

**Assurance of  
Department of  
Environment,  
Land, Water and  
Planning  
breaches of  
planned burn  
control lines**

2018–19



**IGEM**  
Inspector-General  
for Emergency  
Management

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## Acronyms

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<b>BOIC</b>	Burn Officer in Charge
<b>CFA</b>	Country Fire Authority
<b>CFO</b>	Chief Fire Officer
<b>DELWP</b>	Department of Environment, Land, Water and Planning
<b>ePBRAT</b>	Electronic Planned Burn Risk Assessment Tool
<b>FFMVic</b>	Forest Fire Management Victoria
<b>FMD</b>	Fuel Moisture Differential
<b>IGEM</b>	Inspector-General for Emergency Management
<b>PBRAT</b>	Planned Burn Risk Assessment Tool

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# Executive summary

Victoria is one of the most bushfire prone areas in the world. Victoria has approximately eight million hectares of publicly managed parks, reserves and state forest, covering approximately one third of the state<sup>1</sup>, and bringing with it a potential source of bushfire fuel.

Through Forest Fire Management Victoria, the Department of Environment, Land, Water and Planning (DELWP) oversees Victoria's bushfire fuel management on public land, which includes planned burning.

Planned burning is an efficient method of reducing fuel loads over large areas of land, therefore reducing bushfire risk. However, planned burning presents its own risks.

In 2015 a DELWP planned burn realised these risks, breaching control lines and causing significant impact to the natural environment and the community of Lancefield. The resulting independent investigation made 22 recommendations, many of which were imbedded into *Safer Together: A new approach to reducing the risk of bushfire in Victoria (Safer Together)*.

That event also resulted in the Victorian Government requesting the Inspector-General for Emergency Management (IGEM) to manage the prompt investigation and reporting of any future breaches of control lines by a planned burn.

This process, now in place for three-and-a-half years, has facilitated significant improvements in DELWP's risk assessment, planning, and review of planned burns that breach control lines.

This is IGEM's fourth report on breaches of planned burn control lines, covering the period 1 July 2018 to 30 June 2019. It includes a summary of bushfire fuel management in Victoria, findings, a recommendation, and an observation derived from three planned burns that breached control lines during 2018–19, and a progress summary of DELWP's implementation of ongoing recommendations related to planned burning.

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<sup>1</sup> State of Victoria, 2019, <https://www.forestsandreserves.vic.gov.au/land-management/managing-crown-land> retrieved 28 October 2019.

## Breaches of planned burn control lines

In the period 1 July 2018 to 30 June 2019, DELWP conducted 251 planned burns across 130,044 hectares of land. Of these planned burns, three breached control lines, resulting in 82.1 hectares of unintentionally burned land. DELWP classified two as a 'breach' and the third a 'bushfire' (in accordance with its standard operating procedure).

All three breaches of control lines originated from planned regeneration burns, among which IGEM identified several contributing themes, including:

- influence of prolonged dryness on fuel moisture
- contingency planning
- hazardous trees
- patrolling at the site of the breach.

In this report IGEM makes four findings, one recommendation, and one observation (refer to Table 1) based on its analysis of the three planned burns that breached control lines.

**Table 1:** IGEM findings, recommendation, and observation from 2018–19 breaches of planned burn control lines

FINDING	RECOMMENDATION OR OBSERVATION
<p><b>Finding 1</b></p> <p><i>Predictions of the persistence of sufficient fuel moisture content in adjoining forests showed to be inaccurate during periods of prolonged dryness.</i></p>	<p><b>Recommendation 1</b></p> <p>The Inspector-General for Emergency Management recommends that the Department of Environment, Land, Water and Planning review literature and contemporary research projects to assist its understanding of the extent of landscape dryness and its effect on fuel availability. Information collected should be shared with decision makers to increase their understanding of fire behaviour during the conduct and control of planned burns in periods of prolonged landscape dryness.</p>
<p><b>Finding 2</b></p> <p><i>Elements of contingency plans were not able to be carried out operationally, and therefore were ineffective in mitigating a breach of control lines.</i></p>	<p><b>Observation 1</b></p> <p>The Inspector-General for Emergency Management (IGEM) notes that the Department of Environment, Land, Water and Planning (DELWP) has processes in place to ensure documented contingency plans are created, reviewed and approved with consideration of the unique physical characteristics of the planned burn site. This is aimed at supporting more effective mitigation of the risk of a breach of control lines. IGEM encourages DELWP to continue to emphasise with staff the importance of taking the unique physical characteristics of the planned burn site into consideration when creating, reviewing and approving contingency plans.</p>
<p><b>Finding 3</b></p> <p><i>In planning documents, the stipulation of 'dynamic risk assessment' failed to provide operational staff with timely management options to effectively mitigate a breach of control lines.</i></p>	n/a

FINDING	RECOMMENDATION OR OBSERVATION
<p><b>Finding 4</b></p> <p><i>Despite adequate risk assessment, planned patrolling and well-founded operational strategy, ground-based patrol crews were unable to be present at the location of the breach of control lines at the time they occurred.</i></p>	n/a

### Implementation monitoring of recommendations

In this report, IGEM provides its findings on DELWP's implementation progress of six recommendations from its

*Summary of investigations into Department of Environment, Land, Water and Planning breaches of planned burn control lines 2016–17.*

IGEM has assessed three recommendations as complete and two as ongoing. Based on new evidence, IGEM also reassessed one recommendation as complete, which was previously assessed as closed in its *Summary of Department of Environment, Land, Water and Planning bushfire fuel management 2017–18* report.

### Concluding remarks

DELWP has implemented continuous improvement by progressing *Safer Together*, and other initiatives, both internally and with partner agencies.

In implementing recommendations and applying continuous improvement practices, DELWP (and its staff) has shown commitment to embracing new ways of managing the risk of planned burns breaching control lines.

To continue this, IGEM has identified that DELWP focus on developing a better understanding of the extent of landscape dryness and its effect on fuel availability, as well as ensuring documented contingency plans are developed with consideration of the unique physical characteristics of the planned burn site.

DELWP has shown its commitment to progress its organisation's processes and culture toward one that is effectively engaged with partner agencies and the wider community. IGEM further encourages DELWP to continue its current trajectory in cultivating a risk reduction approach to its planned burning program.

# 1 Introduction

## 1.1 Background

In February 2015 the Victorian Government requested that the Inspector-General for Emergency Management (IGEM) conduct a review of performance targets for bushfire fuel management on public land.

IGEM published its *Review of performance targets for bushfire fuel management on public land*<sup>2</sup> (the review) in May 2015. The review made four recommendations, including a shift away from a hectare-based fuel reduction target, to a risk reduction target.

