Bridge fire Gippsland Vic

Key Topics:

- engineering [2]
- mitigation [3]
- multi-hazard [4]

Enhancing resilience of critical road infrastructure [5]

Major findings of the research include the identification of the levels of hazard exposure which could lead to failure of structures and the other parameters affecting failure. Further, methods of modelling road structures under different loading regimes were developed with case studies of typical structures. New design approaches for building back better have been proposed for floodway structures based on parametric analysis of typical types of floodways. A major utilisation outcome of the project is a resilient floodway design guide, published in collaboration with the Institution of Public Works Engineers Australia Queensland.

Project: detail Notabs

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Description

Bridges, culverts and floodways are lifeline road structures and part of road networks, which have a significant role in ensuring resilience of a community before, during and after a natural disaster. Historical data demonstrates that the failure of road structures can have catastrophic consequences on a community affected by disaster due to the impact on evacuation and post disaster recovery. The main objective of the project is to understand the vulnerability of critical road structures: bridges, culverts and floodways under natural hazards of flood, bush fire and earthquakes. Once the level of vulnerability is established, the evaluation of importance of the structures for prioritization for hardening is important for decision making by road authorities.

The project addressed the above gap in knowledge through a comprehensive research program undertaken in collaboration with three research partners and six end user partners. Major findings of the research include identification of the levels of hazard exposure which could lead to failure of structures and the other parameters affecting failure. Further, methods of modeling road structures under different loading regimes has been developed with case studies of typical structures. New design approaches for building back better have been proposed for floodway structures based on parametric analysis of typical types of floodways.

Read the final report here. [44]

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17 MAY 2016

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[57]

17 AUG 2015

Symposium talks road infrastructure

ENGINEERING, EXPOSURE

[58]

25 AUG 2014

Project team meets on Lockyer Valley case study

FLOOD, INFRASTRUCTURE

[59]

Publications

Year	Type	Citation
2021	Journal Article	Dissanayake, A. [38], Venkatesana, S. [60], Roberta, D. [61] & Setunge, S. [6] **Damage integrated performance modelling of steel plate girders at elevated temperature** [62]. *Journal of Constructio*
2021	Report	Setunge, S. [6] *et al.* **Enhancing resilience of critical road structures: bridges, culvers and floodways under natural hazards – final project report** [44]. (Bushfire and Natural Hazards CRC, 2021
2020	Journal Article	Greene, I. [70], Lokuge, W. [18] & Karunasena, W. [71] **Structural design of floodways under extreme flood loading** [72]. *International Journal of Disaster Resilience in the Built Environment* **11,** (202
2020	Journal Article	Pathiranage, T. [77] & Lokuge, W. [18] **Vulnerability assessment of bridges subjected to extreme cyclonic events** [78]. *Natural Hazards* (2020). doi:https://doi.org/10.1007/s11069-020-03931-y DOI
2020	Journal Article	Gajanayake, A. [39], Zhang, G. [83], Khan, T. [84] & Mohseni, H. [12] **Post-disaster Impact Assessment of Road Infrastructure: A State of the Art Review** [85]. *Natural Hazards Review* **21,** (2020). D
2019	Journal Article	Lokuge, W. [18], Wilson, M. [90], Tran, H. [91] & Setunge, S. [6] **Predicting the probability of failure of timber bridges using fault tree analysis** [92]. *Structure and Infrastructure Engineering* **15,** 783
2019	Report	Setunge, S. [6] *et al.* **Enhancing resilience of critical road infrastructure annual report 2018-2019** [97]. (Bushfire and Natural Hazards CRC, 2019). Google Scholar [98] BibTeX [99] EndNote XML [1
2019	Report	Setunge, S. [6] *et al.* **Analysis of design standards and applied loads on road structures under extreme events** [101]. (Bushfire and Natural Hazards CRC, 2019). Google Scholar [102] BibTeX [10
2019	Report	Setunge, S. [6] *et al.* **Enhancing resilience of critical road infrastructure: bridges, culverts and flood-ways under natural hazards Annual Report 2017-2018** [105]. (Bushfire and Natural Hazards
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2018	Journal Article	Nasim, M. [42], Setunge, S. [6], Zhou, S. [115] & Mohseni, H. [12] **An investigation into the water flow pressure distribution on the bridge pier under flood loading** [116]. *Structure and Infrastructi*
2018	Journal Article	Miramini, S. [121] *et al.* **Health Assessment of a Pedestrian Bridge Deck using Ground Penetrating Radar** [122]. *Electronic Journal of Structural Engineering* **18,** 30-37 (2018). Google Scholar [123]
2018	Journal Article	Maizuar, M. [126] *et al.* **Dynamic Behavior of Indonesian Bridges using Interferometric Radar Technology** [127]. *Electronic Journal of Structural Engineering* **18,** 23-29 (2018). Google Scholar [128
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2015	Conference Paper	Rumsewicz, M. [176] **Research proceedings from the 2015 Bushfire and Natural Hazards CRC & AFAC conference** [177]. *Bushfire and Natural Hazards CRC & AFAC annual conference 2015* (Bus
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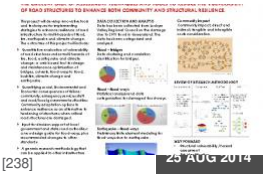

