

EXPLANATORY STATEMENT

Carbon Credits (Carbon Farming Initiative) Act 2011

Carbon Credits (Carbon Farming Initiative—Avoided Deforestation 1.1) Methodology Determination 2015

Background: Emissions Reduction Fund

The *Carbon Credits (Carbon Farming Initiative) Act 2011* (the Act) enables the crediting of greenhouse gas abatement from emissions reduction activities across the economy. 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.

In 2014, the Act was amended by the *Carbon Farming Initiative Amendment Act 2014* (the amending Act), which establishes the Emissions Reduction Fund (ERF). The ERF expands on the Carbon Farming Initiative (CFI) by extending the scope of eligible emissions reduction activities and by streamlining existing processes. The ERF has three elements: crediting emissions reductions, purchasing emissions reductions, and safeguarding emissions reductions.

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 rules for monitoring, record keeping and reporting. These determinations will ensure that emissions reductions are genuine—that they are both real and additional to business as usual.

In deciding to make a methodology determination, the Minister must have regard to the advice of the Emissions Reduction Assurance Committee (ERAC), an independent expert panel established to advise the Minister on proposals for methodology determinations. The Minister will also consider whether any adverse environmental, economic or social impacts are likely to arise as a result of projects to which the determination applies.

The ERAC must include in its advice to the Minister the Committee's opinion on whether the proposed determination complies with the offsets integrity standards set out in section 133 of the Act. The offsets integrity standards require, among other things, that an eligible project should result in carbon abatement that is unlikely to occur in the ordinary course of events and is eligible carbon abatement under the Act. In summary, the offsets integrity standards also include requirements that:

- amounts are measurable and capable of being verified
- the methods used are supported by clear and convincing evidence
- material emissions which are a direct consequence of the project are deducted, and

- estimates, assumptions or projections used in the determination should be conservative.

Offsets projects that are undertaken in accordance with a methodology determination and approved by the Clean Energy Regulator (the Regulator) can generate Australian Carbon Credit Units (ACCUs), representing emissions reductions from the project.

Project proponents can receive funding from the ERF by submitting their projects into a competitive auction run by the Regulator. The Government will enter into contracts with successful proponents, which will guarantee the price and payment for the future delivery of emissions reductions.

Further Information on the Emissions Reduction Fund is available at:
www.environment.gov.au/emissions-reduction-fund.

Application of the Determination

The *Carbon Credits (Carbon Farming Initiative—Avoided Deforestation 1.1) Methodology Determination 2015* (the Determination) sets out the detailed rules for implementing and monitoring offsets projects that avoid emissions by not clearing native forest, and which meet the eligibility requirements in Part 2 of the Determination. These rules have been designed to reflect the requirements of the offsets integrity standards, including to ensure that emissions reductions are real and additional to business as usual.

A project proponent wishing to implement the Determination must make an application to the Clean Energy Regulator (the Regulator) under section 22 of the Act and meet the general eligibility requirements for an offsets project set out in subsection 27(4), which include compliance with the rules set out in the Determination, and the additionality requirements in subsection 27(4A) of the Act. The additionality requirements are:

- the newness requirement
- the regulatory additionality requirement, and
- the government program requirement.

The government program requirement is provided for in the *Carbon Credits (Carbon Farming Initiative) Rule 2015*. Subsection 27(4A) of the Act provides that a methodology determination that covers the project may specify requirements in lieu of the Act's newness requirement or the regulatory additionality requirement. The determination does not specify any requirements in lieu, and the newness and regulatory additionality requirements in the Act apply to projects under the Determination.

Section 23 of the Act provides that, if a project is a sequestration offsets project, an application to the Regulator under section 22 must include a request that the project be treated as either a 100-year or 25-year permanence period project. Then, if the Regulator declares that the project is an eligible offsets project, the Regulator will declare that the project is a 100-year or 25-year permanence period project, as appropriate. Once declared, the permanence period is fixed at either 100 years or 25 years, and it will not be possible for

projects to ‘move between’ permanence periods. (However, it is possible for the regulations or legislative rules to specify a period that is longer or shorter than 100 years – section 87 of the Act.)

If the project proponent elects a 25-year permanence period, a permanence discount applies in accordance with section 16 of the Act. The permanence discount is 20 per cent of the net abatement number unless another percentage is specified in accordance with the legislative rules.

As they are sequestration offsets projects under section 54 of the Act, projects undertaken in accordance with the Determination are subject to a risk of reversal buffer, as provided by section 16 of the Act.

The Determination is derived from the *Carbon Credits (Carbon Farming Initiative) (Avoided Deforestation) Methodology Determination 2013*, referred to as the original *Avoided Deforestation* method. The Determination applies to the same activity as the original *Avoided Deforestation* method—avoided deforestation of Kyoto forests—but has slightly different eligibility requirements, different crediting periods, and some minor changes in the sampling protocol.

Public Consultation

An exposure draft of a draft of the Determination was published on the Department’s website for public consultation from 5 December 2014 to 19 December 2014. As a result of the public consultation the Department received two written submissions.

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.

The Determination ends 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 April 2015, it would expire on 31 March 2025.

Details of the Determination are at [Attachment A](#).

For the purpose of subsections 106(4), (4A) and (4B) of the Act, in making this Determination the Minister has had regard to, and agrees with, the advice of the ERAC that the Determination complies with the offsets integrity standards and that the proposed Determination should be made. The Minister is satisfied that the carbon abatement used in ascertaining the carbon dioxide equivalent net abatement amount for a project is eligible carbon abatement from the project. The Minister also had regard to whether any adverse

environmental, economic or social impacts are likely to arise from the carrying out of the kind of project to which the Determination applies and other relevant considerations.

Subitem 393A(2) of Schedule 1 of the *Carbon Farming Initiative Amendment Act 2014* operated in relation to this Determination to deem the request to the Interim ERAC to be the relevant request to the statutory ERAC under subsection 106(10) of the Act. Subitem 393A(3) then allowed the ERAC to consider the consultation on the exposure draft which occurred before 13 December 2014 and not re-open consultation under section 123D of the Act.

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

Note on this explanatory statement

Numbered sections in this explanatory statement align with the relevant sections of the Determination.

Details of the Determination

Part 1—Preliminary

1. Name

Section 1 provides that the Determination is the *Carbon Credits (Carbon Farming Initiative—Avoided Deforestation 1.1) Methodology Determination 2015*.

2. Commencement

Paragraph 122(1)(a) of the Act provides that a methodology determination comes into force either when it is made, or at a later time specified in the determination. Section 2 provides that the Determination commences on the day after it is registered.

3. Authority

Section 3 provides that the Determination is made under subsection 106(1) of the Act.

4. Duration

Paragraph 122(1)(b) of the Act provides that, unless sooner revoked, a methodology determination remains in force for either the period specified in the determination, or a longer period specified, in a legislative instrument, by the Minister. Section 4 specifies a period for the purposes of this paragraph.

Section 4 provides that the Determination remains in force for the period that begins when the Determination commences, and ends on the day before this instrument would otherwise be repealed under subsection 50(1) of the *Legislative Instruments Act 2003*.

5. Definitions

Section 5 defines a number of terms used in the Determination.

The note at the foot of section 5 lists terms that are not defined in the Determination but which instead have the meaning given to them by section 5 of the Act.

Under section 23 of the *Acts Interpretation Act 1901* and paragraph 13(1)(a) of the *Legislative Instruments Act 2003*, words in the Determination in the singular number include the plural and words in the plural number include the singular.

6. Crediting period

Section 6 provides that projects covered by this Determination have a 15 year crediting period. This represents a revision in the crediting period from 20 years, as provided for with the original *Avoided Deforestation* method, to better reflect when abatement occurs.

Part 2—Avoided deforestation projects

7. Avoided deforestation projects

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.

Subsection 7(1) provides that the Determination applies to an offsets project that:

- involves:
 - removing carbon dioxide from the atmosphere by sequestering carbon in trees in one or more native forests; and
 - avoiding emissions of greenhouse gases attributable to the clearing of one or more native forests; and
- can reasonably be expected to result in ‘eligible carbon abatement’.

Subsection (2) provides that a project covered by subsection (1) is an ‘avoided deforestation project’.

Part 3—Project requirements

Division 1—General

8. Operation of this Part

The effect of paragraph 106(1)(b) of the Act is that a 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. The effect of section 35 of the Act is that the Regulator may, if an appropriate regulation or legislative rule is made, revoke the declaration that a project is an eligible offsets project if eligibility requirements have not been met.

