



KINGLAKE, VICTORIA

Australia's Relationship with Wildfire

The ongoing relationship between Australian communities and wildfire is complex and unavoidable. Much of Australia's native flora and fauna have evolved to thrive as a result of regular wildfires of both natural and human origin. Bushland and scrub areas are often controlled to reduce fuel loads near properties and important infrastructure, however much of this activity is restricted to government-owned crown land, such as national parks, or else it is dependent on the initiative of private land-owners. Wildfire disasters in Australia occur as a result of both naturally occurring seasonal fires, but frequently from intentionally lit fires that become too difficult to control. It is estimated that approximately 50% of wildfires in Australia are intentionally lit, whether by accident, through controlled burns, or as a result of arson.

Growing numbers of Australians are relocating to regional areas seeking a 'tree change' in response to 'urban stresses'. These populations may benefit from positive lifestyle impacts from relocating, but due to close proximity to bushland they are more vulnerable to adverse impacts of wildfire. Additionally, rapid urban sprawl of large cities is resulting in peri-urban zones, increasing the interface between city suburbs and wildfire-prone bushland. Paralleling these trends is the added complexity of climate change, and the increasing risk of fire due to decreased rainfall and higher temperatures in fire-prone regions.

On the 7th February 2009, Australia's southern state of Victoria was devastated by the some of the worst bushfires in history, and would be remembered as Black Saturday. Fire burned just north east of Melbourne threatening the periphery of a city with more than 3.5 million

people. One of the many small towns affected was Kinglake, only 56 km from Melbourne, accounted for 120 out of 173 recorded fatalities.

In the lead up to 2009, Victoria had been suffering a prolonged drought resulting from consecutive years of below average rainfall and record high temperatures. The conditions created the perfect storm of risk factors for wildfire. On both of the most significant bushfire event recent history, being 2009 and 1983, a particular combination of weather patterns was responsible for creating high risk conditions. In these scenarios, north-easterly winds bring hot, dry air from central Australia, resulting in extreme temperatures of above 40 degrees Celsius across the state. Paired with this, cold fronts, usually with little rain, change the wind direction to south-west bringing on gale force winds. The interaction of these hot and cold air masses can cause powerful convection columns and when coupled with a dehydrated landscape can cause bushfires that quickly escape the control of authorities.

Kinglake and the Black Saturday Bushfires have been used as a case study and focus point to investigate bushfire and its impacts through a simulated timeline starting in the past, through the long now and into the future. There were a number of important steps taken by both government and its agencies, as well as communities to address the tragedy of the bushfires. A Royal Commission was launched to investigate the causes and impacts of the Black Saturday bushfires which handed down a number of findings detailing the failings of emergency services and the breakdown of communications.

As the 10 year anniversary of the devastating Black Saturday bushfires approaches, many will mark their milestones, whether it is recovery, remembering loss and survival, and starting anew. It is now time to prepare for the next bushfire event

BY THE NUMBERS

173 people killed
414 people injured
2,100 homes destroyed
7,562 people displaced

The energy that the Black Saturday bushfires released was equivalent to 1500 atomic bombs that struck Hiroshima.

1,100,000 acres of land were burnt.

There were over 5,000 fire fighters involved on Black Saturday, with some coming from New Zealand and the US and Australia.

Only one Australian fire fighter was killed.

