DEPARTMENT OF PLANNING, INDUSTRY & ENVIRONMENT

Guideline for applying the Biodiversity Assessment Method at severely burnt sites

Biodiversity Development Assessment Report/
Biodiversity Certification Assessment Report

environment.nsw.gov.au

Cover photo: Somersby mintbush, *Prostanthera junonis* fire management.
Doug Beckers/DPIE

Published by:

Environment, Energy and Science
Department of Planning, Industry and Environment
4 Parramatta Square, 12 Darcy Street, Parramatta NSW 2150
Phone: +61 2 9995 5000 (switchboard)
Phone: 1300 361 967 (Environment, Energy and Science enquiries)
TTY users: phone 133 677, then ask for 1300 361 967
Speak and listen users: phone 1300 555 727, then ask for 1300 361 967
Email: info@environment.nsw.gov.au
Website: www.environment.nsw.gov.au

Report pollution and environmental incidents
Environment Line: 131 555 (NSW only) or info@environment.nsw.gov.au
See also www.environment.nsw.gov.au

ISBN 978-1-922318-54-1
EES 2020/0104
February 2020

Find out more about your environment at:

www.environment.nsw.gov.au

Contents

List of tables

List of figures

1. Purpose

Much of Australia's biodiversity is adapted to and relies upon bushfire as a natural ecosystem process. Following a fire event such as the catastrophic 2019–2020 bushfires, the values of **severely burnt** vegetation that are assessed by the Biodiversity Assessment Method (BAM) can be significantly altered. This includes identifying vegetation community types and condition and threatened species presence, habitat and distribution.

The *Guideline for applying the Biodiversity Assessment Method at severely burnt sites: Biodiversity Development Assessment Report/Biodiversity Certification Assessment Report* (the Guideline) aims to provide assessors with a reasonable, evidence-based and transparent process for identifying **severely burnt** native vegetation and provides a range of approaches for applying the BAM on land impacted by severe bushfire. The Guideline outlines the approach to identifying the biodiversity values that existed on the land prior to severe bushfire for the purpose of preparing or finalising a Biodiversity Development Assessment Report (BDAR) or a Biodiversity Certification Assessment Report (BCAR).

Applying the BAM on land impacted by severe bushfire will require reasoned evaluation and judgement using the best available information on the biodiversity values of the subject land or local area, and the decision-support tools provided in this document. The Department of Planning, Industry and Environment (the Department) acknowledge there may be unforeseen limitations to this approach. Therefore, the Guideline will be periodically reviewed to incorporate feedback, new tools, resources and knowledge as they become available.

2. Application of the guideline

2.1 Fire type

The Guideline applies to subject land impacted by severe or catastrophic bushfire, which is taken to mean bushfire of high to extreme intensity resulting in significant modification of vegetation structure and composition such that the original vegetation type and condition is no longer identifiable; for example, bushfire that causes deep crown burn (in woodland and forest vegetation formations) or severe surface burns (in grassland vegetation formations) (Keeley 2009).

The Guideline is not applicable to land burnt as part of controlled and other land management burns, traditional burns, or low intensity bushfires that result in minimal structural, compositional and functional changes to the vegetation.

2.2 Assessment type

The Guideline assists BAM accredited assessors (assessors) when applying BAM Stages 1 and 2 on subject land **severely burnt** by bushfire for the purpose of preparing or finalising a BDAR/BCAR for:

a. a development that requires consent under Part 4 of the *Environmental Planning & Assessment Act 1979* (EP&A Act)
b. an activity that requires approval under Part 5, Division 5.1 of the EP&A Act (where the proponent has opted-in to the Biodiversity Offset Scheme)
c. a development that requires approval under Part 5, Division 5.2, of the EP&A Act

d. a clearing that requires approval under Part 5A of the *Local Land Services Act 2013*or under the State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 or
e. a biodiversity certification proposal under the *Biodiversity Conservation Act 2016*.

2.3 Other disturbances

Other disturbances, from the effects of drought or land use (e.g. grazing), for example, may also influence the structure, composition and function of vegetation and/or species and their habitat. This Guideline is not designed to address other disturbances specifically. However, an understanding of these may form part of the assessment of pre-fire vegetation condition and/or threatened species habitat.

2.4 Rainforest and Alpine complex vegetation formations

Where the **severely burnt** vegetation is most likely to have been a plant community type (PCT) from the Rainforest or Alpine complex vegetation formations, the assessor should seek guidance from the BAM Support Mailbox (section 5.1) to determine the most appropriate approach to assessing the likely pre-fire values. These vegetation formations include fire sensitive species that may not regenerate or that regenerate over long periods following severe bushfire.

3. Resources

3.1 Fire mapping

3.1.1 Google Earth Engine Burnt Area Map

The spatial dataset *Google Earth Engine Burnt Area Map (GEEBAM)* provides a rapid desktop assessment to determine the severity of recent bushfires. This mapping describes the impact of fires on the vegetation canopy and is clipped to the Rural Fire Services map of area affected by fire. It represents the entire 2019–2020 fire season to date (as named in the version history) and is updated fortnightly.

