



Land use zoning response to climate change

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Wicked problem? Future natural events will generally intensify with predicted climate change. Different regions will experience differing impacts (eg CSIRO modelling), but to what extent are these taken into account when land use strategies are being developed? Wicked solution? Land use assumptions need a major rethink, coloured by those impacts.

Assessments of development proposals consider climate change but strategic town planning is less transparent regarding how different climate change impacts are incorporated into zoning decisions. Countries like Australia and New Zealand with long-term growing populations contrast strongly with southern Europe, Japan and elsewhere where population growth is neutral or negative. As a result, Australasian land use strategy generally leads incrementally to upzoning, where land moves from low intensity, low value to more intensive, valuable uses. Such assumed upzoning is an incredibly strong driver of investment, market behaviour, public treasury budgets and by inference, of political behaviour supporting property investment.

This broad-brush approach must be replaced to reflect a more finessed settlement pattern which responds transparently in specific locations to anticipated impacts of climate change, such as

- **coastal** erosion (sped up by higher sea levels, increased storm surges, more frequent, deeper low pressure systems),
- more intense and/or frequent storms with heavier rainfall and therefore changed **flood** patterns,
- more intense and/or frequent storms with more damaging **wind and waves**
- changes in temperature and humidity which shorten bushfire burnoff periods in some locations, and
- changes in temperature, humidity, vegetation and bushfire hazard load, leading to more intense and/or frequent **bushfires** in some locations.

Those are the natural drivers, countered by wicked political, financial and marketing blockages to a rational response to such drivers. However, the insurance industry is already factoring climate change impacts into its products.

Another side of this issue is the human drama we see on all media when a natural event impacts on people and places. Politicians, media people and volunteers are pictured in high-visibility vests and hard hats tut-tutting that the ocean or a bushfire has “unexpectedly” destroyed someone’s garden or house. Increasingly and worldwide, volunteer organisations such as State Emergency Services, Surf Life Saving Clubs and Rural Fire Services struggle to find enough members. Their insurers demand less risk-taking. Increasingly, emergency management organisations are refusing to try to defend **indefensible properties**, or to try to rescue those who were warned but did not evacuate in time.

BLOCKAGES TO ACTION?

Is there a legacy of poor land use planning decisions? There used to be less information, little human-induced climate change, much more gradual change which was largely ignored or misinterpreted until recently, along with assumed rescue then government hand-outs for recovery (inferring your damage was just an unforeseeable accident). Today we have better quality information including modelling of future conditions, giving confidence for decision-making about risks to highly-impacted properties. Some are already unsafe; others' assumed development potential needs to be reversed.

Nature will increasingly win during disruptive events. As intelligent humans with good quality information to hand, our response can be to minimise the risks by selectively changing land use intensity, location by location. Why don't we? In Australasia, every jurisdiction allows downzoning as one of a number of responses to changed circumstances such as climate change. How often does it occur? Rarely if ever. Perhaps it is politically and financially too difficult, due to public outcries, private property interests, state and local treasury impacts from reduced land values and so on. On the contrary, most of us know of flood-prone, bushfire-prone or coastal-process-affected properties which were upzoned then disastrously developed. That is what is wicked. Brisbane CBD, Belongil/ Byron Bay and Blue Mountains escarpments are examples. As responsible professionals, we need to counter the assumption that it will all be all right later, when someone else owns it or will be the rescuer. Even building designers are responding to increasing threats by moving infrastructure such as electricity and media hubs out of basements (which flood first) to a higher level. Without electricity, a flooded high-rise's water supply will fail, forcing evacuation.

Downzoning is now an infrequently-implemented optional response to natural hazards, along with planned retreat and other softer responses. However I am arguing for action: we (the planners and politicians) take the initiative and tell the market what will happen and why.

In public relations terms, how might this necessary if painful shift in thinking be achieved?

Long-term market signalling is the least painful way for landowners to adjust. Message spruikers include politicians, bankers, insurers, journalists, community leaders, property professionals and emergency managers as well as scientists and town planners.

Taking a business and political approach, market signalling enables orderly transitioning away from current expectations towards safer but climate-change-related land use. Given time, the market will adjust to selectively lowered land use potential. Buyers already ask "why is this property so cheap? What will it cost to develop given the flooding/ coastal erosion/ bushfire hazard we will have to mitigate? Is there other land with lower risks from climate change?"