Part 3 of the Determination specifies a number of requirements that must be met in order for an avoided deforestation project to be an eligible offsets project.

Division 2—Location

9. Location

This section requires that the project area must be located in Australia. The term ‘Australia’ is defined in the Act as including the external Territories. The term ‘external Territory’ is defined in the *Acts Interpretation Act 1901*.

‘Project area’ is defined in the Act as meaning, in relation to an area-based offsets project, ‘an area of land on which the project has been, is being, or is to be carried out’.

10. Project area to include eligible native forest

Section 10 provides that the project area must include ‘native forest’ that meets the requirements specified in that provision. ‘Native forest’ is defined in section 5 of the Determination. The requirements of subsection (1) of this section are summarised below.

Paragraph (a) provides that the native forest in the project area must have attained forest cover at the time of the application under section 22 of the Act. Forest cover means an area of at least 0.2 of a hectare that has 20 per cent or more canopy cover and trees greater than 2 metres in height. This differs from the definition of ‘native forest’, which may be satisfied by trees with the ‘potential’ to attain these qualities. Unlike the original *Avoided Deforestation* method, the project area does not have to have been forest on 31 December 1989 or at all times between 1990 and project commencement.

Paragraph (b) provides that there must be a clearing consent in relation to the native forest which satisfies the requirements of that paragraph. The terms ‘clearing’ and ‘clearing consent’ are defined in section 5 of the Determination. The requirements of paragraph (b) are needed because the broad definition of ‘clearing’ could otherwise capture the conversion of native forest to settlements, and the broad definition of ‘clearing consent’ could otherwise

capture approval to convert native forest to plantation, neither of which are permitted by the Determination.

The requirements of paragraph (b) are discussed in more detail below.

- Subparagraph (i) provides that the clearing consent had to be issued before 1 July 2010. This requirement protects the integrity of the additionality as permits issued after this date may have been obtained by landholders with the sole intention to access revenue from carbon, rather than intending to clear land.
- Subparagraph (ii) provides that at the time the project proponent applies to the Regulator for a project under section 22 of the Act, the clearing consent must be valid.
- Subparagraph (iii) provides that the clearing consent must provide that clearing is permitted for the purpose of converting the native forest to cropland or grassland. The Determination may be applied only to native forests that would otherwise be converted to cropland or grassland because other land uses could result in abatement which the calculations in the Determination are not intended to capture. For example, a plantation on the project land in the baseline could sequester a significant amount of carbon, which would have to be subtracted from the abatement achieved in the project. However, the Determination does not provide for the calculation of this kind of sequestration and so would over-estimate the amount of abatement achieved in the project.
- Subparagraph (iv) provides that the clearing consent must not allow the conversion of the native forest to plantation or settlements.
- Subparagraph (v) provides that the clearing consent must specify that once the native forest is converted to cropland or grassland, these land-uses must be maintained into the future. This supports the assumption under the baseline calculation that the native forest would not be permitted to regenerate. If other land-uses which resulted in sequestration were to occur in the future, they would require a different baseline calculation that reflected increasing baseline carbon stocks.
- Subparagraph (vi) provides that the clearing consent must not require an offset to mitigate any effect from the clearing. For example, the clearing consent must not require that another area of forest be protected or restored as compensation for the forest that is cleared. This requirement is necessary as these offsets would also offset some of the emissions from the clearing event.

Paragraph (c) has the effect that project proponents must not have a licence or permit that enables them to remove wood from the native forest for commercial purposes. The carbon in such wood may be sequestered in wood products for a considerable time, and this would affect the accuracy of the baseline calculation which assumes that deforestation would cause that carbon to be emitted into the atmosphere as carbon dioxide.

Paragraph (d) provides that there must be no permit allowing the collection of firewood from the native forest. Permits are not required for the collection of firewood for personal use, which is permitted under the Determination because of its immaterial impact on carbon stocks. However, a permit for the collection of firewood would indicate that the large-scale

collection of firewood is intended or possible, and this is prohibited under the Determination because it would have a material effect on carbon stocks.

Subsection (2) contains two definitions that are used throughout the Determination:

- a native forest that satisfies the requirements of subsection (1) is known as an ‘eligible native forest’, and
- a clearing consent that satisfies the requirements of subsection (1) is known as a ‘pre-existing clearing consent’.

11. Evidence relating to eligible native forest

Section 11 lists the evidence that must be provided to the Regulator with an application under subsection 22(1) of the Act. The section does not operate to limit the evidence the Regulator may require from project proponents. For example, section 11 does not affect subsection 24(1) of the Act, which provides that the Regulator may, by written notice given to an applicant, require the applicant to give the Regulator, within the period specified in the notice, further information in connection with the application.

Division 3—Requirements relating to project mechanism

12. Project mechanism

Section 12 specifies the project mechanism. The specification of the project mechanism presupposes that the project area has been ‘stratified’.

Section 24 requires division of the project area into strata, each of which is a ‘carbon estimation area’, a ‘clearing buffer’ or an ‘exclusion area’. Under the project mechanism, subsection (1) of section 12 requires the project to protect eligible native forest that is in a carbon estimation area or a clearing buffer. Native forest in those areas is known as a ‘project native forest’. The project mechanism does not require protection of native forest in exclusion areas.

Paragraph 12(2)(a) provides that the project must be one in which the project native forest is not cleared.

Paragraph 12(2)(b) provides that the project must be one in which the project native forest is managed in order to achieve a mix of trees, shrubs and understory species that reflects the structures described in subparagraphs (b)(i) and (ii). This provision ensures that native forests are not simply ‘locked away’ but rather are managed responsibly. It ensures that the project does not result in perverse or unintended environmental effects.

Division 4 Restrictions on activities

13. No commercial harvesting

Section 13 provides that the project must be one in which biomass is not removed from a carbon estimation area or clearing buffer for commercial purposes. For example, selling timber from these areas of the eligible native forest is prohibited. Permitting the removal of

biomass for commercial purposes would likely have a material impact on carbon stocks for the project which are not accounted for under the Determination.

14. Wood for personal use, fencing and thinning

Section 14 applies only in respect of carbon estimation areas and clearing buffers. The Determination does not seek to restrict the activities project proponents can undertake in exclusion areas.

Paragraph (a) provides that the project must be one in which, if wood is removed for personal use or for the purpose of erecting or repairing fences, no more than 5 per cent of carbon stocks from the carbon estimation area or clearing buffer are removed. These activities are permitted because it is assumed that their effect on project carbon stocks is immaterial.

Paragraph (b) provides that the project must be one in which, if trees are thinned for the purpose of promoting biodiversity or enhancing carbon stocks, 95 per cent of the biomass thinned remains within the carbon estimation area or clearing buffer in which it was thinned. Although it constitutes the short-term loss of living biomass, thinning may lead to the enhancement of carbon stocks in the project area by promoting vegetation growth. Thinning may also result in greater biodiversity in the project area, a desirable environmental outcome.

The definition of ‘thinning’ in the Determination makes it clear that thinning must not amount to clearing, and that project proponents must not thin the native forest to the extent that thinning results in a reduction of estimated abatement below that which has already been credited under the Determination.

Division 5—Other requirements

15. Requirement in lieu of regulatory additionality

Section 15 specifies a requirement in lieu of the regulatory additionality requirement specified in the Act, for the purposes of subparagraph 27(4A)(b)(ii) of the Act. Subsection (2) provides that the project must not be required to be carried out by or under a law of the Commonwealth, a State, or a Territory. Subsection (3) provides that a requirement to carry out an activity under a conservation covenant that is entered into with the Commonwealth, a State, or a Territory, or with an authority of any of those bodies politic, is not a ‘requirement’ for the purposes of subsection (2). The term ‘conservation covenant’ is defined in section 5 of the Determination.

Part 4—Net abatement amount

Division 1—Preliminary

16. Operation of this Part

Section 16 is a standard provision that describes the operation of Part 4 of the Determination. This section provides that, for paragraph 106(1)(c) of the Act, Part 4 specifies the method for working out the carbon dioxide equivalent net abatement amount for a reporting period for an avoided deforestation project that is an eligible offsets project.

The calculations in the Determination differ from those in the original *Avoided Deforestation* method, which calculated the abatement only for the crediting period.

17. Overview of gases accounted for in abatement calculations

Section 17 is a standard provision that sets out an overview of the gases that are accounted for in abatement calculations in Part 4. This table is primarily an overview only; the gases taken into account are built into each equation set out in Part 4.