[238]

Enhancing resilience of critical road infrastructure: Bridges, culverts and flood-ways under natural hazards

[238]

Road networks and critical road structures such as bridges, culverts and flood ways have a vital role before...

[239] 18 AUG 2015

Capturing the Impact of the Failure of Critical Road Structures on the Community

[239]

ENGINEERING [2], MITIGATION [3]

How does the performance of critical road structures such as bridges, culverts and floodways affect the...

[240] 18 AUG 2015

Failure Mechanism of a Typical Girder Bridge in Australia due to Seismic Loads

[240]

EARTHQUAKE [222], ENGINEERING [2]

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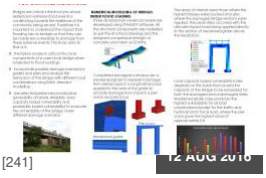

[241] 12 AUG 2016

Vulnerability evaluation for bridges subjected to flood loadings

[241]

INFRASTRUCTURE [209], RESILIENCE [213]

It is important to assess the vulnerability of bridges in an extreme flood event as these critical...

[242] 30 JUN 2017

Evaluating the performance of flood loadings on structural performance of a floodway

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ENGINEERING [2], FLOOD [208]

It is important to investigate the vulnerability of floodways in an extreme flood event as these critical...

[243] 30 JUN 2017

Collapse risk assessment of strengthened concrete bridge pier under flood loads

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A fluid structure interaction using particle finite element method for the full scale reinforced concrete...

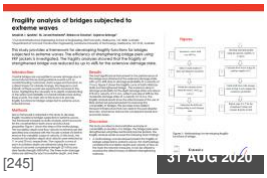
[244] 27 AUG 2019

Numerical Investigation into the Behaviour of Floodways During Extreme Flood Events

[244]

ENGINEERING [2], FLOOD [208]

Australian floodway design guidelines exclusively consider hydraulic principles. Comprehensive analysis of...



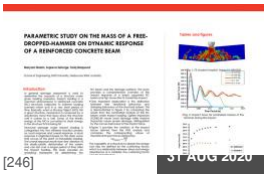
[245] 31 AUG 2020

Fragility analysis of bridges subjected to extreme waves

[245]

INFRASTRUCTURE [209], RESILIENCE [213]

Key findings: Fragility functions development frameworkis introduced for bridgessubjected to extreme wave-...



[246]

Parametric study on the mass of a free-dropped-hammer on dynamic response of a reinforced concrete beam

[246]

INFRASTRUCTURE [209], RESILIENCE [213]

Key findings: The cushioning factor is a parameter that can show the structural response and have a...

