EXPLANATORY STATEMENT

Issued by the Authority of the Minister for the Environment

Carbon Credits (Carbon Farming Initiative) Act 2011

Carbon Credits (Carbon Farming Initiative) (Sequestering Carbon in Soils in Grazing Systems) Methodology Determination 2014

Background

The *Carbon Credits (Carbon Farming Initiative) Act 2011* (the Act) enables the crediting of greenhouse gas abatement in the land sector. Greenhouse gas abatement is achieved either by reducing or avoiding emissions or by removing carbon from the atmosphere and storing it in soil or trees.

Carbon sequestration and emissions reduction activities are undertaken as offsets projects. The process involved in establishing an offsets project is set out in Part 3 of the Act. An offsets project must be covered by, and undertaken in accordance with, a methodology determination.

Subsection 106(1) of the Act empowers the Minister to make, by legislative instrument, a methodology determination. The purpose of a methodology determination is to establish procedures for estimating abatement (emissions reductions and sequestration) and project rules for monitoring, record keeping and reporting on abatement.

A methodology determination must meet the offsets integrity standards set out in section 133 of the Act and the other eligibility criteria set out in section 106 of the Act. The Minister cannot make a methodology determination unless the Domestic Offsets Integrity Committee (DOIC) has endorsed the proposal for the methodology determination under section 112 of the Act and advised the Minister of the endorsement under section 113 of the Act. The DOIC is an independent expert panel established to evaluate proposals for methodology determinations.

Application of the Determination

The *Carbon Credits (Carbon Farming Initiative) (Sequestering Carbon in Soils in Grazing Systems) Methodology Determination 2014* (the Determination) sets out the detailed rules for implementing and monitoring offsets projects that aim to remove carbon dioxide from the atmosphere by sequestering carbon in soil in a grazing system.

The projects will involve implementing management actions that will increase carbon inputs to soil or reduce losses of soil organic carbon, or both.

A project proponent wishing to implement the Determination must make an application to the Clean Energy Regulator (the Regulator) and meet the general eligibility requirements for an offsets project set out in subsection 27(4) of the Act. These requirements include compliance with the rules set out in the Determination.

Offsets projects that are undertaken in accordance with the Determination and approved by the Regulator can generate Australian carbon credit units (ACCUs) that can be sold into relevant markets in order to generate a source of revenue for the project proponent.

Public Consultation

The methodology determination proposal entitled *Measurement-Based Methodology for Sequestering Carbon in Soils in Grazing Systems* (the proposal) was developed by the

Department of the Environment (the Department) in consultation with the Commonwealth Scientific and Industrial Research Organisation.

The proposal was published on the website of the Department from 27 March 2014 to 6 May 2014 for public comment. Three public submissions relating to the proposal were received.

The DOIC considered the issues raised in the public submissions, and how they had been addressed by the applicant, during its assessment of the proposal as required under subsection 112(5) of the Act.

The proposal was endorsed by the DOIC on 27 June 2014.

The applicant consulted with the Regulator and the Australian Government Solicitor in the development of the Determination.

Determination Details

The Determination is a legislative instrument within the meaning of the *Legislative Instruments Act 2003*.

The Determination commences on the day after it is registered on the Federal Register of Legislative Instruments (FRLI).

The Determination expires when it is either revoked under section 123 of the Act, or on the day before it would otherwise be repealed under the *Legislative Instruments Act 2003*, whichever happens first. Under subsection 50(1) of that Act, a legislative instrument such as the Determination is repealed on the first 1 April or 1 October falling on or after the tenth anniversary of registration of the instrument on FRLI. For example, if the Determination is registered before 1 October 2014, it would expire on 30 September 2024.

Details of the Determination are at Attachment A.

A Statement of Compatibility prepared in accordance with the *Human Rights (Parliamentary Scrutiny) Act 2011* is at Attachment B.

Attachment A

Details of the Methodology Determination

Part 1 Preliminary

1.1 Name of Determination

Section 1.1 sets out the full name of the Determination, which is the *Carbon Credits (Carbon Farming Initiative) (Sequestering Carbon in Soils in Grazing Systems) Methodology Determination 2014*.

1.2. Duration

Section 1.2 sets out when the Determination commences and expires.

Paragraph 1.2(a) provides that the Determination commences on the day after it is registered on the Federal Register of Legislative Instruments (FRLI).

Under subparagraph 122(1)(b)(i) of the Act, a methodology determination remains in force for the period specified in the determination.

Paragraph 1.2(b) of the Determination specifies that the Determination expires the day before it would otherwise be repealed under the *Legislative Instruments Act 2003*. Instruments are repealed under that provision on the first 1 April or 1 October following the tenth anniversary of registration on FRLI. Paragraph 1.2(b) ensures that the Determination will expire in accordance with the Act, shortly before it would be repealed under the *Legislative Instruments Act 2003*.

If the Determination expires or is revoked during a crediting period for a project to which the Determination applies, the Determination will continue to apply to the project during the remainder of the crediting period under subsections 125(2) and 127(2) of the Act. Project proponents may apply to the Regulator during a reporting period to have a different methodology determination apply to their projects from the start of that reporting period (subsection 128(1) of the Act).

1.3 Definitions

Section 1.3 defines a number of terms used in the Determination.

Key definitions include those set out below.

activity start date refers to the date from which the project management actions may be applied on a carbon estimation area. That date will be the later of either the first day after the carbon estimation area baseline sampling round ends, or the first day after the Regulator decides to declare a project to be an eligible offsets project. The note to the definition clarifies that the latter date is when the Regulator makes its decision to declare the project under subsection 27(2) of the Act, rather than when the declaration takes effect. This is because, under subsection 27(15) of the Act, a declaration may take effect earlier than the date on which the decision to make it is made.

Note that where a project includes multiple carbon estimation areas, the project may include multiple activity start dates. See Figure 1b.

bare fallow refers to land that is not seeded and has less than 40% ground cover for 3 months or longer. The land may or may not be ploughed and may have been cultivated or chemically treated for the control of weeds and other pests.

baseline emissions period refers to the 5 financial years preceding the financial year in which the project start date occurs. It is the period over which baseline emissions from livestock, synthetic fertiliser, lime and tillage events are estimated.

carbon estimation area refers to an area of land in the project area in which soil organic carbon stocks are measured and soil organic carbon stock change is estimated. A project area may include one or more carbon estimation areas.

CFI soil sampling design method refers to the method that is used to develop a soil sampling plan, to locate sampling locations, and to report and record information on the soil sampling plan. The method is included in the *CFI Soil Sampling Design Method and Guidelines*.

CFI soil sampling and analysis method refers to the method that sets out the standards that need to be met when undertaking sample collection, preparation and analysis for measurement-based soil carbon methodologies. The method is included in the *CFI Soil Sampling and Analysis Method and Guidelines*.

exclusion area refers to land that is within the project area but that is excluded from estimates of soil organic carbon stock change.

organic fertiliser refers to any solid or liquid organic product (excluding polymers and non-biodegradable substances such as plastics, rubber and coatings) created using waste products of other industries and processes that can be applied to the surface of, or incorporated into, agricultural soils. Organic fertilisers include, but are not limited to, manure, castings, waste products, mulches, composts and soil conditioners.

production livestock refers to livestock managed for production purposes. These livestock serve as, or provide, products or services that are sold (for example, meat, wool, and stud services). These livestock do not include other useful animals on a property that may contribute to the farm but from which specific products or services are not derived. For example, horses in a stud are production animals. Horses used to muster cattle are not production livestock.

project duration refers to the time in years between the baseline sampling round and the most recent sampling round for a carbon estimation area (see Figure 1a). This term is used in the calculation of the average rate of soil organic carbon stock change after 3 or more sampling rounds using a regression approach.

project management actions refer to all management actions undertaken in the project area in the period between the activity start date and the end of the final crediting period. The project management actions must include one or more new management actions that differ from the historic management actions. One or more of the new management actions, whether individually or in combination with other project management actions, must aim to increase carbon inputs to the soil, reduce losses of soil organic carbon, or both.

The project management actions, and how they differ from historic management actions, must be described in the form required by the Regulator at the time of application for declaration as an eligible offsets project. This form must include a description of how the project management actions have the potential to increase carbon inputs to the soil, reduce losses of soil organic carbon, or both. The project management actions must not commence until the activity start date.

project start date refers to the date when the first reporting period for an eligible offsets project starts under subsection 76(1) of the Act. Under paragraph 76(1)(b) of the Act, the first reporting period for a project must begin when the declaration of the project under section 27 of the Act takes effect.

Regulations refers to the *Carbon Credits (Carbon Farming Initiative) Regulations 2011*, as amended from time to time.

sampling location refers to the location, specified by a latitude and a longitude, at which a sample has been taken or is to be taken. The intended sampling location is the location from which the sample is intended to be taken. The actual sampling location is the location from which the sample has been taken.

soil core refers to a discrete sample of soil that has been extracted with a coring device and includes the gravel (≥2 millimetres) and the fine fraction (<2 millimetres).

Standard Parameters and Emissions Factors refers to the document titled *Standard Parameters and Emissions Factors for Sequestering Carbon in Soils in Grazing Systems* that is published and made available on the Department's website (www.environment.gov.au). The document includes any amendments to the parameters and emissions factors based on updated information available to the Department, changes in the National Inventory, or changes in the carbon dioxide equivalence of the gases incorporated into those parameters and emissions factors and uploaded by the Department to its website from time to time. The note to the definition reminds proponents that they should check the Department's website to ensure that they have the most current version of the document.

stratum refers to an area of land that:

(a) is in a carbon estimation area; and

(b) meets the requirements in section 4.3.

tillage refers to any form of mechanical preparation of the soil and includes ploughing, cultivation and direct drill.

Note In accordance with section 23 of the *Acts Interpretation Act 1901*, words in the Determination in the singular number include the plural and words in the plural number include the singular.

Figure 1a provides an overview of the critical dates and time periods for a project implementing the Determination. The number of sampling rounds and reporting periods illustrated in **Figure 1a** are indicative, and may vary from project to project.