Solution? We currently have an "urban investigation" zone where long-term studies determine which areas can be upzoned to cater for a growing population. Let's add a new "non-urban investigation" zone where modelling determines selective downzoning over time. The professional investigations are likely to take a decade or so, as local information improves, weather events occur which may change long-term records, and all the associated technical work and lobbying occur. Be transparent: allow the market to adjust through formal and informal information provision, supported by politicians through several electoral cycles.

Importantly, if land remains in private ownership, no compensation is payable in NSW, Victoria, WA or Tasmania, at least. Since 3 July 2017, Queensland Councils are exempt when they reduce property value in response to natural hazards. These key enabling facts support taking a long-term view, based on market adjustment to a consistently delivered public message from credible sources.

With this method, strategic land use planning will actually (not theoretically) respond appropriately and transparently to climate change.



EIANZ CONFERENCE

land use zoning response to climate change

Dr Helen Monks
30 October 2017

IF DAMAGED OR DEMOLISHED BY NATURE, WHAT SHOULD THESE BUILDINGS' OWNERS BE PERMITTED TO DO OR PROHIBITED FROM DOING? HOW SOON? WOULD THEY KNOW IN ADVANCE? WHAT IS OUR STRATEGIC PROFESSIONAL ROLE?



Gold Coast 2015



intensely-developed coastline now at increasing risk from climate change



Belongil, NSW



Kapiti NZ, 1976



Haumoana, Hawkes Bay



Hawkes Bay

Credit: Julian Thomson



TERRACE

NZ weather.com



Oamaru



Glenburn, Wairara

WHAT ABOUT THE IMPACT ON AESTHETICS AND BEACH AMENITY FROM PUBLIC OR PRIVATE PROTECTIVE WORKS? THE SEA WILL ONLY BE HELD BACK TEMPORARILY.



SAN FRANCISCO'S OCEAN BEACH SOUTH OF GOLDEN GATE IS ERODING QUICKLY: GREAT HIGHWAY, PARKING NEAR THE ZOO, POOR AESTHETICS, REDUCING FUNCTIONALITY, INFRASTRUCTURE INCREASINGLY AT RISK, A DESERT CLIMATE, AND IT'S ON THE SAN ANDREAS FAULT



**IS STRATEGIC LAND
USE PLANNING
RESPONDING
QUICKLY ENOUGH?**

https://issuu.com/oceanbeachmasterplan/docs/obmp_document_full/11_2017

COASTAL EROSION AND RISK

COLLARROY JUNE 2016, DURING EAST COAST LOW WHOSE SWELL CAME FROM THE NORTH-EAST RATHER THAN THE TYPICAL SOUTH-EAST





Collaroy, New South Wales

Global
NEWS



COLLARROY 2016

SURFSIDE, NSW, SUBDIVISION AND ROADS



Shoreline recession at a coastal erosion hotspot, courtesy of Eurobodalla Shire Council.

WAMBERAL, NSW CENTRAL COAST, 1978, AREA NOW A VEGETATED SAND DUNE KNOWN LOCALLY AS "THE RUINS", OCEAN VIEW DRIVE (REAR), 4 LOTS NOW ZONED FOR PUBLIC RECREATION (rezoning date not known)





WAMBERAL TO TERRIGAL, CURRENT COASTAL ZONE MANAGEMENT PLAN, INDICATIVE BUILDING CONTROLS BASED ON HAZARD LINES AND LIKELIHOOD OF EROSION HAZARD AND/OR INUNDATION, 2014

KEY:

Pale blue: potential coastal inundation

Yellow: 2050

Orange: 2100



WAMBERAL, SITE OF HOUSE UNDER CONSTRUCTION, 2010 CONSENT, AMENDED 2017

← H/N 103 Ocean View Dr.

Key:

Solid green line is immediate
hazard line at Wamberal

Dashed green line is Zone of Slope
Adjustment at Wamberal

WAMBERAL HOUSE UNDER CONSTRUCTION, 103 OCEAN VIEW DRIVE (SECOND FROM LEFT), SUBDIVIDED BLOCK:
NO POSSIBILITY OF PLANNED RETREAT



COASTAL HAZARDS – CYCLONE?



CYCLONE OR TSUNAMI?