In October 2015 a Department of Environment, Land, Water and Planning (DELWP) planned burn breached control lines and initiated a fire that caused significant loss of property, impact to the natural environment, and impact to the community near the town of Lancefield. Following the fire, the Victorian Government commissioned the *Independent Investigation of the Lancefield-Cobaw Fire*<sup>3</sup> (the independent investigation). The independent investigation made 22 recommendations aimed at improving the systems and processes central to the delivery of planned burning throughout Victoria.

In November 2015 government accepted all recommendations from the review and the independent investigation. DELWP and its partner agencies have since imbedded many aspects of these recommendations into *Safer Together: A new approach to reducing the risk of bushfire in Victoria* (*Safer Together*). This approach continues to combine the expertise of land and fire managers with local knowledge, to deliver better outcomes for Victoria's bushfire-prone communities and the environment.

### **Assurance of bushfire fuel management**

At the request of the then-Minister for Environment, Climate Change and Water, and the then-Minister for Emergency Services (the ministers), IGEM monitored the implementation of all recommendations from the review and the independent investigation under section 64(1)(ca) of the *Emergency Management Act 2013* (the Act)<sup>4</sup>.

In its report *Summary of Department of Environment, Land, Water and Planning bushfire fuel management 2017–18*, IGEM reported that DELWP had implemented all recommendations from the review and the independent investigation.

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<sup>2</sup> The State of Victoria, 2015, *Review of performance targets for bushfire fuel management on public land*, [https://www.igem.vic.gov.au/sites/default/files/embridge\\_cache/emshare/original/public/2017/07/d7/24d0ede21/Reviewofperformancetargetsforbushfirefuelmanagementonpublicland.pdf](https://www.igem.vic.gov.au/sites/default/files/embridge_cache/emshare/original/public/2017/07/d7/24d0ede21/Reviewofperformancetargetsforbushfirefuelmanagementonpublicland.pdf) retrieved 28 October 2019.

<sup>3</sup> The State of Victoria, 2015, *Independent Investigation of the Lancefield-Cobaw Fire*, [https://www.ffm.vic.gov.au/\\_\\_data/assets/pdf\\_file/0002/20000/Independent-investigation-into-Lancefield-Cobaw-fire.pdf](https://www.ffm.vic.gov.au/__data/assets/pdf_file/0002/20000/Independent-investigation-into-Lancefield-Cobaw-fire.pdf) retrieved 28 October 2019.

<sup>4</sup> *Emergency Management Act 2013*, [http://www.legislation.vic.gov.au/domino/Web\\_Notes/LDMS/LTObject\\_Store/ltobjst10.nsf/DDE300B846EED9C7CA257616000A3571/708B0D45D9AEBC9DCA258341001DCB5A/\\$FILE/13-73aa013%20authorised.PDF](http://www.legislation.vic.gov.au/domino/Web_Notes/LDMS/LTObject_Store/ltobjst10.nsf/DDE300B846EED9C7CA257616000A3571/708B0D45D9AEBC9DCA258341001DCB5A/$FILE/13-73aa013%20authorised.PDF) retrieved 28 October 2019.

The ministers also requested IGEM manage the prompt investigation and reporting of any future breaches of control lines by a DELWP planned burn, under section 64(1)(c) of the Act. This process – now in place for more than three-and-a-half years – has contributed to the continuous improvement of DELWP’s risk assessment and internal assurance processes for planning its application of fire on public land.

DELWP has implemented substantial changes in its approach to bushfire fuel management over the past three-and-a-half years, including:

- **Joint Fuel Management Program** – a long-term, tenure-blind planning approach, and an operational model for interoperability in conjunction with the Country Fire Authority (CFA).
- **Community Based Bushfire Management** – a partnership approach to bushfire management, incorporating community perspectives into planning for fuel management decision making, with input from CFA, local councils and Catchment Management Authorities.
- **Planned Burn Risk Assessment Tool (PBRAT)** – a process for describing the assessment of risk in planned burn delivery and control, how assessments are derived, and how risks will be mitigated. It provides for effective peer review and approval at the appropriate levels of command and control.

Continuous improvement remains a focus for the way in which government manages bushfire risk in Victoria, via *Safer Together* and collaboration across the emergency management sector.

## 1.2 Planned burning on public land in Victoria

Planned burning provides an efficient and effective means of fuel management, by reducing the risk of bushfire over large areas of land.<sup>5</sup> However, planned burning is not without its own risks.

The Australasian Fire and Emergency Service Authorities Council defines planned burning as:

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*The controlled application of fire under specified environmental conditions to a predetermined area and at the time, intensity, and rate of spread required to attain planned resource management objectives.*<sup>6</sup>

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DELWP uses planned burning as a tool to decrease fuel loads on public land, and therefore reduce bushfire risk, protecting lives, homes, jobs, and the environment. In addition, DELWP undertakes other activities to mitigate bushfire risk, including slashing, mowing, and creating fuel breaks.

The *Forests Act 1958*<sup>7</sup> and the *Emergency Management Manual Victoria*<sup>8</sup> establish DELWP’s powers and responsibilities for the prevention and suppression of fire on public land.

DELWP manages bushfire risk on public land through Forest Fire Management Victoria (FFMVic), which includes personnel from partner agencies – Parks Victoria, VicForests, and Melbourne Water. FFMVic uses planned burning as an integral tool in working toward reducing the risk and impact of bushfires on Victoria’s parks, forests, and other public land.

<sup>5</sup> National Council for Fire and Emergency Services, 2012, *Code of Practice for Bushfire Management on Public Land*, [https://www.ffm.vic.gov.au/\\_\\_data/assets/word\\_doc/0007/21301/Code-of-Practice-for-Bushfire-Management-on-Public-Land.docx](https://www.ffm.vic.gov.au/__data/assets/word_doc/0007/21301/Code-of-Practice-for-Bushfire-Management-on-Public-Land.docx) retrieved 28 October 2019.

<sup>6</sup> Australasian Fire and Emergency Service Authorities Council, 2016, *National Position on Prescribed Burning*, <https://knowledge.aidr.org.au/media/4869/national-position-on-prescribed-burning.pdf> retrieved 28 October 2019.

<sup>7</sup> *Forests Act 1958*, [http://www.legislation.vic.gov.au/Domino/Web\\_Notes/LDMS/LTObject\\_Store/LTObjSt2.nsf/DDE300B846EED9C7CA257616000A3571/562BB936081E8517CA257761001F3CA5/\\$FILE/58-6254a095.pdf](http://www.legislation.vic.gov.au/Domino/Web_Notes/LDMS/LTObject_Store/LTObjSt2.nsf/DDE300B846EED9C7CA257616000A3571/562BB936081E8517CA257761001F3CA5/$FILE/58-6254a095.pdf) retrieved 28 October 2019.