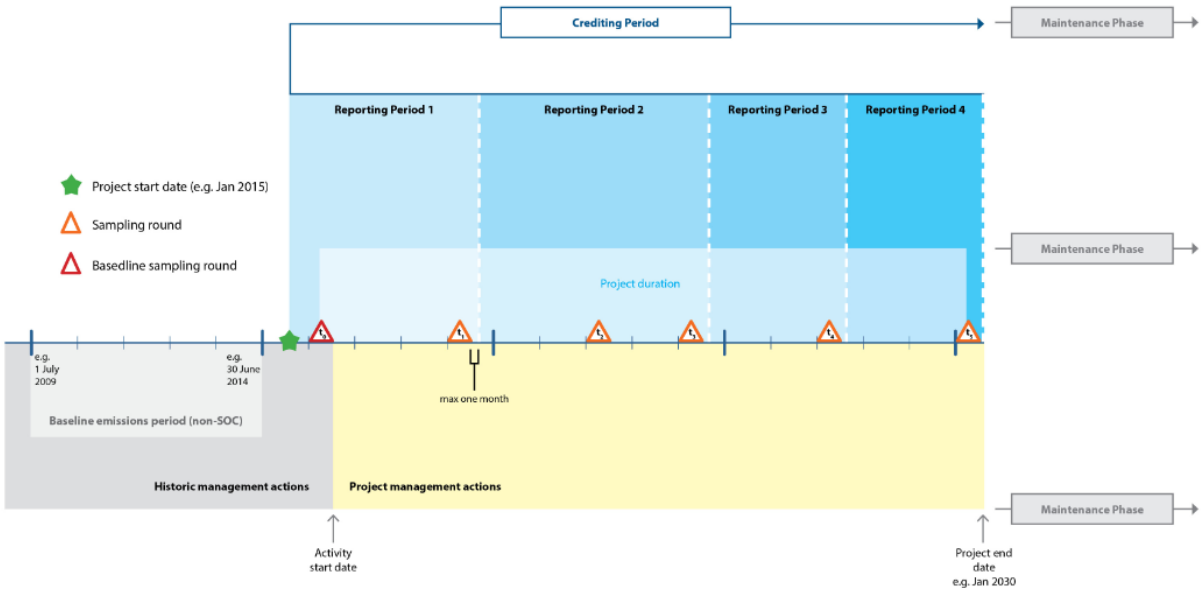
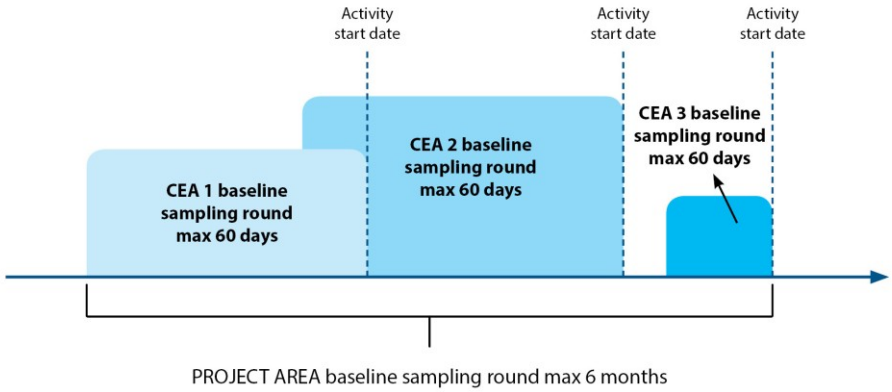


Figure 1b describes the relationship between carbon estimation area sampling rounds and the project area sampling round for a project area with multiple carbon estimation areas. This figure shows that the activity start date occurs the day after the last day of the carbon estimation area baseline sampling round. A project area with multiple carbon estimation areas may have multiple activity start dates.



1.4 Type of project to which this Determination applies

The effect of paragraphs 27(4)(b) and 106(1)(a) of the Act is that a project must be covered by a methodology determination, and that the methodology determination must specify the kind of offsets project to which it applies.

The Determination applies to the type of project specified in paragraph 3.28(1)(t) of the Regulations. In particular, the Determination applies to projects that remove carbon dioxide from the atmosphere by sequestering carbon in soil in a grazing system.

Changing the management of grazing systems can build soil organic carbon by increasing pasture productivity and hence boosting carbon inputs. Changing the management of grazing systems can also affect ground cover and soil structure, thereby creating conditions to retain soil organic carbon more effectively and to reduce the rate of loss of carbon.

Part 2 Requirements for declaration as eligible project

2.1 Eligible projects

The effect of paragraph 106(1)(b) of the Act is that a methodology determination must set out requirements that must be met for a project to be an eligible offsets project. Under paragraph 27(4)(c) of the Act, the Regulator must not declare that an offsets project is an eligible offsets project unless the Regulator is satisfied that the project meets these requirements.

Part 2 of the Determination specifies a number of requirements that must be met in order for a project to which the Determination applies to be declared an eligible offsets project.

The note to section 2.1 refers to regulatory requirements for applications for declarations. In particular, the note refers to regulation 3.36 of the Regulations. This regulation sets out the types of projects that are excluded offsets projects. Under paragraph 27(4)(m) of the Act excluded projects cannot be declared as eligible offsets projects.

2.2 Project mechanism

Section 2.2 specifies that the project mechanism, or activity, must consist of implementing project management actions that could increase carbon inputs to the soil, reduce losses of soil organic carbon, or both.

2.3 Project management actions

Section 2.3 contains general requirements relating to project management actions.

Scientific research suggests that it is possible to build soil carbon through management of grazing systems. However, identifying particular management strategies that reliably build soil carbon stocks across a range of environments is challenging. Environmental and economic factors such as soil type, management history, climate, business structure and attitudes to risk vary significantly from project to project. It cannot be assumed that any one or more management actions that effectively build soil carbon in one context will have similar results for other projects.

The Determination addresses these challenges in 2 ways:

(a) by providing project proponents with flexibility to select project management actions that are appropriate for their site; and

(b) by estimating change in soil organic carbon stocks through direct measurement.

Section 2.3 requires that descriptions of past and future management actions be provided to the Regulator.

Paragraph 2.3(a) requires a description of the management actions that were carried out in the 5 year period immediately before the application for declaration as an eligible offsets project.

Paragraph 2.3(b) requires a description of all the project management actions that will be carried out during the project. Project management actions may include actions that were carried out before the application for declaration as an eligible project and which will continue under the project. Project management actions must include at least one new management action.

Paragraph 2.3(c) requires a description of the new management actions that will be implemented as part of the project mechanism.

Paragraph 2.3(d) requires a description of how the new management actions could achieve the outcomes specified in section 2.2, whether individually or in combination with other new or project management actions.

The note to section 2.3 provides information on the types of evidence that a project proponent may provide to demonstrate that the project management actions could achieve the outcomes specified in section 2.2.

Where a similar set of historic management actions have been applied across the project area and the proposed project management actions are similar across the project area, then these actions can be described for the project area as a whole. Where the historic management actions have varied across the project area (for example a project area that includes areas under both continuous cropping and permanent pasture), and / or the proposed project management actions will vary across the project area, then proponents may need to describe the historic management actions and proposed project management actions for different parts of the project area separately.

The project management actions listed in subsection 3.7(4) may be taken to have the potential to achieve the outcomes specified in section 2.2. Proponents intending to implement these project management actions must still comply with the requirements of paragraph 2.3(d). Proponents wishing to demonstrate the potential of other management actions to achieve the outcomes specified in section 2.2 may provide information from sources such as scientific literature, industry publications or advice from qualified specialists such as agronomists or State or Territory departments of primary industries.

The purpose of paragraph 2.4(e) is to ensure that the project proponent has an understanding of how the project management actions will meet the operational requirements specified in Part 3 of the Determination.

2.4 Land on which project mechanism is implemented

Section 2.4 sets out the requirements for land where project activities may occur and, as a consequence, where project abatement will be estimated.

Subsection 2.4(2) specifies the area where a project to which the Determination applies may be located.

This must be an area within Australia, excluding external territories such as Christmas Island and Norfolk Island. These territories are excluded from the application of the Determination because scientific evidence that underpins the assumption that soil organic carbon levels are stable or declining only applies to mainland Australia and Tasmania.

Project proponents are required to implement the soil sampling design in the CFI soil sampling design method. This design can be applied on any area of land, but it is not expected to be suitable for very large project areas where rates of increase in soil organic carbon are likely to be slow, such as in more arid areas. This is because it is unlikely to be cost effective to sample in these areas at an intensity required to detect a change in soil organic carbon over a reasonable time period (such as 5 years). For this reason, the Determination may not be suitable for projects located in areas of the Australian rangelands.

Subsection 2.4(3) requires that the area in which the project activities will occur must include land that was under either permanent pasture or continuous cropping for the 5 year period immediately prior to the project. This requirement helps to ensure that soil carbon stocks are not fluctuating due to recent land use change. Areas that have recently been converted from crops to permanent pasture or have had phases of cropping and pasture may have fluctuating

soil carbon stocks, which would undermine the assumption that soil carbon stocks are stable or declining under the baseline scenario.

Subsection 2.4(3) provides that the area in which the project activities will occur can include areas of land that were under permanent pasture for the 5 year period prior to the project as well as areas of land that were under continuous cropping for the 5 year period prior to the project (see section 3.6).

Proponents must calculate the 5 year period with reference to either the application for declaration under section 22 of the Act, or the baseline sampling round, depending on which of these 2 events occurred first. For example, if a baseline sampling round is undertaken before the application for declaration, then the land on which the project mechanism will be implemented must have been under either permanent pasture or continuous cropping for the 5 years immediately before the first day of the baseline sampling round.

Subsection 2.4(4) specifies that evidence must be provided to the Regulator to demonstrate that the project area was managed as either a grazing system for production livestock or a continuous cropping system during the relevant 5 year period as determined in accordance with subsection 2.4(3).

The note to subsection 2.4(4) states that the evidence required under subsection 2.4(4) could include, but is not limited to, the types of evidence listed in the note.

Subsection 2.4(5) specifies that land that has been under continuous cropping for the relevant 5 year period must be converting to permanent pasture as part of the project management actions.

2.5 Identification of project area

The project area includes land on which an offsets project is carried out.

A project proponent is required to define the geographic boundaries of the project area when seeking a declaration of an eligible offsets project. The information and documentary requirements to identify a project area are specified in regulation 3.1 of the Regulations. Regulation 3.1 sets out the information and documentation that must accompany an application for a project to be declared an eligible offsets project.

Section 2.5 of the Determination provides that the boundaries of the area in which the project will occur must be identified in accordance with the CFI Mapping Guidelines.

Part 3 Requirements for operation of eligible projects

Division 3.1 Operation of eligible projects

Subdivision 3.1.1 Operation of eligible projects—general

3.1 Operation of eligible projects

Section 3.1 specifies that the rules for operating a project under the Determination are set out in Part 3.

Subdivision 3.1.2 Division of the project area

3.2 Initial division of project area

The effect of section 3.2 of the Determination is that a project area must comprise at least one carbon estimation area before submitting the first offsets report for the project.

The project area may include one or more exclusion areas.

3.3 Carbon estimation area boundaries

Section 3.3 sets out requirements for carbon estimation area boundaries.

The boundaries of a carbon estimation area must be identified in accordance with the requirements set out in the CFI soil sampling design method and the CFI Mapping Guidelines.

Subsection 3.3(3) provides that the boundaries of a carbon estimation area cannot change once a baseline sampling round has been undertaken in the carbon estimation area.

Where there is a discrepancy between the Determination and the CFI Mapping Guidelines, the Determination applies. For example, the requirement in subsection 3.3(3) of the Determination to maintain the same boundaries for carbon estimation areas prevails over the provisions of the CFI Mapping Guidelines which allow carbon estimation area boundaries to be changed.

3.4 Exclusion areas

An area of land must be defined as an exclusion area, in accordance with the CFI Mapping Guidelines, if it is an area of land within the project area which will not be subject to the project mechanism (for example a house block or rocky outcrop).

An exclusion area may adjoin, or be contained within the boundaries of, a carbon estimation area.

