ClimateIndex™

Understanding Bushfire Risk for New South Wales Property Transactions

Groundsure™
LOCATION INTELLIGENCE

InfoTrack

Introduction

"The 2019-20 Black Summer Bushfires were some of the worst in the world and in recorded history. We should expect fire seasons like 2019-20, or potentially worse, to happen again... Climate change, as a result of increased greenhouse gas emissions, clearly played a role in the conditions that led up to the fires and in the unrelenting conditions that supported the fires to spread....".

Dave Owens APM and Mary O'Kane for the NSW Bushfire Inquiry

Australia and the climate crisis

Direct economic losses resulting from natural disasters in 2022 around the globe are estimated at $313 billion*, with Australia experiencing its worst ever natural disaster*.

The overall cost to Australia of not meeting the Paris Climate Agreement from now to 2050 is $1.19 trillion* – due to infrastructure & property damage, agricultural & productivity losses, biodiversity loss and human health.

About 3.5 per cent* of dwellings in Australia already fall under an international definition of being at "*high risk*" from climate damage.

The purpose of this paper is to examine bushfire risk and look ahead to the future to consider how risks could evolve and what this means for property buyers and the conveyancing transaction.
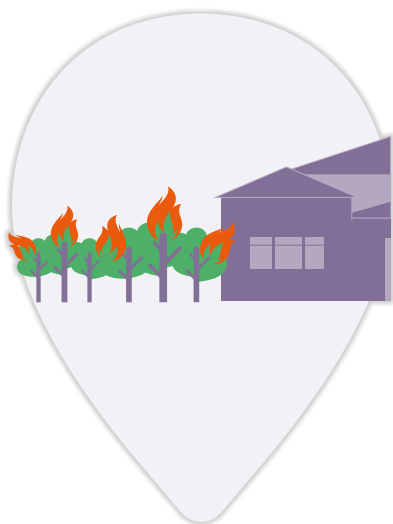
Bushfires - what are the risks?

The Black Summer bushfires of 2019-2020 in eastern and south-eastern Australia were unprecedented in terms of their geographic location, spatial extent, severity and the forest types burnt. They were driven by extreme weather conditions including winter drought and high spring and summer temperatures, creating tinder-dry conditions.

While the below costs account for property and the native ecosystem restoration, the additional cost impacts to human health, loss of tourism and infrastructure could cost the Australian economy over $100 billion.

Bushfires - what are the risks? *(continued)*

The Blue Mountains have the most properties at risk, followed by the Central Coast, Sutherland Shire, Wollongong and Wollondilly.

It can cost upwards of $100,000 to rebuild a 4 bedroom home, with an average of $46,000 per house to remove debris, rising to $68,000 if asbestos is found.

$1.2 Billion

the projected cost of bushfires per year over the next 30 years
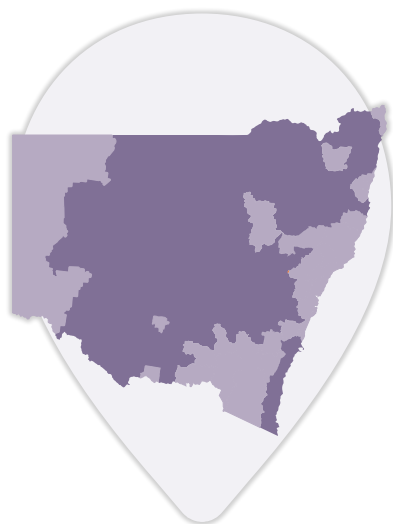
11 Million Hectares

the amount of land that was burnt by the black summer bushfires

$73 Billion

the annual cost for 30 years to restore the native environment

What are the most bushfire prone residential areas?

We have identified the most bushfire prone residential suburbs in New South Wales, using the ClimateIndex climate analysis model for both today and in 30 years time.