The GEEBAM mapping is an interim product that is best used at the landscape scale to identify areas of the subject land that may have been affected by severe bushfire. Ground truthing will be required to confirm mapping. The Guideline will be updated as more accurate products that map the area of land burnt in the 2019–2020 fire season are published.

GEEBAM mapping is located on the SEED Portal.

3.2 Aerial imagery

Assessors must use the ‘most recent pre-fire aerial imagery’, i.e. aerial imagery taken prior, but as close as possible, to the date of the most recent bushfire on a subject land. The source and date on which the aerial imagery was captured should be clearly referenced in the BDAR/BCAR and included on all maps supporting the assessment.

4. Assessment of severely burnt sites

4.1 Biodiversity Assessment Method assessment stage

4.1.1 Biodiversity Assessment Method assessment completed prior to severe bushfire

Where all BAM Stage 1 assessment requirements were completed (including assessments of vegetation integrity and habitat suitability) prior to severe bushfire, the assessor should use this information for the impact assessment in BAM Stage 2 and prepare the BDAR/BCAR.

Consultation with the consent authority is recommended prior to submitting the BDAR/BCAR in case additional considerations may be required because of the severe bushfire. A letter from the consent authority demonstrating support for the proposed approach for completing the BDAR, and any additional considerations should be included in the BDAR/BCAR.

4.1.2 Biodiversity Assessment Method assessment partially completed prior to severe bushfire

Where BAM Stage 1 assessment requirements were partially completed or additional assessment(s) was requested by the consent authority prior to severe bushfire, consultation should be sought with the consent authority to determine an appropriate approach for the remaining assessment.

The approach to completing the remaining assessment requirements should be precautionary and based on the guidance in this document. The outcomes from the assessment that were completed prior to severe bushfire may be used to assist in completing the remaining requirements and preparation of the BDAR/BCAR.

A consent authority may require additional considerations for development applications and clearing proposals because of the severe bushfire. A letter from the consent authority demonstrating agreement for the ongoing approach and any additional considerations should be included in the BDAR/BCAR.

4.1.3 Biodiversity Assessment Method assessment not begun prior to severe bushfire

The assessor must apply section 4.2 of the Guideline to determine if all or part of the native vegetation on the subject land is considered **severely burnt**. Where the subject land includes areas of native vegetation that are determined as **severely burnt**, the assessor should follow the Guideline to assist with applying the BAM to the subject land, as outlined in Table 2. This will include identifying PCTs, threatened ecological communities (TECs) and threatened species habitat. Where the subject land includes no areas of native vegetation determined as **severely burnt**, the assessor must apply the standard BAM.

Where the BAM Stage 1 assessment is initiated following severe bushfire, consultation should be sought with the consent authority to determine an appropriate approach for the assessment. A letter from the consent authority demonstrating agreement for the ongoing approach and any additional considerations should be included in the BDAR/BCAR.

4.1.4 Assessment of serious and irreversible impacts

The assessor must take into account the impacts, or likely impacts, of the 2019–2020 bushfire season on the threatened species and threatened ecological communities when considering the impacts of the development on entities at risk of serious and irreversible impacts (SAII). For example, when addressing criteria under subsections 10.2.2 in the BDAR/BCAR the assessor must consider the extent and condition of the TEC within 1000 ha and 10 000 ha of the development footprint based on likely impacts as a result of severe bushfire.

The impact assessment criteria under section 10.2 of the BAM must be applied using the best available data and information on the entities at risk of a SAII following the 2019–2020 bushfire season.

It is recommended that assessors consult with the Department for advice on the most current information, or where they are uncertain on how to address the assessment criteria.

4.2 Determining severely burnt vegetation

Determining the burn severity of native vegetation will require judgement, supported by clear reasoning and use of the decision support tools provided in the Guideline. Figure 1 sets out the process to determine whether the subject land has been severely burnt, and therefore, the BAM should be applied with the use of the Guideline.

4.2.1 Determine if the subject land was burnt in the 2019–2020 bushfires

Consideration of whether the subject land was burnt in the 2019–2020 bushfires requires evaluation of the GEEBAM Burnt Area Classes (see section 3.1.1) or through other evidence-based information such as on-ground assessment.

Where the subject land is determined as being burnt in the 2019–2020 bushfires, the native vegetation burn severity should be evaluated (section 4.2.2). The subject land is considered burnt when any one of the following GEEBAM Burnt Area Classes occur within its boundaries:

- Canopy fully affected (the canopy and understorey are most likely burnt)
- Canopy partially affected (a mix of burnt and unburnt canopy vegetation)
- Canopy unburnt (vegetation may be affected by fire)

The GEEBAM Burnt Area Classes ‘Canopy unburnt’ is required to capture potentially burnt grasslands and derived grasslands.

If the stated GEEBAM Burnt Area Classes do not appear within the boundaries of the subject land, but the accredited assessor has knowledge of the subject land being burnt by bushfire in the 2019–2020 fire season, they should determine the appropriate burnt area class.