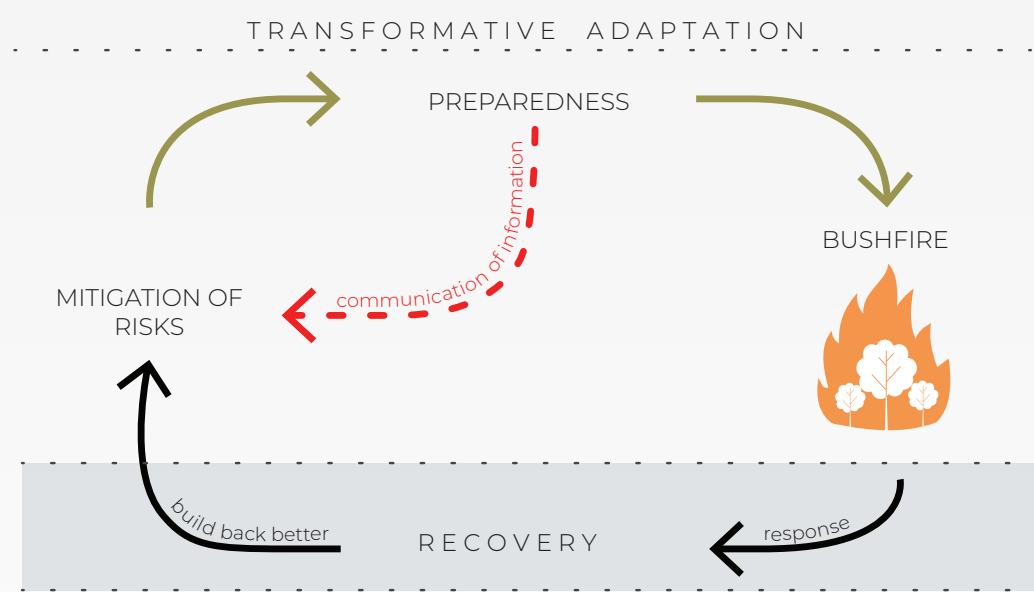
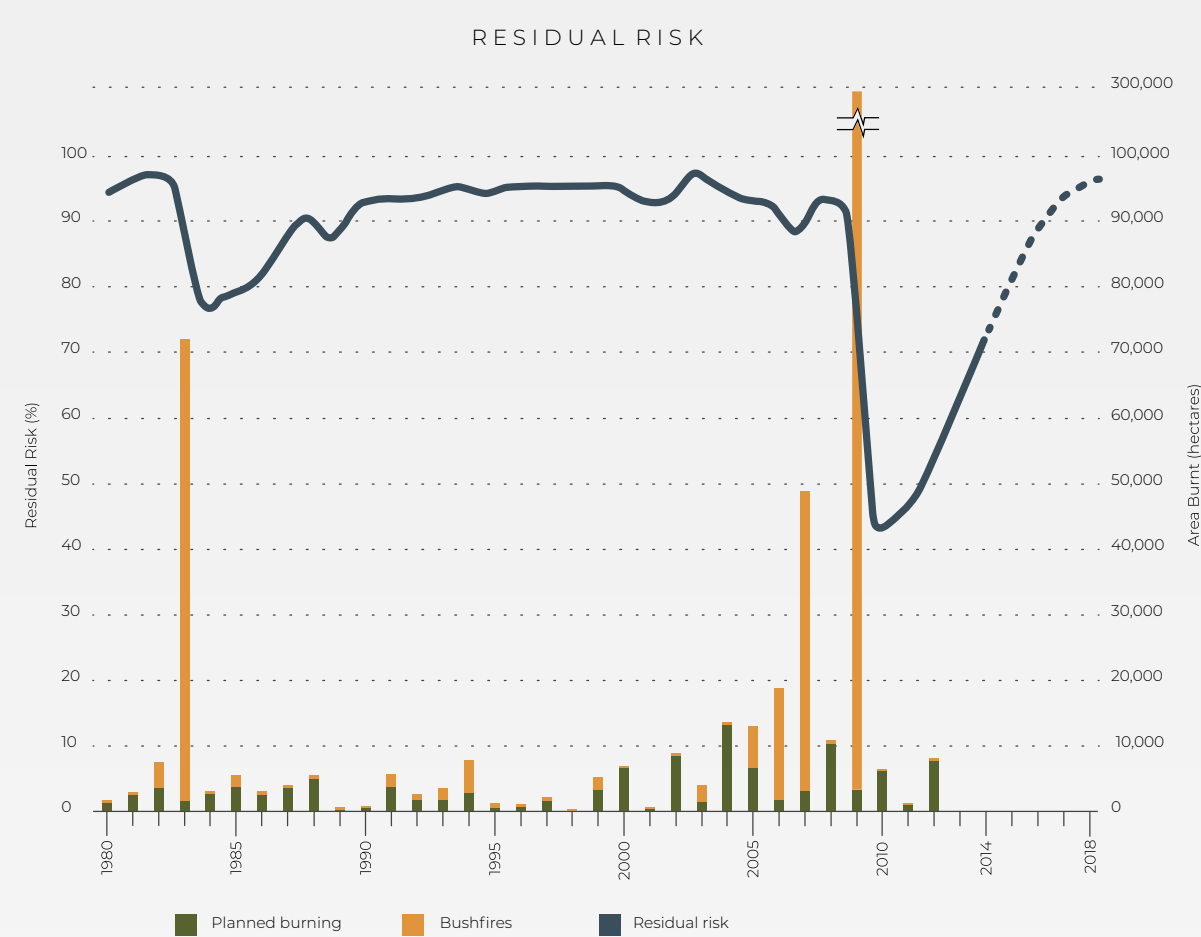
There were over 400 separate fires that led up to the event of Black Saturday. The temperature on the day was recorded around 47 degrees. There were 12 years of drought which led up to the fires. Some flames reached 100 metres high.