Top 20 NSW suburbs at risk from Bushfires

30 Year Rank	Suburb	Count of Lots	Today Risk		30 Year Risk		Today Rank	30 Year Rank	Change in Rank
			Count of Lots with Very High Assessment	Percentage of Lots with Very High Assessment	Count of Lots with Very High Assessment	Percentage of Lots with Very High Assessment			
1	Blue Mountains National Park	2188	1068	48.81%	1068	48.81%	1	1	▲ 0
2	Colo Vale	1488	715	48.05%	715	48.05%	2	4	▼ -2
3	Booligal	1152	488	42.36%	488	42.36%	3	7	▲ -4
4	Howes Valley	489	472	96.52%	459	93.87%	4	10	▼ -6
5	Deniliquin	5999	466	7.77%	481	8.02%	5	8	▲ -3
6	Kurrajong Heights	612	426	69.61%	426	69.61%	6	13	▲ -7
7	Moama	4995	400	8.01%	442	8.85%	7	12	▼ -5
8	Nymboida	492	392	79.67%	424	86.18%	8	14	▲ -6
9	Cooplacurripa	536	355	66.23%	362	67.54%	9	15	▲ -6
10	Comara	359	338	94.15%	350	97.49%	10	16	▼ -6
11	Maude	1035	330	31.88%	330	31.88%	11	17	▲ -6
12	Putty	324	320	98.77%	320	98.77%	12	18	▲ -6
13	Bilpin	375	314	83.73%	314	83.73%	13	19	▲ -6
14	Blackheath	4435	270	6.09%	270	6.09%	14	28	▲ -14
15	Ebor	418	260	62.20%	260	62.20%	15	30	▼ -15
16	Lower Creek	291	256	87.97%	260	89.35%	16	30	▼ -14
17	Chambigne	329	249	75.68%	249	75.68%	17	33	▼ -16
18	Bellbrook	612	243	39.71%	466	76.14%	18	9	▲ 9
19	Lower Portland	418	242	57.89%	242	57.89%	19	36	▲ -17
20	Yarrowitch	596	226	37.92%	226	37.92%	20	38	▲ -18

Top 20 NSW suburbs at risk from Bushfires *(continued)*

One headline finding from the analysis is several South Coast locations that aren't at risk today but will be in the next 30 years. The Forest Fire Danger Index (FFDI) data from CSIRO, which forms the backbone of our future risk projections indicates a worrying trend: the types of fire weather conducive to bushfires are expected to become more frequent and severe in southern coastal areas.

These regions already carry a 'High' fire risk rating, and with the anticipated increase in adverse fire weather conditions, we're seeing a substantial shift of hundreds of properties into the highest risk category. It's this combination of existing risk factors and the projected exacerbation due to climate change that makes these areas particularly vulnerable to bushfires in the future.

How do we manage Bushfire risk

The Groundsure Bushfire Calculator is an innovative tool designed to meticulously evaluate and predict bushfire risks for properties. This state-of-the-art model intelligently integrates a variety of critical factors, such as historical wildfire patterns, lightning frequency, climatic conditions, and the property's proximity to bushfire-prone areas.

By incorporating modelled climate variables, we refine our calculator to provide not only a current risk assessment but also a forward-looking perspective, anticipating future shifts in weather patterns pertinent to fire risk. Our model recognizes that factors like recent fire prevention measures and the proximity to urban centres can significantly mitigate these risks.

We have designed our bushfire assessment based on a straightforward 2-stage approach:

1. Initially we assess the risk of bushfires in space occupied by bushfire prone land (a classification of combustible vegetation established by the local councils in NSW) considering various external climate and societal variables.

2. Then we assess the risk of these bushfire prone land areas based on the proximity and average slope of the bushfire prone land to the property site.