Exclusion areas within the project area should not be productive land; that is, the land should not be used for primary production. This is because changes in soil carbon stock are only calculated in the carbon estimation areas, while changes in emissions sources in the greenhouse gas assessment boundary, such as livestock emissions, are calculated for the project area as a whole (including the exclusion zones). If the project area contains exclusion areas which are productive areas of land upon which the project mechanism is not implemented then the area for which emissions sources are calculated is larger than the area upon which soil organic carbon stock change is calculated. This may potentially disadvantage project proponents.

Subdivision 3.1.3 Carbon estimation area requirements

3.5 Carbon estimation area requirements—general

Section 3.5 provides that a carbon estimation area must consist of land on which the project mechanism, or project activities, will be carried out.

3.6 Permanent pasture requirements for a carbon estimation area

Section 3.6 sets out 2 alternative permanent pasture requirements for carbon estimation areas.

The first option is set out in paragraph 3.6(1)(a). Under this option, the carbon estimation area must have been under permanent pasture in the relevant period specified in paragraph 3.6(1)(a).

The second option is that the carbon estimation area must have been under continuous cropping in the relevant period determined in accordance with paragraph 3.6(1)(b). Project areas that have been continuously cropped before the activity start date must convert to permanent pasture as part of the project management actions.

A project area may be comprised of multiple carbon estimation areas, including some that have been under permanent pasture for the 5 year period prior to the project and others that have been under continuous cropping. However, a particular carbon estimation area cannot have had phases of cropping and of permanent pasture in the relevant period specified in paragraphs 3.6(1)(a) and (b).

Division 3.2 Restricted activities

Division 3.2 restricts certain activities which may have an impact on carbon stocks in the project area.

3.7 Management actions

Subsection 3.7(1) provides that any management actions undertaken in the project area between the activity start date and the end of the final crediting period must be project management actions.

The note at subsection 3.7(1) clarifies that, once the final crediting period has ended, proponents are not required to continue the project management actions. Proponents are, however, required to notify the Regulator if a risk of reversal event (specified in subsection 7.3(2)) occurs during the period specified in subsection 7.4(1).

Subsection 3.7(2) specifies that project management actions must include at least one new management action that differs from historic management actions.

Subsection 3.7(3) specifies that one or more new management actions must be implemented in each carbon estimation area in the period beginning on the activity start date, and ending on the date 2 years from the final day of the relevant carbon estimation area baseline sampling round. The new management action or actions must be implemented before the t_1 sampling round. The activity start date will be after a carbon estimation area baseline sampling round has been completed in the area and after the Regulator has declared a project to be an eligible offsets project under subsection 27(2) of the Act.

Subsection 3.7(4) sets out a non-exhaustive list of possible new management actions. Project proponents may choose the new management action, or actions, that they implement in their project area. This gives proponents the flexibility to select management strategies that suit the particular conditions of their project.

It should be noted, however, that the listed indicative new management actions are not guaranteed to build soil carbon on any particular project site. The choice of which action or actions to apply in order to build soil carbon in grazing systems is entirely up to the proponent and all proponents are encouraged to research proposed management strategies and seek expert advice on what management actions will best suit their project site.

Subsection 3.7(5) provides a list of management actions that cannot be project management actions for the purposes the Determination.

3.8 Clearing woody vegetation

Section 3.8 specifies the situations in which clearing woody vegetation may be undertaken in the project area.

Section 3.8 provides that woody vegetation may be cleared from within the project area only to manage the regrowth of invasive woody weeds that have grown since the project start date and are growing on previously existing grassland or open woodland.

The note to section 3.8 clarifies that clearing of woody vegetation may require approval from the relevant State or Territory government agency, and that failure to obtain regulatory approvals may affect a project's status.

3.9 Organic fertiliser

Section 3.9 sets out the circumstances in which applying organic fertiliser that includes crop residue, hay or straw to the soil in a carbon estimation area is a project management action.

The Determination restricts the use of organic fertiliser that includes crop residue, hay or straw because removing biomass from an area can potentially reduce soil organic carbon stocks, reducing the net environmental benefit from the project. Where that crop residue, hay or straw would have been removed from an area regardless of the project (for example, straw that was used as poultry bedding) then it can be assumed that the project will not cause a decrease of soil organic carbon stocks through the removal of biomass.

Part 4 Requirements for soil carbon measurements

Division 4.1 Soil carbon measurements—general

4.1 Soil carbon measurements—general

Section 4.1 specifies that the processes for measuring soil carbon are set out in Division 4.1.

To be confident that carbon is being sequestered in soil, the Determination requires that temporal change in site-specific soil organic carbon stocks and their associated uncertainty must be measured.

The Determination requires project proponents to comply with the CFI soil sampling design method, which provides instructions on how to develop a soil sampling plan, locate sampling locations, and report and record information on the soil sampling plan and on the sampling locations. The soil sampling design in the CFI soil sampling design method is stratified simple random sampling with compositing across strata. The purpose of the soil sampling design is to detect changes in soil organic carbon stocks over time while minimising sampling costs. The soil sampling design does not require the project proponent to have any prior knowledge of the spatial variability of soil carbon in the project area. The method is included in the *CFI Soil Sampling Design Method and Guidelines*. The *CFI Soil Sampling Design Method and Guidelines* provide an explanation of the CFI soil sampling design method and additional guidance on how to implement the method.

The Determination also requires project proponents to comply with the CFI soil sampling and analysis method. The CFI soil sampling and analysis method describes the minimum requirements for soil sample collection, soil sample preparation and analysis of sub-samples at a laboratory. The method is included the *CFI Soil Sampling and Analysis Method and Guidelines*. The *CFI Soil Sampling and Analysis Method and Guidelines* provide additional guidance on, and explanation for, the steps involved in soil sample collection, preparation and analysis, and equations for calculating parameters to derive soil organic carbon stocks.

Division 4.2 Soil carbon measurements—requirements

4.2 Soil carbon measurements—definitions

Section 4.2 defines a number of terms used in Division 4.2.

Qualified technician is a defined term because, under the Determination, sampling must be carried out by a technician who has nationally accredited qualifications or formally recognised trade skills or prior learning, that address the specific competencies set out in the *CFI Soil Sampling and Analysis Method and Guidelines* (Appendix A, 'Soil Technician Competencies').

4.3 Strata

Section 4.3 sets out the requirements for establishing strata in carbon estimation areas.

The section requires that at least 3 evenly-sized strata be defined for each carbon estimation area in the project area in accordance with the CFI soil sampling design method and the CFI Mapping Guidelines. The CFI soil sampling design method requires that the strata be evenly sized within a 5% tolerance (paragraph D.2(1)(b)).

Subsection 4.3(4) specifies that the strata defined for the baseline sampling round must be maintained for all subsequent sampling rounds. This is because changing the strata boundaries would mean that the calculated soil organic carbon stock for the carbon estimation

area in subsequent sampling rounds would not have been calculated on the same basis and therefore may not be compared with the baseline sampling round.

4.4 Composites

Section 4.4 sets out the requirements for sampling locations and composites. Composites are soil samples created by bulking and mixing individual soil cores collected from different sampling locations.

A sampling location is randomly allocated within each stratum for each composite sample in the sampling plan. Single soil samples from the sampling location allocated to a composite in each stratum are combined to create that composite sample. A sub-sample from each composite is analysed for soil organic carbon content and water content. Creating a composite reduces the laboratory analysis costs for proponents as there is no need to analyse separately the soil organic carbon content of individual samples.

Subsection 4.4(2) requires that at least 3 composites be included in the sampling plan for each carbon estimation area.

The effect of subsections 4.4(2) and 4.3(1) is that at least 3 strata and 3 composites are required in each carbon estimation area. These minimum requirements are to mitigate the risk that a change in soil organic carbon over time is detected by chance. However, these are minimum requirements. Three strata and 3 composites may not be adequate to detect a change in soil organic carbon over time in a carbon estimation area. It is recommended that project proponents undertake their own assessment of the required strata and composites to include in each carbon estimation area. It is likely that more than 3 strata will be needed for a carbon estimation area. Project proponents should refer to the *CFI Soil Sampling Design Method and Guidelines* for information on the factors to consider when deciding on the number of strata and composites to include in their sampling plan.

Subsection 4.4(8) requires that sampling locations in sampling rounds subsequent to the baseline sampling round must be determined in accordance with the CFI soil sampling design method. In subsequent sampling rounds, project proponents can choose to vary the original sampling locations by a small distance or select new random sampling locations. Information on each approach is provided in the *CFI Soil Sampling Design Method and Guidelines*.

4.5 Sampling technicians

Section 4.5 provides that soil sampling under the Determination must be carried out by a ***qualified technician***, as defined in section 4.2.

The Determination requires that sampling and preparation are undertaken by a qualified technician because inappropriate collection, handling and preparation of samples can introduce significant error into the analysis results.

Each soil sample must be prepared and sub-sampled before laboratory analysis. Sample preparation steps include air-drying, weighing, crushing, sieving, mixing and sub-sampling composites. These steps can either be carried out by a qualified technician who has the necessary equipment prior to submitting sub-samples to a laboratory, or at a laboratory that meets the requirements of subsection 4.7(1).

4.6 Sampling, preparation and analysis of soil

Subsection 4.6(1)) requires samples to be collected in accordance with the CFI soil sampling and analysis method.

Subsections 4.6(2)–(5) set out the requirements for establishing a nominated sampling depth.

To ensure consistency with Australia's *National Inventory Report*, project proponents must nominate a sampling depth of at least 30 centimetres. The Determination provides proponents with the flexibility to sample deeper than 30 centimetres should they choose to do so. The nominated sampling depth must be the same depth at all sampling locations within a carbon estimation area. If sampling to a depth greater than 30 centimetres, the project proponent must calculate soil organic carbon stocks in 2 'layers' (an 'upper layer' from 0–30 centimetres, and a 'deeper layer' from 30 centimetres to the nominated sampling depth) in accordance with the provisions of the CFI soil sampling and analysis method and Parts 5 and 6 of the Determination.

Project proponents who have initially sampled to a depth greater than 30 centimetres may reduce their nominated sampling depth to 30 centimetres at subsequent sampling rounds. However, once the nominated sampling depth has been reduced to 30 centimetres, proponents may not increase their nominated sampling depth to deeper than 30 centimetres for the remainder of the project duration.

Subsections 4.6(6)–(7) set out the requirements for preparing sub-samples. A sub-sample is a representative portion of the composite sample (<2 mm fraction), upon which laboratory analyses are conducted. The aim of sub-sampling is to obtain a small but representative quantity of the composite sample for laboratory testing. Sub-samples must be created, stored and handled in accordance with the CFI soil sampling and analysis method.

4.7 Analysis of organic carbon and water content

Section 4.7 sets out the requirements for analysing the organic carbon and water content of sub-samples. Analysis of water content is required to calculate the bulk density of the soil (oven-dry soil mass per unit volume), which is needed to calculate the soil organic carbon stock in an area.

Subsection 4.7(1) requires that sub-samples must be analysed in laboratories:

(a) certified by the Australasian Soil and Plant Analysis Council (ASPAC) using a method that is certified through ASPAC for organic carbon analysis and gravimetric water content; or
(b) using an organic carbon method and gravimetric water content method that has been accredited for that laboratory by NATA under ISO-IEC 17025 (Chemical Testing).