18. Carbon dioxide equivalent net abatement amount

Section 18 sets out an outline of the method for calculating the carbon dioxide equivalent net abatement amount that is set out in detail in Part 4. This section is primarily an overview only; the method is set out in more detail in the subsequent provisions of Part 4.

19. References to factors and parameters from external sources

Section 19 is a standard provision that explains how references to factors and parameters from external sources are to be construed for the purposes of the Determination. Under this provision, where a calculation references a parameter in another instrument or writing, the parameter, as defined at the end of the reporting period, should be applied for the reporting period. That is, if the value of a parameter changes between the end of the reporting period and the submission of an offsets report for that period, then the value of the parameter is that at the end of the reporting period, not the new value current at the time of drafting the offsets report.

20. Use of data—pre-existing projects

Section 20 applies to projects that have been registered under the original *Avoided Deforestation* determination, and have had data collected and accepted by the Regulator in a previous offsets report that was accompanied with an audit report. A certificate of entitlement issued by the Regulator would show that the data underpinning the corresponding offsets report had been accepted. In this situation, the data previously collected can be used to estimate the carbon dioxide equivalent net abatement amount, as calculated under Subdivision 3 and Subdivision 4 of Part 4 of the Determination.

Division 2—Stratification

21. Stratification of project area

Subsection 21(1) provides that the project area must be stratified, that is, divided into carbon estimation areas, exclusion areas and clearing buffers. Subsection (2) provides that each such area is a ‘stratum’. The effect of this is that the project area is equal to the sum of all strata. The project area must be stratified before the submission of the first offsets report.

Subsection (3) provides that, if the pre-existing clearing consent includes conditions that require that an area of the eligible native forest not be cleared, the project area must include at least one stratum that is a clearing buffer. The clearing buffer, or clearing buffers, must be sufficient to satisfy the conditions in the pre-existing clearing permit (See Subsection (4) for details on the clearing buffer). The size of the clearing buffer is dependent on the total area of the eligible native forest, not the area of eligible native forest in carbon estimation areas.

Subsection (4) defines the terms ‘carbon estimation area’, ‘clearing buffer’ and ‘exclusion area’ for the purposes of the Determination.

Carbon estimation areas

A ‘carbon estimation area’ is an area of eligible native forest that:

- in the absence of the project, would have been cleared in accordance with the pre-existing clearing consent; and
- in which the project mechanism will be applied.

Carbon estimation areas are areas of native forest in the project area that are protected in accordance with the project mechanism. Accordingly, the abatement calculations in the Determination are made in relation to the abatement and emissions which occur in the carbon estimation area.

Clearing buffers

A ‘clearing buffer’ means an area (if any) of eligible native forest that:

- in the absence of the project, would have been left uncleared in order to comply with conditions of the pre-existing clearing consent; and
- under the project, will not be cleared.

Clearing consents may specify a proportion of the eligible forest that must not be cleared. That is, the clearing consent refers to a proportion of area rather than a specific geographic area that cannot be cleared (see Example 1). Such an area is known as a clearing buffer.

The project proponent may delineate two or more clearing buffers so long as, taken together, they cover an area containing the specified proportion (see Example 2).

If the clearing consent specifies that *particular* trees (or kinds of tree), for example trees of a certain species or size, must not be cleared, those trees must be categorised as non-project trees where they are found in biomass surveys in a carbon estimation area (see section 5).

Clearing buffers are part of the project area but are not counted in the abatement calculations in the Determination.

The monitoring requirements in Part 5 of the Determination apply in respect of clearing buffers.

It is important to note that the size of the clearing buffer(s) is governed by the size of the eligible native forest to which the clearing permit applies and not the area of native forest in carbon estimation areas. This is of particular importance where the carbon estimation areas do not cover the entire eligible native forest (see Example 3). The reason for this is that trees in the project area may not be used to offset other land-use requirements.

Example 1

Ashley has a clearing consent for the native forest on her land. The clearing consent specifies that 20 per cent of the native forest must not be cleared. When stratifying the project area, which covers the entire native forest on her land, Ashley delineates a single clearing buffer covering 20 per cent of the eligible native forest.

Example 2

Iain has a clearing consent for the native forest on his land. The clearing consent specifies that up to 80 per cent of the native forest can be cleared. When stratifying the project area, which covers the entire native forest on her land, Iain delineates two clearing buffers, one covering 15 per cent of the native forest, and the other 5 per cent.

Example 3

Rachel has a clearing consent for the 2000 hectare native forest on her land. The clearing consent specifies that 20 per cent (400 hectares) of the native forest must not be cleared. Rachel decides to convert 1000 hectares of the native forest to cropland, but to conduct an offsets project in relation to the remaining 1000 hectares. Accordingly, her project area contains 1000 hectares, of which Rachel must delineate a clearing buffer covering 400 hectares (20 per cent of the total native forest) and not 200 hectares (20 per cent of the project area).

Exclusion areas

An ‘exclusion area’ is an area of the project area that is neither:

- a clearing buffer; nor
- a carbon estimation area.

Exclusion areas are considered part of the project area but do not contribute to sequestration and are not included when calculating net abatement for the project. Exclusion areas provide

proponents a degree of flexibility in managing and maintaining mapping of the project area without requiring an application for a variation to be submitted to the Regulator. The project mechanism is not implemented in exclusion areas.

22. Remotely-sensed imagery of project area

Subsection (1) provides that remotely-sensed imagery of the project area must be acquired for the purposes of stratification.

Subsection (2) provides that the remotely-sensed imagery must be consistent with the requirements of the CFI Mapping Guidelines, and corrected for any irregular features.

Subsection (3) provides that the remotely-sensed imagery must be pre-processed in order to correct any irregular feature that comprise more than 10 per cent of the total area of the carbon estimation area or areas. For example, if more than 10 per cent of the carbon estimation area has heavy cloud cover, these areas would need to be delineated from the image and deleted, then filled with data from another image. This is necessary to ensure that the land cover assessment conducted in accordance with the next section is accurate.

Subsection (4) provides examples of what constitutes an irregular feature, but it is not an exhaustive list.

23. Re-stratification of carbon estimation areas

Section 23 provides for the re-stratification of carbon estimation areas.

This section provides that, when a disturbance of sufficient magnitude has been detected, the area affected by the disturbance must be re-stratified into a new carbon estimation area before the submission of the next offsets report.

Subsection (3) provides that when an area of disturbance is re-stratified, the carbon estimation area touching its boundaries must be re-stratified too. In order to prevent double-crediting, carbon estimation areas must not overlap.

The Determination does not provide for the re-stratification of exclusion areas. This is because exclusion areas do not count towards project abatement. Exclusion areas that become areas of native forest during the crediting period cannot be re-stratified into carbon estimation area because they could not have been cleared in the baseline.

Similarly, the Determination does not provide for the re-stratification of clearing buffers. Like exclusion areas, clearing buffers are established in relation to the baseline and do not contribute toward the project abatement.

24. Strata boundaries

Section 24 provides that the geographic boundaries of each carbon estimation area, exclusion area and clearing buffer in the project area must be identified on a geospatial map in accordance with the CFI Mapping Guidelines. The strata map does *not* have to be submitted with an application for an eligible offsets project under subsection 22(1) of the Act.

Division 3—Baseline deforestation plan

25. Baseline deforestation plan

Subsection (1) provides that a deforestation plan must be prepared in relation to the project area (the ‘baseline deforestation plan’). The baseline deforestation plan describes what would have occurred in the project area if the project proponent were not protecting the native forest. The deforestation plan corresponds to the activities permitted and/or prohibited by the clearing consent.

Subsection (2) sets out the required content of the deforestation plan. Paragraph (a) provides that the deforestation plan must detail the alternative land use for each area that is not being cleared due to the project. Paragraph (b) provides that the deforestation plan must include the spatial extent of each of the listed project characteristics. The spatial extent refers to the geographic area associated with each project characteristic, and should include the location and area of each characteristic. Paragraph (c) provides that the deforestation plan must detail any requirements to not clear certain kinds of tree, this maybe a particular species or a tree above a certain size. These kinds of trees are defined as non-project trees. Paragraph (d) provides that the deforestation plan must include an estimate of the canopy cover had the authorised clearing occurred. Canopy cover is the percentage of the area that is covered by the canopy of trees. This estimate can be gained by multiplying the estimate of the average number of non-project trees per hectare for a carbon estimation area by the expected canopy cover of each individual non-project tree (in square metres), and dividing this by 10,000 (the number of square metres in a hectare).

