AUSTRALIAN RESEARCH COUNCIL
Discovery Projects
Application for Funding Commencing in 2025

DP

Project ID: DP250100794

First Investigator: Dr Kerry Nice

Admin Org: The University of Melbourne

Total number of sheets contained in this Application: 64

Information on this form and its attachments is collected in order to make recommendations to the Minister on the allocation of financial assistance under the Australian Research Council Act 2001 and for due diligence and post award reporting. The information collected may be passed to third parties, including being sent to overseas parties for assessment purposes. It may also be passed to any other Australian Government Department or Agency and noting information contained in this application can be disclosed without consent where authorised or required by law.

Part A - Administrative Summary (DP250100794)

A1. Application Title

(Provide a short title (up to 75 characters, approximately 10 words).

Note – The answer to this question is auto-populated from the EOI application and is a locked field.)

Mapping climate (in)justice in Australian cities

A2. Person Participant Summary

(Add all named participants who will be participating in the application. These will include personnel who may be Chief Investigators (CIs) or Partner Investigators (PIs). Refer to the Grant Guidelines and the Instructions to Applicants for personnel eligibility requirements.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Number	Name	Participant Type	Current Organisation(s)	Relevant Organisation
1	Dr Kerry Nice	Chief Investigator	The University of Melbourne	The University of Melbourne
2	Dr Negin Nazarian	Chief Investigator	The University of New South Wales	The University of New South Wales
3	A/Prof Fiona Johnson	Chief Investigator	The University of New South Wales	The University of New South Wales
4	Prof Jason Byrne	Chief Investigator	University of Tasmania	University of Tasmania

A3. Organisation Participant Summary

(Add all organisations participating in this application.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Number	Name	Participant Type
1	The University of Melbourne	Administering Organisation
2	The University of New South Wales	Other Eligible Organisation
3	University of Tasmania	Other Eligible Organisation

A4. Application Summary

(Provide an Application Summary, focusing on the aims, significance, expected outcomes and benefits of this project. Write the Application Summary simply, clearly and in plain English. If the application is successful, the Application Summary, along with the National Interest Test, will be used to give the general community an understanding of the research. Avoid the use of acronyms, quotation marks and upper-case characters. Refer to the Instructions to Applicants for further information. (Up to 750 characters, approximately 100 words).

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Urbanisation exacerbates climate hazards, particularly excess heat and flooding. This magnifies climate injustice in cities, where high-risk areas coincide with vulnerable populations lacking adequate resources to adapt. There are, however, critical gaps in accurate, multi-hazard mapping of climate risks and injustice in Australian cities. This project will address this gap by precisely mapping hazards and vulnerabilities in urban areas using advanced methods, including novel datasets and machine learning. By understanding the spatial dynamics, it seeks to reveal the impact of urban-induced climate hazards and support equitable adaptation strategies under present-day conditions as well as future urbanisation and climate scenarios.

A5. National Interest Test Statement

(See the Instructions to Applicants for addressing the National Interest Test and and 'How do I write a National Interest Test statement' available on the ARC website (up to 1500 characters, approximately 200 words).

Note - This question was not included in the EOI application and must be answered.)

Heat and flooding are Australia's deadliest and costliest climate hazards. Both are exacerbated by built environments, creating significant risks to city dwellers and infrastructure. These issues are particularly pressing as more than 90% of Australians live in towns and cities.

Our current knowledge gaps, however, limit the accurate mapping of these hazards under present-day and future climate conditions and urban growth scenarios. This hampers effective planning for the future. By mapping existing and future climate risks to where vulnerable people live, we can reduce climate injustice and improve quality of life. This project aims to develop, test, and evaluate new methods of mapping how urban climate hazards affect vulnerable groups. Bringing together advanced techniques, new data, and machine learning, and combining these with community and stakeholder policy co-design, the project will help urban planners, city managers, and policymakers to better understand where and how climate injustices occur. This will support improved planning processes and reduce the economic and social costs associated with flooding and heat on community health, essential services, and infrastructure.