Subsection 4.7(2) requires that the laboratory analysis of the soil sub-samples, and the content of the associated reports, must comply with the CFI soil sampling and analysis method in the *CFI Soil Sampling and Analysis Method and Guidelines*.

4.8 Commencement of baseline sampling round and project management actions

Subsection 4.8(1) provides that the baseline sampling round for each carbon estimation area in the project area must not begin until after the project start date.

The note to subsection 4.8(1) explains when the project start date occurs, including for projects in which the baseline sampling round is undertaken before an application for declaration of the project as an eligible offsets project is made to the Regulator.

Subsection 4.8(2) provides that the baseline sampling round for a carbon estimation area must not take longer to complete than 60 calendar days from the first day of sampling to the last day of sampling. Project proponents may choose the most appropriate time of year to undertake soil sampling, which will generally be when soil moisture conditions are suitable for sampling the soil type(s) within the carbon estimation area.

Subsection 4.8(3) specifies that project management actions must not begin in a carbon estimation area until the baseline sampling round has been completed. This ensures that an estimate of soil organic carbon stocks in the carbon estimation area is obtained before the project mechanism is implemented.

4.9 Sampling rounds and reporting periods—timing

Section 4.9 deals with the relationship between sampling rounds and reporting periods.

Subsections 4.9(1) and (2) specify that sampling rounds for all carbon estimation areas in the project area must be:

(a) completed within 60 calendar days from the first day of sampling to the last day of sampling; and

(b) completed within 6 months from the first day of the first carbon estimation area soil sampling round to the last day of the final carbon estimation area soil sampling round. This collective of every carbon estimation area sampling round within this 6 month period is referred to in the Determination as a ***project area sampling round***.

Subsection 4.9(3) requires that the last calendar day of a reporting period must be not more than 1 month after the last calendar day of a project area sampling round. This ensures that the time over which soil organic carbon stock change is estimated (the time between sampling rounds) closely corresponds to the period over which emissions from sources within the greenhouse gas assessment boundary are estimated (the reporting period). The note to the subsection states that a reporting period does not need to end after every project area sampling round. That is, the first reporting period can include 2 or more sampling rounds while subsequent reporting periods can include one or more sampling rounds.

4.10 Sampling rounds—frequency

Section 4.10 provides for the timing and frequency of carbon estimation area sampling rounds.

Subsection 4.10(1) requires that for each carbon estimation area in the project area, the median day, month and year of the carbon estimation area baseline sampling round (which is referred to as 't_0' in the Determination) be recorded to the nearest day. This is the middle date of the baseline sampling round or the next calendar date if the sampling round took an even number of days.

Subsection 4.10(2) sets out the general rule for the timing of sampling in a carbon estimation area. According to this general rule, all sampling carried out in the same carbon estimation area in the years after the carbon estimation area baseline sampling round must occur no more than 30 days before, and no more than 30 days after, the median day and month of the date of the carbon estimation area baseline sampling round.

This is to ensure that each round of soil sampling is conducted at approximately the same time of year, thereby minimising the impact of intra-annual variability on measured soil organic carbon stock change over time. The ability to sample within 30 days before or after the median day and month of the carbon estimation area baseline sampling round provides project proponents with some flexibility to choose a suitable time for undertaking sampling. The exception to this rule is set out in section 4.11.

Subsection 4.10(3) requires that the day/s, month/s and year/s of all carbon estimation area sampling rounds after the carbon estimation area baseline sampling round be recorded.

Subsection 4.10(4) specifies that the time between consecutive sampling rounds (the ***sampling interval***) must not be less than 1 year or more than 5 years, with allowances for the times specified in subsection 4.10(2) or for an extension of time under section 4.11.

Subsection 4.10(5) requires that the sampling interval must not vary by more than 2 years over the project duration. This is because the use of a linear regression to calculate soil organic carbon stock change over time is more accurate if sampling rounds occur at regular sampling intervals. For example, if there were 2 years between the t_0 and t_1 sampling rounds and 4 years between the t_1 and t_2 sampling rounds, then the number of years between the t_2 and t_3 sampling rounds must be 2, 3 or 4 years.

4.11 Sampling rounds—extension of time by Regulator

Section 4.11 allows a project proponent to apply to the Regulator to seek an extension of time to carry out a carbon estimation area sampling round if exceptional circumstances prevent sampling within the timeframes specified in subsection 4.10(2).

Subsection 4.11(2) provides that the sampling must be carried out within the timeframe specified by the Regulator.

Examples of exceptional circumstances may include soil moisture levels being too low to enable accurate sampling, weather events such as heavy rain or fire inhibiting access to the site, or unexpected circumstances rendering qualified technicians unavailable.

Evidence that may be provided to the Regulator in support of an application for an extension of time could include a statutory declaration from the qualified technician stating that the conditions are unsuitable for soil sampling.

4.12 Sampling rounds—organic fertiliser

Section 4.12 requires that where organic fertiliser has been applied to a carbon estimation area, that carbon estimation area must not be re-sampled until 2 years (less 30 days as provided for in subsection 4.10(2)) has elapsed since the last day that organic fertiliser was applied to that carbon estimation area.

This restriction allows time for the organic fertiliser to decompose and minimises the risk that it will bias the results of soil organic carbon analysis.

Part 5 The net abatement amount—baseline calculations

Division 5.1 The net abatement amount

5.1 The net abatement amount

Under the Determination, abatement is calculated as the change in soil organic carbon stocks in the reporting period minus any increase in greenhouse gas emissions from livestock, synthetic fertiliser, lime and tillage during the reporting period.

Division 5.2 Baseline calculations—Preliminary

5.2 General

Section 5.2 refers to factors or parameters that are used in a calculation and derived from the:

- *National Greenhouse and Energy Reporting Regulations 2008* (the NGER Regulations);
- the *National Greenhouse and Energy Reporting (Measurement) Determination 2008* (the NGER Measurement Determination);
- the *Standard Parameters and Emissions Factors*; or
- Australia's *National Inventory Report*.

The effect of subsection 5.2(1) is that if any factors or parameters derived from the 4 specified sources and relied upon in the Determination are amended during a project's reporting period, then the project proponent is required to use the new factor or parameter prescribed in the source that is in force at the time the report is submitted, or required to be submitted, whichever is earlier.

Subsection 5.2(2) clarifies that, for the purposes of calculating net abatement for a particular reporting period, the project proponent needs to recalculate the baseline emissions using the relevant factor. Other values carried over from previous reporting periods and used to derive the net abatement number for the current reporting period do not need to be recalculated.

5.3 Greenhouse gas assessment boundary

Section 5.3 describes the greenhouse gas sources and carbon pools that need to be assessed in order to determine the amount of carbon dioxide removed from the atmosphere when undertaking the project activity. The greenhouse gas assessment boundary includes the soil organic carbon pool within the project area and the emission of greenhouse gases from establishing and managing the project.

The carbon pool and emission sources which need to be taken into account when calculating abatement for the project are set out below.

Soil carbon sequestration

Soil organic carbon sequestration is the abatement pathway for the Determination. Changes in soil organic carbon stocks are included within its greenhouse gas assessment boundary.

Livestock emissions

There is potential for livestock numbers, and hence emissions, to increase as a result of a project to which the Determination applies. Accordingly this source is included within the greenhouse gas assessment boundary.

Synthetic Fertiliser emissions

There is the potential for emissions from synthetic fertilisers to increase as a result of a project to which the Determination applies. Accordingly this source is included within the greenhouse gas assessment boundary.

Lime emissions

There is the potential for emissions from lime to increase as a result of a project to which the Determination applies. Therefore this source is included within the greenhouse gas assessment boundary.

Tillage emissions

A range of tillage activities associated with pasture establishment, pasture cropping, and pasture renovation or renewal could potentially be carried out under the Determination. Tillage has the potential to cause emissions of greenhouse gases through 4 pathways: loss of soil organic carbon, release of nitrous oxide from soil, fuel use and release of nitrous oxide from decomposition of crop or pasture residue.

Emissions from loss of soil organic carbon are already accounted for through soil organic carbon stock measurements, and emissions of nitrous oxides from soil are unlikely to be material given that the project eligibility requirement to exclude bare fallow will ensure that adequate plants are available to take up residual nitrates. Therefore tillage emissions from these pathways are not accounted for in the greenhouse gas assessment boundary.

The Determination accounts for emissions from fuel use associated with tillage and for emissions from the decomposition of crop or pasture residue using National Inventory methods.

A number of emission sources are excluded from the abatement calculations under the Determination.

Organic Fertiliser emissions

Emissions associated with the application of organic fertiliser to land, any processing of feedstocks to form the value-added organic fertiliser (such as compost), and the subsequent decomposition of the fertiliser would likely be less than or equal to the emissions from the feedstock in the absence of the project. Accordingly, emissions from organic fertiliser are not accounted for within the greenhouse gas assessment boundary.

Other fuel use emissions

Fuel use emissions, other than for tillage events, are likely to be immaterial in projects to which the Determination applies and so are not accounted for within the greenhouse gas assessment boundary.

Vegetation and woody biomass

Emissions or removals of greenhouse gases from vegetation and woody biomass are not likely to change as a result of the project and so are not accounted for within the greenhouse gas assessment boundary.

Feed supplements

Feed supplements are excluded as a potential emissions source on the grounds that it is conservative to do so.

Fire emissions

It is unlikely that project management activities will lead to an increase in the frequency or intensity (and hence emissions from) fire events. Therefore this source is excluded from the greenhouse gas assessment boundary.

Division 5.3 Baseline—general

Division 5.3 sets out the requirements for the baseline scenarios covered by the Determination.

5.4 Baseline—general

Section 5.4 specifies that the baseline scenario for each carbon estimation area must be calculated in accordance with Part 5 of the Determination.

5.5 Baseline—emissions

Subsections 5.5(1) and (2) set out the general approach to calculating baseline emissions from emissions sources within the greenhouse gas assessment boundary.

Given the diversity of management practices employed by broadacre farming and grazing enterprises, the Determination does not prescribe a standardised baseline for all projects. Rather, each project must determine the baseline emissions that would have been released in the absence of the project from each source within the greenhouse gas assessment boundary. The assumed baseline scenarios are primarily derived using historic data from management practices during the baseline emissions period (being the 5 financial years preceding the financial year of the project start date).

In some cases it may be difficult for proponents to provide data to verify their historic management and, hence, calculate baseline emissions. To address this situation, alternative baseline scenarios are provided for some sources. Further, proponents who are unable to provide records to calculate baseline emissions from a particular source may still be able undertake a project under the Determination, but will receive zero baseline emissions for the source where the verification requirements of the Determination cannot be met.

Emissions from different sources may vary from year to year in the baseline emissions period due to a number of factors such as environmental variation. In order to account for this variation the Determination does not require proponents to account for changes in emissions from sources in the greenhouse gas assessment boundary unless the mean annual emissions in the reporting period vary from mean annual baseline emissions by a certain amount.