Subsection (3) provides that the content of the deforestation plan must be represented spatially, as in a map, in accordance with the CFI Mapping Guidelines.

Division 4—Net abatement amount

Subdivision 1—Allometric equations

Subdivision 1 of Division 4 sets out the process for developing or validating allometric equations in order to calculate the biomass in the project area. Allometric equations are used to estimate biomass from one or more non-destructive measures such as the diameter of the trunk at 1.3 metres (diameter at breast height). Different equations give different estimates for biomass because each one is designed for a specific range of variables including the type of forest and climate.

26. Allometric equations to be validated or developed

Section 26 provides that for each tree species or group of species for which an allometric equation will be applied, an allometric equation must have been developed or validated in accordance with this section. A species refers to a single species, such as *Callitris endlicheri*, whereas a species group refers to a collection of species that have the same growth form. Project proponents can validate existing equations or develop new ones provided that they too are validated. The process for developing a new equation is set out in sections 27 to 39. Paragraph (2)(b) sets out the requirements that an existing equation must meet if it is to be

validated under the Determination. Validation ensures that carbon stocks in the project area are correctly accounted for. While the project proponent does not have to develop an allometric equation for all tree species all trees within a plot must be measured in accordance with sections 46 and 47.

27. Validating or developing allometric equations

Section 27 provides that each allometric equation must be validated or developed using destructive sampling by carrying out the steps specified in the present Subdivision.

28. Step 1—Scope of allometry

Subsection (1) provides that allometric equations developed or validated apply only to the above-ground biomass of the native forest in the project area. A note refers to section 41, which provides that below-ground biomass is determined using prescribed root:shoot ratios.

Subsection (2) provides that an allometric equation may be applied only within its allometric domain.

29. Step 2—Determination of allometric domains

Subsection (1) defines ‘allometric domain’ as describing the specific conditions under which an allometric equation is likely to apply because the conditions that underpin it are satisfied. An allometric domain may apply to a single species or group of species.

Subsection (2) provides that an allometric domain must be defined for each allometric equation.

Subsection (3) sets out the requirements for defining an allometric domain. For example, an allometric domain may include:

Reference: *C. endlicheri* 1

Species: *Callitris endlicheri*

Form: Single stem tree form

Measurement range: DBH 3.5cm-15cm

Subsection (4) requires that if a new allometric equation is developed, the spatial extent of the equation must be specified. That is, the geographic area for which the allometric equation is likely to apply. This may be defined by a number of site factors such as soil type and annual rainfall.

Subsection (5) requires that if a pre-existing allometric equation is to be validated, the spatial extent of the equation must be specified if it has previously been defined for the equation.

Subsection (6) sets out additional requirements for defining an allometric domain for a group of species. Additional guidance for developing allometric equations for groups of species may be found in:

- Picard, N, et al. (2012) *Manual for building tree volume and biomass allometric equations: from field measurements to prediction*. Food and Agricultural Organization of the United Nations, Rome and Centre de Coopération Internationale en Recherche Agronomique pour le Développement, Montpellier.

30. Step 3—Sample size

The sample size required to generate a valid allometric equation will vary depending on whether the project proponent validates an existing equation or develops a new equation.

Subsection (1) provides that for each equation to be validated, at least six trees must be selected for destructive sampling, including at least one from each class size as defined in section 34.

Subsection (2) provides that for each equation to be developed, at least 20 trees must be selected for destructive sampling, including at least one tree from each class size as defined in section 34

31. Step 4—Determination of plot design for tree selection

Once the sample size has been determined for validating or developing an allometric equation, the project proponent must determine the plot design for tree selection. Trees for the destructive sampling procedure will be collected from these plots.

Subsection (2) provides that enough plots must be allocated to capture at least 100 trees across the spatial domain of the study site. One hundred trees are specified as the minimum selected in order to increase the probability of identifying the full range of variables within the study site. In highly variable sites, project proponents may aim to capture more than 100 trees.

32. Step 5—Allocation of plots for tree selection

Once the plot design has been established for validating or developing an allometric equation, the project proponent must allocate plots for tree selection. Subsection (1) provides that when developing an allometric equation, the plots must be within one or more carbon estimations areas as well as within the spatial extent of the allometric domain defined in section 29.

Subsection (2) provides that when validating an allometric equation, the plots must be allocated across the carbon estimation area or areas in which the allometric equation is to be applied.

Subsection (2) provides that plots must be allocated using a pseudo-random number generator with a known seed number. Such a random number generator generates a list of points which are effectively random, but by knowing the seed number, the list can be reproduced. This allows a process for demonstrating that plot locations were in fact random. While programs such as Microsoft Excel often have pseudo-random number generators, such as the 'rand()' function, such a function does not allow for a known seed number to be used and would not be appropriate for this Determination.

33. Step 6—Survey and random selection of trees for destructive sampling

Section 33 details the process for the selection of trees for destructive sampling.

Project proponents must establish plots and measure all trees within the plot. Each tree within the plot must be assigned a unique identifier so it can then be relocated if it is identified for destructive sampling. For each tree, project proponents must measure all parameters that will be used in the allometric equation (for example, diameter at breast height, total height, or species).

Project proponents must survey and establish enough plots such that the minimum sample size prescribed in section 31 has been achieved.

34. Step 7—Size classes

Prior to undertaking destructive sampling field work, the project proponent must classify the trees measured in section 33 by species or species group, and then into size classes in order to carry out the procedures to develop or validate an allometric equation.

Subsection (1) has the effect that individual tree species or species groups must be stratified into at least three size classes meeting the requirements of subsection (2). Project proponents may wish to choose the size classes based on the variation and sizes in the trees being sampled in order to optimise the process. Additional guidance on establishing size classes may be found in:

- Snowdon, P, et al. (2002) NCAS Technical Report no.31: Protocol for Sampling Tree and Stand Biomass, Australian Greenhouse Office.

Subsection (2) specifies that each class must have a minimum and maximum variable range identified and size class interval defined.

Subsection (3) requires project proponents to use a pseudo-random number generator with a known seed number to give each tree a random ranking. By sorting the list of trees by the ranking number, each size class is effectively randomized.

Subsection (4) requires that at a minimum the first tree in each size class ranked in accordance with subsection (3) must be selected for destructive sampling.

Subsection (5) specifies the requirements if more than one tree per size class is needed to achieve the minimum sample size specified in section 30.

35. Step 8—Destructive sampling procedure

Section 35 sets out the procedure for destructive sampling of trees identified in accordance with section 33 and 34.

Subsection 35(3) provides that if developing an allometric equation for a single species, then at least every fourth tree and one tree from each size class must be cut into components using the procedure in section 35. An individual tree can represent both the fourth tree cut in a

sequence and an individual from a size class. This requirement is to ensure there is a distribution of trees being fully analysed in accordance with section 35.

Subsection 35(5) provides that if developing an allometric equation for a group of species, then all trees must be cut into components using the procedure in section 35.

The destructive sampling protocol in section 35 was adapted from:

- Walker, S, et al. (2012) Standard Operating Procedures for Terrestrial Carbon Measurement: Version 2012, Winrock International.

The sampling design and statistical analyses were adapted from:

- Snowdon, P. et al. (2002) NCAS Technical Report no.31: Protocol for Sampling Tree and Stand Biomass, Australian Greenhouse Office.
- Dietz, J. and Kuyah, S. (2011) Guidelines for establishing regional allometric equations for biomass estimation through destructive sampling. World Agroforestry Centre (ICRAF), United Nations Avenue, Gigiri.
- Picard, N, et al. (2012) *Manual for building tree volume and biomass allometric equations: from field measurements to prediction*. Food and Agricultural Organization of the United Nations, Rome and Centre de Coopération Internationale en Recherche Agronomique pour le Développement, Montpellier.

36. Step 9—Biomass analysis

Section 36 sets out the procedure for undertaking a biomass analysis in order to convert wet weight measurements into dry weight. The analysis is undertaken using the samples obtained in Step 8.

Subsection (1) specifies the process for calculating the whole tree dry to wet weight ratio. Subparagraph (1)(a)(ii) requires that representative subsamples be collected for each tree component. Different components may require different procedures for determining what is representative. In relation to this requirement, proponents may wish to consult:

- Snowdon, P et al. (2002) NCAS Technical Report no.31: Protocol for Sampling Tree and Stand Biomass, Australian Greenhouse Office.

