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ENHANCEMENTS OF THE AUSTRALIAN EXPOSURE INFORMATION PLATFORM: MAKING EXPOSURE MORE ACCESSIBLE

ABOUT THIS PROJECT

This research builds on the Australian Exposure Information Platform (AEIP), developed by Geoscience Australia and the Bushfire and Natural Hazards CRC as part of the *Natural hazard exposure information modelling framework* project. The AEIP was launched in August 2018 (see *Hazard Note 74*). This *Hazard Note* presents enhancements of the AEIP based on user feedback since its launch, including the development of a new Dynamic Exposure Dashboard.

AUTHORS

Con Charalambou, Jake Bradley and Mark Dunford, Geoscience Australia. Contact con.charalambou@ga.gov.au

SUMMARY

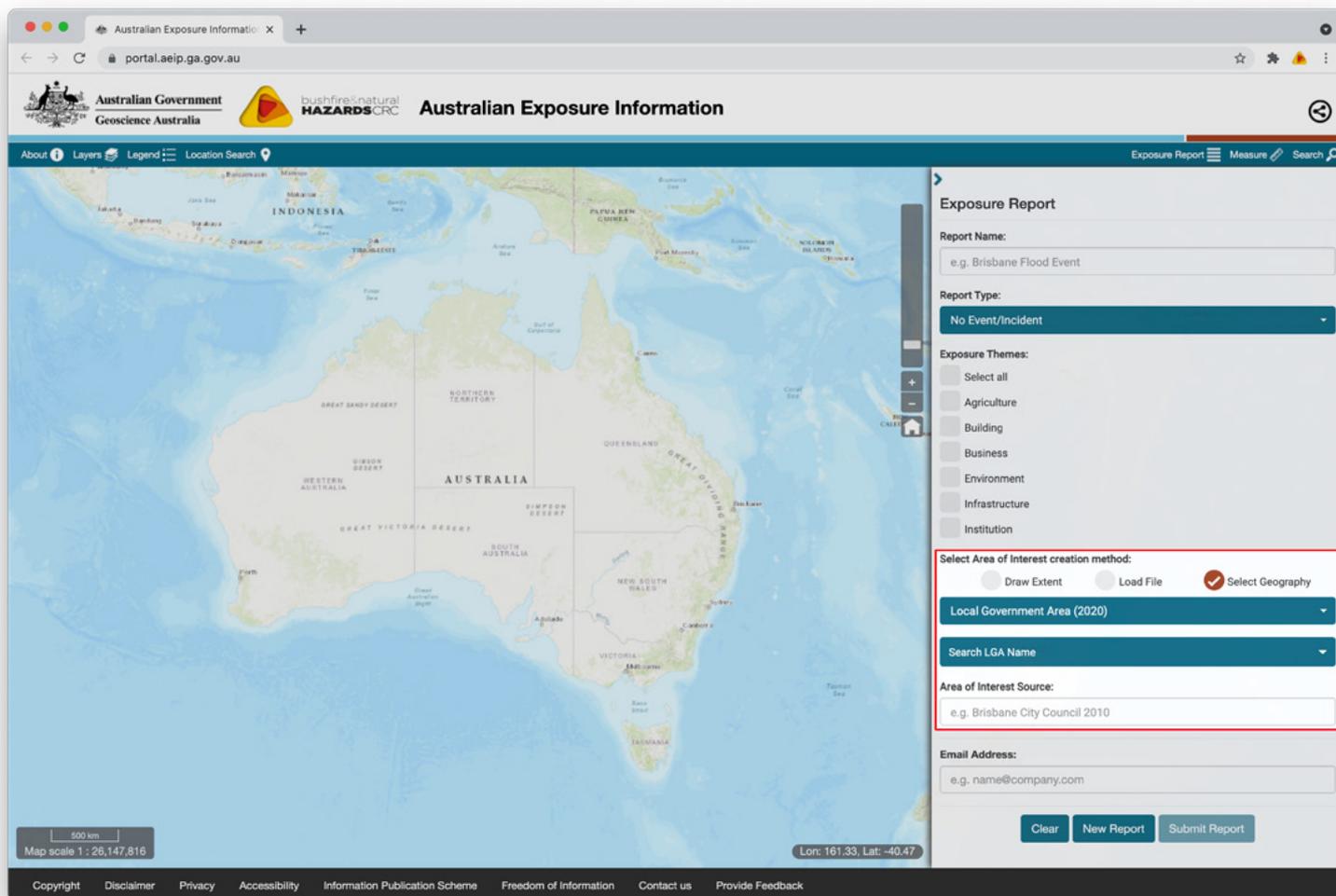
The AEIP is being used by the emergency management sector across Australia to understand what is potentially at risk of natural or human-induced hazards on communities. Through a user-defined area, the AEIP shows what is exposed to risk, such as a detailed statistical summary of the number of people, dwellings, other buildings and structures, businesses, agricultural and environmental assets. The AEIP has now been enhanced based on user feedback, with the research team improving the AEIP mapping and report-producing technology and developing a new tool - the Dynamic Exposure Dashboard - that complements the AEIP's functionality. While the AEIP can still be used to develop detailed reports of exposure, the Dashboard can be used during hazards, giving decision makers the ability to interact dynamically with nationally consistent exposure information for known areas at any time of day, without waiting for exposure reports to be sent through the AEIP. The Dashboard is accessible via the landing page of the AEIP at www.aeip.ga.gov.au.