If the subject land does not include any of the stated GEEBAM Burnt Area Classes and the assessor has no knowledge of the subject land being burnt by bushfire in the 2019–2020 fire season, the subject land is considered to not be burnt and, the BAM must be applied.

4.2.2 Evaluate native vegetation to determine burn severity

The extent of native vegetation on the subject land should be evaluated for being **severely burnt** using the criteria outlined in Table 1 as a guide. This assessment will require site visits. The assessor must use their judgement to determine if the combination of the features described in Table 1, as evident for the native vegetation on the burnt subject land (e.g. vegetation formation), constitutes **severely burnt**.

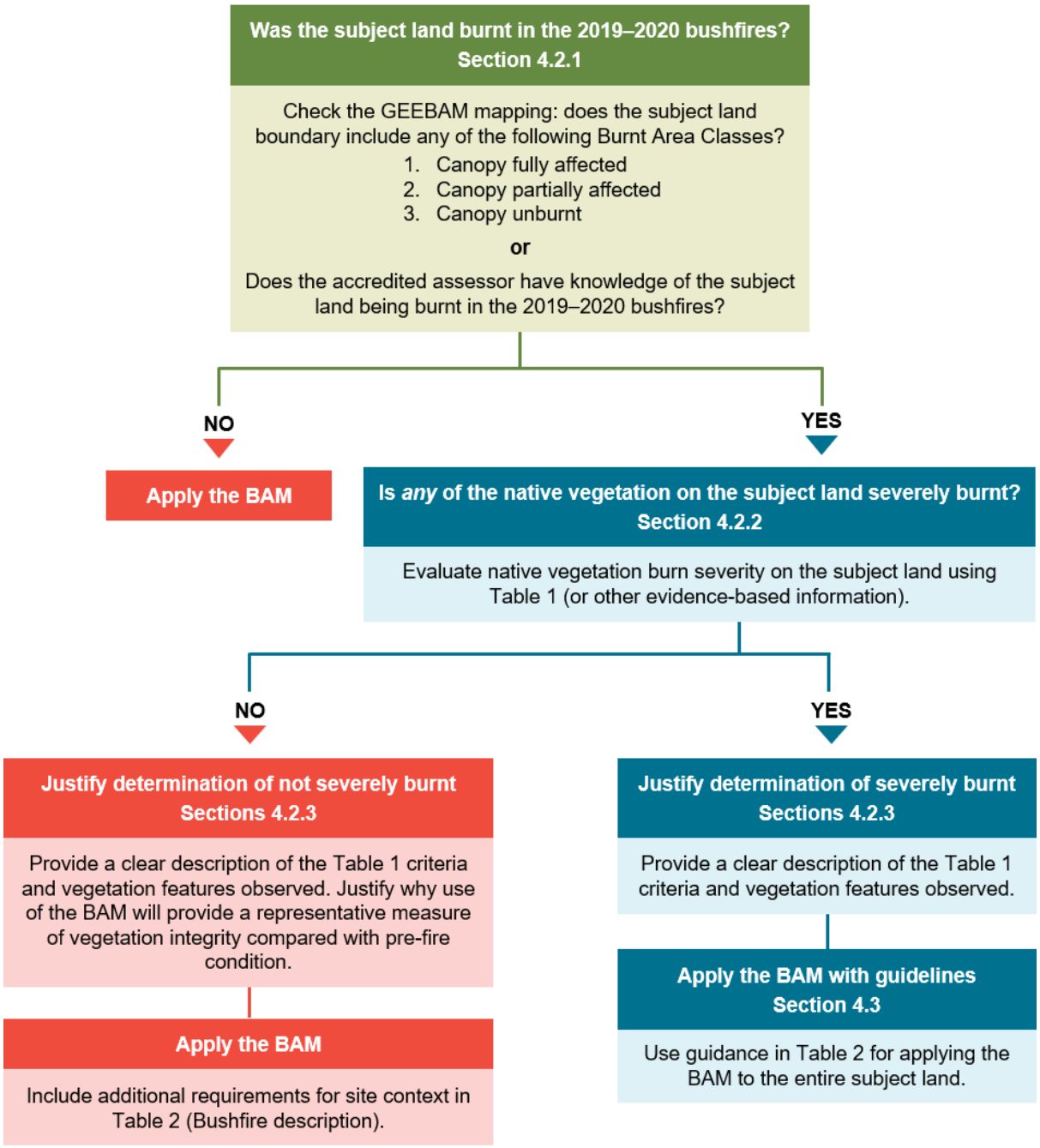

Figure 1 **Determine whether native vegetation on a subject land is *severely burnt* and requires application of the Guideline to the Biodiversity Assessment Method assessment.**

For example, the subject land could be **severely burnt** if:

- in woodland and forest formations, the **Growth form: trees** feature is consistent with the description in Table 1
- in grassland (including derived grasslands) formations, the **Growth form: grasses and grass-like** feature is consistent with the description in Table 1.