FLOODING OF CENTRAL BUSINESS DISTRICTS



BRISBANE RIVER 2014 FLOOD – BEFORE

ABC images <http://www.abc.net.au/news/specials/qld-floods/>
Basin Pocket (Ipswich)

Lai



AND DURING FLOOD

Basin Pocket (Ipswich)

[Larger Map](#)



Homes in Fig Tree Pocket

[Larger](#)



Homes in Fig Tree Pocket

[Larger Map](#)



2017 MAPPING – BRISBANE CITY COUNCIL: flood awareness project (education), CBD & Kangaroo Point



Understand flood likelihood

Click the buttons below to explore the likelihood of flooding for your property and local area. The information is based on the latest flood modelling and does not reflect actual recorded flood levels.

[Click here for a fact sheet to understand flood likelihood.](#)

Map legend

- High likelihood (5.0% Annual Chance)
- Medium likelihood (1.0% Annual Chance)
- Low likelihood (0.2% Annual Chance)
- Very low likelihood (0.05% Annual Chance)

S, IDYLIC
T FLOODS

OR THERE IS A STORM SURGE FROM
MORETON BAY OR SEA LEVEL RISE
IMPACTS



ANOTHER FORM OF FLOOD MITIGATION
(A LEVEE AROUND HIGHEST AVAILABLE
LAND IN A FLAT LANDSCAPE)

ARCHITECTURE IN THE BUSH





DEFENSIBLE OR NOT?

VOLUNTEERS AND RISK-TAKING



we lose firefighters from conditions like heart attacks every year; these are asleep or resting

VOLUNTEERS ARE AGEING



COST OF REPEATEDLY REPAIRING VULNERABLE
INFRASTRUCTURE AT PUBLIC COST: WHAT
COST/BENEFIT ANALYSIS NEEDS TO BE DONE PRIOR TO
REPAIR? REPAIR AT WHOSE COST?



SHOCK HORROR! THE UNEXPECTED!

(UNFORTUNATELY CALLED A KING TIDE RATHER THAN AN EAST COAST LOW)

Source: AAP, 7 JUN 2016 - 8:38 AM UPDATED 7 JUN 2016 - 1:08 PM

Sydneysider Garry Silk has just one word to describe how he feels after his million-dollar Collaroy beachfront property was damaged by king tides: "Shattered".

The 62-year-old spent the weekend watching the surf slowly eat away at his backyard, inching closer and closer to his home.

After leaving on Sunday night, Mr Silk returned on Monday morning to find 15 metres of his yard claimed by the waves and the in-ground swimming pool lying on the beach.

"It started getting hairy at 4.30pm yesterday when we lost our rear fence and then it actually undermined the house," Mr Silk told AAP.

"We've lost our garden."

Mr Silk, a resident of Pittwater Road, said he and his neighbours were the only beachfront residents in the area without a sea wall.

The Warringah Council would not allow anyone to build sea protection on council land, he said.

"We moved in three years ago. We talked to council, but it's a bit late now," he said.

"This is the only strip without sea protection."

Seven beachside homes and a unit block were evacuated about 8pm on Sunday night as eight-metre waves slammed the coast leading to major erosion.

Mr Silk's sister-in-law Susie Cummins, of Clontarf, said the experience was a surreal one.

"There was water up to the road," Ms Cummins said. "There was even a crab walking along."

Storms lashed the east coast of NSW at the weekend, with Sydney's northern beaches one of the areas worst affected.

BUSHFIRE RISKS: PEOPLE AND PROPERTY - DEFENSIBLE OR NOT?



HUGE FIRE, LARGE TOWN, LOTS OF VEGETATION BUT
AN APPARENTLY FAVOURABLE WIND, FOR NOW



TOP OF ESCARPMENT, BUSH ALL ROUND (ABOVE AND BELOW)



DEFENSIBLE OR NOT?



ROADS ON ALL SIDES,
OPEN Paddock ON
THIRD SIDE (UNBURNT
IN THIS FIRE),
CLEARINGS AROUND
STRUCTURES



WIDE SEALED ROAD,
LITTLE VEGETATION OR
OTHER FUEL LOAD
ANYWHERE



HAZARD IS UPHILL, LIMITED VEGETATION BETWEEN HOUSES BUT WHICH WAY IS THE WIND BLOWING?