<sup>8</sup> State of Victoria, 2018, *Emergency Management Manual Victoria* <https://www.emv.vic.gov.au/policies/emmv> retrieved 28 October 2019.

DELWP's approach to bushfire fuel management also focuses on working with local communities to reduce bushfire risk.

DELWP works with communities by developing strategic bushfire management planning frameworks that:

- identify values to be protected from bushfire
- assess bushfire risk to those values
- set out strategies to manage this risk.

For more information about planned burning on public land in Victoria, refer to DELWP's FFMVic website ([www.ffm.vic.gov.au](http://www.ffm.vic.gov.au)).

## 1.3 Role of the Inspector-General for Emergency Management

The Inspector-General is an independent, statutory role established under the Act, with its two objectives being to:

- provide assurance to government and the community in respect of the emergency management arrangements in Victoria
- foster continuous improvement of emergency management in Victoria.

IGEM undertakes its role in relation to the management of investigations and reporting of any breaches of control lines by a DELWP planned burn under section 64(1)(c) of the Act, and its implementation monitoring role under section 64(1)(ca) of the Act.

## 1.4 Assurance approach

IGEM's assurance activities are guided by the *Assurance Framework for Emergency Management*<sup>9</sup>. The framework outlines guiding principles to focus assurance activities in a coordinated, less burdensome and more valuable manner, these being:

- continuous improvement
- collaboration and coordination
- reducing burden
- adding value.

IGEM provides system-level assurance with respect to planned burns that breach control lines, applying an evidence-based approach.

In managing DELWP's process of reporting breaches of planned burn control lines, IGEM and DELWP have developed a cooperative system of assurance. This process has resulted in DELWP making changes to the way it manages the review of breaches of planned burn control lines, and also improvements to the way breaches of planned burn control lines are investigated.

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<sup>9</sup> State of Victoria, 2019, *Assurance Framework for Emergency Management*  
[https://www.igem.vic.gov.au/sites/default/files/embridge\\_cache/emshare/original/public/2019/09/a2/d2055f6e6/Assurance%20Framework%20for%20Emergency%20Management.pdf](https://www.igem.vic.gov.au/sites/default/files/embridge_cache/emshare/original/public/2019/09/a2/d2055f6e6/Assurance%20Framework%20for%20Emergency%20Management.pdf) retrieved 28 October 2019.

## IGEM assurance of breaches of planned burn control lines

In late-2016 IGEM published its first report, *Summary of investigations into Department of Environment, Land, Water and Planning breaches of planned burn control lines 1 January to 30 June 2016*<sup>10</sup>. IGEM did not make recommendations in that report.

In January 2018 IGEM published its second report, *Summary of investigations into Department of Environment, Land, Water and Planning breaches of planned burn control lines 2016–17*<sup>11</sup>, in which it made six recommendations. DELWP has since provided IGEM with evidence of its progress toward implementing actions that address each of these recommendations.

In IGEM's third report, *Summary of Department of Environment, Land, Water and Planning bushfire fuel management 2017–18*<sup>12</sup>, IGEM assessed DELWP's progress in implementing the six recommendations made in its second report. IGEM assessed one recommendation as closed and the remaining five as ongoing.

This is IGEM's fourth report on breaches of planned burn control lines and covers the period 1 July 2018 to 30 June 2019. It includes a summary of planned burning in Victoria, findings, a recommendation, and an observation derived from three planned burns that breached control lines. Additionally, this report contains a progress summary of DELWP's implementation of ongoing recommendations related to breaches of planned burn control lines.

When assessing the implementation progress of each recommendation, IGEM assigns a 'status' that describes its assessment of DELWP's implementation progress as defined in Table 2.

**Table 2:** Implementation status

STATUS	DESCRIPTION
Complete	Recommendation has been implemented.
Ongoing	Recommendation is in progress and will continue to be monitored by IGEM.
Closed	Recommendation has not been implemented.

<sup>10</sup> State of Victoria, 2016, *Summary of investigations into Department of Environment, Land, Water and Planning breaches of planned burn control lines 1 January to 30 June 2016*, [https://www.igem.vic.gov.au/sites/default/files/embridge\\_cache/emshare/original/public/2017/07/3a/b99b3fa50/Summaryofinvestigationintobreachsofplannedburncontrollines1Januaryto30June2016.pdf](https://www.igem.vic.gov.au/sites/default/files/embridge_cache/emshare/original/public/2017/07/3a/b99b3fa50/Summaryofinvestigationintobreachsofplannedburncontrollines1Januaryto30June2016.pdf) retrieved 28 October 2019.

<sup>11</sup> State of Victoria, 2018, *Department of Environment, Land, Water and Planning breaches of planned burn control lines 2016–17*, [https://www.igem.vic.gov.au/sites/default/files/embridge\\_cache/emshare/original/public/2018/01/61/2d0648f03/Summary\\_of\\_investigations\\_into\\_DELWP\\_breaches\\_of\\_planned\\_burn\\_control\\_lines.pdf](https://www.igem.vic.gov.au/sites/default/files/embridge_cache/emshare/original/public/2018/01/61/2d0648f03/Summary_of_investigations_into_DELWP_breaches_of_planned_burn_control_lines.pdf) retrieved 28 October 2019.

<sup>12</sup> State of Victoria, 2019, *Summary of Department of Environment, Land, Water and Planning bushfire fuel management 2017–18*, [https://www.igem.vic.gov.au/sites/default/files/embridge\\_cache/emshare/original/public/2019/09/fd/1dabd6b22/REPORT%20-%20Summary%20of%20Department%20of%20Environment%2C%20Land%2C%20Water%20and%20Planning%20bushfire%20fuel%20management%202017%E2%80%9318.pdf](https://www.igem.vic.gov.au/sites/default/files/embridge_cache/emshare/original/public/2019/09/fd/1dabd6b22/REPORT%20-%20Summary%20of%20Department%20of%20Environment%2C%20Land%2C%20Water%20and%20Planning%20bushfire%20fuel%20management%202017%E2%80%9318.pdf) retrieved 28 October 2019

## 2 Summary of planned burning in 2018–19

### 2.1 Overview of 2018–19 planned burning program

For the period 1 July 2018 to 30 June 2019, DELWP conducted 251 planned burns across 130,044 hectares of land. Additionally, 12,034 hectares of land were treated by other mechanical fuel management methods including slashing, mowing, and maintaining fuel breaks.