The assessor should continue to assess all features in Table 1 to determine if they, in combination, indicate **severely burnt** native vegetation.

For the purpose of applying the criteria in Table 1, the assessor will need to consider the vegetation formation, land use and vegetation condition prior to severe bushfire, and the interaction of these variables with bushfire. If the feature was not present prior to the severe bushfire, the assessor should provide justification for why this feature is not relevant to determining if native vegetation **severely burnt**.

Regardless of whether all or part of the native vegetation is determined as **severely burnt** or not, when the subject land occurs on the GEEBAM map area or is known to have been impacted by the 2019–2020 bushfires (as defined in section 4.2.1), the assessor should consider the additional requirements for site context as per Table 2 (4.2, Bushfire description).

Where any native vegetation on the subject land is determined as **severely burnt**, the BAM is applied with the use of the Guideline to the entire subject land.

Table 1 Decision support criteria to help evaluate if native vegetation is *severely burnt* (modified from Keeley 2009).

Feature	Descriptive characteristics for severely burnt vegetation
Species richness	The range of species present before the fire are burnt and/or cannot be identified. Dominant species cannot be easily identified until regeneration occurs.
Growth form: trees	Canopy trees are killed and/or canopy is consumed or largely consumed with most leaf material charred/scorched. Epicormic growth, if present, is not well developed (<1m long).
Growth form: shrubs, forbs, ferns and other	All understorey plants are consumed or largely consumed (some charred). Re-growth, if present, is immature (very few species have attained full height).
Growth form: grasses and grass-like	Ground cover is consumed, or largely consumed. Evidence of ground scorch is present. Re-growth, if present, consists predominately of new resprouting growth (native vegetation).
Logs	Logs (if expected to have been previously on site) are absent or largely consumed.
Litter cover	Pre-fire surface litter (if expected) is consumed. Soil organic layer is consumed or largely consumed. New leaf may be occurring where the canopy was burnt but not scorched
Ash	White ash deposition and charred organic matter is present to several centimetres depth.

4.2.3 Justify determination in the Biodiversity Development Assessment Report/Biodiversity Certification Assessment Report

The assessor should document in the BDAR/BCAR a clearly stated determination for the extent of native vegetation on the subject land that is **severely burnt** or **not severely burnt**. This should be supported by a clear description of the criteria in Table 1 and justification for the decision based upon the features observed.

If the native vegetation is determined as **not severely burnt**, the justification must include details that demonstrate why the BAM will provide a measure of vegetation integrity that is representative of the biodiversity values that were present on the subject land prior to severe bushfire.

Evidence should be provided in the form of photographs (minimum of two photographs per vegetation formation, with date, GPS coordinates and bearing) of the native vegetation to support the assessment of **severely burnt** or **not severely burnt** for the purpose of applying the Guideline.

References or evidence of any discussions/agreement with the consent authority and the Department regarding the assessment approach are also to be included.

4.3 Applying the Biodiversity Assessment Method

Table 2 provides guidance for application of the BAM to **severely burnt** native vegetation. The recommendations highlighted in Table 2 should be read in conjunction with the existing requirements of the BAM. Any BAM requirements that are not covered by the Guideline must still be applied.

Table 2 Guidance for application of the Biodiversity Assessment Method to subject lands with *severely burnt* native vegetation.

BAM ref.	Recommended application of the BAM
BAM Chapter 4: Landscape context	
Section 4.2	**Bushfire description** • Where the GEEBAM Burnt Area Classes *Canopy fully affected*, *Canopy partially affected* and *Canopy unburnt* are present on the subject land, a description of the recent bushfire(s) should be provided for the subject land and surrounding landscape, including the 1500 m buffer (or 500 m buffer for linear developments). This may require description of several bushfires where the subject land was only partially burnt by each. • Describe the following (where information is available): a. estimated time since the most recent bushfire(s) (months) b. total area of the most recent bushfire event(s) (km^2) c. sites of resource flows and sinks, e.g. where moisture and nutrients are likely to accumulate and support more rapid regeneration of vegetation and a higher carrying capacity (include justification). • All supporting material must be clearly referenced and dated. • A justification should be provided for any missing information, including efforts undertaken to obtain it. **Maps** • Prepare two versions of the Site Map and Location Map using: a. the most recent pre-fire aerial imagery, and b. the most recent post-fire aerial imagery (where available). • All maps must include the extent of the most recent bushfire(s) across the assessment area. • All maps must include the likely sites of resource flows and sinks.
Section 4.3	**Vegetation cover** • Estimate the native vegetation cover on the subject land and within a 1500 m buffer (or 500 m buffer for linear developments) **prior to** the most recent bushfire(s), using the most-recent pre-fire aerial imagery.