▲ **Above:** THIS HAZARD NOTE PRESENTS ENHANCEMENTS OF THE AEIP BASED ON USER FEEDBACK SINCE ITS LAUNCH, INCLUDING THE DEVELOPMENT OF A NEW DYNAMIC EXPOSURE DASHBOARD (PICTURED).

The AEIP was developed with and for emergency management agencies, with the beta version initially launched in August 2018 at the AFAC18 powered by INTERSCHUTZ conference. The AEIP's success has been demonstrated through the hundreds of thousands of exposure reports produced

since its launch, including throughout the 2019-20 bushfire season. The Royal Commission into National Natural Disaster Arrangements report acknowledged that the AEIP should be maintained and improved, as a tool to support decision makers understand what is at risk to hazards across the country.



▲ **Figure 1:** THE AUSTRALIAN EXPOSURE INFORMATION PLATFORM HAS BEEN ENHANCED, INCLUDING THE ABILITY TO CHOOSE FROM A SELECTION OF COMMONLY USED EXISTING GEOGRAPHIES, SUCH AS LOCAL GOVERNMENT AREAS, AS OUTLINED HERE IN RED.

CONTEXT

In 2002, Geoscience Australia developed the NEXIS project, which provided nationally consistent [exposure](#) information that enabled users to understand elements at risk across Australia. Using this system, from 2013, the CRC and Geoscience Australia collaborated with the University of Melbourne and the University of Canberra to create a comprehensive [Natural Hazard Exposure Information Framework](#). The objective was to fully describe and categorise the exposure information elements within NEXIS, specifically to meet the needs of the emergency management sector.

To collect and present the information included in NEXIS and the Framework to the public, the project developed and launched the Australian Information Exposure Platform (AEIP) – an interface that allows easy access to this exposure information within a robust, reliable and operational online system. The information accessible through the AEIP includes statistics, spatial and survey data, such as demographics, building, business, agriculture,

institutions, infrastructure and environmental elements. For more information about the development and use of the AEIP, see *Hazard Note 74* (Further Reading, page 2).

Since its launch in 2018, the AEIP and underlying system have been widely used to understand exposure risk for disaster prevention, preparedness, response and recovery within agencies, and through government and industry. Hundreds of thousands of reports have been produced that help decision makers understand what is exposed to risk to natural hazards or emergencies in any given area.

Significantly, the AEIP was used to generate more than 8,300 reports during the 2019-20 bushfire season, by agencies such as NSW Rural Fire Service, who integrated the AEIP with their internal fire simulation technology to identify what would be at risk as fires spread that season. In 2020, more than 3.8 million exposure reports were prepared for the NSW Rural Fire Service to underpin the asset component of the Impact index, as part of the Australian Fire Danger Rating System (AFDRS) Program.

In October 2020, the Royal Commission into National Natural Disaster Arrangements final report acknowledged that the AEIP was an important national system that should be maintained and improved. All of this clearly reflects a need to continue providing a nationally consistent exposure information platform that is easily accessible to governments, industry and the public.

BUSHFIRE AND NATURAL HAZARDS CRC RESEARCH

Between 2018 and 2021, as the AEIP continued to be used by the emergency management sector, the researchers consulted with targeted key users – including emergency management agencies, as well as local, state and federal government representatives – to collect feedback about how to improve its capability. These consultations highlighted the need to make several key improvements that would meet the varying needs of users.

For example, Emergency Management Australia Recovery, Department of Fire and Emergency Services (Western Australia)

and Queensland Fire and Emergency Services expressed an interest in a mapping interface within a dynamic dashboard. This would allow the user to quickly and easily see the number of buildings, people and other exposure elements as they panned around, or drew areas, to understand the magnitude of risk.

In addition, users wanted to access existing commonly used geographies. The existing web mapping interface allowed users to draw or upload their own custom area of interest, however, users suggested expanding this to include a selection of commonly used geographies. The project has done this by:

1. improving the functionality of the AEIP's web mapping and reporting technology
2. using the AEIP's capabilities to create the new Dynamic Exposure Dashboard.

Improvements to the AEIP

The web mapping and reporting functionality of AEIP has been enhanced in several ways.

