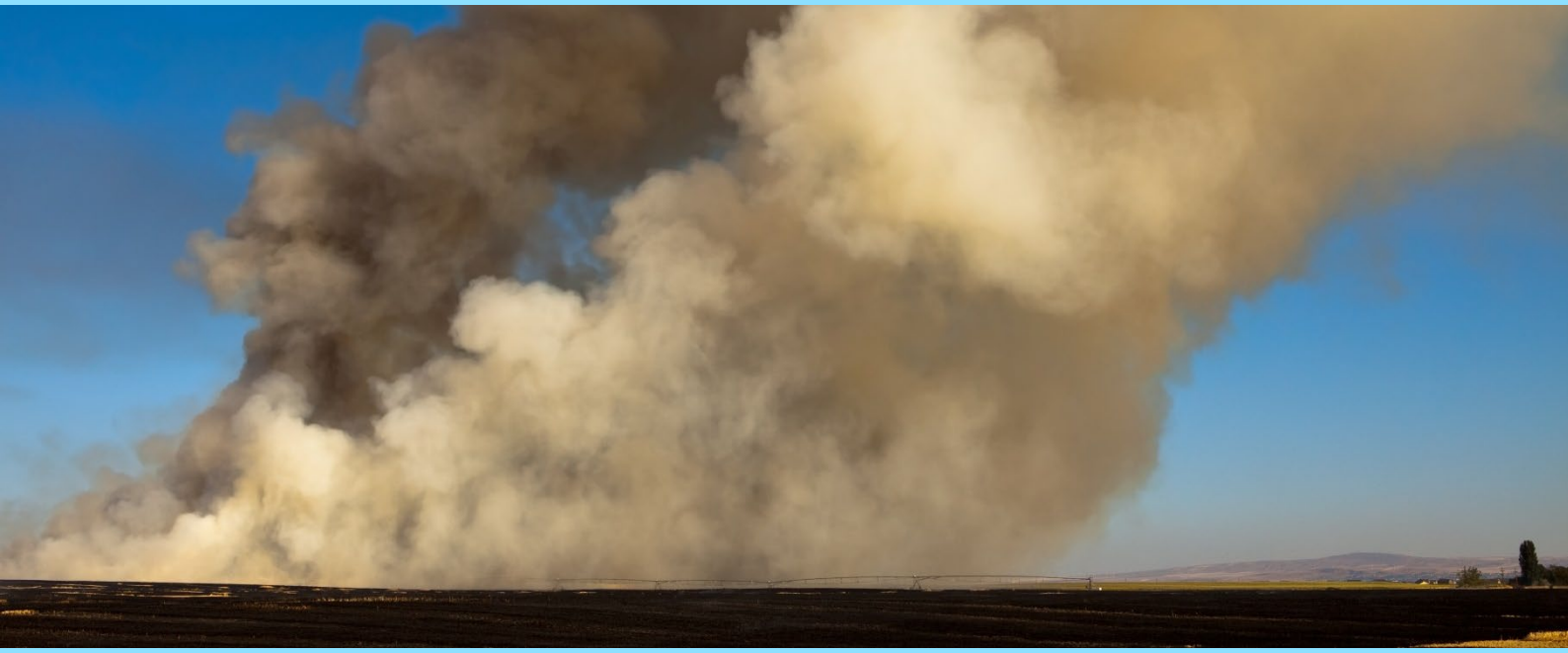

Local Government Air Quality Toolkit

Agricultural burning guidance note

Information on good design and management practices to reduce air emissions from agricultural burning

NSW GOVERNMENT

Acknowledgement of Country

Department of Climate Change, Energy, the Environment and Water acknowledges the Traditional Custodians of the lands where we work and live.

We pay our respects to Elders past, present and emerging.

This resource may contain images or names of deceased persons in photographs or historical content.

The Local Government Air Quality Toolkit has been developed by Department of Climate Change, Energy, the Environment and Water in collaboration with the NSW Environment Protection Authority, the NSW Department of Planning, Housing and Infrastructure, Local Government NSW and local councils.