DELWP described 2018–19 as a difficult year for planned burn delivery, with high fire dangers extending well into the peak burn delivery period in Autumn 2019. Underlying dryness and drought in some areas of the state, regular high wind periods and associated higher fire dangers increased the risks and complexities associated with delivering planned burns.

Consequently, DELWP's delivery was significantly delayed with minimal planned burning possible in Autumn 2019. DELWP had opportunities to extend planned burning operations into May and June 2019, however, due to shorter day length duration, the area treated during this period was less than DELWP would normally achieve during Autumn.

Despite experiencing a difficult year, DELWP increased the number of hectares treated (when compared to 66,035 hectares in 2017–18). This variability reflects the highly seasonal nature of planned burning, where environmental influences have a direct affect on program delivery from year to year.

### 2.2 Breaches of planned burn control lines 2018–19

In 2018–19, DELWP reported three planned burns that breached control lines, resulting in a total of 82.1 hectares of unintentionally burned land.

In the context of DELWP's 2018–19 burning program, the three reported breaches accounted for 1.2 per cent of all planned burns conducted. In terms of area burned, this comprised 0.063 per cent of all planned burn area and 0.058 per cent of the total area of land treated by all forms of fuel management.

In accordance with its Standard Operating Procedure 3.5.6 - *Classification, Reporting and Investigation of Breaches of Control Lines by Planned Burns*<sup>13</sup>, DELWP classified two as a 'breach' and the third was classified as a 'bushfire'.

For the two breaches, DELWP conducted a Planned Burn Breach Analysis and provided it to IGEM.

For the bushfire, DELWP led an investigation with IGEM contributing one of its qualified investigators as an independent advisor. DELWP finalised its investigation report and provided it to IGEM.

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<sup>13</sup> State of Victoria, 2018, *Bushfire Management Manual 3. Fuel Management*, [CD/19/700671]

All three breaches originated from planned regeneration burns, amongst which, IGEM identified several themes that contributed to fire breaching planned burn control lines. These included:

- FFMVic resources were not patrolling at the exact location of the breach at the time it occurred
  - two breaches occurred overnight, after patrol resources had left for the day
  - the third breach occurred in an area where resources were not able to access the exact location (planned aerial reconnaissance detected the breach)
- for two breaches, fuel moisture levels were at the lower end of the assigned planned burn prescription, though were still within acceptable limits
- two breaches occurred eight days after completion of ignition and the commencement of patrolling, which is outside the capability of reasonable weather forecasting
- issues with some contingency plans, in the context that the operational suitability of some control strategies within the plans were not fully considered, such as assumptions about the trafficability of tracks, inaccessible terrain not being identified, and the operational impact of the presence of hazardous trees.

Through its analysis, IGEM found that DELWP followed its own processes in developing and approving plans for each of the planned burns. However, DELWP did not fully consider all the unique elements of some planned burns.

By not considering all the unique elements of these planned burns, some control strategies within the contingency plans were found to not be operationally effective when the need arose to execute them. IGEM found that DELWP did not fail in its processes associated with planning, approval, or conduct of the burns, but rather, it did not fully consider the potential for the persistence of fire within the contingency area due to the effect of prolonged seasonal dryness.

## REGENERATION BURNS

Planned burns are conducted where timber has been harvested in state forest (being public land) and an accumulation of debris (called slash) has been left behind. DELWP, through FFMVic, provides the operational delivery of these planned burns (called regeneration burns) to ensure that eucalypt species quickly regenerate the site.

Regeneration burning creates an ash bed which is receptive to eucalypt seed, and is usually the most effective means of establishing regeneration. Regeneration burning is the least disruptive, and most efficient method of re-stabilising the forest after harvest. A missed or failed regeneration burn can potentially have significant consequences both environmentally (due to site disturbance required), and economically (due to increased cost).

One key element of regeneration burn delivery is the use of a prescribed level of Fuel Moisture Differential<sup>14</sup> (FMD), between the moisture content of fuel inside the burn area and in the adjoining standing forest, to mitigate the risk of a breach of control lines at the time of ignition.

Effective FMD results in reduced fire spread and intensity which supports the effectiveness of established or natural control lines. In addition to having an FMD at the time of ignition, the moisture content of fuels in the adjoining standing forest during the following days, needs to be sufficient to prevent fire from spreading rapidly.

Delivery windows for regeneration burns can be quite narrow, due to the requirement to have a difference between the moisture content of the slash fuels and the surrounding forest fuels.

<sup>14</sup> Fuel Moisture Differentials (FMD) are specified in the prescription for regeneration burns. FMD are utilised where the fuels on the forest floor surrounding the slash area are relatively damp and therefore do not readily support fire spreading freely.

### **Influence of prolonged dryness on fuel moisture**

For all three planned burns that breached control lines, control strategies were reliant on the difference in fuel moisture between the fuel inside the burn area and the adjoining standing forest (fuel moisture differential), being standard practice for all regeneration burns.

For one planned burn, ground crews reported that there were no signs that fire had crossed control lines during ignition. After ignition was complete, an aircraft conducting a planned reconnaissance flight identified a spot over 150 metres from control lines, within the contingency area. Planned resources attempted to control the spot over, but were unsuccessful due to steep terrain and large log obstructions. Resources ceased efforts at nightfall, with the understanding that overnight conditions would reduce the spread of fire from the spot over. Fire persisted in heavier fuels for a further six days, whilst resources constructed control lines to contain the spread of fire.

For another planned burn, the control strategies of using the fuel moisture differential and direct attack, failed for one part of the burn. Fire persisted within the contingency area for a further eight days, with weather conditions further diminishing the moisture content of fuels. On the eighth day after ignition, fire activity increased and spotted over a wet gully. With the presence of strong winds, fire rapidly spread beyond contingency lines and was promptly declared a breach of control lines and classified as a 'bushfire'.



Source: DELWP

For the third planned burn, DELWP's analysis determined that fire breached control lines due to unforeseen high winds rekindling otherwise benign ignition sources within the burn area.

Seven days after ignition, DELWP planners were alerted to increased forecast winds. Accordingly, DELWP conducted an inspection of the burn boundary, and deemed it secure. Resources left the site late in the day, with further patrolling planned for the following day.

The breach was identified early the next morning, having spread throughout the night and across a drainage line. DELWP noted that operational staff were surprised that fire had crossed a drainage line, that in less dry times, would have contained the fire.

Investigators determined that the breach likely occurred as a result of increased winds blowing fresh embers from heavy fuel within the planned burn area, across control lines and into unburnt forest.