Research outcomes will be shared through traditional academic channels (publications, reports, and data sharing), policy guidance for decision-makers, and implementable solutions for the community.

Part B - Participant Details including ROPE (Dr Kerry Nice)

B1. Personal Details

(Note: The answers to Questions B1 - B14 and B16 - B17 are auto-populated from the EOI application and are locked fields. For Question B1 additional fields of information regarding material personal interests were not included in the EOI application form and must be answered. This information will be automatically populated from your RMS profile. To update Personal Details, click the 'Manage Personal Details' link below. Note this will open a new browser tab. When returning to the form ensure you 'Refresh' the page to capture the changes made to your profile.

Note: The date of birth, country of birth, Indigenous status and material personal interests sections will not appear in the PDF version of the form and will not be visible to assessors. Data may be shared with other Commonwealth Entities.

All information contained in Part B is visible to the Administering Organisation on this application.)

Participation Type

Chief Investigator

Title

Dr

First Name

Kerry

Middle Name

Alan

Family Name

Nice

B2. Qualifications

(Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Conferral Date	AQF Level	Degree/Award Title	Discipline/Field	Awarding Organisation	Country of Award
08/03/2017	Doctoral Degree	Doctor of Philosophy	Science	Monash University	Australia
13/10/2011	Masters Degree	Master of Enviroment and Sustainability	Geography	Monash University	Australia
31/05/1990	Bachelor Degree	Bachelor degree	English and Film Studies	University of Colorado at Boulder	United States of America

B3. Research Load (non-ARC Grants and Research)

(Provide details of research funding from non-ARC sources (in Australia and overseas). For research funding from non-ARC sources, list all projects/applications/awards/fellowships awarded or requests submitted involving that participant for funding for the years 2024 to 2030 inclusive.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Uploaded PDF file follows on next page.

Description (All named investigators on any application or grant/fellowship in which the candidate is involved, project title, source of support, scheme and round)	**Same Research Area** (Yes/No)	**Support Status** (Requested/Current/Past)	**Application Project ID** (for NHMRC applications only)	**2024** $'000	**2025** $'000	**2026** $'000	**2027** $'000	**2028** $'000	**2029** $'000	**2030** $'000
2023, GC22011 Hort Innovation: Re-imagining streets with green infrastructure, Professor Sarah Bell (UoM), Dr Kerry Nice (UoM), Dr Nano Langenheim (UoM), Dr Marie Dade (UoM), Thami Croeser (RMIT), Dom Blackham (Mosaic Insights)	Yes	C		783	783					
2023, UoM – CNRS Graduate Research Projects Scheme 2023-2024, Climate benefits and tradeoffs of urban greening: evaluation and impact of management practices at parkscape and streetscape, UoM: Prof. Stephen Livesley, Dr. Kerry Nice, Dr. Paul Cheung, CNRS: Pr Pierre-Emmanuel Bournet, Dr. Sophie Herpin, Pr Patrice Cannavo	Yes	R			30	30	30			
2023, NHMRC 2023 Global Alliance for Chronic Diseases. Air pollution and non-communicable disease: City-wide implementation to reduce transport emissions. Prof. Mark Stevenson (UoM), A/Prof. Cuong Viet Pham (Hanoi University of Public Health), A/Prof. Jason Thompson (UoM), Dr. Dang Ngoc Tran (University of Medicine and Pharmacy at Ho Chi Minh City), Dr. Kerry Nice. (UoM), Dr. Thanh Ho (UoM), Dr. Nhung Thi Trang Nguyen (Hanoi University of Public Health).	Yes	R			513	513	513			

B4. What will your time commitment be to research activities related to this project?

(Enter your time commitment to this project as a Full-Time Equivalent (FTE). Note that a FTE of 1.0 represents a full-time commitment (i.e. 5 days per week).