Depending on the source and the relevant baseline, this amount is derived by calculating either the standard deviation, or the tolerance margin, of the mean annual emissions from the relevant source during the baseline emissions period. Where the difference in project emissions relative to baseline emissions exceeds the standard deviation or tolerance margin, it is considered that there is a material difference which must be accounted for in calculating net abatement.

Division 5.4 Baseline—soil carbon

Subdivision 5.4.1 Soil carbon baseline—general

5.6 Soil carbon baseline—general

Section 5.6 sets out the general requirements for calculating the soil carbon baseline.

The soil carbon baseline is the soil organic carbon stock measured at the baseline sampling round, before project management actions are implemented.

Section 5.6 provides that, for the purposes of Division 5.4, the soil organic carbon stocks for the baseline sampling round must be calculated in up to 2 sequential soil layers for each carbon estimation area.

Note that it is not a requirement to sample soil deeper than 30 centimetres. Project proponents must sample the upper 0–30 centimetre layer. Proponents may also sample a deeper layer (for example, in circumstances where they consider that their project management actions will result in changes in soil organic carbon stock below 30 centimetres).

Subsection 5.6(3) specifies that the first, or upper, layer must extend from the surface of the soil to a depth of 30 centimetres. The second, deeper, soil layer must extend from the base of the first layer (at 30 centimetres) to the nominated sampling depth chosen by the project proponent (for example 45, 60 or 90 centimetres from the soil surface).

The note to paragraph 5.6(3)(c) clarifies the distinction between a nominated sampling depth and an actual sampling depth. At some sampling locations, it may not be possible to sample to the nominated sampling depth, due to the coring device encountering bedrock or impenetrable layers. In these cases the actual sampling depth would be to the depth reached by the coring device.

Paragraph 5.6(3)(d) specifies that the nominated thickness of each soil layer will be denoted by T_n plus the layer (0–30 centimetres or 30–*x* centimetres).

The note to paragraph 5.6(3)(d) clarifies that the nominated thickness of each soil layer directly relates to the nominated sampling depth. For example, if the nominated sampling depth is 30 centimetres, the value of T_n for the 0–30 centimetre layer is 30 centimetres. If the nominated sampling depth is 60 centimetres, the value of T_n for the 0–30 centimetre upper soil layer is 30 centimetres and the value for the deeper soil layer (which in this example is 30–60 centimetres) is also 30 centimetres.

Subsection 5.6(4) specifies that a nominated sampling depth that is greater than 30 centimetres is indicated as '*x* centimetres'.

Data required to calculate the soil organic carbon stocks in each soil layer for each composite sample for the baseline sampling round include the values for the percentage oven-dry organic carbon content (OC_{OD}), bulk density (BD), gravimetric gravel content (P_{gravel}), the nominated thickness of the soil layer (T_n) and the average actual thickness of the soil layer (T_a) for each composite sample at the baseline sampling round. Values for OC_{OD}, BD, P_{gravel} and T_a must be calculated using the Equations in Section 6 of the *CFI Soil Sampling and Analysis Method and Guidelines.*

Subdivision 5.4.2 Soil carbon baseline—equivalent soil mass calculations

Variations in soil bulk density must be taken into account to measure soil carbon stock change over time correctly. Changes in bulk density through time will change the mass of soil sampled at a fixed depth and will affect the calculation of soil organic carbon stocks. Calculations must be included to adjust for these changes otherwise the magnitude of soil organic carbon stock change will be incorrect. The impact of variations in bulk density on soil organic carbon stock has been addressed in the Determination by using an equivalent soil mass approach.

Calculating the equivalent soil mass for each layer in a carbon estimation area based on composite samples collected during the baseline sampling round provides a fixed comparison point for calculating the soil organic carbon stocks of each layer at subsequent sampling rounds. Calculations for the equivalent soil mass approach adopted by the Determination are set out in Subdivision 5.4.2.

5.7 Soil carbon baseline—equivalent soil mass values

The equivalent soil mass approach adopted by the Determination requires calculation of the following values, specified in subsection 5.7(2), from the baseline soil sampling round:

(a) the mass of soil contained in each soil layer, assuming that the nominated thickness (T_n) of each soil layer was attained (see section 5.8);
(b) the cumulative mass of soil contained between the soil surface (0 centimetres) and the nominated sampling depth (see section 5.9); and
(c) the equivalent soil mass contained between the soil surface (0 centimetres) and the lower boundary of each layer sampled, assuming that the nominated thickness (T_n) of each soil layer was attained (see section 5.10).

Subsection 5.7(4) provides for carbon estimation areas where only the upper soil layer (0–30 centimetres) is sampled. In these cases only one equivalent soil mass value needs to be calculated for the carbon estimation area.

Subsection 5.7(5) specifies that, where an upper soil layer (0–30 centimetres) and a deeper soil layer (30–*x* centimetres) were sampled, the 2 equivalent soil mass values set out in paragraphs 5.7(5)(a) and (b) must be calculated.

5.8 Soil carbon baseline—mass of soil

Section 5.8 specifies how to calculate the mass of soil contained in the nominated thickness of each soil layer per hectare for each composite sample collected from the carbon estimation area at the baseline soil sampling round.

No subscript for the composite (i) is used for the parameter $T_{n,l}$, since the nominated thickness must be the same value for all composite samples within a carbon estimation area at a given sampling round.

The bulk density of the l^{th} soil layer for the i^{th} composite soil sample at the baseline sampling round ($BD_{t_0 i,l}$) must be calculated in accordance with the formulae in Section 6 of the *CFI Soil Sampling and Analysis Method and Guidelines*.

5.9 Soil carbon baseline—cumulative mass of soil

Section 5.9 requires the calculation of the cumulative mass of soil that would have been collected between the soil surface (0 centimetres) and the nominated sampling depth (either 30 centimetres or a nominated sampling depth that is greater than 30 centimetres).

5.10 Soil carbon baseline—equivalent soil mass

The equivalent soil mass (ESM_d) that is contained between the surface and the lower boundary of each soil layer sampled is calculated as the tenth percentile of the values derived for the baseline cumulative soil mass ($CSM_{t_0\ i,d}$—Equation SC2) across all composite samples collected from the l^{th} soil layer within the carbon estimation area at the time of baseline sampling round.

The tenth percentile (rather than a higher percentile) is used to lessen the mathematical requirement to add soil with an unmeasured carbon content to the bottom of the samples. Using the tenth percentile, and not the lowest value, also helps avoid the situation of having a

potentially incorrect or low measured value for $CSM_{t_0\ i,d}$ dictate all future calculations. The value derived is used as the equivalent soil mass for all subsequent sampling rounds conducted within the carbon estimation area.

Section 5.10 sets out the procedure for calculating ESM_d associated with the tenth percentile.

5.11 Soil carbon baseline— calculating the tenth percentile by interpolation

If one of the calculated values for the percentile referred to in subsection 5.10(5) is exactly 10, then ESM_d is equivalent to the value of $CSM_{t_0 i,d}$ associated with P=10 (see subsection 5.10(6)). However, it is more likely that no individual value of P will be exactly 10 and the value of the tenth percentile will have to be calculated by interpolation.

The procedure for undertaking the calculation of the value of the tenth percentile by interpolation is set out in section 5.11 in Subdivision 5.4.3.

Subdivision 5.4.3 Baseline soil organic carbon stocks

Subdivision 5.4.3 sets out the formulae to be used to calculate soil organic carbon stocks where only the 0–30 centimetre soil layer was sampled, and the formulae to be used where upper (0–30 centimetres) and deeper (30–*x* centimetres) soil layers were sampled.

The requirements both to use an equivalent soil mass approach when quantifying soil organic carbon stocks and their temporal variation, and to correct for situations where it was not possible to obtain a soil sample to the nominated sampling depth, necessitates the use of different formulae to calculate the soil organic carbon stocks where only the upper soil layer (0–30 centimetres) was sampled compared to where the upper (0–30 centimetres) and deeper (30–*x* centimetres) layers were sampled.

Where only the 0–30 centimetre layer was sampled, the approach set out in sections 5.13–5.15 must be used. This includes an approach for correcting soil organic carbon stocks for circumstances where it was not possible to reach the nominated sampling depth of 30 centimetres.

Where 2 sequential layers were sampled the approach set out in sections 5.16–5.18 must be used. Where 2 sequential soil layers were sampled, the soil organic carbon stock in the deeper soil layer (30–*x* centimetres) is calculated as the difference between the soil organic carbon stock to the *x* centimetre depth and the soil organic carbon stock to a 30 centimetre depth expressed on an equivalent mass basis, with the soil organic stocks to *x* centimetres corrected for circumstances where it was not possible to reach the nominated sampling depth.

In the Equations set out in sections 5.19 and 5.20, which calculate the mean and standard deviation of the corrected soil organic carbon stock in the equivalent soil mass for each soil layer of each carbon estimation area, the subscript *l* is used to denote the layers. Since all calculations are completed for one soil layer at a time, the reference to a particular depth layer has been removed from the subscript to simplify the presentation of the Equations.

Subdivision 5.4.4 Soil organic carbon baseline—additional calculations

The Equations SC17, SC18 and SC19 in sections 5.22–5.24 are provided in the Determination to assist project proponents to calculate the total baseline soil organic carbon stocks for each carbon estimation area soil layer, for each carbon estimation area, and for the project area, respectively.

The values derived from these Equations are not required to calculate changes in soil organic carbon stocks over time.

Division 5.5 Baseline—production livestock

Division 5.5 sets out the process for calculating the emissions from production livestock during the baseline emissions period.

Subsection 5.25(2) sets out 2 alternative approaches to calculating livestock emissions for the baseline emissions period.

The general rule is that proponents must use historic stocking data to calculate mean annual emissions and standard deviation under livestock baseline A. The Equations for determining emissions from livestock in accordance with baseline A are set out in Subdivision 5.5.2.

In circumstances where a proponent can demonstrate to the Regulator that property specific data is not available, then they may use livestock baseline B to calculate baseline emissions. For example, a proponent who has recently purchased a property may not be able to provide property specific data on historic stocking rates.

The Equations for determining emissions from livestock in accordance with baseline B are set out in Subdivision 5.5.3.

To simplify data collection, reporting, and verification requirements the Determination uses a number of default factors and parameters, derived from the National Inventory, to calculate emissions from livestock. These factors and parameters are set out in the Standard Parameters and Emissions Factors as updated from time to time.

Division 5.6 Baseline—synthetic fertiliser

The Determination sets out 3 approaches to calculating synthetic fertiliser emissions for the baseline emissions period, depending on the land use of the relevant area. These approaches are set out in Division 5.6.

Under Division 5.6, the project area will automatically receive a default zero baseline (synthetic fertiliser baseline A) unless the project area incorporates pasture used for dairy cattle or the project is converting continuously cropped land to permanent pasture. A zero baseline is applied to pasture used for non-dairy livestock because application rates of nitrogenous fertiliser are typically low in these situations and this approach reduces the administrative complexity of reporting and verifying historic fertiliser application rates using records that may cover both areas under pasture and areas under crops.

For land in the project area that was under pasture for dairy cattle, and to which nitrogenous fertiliser has been applied, proponents must calculate the mean annual emissions from synthetic fertiliser for the baseline emissions period for that land using synthetic fertiliser baseline B. A separate baseline is provided for land under pasture for dairy cattle because synthetic fertilisers are typically applied to these pastures to maintain feed quality and milk production.