Subsections (2) and (3) detail the process for determining the coefficient of variation for dry:wet weight ratios in allometric equations for single species where not all trees were analysed for dry weight. The coefficient of variation is only required to be measured when a sub-sample of trees are used to determine a dry to wet weight ratio. This is done to minimise error in the final estimates of tree biomass. Where the error is potentially large, in that the coefficient of variation is greater than 15 per cent, further sampling will be required. The requirements for the treatment of samples where the coefficient exceeds 15 per cent are also specified.

Subsection (4) specifies the treatment of samples where the coefficient of variation for dry:wet weight ratios in allometric equations for single species is below 15 per cent.

37. Step 10—Data exploration and analysis

With the exception of subsection (1), section 37 only applies to the development of new allometric equations.

Subsection (1) requires that the whole tree dry weight data obtained in section 36 must be compiled into a database or spreadsheet suitable for statistical analysis or importation into a statistical analysis software package.

Subsection (2) provides that to validate an existing allometric equation the steps in Step 11 in section 38 must be completed.

Subsection (3) provides that the steps in 10.1 in section 37 are to be used when developing a new allometric equation.

Subsections (4) to (13) specify the detailed process for developing and testing the appropriateness of an allometric equation from the data obtained in section 35.

An allometric equation being developed must take the form of a statistical model fitted using:

- simple linear regression;
- multiple regression;
- polynomial regression; or
- non-linear regression.

Each allometric equation developed is required to satisfy the assumptions that the response variables change in a systematic way with variation in the predictor variable and that errors are statistically independent and normally distributed.

Applying a transformation to the data may be needed to satisfy the above assumptions. As logarithmic transformation introduces bias, this bias must be corrected. Therefore, subsection (8) provides that if a logarithmic transformation is applied to the response variable, the proportional bias must be estimated and applied using the ratio of the arithmetic sample mean to the mean of the back-transformed predicted variables.

Proponents may wish to consult:

- Snowdon, P (1991) A ratio estimator for bias correction in logarithmic regressions. *Canadian Journal of Forest Research* 21, 720–724.

Subsection (13) provides that the mean of the weighted residuals calculated in Equation 1 must not be significantly different from zero, as determined by applying a two-tailed student t-test.

Subsection (14) provides that if the allometric equation satisfies the requirements of subsection (13), the allometric equation can progress to validation in Step 11 in section 38.

Subsection (15) requires that if the allometric equation does not satisfy subsection (13):

- an existing equation must be selected in accordance with section 26 and validated using the procedure outlined in section 38; or
- a new equation must be developed.

38. Step 11—Validation of allometric equation

Section 38 requires that the effectiveness of an allometric equation to predict biomass (or tree volume) must be validated by comparing its predictions to observations made using an independent dataset.

Subsections (1) and (2) provide that each allometric equation must be validated with respect to the native forest covered by pre-existing clearing consent. Each allometric equation must also be validated during the first reporting period in which the allometric equation is applied and the last reporting period in the crediting period.

Each allometric equation to be applied in the project area must be validated in accordance with the process set out in the subsections summarised in the following steps:

Step 11.1—Confirmation of allometric domain

Subsections (3) to (7) set out the procedure for confirming the allometric domain of an equation to be validated for the carbon estimation areas in which it will be applied.

Step 11.2—Predicted biomass of sample trees

The effect of subsections (8) and (9) is that a predicted estimate of the biomass contained within each test tree must be generated using the allometric equation to be validated using as inputs the predictor variable measurements collected from each test tree.

Step 11.3—Comparison between predicted and observed biomass

Subsections (10) to (12) set out the procedure for comparing the predictions of a allometric equation with the observations estimated by the destructive sampling of test trees selected in accordance with Step 3 in section 30.

Step 11.4—Minimum requirements for validation of allometric equations

Subsection (13) specifies the minimum requirements for validation of allometric equations.

39. Procedure if allometric equation cannot be validated

Section 39 sets out the procedure that must be followed if an allometric equation cannot be validated and requires that another equation be selected for validation in accordance with section 26 or that a new allometric equation be developed in accordance with section 26.

Subdivision 2—Biomass survey

40. Determination of native forest biomass

Section 40 provides that a field-based survey must be undertaken in order to determine the biomass stocks in the native forest in the project area. Biomass surveys must be carried out in the first reporting period for all carbon estimation area. After this time, biomass surveys are only required for carbon estimation areas in which there is a disturbance. In the absence of a disturbance, project proponents can assume that biomass in the carbon estimation area remains unchanged after the first reporting period. That is, the biomass data (e.g. stem diameter measures) or the output from the biomass survey (e.g. carbon stocks) calculated in accordance with the Determination can be reused for subsequent offsets reports.

Alternatively, project proponents can choose to re-survey carbon estimation area in order to detect increases in tree growth in accordance with section 62.

The steps detailed in this Subdivision must be followed for the initial assessment of biomass stocks and whenever a biomass survey is conducted to account for changes to carbon stocks during the project period.

41. Determination of root:shoot ratios

Section 41 determines the procedure for determining the root:shoot ratio for a Major Vegetation Group class. These root:shoot ratios are used to determine the below-ground biomass of trees in the project area. Root:shoot ratios are applied in Equation 8 and Equation 14.

42. Step 1—Plot design

Section 42 sets out the requirements for the plot design for a biomass survey. Due to the variety of forest ecosystems in Australia and the variable condition of the forest stand in the ecosystems, the method of determining a specific plot design should be based on maximising efficiency and minimising variance when determining the biomass content of carbon estimation area.

Subsection (5) provides that if the plot is located on a slope greater than 10 degrees, then a correction must be applied in order to correct for the slope. In relation to this requirement, project proponents may wish to consult:

- Walker, S, et al. (2012) Standard Operating Procedures for Terrestrial Carbon Measurement: Version 2012, Winrock International.

43. Step 2—Allocation of plots

Section 43 sets out the procedure for allocating plot points to a carbon estimation area.

Subsections (1) to (3) provide for the identification of waypoints. A minimum of 200 waypoints must be assigned to each carbon estimation area. These represent the potential plot points that can be surveyed in the pilot survey, primary biomass survey and any additional surveys that are required to achieve the Targeted Precision. The actual number of

plots to be surveyed is determined in Step 4 in section 45 and validated in Step 9 in section 50. However, this step is applied first in order to avoid multiple allocations of plot points. The plots allocated for a biomass survey should be different than those allocated for tree selection for the development or validation of an allometric equation.

Subsections (4) to (7) provide for allocation of plots using a method that is both random and replicable. Accordingly, project proponents must use a pseudo-random number generator with a defined seed number when allocating plots to carbon estimation area. The final plot points become the waypoint of the plots. Potential plot points should be assigned a random ranking (i.e. a number) using the pseudo-random number generator with a known seed number. Then all potential plot points are numerically sorted by the ranking from lowest to highest. The lowest ranked plot will become *plot 1* and the highest ranked will be the last ranked plot. For example, if 200 potential plot points are generated, the highest ranked would be *plot 200*. Project proponents must survey the required number of plots as estimated in Step 4.2 in section 45. For example, if on completion of Equation 6 the estimated number of plots is 50, project proponents must survey plots 1-50.

Subsection (8) provides that the project proponent must retain the area boundary used to allocate plots as provided by this section in order to enable the replication of the plot allocation using the defined seed number. This enables audits of the project area.

Subsection (9) lists attributes that must be assigned for each plot waypoint.

In all survey scenarios, project proponents must survey the allocated plots in numerical order according to the plot point number [PLOT_NUM].

44. Step 3—Pilot survey

Section 44 sets out the requirements for undertaking a pilot survey. The pilot survey is used to estimate the variation in biomass that is present within each carbon estimation area. The plots for the pilot survey will be selected from those allocated in section 43 starting at plot 1. While a minimum of five plots is required for the pilot study, project proponents may choose to measure more than this to improve the accuracy of the estimate of variation. An improved estimation of the variation will improve the efficiency of the biomass survey and reduce the risk of over or under sampling.

The effect of subsection (3) is that data collected in the pilot survey, such as diameter at breast height, may be included in the biomass survey.

45. Step 4—Number of plots

The number of plots that need to be measured in a biomass survey are a function of the inherent variability of the forest and the Target Precision. The variability of the forest is estimated in section 44 and the Target Precision is provided in section 45. With this information, section 45 sets out the procedure for determining the number of plots in the biomass survey.