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https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1539 [92] https://www.bnhcrc.com.au/publications/biblio/bnh-6040 [93] http://dx.doi.org/10.1080/15732479.2019.1569069 [94] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Predicting%2Bthe%2Bprobability%2Bof%2Bfailure%2Bof%2Btimber%2Bbridges%2Busing%2Bfault%2Btree%2Banalysis%22&as_sauthors=Lokuge&as_occt=any&as_epq=&
[95] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/6040 [96] https://www.bnhcrc.com.au/publications/biblio/export/xml/6040 [97] https://www.bnhcrc.com.au/publications/biblio/bnh-6126 [98]
http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22Enhancing%2Bresilience%2Bof%2Bcritical%2Broad%2Binfrastructure%2Bannual%2Breport%2B2018-
2019%22&as_sauthors=Setunge&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&as_yhi=&as_sdtAAP=1&as_sdtp=1 [99]
https://www.bnhcrc.com.au/publications/biblio/export/bibtex/6126 [100] https://www.bnhcrc.com.au/publications/biblio/export/xml/6126 [101] https://www.bnhcrc.com.au/publications/biblio/bnh-5620 [102]
http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Analysis%2Bof%2Bdesign%2Bstandards%2Band%2Bapplied%2Bloads%2Bon%2Broad%2Bstructures%2Bunder%2Bextreme%2Bevents%22&as_sauthors=Setunge&as_occt=a
[103] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/5620 [104] https://www.bnhcrc.com.au/publications/biblio/export/xml/5620 [105] https://www.bnhcrc.com.au/publications/biblio/bnh-5435 [106]
http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22Enhancing%2Bresilience%2Bof%2Bcritical%2Broad%2Binfrastructure%3A%2Bbridges%2C%2Bculverts%2Band%2Bflood-
ways%2Bunder%2Bnatural%2Bhazards%2BAnnual%2BReport%2B2017-
2018%22&as_sauthors=Setunge&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&as_yhi=&as_sdtAAP=1&as_sdtp=1 [107]
https://www.bnhcrc.com.au/publications/biblio/export/bibtex/5435 [108] https://www.bnhcrc.com.au/publications/biblio/export/xml/5435 [109] https://www.bnhcrc.com.au/people/buddhiwahalathantri [110]
https://www.bnhcrc.com.au/publications/biblio/bnh-6057 [111] http://dx.doi.org/10.1108/IJDRBE-09-2017-0051 [112] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Quantitative%2Bassessment%2Bof%2Bflood%2Bdischarges%2Band%2Bfloodway%2Bfailures%2Bthrough%2Bcross-
cultivation%2Bof%2Badvancement%2Bin%2Bknowledge%2Band%2Btraditional%2Bpractices%22&as_sauthors=Wahalathantri&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=
[113] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/6057 [114] https://www.bnhcrc.com.au/publications/biblio/export/xml/6057 [115] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1710 [116]
https://www.bnhcrc.com.au/publications/biblio/bnh-6048 [117] http://dx.doi.org/10.1080/15732479.2018.1545792 [118] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22An%2Binvestigation%2Binto%2Bthe%2Bwater%2Bflow%2Bpressure%2Bdistribution%2Bon%2Bthe%2Bbridge%2Bpier%2Bunder%2Bflood%2Bloading%22&as_sauthors=Nasim&amp
[119] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/6048 [120] https://www.bnhcrc.com.au/publications/biblio/export/xml/6048 [121] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1509 [122]
https://www.bnhcrc.com.au/publications/biblio/bnh-6044 [123] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Health%2BAssessment%2Bof%2Ba%2BPedestrian%2BBridge%2BDeck%2Busing%2BGround%2BPenetrating%2BRadar%22&as_sauthors=Miramini&as_occt=any&as_epq
[124] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/6044 [125] https://www.bnhcrc.com.au/publications/biblio/export/xml/6044 [126] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1506 [127]