Proponents with a project area that is transitioning from continuous cropping must calculate their mean annual emissions from synthetic fertiliser for the baseline emissions period using verifiable data, and in accordance with synthetic fertiliser baseline C. A separate baseline is provided for land that is transitioning from continuous cropping because synthetic fertilisers are typically applied to cropped land in substantial quantities.

Baseline emissions from parts of the project area that were under pasture for dairy cattle and that were under continuous cropping are summed to derive mean annual emissions for the baseline emissions period.

To simplify data collection, reporting, and verification requirements the Determination uses a number of default factors and parameters, derived from the National Inventory, to calculate emissions from synthetic fertiliser. These factors and parameters are set out in the Standard Parameters and Emissions Factors as updated from time to time.

The Equations for determining baseline emissions from synthetic fertiliser are set out in Division 5.6.

Division 5.7 Baseline—lime

Division 5.7 sets out the formulae for calculating the mean annual emissions from lime, and the standard deviation of those emissions, during the baseline emissions period.

For each application of lime, the quantity of carbonates ($CaCO_3$ or $CaMg(CO_3)_2$) applied for each year of the baseline emissions period must be calculated in accordance with section 5.50. Proponents should note that the percentage carbonate content of lime is described as its neutralising value.

To simplify data collection, reporting, and verification requirements the Determination uses a number of default factors and parameters, derived from the National Inventory, to calculate emissions from tillage events. These factors and parameters are set out in the Standard Parameters and Emissions Factors as updated from time to time.

The Equations for determining baseline emissions from lime are set out in Division 5.7.

Division 5.8 Baseline—tillage events

Division 5.8 sets out the formulae for calculating the mean annual emissions from tillage events, and the standard deviation of those emissions, during the baseline emissions period.

Emissions from tillage events include nitrous oxide releases from crop and pasture residues as well as greenhouse gases emitted from fuel use. To simplify data collection, reporting, and verification requirements the Determination uses a number of default factors and parameters, derived from the National Inventory, to calculate emissions from tillage events. These factors and parameters are set out in the Standard Parameters and Emissions Factors as updated from time to time.

A range of factors will influence actual fuel usage by tillage machinery including the tillage equipment used, soil type and structure, and machine power and efficiency. To simplify data collection, reporting, and verification requirements the Determination estimates fuel use emissions using the method and values of the *National Greenhouse and Energy Reporting (Measurement) Determination 2008* (as updated from time to time) and using a default parameter for fuel use of 12 litres of diesel fuel per hectare.

The Equations for determining baseline emissions from tillage events are set out in Division 5.8.

Part 6 The net abatement amount—project calculations

Division 6.1 Calculation of soil organic carbon stocks

Subdivision 6.1.1 Soil organic carbon stock calculations—general

This Division sets out formulae that must be used when calculating the soil organic carbon stock change for an eligible offsets project to which this Determination applies.

The Determination sets out 2 methods for calculating soil organic carbon stock change over time. The first method calculates soil organic carbon stock change after 2 sampling rounds. Project proponents will only need to use the first method if they submit their first offsets report after 2 sampling rounds. The second method calculates soil organic carbon stock change after 3 or more sampling rounds. A project proponent will need to use the second method for their first offsets report if they have completed 3 or more sampling rounds within the first reporting period. The second method will be used for all subsequent reporting periods and offset reports.

Subsection 6.1(2) sets out the notation for sampling rounds, where t_0 means the baseline sampling round, t_1 means the first sampling round after the baseline sampling round and t_x means any sampling round after the t_1 sampling round. That is, t_x could be t_2, t_3, t_4 etc.

Subdivision 6.1.2 Soil organic carbon stock calculations—t_1 sampling round

Subdivision 6.1.2 sets out the process for calculating the soil organic carbon stock at the t_1 sampling round.

Subsection 6.2(1) requires that for projects with one soil layer (0–30 centimetres) the corrected soil organic carbon stock in the equivalent soil mass for each composite sample at the t_1 sampling round must be calculated in accordance with sections 5.8 and 5.13–5.15, substituting t_1 for t_0.

Subsection 6.2(2) requires that for projects with 2 soil layers (0–30 centimetres and 30–x centimetres) the corrected soil organic carbon stock in the equivalent soil mass in each soil layer for each composite sample at the t_1 sampling round must be calculated in accordance with sections 5.8 and 5.16–5.18, substituting t_1 for t_0.

Data required to calculate the soil organic carbon stocks in each soil layer for each composite sample for the t_1 sampling round include the values for the percentage oven-dry organic carbon content (OC_{OD}), bulk density (BD), gravimetric gravel content (P_{gravel}), the nominated thickness of the soil layer (T_n) and the average actual thickness of the soil layer (T_a) for each composite sample at the t_1 sampling round. Values for OC_{OD}, BD, P_{gravel} and T_a must be calculated using the Equations in Section 6 of the *CFI Soil Sampling and Analysis Method and Guidelines.*

The equivalent soil mass calculations in Equations SC2, SC3 and SC4 (sections 5.9–5.11) are not repeated at t_1, as the values for ESM_d calculated at the baseline sampling round (t_0) must be used to calculate the corrected soil organic carbon stocks in the equivalent soil mass at all subsequent sampling rounds.

Subsections 6.3 and 6.4 describe the process for calculating the mean and standard deviation of the corrected soil organic carbon stocks in the equivalent soil mass for each soil layer of each carbon estimation area at the t_1 sampling round. These values are used in the Equations in Subdivision 6.1.3 to determine the extent of change in soil organic carbon stock between t_0 and t_1.

Subdivision 6.1.3 Soil organic carbon stock change calculations—between t_0 and t_1

Subdivision 6.1.3 sets out the process for determining the critical change in soil organic carbon stock between the baseline sampling round (t_0) and the subsequent t_1 sampling round associated with a defined probability of 60%. That is, the value for the critical soil organic carbon stock change is the mean change in soil organic carbon stock that would be exceeded 60% of the time. The probability of exceedance of 60% adopted in the Determination meets the need to be conservative and to reward sampling effort, without precluding reasonable rates of soil organic carbon stock change being recognised.

The statistical approach adopted in Subdivision 6.1.3 assumes that the composite samples are independent and that the number of composite samples (n_{t_0} and n_{t_1}) and the standard deviations (SD_{t_0} and SD_{t_1}) obtained for the t_0 and t_1 soil sampling rounds, respectively, could be different.

Subdivision 6.1.3 sets out the processes for determining:

- the change in mean corrected soil organic carbon stock in the equivalent soil mass for each soil layer of each carbon estimation area between t_0 and t_1—see section 6.6.
- the standard deviation of the difference between means, using the standard deviation of the soil organic carbon stocks and number of composite samples from the baseline sampling round (t_0), and the standard deviation of the soil organic carbon stocks and number of composite samples from the subsequent sampling round (t_1)—see section 6.7.
- the critical change in corrected soil organic carbon stock in the equivalent soil mass for each soil layer in each carbon estimation area over the period t_0 to t_1 for a probability of exceedance of 60%—see section 6.8.
- the total critical change in corrected soil organic carbon stock in the equivalent soil mass for each soil layer across the entire area of the carbon estimation area over the period t_0 to t_1 with a probability of exceedance of 60%—see section 6.9.
- the total critical change in corrected soil organic carbon stock in the equivalent soil mass for each carbon estimation area over the period t_0 to t_1 with a probability of exceedance of 60%—see section 6.10.
- the total critical change in corrected soil organic carbon stock in the equivalent soil mass for the project area over the period t_0 to t_1 with a probability of exceedance of 60%—see section 6.11; and
- the total critical change in corrected soil organic carbon stock in the equivalent soil masses for the project area with a probability of exceedance of 60%, converted to carbon dioxide equivalents—see section 6.12.

With only 2 temporal sampling rounds (t_0 and t_1) it is not possible to determine whether a detected change in soil organic carbon stocks is due to management or some other factor, such as climatic variability. As a consequence, it is not possible to determine whether that increase in soil organic carbon stocks is able to be maintained over time. To avoid the potential for credits to be issued for changes in stocks that may not be able to be maintained over time, section 6.13 requires that a 50% discount be applied to the total critical change in soil organic carbon stocks for the project area over the period t_0 to t_1.

After 3 or more sampling rounds the change in soil organic carbon stock is recalculated for the entire project duration using the regression approach, as set out in Subdivision 6.1.4. In this way the 50% discount is only temporarily applied to the calculation of soil organic carbon stock change.

Subdivision 6.1.4 Soil organic carbon stock calculations—after 3 or more sampling rounds (t_x)

Subdivision 6.1.4 sets out the process for calculating the soil organic carbon stock at the t_x sampling round. The t_x sampling round is any sampling round after the t_1 sampling round.

Subsection 6.14(1) requires that for projects with one soil layer (0–30 centimetres) the corrected soil organic carbon stock in the equivalent soil mass for each composite sample at the t_x sampling round must be calculated in accordance with sections 5.8 and 5.13–5.15, substituting t_x for t_0.

Subsection 6.14(2) requires that for projects with 2 soil layers (0–30 centimetres and 30–*x* centimetres) the corrected soil organic carbon stock in the equivalent soil mass in each soil layer for each composite sample at the t_x sampling round must be calculated in accordance with sections 5.8 and 5.16–5.18, substituting t_x for t_0.

Data required to calculate the soil organic carbon stocks in each soil layer for each composite sample for the t_x sampling round include the values for the percentage oven-dry organic carbon content (OC_{OD}), bulk density (BD), gravimetric gravel content (P_{gravel}), the nominated thickness of the soil layer (T_n) and the average actual thickness of the soil layer (T_a) for each composite sample at the t_x sampling round. Values for OC_{OD}, BD, P_{gravel} and T_a must be calculated using the Equations in Section 6 of the *CFI Soil Sampling and Analysis Method and Guidelines.*

The equivalent soil mass calculations in Equations SC2, SC3 and SC4 (sections 5.9–5.11) are not repeated at t_x, as the values for ESM_d calculated at the baseline sampling round (t_0) must be used to calculate the corrected soil organic carbon stocks in the equivalent soil mass at all subsequent sampling rounds.

Sections 6.15 and 6.16 describe the process for calculating the mean and standard deviation of the corrected soil organic carbon stocks in the equivalent soil mass for each soil layer of each carbon estimation area at the t_x sampling round. These values are used in the Equations in Subdivision 6.1.5 to determine the extent of change in soil organic carbon stock between t_0 and t_x.

Subdivision 6.1.5 Soil organic carbon stock change calculations—between baseline (t_0) and subsequent (t_x) sampling rounds

After 3 or more sampling rounds have been completed, it is possible to take a regression approach to determine the average change in soil organic carbon stock over time. The slope of the linear regression produced by plotting the mean corrected soil organic carbon stock against the duration of the project provides an estimate of the average rate of soil organic carbon stock change (t C/ha/y).