Firstly, when selecting an area on the AEIP, users can now choose from a list of commonly used existing geography boundaries (such as local government areas, postcodes or electoral boundaries) and then select the one that applies to them, rather than having to manually select or draw each area on the AEIP map. This is especially helpful for people without any manual web mapping experience, or for state or local emergency management agencies who require quick definition of exposure using geographies that are relevant to them, such as local government areas.

Secondly, users can now simultaneously create multiple exposure reports in a single request, via a batch processing function. Whereas before users could only produce one report at a time, they can now request up to five reports at once. The reports still provide the same level of detail as before, and are emailed to the user as separate documents at the same time.

Lastly, bug fixes and refinements have been made to help high-volume users, for example errors that were received when retrieving information for a very large area that involved complex mapping. The AEIP now includes additional error-removal and messaging to help users avoid these errors in future.

The new Dynamic Exposure Dashboard

The newly developed Dynamic Exposure Dashboard – currently in the beta development phase – expands on the way end-users want to interact with exposure information to meet their

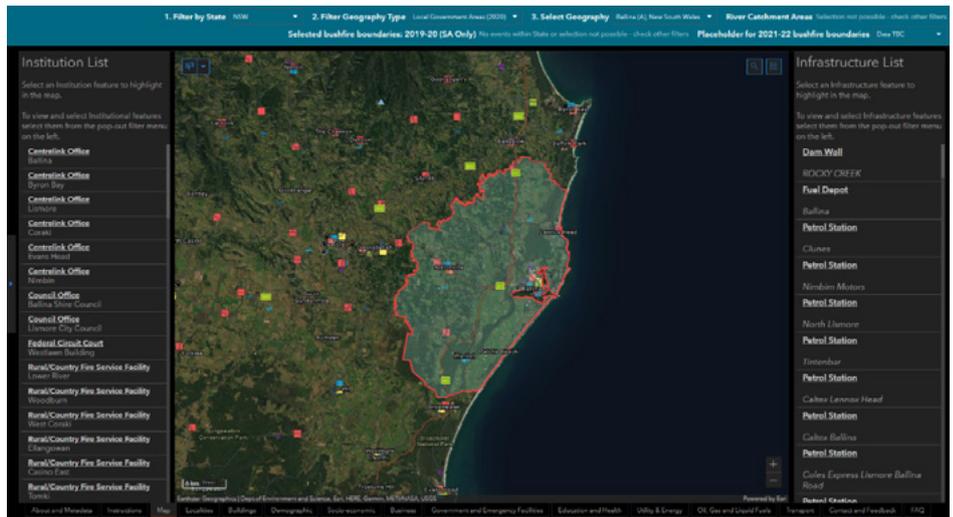


Figure 2: THE DYNAMIC EXPOSURE DASHBOARD, WITH THE BALLINA LOCAL GOVERNMENT AREA IN NSW HIGHLIGHTED ON THE DIGITAL MAP.

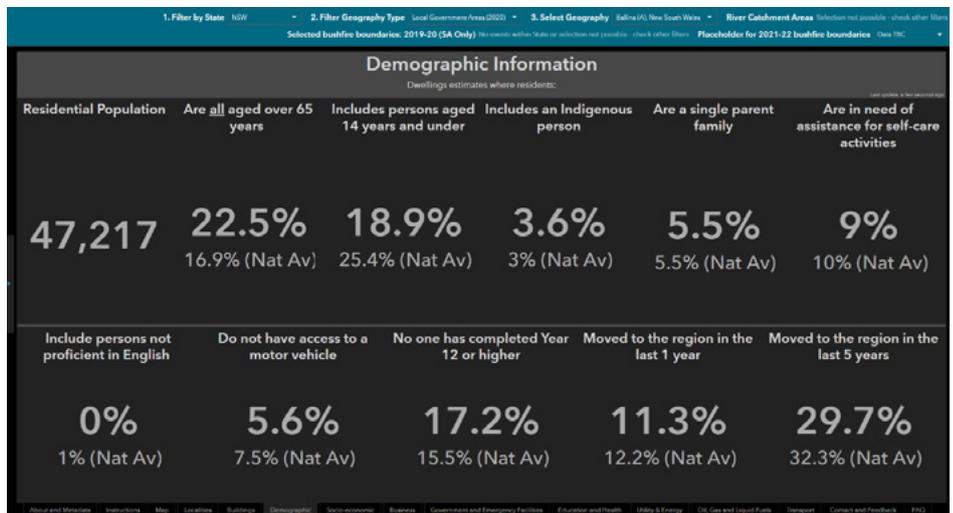


Figure 3: THE DYNAMIC EXPOSURE DASHBOARD INFORMATION PANEL, USING THE BALLINA LOCAL GOVERNMENT AREA IN NSW AS AN EXAMPLE AND SHOWING THE 'DEMOGRAPHIC INFORMATION' TAB, RELAYING DEMOGRAPHIC INFORMATION UPDATES IMMEDIATELY.

decision-making needs. The Dashboard was created in response to users' needs to view what is exposed quickly and easily, not only where an event is unfolding, but in areas adjacent to the event.