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1. Introduction

1.1 Overview

This guidance note provides information for council officers on the management of agricultural burning and the roles and responsibilities of farm owners and managers.

It gives general information on good design and management practices to reduce air emissions from agricultural burning. It does not cover water quality management, nutrient management, work health and safety, or greenhouse gas emissions.

Agricultural burning, or crop stubble burning, is a type of biomass burning that involves the deliberate use of fire for management purposes.

Stubble is the base of the plant and the straw residue remaining on the surface of the soil following the harvest of crops. This includes material discharged from the harvester. This material is often burned so that the land is clear for reuse.

In New South Wales, agricultural activities and agricultural burning are usually carried out on farms where no scheduled activities are occurring.

Local government has regulatory responsibility for environment protection from agricultural burning.

During the last 25 years, conservation farming has continued to evolve. There is now less burning, less soil cultivation and increased retention of crop stubble. This trend has been driven by the need to maximise water use and protect soils from erosion, in an era of increasing climate variability.

The types of material subject to agricultural burning and where it is commonly practised, include:

- cotton – in the Gunnedah area in late autumn and winter. The stubble is cut green and burned in piles, creating large amounts of smoke
- rice – during the autumn in the Murrumbidgee Irrigation Area
- sugarcane – in northern New South Wales in winter and spring
- wheat – in north-western New South Wales during autumn
- other vegetation (e.g. cleared timber) – anywhere in New South Wales.

The potential for health and nuisance impacts from burning is heightened if the burning occurs when the prevailing weather is conducive to poor dispersion and poor dilution of the smoke.

In the case of broad area agricultural burning, poor dispersion occurs when the smoke plume is confined close to the ground rather than dispersing and diluting downwind.

> Simultaneous agricultural burning on several properties can result in significant cumulative impacts, particularly in conditions where dispersion is poor.