The Determination adopts this approach because a trend line will more accurately describe the average soil organic carbon stock change over time due to new management actions, as it smooths the fluctuations in soil organic carbon stocks that can occur due to natural variation. This approach operates on the assumption that other factors that influence soil organic

carbon, such as rainfall and temperature, are random and vary through time, but the impact of management actions on soil organic carbon tend to be constant and less variable.

Subdivision 6.1.5 sets out the process for determining the critical average rate of soil organic carbon stock change over the project duration associated with a defined probability of 60%. That is, the critical rate of soil organic carbon stock change is the average rate of soil organic carbon stock change that would be exceeded 60% of the time. Figure 2 below illustrates this mechanism. Calculating the rate of soil organic carbon stock change based on the slope associated with a defined probability of 60%, rather than the slope associated with a defined probability of 50% (the line of best fit), reduces the risk of over-estimating soil organic carbon stock change and provides a high degree of confidence that the accumulation of soil organic carbon stock is real.

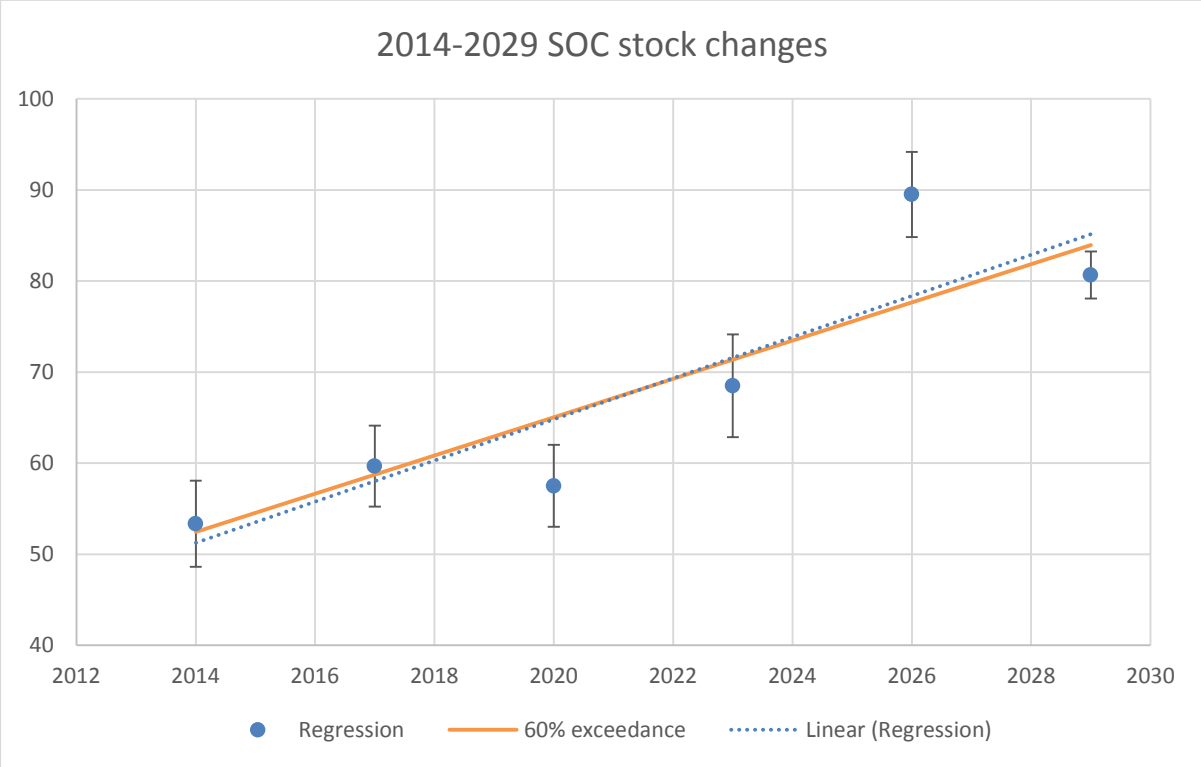


Figure 2: An example of a linear regression for a project with 6 sampling rounds over 15 years. The blue dotted line is the line of best fit (the slope associated with a 50% probability of exceedance) and the orange line is the slope associated with a 60% probability of exceedance.

Subdivision 6.1.5 sets out the processes for determining:

- the average rate of change of corrected soil organic carbon stock in the equivalent soil mass for each soil layer of each carbon estimation area between t_0 and t_x—see section 6.17. Section 6.17 describes how, for each soil layer in a carbon estimation area, the mean corrected soil organic carbon stock in the equivalent soil mass determined for each sampling round must be plotted as a function of the duration of the project when the soil sampling rounds occurred. The values of mean corrected soil organic carbon stock from all sampling rounds, including the t_0, t_1 and all t_x sampling rounds, must be included in the plot for the regression analysis.

- the critical average rate of change of the corrected soil organic carbon stock in the equivalent mass for each soil layer in each carbon estimation area over the period t_0 to t_x for a probability of exceedance of 60%—see section 6.18.
- the total critical change in corrected soil organic carbon stock in the equivalent soil mass for each soil layer across the entire area of the carbon estimation area over the period t_0 to t_x with a probability of exceedance of 60%—see section 6.19.
- the total critical change in corrected soil organic carbon stock in the equivalent soil mass for each carbon estimation area over the period t_0 to t_x with a probability of exceedance of 60%—see section 6.20.
- the total critical change in corrected soil organic carbon stock in the equivalent soil mass for the project area over the period t_0 to t_x with a probability of exceedance of 60%—see section 6.21; and
- the total critical change in corrected soil organic carbon stock in the equivalent soil masses for the project area with a probability of exceedance of 60%, converted to carbon dioxide equivalents—see section 6.22.

Subdivision 6.1.6 Soil organic carbon stock change over a reporting period

Subdivision 6.1.6 requires that the change in soil organic carbon stocks for the project area in CO_2-e must be calculated for each reporting period. This value is included in the net abatement calculation in Division 6.3.

The last calendar day of a reporting period must be no more than 1 month after the last date of a project area sampling round (which is the collective of every carbon estimation area sampling round). A reporting period does not need to end after every project area sampling round, so a reporting period may include several sampling rounds.

Subdivision 6.1.6 sets out the processes for determining:

- the corrected soil organic carbon stock change in the project area over the first reporting period—see section 6.24; and
- the corrected soil organic carbon stock change in the project area over the second and subsequent reporting periods—see section 6.25.

For second and subsequent reporting periods, section 6.25 requires that the change in corrected soil organic carbon stock for the project area for each reporting period is calculated as the total critical change in corrected soil organic carbon stock for the project area over the project duration (from t_0 to t_x), minus any previously reported change in corrected soil organic carbon stock for the project area.

Division 6.2 Calculation of project emissions

Subdivision 6.2.1 Calculation of project emissions—general

Under the Determination, all proponents must calculate the mean annual emissions from each source within the greenhouse gas assessment boundary for the reporting period. For each source they must compare mean annual emissions for the reporting period against the mean annual emissions for the baseline emissions period. If the mean annual emissions for the reporting period fall outside of the bounds of one standard deviation (or, where relevant,

outside the tolerance margin) of the mean annual emissions for the baseline emissions period, then there has been a material difference between project and baseline emissions.

The material difference must be calculated and used to derive the net change in greenhouse gas emissions from all sources due to the project. This means that, where emissions from one source decrease due to the project, they may offset increases in emissions from other sources.

Subdivision 6.2.2 Calculation of project emissions—production livestock

Subdivision 6.2.2 sets out the process for determining:

- the mean annual livestock emissions during the reporting period—see sections 6.27–6.31.
- the material difference (if any) between mean baseline emissions period and mean reporting period emissions—see section 6.32. The material difference must be calculated using whichever of equations LS13 and LS14 apply.
- the change in livestock emissions for the reporting period—see section 6.33.

Equation LS10 in section 6.29 uses the default emission factor for the livestock group ($EF_{LS,gijk}$). The values for $EF_{LS,gijk}$ are set out in Tables 1–4 of the *Standard Parameters and Emission Factors*. The values in the tables have been derived using National Inventory approaches.

Subdivision 6.2.3 Calculation of emissions from synthetic fertiliser

Subdivision 6.2.3 sets out the process for determining:

- the mean annual emissions from synthetic fertiliser during the reporting period—see sections 6.34–6.39.
- the material difference (if any) between mean baseline emissions period and mean reporting period emissions—see section 6.40. The material difference must be calculated using whichever of equations SF17 and SF18 apply.
- the change in emissions from synthetic fertiliser for the reporting period—see section 6.41.

Equation SF13 in section 6.36 uses the default emission factor for the synthetic fertiliser group ($EF_{SF,ij}$). The values for $EF_{SF,ij}$ are set out in Table 5 of the *Standard Parameters and Emission Factors*. The values in the tables have been derived using National Inventory approaches.

Equation SF14 in section 6.37 uses the National Inventory emission factor for carbon dioxide emissions from urea (EF_U), as updated from time to time. The factor is currently 0.73 (IPCC (2006) default emission factor).

Subdivision 6.2.4 Calculation of emissions from lime

Subdivision 6.2.4 sets out the process for determining:

- the mean annual emissions from lime during the reporting period—see sections 6.42–6.46.
- the material difference (if any) between mean baseline emissions period and mean reporting period emissions—see section 6.47. The material difference must be calculated using whichever of Equations L10 and L11 apply.
- the change in emissions from lime for the reporting period—see section 6.48.

Subdivision 6.2.5 Calculation of emissions from tillage events

Subdivision 6.2.5 sets out the process for determining:

- the mean annual emissions from tillage events during the reporting period—see sections 6.49–6.55.
- the material difference (if any) between mean baseline emissions period and mean reporting period emissions—see section 6.56. The material difference must be calculated using whichever of equations T14 and T15 apply.
- the change in emissions from tillage events for the reporting period—see section 6.57.

Equation T8 in section 6.50 uses the National Inventory emission factor for residues (EF_R), as updated from time to time. The factor is currently 6.09 tonnes CO_2-e / tonne N (IPCC (2006) default emission factor).

The values for $Z_{v,}$ O_v, XF_v and RN_v in Equation T8 are set out in Table 6 of the *Standard Parameters and Emission Factors*. The values in the tables have been derived using National Inventory approaches.

Equation T10 in section 6.52 uses the National Inventory emission factor for residues (EF_R), as updated from time to time. The factor is currently 6.09 tonnes CO_2-e / tonne N (IPCC (2006) default emission factor).

$RF_{p,Y}$ in Equation T10 is the fraction of residues of pasture removed in a given year. The pasture may be removed through, for example, grazing or baling.

The values for O_p and RN_p in Equation T10 are set out in Table 7 of the *Standard Parameters and Emission Factors*. The values in the tables have been derived using National Inventory approaches.

A default fuel use quantity of 0.012 kL is used in Equation T11 in Section 6.53. This factor has been developed considering a range of different tillage types.

The values for EC_F and EF_{Fg} are set out in are set out in Part 4 ('Fuel combustion—fuels for transport energy purposes') of Schedule 1 ('Energy content factors and emission factors') to the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*, as updated from time to time.