Over 1,500 pieces of fire fighting equipment was destroyed including one water dumping helicopter.

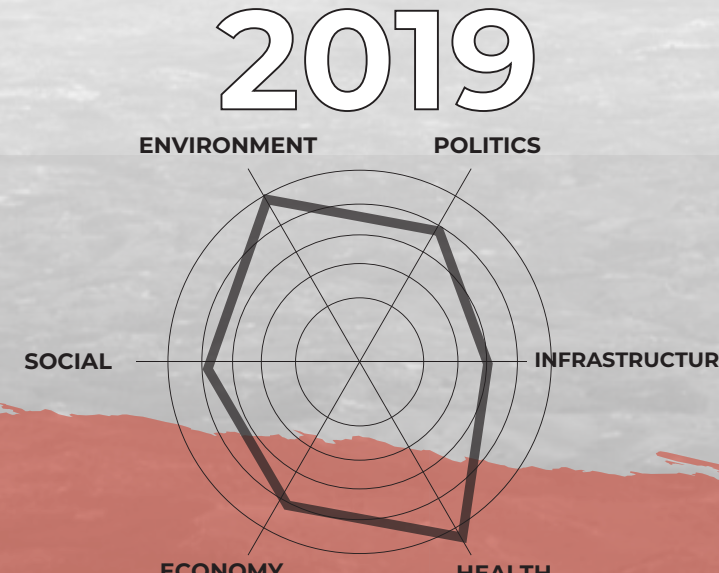
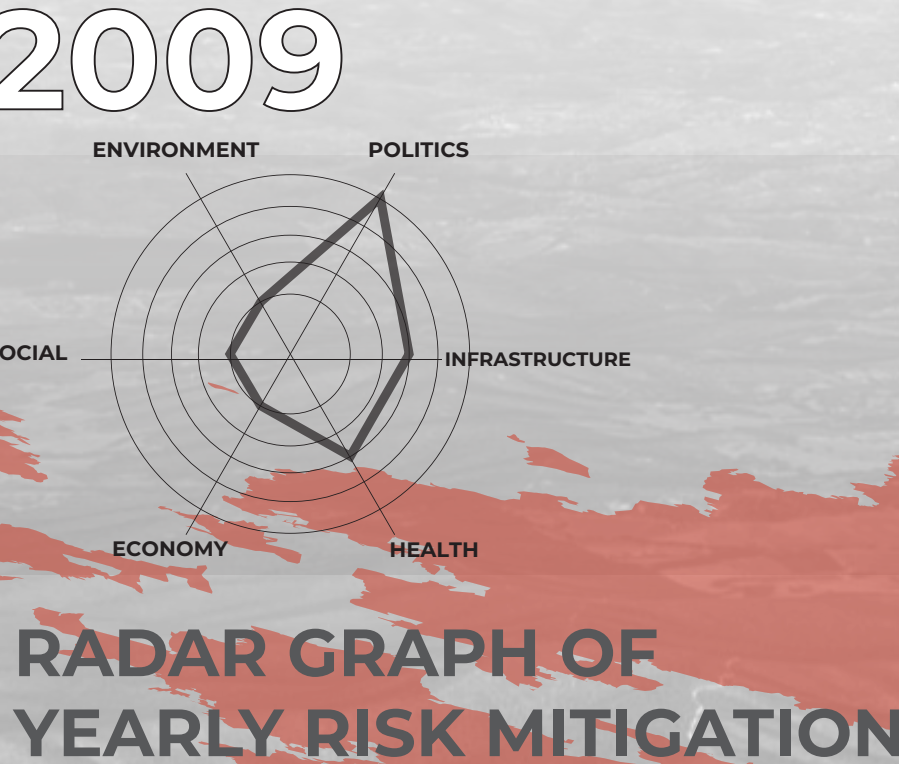
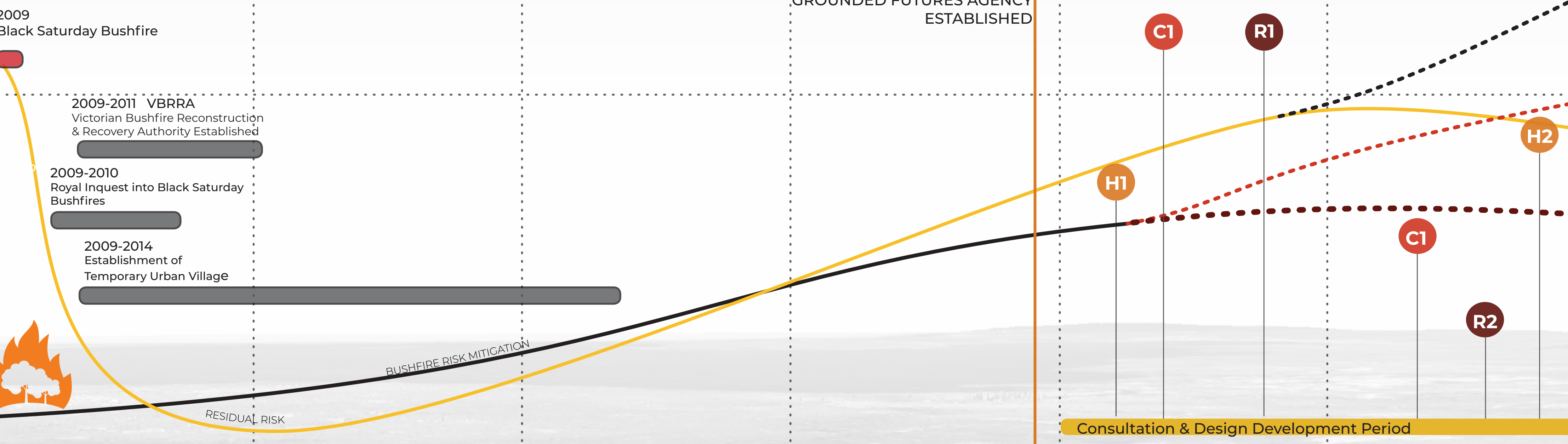
78 towns across the state of Victoria were impacted by the fires. An estimated 1,000,000 animals were killed, much of them located in the National Parks.

Over \$388 Million was raised for the Victorian Bushfire Relief Fund Appeal.