BAM ref.	Recommended application of the BAM
BAM Chapter 5: Assessing native vegetation, threatened ecological communities and vegetation integrity	
Section 5.1	**Vegetation extent** • Map the native vegetation extent on the subject land **prior to** the most recent bushfire(s), using the most recent pre-fire aerial imagery.
Section 5.2	**PCT and TEC determination** • The identification of PCTs and TECs must be determined by the most likely PCT/TEC that was present prior to the severe bushfire. The assessor should not determine a different PCT/TEC on the basis of any changes in species composition predicted as resulting from the severe bushfire. • Identification of PCTs/TECs will require judgement, supported by clear reasoning and use of the decision support tools provided in the Guideline. Determine the most likely PCTs/TECs on the subject land using a combination of the following (in addition to the criteria in BAM, 5.2.1.5): a. flora species present, particularly dominant species, determined by an extensive search for residual fertile material or regeneration b. geology and soils c. landscape position d. elevation, aspect and slope e. mean annual rainfall f. observation of unburnt PCTs on the subject land, adjacent to it or in the surrounding area g. existing site specific or nearby plot data from BioNet Systematic Flora Survey data collection (Vegetation Information System (VIS) data) in the BioNet Atlas application. h. local or regional vegetation maps i. aerial imagery (most recent pre-fire) j. other documented flora records from the local area. • Provide justification for the basis on which the PCT/TEC was assigned, including reference to specific characteristics used and consideration for how bushfire(s) occurrence has affected the determination. Evidence of any discussions and/or agreements with the Department regarding the selection of PCTs and TECs and all source material should be provided in the BDAR/BCAR. • Where the PCT cannot be identified with reasonable certainty or accuracy, it is recommended the vegetation assessment be delayed until sufficient regeneration occurs to support a more certain identification. • Where a TEC cannot be identified with reasonable certainty or accuracy, it is recommended the vegetation assessment be delayed until sufficient regeneration occurs to support identification, or presence of the TEC may be assumed.

BAM ref.	Recommended application of the BAM
	• The assessor should document in the BDAR/BCAR that they have the technical and botanical expertise to support their determination of a PCT and TEC, based on fire remnants and early regeneration of vegetation. This may include documenting advice supporting the assessment that was provided by third parties who have: a. previously worked in or are familiar with the ecological values of the subject or local area b. knowledge of the vegetation on the subject land area prior to recent severe bushfire(s) c. demonstrable experience in botanical identification and/or aerial imagery interpretation.
5.3	**Vegetation zones** • Determine the most likely vegetation zone(s) and patch size area(s) on the subject land prior to the severe bushfire(s), using the most recent pre-fire aerial imagery. As the vegetation zones are determined by pre-fire condition state, they may support burnt and unburnt areas. • Where the vegetation zone cannot be determined by condition prior to the severe bushfire event(s), delineate the vegetation zones by PCT only and assess the vegetation as being in a single condition state. • If the assessment has been partially completed prior to the severe bushfire event, information from that work should be used to determine vegetation zones. • Document the basis on which the vegetation zone(s) and patch size area(s) have been assigned, including why pre-fire condition state was unable to be determined (if applicable). All source material should be provided in the BDAR/BCAR, including references and dates. • Vegetation zones should be evaluated as **severely burnt** or **not severely burnt** as per section 4.2.2. The criteria in Table 1 should be used as a guide, comparing the features to those expected for the PCT present. The assessor must use their judgement to determine if the combination of the features described in Table 1 is evidence that the vegetation zone is **severely burnt**. A vegetation zone is considered **severely burnt** where all or part of the native vegetation within that zone is determined as **severely burnt**. • A determination for all or part of the vegetation zone being **severely burnt** or **not severely burnt** must be documented in the BDAR/BCAR. This should be supported by a clear description of the criteria in Table 1 and justification for the decision based upon the features observed (for the PCT present). If the vegetation zone is determined **not severely burnt** the justification should include details for why the BAM will provide a measure of vegetation integrity for that vegetation zone that is representative of the biodiversity values that were present on the subject land prior to severe bushfire. • Determine the extent of bushfire impact within the vegetation zone as area fully burnt and area partially burnt. • Map vegetation zone(s) and patch size area(s) using the most recent pre- and post-fire aerial imagery (where available). • Provide photographs (with dates, GPS coordinates and bearings) of each vegetation zone clearly identifying the burn severity and regeneration of vegetation (where present). • Provide justification in the BDAR/BCAR where any information was not provided.

BAM ref.	Recommended application of the BAM

Vegetation Integrity

- The Guideline sets out several options that can be used to assess the most likely vegetation integrity value for a vegetation zone prior to fire. Consultation with the consent authority or the Department on the most appropriate approach for determining vegetation integrity prior to beginning the assessment is recommended.
- Identify one of the following options (Figure 2) for determining vegetation integrity in a **severely burnt** vegetation zone. For vegetation zones **not severely burnt**, apply the BAM.
- Clearly identify the option selected for each vegetation zone and provide justification for the choice of method in the BDAR/BCAR, including reasoning for why other options were unsuitable. Include reference to or evidence of any discussions and/or agreements with the Department and details of all source material, including references and dates.

The options for collecting vegetation integrity data are presented below. Assessors should note that a mix of options may be used for an assessment, depending on the specific circumstances of each vegetation zone and the context of the site. Recommendations on when to apply each option are provided.