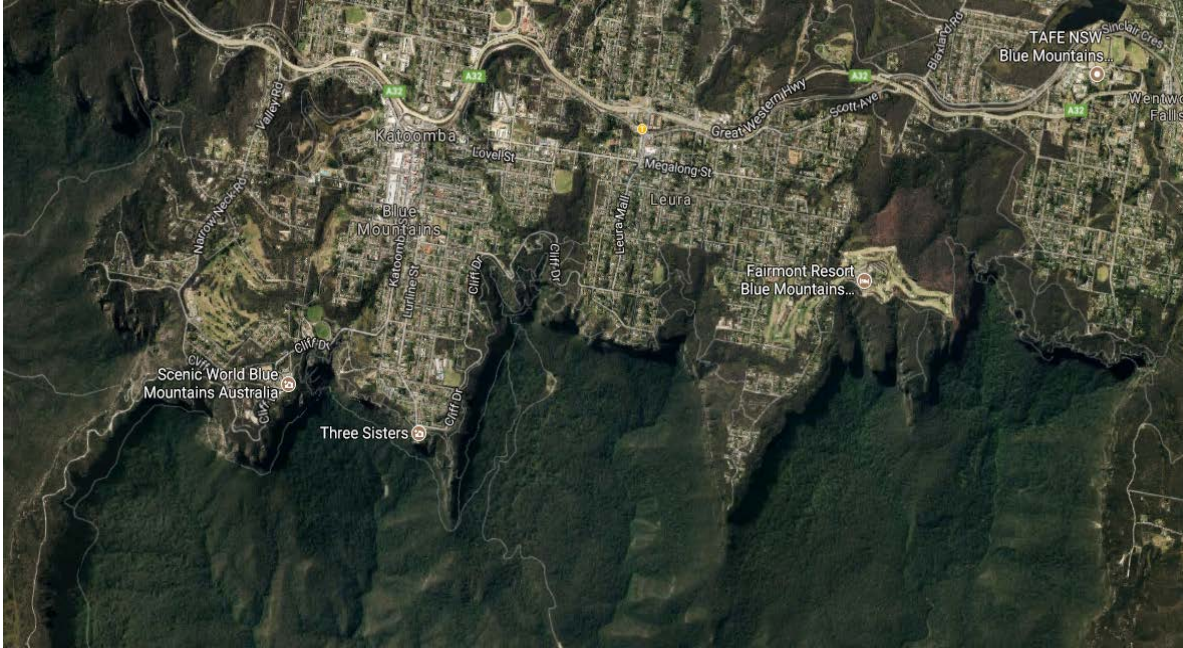
fire from a NSWRFs aircraft. Photo: Twitter / NSW Rural Fire Service