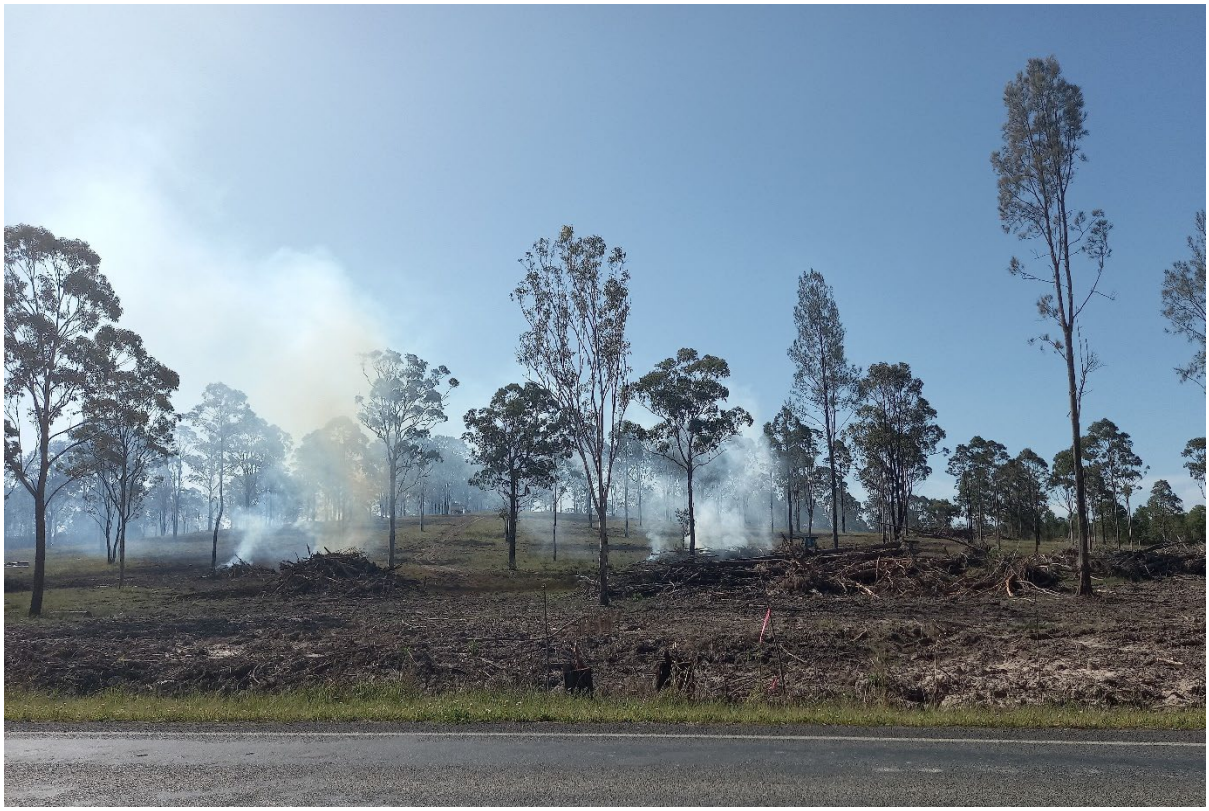

Figure 1 **Pile burning**
Source: Emily Nicolson/MidCoast Council

1.2 Protection of the Environment Operations Act 1997 and Protection of the Environment Operations (Clean Air) Regulation 2022

The Protection of the Environment Operations (Clean Air) Regulation 2022 (Clean Air Regulation) allows burning of vegetation for agricultural operations if the burning is carried out (s 15):

a. on the premises on which the vegetation grew, and
b. as part of agricultural operations, including
    i. clearing the premises of vegetation, other than for construction on the premises, or
    ii. the burning of stubble, orchard prunings, diseased crops, weeds or pest animal habitats on farms, or
    iii. the burning of pasture for regenerative purposes.

The Clean Air Regulation also establishes a general obligation for any person conducting a fire, including agricultural burning, to take all practicable measures to minimise or prevent air pollution (s 9). It does this by requiring persons intending to conduct agricultural burning to, for example, take into account the potential for smoke impacting on any person due to wind direction and weather conditions.

Outside of agricultural burning permitted by s 15 of the Clean Air Regulation, local councils can prohibit burning of vegetation under s 12 of the Clean Air Regulation, for example, in backyard burning. Open burning at this scale is covered in the Local Government Air Quality Toolkit – *Neighbourhood smoke guidance note*.

Part 5.4, Division 2, s 133 of the *Protection of the Environment Operations Act 1997* (POEO Act) allows the NSW Environment Protection Authority (EPA) to ban burning in the open, conditionally or unconditionally, on days when weather conditions mean that burning is likely to contribute to significant air pollution.

The EPA initiates the no burn procedure by notifying the Rural Fire Service (RFS) 2 days before the proposed ban. Following discussions between the RFS and EPA, the EPA finalises the no burn notice on the day before it comes into effect.

2. Potential emissions to air

Agricultural burning produces broad area emissions of smoke, particulates and associated odour. Each of these can have adverse off-site impacts if not properly managed.

Burning may also involve the release of pesticides and herbicides that have been used on the crops to be burnt. Of particular concern is the large quantity of pesticides used on cotton crops.

The composition and intensity of the smoke produced from the combustion of the biomass is influenced by all of the following factors:

- crop area burned
- meteorological conditions
- soil moisture content
- nature of the stubble (density and moisture content).

The smoke will contain a range of pollutants as a result of both the complete and incomplete combustion of the biomass. These pollutants include carbon monoxide and particulates of varying composition (respirable and inhalable). The fine particles consist of black carbon (that is, soot) and other material formed through the incomplete combustion process of the biomass, such as the group of chemical compounds generally referred to as polycyclic aromatic hydrocarbons (PAHs) which may also adhere to the soot particles.

An example of the significant amount of smoke that can be generated from a stubble burn is shown in Figure 2.