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

0.3

B5. Employment Details as at grant commencement date

(Confirm your employment status at all organisations that you will be associated with as at the grant commencement date. Enter the relevant appointment type and Full-Time Equivalent (FTE) for each organisation.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Org name	Is this an Eligible Organisation?	Please choose your appointment type for this organisation.	Please enter your FTE for this Organisation
The University of Melbourne	Yes	Employee	1

B6. Relevant Organisation for this application as at grant commencement date for this project

(Enter the Organisation that is relevant to your participation on this application, and that you will be associated with as of 1 January 2025. The 'relevant organisation' is the primary organisation that will be supporting your involvement in this project if it is funded. Note that the Organisation must be listed in B5 for this question to validate.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Relevant Organisation

The University of Melbourne

B7. Currently held ARC Projects

(This information is automatically populated from RMS. If you have any concerns with the information recorded here, please contact your Administering Organisation's Research Office.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Identifier	Investigators	Admin Organisation	Project Title	Funding	End Date	Final Report Due Date	Final Report Status
DP210102089	A/Prof Ben Beck ; Prof Christopher Pettit ; A/Prof Meead Saberi ; Dr Simone Zarpelon Leao ; Dr Kerry Nice ; Prof Tarek Sayed ; Prof Trisalyn Nelson ; A/Prof Meghan Winters	Monash University	Sustainable mobility: city-wide exposure modelling to advance bicycling	$422,000	10/08/2024	10/08/2025	Draft

B8. Research Opportunity and Performance Evidence (ROPE) - Current and previous appointment(s) / position(s) - during the past 10 years

(To update any details in this table, click on the 'Manage Employment Details' link in this question. Note this will open in a new browser tab. 'Refresh' the application page when returning to the form to capture changes made to the participant's profile. This data is automatically populated from the participant's RMS profile.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Description	Department	Contract Type	Employment Type	Start Date	End Date	Organisation
Research Fellow	Faculty of Architecture, Building and Planning	Permanent	Full Time	01/01/2022		The University of Melbourne
Research Fellow	Faculty of Architecture, Building and Planning	Contract	Full Time	14/11/2016	31/12/2021	The University of Melbourne
Research Fellow	School of Earth Atmosphere and Environment	Contract	Part Time	01/04/2019	31/12/2020	Monash University
Research Fellow	School of Earth Atmosphere and Environment	Contract	Part Time	14/06/2017	31/12/2018	Monash University
Research Assistant	School of Earth, Atmosphere and Environment	Contract	Part Time	01/06/2012	01/10/2016	Monash University
Doctoral Researcher	School of Earth, Atmosphere and Environment	Contract	Full Time	01/04/2012	01/08/2016	Monash University
Practical session teaching/lecturing	School of Earth, Atmosphere and Environment	Contract	Part Time	01/08/2013	01/11/2015	Monash University

B9. Research Opportunity and Performance Evidence (ROPE) - Career Interruptions

(Note - The following fields will not be visible to assessors: From when; To when; FTE of career interruption and Interruption category. RMS will automatically calculate the total career interruption in the field 'Total Period of Career Interruptions which will be visible to assessors.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)
Has the participant experienced a significant interruption that has impacted on research opportunity?

No

Total Period of Career Interruptions

B10. Research Opportunity and Performance Evidence (ROPE) - Career Highlights

(Include up to 10 career highlights including a short context statement for each highlight, where relevant (up to 1,500 characters, approximately 200 words).

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

1. PhD thesis resulting in the VTUF-3D model, one of the few micro-scaled urban models to include the influence of urban vegetation (published in Urban Clim)
2. Collaborations to develop the TARGET and UT&C urban models (both published in Geosci Model Dev), both highly cited and widely used by academics and consultants.
3. High profile evaluation (QJR Meteorol Soc) of my models in the Urban Plumber urban land surface model intercomparison project
4. Supervision of PhD students in using irrigation of urban vegetation for urban heat mitigation (and four publications)
5. Devised computer vision methods to generate urban modelling input from street view imagery (published in Urban Climate), using neural networks to assess global pollution reductions during COVID-19 (published in Atmos Pollut Res) and impacts of urban design on public health (Lancet Planetary Health)
6. Numerous consultancies using my urban heat expertise for AU Dept. Agriculture, WSROC, Qld DES, ACT, VIC State government
7, Recipient of the 2016 Graham Treloar Early Career Researcher Fellowship
8. Chief Investigator on 2020 NHMRC/UKRI Build Environment and Prevention scheme for computer vision and public health, 2021 ARC Discovery for computer vision and cycling infrastructure, and 2023 Hort Innovation Tender for urban redesign using green infrastructure.
9. Service on Graduate Research Subcommittee for Melbourne School of Design
10. 13 years as a senior level software engineer in industry

B11. Research Opportunity and Performance Evidence (ROPE) - Details of participant's career and contributions to the field, including evidence of high-quality outputs, collaboration and excellence in research training and mentoring (where appropriate).