https://www.bnhcrc.com.au/publications/biblio/bnh-6042 [128] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Dynamic%2BBehavior%2Bof%2BIndonesian%2BBridges%2Busing%2BInterferometric%2BRadar%2BTechnology%22&as_sauthors=Maizuar&as_occt=any&as_epq=&a
[129] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/6042 [130] https://www.bnhcrc.com.au/publications/biblio/export/xml/6042 [131] https://www.bnhcrc.com.au/publications/biblio/bnh-5216 [132]
http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Failure%2Bmechanisms%2Bof%2Bbridge%2Bstructures%2Bunder%2Bnatural%2Bhazards%22&as_sauthors=Setunge&as_occt=any&as_epq=&as_oq=&as_eq=&
[133] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/5216 [134] https://www.bnhcrc.com.au/publications/biblio/export/xml/5216 [135] https://www.bnhcrc.com.au/publications/biblio/bnh-6643 [136]
http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Floodway%2Binspection%2Band%2Bmaintenance%2Bframework%22&as_sauthors=Setunge&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&am
[137] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/6643 [138] https://www.bnhcrc.com.au/publications/biblio/export/xml/6643 [139] https://www.bnhcrc.com.au/people/lihaizhang [140]
https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1508 [141] https://www.bnhcrc.com.au/publications/biblio/bnh-5164 [142] http://dx.doi.org/10.1002/stc.1985 [143] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Detecting%2Bstructural%2Bdamage%2Bto%2Bbridge%2Bgirders%2Busing%2Bradar%2Binterferometry%2Band%2Bcomputational%2Bmodelling%22&as_sauthors=Maizuar&as
[144] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/5164 [145] https://www.bnhcrc.com.au/publications/biblio/export/xml/5164 [146] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1113 [147]
https://www.bnhcrc.com.au/publications/biblio/bnh-5163 [148] http://dx.doi.org/10.1142/S175882511750003X [149] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Monitoring%2Bthe%2Bdynamic%2Bbehaviour%2Bof%2Bthe%2BMerlynston%2BCreek%2BBridge%2Busing%2Binterferometric%2Bradar%2Bsensors%2Band%2Bfinite%2Belement%2Bm
[150] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/5163 [151] https://www.bnhcrc.com.au/publications/biblio/export/xml/5163 [152] https://www.bnhcrc.com.au/publications/biblio/bnh-5191 [153]
http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Predicting%2Bthe%2Bfailure%2Bof%2Btimber%2Bbridges%2Bby%2Busing%2Bcurrent%2Binspection%2Breports%22&as_sauthors=Lokuge&as_occt=any&as_epq=&a
[154] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/5191 [155] https://www.bnhcrc.com.au/publications/biblio/export/xml/5191 [156] https://www.bnhcrc.com.au/people/nherath [157]
https://www.bnhcrc.com.au/publications/biblio/bnh-5165 [158] http://dx.doi.org/10.1007/s10518-016-0058-6 [159] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22A%2Bprobabilistic%2Bstudy%2Bof%2Bground%2Bmotion%2Bsimulation%2Bfor%2BBangkok%2Bsoil%22&as_sauthors=Herath&as_occt=any&as_epq=&as_oq=&amp
[160] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/5165 [161] https://www.bnhcrc.com.au/publications/biblio/export/xml/5165 [162] https://www.bnhcrc.com.au/publications/biblio/bnh-4386 [163]
http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22Enhancing%2Bthe%2Bresilience%2Bof%2Bcritical%2Broad%2Binfrastructure%3A%2Bannual%2Bproject%2Breport%2B2016-
17%22&as_sauthors=Setunge&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&as_yhi=&as_sdtAAP=1&as_sdtp=1 [164]