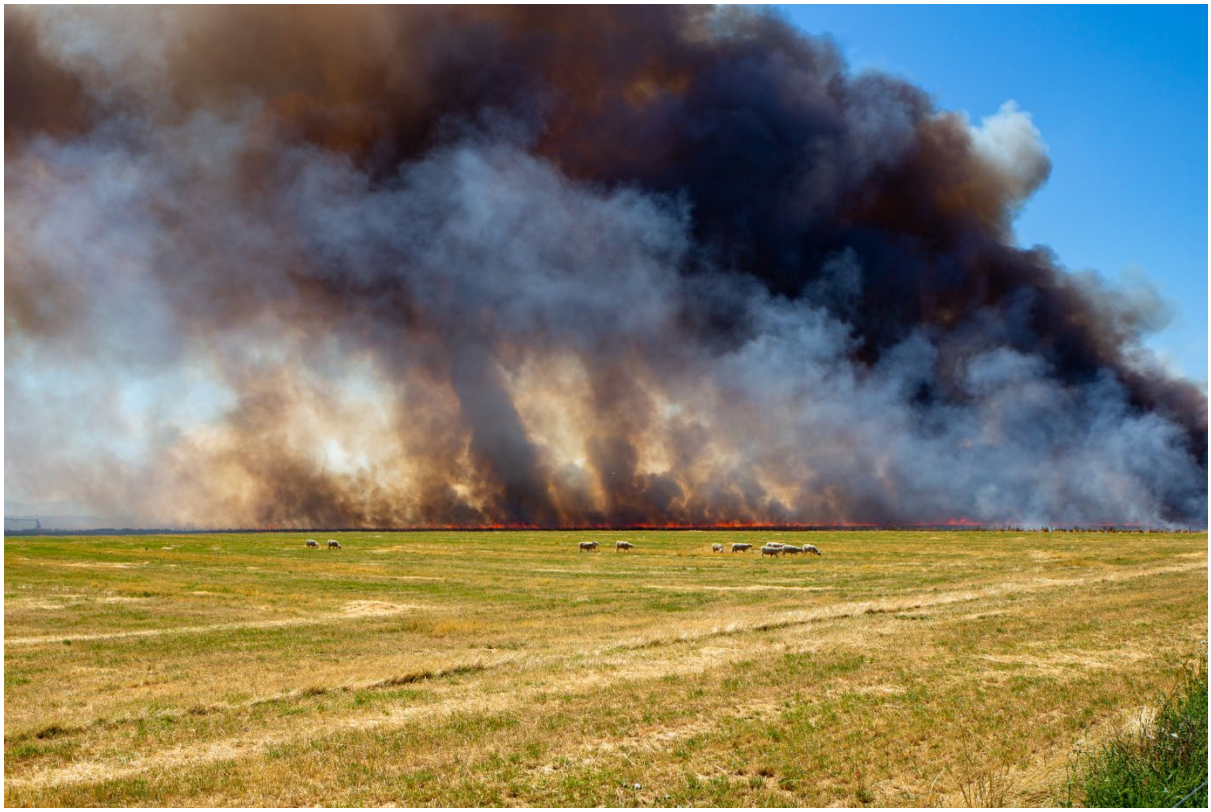

Figure 2 **Large smoke plume from the burning of stubble**
Source: Sheryl Watson/iStock

3. Managing air pollution

3.1 Responsibilities of owners and operators

The Clean Air Regulation establishes a general obligation for the land owner/occupier conducting a fire, including agricultural burning, to take all practicable measures to minimise or prevent air pollution. A person intending to conduct agricultural burning must take into account the potential for smoke impacts due to wind direction and weather conditions (EPA 2022b).

Operators should consider the following before agricultural burning:

- the significance of the generated smoke and its impact on identified surrounding sensitive land uses (e.g. schools, day care centres, hospitals, aged care facilities, sporting grounds); the direction from the burn area to these sites must be established and smoke must not be permitted to be blown by the wind to an area where it can be harmful to the health of any person, or cause or be likely to cause discomfort or inconvenience to any person

> The onus is on the land owner and/or occupier as the operator to not allow visible smoke to impact sensitive sites. If justifiable smoke complaints are being received, the operator may be required to extinguish the fire.