(Provide details of the participant's research impact and contributions. This should not include information provided elsewhere in the application (up to 1,500 characters, approximately 200 words).

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

I am internationally recognised expert in urban climate modelling, especially in examining heat mitigation strategies at neighbourhood and household scales utilising the cooling benefits of vegetation and water, and in assessing human thermal stress in increasingly overheated cities. This expertise is evidenced by numerous requests for reviews of publications, consultancies utilising my urban heat knowledge, invited and other presentations at international climate conferences, and my wide range of publications in Q1 journals with a large network of researchers across multiple fields.

I have developed three urban climate models through my career, actively maintaining them, and assisting both established researchers and emerging students around the world in their use and in making further improvements. State and local governments are currently utilising my research and my advice to formulate appropriate public health measures and urban planning recommendations.

I have secured $2.8 million in research income through competitive grants, enabling my research to expand, bringing new innovative methods (machine learning/computer vision) into climate research as well the impacts of urban systems on public health and on spatial disadvantage.

I have supervised 3 PhD students (2 completions), 1 visiting CSC PhD, 10 Masters of IT, and 1 honours student. As a senior member of my research lab (Transport, Health and Urban Systems), I serve as a mentor to some of the junior members.

B12. Research Opportunity and Performance Evidence (ROPE) - How many PhDs, Masters and Honours students that the participant has supervised have completed their degree?

(Provide total numbers under each category for completions where you have been the principal supervisor.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)
PhD student completions as principal supervisor:

2

Masters student completions as principal supervisor:

0

Honours student completions as principal supervisor:

1

B13. Research Opportunity and Performance Evidence (ROPE) - Research Output Context

(Research context - Provide clear information that explains the relative importance of the participant's research outputs in disciplinary context. This can include publication and citation metrics and other content relevant to the discipline (up to 1,500 characters, approximately 200 words).

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

My model development and climate science research has been mostly (92%) published in acclaimed Q1 journals. This is evidence of my expertise in designing, building, and use of local and micro-scale models that account for urban surface energy balances, influence of blue green infrastructure, and processes of urban hydrology and vegetation physiology. My urban heat knowledge has been utilised in a number of government consultations and planning reports through the Department of Agriculture, Water and the Environment (DAWES), the Western Sydney Regional Organisation of Councils (WSROC) Cool Suburbs Rating and Accreditation tool, urban heat analysis for the Queensland Department of Environment and Science (DES), and urban heat assessments for the Victorian government's Fishermans Bend Urban Ecology Strategy. I have presented my research at 19 international conferences (3 of those as invited talks). My research has also been featured in 13 collaborative presentations at 10 international conferences (1 invited talk). My 31 peer reviewed publications also include research in the use of machine learning, computer vision, and generative AI in analysing climate data, generating modelling data, or in modelling the impacts on public health of other urban factors (i.e. transportation systems or urban structures). This range of both specific urban climate knowledge combined with the ability to use a wide range of innovative techniques will be of high importance in this project.