Step 4.1—Coefficient of variation of each carbon estimation area

Subsections (2) and (3) have the effect that project proponents must use the data obtained in the pilot survey in Step 3 to calculate the coefficient of variation of each carbon estimation area by completing Equation 5.

Step 4.2—Number of plots to sample in each carbon estimation area

Subsection (4) provides that, for the purposes of the Determination, native forest carbon stocks must be estimated within ± 10 per cent of the true value of the mean at a 90 per cent confidence level.

Subsection (5) provides that the requirement in subsection (4) is referred to as the 'Targeted Precision'. The estimate of carbon stocks for each carbon estimation area must meet the Targeted Precision, as this limits the potential error of the estimate. The results of the biomass survey are tested against the Targeted Precision in section 50.

Subsection (6) provides that in order to estimate the required sample size to achieve the Targeted Precision in each carbon estimation area, project proponents must complete Equation 6.

46. Step 5—Preparation of biomass survey

Section 46 sets out the requirements project proponents must meet when preparing a biomass survey. These requirements are intended to ensure the accuracy of measurements and minimise error. Paragraph (b) specifies that if trees do not have an associated allometric equation, then the diameter of the stem must be recorded. The proponent should select a standard height to measure the stem diameter. For example, a common measurement place for trees is diameter at breast height (DBH), which is 1.3m, whereas for mallee species diameter at 30cm height may be more appropriate. This provision is to ensure that all trees in the plot have a variable to be measured.

47. Step 6—Measurements within plots

Section 47 sets out the requirements for navigating to, establishing and undertaking measurements within plots.

The survey team must use a GPS device that has an accuracy of ± 4 metres when navigating to each waypoint. When the survey team has navigated to the plot, it must establish the plot as detailed in Step 1 in section 42. Once the plot is established, specific measurements must be taken within the plot to accurately estimate plot biomass.

When measuring above-ground biomass within the plot, project proponents must measure the explanatory variable(s) required by the allometric equation that is to be used for each species or group of species that is found within the plot. This is often a stem diameter at some distance from the ground and can include height along with other independent variables required by the allometric equation. Measurements are needed from all trees within a plot, not only project trees. These measurements are important in determining the number of non-

project trees per hectare within the project area, which is used to demonstrate that clearing would occur with the implementation of the permit.

No measurement is required for below-ground biomass as National Greenhouse Account default root:shoot ratios are applied.

48. Step 7—Biomass of plots

Subsection (1) provides that project proponents must determine the biomass of each plot surveyed as provided by Step 6 in section 47 by following Steps 7.1 to 7.4.

Step 7.1—Determination of above-ground biomass by applying allometric equations

Project proponents must have developed or validated all allometric equations used in the estimation of above-ground biomass in accordance with Subdivision 1 —Allometric equations. Once this is complete, proponents must convert the measurements made in the field sample plots into the above-ground biomass stock estimates for each tree, using the allometric equation for the species or group of species.

Step 7.2—Determination of above-ground biomass in survey plots

Subsection (4) provides that project proponents must determine the above-ground biomass stock in survey plot (sp) in carbon estimation area (i) by completing Equation 7.

Step 7.3—Determination of below-ground tree biomass in survey plots

Subsection (5) provides that project proponents must determine the below-ground tree biomass in each plot surveyed as provided by Step 6 in section 47 by completing Equation 8.

Equation 8 requires the input of the appropriate root:shoot ratios, which are determined in accordance with section 41.

Step 7.4—Determination of total tree biomass in each plot

Subsection (6) provides that project proponents must determine the total tree biomass for each plot surveyed as provided by Step 6, section 47, by completing Equation 9.

49. Step 8—Edge corrections for plots crossing carbon estimation area boundaries

Section 49 sets out the steps for correcting the edge effects that occur when a plot crosses the boundary of a carbon estimation area.

An edge correction must be applied if a plot, once established, moves into one or more strata outside of the carbon estimation area that is being surveyed. If it is determined that a plot, once established, will span multiple strata, then the collection of biomass data within the plot will lead to an erroneous plot estimate.

Project proponents must omit the plot if more than 20 per cent of the plot falls outside of the carbon estimation area that is to be surveyed.

For all other scenarios where plots have edge effects, project proponents must first use the mirage method to mirror the plot into the carbon estimation area that is being surveyed. Further details on implementing the mirage method can be found in:

- Beers, T.W. (1977) Practical correction of boundary overlap. *Southern Journal of Applied Forestry* 1, 16–18.

With circular plots, for example, the proponents would measure the distance from the plot centre to the edge of the carbon estimation area, then locate a second plot the same distance beyond the edge of the carbon estimation area. The proponent would then measure all trees located within the carbon estimation area as determined from the second plot, and allocate these measures to the first plot. The effect of this is that trees that fall in both the original and mirage plot will be measured twice.

50. Step 9—Validation of sample size

Subsection (1) provides that the project proponent must perform an ex-post analysis of the data obtained in the biomass survey in order to verify that the survey performed as provided by this Subdivision has achieved Targeted Precision.

Step 9.1—Standard error

Subsection (2) requires that project proponents must complete Equation 10 in order to determine the standard error.

Step 9.2—Determination of Targeted Precision

Subsection (3) provides that project proponents must complete Equation 11 in order to verify that the survey has achieved Targeted Precision.

Subsection (4) provides that project proponents must use the 90 per cent confidence level when determining the t-value.

Subsection (5) provides that the final value of the Targeted Precision error limit of the primary biomass survey must be less than or equal to 10 per cent.

Subdivision 3—Calculation of baseline emissions

51. Calculating baseline emissions

Emissions from the baseline are calculated once for the project, using data collected for the first reporting period. Once calculated, the baseline is set for the remainder of the crediting period. Section 51 explains that Subdivision 3 contains the steps to be followed for calculating the baseline emissions in the project area.

52. Baseline relevant carbon pools

Section 52 provides that carbon pools relevant to the baseline are limited to above-ground tree biomass, below-ground tree biomass, and the burning of biomass for clearing purposes.

53. Step 1—Surveying requirements

Section 53 explains that the first step for calculating the baseline emissions is to conduct a biomass survey according to the process outlined in Subdivision 3. This ensures that project proponents have accurate carbon stock data for their project area as a basis for which to conduct subsequent calculations.

54. Step 2—Calculating carbon stocks in carbon estimation area

Section 54 contains calculations that project proponents must complete in order to calculate carbon stocks in each carbon estimation area.

Step 2.1—Determine mean carbon stocks in each carbon estimation area

First, subsection 54 (1) provides that Equation 12 must be used to estimate the mean carbon stock in all pools in each carbon estimation area. Under the Determination, it is assumed that the carbon stock at the time of the first offsets report is equivalent to the carbon stock prior to the planned deforestation. These forest carbon stocks represent the carbon stocks that would have been cleared in accordance with the deforestation plan. This same equation is used to estimate the carbon stocks for future reporting periods when a biomass survey is carried out.

Step 2.2—Non-project tree buffer

If the clearing consent excludes certain trees in a carbon estimation area from being cleared, the biomass in these trees cannot contribute to estimates of abatement. For example, some clearing consents may protect particular species or trees above a certain size from being cleared. To address this, subsections (2) to (5) provide that the ‘non-project tree buffer’ is either calculated for each carbon estimation area using Equation 13, or biomass from non-project trees is always excluded from the results of biomass surveys. The result is a proportion of biomass that is not at threat of being cleared.

Paragraph (2)(a) provides that proponents can opt to exclude the biomass of non-project trees from the results of the biomass estimate thereby setting the biomass as zero. The effect of this is that if future biomass surveys are conducted, for example if re-stratifying or measuring for carbon stock enhancement, then the same kinds of trees must also be excluded. For example, if trees with a stem diameter greater than 30cm cannot be cleared, and the project proponent opts to exclude these trees from the first biomass survey, then trees with a stem diameter greater than 30cm must be excluded for the first and all subsequent biomass surveys, regardless of their size at project commencement. That is, if only trees with a stem diameter of less than 30cm were included in the first biomass survey and the stem diameter of those trees is now greater than 30cm, these trees will need to be excluded as they are now of a size that cannot be cleared in accordance with the pre-existing clearing consent. While non-project trees can be excluded from the results of the biomass survey, such trees must always be measured in accordance with Subdivisions 1 and 2.