Subdivision 6.2.6 Calculation of emissions from all sources within greenhouse gas assessment boundary

6.58 Project emissions from all sources—general

Where there is a material difference between the mean annual emissions in the baseline emissions period and the mean annual emissions in the reporting period for a given source, the Determination requires that this difference be used to calculate the total change in emissions from that source.

The total change in emissions from each source must be summed to calculate the total change in emissions from all sources within the greenhouse gas assessment boundary.

If the total change in emissions from all sources within the greenhouse gas assessment boundary for a given reporting period is a positive value (that is, there has been a net increase in emissions from all sources as a consequence of the project), then this value will be deducted from soil organic carbon stock change for that reporting period to calculate net abatement.

If the total change in emissions from all sources within the greenhouse gas assessment boundary for a given reporting period is a negative value (that is, there has been a net decrease in emissions from all sources as a consequence of the project), then this value is taken to equal zero for the purpose of calculating net abatement for that reporting period. This decrease in emissions is not recognised in the calculation of net abatement because the Determination only provides for abatement through soil carbon sequestration.

However, if the total change in emissions from all sources is a negative value for a given reporting period, then this value is carried into calculations of total change in emissions in the subsequent reporting period. In this way, a decrease in emissions due to the project in one reporting period may offset potential increases in emissions due to the project in the following reporting period.

6.59 Project emissions from all sources—calculation

Section 6.59 provides that the total emissions from all sources within the greenhouse gas assessment boundary during the reporting period must be calculated in accordance with Equation EALL1.

Division 6.3 Calculation of the carbon dioxide equivalent net abatement amount

6.60 Calculating the carbon dioxide equivalent net abatement amount—first reporting period

The carbon dioxide equivalent net abatement amount for an offsets project to which the Determination applies must be calculated for the first reporting period using Equation NA1.

Net greenhouse gas abatement for the first reporting period is the change in soil organic carbon stock for the project area in CO_2-e ($\Delta CO_2e\text{-}PA_{Rc}$), minus the total change in greenhouse gas emissions from all sources for the project area in CO_2-e ($\Delta E_{all_{Rc}}$).

In circumstances where 2 sampling rounds (that is, the baseline sampling round and one subsequent sampling round) have been completed within the first reporting period, the change in soil organic carbon stocks for the project area in CO_2-e over the reporting period ($\Delta CO_2e\text{-}PA_{Rc}$) equals $Discounted\text{-}\Delta CO_2e\text{-}PA\_cor_{(t_0-t_1)}$ (calculated using Equation SC31—see section 6.13).

In circumstances where 3 or more sampling rounds have been completed within the first reporting period, the change in soil organic carbon stocks for the project area in CO_2-e over

the reporting period ($\Delta CO_2e\text{-}PA_{Rc}$), equals $Critical\text{-}\Delta CO_2e\text{-}PA\_cor_{(t_0-t_x)}$ (calculated using Equation SC43—see section 6.22).

If the change in soil carbon stock in CO_2-e for the reporting period ($\Delta CO_2e\text{-}PA_{Rc}$), calculated using Equation SC31 or Equation SC43, is less than zero, then $\Delta CO_2e\text{-}PA_{Rc}$ equals zero for the purpose of the net greenhouse gas abatement calculation in Equation NA1. The soil organic carbon stock change can be assumed to be zero, because the calculated soil organic carbon stock change for the subsequent reporting period will take into account soil organic carbon stock change over the entire project duration: that is, there will be a 'true-up' of soil organic carbon stock change in the subsequent reporting period.

The total change in greenhouse gas emission from all sources for the project area in CO_2-e ($\Delta E_{all_{Rc}}$) must be greater than or equal to zero for the purpose of the net greenhouse gas abatement calculation in Equation NA1, in accordance with subsections 6.59(3) and (4).

6.61 Calculating the carbon dioxide equivalent net abatement amount—subsequent reporting periods

The carbon dioxide equivalent net abatement amount for an offsets project to which the Determination applies must be calculated for the second and subsequent reporting periods using Equation NA2 or NA3.

For second and subsequent reporting periods, net greenhouse gas abatement is the change in soil organic carbon stock for the project area in CO_2-e for the current reporting period ($\Delta CO_2e\text{-}PA_{Rc}$), minus the total change in greenhouse gas emissions from all sources for the project area in CO_2-e for the current reporting period ($\Delta E_{all_{Rc}}$), plus the net abatement number for the reporting period prior to the current reporting period ($NA_{R(c-1)}$), in circumstances where $NA_{R(c-1)}$ was less than zero.

If the net abatement number for the reporting period immediately prior to the current reporting period was greater than or equal to zero, then the net abatement number for the current reporting period must be calculated using Equation NA2.

If the net abatement number for the reporting period immediately prior to the current reporting period was less than zero, then the net abatement number for the current reporting period must be calculated using Equation NA3. In circumstances where the net abatement number for the reporting period prior to the current reporting period ($NA_{R(c-1)}$) was less than zero, Equation NA3 requires that $NA_{R(c-1)}$ be carried over into the calculation of net abatement for the current reporting period. This ensures that all increases in emissions from all sources within the greenhouse gas assessment boundary are accounted for over the crediting period.

If the change in soil organic carbon stock in CO_2-e for the current reporting period ($\Delta CO_2e\text{-}PA_{Rc}$) as calculated using Equation SC44 is less than zero, then $\Delta CO_2e\text{-}PA_{Rc}$ equals zero for the purpose of the net greenhouse gas abatement calculation in Equations NA2 and NA3, unless the current reporting period is the final reporting period of the project. In that case $\Delta CO_2e\text{-}PA_{Rc}$ equals the value calculated using Equation SC44.

The total change in greenhouse gas emission from all sources for the project area in CO_2-e ($\Delta E_{all_{Rc}}$) must be greater than or equal to zero for the purpose of the net greenhouse gas abatement calculation in Equation NA2 and NA3, in accordance with subsections 6.59(3) and (4).

Division 6.4 Data collection

Division 6.4 sets out the data requirements for estimating baseline and project emissions.

The information specified in Division 6.4 is required to derive input parameters for the calculations set out in Parts 5 and 6.

Part 7 Monitoring, record-keeping and reporting requirements

Division 7.1 General

7.1 Application

Subsection 106(3) of the Act provides that a methodology determination may require the project proponent of an eligible offsets project to comply with specified monitoring, record-keeping and reporting requirements.

Under Parts 17 and 21 of the Act, a failure to comply with these requirements may constitute a breach of a civil penalty provision, and a financial penalty may be payable.

The monitoring, record-keeping and reporting requirements specified in Part 7 of the Determination are in addition to any requirements specified in the Regulations.

Division 7.2 Monitoring requirements

7.2 Project monitoring—general

Section 7.2 requires that a project proponent monitor the matters specified in Division 7.2.

The proponent must also provide to the Regulator the information specified in the Division.

7.3 Project monitoring—risk of reversal events and known erosion events

Section 7.3 specifies that a project proponent must monitor risk of reversal events or erosion events in the project area.

7.4 Project monitoring—notification of risk of reversal events and known erosion events

The Act (sections 81 and 82) and Regulations (regulation 6.11) impose a general obligation on proponents to notify the Regulator if there is a 'significant reversal' in carbon due to:

- a deliberate act by the proponent (notify within 90 days);
- a deliberate act by another person (notify within 60 days);
- a natural disturbance (notify within 60 days).

In addition to these general obligations, section 7.4 of the Determination requires proponents to notify the Regulator of known erosion events. Section 7.4 also requires project proponents to notify the Regulator if one of the 'risk of reversal' events specified in section 7.3 occur.

This notification will assist the Regulator to prioritise its compliance and monitoring program.

Subsection 7.4(1) sets out when a project proponent is required to notify the Regulator in writing if a risk of reversal event, or a known erosion event, occurs.

7.5 Project monitoring—notification of proposed changes to project management actions

Subsection 7.5(1) specifies that a project proponent must provide advance written notification to the Regulator advising of any proposed changes to the project management actions, including cessation of management actions.

Subsection 7.5(2) sets out the formal requirements for notification under section 7.5.

Subsection 7.5(4) provides that the proponent may not undertake any proposed management actions until the Regulator provides written confirmation that the project management actions for that project have been amended to include the proposed project management actions.

The effect of section 7.5 is that the project proponent may change the project management actions during the project, but the project management actions must continue to meet the criteria described in the Determination, and any changes must be approved by the Regulator.

Division 7.3 Record-keeping requirements

Division 7.3 sets out the records that must be maintained in relation to the project to demonstrate, if required, that the project is carried out in accordance with the Determination.

Record keeping requirements relating to the design of the sampling program and the physical soil sampling are set out in the CFI soil sampling design method (in the *CFI Soil Sampling Design Method and Guidelines*) and the CFI soil sampling and analysis method (in the *CFI Soil Sampling and Analysis Method and Guidelines*). Project proponents are required to comply with the record keeping requirements set out in the method sections of those documents—see subsection 7.6(2).

Specific information that must be kept in relation to particular parts of the Determination is set out in sections 7.7–7.12.

Division 7.4 Offsets report requirements

7.13 Information in first offsets report

Section 7.13 sets out the information that must be included in an offsets report for the first reporting period for the project.

7.14 Information in subsequent offsets reports

Section 7.14 sets out information that must be included in the second and subsequent offsets reports for the project.

7.15 Information in all offsets reports

Section 7.15 sets out information that must be included in all offsets reports for the project.

Subsection 7.15(4) specifies that all reports must contain the information required by the CFI soil sampling design method and the CFI soil sampling and analysis method. Where the methods specify that certain information is only required in particular reports (for example, the first offsets report), it is not required to be provided in other reports.

Attachment B

Statement of Compatibility with Human Rights

Prepared in accordance with Part 3 of the *Human Rights (Parliamentary Scrutiny) Act 2011*

Carbon Credits (Carbon Farming Initiative) (Sequestering Carbon in Soils in Grazing Systems) Methodology Determination 2014

This legislative instrument is compatible with the human rights and freedoms recognised or declared in the international instruments listed in section 3 of the *Human Rights (Parliamentary Scrutiny) Act 2011*.

Overview of the Legislative Instrument

The *Carbon Credits (Carbon Farming Initiative) (Sequestering Carbon in Soils in Grazing Systems) Methodology Determination 2014* (the Determination) sets out the detailed rules for implementing and monitoring offsets projects that sequester carbon in soil in a grazing system. The project activities, or 'mechanism', involve implementing management actions that could increase carbon inputs to soil or reduce losses of soil organic carbon, or both. The Determination applies to projects in which land has been under either permanent pasture or under continuous cropping and that are converting to permanent pasture as part of the project.

Project proponents wishing to implement the Determination must make an application to the Clean Energy Regulator (the Regulator) and meet the eligibility requirements set out under the *Carbon Credits (Carbon Farming Initiative) Act 2011*. Offsets projects that are approved by the Regulator can generate Australian carbon credit units that can be sold to:

- Australian companies that pay the carbon price established under the *Clean Energy Act 2011*; and
- businesses in Australia wanting to offset their own carbon pollution.

Human rights implications

This legislative instrument does not engage any of the applicable rights or freedoms.

Conclusion

This legislative instrument is compatible with human rights as it does not raise any human rights issues.

Greg Hunt, Minister for the Environment