Option 1. Use an unburnt section(s) of the vegetation zone and replicate plot data in the BAM-C

- This approach is applicable where either:
  - the vegetation integrity assessment was partially completed prior to the severe bushfire, or
  - parts of the vegetation zone contain unburnt vegetation and assessment outcomes from that area can be extrapolated to determine native vegetation integrity for the vegetation zone, including the **severely burnt** areas.
- The selection of a suitably unburnt area should be justified with respect to the regenerative characteristics of the PCT and include reference to the composition, structure, function and habitat features as expected for the PCT prior to the severe bushfire(s).
- The area of the vegetation zone containing unburnt vegetation must be large enough for a BAM plot and transect.
- Requirements for random location of BAM plots (BAM, 5.3.4.5 and 5.3.4.6) may be varied to meet the minimum plot numbers. Where BAM 5.3.4.5 and BAM 5.3.4.6 requirements are varied to achieve the minimum plot numbers, justification and details should be included in the BDAR/BCAR.
- When the configuration and size of the unburnt part(s) of the vegetation zone does not allow for the minimum plots required by the BAM, the highest number possible must be surveyed (plots may be placed side by side in this case, with explanation provided in the BDAR/BCAR).
- Where the minimum number of plots cannot be achieved, plot data can be replicated in the BAM-C to allow the assessment to proceed. If replicating plot data in the BAM-C, all plots must be replicated equally (this may exceed the minimum plot requirements for the vegetation zone). For example, if plot data is available for two plots and five are required by the BAM, then both plots must be replicated three times. This would result in a total of six plots being entered in the BAM-C.
- When replicating plots in the BAM-C, the assessor must enter actual plot data, rather than an average of the plot data. Clearly identify where this occurs and justify the need for replicating plot data.
- Identify the use of this option by including ’rep’ in the vegetation zone(s) name within the BAM-C.

BAM ref.	Recommended application of the BAM

Option 2. Locate surrogate plots for vegetation zone

- It is recommended that this approach be applied where:
  a. there is no unburnt vegetation on the subject land (for the relevant vegetation zone), and
  b. the likely vegetation condition state for the vegetation zone was moderate to poor prior to the severe bushfire(s).
- Select a surrogate vegetation zone (as described in Box 1) located on land as close as possible and within 10 km of the subject land boundary.
- Plot data from a surrogate site must not be replicated to meet the minimum number of plots required by the BAM.
- Justification for the selection of a surrogate vegetation zone must be provided in the BDAR/BCAR using the criteria listed in Box 1. A map of the surrogate vegetation zone location in relation to the subject land must be included.
- Plots data from a surrogate site should be identified by including '_sur' in the vegetation zone(s) name within the BAM-C.

Option 3. Use of existing VIS data

- It is recommended that this approach be applied where:
  a. there is no unburnt vegetation on the subject land (for the relevant vegetation zone), and
  b. the VIS data is representative of the broad condition state of the vegetation zone prior to the recent severe bushfire(s).
- Existing VIS data can be accessed from the BioNet Systematic Flora Survey in the BioNet Atlas application.
- Where VIS data is available for the subject land or nearby site (generally within 10 km of the subject land boundary) for the same PCT (as described in Box 1), it may be used to inform the vegetation integrity assessment. VIS data should be evaluated for being representative of the broad condition state of the vegetation zone prior to the recent severe bushfire(s).
- Justification for the selection of VIS data must be provided in the BDAR/BCAR using the criteria listed in Box 1. Include a map of the VIS survey site location in relation to the subject land.
- As VIS data does not include function scores, the assessor should collect information on the number of large trees and presence of stem size classes from the subject land. The likelihood of regeneration being present may be based on consideration of previous land use and other information used in section 5.2. Alternatively, the assessor may use benchmark condition.
- The VIS survey name and site number (as documented in the database) should be provided in the BDAR/BCAR including justification for the allocation of PCT from VIS data (where PCT has not been identified in the database).
- Plot data from VIS should be identified by including '_vis' in the vegetation zone(s) name within the BAM-C.
- Where the VIS data does not meet the minimum number of plots required by the BAM, advice may be sought from the consent authority or the Department as to the most appropriate approach for determining vegetation integrity.