- material being burnt is not wet (Clean Air Regulation s 9(2)(b)) and therefore likely to generate excessive quantities of smoke; morning dew on a crop can cause this issue, which should be allowed to fully dry before burning starts. Cleared timber should be left to season properly, which can take considerable time, sometimes over 12 months depending on the types of timber and size of material.
- disposed material is suitable to be burnt (Clean Air Regulation s 9(2)(c))
- whether wind direction or prevailing weather conditions will inhibit adequate dispersion of smoke (e.g. avoid burning overnight or in the early morning when temperature inversions can occur) (Clean Air Regulation s 9(2)(a))
- potential for creating a traffic hazard on public roads through reduced visibility
- all recommended steps have been taken to ensure that the fire will not go beyond their site boundary; this would include adequate fire breaks around trees. Where boundaries are adjacent to Crown land (e.g. forest, national park) then extra supervisory conditions may be required
- the start time and duration of the burn, with the primary concerns being whether ongoing and effective fire management can be maintained during the day and, if required, at night (generally the fire should be extinguished by nightfall) (Clean Air Regulation s 9(2)(a))
- resources required (both human and materials) to extinguish the fire at any time during the proposed burn period; in particular, before nightfall
- enhancing combustion efficiency through the use of fuels or accelerants is NOT recommended
- burning of certain items is prohibited (e.g. treated timber, tyres) (Clean Air Regulation s 10).

For locations where sensitive sites are visible from a prospective burn site, and zero impacts at these sites cannot be guaranteed, the operator should not burn agricultural crops when the prevailing wind is towards the direction of the identified sensitive land

use. The forecast duration of the prevailing wind must also be checked and determined to be within the anticipated timeframe of the burn to avoid wind changes or shifts that could give rise to problems.

To reduce cumulative impacts from agricultural burning operations, local councils or shires may choose, in collaboration with the local RFS, to establish a coordination roster to manage the number of individual burns, or the total area of a burn, for the benefit of the local community.

Notification and permits

The operator may need to obtain a fire permit from a NSW fire authority before conducting an agricultural burn:

- If the area is within a district controlled by Fire and Rescue NSW (FRNSW) then a permit is always required for burning. This permit must be obtained from FRNSW and the operator will be expected to comply with all documented conditions in the permit.
- If the area is outside the FRNSW area of control then a permit is required if burning is to be conducted within the designated Bush Fire Danger Period, which generally runs from 1 October to 31 March. This permit can be obtained from the local RFS and the operator will be expected to comply with all documented conditions in the permit.

Permits impose conditions on the way a fire is lit and maintained. They are usually issued for a period of 21 days and the operator will need to check their permit has not expired before undertaking final preparations to burn.

Operators must:

- provide 24-hours' notice to the local RFS before starting any agricultural burning, irrespective of any permits obtained
- provide 24-hours' notice of their intention to burn to any neighbouring property owners or managers; this includes agencies responsible for neighbouring Crown land or national parks or catchment areas (if any).

Designated no burn and total fire ban periods

The following should be taken into consideration for no burn and total fire ban periods:

- Irrespective of permits, no burning is allowed during designated no burn periods. Operators must check that a no burn period is not in force in their district before initiating a burn.
- No burning is allowed during designated total fire ban periods. These are advertised widely in the media along with other no burn periods. Operators must check that a total fire ban is not in force in their district before initiating a burn.

Best practice

Control technology methods such as capture and treatment of emissions from agricultural burning are often not practical as the material is usually burnt in an open area. However, there are some things that could be considered in the management of these potential impacts, such as:

- limiting the area or pile size to be lit, which must be supervised. This reduces the volumes of smoke produced and the dimensions of the smoke plume
- consideration of wind direction could allow burns to occur when the wind is blowing away from town or nearby residents

- burning should not be scheduled after rain. Material should be dry and free of wet material such as soil
- burn during daylight hours after early morning temperature inversions have broken up.

Although it is not specifically banned, night-time burning should always be discouraged.