Paragraph (2)(b) provides an alternative approach, where proponents do not exclude non-project trees from the results of the biomass survey, but instead estimate the non-project tree buffer. This buffer is determined for each carbon estimation area at the beginning of the

project and only ever references the data collected for the first offsets report. It must be applied in assessing the project baseline and for all future assessments of tree biomass during the project period, including the monitoring of any biomass enhancement. That is, the non-project tree buffer is a fixed value throughout the crediting period except if it needs to be recalculated in accordance with subsection (3). In the circumstance that a new carbon estimation area is delineated as a result of a disturbance event, the non-project tree buffer of the original, un-delineated carbon estimation area must be used.

Subsection (3) provides that proponents may re-introduce kinds of trees that have previously been excluded, so long as the non-project tree buffer is re-calculated using the original data from the first biomass survey. For example, if trees with a stem diameter greater than 30cm were excluded from the results of first biomass survey, they could be included in the second biomass survey so long as the non-project tree buffer is recalculated using the data from the first biomass survey and includes trees with a stem diameter greater than 30cm. If a kind of non-project tree is not represented in the non-project tree buffer, it cannot be included in the results of a biomass survey.

Step 2.3—Total biomass of non-project trees within each plot

Equation 14 calculates the total biomass of non-project trees in each plot by applying the non-project tree buffer.

55. Step 3—Calculating carbon stocks in carbon estimation area following clearing

Section 55 contains equations to calculate the long-term average carbon stock in each carbon estimation area that would have existed in the baseline following clearing as stated in Subsection (1).

Subsection (2) provides that Equation 15 is to be used to calculate the long-term average mean carbon stock in all pools in each carbon estimation area following clearing according to the deforestation plan. This represents the long-term average carbon stock that would have remained following deforestation, accounting for stock changes resulting from burning and decay of biomass. To complete Equation 15, Equations 16 to 20 must first be calculated.

Because the post-deforestation land use in the baseline is cropping or grazing, regrowth events are assumed to be continuously suppressed and so would be immaterial. Accordingly, the Determination limits baseline calculations to the degradation of the debris pool remaining after deforestation. This is calculated by determining the impact of any treatment on the debris pool after clearing and the decay of the residual biomass after treatment.

Step 3.1—100 year average of biomass within sample plots following clearing

Subsection (3) provides that project proponents must complete Equations 16 to 20 in order to determine the 100 year average biomass stock that would exist in the sample plots following clearing.

Step 3.1.1—Model biomass in debris pool

Subsection (4) provides that Equation 16 is used to calculate the biomass in the debris pool within each sample plot, post-deforestation in the baseline. All biomass subject to clearing, consistent with the National Inventory approach, is treated as moved to the debris pool following the clearing event; and therefore the biomass stock sampled within plots represents the biomass stock of the debris pool. Under the Determination, the non-project tree buffer is not applied for estimating the long-term carbon stocks. The effect of this is a conservative baseline.

Step 3.1.2—Partition of biomass into Major Vegetation Group tree components

In order to determine the impact of treatment (such as fire) and decay on each component of the tree, subsection (5) requires the biomass of each sample plot to be partitioned into its Major Vegetation Group tree components (stem, branch, bark, leaves, coarse roots and fine roots). Subsection (6) provides that biomass partitioning must be done in accordance with the yield allocations in Schedule 1. Subsection (7) provides that Equation 17 must be used to calculate the biomass of each tree component in each sample plot in order to determine the impact of treatment and decay on each component of the tree, using the applicable biomass fractions in Schedule 1.

Step 3.1.3—Treatment of the debris pool

Once the debris pool has been partitioned into the respective tree components, the debris pool is assumed to be treated by fire. Equation 18 must be completed to determine the biomass of each tree component after burning, using Schedule 1 for burn efficiency data. Where fire is not used as a treatment and the biomass is left to decay, this step can be omitted and decay modelled using Equation 19.

Step 3.1.4—Average long-term carbon stock of tree components

Once the biomass residue has been determined for each tree component in each plot (using Equations 18), the long-term average carbon stock (for each tree component in each plot), must be determined while accounting for decay. Equation 19 is to be used to calculate the 100 year average biomass of each tree component in each sample plot.

Step 3.1.5—Sum of average long-term carbon stock of each tree component

Subsection (10) provides that the long-term average biomass in each sample plot must then be calculated by using Equation 20, which sums the 100 year average biomass of each tree component in the sample plot (calculated in Equation 19).

56. Step 4—Calculating changes in baseline carbon stock in each carbon estimation area

Section 56 provides that the parameters obtained in sections 54 and 55 are to be used to complete Equation 21, which estimates the change in baseline carbon stocks during the crediting period as a result of the implementation of the deforestation plan.

57. Step 5—Calculation of emissions in each carbon estimation area in the baseline

Subsection (1) provides that project proponents must account for methane and nitrous oxide emissions released as a result of the burning.

Step 5.1—Pre-fire above-ground biomass stock

Subsection (1) specifies that the first step in this calculation is to determine the pre-fire above-ground biomass stock in each carbon estimation area that would have been burned. This is calculated from data collected from the biomass survey for the first reporting period. Subsection (2) provides that this is to be done using Equation 22.

Step 5.2—Determination of methane and nitrous oxide emissions from biomass burns

Subsection (3) provides that methane and nitrous oxide emissions from fire events are to be determined using Equation 23 (for methane) and Equation 24 (for nitrous oxide). These equations use the results obtained in Equation 22.

Step 5.3—Determination of greenhouse gas emissions from biomass burning

Having determined the methane and nitrous oxide emissions from biomass burning, greenhouse gas emissions from a biomass burning event must be calculated for each carbon estimation area by completing Equation 25, which sums the results of Equations 23 and 24. Equation 25 is also used when estimating emissions from a post-deforestation biomass burn in the project.

Subsection (5) redefines the output of Equation 25 to refer specifically to the baseline for each carbon estimation area.

58. Step 6—Calculating net baseline greenhouse gas emissions and removals

Section 58 provides that Equation 27 is to be used to calculate the net greenhouse gas emissions in the baseline. The results of Equations 21 and 26 are to be used as inputs in Equation 27.

Subdivision 4—Calculation of project emissions and removals

Subdivision 4 provides calculations to enable project proponents to calculate the net greenhouse gas emissions and removals arising from project activities. The output is the parameter $E_{Pr,r}$, which is used in Subdivision 5 to calculate net greenhouse gas abatement for the project.

59. Calculating project emissions and removals

Section 59 provides that project emissions must be calculated by following the steps in the present Subdivision. At the end of each reporting period, emissions data collected during the reporting period must be used for the equations in the present Subdivision. The Determination also provides a mechanism for proponents to account for any removals detected during the reporting period.

60. Project relevant carbon pools

Section 60 specifies the relevant carbon pools for the purposes of the present Subdivision. Relevant carbon pools are limited to:

- above-ground tree biomass;
- below-ground tree biomass;
- the combustion of fossil fuels in vehicles, machinery and equipment; and
- the burning of biomass from fires.

61. Step 1—Project forest carbon stock changes in carbon estimation area resulting from disturbances

Section 61 provides calculations to determine emissions in areas where degradation or natural disturbance have been detected in a carbon estimation area or clearing buffer.

If a disturbance is detected in a carbon estimation area (where ‘disturbance’ is defined in section 5 as degradation or a natural disturbance), then the carbon estimation area must be re-stratified by delineating a new carbon estimation area where the disturbance has occurred, in accordance with section 23. Subsections (1) to (5) provide instructions for calculating the mean carbon stock changes in a new carbon estimation area that has been created under section 3.6 due to a disturbance.

Instructions for calculating the biomass stocks in the new carbon estimation area after degradation or natural disturbance are contained in subsections (1) to (3). These subsections specify that project proponents can calculate the new biomass stocks by either re-surveying the new carbon estimation area in accordance with Subdivision 2, or by conservatively electing to set carbon stocks at zero in the deforested area. Re-surveyed carbon estimation areas must achieve the Targeted Precision.

After determining the carbon stocks remaining after the disturbance, project proponents must determine the mean carbon stock changes per hectare as a result of the disturbance in each affected carbon estimation area using Equation 28. The net carbon stock changes in all pools as a result of the disturbance must then be calculated using Equation 29. These equations specify that the net carbon stock changes within each carbon estimation area resulting from the disturbance are equal to the spatial extent of the disturbance event multiplied by the emissions from the event, represented by the change in carbon pools.