How do we manage Bushfire risk *(continued)*

Bushfire prone land (BFPL)

The location of potentially flammable vegetation is the single most important variable when modelling bushfires as this is the fuel which will ignite and facilitate fire spread and longevity. We have used the Bushfire prone land (BFPL) data to locate this and, with additional datasets considering fire weather and proximity to urban areas, this has enabled us to provide a unique assessment for both the contemporary risk of bushfires as well as a 30 year climate modelled solution.

Bushfire prone land is generated by local councils within the NSW state. It is the primary trigger for planning for bushfire protection, as well as the foundation of regulations for development in the state. Land is determined by three risk level classifications for vegetation based on their combustibility and ember production.

Areas not designated as bushfire prone are not a guarantee that losses from bushfires will not occur.

Elevation

In addition to the type of vegetation and the distance from the property, another consideration that has a bearing is known as the 'effective slope'. As fires can spread more easily uphill, given the importance that elevation and the position of a lot compared to the adjacent BFPL can have on bushfire risk, we also consider the slope angle between the area of bushfire prone land and the property.
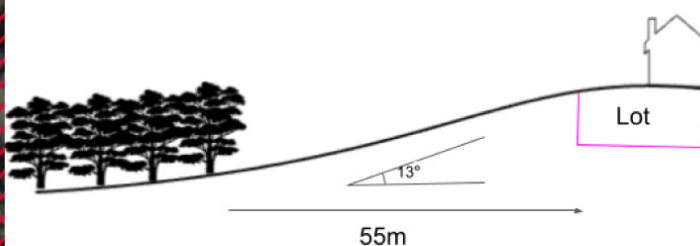
The graphs below demonstrate how proximity of BFPL and slope profile work together to heighten the risk with elevation.
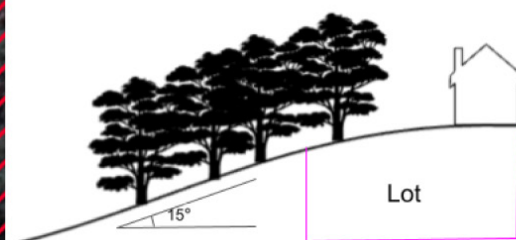

Lot

145m
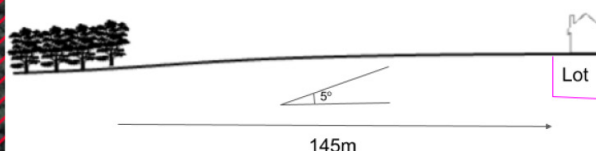
Low
- High bushfire risk classified land within 750m, but further than 140m away.
- Low slope angle of 5° between the BFPL and the lot outline

How do we manage Bushfire risk *(continued)*

Moderate to High
- High bushfire risk classified land between 50m and 100m of the lot boundary.
- Slope angle of 13° between the BFPL and the lot outline

Very High
- High bushfire risk classified land within the lot boundary.
- When on site, slope is disregarded

The aspect of the landscape, or the direction it faces, can also affect how fires burn. The aspect influences the type of plants that grow there and the level of moisture it contains. In NSW, west-facing slopes are the hottest and driest. The vegetation is more flammable, but the plants are also more fire tolerant. South-facing slopes are usually cooler and wetter with less flammable vegetation. However, these plants are less fire tolerant and fires in these areas can be devastating.

How do we manage Bushfire risk *(continued)*

Forest Fire Danger Index (FFDI)

This is based on a combination of different weather conditions known to influence the risk of dangerous bushfire conditions in Australia, including temperature, rainfall, humidity and wind speed. It is used to measure the degree of danger of fire in Australian forests.

Supplementing the bushfire prone land datasets with a view on likelihood for naturally caused fires to ignite enables us to provide a better assessment of the risk of specific bushfire prone land areas.

Lightning

Lightning is the predominant natural cause of bushfires, particularly when weather conditions and the vegetation are dry. Ground flash density (GFD) is a measure of the frequency of lightning strikes in a given area over a specific period of time, typically expressed in terms of flashes per square kilometre per year. It is a commonly used metric for assessing the lightning risk of an area and is often used in the design and evaluation of lightning protection systems.