B14. Research Opportunity and Performance Evidence (ROPE) – Research Outputs Listing including Ten Career-Best Research Outputs

(Provide up to 10 research outputs and provide clear information regarding the research impact of the researcher's chosen career-best outputs. Mark the research outputs that are most relevant to this project categorised under the following headings: Authored books; Edited books; Book chapters; Refereed Journal articles; Fully refereed conference proceedings; Additional research outputs (including non-traditional research outputs and preprints or comparable resources). CVs and theses should not be included in this list. Each text box allows up to 150 characters, approximately 20 words annotation per output.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Research Outputs Listing

Generated research output document follows on the next page

Ten Career-Best Research Outputs

[1] * Kerry A. Nice, Andrew M. Coutts & Nigel J. Tapper 2018, 'Development of the VTUF-3D v1.0 urban micro-climate model to support assessment of urban vegetation influences on human thermal comfort', *Urban Climate*, vol. 24, pp. 1052–1076, doi:10.1016/j.uclim.2017.12.008 (Refereed Journal Article)

Research Outputs Annotation Describes climate model I developed, one of the few that examines cooling impacts of blue-green infrastructure at a micro-climate scale. (IF: 6.4)

[2] * Naika Meili, Gabriele Manoli, Paolo Burlando, Elie Bou-Zeid, Winston T. L. Chow, Andrew M. Coutts, Edoardo Daly, Kerry A. Nice, Matthias Roth & Nigel J. Tapper et al. 2020, 'An urban ecohydrological model to quantify the effect of vegetation on urban climate and hydrology (UT&C v1.0)', *Geoscientific Model Development*, vol. 13, no. 1, pp. 335–362, doi:10.5194/gmd-13-335-2020 (Refereed Journal Article)

Research Outputs Annotation Urban climate model I contributed to the development, local scaled with advanced hydrology and vegetation modelling. Highly cited. (IF: 5.2)

[3] * Ashley M. Broadbent, Andrew M. Coutts, Kerry A. Nice, Matthias Demuzere, E. Scott Krayenhoff, Nigel J. Tapper & Hendrik Wouters 2019, 'The Air-temperature Response to Green/blue-infrastructure Evaluation Tool (TARGET v1.0): an efficient and user-friendly model of city cooling', *Geoscientific Model Development*, vol. 12, no. 2, pp. 785–803, doi:10.5194/gmd-12-785-2019 (Refereed Journal Article)

Research Outputs Annotation Local scaled climate model I co-developed and maintain, to allow quick assessments of the air temperature impacts of water and vegetation. (IF: 5.2)

[4] * Cheung, Pui Kwan, Jim, C.Y., Tapper, Nigel, Nice, Kerry A. & Livesley, Stephen J. 2022, 'Daytime irrigation leads to significantly cooler private backyards in summer', *Urban Climate*, vol. 46, pp. 101310, doi:10.1016/j.uclim.2022.101310 (Refereed Journal Article)

Research Outputs Annotation Describing my research into urban cooling effects of irrigation of vegetation at a household scale. (IF: 6.4)

[5] * Naserikia, Marzie, Hart, Melissa A., Nazarian, Negin, Bechtel, Benjamin, Lipson, Mathew & Nice, Kerry A. 2023, 'Land surface and air temperature dynamics: The role of urban form and seasonality', *Science of The Total Environment*, vol. 905, pp. 167306, doi:10.1016/j.scitotenv.2023.167306 (Refereed Journal Article)

Research Outputs Annotation The relationship between satellite measured land surface temperatures and ground level air temperatures, informs method for this project. (IF: 10.9)

[6] * Kerry A. Nice, Negin Nazarian, Mathew J. Lipson, Melissa A. Hart, Sachith Seneviratne, Jason Thompson, Marzie Naserikia, Branislava Godic & Mark Stevenson 2022, 'Isolating the impacts of urban form and fabric from geography on urban heat and human thermal comfort', *Building and Environment*, vol. 224, pp. 109502, doi:10.1016/j.buildenv.2022.109502 (Refereed Journal Article)

Research Outputs Annotation Utilising VTUF-3D to model 10,000 urban configurations to comprehensively assess impacts of morphologies and material types on urban heat. (IF: 7.9)

[7] * Jasper S. Wijnands, Kerry A. Nice, Sachith Seneviratne, Jason Thompson & Mark Stevenson 2022, 'The impact of the COVID-19 pandemic on air pollution: A global assessment using machine learning techniques', *Atmospheric Pollution Research*, vol. 13, no. 6, pp. 101438, doi:10.1016/j.apr.2022.101438 (Refereed Journal Article)