https://www.bnhcrc.com.au/publications/biblio/export/bibtex/4386 [165] https://www.bnhcrc.com.au/publications/biblio/export/xml/4386 [166] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1447 [167]
https://www.bnhcrc.com.au/publications/biblio/bnh-5073 [168] http://dx.doi.org/10.1108/BEPAM-01-2016-0001 [169] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Fault%2Btree%2Banalysis%2Bmethod%2Bfor%2Bdeterioration%2Bof%2Btimber%2Bbridges%2Busing%2Ban%2BAustralian%2Bcase%2Bstudy%22&as_sauthors=Lokuge&as_c
[170] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/5073 [171] https://www.bnhcrc.com.au/publications/biblio/export/xml/5073 [172] https://www.bnhcrc.com.au/publications/biblio/bnh-3116 [173]
http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Enhancing%2Bresilience%2Bof%2Bcritical%2Broad%2Binfrastructure%3A%2Bbridges%2C%2Bculverts%2Band%2Bflood%E2%80%90ways%2Bunder%2Bnatural%2Bhazards%3A%2Ban
2016%22&as_sauthors=Setunge&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&as_yhi=&as_sdtAAP=1&as_sdtp=1 [174]
https://www.bnhcrc.com.au/publications/biblio/export/bibtex/3116 [175] https://www.bnhcrc.com.au/publications/biblio/export/xml/3116 [176] https://www.bnhcrc.com.au/people/michael-rumsewicz [177]
https://www.bnhcrc.com.au/publications/researchproceedings2015 [178] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Research%2Bproceedings%2Bfrom%2Bthe%2B2015%2BBushfire%2Band%2BNatural%2BHazards%2BCRC%2B%26%2BAFAC%2Bconference%22&as_sauthors=Rumsewicz&amp
[179] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/2169 [180] https://www.bnhcrc.com.au/publications/biblio/export/xml/2169 [181] https://www.bnhcrc.com.au/publications/biblio/bnh-1950 [182]
http://dx.doi.org/10.1061/(ASCE)NH.1527-6996.0000194 [183] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Vulnerability%2Bof%2BFloodways%2Bunder%2BExtreme%2BFlood%2BEvents%22&as_sauthors=Wahalathantri&as_occt=any&as_epq=&as_oq=&as_eq=&
[184] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/1950 [185] https://www.bnhcrc.com.au/publications/biblio/export/xml/1950 [186] https://www.bnhcrc.com.au/publications/biblio/bnh-2410 [187]
http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Enhancing%2Bresilience%2Bof%2Bcritical%2Broad%2Binfrastructure%3A%2Bbridges%2C%2Bculverts%2Band%2Bfloodways%2Bunder%2Bnatural%2Bhazards%2B%22&as_sauthc
[188] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/2410 [189] https://www.bnhcrc.com.au/publications/biblio/export/xml/2410 [190] https://www.bnhcrc.com.au/publications/biblio/bnh-1549 [191]
http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Enhancing%2BResilience%2Bof%2BCritical%2BRoad%2BInfrastructure%2BAnnual%2BReport%2B2014%22&as_sauthors=Setunge&as_occt=any&as_epq=&as_oq=&
[192] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/1549 [193] https://www.bnhcrc.com.au/publications/biblio/export/xml/1549 [194] https://www.bnhcrc.com.au/publications/biblio/bnh-2351 [195]
http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Enhancing%2Bresilience%2Bof%2Bcritical%2Broad%2Binfrastructure%3A%2Bbridges%2C%2Bculverts%2Band%2Bfloodways%2Bunder%2Bnatural%2Bhazards%3A%2BAnnual%2Bproj
2015%22&as_sauthors=Setunge&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&as_yhi=&as_sdtAAP=1&as_sdtp=1 [196]
https://www.bnhcrc.com.au/publications/biblio/export/bibtex/2351 [197] https://www.bnhcrc.com.au/publications/biblio/export/xml/2351 [198] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1121 [199]