62. Step 2—Optional calculation of carbon stock enhancements

Section 62 specifies optional calculations to determine net carbon stock changes in each carbon estimation area as a result of forest carbon stock enhancement. Forest carbon stock enhancement may occur through both natural growth and human assisted growth in biomass stocks in a carbon estimation area. These calculations are optional as the omission of the calculations is conservative.

If project proponents wish to account for carbon stock enhancements, subsections (2) to (4) provide that to determine growth in biomass stocks, a complete biomass survey must be conducted at the end of each reporting period in the carbon estimation area that undergo carbon stock enhancements. Carbon estimation area must be surveyed in accordance with Subdivision 2 and must achieve the Targeted Precision.

For each of the surveyed carbon estimation area, the net carbon stock changes as a result of forest carbon stock enhancement are then calculated for the relevant reporting period using Equation 30.

63. Step 3—Calculating project emissions

Section 63 contains instructions for calculating the emissions resulting from fires in the project area and from the combustion of fossil fuels used in the project.

Calculations to determine emissions from fires in the project area are specified in subsections (2) and (3).

Subsection (2) provides that the biomass burnt by fires in each carbon estimation area for a reporting period must be calculated using Equation 31, which requires project proponents to determine the area burned and the fire type. The burn efficiency factor in this equation adjusts the biomass burnt according to fire type (wildfire or controlled burn), recognising that the mass of biomass burnt varies with different types of fire.

Subsection (3) provides that the mass of biomass burned in each carbon estimation area (calculated in Equation 31) must be used to calculate the methane and nitrous oxide emissions associated with each fire event in each carbon estimation area. Emissions are to be calculated using Equation 32 (for methane emissions) and Equation 33 (for nitrous oxide emissions). These emissions must then be summed in Equation 34 to determine total emissions due to fire events in the carbon estimation area. Section 61 accounts for any changes in carbon stocks as a result of a fire.

Calculations to determine emissions from fuel use in the project are specified in subsections (4) and (5). Subsection (4) provides that net total emissions of fuel consumption during a reporting period must be calculated for each carbon estimation area using Equation 35. This equation sums the results of Equation 36 in subsection (5), which provides that the emissions of each greenhouse gas (carbon dioxide, methane and nitrous oxide) must be separately calculated for each fuel type (diesel, gasoline, etc.) for fuel used for each carbon estimation area during the reporting period.

Subsection (6) provides that total greenhouse gas emissions for the project during a reporting period are to be calculated using Equation 37. This equation sums the emissions from fossil fuel combustion calculated using Equation 35 and the emissions from biomass burnt due to fires in the reporting period calculated using Equation 36.

64. Step 4— Calculating total net greenhouse gas project emissions at the end of the reporting period

Section 64 specifies that the total net greenhouse gas project emissions for the project at the end of a reporting period are to be calculated using Equation 38.

The output of Equation 38 is a cumulative total of project emissions through time. Equation 38 requires total net greenhouse gas emissions to be calculated for each carbon estimation area for the current reporting period, and then requires these results to be summed to determine total net project emissions for the current reporting period. The emissions for the reporting period are then added to the emissions reported for the previous reporting period to get an estimate of all emissions across all reporting periods for the project.

Total net greenhouse gas emissions for each carbon estimation area are calculated as the sum of all net carbon stock changes as a result of degradation and natural disturbance (calculated in Equations 28 and 29), plus the total greenhouse gas emissions from fire and fuel use (calculated in Equation 37), less the net carbon stock change as a result of forest carbon stock enhancement (calculated in Equation 30). For the first reporting period under this Determination for projects transitioning from the original *Avoided Deforestation* method, $E_{Pr,r-1}$ is equivalent to $GHG_{NET\ P}$ in the original *Avoided Deforestation* method.

Subdivision 5—Calculating net greenhouse gas abatement

65. Net abatement amount

Subdivision 5 specifies calculations to determine the project's net abatement amount for the reporting period. This is calculated by estimating the net greenhouse gas abatement for the crediting period (Equation 39), from which the carbon dioxide equivalent net abatement amount for the project for the reporting period can be calculated as an annual rate (Equation 40A and Equation 40B).

In Equations 40B there is reference to both A_{rp} and A_{AD} . A_{AD} is net greenhouse gas abatement already credited to projects under the *Carbon Credits (Carbon Farming Initiative) (Avoided Deforestation) Methodology Determination 2013*. This is only applicable for projects that were registered and credited under the original *Avoided Deforestation* method. On the other hand, A_{rp} is carbon dioxide equivalent net abatement amount for each previous reporting period since project commencement. As A_{rp} is not calculated in the original *Avoided Deforestation* method, this only applies reporting periods where this Determination is applied.

For example, a project proponent had their project registered under the original *Avoided Deforestation* method. Under that method they were credited for 1000 tonnes of abatement as calculated from Equation 41. For the first reporting period under this Determination, the proponent would report A_{AD} as 1000, and A_{rp} as zero. In this example, assume A_r is calculated as 500 at the end of the first reporting period. For the second reporting period the project proponent would report A_{AD} as 1000 and A_{rp} as 500.

For projects that have transitioned from the original *Avoided Deforestation* method, credits already issued for the project must be accounted for in the calculations (Equation 41).

Part 5— Reporting, record-keeping and monitoring requirements

Subsection 106(3) of the Act provides that a methodology determination may provide that the project proponent of an eligible offsets project to which the determination applies is subject to 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 offsets report, record-keeping and monitoring requirements specified in Part 5 of the Determination are in addition to any requirements specified in the regulations or rules made under the Act.

Division 1—Offsets report requirements

66. Operation of this Division

Section 66 provides that, for paragraph 106(3)(a) of the Act, this Division sets out information that must be included in an offsets project report about an avoided deforestation project that is an eligible offsets project.

67. Requirement for first offsets report

Section 67 sets out the information that must be included in the first offsets report submitted for the project. General information that must be contained in all offsets reports is set out in section 68.

68. Information that must be included in all offsets reports

An offsets report is required to set out any information that has to be submitted in the report under the applicable methodology determination.

Section 68 sets out the information that must be submitted in all offsets reports for the project. This includes the first and all subsequent reports.

69. Determination of certain factors and parameters

Section 69 provides that the offsets reporting requirements in this section apply where it is not possible to meet the requirements of subsection 19(1), as outlined in paragraph 19(2)(b). Further explanation of these circumstances is provided in section 19. The purpose of section 69 is to provide the Regulator with information on which version of the *NGER (Measurement) Determination* or other relevant external source has been used by a project proponent to meet the monitoring requirements. The proponent is required to detail in their offsets report the version of the *NGER (Measurement) Determination* or external source that was used when undertaking monitoring, the dates that the version was used and why it was not possible for the proponent to use the version that was in force at the end of the reporting period.

Division 2—Record-keeping requirements

70. Operation of this Division

Section 70 provides that, for paragraph 106(3)(c) of the Act, this Division sets out record keeping requirements for an avoided deforestation project that is an eligible offsets project.

Other requirements are specified in the Act and in other instruments under the Act.

71. Information relating to remotely sensed imagery

Section 71 provides that records must be kept in relation to each of the requirements for remotely sensed imagery set out in section 22.

Division 3—Monitoring Requirements

72. Operation of this Division

Section 72 provides that, for paragraph 106(3)(d) of the Act, this Division sets out monitoring requirements for an avoided deforestation project that is an eligible offsets project.

Other requirements are specified in the Act and in other instruments under the Act.

73. Monitoring for disturbance

Subsection (1) provides that the project area must be monitored for disturbances during the reporting periods.

Subsection (2) specifies that monitoring is undertaken through land cover assessments with remotely sensed imagery.

Division 4—Reporting under section 77A of the Act

74. No division of carbon estimation area

Section 74 provides that the project proponent can partially report on a project in accordance with subsection 77A(2) of the Act; however they may not partially report on only a part of a carbon estimation area.

Schedule 1 Partitioning of Biomass

Schedule 1 provides four tables which specify numeric values for the partitioning of biomass, burn efficiency and decay rates. The values are used as specified input values for the Equations 14, 17, 18, 19.

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—Avoided Deforestation 1.1) Methodology Determination 2015

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—Avoided Deforestation 1.1) Methodology Determination 2015* (the Determination) sets out the detailed rules for implementing and monitoring offsets projects that sequester carbon by not clearing native forests. The Determination applies to projects on land with native forest cover at risk of clearing. It uses historical clearing practices to estimate when the clearing was going to occur, and abatement is estimated from this clearing event onwards.

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.

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