in SavBAT 2.

Table O Nitrogen to carbon ratio

Sections 49 and 50

Vegetation fuel type	Fuel size class			
	fine	**coarse**	**heavy**	**shrub**
hOFM	0.0096	0.0081	0.0081	0.0093
hWMi	0.0096	0.0081	0.0081	0.0093
hWHu	0.0096	0.0081	0.0081	0.0093
hSHH	0.0096	0.0081	0.0081	0.0093
lWHu	0.0113	0.00389	0.01497	0.00389
lWMi	0.0118	0.00389	0.01497	0.00389
lWTu	0.0105	0.00389	0.01497	0.00389
lOWM	0.0102	0.00389	0.01497	0.00389
lSHH	0.0107	0.00389	0.01497	0.00389

Note Table O is the same as Table 8 in SavBAT 2.

Table P Fine fuel accumulation value (tonnes / hectare)

Section 54

Fire season	Vegetation fuel type	YSLB (n)					
		1	**2**	**3**	**4**	**5**	**6**
EDS	**hOFM**	2.74	4.25	5.07	5.53	5.78	6.06
	hWMi	3.80	4.41	4.51	4.53	4.53	4.53
	hWHu	2.08	3.41	4.25	4.79	5.14	5.68
	hSHH	1.88	3.55	5.03	6.35	7.51	11.64
LDS	**hOFM**	4.44	5.95	6.77	7.23	7.48	7.76
	hWMi	5.5	6.11	6.21	6.23	6.23	6.23
	hWHu	3.78	5.11	5.95	6.49	6.84	7.38
	hSHH	3.58	5.25	6.73	8.05	9.21	13.34
EDS	**lWHu**	1.75	3.14	4.12	4.80	5.27	5.60
	lWMi	2.00	2.69	2.89	2.95	2.97	2.98
	lWTu	2.71	4.48	5.52	6.12	6.47	6.68
	lOWM	2.79	3.66	3.91	3.98	4.01	4.01
	lSHH	1.00	2.11	3.08	3.93	4.68	5.32
LDS	**lWHu**	2.01	3.40	4.38	5.06	5.53	5.86
	lWMi	2.28	2.97	3.17	3.23	3.25	3.26
	lWTu	3.05	4.82	5.86	6.46	6.81	7.02
	lOWM	2.97	3.84	4.09	4.16	4.19	4.19
	lSHH	1.28	2.39	3.36	4.21	4.96	5.60

Note Table P is the same as Table 4 in SavBAT 2.