Research Outputs Annotation Machine learning to quantify changes in air pollution (NO2, O3, PM2.5, PM10) due to COVID-19 in 800 cities. Informs method for this project. (IF: 4.9)

[8] Kerry A. Nice, Jasper S. Wijnands, Ariane Middel, Jingcheng Wang, Yiming Qiu, Nan Zhao, Jason Thompson, Gideon D.P.A. Aschwanden, Haifeng Zhao & Mark Stevenson 2020, 'Sky pixel detection in outdoor imagery using an adaptive algorithm and machine learning', *Urban Climate*, vol. 31, pp. 100572, doi:10.1016/j.uclim.2019.100572 (Refereed Journal Article)

Research Outputs Annotation Extracting sky view factors from imagery of urban areas can help provide this parameter for urban climate research and urban modelling. (IF: 6.4)

[9] Jason Thompson, Mark Stevenson, Jasper S Wijnands, Kerry A Nice, Gideon DPA Aschwanden, Jeremy Silver, Mark Nieuwenhuijsen, Peter Rayner, Robyn Schofield & Rohit Hariharan et al. 2020, 'A global analysis of urban design types and road transport injury: an image processing study', *The Lancet Planetary Health*, vol. 4, no. 1, pp. e32–e42, doi:10.1016/s2542-5196(19)30263-3 (Refereed Journal Article)

Research Outputs Annotation Utilising neural networks to discover urban typologies from maps of 1700 global cities and discovering how urban design impacts road trauma. (IF: 9.4)

[10] * Lipson, Mathew J., Grimmond, Sue, Best, Martin, Abramowitz, Gab, Coutts, Andrew, Tapper, Nigel, Baik, Jong-Jin, Beyers,

Meiring, Blunn, Lewis & Boussetta, Souhail et al. 2023, 'Evaluation of 30 urban land surface models in the <scp>Urban-PLUMBER</scp> project: Phase 1 results', *Quarterly Journal of the Royal Meteorological Society*, doi:10.1002/qj.4589 (Refereed Journal Article)

Research Outputs Annotation High profile intercomparison of 30 urban land surface models, including my models VTUF-3D and TARGET. (IF: 9.8)

B15. Is the participant applying for Teaching Relief?

(This is a 'Yes' or 'No' question.
(This question must be answered if the participant is a Chief Investigator)
• If you select 'Yes', you will be prompted to request the amount of Teaching Relief up to maximum of $50,000 per Chief Investigator for each requested year.
• Once saved, this information will populate to the budget question D1 where it can then be added to the budget table.

Note - This question was not included in the EOI application and must be answered if the participant is a Chief Investigator. Teaching relief is not available for Partner Investigators.)

No

B17. Partner Investigator – upload a CV in no more than one A4 page

(Provide a CV of up to one A4 page relevant to the project noting that Partner Investigators are not required to complete Research Opportunity and Performance Evidence (ROPE) questions B10 to B14. The PDF should not include qualifications, current and previous appointment(s)/position(s), employment or career interruptions as this will be automatically populated from your profile at questions B2, B8 and B9.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

No PDF file uploaded.

Part B - Participant Details including ROPE (Dr Negin Nazarian)

B1. Personal Details

(Note: The answers to Questions B1 - B14 and B16 - B17 are auto-populated from the EOI application and are locked fields. For Question B1 additional fields of information regarding material personal interests were not included in the EOI application form and must be answered. This information will be automatically populated from your RMS profile. To update Personal Details, click the 'Manage Personal Details' link below. Note this will open a new browser tab. When returning to the form ensure you 'Refresh' the page to capture the changes made to your profile.

Note: The date of birth, country of birth, Indigenous status and material personal interests sections will not appear in the PDF version of the form and will not be visible to assessors. Data may be shared with other Commonwealth Entities.

All information contained in Part B is visible to the Administering Organisation on this application.)