IGEM notes that this planned burn was well planned and executed, with thorough consideration for burn security. In the days after ignition, DELWP personnel were cognisant of the risk of breach due to forecast increased wind and drying conditions, and made efforts to mitigate these hazards by making additional assessments and scheduling increased patrolling.

All reported breaches for 2018–19 highlight the link between prolonged dryness and unpredictable weather in the two-to-10 days post-ignition, both of which influence the drying cycle and therefore fuel moisture content. With a reliance on rainfall to maintain sufficient fuel moistures, prolonged dry periods have an influence on landscape dryness, and its effect on fuel availability, and in turn, fire behaviour.

Using forecasts available at the time, senior DELWP staff made predictions in relation to the effect of the drying cycle on the moisture content of fuels in the adjoining forest, and its ability to prevent a breach of control lines. However, the extent and duration of the drying cycles that occurred post ignition, were greater than DELWP was able to predict.

### **Finding 1**

Predictions of the persistence of sufficient fuel moisture content in adjoining forests showed to be inaccurate during periods of prolonged dryness.

### **Recommendation 1**

The Inspector-General for Emergency Management recommends that the Department of Environment, Land, Water and Planning review literature and contemporary research projects to assist its understanding of the extent of landscape dryness and its effect on fuel availability. Information collected should be shared with decision makers to increase their understanding of fire behaviour during the conduct and control of planned burns in periods of prolonged landscape dryness.

## Contingency planning

For one planned burn, DELWP completed ignition with no reported issues. Soon after, a convection column that developed during the burn collapsed<sup>15</sup> and resulted in a spot over outside the control line, and a breach was subsequently identified.

DELWP made efforts to contain the breach using direct attack, as identified in the contingency plan, but the bulldozer operator was unable to access the area due to log obstructions and steep terrain. Resources left the site at nightfall with the prediction that fire activity would reduce overnight, and an assessment that the level of fire activity would be low due to dropping air temperature and rising relative humidity. DELWP resources planned to return the following day.

Resources returned the following day to find that, as predicted, fire had not spread significantly, but had spread into steep terrain. Direct attack with bulldozers, aircraft and ground crew limited further spread, however bulldozer operators were unable to track the perimeter of the spot over. Fire continued to spread slowly for six days until it burned through to control lines being constructed using parallel attack.

In its own analysis, DELWP identified that a key issue in controlling the breach with direct attack was the steepness of terrain, which prevented machinery putting a control line around the spot over.



Source: DELWP

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<sup>15</sup> Column collapse is an atmospheric event where updraft winds, associated with fast-rising, hot air from fire, reach a vertical limit before falling back to the ground as downdraft winds. Downdraft winds can be erratic in direction and speed and can carry significant smoke and transport burning embers. When the downdraft winds reach the ground, they generally spread horizontally and blow across the ground, but can occasionally become entangled with prevailing winds, causing eddies and vortices. These winds can be stronger in strength than the prevailing winds at the time and can quickly change the prevailing wind direction without warning.

For another planned burn, the control strategies within the contingency plan could not be successfully implemented in one area due to steep slope, obstructions preventing bulldozers from operating, and the presence of hazardous trees. DELWP's analysis identified that these factors could have easily been identified by burn planners, the Burn Officer in Charge (BOIC) and the Burn Control Team prior to the burn being ignited, but were not.

This was a regeneration burn in, and surrounded by, mixed *Eucalyptus* spp. forest, including stringybark trees that have a high propensity for spotting<sup>16</sup>. Fire spotted into the contingency area in the afternoon of the day of ignition, and crews monitoring the spot over predicted that benign fire behaviour and fuel moisture differentials would prevent further spread of fire.

Four days after the initial spot over, fire behaviour increased and crews attempted direct attack. Bulldozer operators were unable to access the spot over due to steep slopes and rock obstructions. Crews considered other strategies, but they were not feasible due to the presence of hazardous trees.

The contingency strategy of using the fuel moisture content of a wet gully to restrict the spread of fire was applied (as described previously), but was ineffective due to spotting over a wet gully. On the eighth day after ignition, fire from the spotting spread rapidly beyond contingency lines. It was declared a breach of planned burn control lines and classified as a 'bushfire'. DELWP's subsequent analysis found that the contingency plan was developed through a desktop assessment and staff did not appropriately assess the control options within the contingency plan to confirm feasibility of implementation.

## Finding 2

Elements of contingency plans were not able to be carried out operationally, and therefore were ineffective in mitigating a breach of control lines.

## Observation 1

The Inspector-General for Emergency Management (IGEM) notes that the Department of Environment, Land, Water and Planning (DELWP) has processes in place to ensure documented contingency plans are created, reviewed and approved with consideration of the unique physical characteristics of the planned burn site. This is aimed at supporting more effective mitigation of the risk of a breach of control lines. IGEM encourages DELWP to continue to emphasise with staff the importance of taking the unique physical characteristics of the planned burn site into consideration when creating, reviewing and approving contingency plans.

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<sup>16</sup> Spotting is behaviour of a fire producing sparks or embers that are carried by the wind or convective activity and starts new fires beyond the zone of direct ignition by the main fire.

### CASE STUDY: FRYERSTOWN PLANNED BURN

IGEM observers attended a planned burn in Fryerstown in 2019. This was a complex burn and DELWP showed a high level of planning and preparation, both administratively and operationally. IGEM observed a high level of engagement between DELWP and CFA members in attendance.

The BOIC had thorough knowledge of the site and was well-informed of the challenges associated with the burn. On the day of planned ignition, the BOIC shared these insights with all in attendance during a briefing and facilitated a guided tour of the burn boundary.

DELWP did not approve this planned burn for ignition, despite the full contingent of resources in attendance on site and equipped to commence conduct of the burn. This showed DELWP's willingness to call-off a planned ignition based upon risk assessment, even though all resources were on site and operationally ready.

Despite not being ignited, this planned burn provided IGEM observers with an example of good practice through the approvals process, cross-agency cooperation, and oversight at all levels of planning.



Source: IGEM

## Hazardous trees

For one planned burn, DELWP reported that hazardous trees limited crew access to the area where the burn spotted over and along control lines constructed to contain spot overs. In its planning documents, DELWP noted that tree hazards were to be managed using “dynamic risk assessment”, should fire cross planned burn control lines. This is in accordance with standard procedures, and was reflected in the contingency plan. DELWP noted that hazardous trees were not a major constraint, due to the use of bulldozers in preference of ground crews.

For another planned burn, hazardous trees prevented implementation of a selected control strategy. Planning documents noted no tree hazards had been assessed or treated outside the burn area and stated that if they were identified (as occurred), crews would initiate “a restricted work area, until a dynamic risk assessment is complete”.