We report the mean annual Ground Flash Density (GFD) per 1km2 per year on a 0.5 degree grid based on a baseline climatology between 1995 and 2015. GFD is an important metric for determining areas most vulnerable to lightning strikes, an important igniter and component of bushfire risk prediction.

Wildfire history

Historic bushfire data is a vital dataset to incorporate into our assessment as it informs us of a higher level of risk given a bushfire has occurred in the past. Unless significant development has occurred, which would have an impact on the presence of bushfire prone land, then it is likely that future bushfires could repeat. We also consider a higher level of inflated risk if we have detected more recent wildfires, going back to the last 5 calendar years.

We collect fire history data from 2 separate sources. The National Parks & Wildlife Service (NPWS) Fire History dataset & the Department of Planning and Environment (DPE) Fire Extent and Severity Mapping (FESM). In our model we consider bushfire history within the last 5 years as an indicator of greater risk.

How do we manage Bushfire risk *(continued)*

Prescribed burns

Knowledge of prescribed burns is a good indicator of where mitigation has been put into place and subsequently reduces the overall risk of future uncontrolled bushfires to occur. It is evidence of the presence of management being used to reduce bushfire risks in the area.

Urbanity

A classification of urban space (as opposed to rural) is an indication and assumption that they are more likely to have a better response time from emergency services dealing with the fire. it is considered to be less likely that rural properties will be actively protected and have a greater degree of damage risk.

We have adopted a 1km buffer around urban areas to pick up bushland in the immediate vicinity of towns.

The impact of the Black Summer Bushfires

The impact of major bushfire events, such as the catastrophic fires of the summer of 2020, plays a crucial role in refining our risk assessment model. Our approach involves a dynamic recalibration of risk levels for areas that have previously experienced bushfires. Significantly, the model places greater emphasis on recent events, particularly those occurring within the last five years. Consequently, the devastating summer 2020 fires have a pronounced effect on our evaluations.

In this unprecedented incident, simultaneous fires erupted in the north, south and central regions of NSW, rather than the traditional north to south migratory movement. The ferocity and scale of the fires saw them evolve into mega-fires which took on their own unique behaviour, igniting the air even without fuel from tinder-dry vegetation, as this quote from the *NSW Final Inquiry Report into the Black Summer Bushfires* so clearly describes:

"I witnessed fires burn through open paddocks with no grass, through areas which had hazard reductions two years earlier, through areas where wildfire had passed only one year previous and watched ancient Gondwana rainforest which has never burnt reduced to blacked debree [sic]. I saw houses burn in open paddocks with no fuel around them for hundreds of metres. Nothing could have changed the outcomes due to the dryness of the landscapes and the prevailing weather conditions."

Case study - Currowan State Forest, NSW

The case study below provides another vivid description of the human and physical cost from the Black Summer.

"The 500,000 hectare inferno"
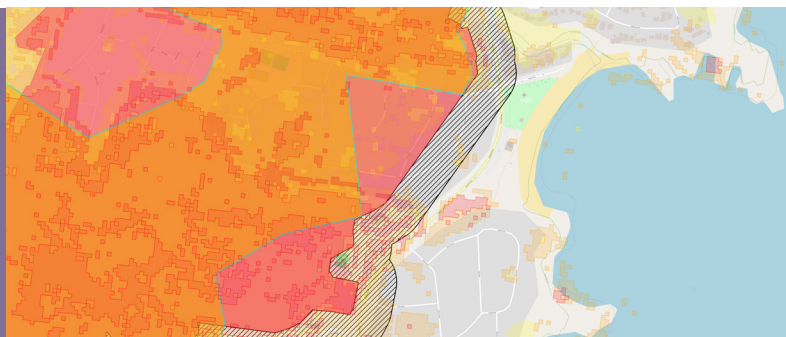
On November 26th 2019, a lightning strike would cause the 74 day long Currowan fire, killing 3 people and destroying hundreds of homes. What started somewhere in the Currowan State Forest, was now heading towards coastal towns, and "*jumping*" the highway. Less than a month later, another fire started (cause unknown) somewhere in Tianjara.