A NEED FOR CHANGE



TIMELINE OF DESIGN STRATEGY



RADAR GRAPH OF YEARLY RISK MITIGATION

IMPROVED RESILIENCE?

Changes of Thinking
By actively implementing measures that result in systematic changes through transformative adaptation, the communities affected by bushfires will see reductions in the impact of these events. Such changes also have other far reaching consequences; improving sustainability and taking steps to reduce the human footprint on the planet, especially in the wake of the latest IPCC report on climate change that predicts our impacts to be far greater than before. The aim of this strategy is to establish a long term transformative change in the systems we operate in. Information and feedback loops help to break down top-down only approaches, involving the community to a greater degree at all phases of process for benefits in preparedness, mitigation, response and recovery. As a result of this continued feedback of information, this is a framework that has been designed to evolve over time, informed constantly by new data, and advances in technology. It is able to be scaled from the household scale up to a regional scale, while still maintaining the ability to be customised to individual communities. The resilience strategy must be able to account for the influences and factors of scale across many different sectors.

This change in thinking should permeate across all levels of implementation - with the understanding that subtle and prolonged shifts of thinking towards resilience will create a "new normal"; a preventative social ideology that promotes system wide preventative measures free of special interest organisations.

Digital Influence
As shown briefly through the use of Stochastic Fire Mapping charts, digital technology will be a key aspect to the implementation of this strategy, as well as the representation of information. Developments in technology will enable new tools to be used and better communications to accumulate unbiased

2009 BUSHFIRE EXTENT OVERLAY





HOUSEHOLD

- H1

1. HOUSEHOLD MICROCLIMATE STRATEGIES
Sprinkler systems: installation of exterior sprinkler systems for homes. Mitigate fire risk by managing the natural landscape.
- H2

2. RETROFITTING OF EXISTING HOUSES
Where possible, retrofit existing housing stock to meet B.A.L. ratings.
- H3

3. BUILD NEW HOUSES TO HIGHEST B.A.L. RATING
All new homes from 2019, within fire prone areas will be built to the highest B.A.L. rating.
- H4

4. KEY FEATURES OF FIRE-RESILIENT HOUSE DESIGN
 - Shutters to protect against embers and flames.
 - Roof form that does not accumulate debris.
 - Roof form that does not capture airborne embers.
 - Efficient buildings footprint to ensure affordability.
- H5

5. 5 MILE RADIUS BUILDING PHILOSOPHY
Compressed earth is sourced as a primary building material from the local area.
This building methodology is suited to the temperate climate of the region, typical of fire-prone areas worldwide.
Compressed earth is inherently fire resistant.
The 5 Mile Radius philosophy is about:
 - Sourcing building materials from within a five mile radius.
 - Is sustainability-driven.
 - Designing and building with local materials and local community.
 - Is more than a building; it is a movement.



COMMUNITY

- C1

1. COMMUNITY FIRE WARDEN
Appointment of Fire Warden to oversee data accumulation, strategy input and to provide critical information back to the community. Creates feedback loop between government research agencies and communities.
- .A

KEY ROLES: (A) COMMUNICATOR
Connect local communities with key sources of information and knowledge like CFA, Bureau of Meteorology, that are directly relevant to them.
- .B

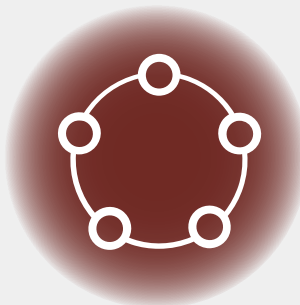
(B) ASSESSMENT
Assess local community preparedness, risks and knowledge. Identify gaps in knowledge and communicate important data to the community explaining associated risks based on regional levels assessments.
- C2

2. MAINTAIN SYSTEMS REQUIRED IN THE EVENT OF WILDFIRE
Fire wardens allocated according to each community centre evacuation point. Allocated according to risk assessment and per capita population calculations.
- C3