BAM ref.	Recommended application of the BAM
	Option 4. Assume benchmark condition • It is recommended that this approach be applied where: a. there are no patches on the subject land with unburnt vegetation (for the relevant vegetation zone), and/or b. the PCT condition state was likely to have been high or very high prior to the recent severe bushfire(s). • Benchmark condition scores (located in the BioNet Vegetation Classification module for each PCT) may be used to represent the vegetation integrity for the **severely burnt** vegetation zone. • Use of this approach should be identified by including '_bm' in the vegetation zone(s) name within the BAM-C. **Hollow bearing trees** • The number of trees with hollows must be assessed (as per BAM, 5.3.4.29) on the subject land. • Plots should be randomly allocated (as per BAM, 5.3.4), including placement within the vegetation zone(s) or parts of vegetation zone(s) burnt by bushfire(s). • Clearly identify these plots on the Site Maps, providing GPS coordinates and bearings. • Where hollow bearing trees are present then this feature is recorded in the BAM-C irrespective of the option selected to estimate vegetation integrity scores.
BAM Chapter 6: Assessing the habitat suitability for threatened species	
Section 6.4	**Assessing habitat constraints for ecosystem and species credit species** • Threatened species habitat suitability must be assessed on the subject land, including within all **severely burnt** and **not severely burnt** vegetation zones, applying the BAM with the use of the Guideline. • Generally, habitat constraints that are components of vegetation should not be determined as being absent (including from the impact of bushfire) unless evidence is provided that the constraint was not present prior to the bushfire(s) (e.g. it is not present on unburnt areas of the subject land). **Assumed presence and expert reports** • Threatened species should be assumed present or assessed with an expert report for **all** vegetation zones on the subject land (except with agreement from the consent authority for the assessor to undertake a threatened species survey for specific threatened plants, such as particular fire respondent species). • If using an expert report, threatened species presence must be assessed on the subject land, including within the **severely burnt** vegetation zones. • A threatened species may be excluded from further assessment if the expert determines that the species would not or is unlikely to have been present on the subject land prior to the severe bushfire. • An expert report must not be used for a species for which assessment is required by referring to an important mapped area.

BAM ref.	Recommended application of the BAM
	Threatened species survey • Survey for threatened plant species can only be undertaken where evidence indicates the species, if present, will be identifiable above ground as part of the early regeneration following severe bushfire. Evidence includes peer-reviewed literature describing the species presence on sites within six months following a severe bushfire or reference populations in similar post-severe bushfire sites under similar conditions (e.g. rainfall, season) are detectable. All source material should be provided in the BDAR/BCAR, including references and dates. • An assessor should seek written agreement from the consent authority prior to conducting a threatened species survey and provide documentation of this agreement in the BDAR/BCAR. • Surveys cannot be undertaken to assess presence or absence of threatened fauna after the fire event **Species polygons and counts** • The area of habitat or estimated number of individuals should, in general, be based on the pre-fire occurrence. • The habitat condition, used to calculate credits for species assessed by area, of the species polygon is determined by the vegetation integrity score for each vegetation zone (as determined by the selected approach in 5.3).
BAM Chapter 10: Thresholds for the assessment and offsetting of impacts of development	
Section 10.2	• Entities at risk of a SAII must be assumed present or assessed by expert report.
Subsection 10.2.2	• All criteria in paragraph 10.2.2.1 must be addressed and include consideration of the impacts of the recent bushfire(s) on threatened ecological communities.
Subsection 10.2.3	• All criteria in paragraph 10.2.3.1 must be addressed and include consideration for the interaction of impacts from the recent bushfire(s) with those from development on the threatened species populations.
BAM Appendix 1: Streamlined assessment module – clearing paddock trees	
	• Determine if the vegetation meets the definition of paddock trees using most recent pre-fire aerial imagery. • Where a paddock tree has been damaged by bushfire, the diameter at breast height (DBH) must be estimated to represent the DBH prior to the severe bushfire(s). • Photos of all paddock trees in the assessment must be included (with dates, with GPS coordinates and bearings). • If the occurrence of hollows cannot be reliably determined, then presence of hollows must be assumed. If hollows are determined absent, justification should be included in the BAM.

BAM ref.	Recommended application of the BAM
BAM Appendix 2: Streamlined assessment module – small area development that requires consent	
	• Identify the most likely dominant PCT on the subject land prior to the severe bushfire(s) using most recent pre-fire aerial imagery. • Determine vegetation integrity using the preferences outlined in section 5.3 (of Table 2, Vegetation integrity), employing a qualitative (observation) or quantitative approach (as detailed in the BAM, Appendix 2). • Threatened species habitat suitability must be assessed on the subject land for species at risk of a SAII, including within the **severely burnt** vegetation zones. • Generally, habitat constraints that are components of vegetation should not be determined as being absent (including from the impact of bushfire) unless evidence is provided that the constraint was not present before the bushfire(s) (e.g. it is not present on unburnt areas of the subject land).