Participation Type

Chief Investigator

Title

Dr

First Name

Negin

Middle Name

Family Name

Nazarian

B2. Qualifications

(Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Conferral Date	AQF Level	Degree/Award Title	Discipline/Field	Awarding Organisation	Country of Award
20/07/2022	Certificate IV	Certificate in Executive Management and Development (CEMD)	The Authentic Communicator: Activating Presence	University of New South Wales	Australia
28/09/2021	Certificate IV	Certificate in Executive Management and Development (CEMD)	Relationship Networking Program (RNP)	University of New South Wales	Australia
26/04/2021	Certificate IV	Certificate of Completion	Beyond Smart Cities: Emerging Design and Technology	Massachusetts Institute of Technology	United States of America
01/02/2020	Certificate IV	Certificate of Completion	Machine Learning in Python for Environmental Science	American Meteorological Society (AMS)	United States of America
30/12/2015	Doctoral Degree	Doctorate of Philosophy	Engineering Science	University of California San Diego	United States of America

01/06/2012	Masters Degree	Master of Science	Engineering Science	University of California San Diego	United States of America
01/06/2011	Bachelor Degree	Bachelor of Science	Mechanical Engineering	University of Tehran	Iran

B3. Research Load (non-ARC Grants and Research)

(Provide details of research funding from non-ARC sources (in Australia and overseas). For research funding from non-ARC sources, list all projects/applications/awards/fellowships awarded or requests submitted involving that participant for funding for the years 2024 to 2030 inclusive.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Uploaded PDF file follows on next page.

Funding from non-ARC sources										
Description (All named investigators on any application or grant/ fellowship in which a participant is involved, project title, source of support, scheme and round)	**Same Research Area** (Yes/No)	**Support Status** (Requested/Current/Past)	**Application ID** (NHMRC applications only)	**2024** ($'000)	**2025** ($'000)	**2026** ($'000)	**2027** ($'000)	**2028** ($'000)	**2029** ($'000)	**2030** ($'000)
Mathew, S., Klerck, M., Wakerman, J., Brearley, M., Hart, M., Nazarian, N., Maharaj, A. "Air in Alice: a community response to reduce future environmental risks", Citizen Science Grants, Department of Industry, Science, Energy and Resources, Sep 2021 - 2024.	Y	C	N/A	166						
Nazarian, N., Pettit, C. "CAPS: Clean Air Project Sydney - Smart Sensing for Improved Ventilation, Air Quality, and Performance in Buildings", City of Sydney Council, 2022-2023	N	C	N/A	50						
Nazarian N., Hart, M., Australia-Germany Joint Research Co-operation Scheme "Global Analysis of Spatio-temporal Variability in Surface Urban Heat", 2023 - 24	Y	C	N/A	25						
Paolini, R., Pfautsch S., Nazarian N., Hart, M., WSU-UNSW Project Mezze partnership seed funding "Too hot to play: quantifying the impacts of urban climate change on playground activity", 2023 - 24.	N	C	N/A	25						
Mathew, S., Klerck, M., Hart, M., Nazarian, N., Maharaj, A. "Air in East Arnhem: Crowdsourcing Air Quality, Temperature, and Health Data with Yolngu Citizen Scientists", MRFF Indigenous Health, 2024 - 26.	Y	C	N/A	260	260	260				

B4. What will your time commitment be to research activities related to this project?

(Enter your time commitment to this project as a Full-Time Equivalent (FTE). Note that a FTE of 1.0 represents a full-time commitment (i.e. 5 days per week).

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

0.2

B5. Employment Details as at grant commencement date

(Confirm your employment status at all organisations that you will be associated with as at the grant commencement date. Enter the relevant appointment type and Full-Time Equivalent (FTE) for each organisation.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Org name	Is this an Eligible Organisation?	Please choose your appointment type for this organisation.	Please enter your FTE for this Organisation
The University of New South Wales	Yes	Employee	1

B6. Relevant Organisation for this application as at grant commencement date for this project

(Enter the Organisation that is relevant to your participation on this application, and that you will be associated with as of 1 January 2025. The 'relevant organisation' is the primary organisation that will be supporting your involvement in this project if it is funded. Note that the Organisation must be listed in B5 for this question to validate.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Relevant Organisation