3. SHELTER STRATEGY DURING RESPONSE
Shelter strategy during wildfire events focus on where shelter is sought by those impacted. This may involve shelter in a car, or a house, or both.
- C4

4. (RESILIENCE) COMMUNITY CENTRE
Community Centres are managed by Fire Warden. Objective is for a long term vision of community engagement and resilience through building social, economic, environmental sustainability.
- C5

5. PUBLIC INFORMATION BRIEFING
Public awareness campaign implemented through community centres by the Fire Warden. This includes fire safety education and preparedness strategies, including building workshops run by 5 Mile Radius.



REGIONAL

- R1

1. PUBLIC AWARENESS CAMPAIGN
Implement a comprehensive public awareness program to educate the public and the youth in particular on the dangers and appropriate preventative measures to be bushfire safe centres.
- R2

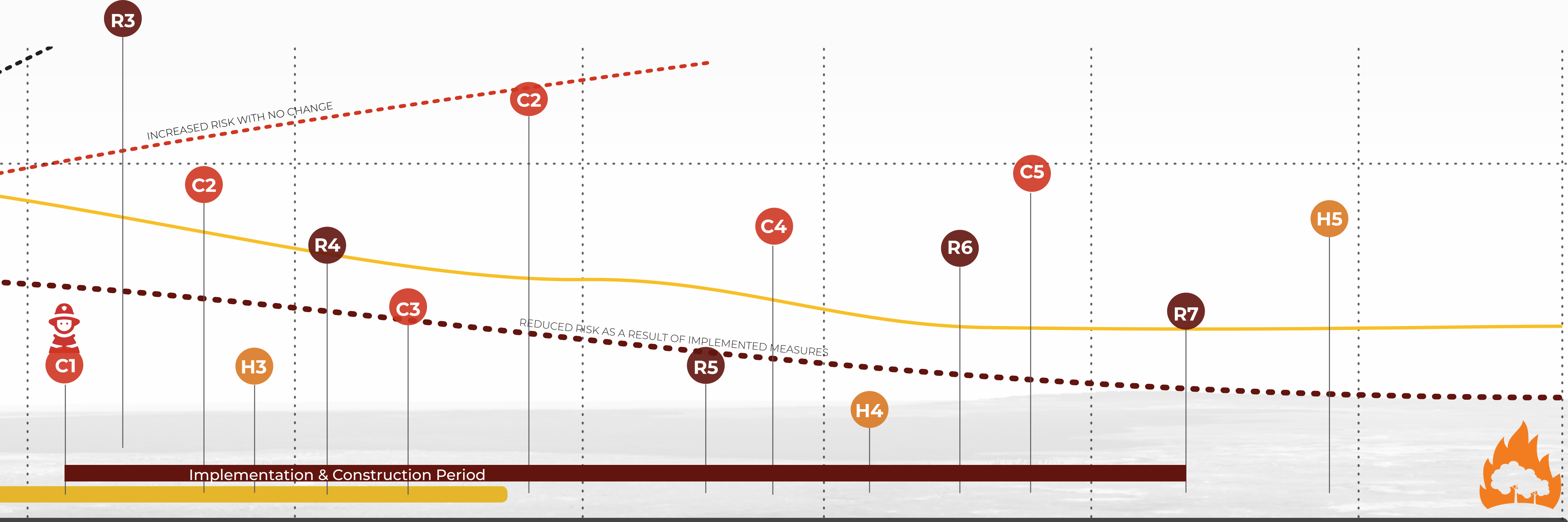
2. IMPROVING ADAPTABILITY OF NATIONAL PARKS
National Parks Service to improve park access & egress for tourism, implement fire breaks at critical areas across National Parks and State Forests, and promote a network of connected Park Services across the region to ensure a continuous feedback loop of information
- R3