The Dashboard was created using ArcGIS Online software and accesses the same exposure information, except that it doesn't include agriculture and environment exposure details. It appears as a digital map of Australia, although users cannot draw their own area of interest as they can with the AEIP. Instead, users can narrow down to an existing area on the map (using existing geographies such as local government areas) and re-adjust the area as many times as necessary to see what is exposed in each spot as they pan, zoom and select new areas.

Once the user has selected an area of interest, they can access information relating to residential buildings, demographics,

socioeconomics, businesses, government and emergency facilities, education and health facilities, utilities and energy (including oil, gas, liquid and fuel), and transport. Whereas the AEIP provides this information in reports, the Dashboard does not create reports, instead presenting this information to users immediately (see Figures 2 and 3).

HOW CAN THIS RESEARCH BE USED?

Before AEIP, during an emergency, users had to wait for Geoscience Australia to manually create exposure reports. With AEIP, users can now quickly and easily generate their own customised exposure reports through either the web mapping application or by integrating the Application Programming Interface (API) into their internal systems.

The AEIP exposure reports remain critical for risk planning and predictive services.

However, the Dashboard takes this one step further, providing a quicker alternative to understand what is exposed in a more dynamic way. As an event evolves, users can pan and move their area of interest to help with what if scenarios, and be aware of what is ahead, in the path of an unfolding event. With these enhancements made to the AEIP and the development of the Dashboard, users can now access exposure information 24/7 that helps identify what is exposed any time and anywhere across Australia.

The Dashboard also requires less technical experience and provides exposure information dynamically, so it has potential to appeal to a broader audience. It fills an important gap in operations, displaying exposure information in a manner that allows for rapid assimilation into executive decision making.

Displaying the same exposure information two different ways enables decision makers to include exposure information in critical pre-planning, as well as on the fly during scenario assessments, anywhere across Australia. The interactive nature of the Dashboard equips decision makers with the ability to clearly understand what is exposed during a hazard, including surrounding areas, no matter the scenario, direction or spread.

END-USER STATEMENT

The Australian Fire Danger Rating System (AFDRS) Program aims to design, develop and implement a national system to better describe the overall fire danger and risk to the community, and assist preparedness and decision making of fire and land management agencies.

The initial focus of the AFDRS program was to improve the accuracy and utility of fire danger ratings based on fire behaviour modelling. Over the 2020/21 fire season the AFDRS ISI project team at NSW Rural Fire Service (RFS) tested the inclusion of selected variables from the AEIP in the impact index modelling for the AFDRS. AEIP data was provided at a 1.5km grid cells, (3.8 million) across Australia.

By gaining access to the AEIP data, NSW RFS will be able to develop models that support fire and land management in the fuel types and climates of each state and territory. Assuming the models meet end user requirements, Geoscience Australia, the AFDRS program, and NSW RFS will work together to explore how to best integrate NEXIS data and the AFDRS to provide a sustainable national product.

Meaghan Jenkins, Research Officer, NSW Rural Fire Service

FUTURE DIRECTIONS

Researchers have been engaging closely with local, state and federal governments to demonstrate the capabilities of the AEIP and the Dashboard. They have also worked with individual emergency management agencies to better align exposure requirements to their existing capabilities. The AEIP enhancements and Dashboard were demonstrated at the Emergency Management Spatial Information Network Australia National Meeting in June 2021 and profiled at the Australian and New Zealand Disaster and Emergency Management Conference in September 2021. They will be promoted at the AFAC21 powered by INTERSCHUTZ conference in October 2021.

With the Dashboard currently in beta format, researchers are now collecting feedback that will inform the future direction of both the AEIP and the Dashboard. Changes or additions to either service will be guided by user feedback and the availability of new data. In the case of the Dashboard, new functionality within the software may lead to the inclusion of the agriculture and environment exposure information later, and the ability for users to draw their own areas of interest as they can with the AEIP.

There is also the future possibility that both the AEIP and the Dashboard could be integrated into one application, where users could access both services in one spot.

A final ongoing focus is the regular update of the underlying NEXIS data, including quality and currency. Where possible, faster updates, through cloud-based automated workflows, will allow faster and more reliable data updates to flow from the source to end users via the AEIP.

FURTHER READING

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Hazard Notes are prepared from available research at the time of publication to encourage discussion and debate. The contents of *Hazard Notes* do not necessarily represent the views, policies, practises or positions of any of the individual agencies or organisations who are stakeholders of the Bushfire and Natural Hazards CRC.

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