NOTE THE SPOT FIRES, CENTRE RIGHT;
EAST OF QUEANBEYAN, NSW, FEBRUARY 2017

BLUE MOUNTAINS, NO URBAN AREAS VISIBLE

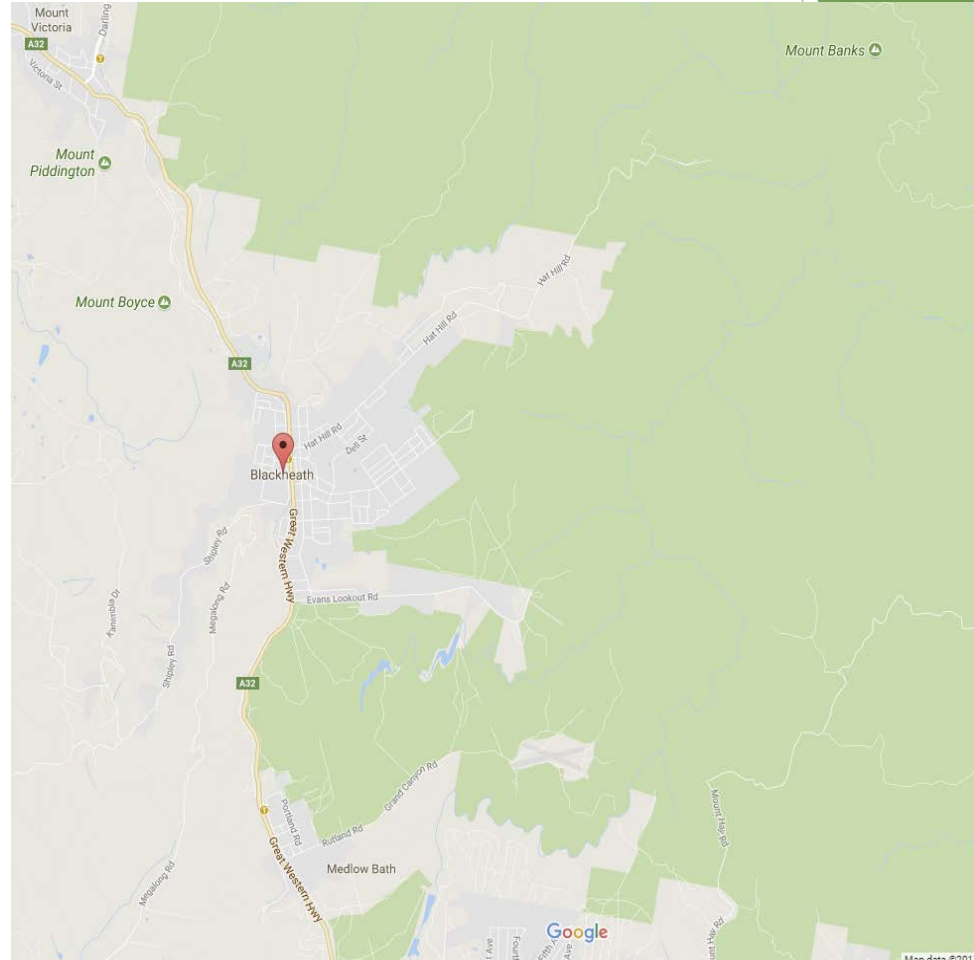


BUSHFIRE RISKS: BLUE MOUNTAINS, NSW



KANANGRA BOYD NP TO SOUTH. BUT PREDOMINANT BUSHFIRE WIND HERE IS FROM W: COMPARE WITH BLACKHEATH, FURTHER WEST

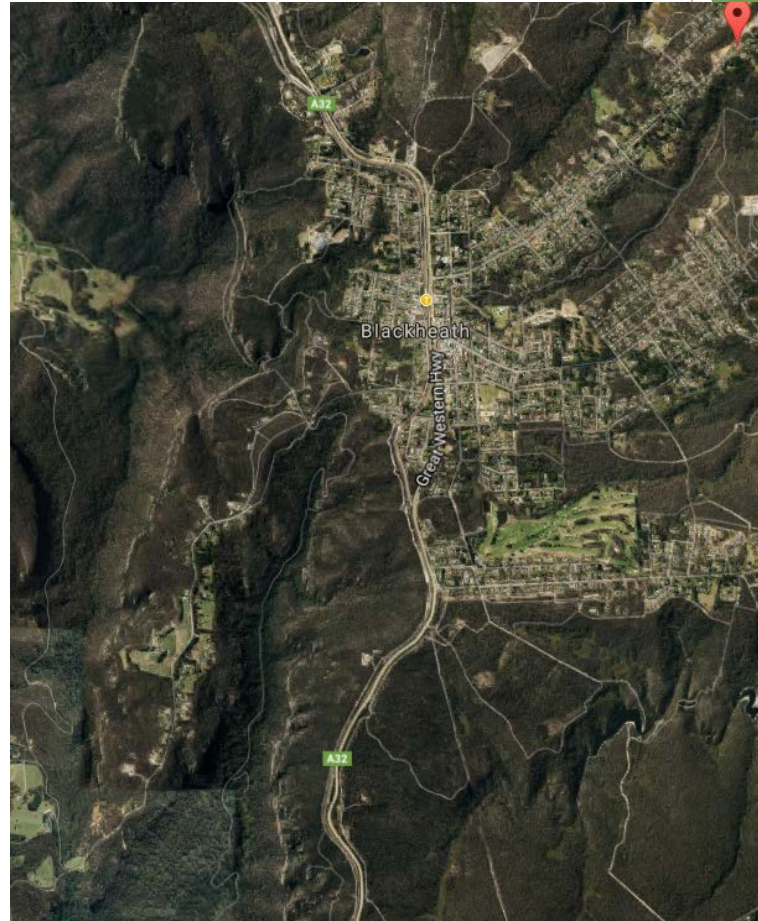
ONE ROAD IN/OUT ABOVE
GROSE RIVER
ESCARPMENT (TOP RIGHT)
– BLUE MOUNTAINS NP;
TO WEST, MEGALONG AND
KANIMBLA VALLEYS –
SIMILAR, UNMANAGED
VEGETATION WITH
HOUSES TO ESCARPMENT
(WEST)