Planning documents further stated:

*... hazardous trees that are identified after ignition will be assessed and treated as they are identified. If treatment is not possible an exclusion area will be implemented.*

When crews considered enacting suppression options, they were not deemed feasible because of the delay in making the area safe from hazardous trees.

### Finding 3

In planning documents, the stipulation of 'dynamic risk assessment' failed to provide operational staff with timely management options to effectively mitigate a breach of control lines.

## Patrolling at the site of the breach

For all three planned burns that breached control lines, no crews were patrolling the immediate location of the breaches, at the time that they occurred, due to inaccessible terrain or breaches occurring at night after crews had finished patrol for the day.

For one planned burn, crews were actively patrolling the site, but were focused on the area of the planned burn that was accessible by vehicle and safest to patrol. The breach originated from a spot over in an inaccessible location well within the contingency area, and was detected by a planned reconnaissance flight.

For the second and third planned burns, patrol activities were entering their eighth day and were conducted at regular intervals. For both of these planned burns, weather forecasts issued many days after ignition, introduced the prediction of strong winds that were not previously forecast. DELWP planners assessed this against the risk of a breach, and as result, planned for patrol crews to continue daily patrols, and attend the following morning (this is standard practice seven days beyond ignition when daytime patrol activities have found little, or no, fire activity). Both the second and third planned burns breached control lines overnight on the eighth day after ignition, when resources were not scheduled to patrol.

### Finding 4

Despite adequate risk assessment, planned patrolling and well-founded operational strategy, ground-based patrol crews were unable to be present at the location of the breach of control lines at the time they occurred.

### 3 Implementation monitoring of IGEM recommendations

This chapter provides an update on the implementation progress of the recommendations from IGEM's *Summary of investigations into Department of Environment, Land, Water and Planning breaches of planned burn control lines 2016–17* (2016–17 summary report).

#### RECOMMENDATION 1

The Inspector-General for Emergency Management recommends that the Department of Environment, Land, Water and Planning (DELWP) develops a process to assess the operational risks of combining two (or more) planned burns that are planned and prepared to be ignited as separate and discrete units. In so doing, DELWP may increase its control and mitigation of the risks associated with two different planned burns being conducted in close proximity, but whose combined effects DELWP and its delivery partners may not have considered during the separate planning stages.

Lead agency	DELWP
Status	Complete

In its 2016–17 summary report, IGEM found that DELWP did not adequately assess the risks associated with conducting two concurrent planned burns located directly adjacent to each other. DELWP planned and conducted each of the two burns as separate operations. However, having the two burns conducted side-by-side resulted in each having a direct environmental effect on the other, and creating unexpected fire behaviour.

Subsequently, one of the burns breached control lines. A major contributing factor to the breach was the combined effects of conducting multiple planned burns within the landscape.

In its *Summary of Department of Environment, Land, Water and Planning bushfire fuel management 2017–18* (2017–18 summary report), IGEM assessed this recommendation as ongoing. This was in the context that DELWP had addressed Phase 1 planning, but did not address the aspect of the recommendation concerning the operational risks of combining two (or more) planned burns that are planned and prepared to be ignited as separate and discrete units in consideration of Phase 2 of the PBRAT. The District Burn Team is responsible for progressing each burn through Phase 2, and the management of multiple burns under the one Burns Controller on the same day.

In 2018 FFMVic issued its Assistant Chief Fire Officers, Regional Managers and Fuel Management Coordinators with a lessons-sharing document providing instruction on changes to the PBRAT specific to 'multi-block ignitions'. In doing so, DELWP addressed the need to assess a multi-block planned burn within prescheduling assessment (Phase 1) and approval.

DELWP provided further documentation on how its peer review process was incorporated into the planning and approval of burn planning during Phase 1 assessment. DELWP also advised IGEM that it had increased the rigour of its Phase 1 risk assessment to incorporate quality assurance measures into its planned burning program, considering factors including the risks associated with ignition of adjacent burns or multiple blocks within the same burn.

In its 2017–18 summary report, IGEM assessed that DELWP's Phase 2 approach was general in nature, and permitted discretion in scheduling two separately planned burn units for ignition at the same time, without a process for assessing the new operational risks associated with concurrent ignition. At the time, DELWP advised IGEM that it was considering how to best advise planned burn teams and Burns Controllers and raise awareness of the potential risks associated with scheduling adjacent planned burns for ignition at the same time.

In February 2019 DELWP's Chief Fire Officer (CFO) issued the *Joint Fuel Management Program: Autumn 2019 Delivery Direction*. Within it, the CFO emphasised process improvements, stating:

*Planned burn teams and Burns Controllers must consider the potential operation risk associated with conducting two (or more) separate but adjacent planned burns concurrently... attention should be given to the influence that the fire behaviour from each burn will have on that of the other.*

In April 2019, and in support of the CFO's direction, FFMVic produced its lessons-sharing document *Planned burn breach - Conduct of adjacent planned burns*. This lessons-sharing document addresses a breach of planned burn control lines that resulted from two adjacent planned burns conducted concurrently. The circumstances and factors that contributed to the breach are explained in detail, with lessons identified, and future mitigating actions outlined.

### Finding

IGEM considers that this recommendation has been implemented.

## RECOMMENDATION 2

The Inspector-General for Emergency Management recommends that the Department of Environment, Land, Water and Planning (DELWP) continues the delivery of its training program for its staff involved in planned burning activities that covers the correct interpretation and application of risk and risk assessment values when applying the Planned Burn Risk Assessment Tool (PBRAT) to proposed burning activities. Such a program will assist DELWP to ensure it consistently applies its risk assessment process. As part of this program, the PBRAT process would benefit from the creation of aides and examples to assist staff in applying risk assessment values against individual criteria of the PBRAT.

Lead agency	DELWP
Status	Ongoing

IGEM found that in all-but-one of the planned burns that breached control lines during 2016–17, DELWP paperwork and approvals included some inaccurate entries, omissions, or quality assurance oversights. IGEM noted that these issues were confined to DELWP's completion of PBRAT checklists, and PBRAT approvals forms.

DELWP continues to emphasise the importance of its peer review process, which forms part of PBRAT approval. This is supported by *Burn Program Quality Assurance* as the foundation in providing quality assurance of planned burn planning and approval via the PBRAT.

In 2018 DELWP advised IGEM that it would further consider various quality assurance as part of *Safer Together Project 2.8 – Quality Assurance Systems for Fuel Management*. This project has since closed, with work being potentially transferred to another, future project.

IGEM considers this recommendation will be complete when DELWP has fully implemented and demonstrated within business-as-usual, its *Burn Program Quality Assurance* process, and applied learnings to its risk assessment process.