Whilst coastal towns as far as 60km from the ignition point were preparing for ember attacks, the fire at Tianjara created a bushfire generated storm, known as a pyrocumulonimbus, and the two fires combined to become large enough for the Rural Fire Service to divide it by local government area.

Some 40km away, New Years Eve of 2019 was shaping up to be a hot, busy day at Malua Bay with many heading to the beach for some respite. Whilst they knew of the fires in the surrounding areas, little did they know that a few hours later, the Batemans Bay Surf Life Saving Club would become a safe refuge for over 2,000 people, horses, dogs, birds, reptiles and cats escaping the flames.

One residential street around Malua Bay named Moorong Crescent was one of many which felt the brunt of these fires. Ironically Moorang is a Wiradjuri word meaning bleak or cold, it was anything but on this day.

Case study - Currowan State Forest, NSW *(continued)*

The "perfect" conditions

A decade of dry conditions, combined with perfect fire weather conditions (low humidity dry soil, high temperatures and wind) pushed the fire from north-west of Batemans Bay to the Southern Highlands in less than 6 weeks. The behaviour of the Currowan and Tianjara fires are difficult to predict, but with new enhanced analysis available, property purchasers, owners and their legal representatives now have access to some of the most comprehensive detail on the risk bushfire poses to property.

Whilst much of the landscape is healing, it can take 150 to 200 years before woodland reaches a stable system, and 500 to 1,000 years for rainforest. Homes are being rebuilt but the psychological trauma remains for many of those impacted by these fires.

An inquiry into the Black Summer's Currowan bushfire heard that it was so intense it generated four thunderstorms (one thunderstorm during a fire is unusual) during the two months it burned and, in some cases, the only containment option was the Pacific Ocean as it hit the coastline.

Writer and broadcaster Bronwyn Adcock wrote a book about her experience of the fires, whilst also trying to protect her home and family. She concluded that "*We can't always expect a fire truck, I think communities need to become a bit more resilient and we need to all contribute what we can and play a role and part of that is just communities becoming really fire wise.*"

The data

The bushfire data used in ClimateIndex™ looks beyond the narrow scope of what has been previously available, in certificates and commercially available reports. ClimateIndex™ considers the type and vulnerability of bushfire prone land, the likelihood and severity of "*fire weather*" (vegetation dryness, temperatures, wind speed and humidity), historic wildfire and prescribed burn areas, lightning strikes, topography and how urban an area is.

The Groundsure ClimateIndex™ report clearly identifies the threat of bushfires at Malua Bay today, as well as how they are likely to get worse over the next 30 years.

Advising clients on Bushfire risk

Conveyancers and lawyers are acting in their clients' best interests and to advise where decisions that could be made are exposed to significant risk. For this reason alone, the homebuyer has a right to know what could lie ahead as they make the most expensive financial decision of their lives.
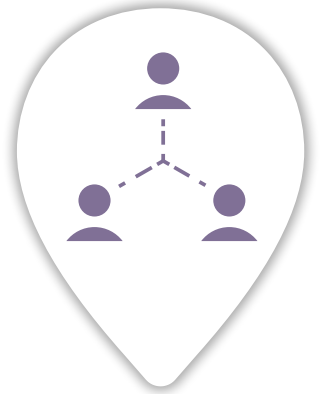
Lawyers have an automatic duty of care to their client – it is a fundamental principle of the contract, but it goes wider than that. _A legal opinion from Norton Rose Fulbright_, one of Australia's pre-eminent environmental law practices, was published in Spring 2023. The Opinion identifies that not only do lawyers and conveyancers have a duty of care, but they also have a duty to disclose and to warn on the basis that information is readily available for them to do so in an easy and accessible way.