EASTERN END OF HAT HILL ROAD, BLACKHEATH, GROSE VALLEY TO RIGHT: WELL-SET-BACK HOUSING



WESTERN SIDE OF
BLACKHEATH WITH
ESCARPMENTS, NATIONAL
PARK, BUT EXPOSED
SHIPLEY PLATEAU (ONE
ROAD IN/OUT; SOME
AGRICULTURE, MOSTLY
HOBBY FARMS AND
WEEKENDERS); EXPOSED
EVANS LOOKOUT ROAD
(LOWER RIGHT)



Tropical Storm Harvey

No rival for 1000-year flood

SMH 2-3/9/17

United States
Jason Samenow
Washington

As Harvey's rains unfolded, the intensity and scope of the disaster were so enormous that weather forecasters, first responders, the victims, everyone really, couldn't believe their eyes. Now the data bears out what everyone suspected: This flood event is on an entirely different scale than what we've seen before in the United States.

A new analysis from the University of Wisconsin's Space Science and Engineering Centre has determined that Harvey is a 1-in-1000-year flood event that has overwhelmed an enormous section of Southeast Texas equivalent in size to New Jersey.

There is nothing in the historical record that rivals this, according to Shane Hubbard, the Wisconsin researcher who made and mapped this calculation.

"In looking at many of these events [in the US], I've never seen anything of this magnitude or size," he said. "This is something that hasn't happened in our modern era of observations."

A 1000-year flood event, as its names implies, is exceptionally rare. It signifies just a 0.1 per cent chance of such an event happening in any given year.

More than 500 millimetres of rain fell over an area of about 75,000 square kilometres larger than 10 states, including West Virginia and Maryland.

More than 760 millimetres of rain fell over an area of more than 28,000 square kilometres.

Apart from Harvey, there's simply no record of a 1000-year event occupying so much real estate.

While no one questions the exceptional nature of Harvey's rainfall, the concept has been criticised by some academics and flood planners. For one, rainfall and flood data generally go back only 100 years or so, so statistical tricks must be applied to determine what 500 and 1000-year events actually represent.

And with climate changing and precipitation events becoming more intense, what constitutes returning frequency is probably changing too.

Washington Post



Firefighters rescue two horses stranded in floodwaters from Tropical Storm Harvey in Beaumont, Texas.

HURRICANE HARVEY,
SOUTHERN U.S.A.
SEPTEMBER 2017

BLOCKAGES TO ACTION COME IN MANY FORMS



Queensland, 2011
(dailymail.co.uk)



Brisbane 2014



"my home went under, sorry, just passing through looking for a safer one"

ZONE 1(D) RURAL (Urban Investigation) – current in Gosford City

Objective

..to identify land currently used for rural purposes that may have the potential for urban purposes and prevent such land from being developed in a manner that may preclude future urban development.

(followed by descriptions of defined land uses and level of consent/prohibition)

Source: Gosford City Council, IDO 122 (1979 within months of being superseded without an equivalent zone)

ZONE X (Non-urban Investigation) – proposed by this paper

Objectives

... to identify land currently used for urban purposes that has the potential for loss or damage due to hazards including climate change impacts, to prevent such land from being further developed in any substantial way, and to investigate its return to non-urban and/or low intensity and/or resilient land uses

Development that does not require consent: Extensive agriculture, demolition, home business, home occupation

Development that needs consent: Animal establishments, dams, extractive industries, helipads, home industries, intensive agriculture, mines, plant nurseries, roads, subdivision, utility installations, veterinary hospitals

Would the following be consistent with the objective during transition, or not? dwelling house (yes), educational establishments (no), places of public worship (no), tourist and visitor accommodation (yes) (One test might be your professional comfort level after destruction of the structure, followed by media and political outcries with the inevitable "poor me, government should do something".)

Prohibited development: Any development not included in Item 1 or 2

Minimum lot size

According to location-specific mapping, but likely exceeding 2ha ranging up to 40 ha

Documents required with an application for consent

(the highest number, including emergency management plan)

Following the investigation period, the land would be rezoned again to a more conventional zoning such as Rural (which has an agricultural purpose) or Environment (which has conservation and scenic purposes).

LET'S NOT LOSE THE PLOT...



LET'S HOLD HANDS AND
HELP EACH OTHER OUT
DESPITE THE RISKS



AND LET'S BE COURAGEOUS WITH OUR SOLUTIONS FOR
SUSTAINABLE LAND USE IN THE FACE OF CLIMATE CHANGE