## Finding

IGEM considers that this recommendation is progressing and will continue to monitor its implementation.

**RECOMMENDATION 3**

The Inspector-General for Emergency Management recommends that the Department of Environment, Land, Water and Planning (DELWP) in consultation with the regions and relevant personnel, revise its procedure for planned burn contingency planning. This review should aim to provide a clear, and consistent, set of minimum standards (and examples) to guide DELWP's staff in how to develop adequate contingency plans for planned burning activities.

Lead agency	DELWP
Status	Ongoing

In its 2016–17 summary report, IGEM found inconsistencies in the contingency planning amongst planned burns that breached control lines. IGEM noted that DELWP did not provide planning staff with adequate guidance and instruction on the minimum requirements for a sufficiently rigorous contingency plan, should a planned burn breach control lines.

DELWP advised IGEM that actions to address this recommendation are ongoing and fall within *Safer Together Project 2.6 – Common Burn Risk Assessment Tool*. Implementation of this project is scheduled through 2019–20. As part of its project implementation, DELWP is considering how contingency planning can be most effectively embedded as part of a holistic risk assessment and mitigation-identification process.

IGEM considers this recommendation will be complete when DELWP has fully implemented and transitioned to business-as-usual its contingency planning for planned burns within its risk management processes.

**Finding**

IGEM considers that this recommendation is progressing and will continue to monitor its implementation.

**RECOMMENDATION 4**

The Inspector-General for Emergency Management recommends that the Department of Environment, Land, Water and Planning revises its Planned Burn Risk Assessment Tool (PBRAT) template to ensure it does not round-down calculated scores that currently result in risk rating values in the PBRAT template appearing lower than required by the derived theoretical scores.

Lead agency	DELWP
Status	Complete

In analysing breaches of planned burn control lines in 2016–17, IGEM found that DELWP's PBRAT template tended to round-down calculated scores. This allowed the tool to inadvertently assign a risk rating lower than what was warranted by the calculated scores. IGEM noted that this may have led to DELWP approvers underestimating the levels of risk associated with igniting planned burns, or potentially result in DELWP failing to consider the need for different - or enhanced - risk mitigation strategies, or approval considerations than otherwise required by a higher score.

DELWP observed that weightings applied in the original PBRAT template were misleading and were not operational within the FFMVic delivery model, and subsequently created a lack of confidence in the PBRAT scores.

DELWP has since transitioned to an electronic Planned Burn Risk Assessment Tool<sup>17</sup> (ePBRAT), that replaces the PBRAT template as previously analysed by IGEM. DELWP's new ePBRAT no longer applies a risk score to the likelihood and consequence of a planned burn breaching control lines. DELWP has also applied greater focus upon the three phases of review in the ePBRAT and its peer review of burn plans.

DELWP advised IGEM that it will continue its transition to a common burn risk assessment tool as part of *Safer Together Project 2.6 – Common Burn Risk Assessment Tool* through 2019–20. This transition will consider planned burn complexity, and be integrated as part of a systems approach amongst agencies involved in planned burning.

IGEM considers that this recommendation has been implemented, because DELWP has replaced the paper-based PBRAT with the ePBRAT, and the issue of rounding-down calculated scores has been eliminated.

**Finding**

IGEM considers that this recommendation has been implemented.

<sup>17</sup> The ePBRAT is DELWP's Electronic Planned Burn Risk Assessment Tool, and was introduced in 2018, to replace the paper-based PBRAT. This online tool is accessible to planning staff, and is used to plan the delivery, formalise the risk assessment, and track the approval of planned burns. The ePBRAT describes DELWP's assessment of risk of planned burn delivery and control, how those assessments were derived and how the risks will be mitigated. It provides for effective peer review and approval at the appropriate levels of command and control.

**RECOMMENDATION 5**

The Inspector-General for Emergency Management recommends that the Department of Environment, Land, Water and Planning (DELWP) review its procedures to ensure that the boundaries of planned burns are clearly understood and can correctly be navigated by all on-ground resources. This should aim to ensure DELWP uses accurate mapping and on-ground navigational markers to a standard that confers upon crews a clear and unambiguous understanding of key locations of the boundary, lighting patterns, and treated area boundaries, even if crews themselves lack personal, local knowledge. To achieve this, DELWP may consider, where warranted, mandatory, guided tours of planned burn boundaries for ground crews, prior to ignition.

Lead agency	DELWP
Status	Complete

During one planned burn in 2016–17, DELWP inadvertently ignited fire on private land, outside of the defined planned burn boundary. In its 2016–17 summary report, IGEM noted that the main contributing factor was inadequate controls to prevent ground crews making navigational errors in the context of the boundary of the planned burn.

DELWP advised IGEM that it completed a review of its procedures in its *Bushfire Management Manual 3.0 Fuel Management* (the manual). DELWP found that the manual suitably considered the requirements of burn boundary identification, briefings, mapping standards and handovers through the planning, pre-burn activities and burn conduct phases of planned burn management. DELWP found the level of detail and instruction in its procedures are appropriate, and will focus more attention on implementation of these procedures.

The current practice of identifying key points of a burn boundary with ‘letter identifiers’ is not prescribed in the manual, but is a statewide practice developed and shared via review processes.

DELWP reviewed the two most recent instances where ignition took place outside the burn boundary and found that these were not due to inadequate procedures. The causes were found to be human factors; namely misinterpretation, false assumptions, and refusal of assistance.

DELWP has produced a lessons-sharing document, focusing on mistaken ignitions over the past three planned burning seasons, and has distributed this lessons-sharing document to senior leadership.

DELWP advised IGEM that the identification of burn boundaries are also addressed operationally through after-action reviews, debriefs, and through district and regional burn team meetings.

IGEM finds that DELWP broadly implemented the intent of this recommendation by alternative means. However, given the common but informal practice of identifying key points on burns boundaries with ‘letter identifiers’, IGEM encourages DELWP to incorporate this into its manual to ensure consistency, and to formalise current practice.

**Finding**

IGEM considers that this recommendation has been implemented.

**RECOMMENDATION 6**

The Inspector-General for Emergency Management recommends that the Department of Environment, Land, Water and Planning review its procedures for when crews may be released from patrolling activities for an active burn. This should include emphasis on the importance of burn security and patrolling, even when burn crews have extinguished known spot overs.

Lead agency	DELWP
Status	Complete (revised)

IGEM found that during one planned burn in 2016–17, DELWP halted patrolling activities in the belief that it had extinguished all spot overs, and therefore, the planned burn would not subsequently breach control lines. The planned burn did breach control lines, with DELWP's investigation finding that the breach resulted from a poorly blacked-out spot over, or from an ember that had not been identified when the spotting occurred.