https://www.bnhcrc.com.au/publications/biblio/bnh-3471 [200] http://dx.doi.org/10.1016/S2212-5671(14)01014-4 [201] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Decision%2Bmaking%2Bon%2Btransport%2Bnetwork%2Bplanning%2Band%2Bthe%2Bimpact%2Bon%2Bcommunity%2C%2Beconomy%2Band%2Bthe%2Benvironment%22&as_sau
[202] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/3471 [203] https://www.bnhcrc.com.au/publications/biblio/export/xml/3471 [204] https://www.bnhcrc.com.au/node/247/generate-pdf?
order=field_date_release&sort=asc [205] https://www.bnhcrc.com.au/node/247/generate-pdf?order=title&sort=asc [206] https://www.bnhcrc.com.au/resources/presentation-slideshow/423 [207]
https://www.bnhcrc.com.au/file/515/download?token=5gFRQ5rM [208] https://www.bnhcrc.com.au/research/topics/flood [209] https://www.bnhcrc.com.au/research/topics/infrastructure [210]
https://www.bnhcrc.com.au/resources/presentation-slideshow/1491 [211] https://www.bnhcrc.com.au/file/4808/download?token=FlwigjDZ [212] https://www.bnhcrc.com.au/research/topics/environments [213]
https://www.bnhcrc.com.au/research/topics/resilience [214] https://www.bnhcrc.com.au/resources/presentation-slideshow/2184 [215] https://www.bnhcrc.com.au/file/5715/download?token=dMj0g_Oq [216]
https://www.bnhcrc.com.au/resources/presentation-audio-video/2699 [217] https://www.bnhcrc.com.au/file/6191/download?token=ebl7xwk1 [218] https://www.bnhcrc.com.au/resources/presentation-slideshow/3155 [219]
https://www.bnhcrc.com.au/file/6640/download?token=lxTSee76 [220] https://www.bnhcrc.com.au/hazardnotes/26 [221] https://www.bnhcrc.com.au/file/7119/download?token=kBir6kyn [222]
https://www.bnhcrc.com.au/research/topics/earthquake [223] https://www.bnhcrc.com.au/resources/presentation-slideshow/3750 [224] https://www.bnhcrc.com.au/file/7562/download?token=WKXZ_P1k [225]
https://www.bnhcrc.com.au/resources/presentation-slideshow/4170 [226] https://www.bnhcrc.com.au/file/7947/download?token=eo8mH88h [227] https://www.bnhcrc.com.au/resources/presentation-slideshow/4176 [228]
https://www.bnhcrc.com.au/file/7953/download?token=_qTdznJ2 [229] https://www.bnhcrc.com.au/resources/presentation-slideshow/5126 [230] https://www.bnhcrc.com.au/file/9203/download?token=AT3zJ-At [231]
https://www.bnhcrc.com.au/resources/presentation-slideshow/5707 [232] https://www.bnhcrc.com.au/file/10143/download?token=B3EqnRF_ [233] https://www.bnhcrc.com.au/research/topics/economics [234]
https://www.bnhcrc.com.au/research/topics/planning [235] https://www.bnhcrc.com.au/research/topics/policy [236] https://www.bnhcrc.com.au/resources/presentation-slideshow/5760 [237]
https://www.bnhcrc.com.au/file/10205/download?token=yskSmYAO [238] https://www.bnhcrc.com.au/resources/poster/1222 [239] https://www.bnhcrc.com.au/resources/poster/2012 [240]
https://www.bnhcrc.com.au/resources/poster/2031 [241] https://www.bnhcrc.com.au/resources/poster/2854 [242] https://www.bnhcrc.com.au/resources/poster/3721 [243] https://www.bnhcrc.com.au/resources/poster/3722 [244]
https://www.bnhcrc.com.au/resources/poster/5919 [245] https://www.bnhcrc.com.au/resources/poster/7731 [246] https://www.bnhcrc.com.au/resources/poster/7752 [247] https://www.bnhcrc.com.au/research/resilience-hazards/4674
[248] https://www.bnhcrc.com.au/research/cluster/built-environment [249] https://www.bnhcrc.com.au/research/earthquakerisk [250] https://www.bnhcrc.com.au/organisations/ua [251]
https://www.bnhcrc.com.au/research/floodpronebuildings [252] https://www.bnhcrc.com.au/research/housingresilience [253] https://www.bnhcrc.com.au/organisations/jcu [254] https://www.bnhcrc.com.au/research/hazardexposure