The overnight meteorological conditions generally cause very poor dispersion of smoke, which can result in significant impacts much further away and at higher concentrations than during the day. These conditions can persist through the early morning, particularly in areas of undulating terrain or near significant bodies of water.

At night, tracking the smoke plume becomes more difficult and therefore the risk of causing discomfort or harm to the community increases.

There is no specific requirement to have fires extinguished by nightfall. However, under the *Rural Fires Act 1997*, someone must be in attendance all the time a fire is alight. Therefore, if an operator cannot attend the fire overnight, it must be extinguished.

The nature of the terrain becomes a factor at night-time. For example, if burning in a valley, there is potential for accumulation and channelling of smoke along the valley floor, in a manner totally different to what occurs during the day. In this case sensitive land uses in these areas could be at risk.

Effective extinguishment of the burn is the only way to stop or control impacts due to emissions.

3.2 Alternatives to agricultural burning

As mentioned in Chapter 1, during the last 25 years conservation farming has continued to evolve, resulting in less burning, less soil cultivation and increased retention of crop stubble. This trend has been driven by the need to maximise water use and protect soils from erosion, in an era of increasing climate variability.

Exceptions to this apply in areas that have excessive weeds or disease, where burning is still perceived to be the best management alternative.

Council officers can encourage operators to review the need for agricultural burning and examine the feasibility of using alternative agricultural management practices.

Advantages of not burning

An advantage of not burning crop residue is the potential reduction in soil and water erosion. Retained stubble can improve or maintain soil quality and moisture by protecting the soil surface from the elements. This is because:

- stubble cover provides a cushion for the soil so that the impact of rain decreases and the soil is not as easily dislodged and moved
- the stubble also provides a wind barrier and holds the soil in place so that less nutrient-rich topsoil is lost
- crop residue slows water runoff, which increases infiltration of water and increases soil moisture. Ground cover also reduces evaporation, which can help in dry years.

4. Considerations for local councils

4.1 Scheduled or non-scheduled activity

Overview

As mentioned in Chapter 1, agricultural activities in New South Wales including burning are usually carried out on farms where no scheduled activities are occurring. However, authorised local government officers have an important role to play in managing the compliance process for these non-scheduled activities, and enforcing positive environmental outcomes using statutory notices, orders and directions.

Local councils are responsible for following up complaints regarding agricultural burn smoke and ash fallout. Chapter 3 of the Local Government Air Quality Toolkit – *Resource pack* contains checklists for investigating complaints and conducting inspections.

4.2 Collaboration

Local government should consider a coordinated approach to local agricultural burning to achieve benefits for local air quality.

Local councils, the RFS and other agencies can work together to:

- establish a timetable for agricultural burning in the local area so air quality impacts can be minimised
- agree on approval, assessment and management practices that can be adopted locally
- develop a communication strategy for keeping the community informed about local initiatives regarding agricultural burning.

Case study

Note that this case study is for illustrative purposes only. It does not indicate a procedure that ARAs, authorised officers and enforcement officers should follow in all cases and does not constitute legal advice. Readers should seek their own legal advice in relation to their specific circumstances.

Issue: Backyard burning of large quantities of timber for agriculture operations. A complaint was received from adjoining property owners alleging that the neighbour was trying to burn around 30 piles of wet timber, which were producing large amounts of smoke. The complaint alleged that the smoke was causing breathing difficulties for the neighbours. The piles had been observed to be smouldering for several days. The complainant contacted the RFS but the RFS was unable to take action as the burning occurred outside of the prohibited fire season.

Background: The complainant's house is located in a rural area about 300 m from the burn piles. The neighbouring property was planted with pine trees that were felled during the prior winter. Timber consisting of mature pine trees including roots had been pushed in piles up to 20 m in length, 6 m in width and 3 m in height (Figure 3).