In its 2017–18 summary report, IGEM assessed this recommendation as closed. IGEM found that the recommendation was partially implemented, with no further activity planned. IGEM's concerns centred around DELWP not providing specific evidence in relation to reviewing its procedures for when crews may be released from patrolling activities of an active burn, as per the recommendation.

However, in 2019 DELWP advised IGEM that FFMVic had since conducted a review of its *Bushfire Management Manual 3.0 Fuel Management*, to determine if further direction was required regarding patrol. DELWP found that the manual "...requires for the patrol of burns to be considered through all phases of planned burn management". The manual is not prescriptive to the point of stipulating when crews may be released from certain activities, and is also not the only means for determining burn security.

DELWP deems that its Burns Controllers and BOICs, being experienced fire management personnel, have received extensive training and developed skills and knowledge regarding patrolling throughout their careers. This skill-set is paramount in determining an acceptable level of risk of breach of control lines, and therefore when crews may be released from patrol. In light of this, DELWP considered no amendment to the manual was required.

IGEM has reassessed DELWP's actions in relation to this recommendation in light of this new evidence, and finds that DELWP has met the intent of this recommendation by conducting a review of its procedures for when crews may be released from patrolling activities for an active planned burn.

**Finding**

IGEM considers that this recommendation has been implemented.

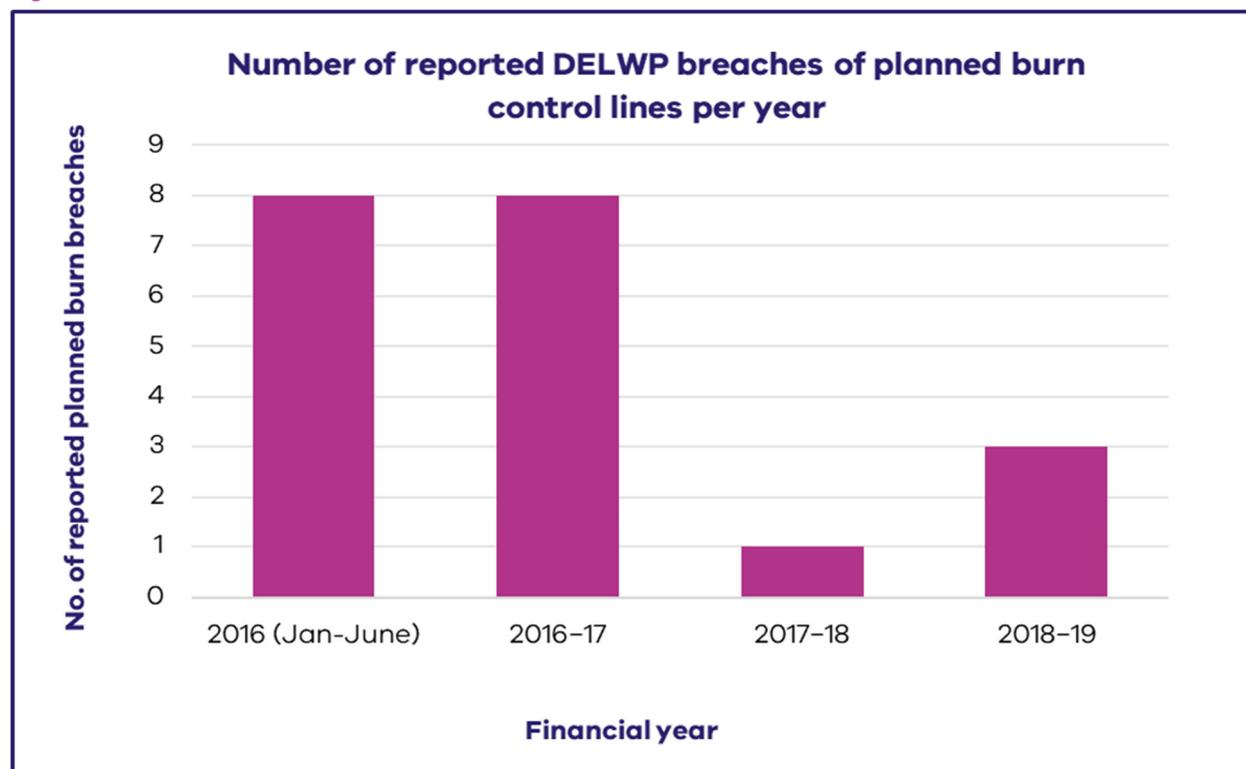
## 4 Continuous improvement

Since IGEM commenced monitoring bushfire fuel management recommendations, and managing the investigation and reporting of breaches of planned burn control lines, DELWP (and its staff) have demonstrated commitment to progressing its organisation's processes and culture toward one that is more engaged with partner agencies and the greater community.

IGEM made six recommendations in its 2016–17 summary report, and makes one further recommendation in this report.

In implementing recommendations and applying continuous improvement practices, there is some evidence to suggest that the occurrence of planned burns breaching control lines is reducing as depicted in Figure 1.

**Figure 1:** Number of planned burns that breached control lines over time



In the conduct of IGEM's assurance activities, DELWP has provided examples of its lessons-sharing products. These serve to identify lessons from past events and share them with staff. DELWP is yet to measure the effectiveness of these products, however IGEM considers that sharing experiences and learnings is a positive improvement in DELWP's lessons management and continuous improvement culture. IGEM encourages DELWP to continue to broaden its focus beyond its own organisation by incorporating lessons from, and to share its own lessons with, partner agencies.

## 5 Concluding remarks

Over the past three-and-a-half years, IGEM has observed DELWP implement processes for continuous improvement within its planned burning program. DELWP has shown commitment by progressing *Safer Together* and other initiatives, both internally and with partner agencies, providing positive change within the sector and the broader community.

DELWP and its staff have shown thoroughness in establishing processes to evaluate and mitigate the risks associated with planned burning, and a willingness to reflect upon good practice and opportunities for improvement. In turn, this has resulted in a decline in the incidence of planned burns that breach control lines.

To continue this trend, IGEM has identified that DELWP focus on developing a better understanding of the extent of landscape dryness and its effect on fuel availability, as well as ensuring documented contingency plans are developed with consideration of the unique physical characteristics of the planned burn site.

IGEM also encourages DELWP to continue to produce lessons-sharing products for its personnel, in order to benefit from previous experiences.

DELWP has shown its commitment to progress its organisation's processes and culture towards one that is effectively engaged with partner agencies, and the wider community. IGEM further encourages DELWP to continue along its current trajectory in cultivating a risk reduction approach to its planned burning program.





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