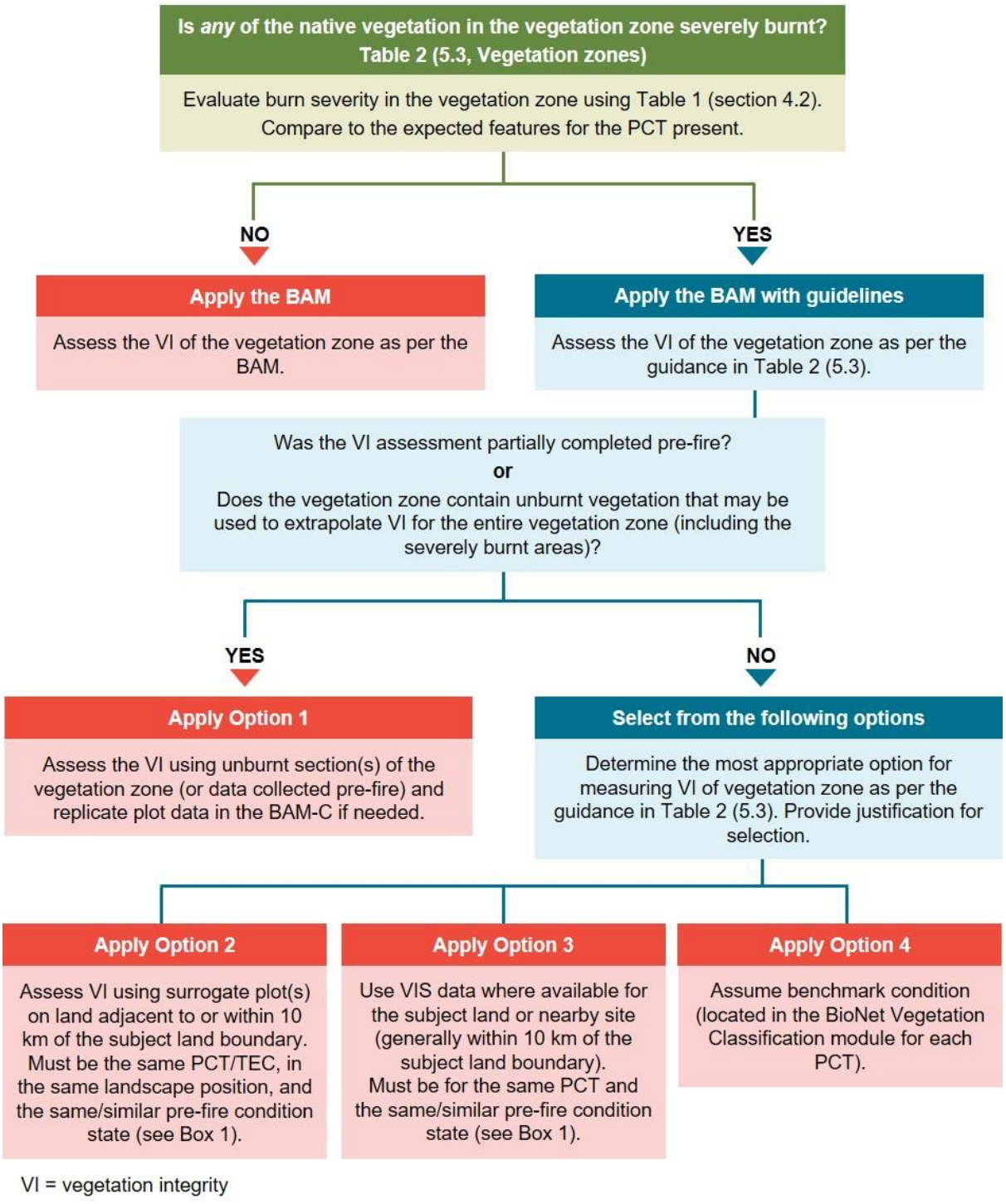

Figure 2 **Determining the preferred option for assessing the vegetation integrity of *severely burnt* vegetation zone.**

Box 1: Selecting a surrogate vegetation zone or VIS plot data for the vegetation integrity assessment of severely burnt native vegetation.

A surrogate vegetation zone or VIS plot data must reasonably represent the **severely burnt** vegetation zone prior to the recent severe bushfire, and have:

1. the same PCT or TEC in the same landscape position, and
2. the same or similar condition state prior to the recent severe bushfire(s).

Where relevant, provide a justification to vary the usual requirements for locating plots (BAM, 5.3.4.5 and 5.3.4.6) to meet the same condition state as the **severely burnt** zone (in its pre-fire condition state).

Provide a detailed justification for choice of surrogate vegetation zone with reference to the following criteria (where available and relevant):

- geology and soils
- landscape position
- mean annual rainfall
- recent rainfall (previous 12 months)
- elevation
- aspect and slope
- species present
- observation of PCTs in the surrounding area
- documented records from the local area
- aerial imagery
- use of local or regional vegetation maps
- land use and management history
- native vegetation clearing
- weed cover extent
- natural disturbance history (e.g. fire interval, drought impact)
- work Health and Safety limitations (e.g. unsafe areas due to risk of falling limbs).

Justification should be provided for any missing information, including efforts undertaken to obtain it.

5. Supporting material

5.1 Biodiversity Assessment Method support

Additional support for the application of the BAM to a **severely burnt** site may be requested at bam.support@environment.nsw.gov.au.

5.2 Literature

Keeley, J.E. 2009. Fire intensity, fire severity and burn severity: a brief review and suggested usage. *International Journal of Wildland Fire*,18: 116-126.

Keeley, J.E. and Pausas, J.G. 2019. Distinguishing disturbance from perturbations in fire-prone ecosystems. *International Journal of Wildland Fire*, 28: 282-287.