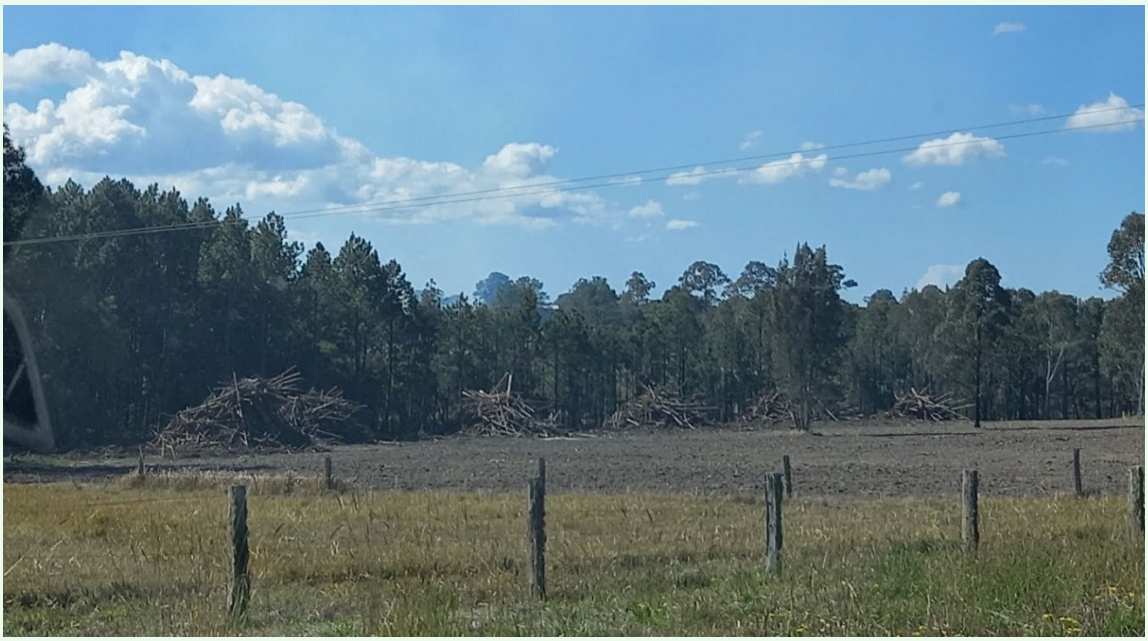

Figure 3 **Timber piled up ready for burning**
Source: Emily Nicolson/MidCoast Council

Response: The council officer contacted the property owner conducting the fire to advise that the council had received complaints in relation to smoke and that burning should be undertaken in an efficient manner.

Council advised that under s 9 of the Clean Air Regulation 'a person who burns anything in the open or in an incinerator must do so by such practicable means as are necessary to prevent or minimise air pollution'.

'...preventing or minimising air pollution may include the following –

a. mitigating the potential for smoke impacting on a person, considering —
   i. wind direction, and
   ii. weather conditions, and
   iii. the likely length of burning time of the material,
b. taking reasonable measures to ensure the material being burnt is not wet,
c. burning only material that is suitable for disposal by burning, considering the possible effects on human health and the environment.'

Further complaints were received the following day and an officer completed an inspection (drive-by only as the gate was locked). Piles were observed smouldering from the road. The officer could have entered the property under the POEO Act.

A warning letter was issued to the property owner, which included:

'To ensure that burning is conducted in an efficient manner the burn pile should be constructed in accordance with the RFS Standards for Pile Burning and the following actions must be taken:

- Reduce the burn piles to a size that ensures piles do not smoulder overnight.
- Ensure material being burnt is not green, wet or covered in dirt, and is suitable to be efficiently burnt.
- Reduce the number of piles being burnt at once and continue to monitor for potential smoke impacts on surrounding residences.
- Ensure piles are not left to smoulder overnight.'

The next step, if required, would have been to issue a prevention notice under the POEO Act.

Other methods of disposal were discussed with the property owner such as wood chipping (not feasible) and firewood (time constraints).

Outcome: The number of piles burnt were reduced and the piles were only burnt when wind was blowing in a northerly direction, away from neighbouring residences. No further complaints were received, or action required.

5. References and other resources

All documents and webpages that are part of the Local Government Air Quality Toolkit are available from the EPA website.

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