3. "URBAN FORTRESS" AND LIMITING URBAN SPRAWL
Legislate to prevent further urban sprawl, implement strategies for urban fringe zones.
Our approach to a resilient wildland urban interface involves securing the urban fringe.
'Urban Fortress' concept demonstrates resilient fringe that is more widely applicable across the region.
- R4

4. ACTIVE DATA COLLECTION
Detailed fire modelling, mapping of risks and surveys to create a feedback loop between community and government agencies.
Extensive fire modelling during bushfire season or again where deemed necessary (e.g. on days when F.D.A. is 90 or above).
This information would then be communicated directly to communities via the community fire warden.
- R5

5. TRANSFORMATIVE ADAPTATION
Transformative Adaptation: a term which reflects the need for greater, more significant adaptation responses as the world's global efforts to mitigate the impacts of climate change have fallen short. This involves changing and reforming systems with a focus on the future and long term change. This type of adaptation requires questioning the effectiveness of existing systems, and changing power dynamics to promote autonomy at the community level to create this systematic change.
- R6

6. RETROFITTING FOR BUSHFIRE RESILIENCE POLICY
Policy changes to allow for subsidies to make it easier for homeowners to upgrade their homes to meet B.A.L. ratings.



and accurate information from which detailed design, strategy and policy decisions can be made. Given our fast pace pf technological development the utilisation and adaptation of technology for disaster resilience will need to used to improve strategies over time. This will also improve feed-back loops to between household, community and regional scale. Advances of software analysis will ensure accuracy and legitimacy for the application of strategical decisions in the future.

Strategy for the Future
This design strategy is the product. Wildfire Grounded Futures, is focused on the notion that we should design for a future that is built upon grounded understanding of the changing world we live in. We need to build for the long term and shift our thinking decidedly towards future planning. In flipping the equation of disaster recovery and instead beginning with preparation we are challenging the standard response to natural hazards. Planned strategies designed within a framework are more effective than rushed, reactive responses. The transformative adaptation approach and is a crucial design initiative to implement in the future resiliency of our world.

Flexibility of Strategy
The design proposal as outlined in this project is not bound by a disaster type, nor by the geographical, economical or government bodies. The Black Saturday Bushfires were used a case study to understand how such a process would be implemented. It understands that it is virtually impossible natural hazards from occurring, and with the increasing effects of climate change it is likely that the severity of these hazards will increase. Therefore it does not aim to impose a rigid solution, rooted in architecture, limited to place and time, but rather a strategic framework that is flexible and adaptable to its context with a future vision embedded.



BUSHFIRE IN 2039
In 2039, when a severe bushfire affects Kinglake, the rest of the Murrindindi Shire as well as other parts of Victoria, communities are well prepared.
No lives are lost.
As a result of the changes implemented more than a decade ago, communities have not only survived the bushfires but have experienced significantly fewer losses of property. What seemed like hard line and expensive policies all those years ago have paid off. Despite the ferocity of the bushfires, more homes were left standing, communities supported each other, warnings were able to be communicated up to a month in advance thanks to the latest technology and communities were kept informed in the lead up and during the bushfire to allow them to make informed decisions about their safety. Better land management and communication schemes meant that the fires were contained, minimising the amount of bushland burnt.
Climate change continues to affect Australia and the world, however due to the transformative changes taken and systems set into motion, Australia has become more resilient to the increasing number and severity of natural hazards, as will as becoming a more sustainable nation.
In the bushfire context, the risk comes from a number of different factors. By grounding our futures in knowledge and beginning the process of transformative adaptation, resilience can be built into communities to better prepare, mitigate and recover from natural hazards by reducing many different vulnerabilities. As we know, vulnerabilities are often exposed in the face of natural hazards, or other disruptive conditions such as climate change. A lack of sufficient preventative measures ultimately leads to the increased impact of a natural hazards, as was seen in the case of Black Saturday Bushfires.