There have been a number of prominent legal experts and associations that have also spoken out to this effect. Justice Brian Preston, Chief Judge of the Land and Environment Court of NSW, published a 2020 paper on adopting "_A climate conscious approach to legal practice_". He stated that it requires lawyers to have "an active awareness of the reality of climate change and how it interacts with daily legal problems" and to "_giving advice and litigating or resolving the legal problem or dispute in ways that meaningfully address the climate change issues._"

In 2021, The Law Council of Australia published their climate change policy. In the summary, they stated that "_lawyers should be alive to the unfolding legal implications of climate change and its consequences, and they should be informed, skilled and ready to assist clients on climate change-related legal matters, within their areas of skill and competence._"
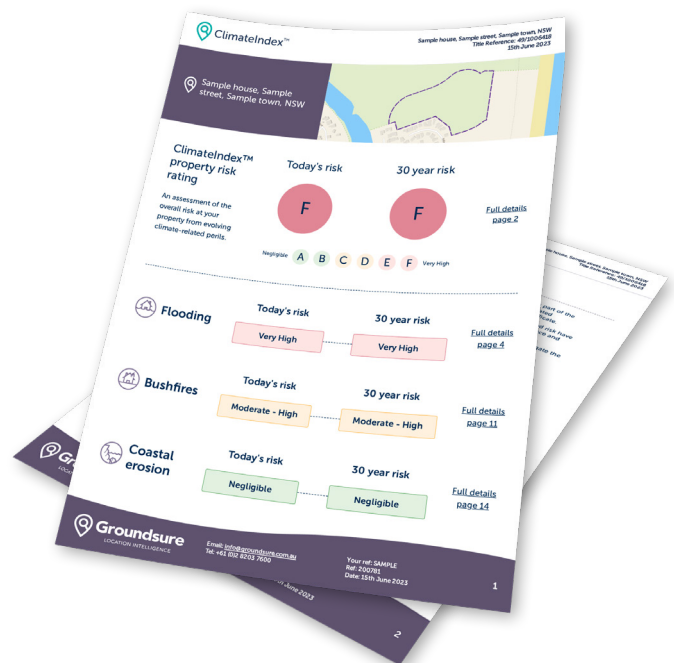
The New South Wales Law Society is perhaps the most proactive Lead Association to date and has established a Working Group to consider how best to support members and to develop its advocacy work on how to respond to the climate challenge from a legal perspective. We understand that the Society continues to review the UK Law Society Guidance and its core principles, as well as a newly published legal opinion from the pre-eminent environmental law team at Norton Rose Fulbright.

A simple way to meet future climate compliance

The Climateindex™ report provides a clear, simple way to support your client care and fulfil your duties, while preparing for new Guidance. Through careful modelling and plotting a prediction based on current trends for the 3 key physical risks in one location. This makes it cheaper and more efficient for the lawyer and provides improved insight to support the prevailing 10.7 Certificate that typically looks at past events without signposting to what the future trend could be.

It provides property-specific assessments for individual residences, instead of broad regional ratings. They are specifically designed for property lawyers and conveyancers to do their due diligence and better inform buyers.

Find out more about ClimateIndex™:

Find out more

Watch our video:

Watch now

NSW Lawyers - Advising Clients on Climate Risks with ClimateIndex™

How to order

The Groundsure ClimateIndex™ Report is **available to order now through InfoTrack** for New South Wales properties.

Find out more

For more information on ClimateIndex, speak to your InfoTrack account manager or email us at *info@groundsure.com.au.*

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LOCATION INTELLIGENCE

Groundsure is a leading environmental and climate data authority. We give land and property professionals expert information on risks including land contamination, flooding and ground stability, as well as forward guidance on potential climate risks, to advise their clients in the transaction. We provide high value, property-specific opinions and analysis of land use, turning data into practical, actionable insight.

InfoTrack

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