The University of New South Wales

B7. Currently held ARC Projects

(This information is automatically populated from RMS. If you have any concerns with the information recorded here, please contact your Administering Organisation's Research Office.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Identifier	Investigators	Admin Organisation	Project Title	Funding	End Date	Final Report Due Date	Final Report Status
CE170100023	Prof Andrew Pitman ; Prof Lisa Alexander ; Prof Michael Reeder ; A/Prof Gabriel Abramowitz ; Prof Nerilie Abram ; Prof Julie Arblaster ; Prof Dietmar Dommenget ; Prof Jason Evans ; Prof Andrew Hogg ; Prof Neil Holbrook ; Prof Todd Lane ; Prof Steven Sherwood ; Prof Peter Strutton ; Dr	The University of New South Wales	ARC Centre of Excellence for Climate Extremes	$30,050,000	31/12/2024	31/12/2025	Draft

	Elizabeth Ebert ; Dr Simon Marsland ; Dr Richard Matear ; Dr Alain Protat ; Dr Yingping Wang ; Dr Matthew Wheeler ; Mr Martin Best ; Dr Sandrine Bony ; Dr Wojciech Grabowski ; Dr Stephen Griffies ; Prof Dr Nicolas Gruber ; Prof Hoshin Gupta ; Dr Robert Hallberg ; Dr Cathy Hohenegger ; A/Prof Reto Knutti ; Dr Gerald Meehl ; Mr Sean Milton ; Dr Nathalie de Noblet-Ducoudré ; Dr Jon Petch ; Dr Christa Peters-Lidard ; A/Prof Joellen Russell ; Dr Joseph Santanello ; Prof Dr Sonia Seneviratne ; Prof Dr Bjorn Stevens ; Dr Peter Stott ; Dr Rachel Law ; A/Prof Ali Behrangi ; Prof Craig Bishop ; A/Prof Andrea Taschetto ; Prof Sarah Perkins-Kirkpatrick ; Dr Ailie Gallant ; Dr Amelie Meyer ; Dr Claire Vincent ; Dr Andrew Marshall ; Dr Callum Shakespeare ; Dr Negin Nazarian ; Dr Anna Ukkola ; Dr Yi Huang ; Dr Kate Saunders ; Dr Martin Singh ; Ms Vilia Co ; Dr Nicola Maher						

B8. Research Opportunity and Performance Evidence (ROPE) - Current and previous appointment(s) / position(s) - during the past 10 years

(To update any details in this table, click on the 'Manage Employment Details' link in this question. Note this will open in a new browser tab. 'Refresh' the application page when returning to the form to capture changes made to the participant's profile. This data is automatically populated from the participant's RMS profile.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Description	Department	Contract Type	Employment Type	Start Date	End Date	Organisation
Scientia Senior Lecturer	School of Built Environment	Contract	Full Time	01/07/2021		The University of New South Wales
Scientia Lecturer	School of Built Environment	Contract	Full Time	18/07/2018	01/07/2021	The University of New South Wales
SMART Scholar	Singapore-MIT Alliance for Research and Technology	Contract	Full Time	08/01/2016	17/05/2018	Massachusetts Institute of Technology
Graduate Research Associate	Department of Mechanical and Aerospace Engineering	Contract	Part Time	01/09/2011	15/12/2015	University of California, San Diego
Graduate Research Associate	Department of Atmospheric Compositions	Contract	Part Time	01/10/2014	01/02/2015	Centro de Investigaciones Energeticas Medioambientales y Tecnologicas

B9. Research Opportunity and Performance Evidence (ROPE) - Career Interruptions

(Note - The following fields will not be visible to assessors: From when; To when; FTE of career interruption and Interruption category. RMS will automatically calculate the total career interruption in the field 'Total Period of Career Interruptions which will be visible to assessors.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)
Has the participant experienced a significant interruption that has impacted on research opportunity?

No

Total Period of Career Interruptions

B10. Research Opportunity and Performance Evidence (ROPE) - Career Highlights

(Include up to 10 career highlights including a short context statement for each highlight, where relevant (up to 1,500 characters, approximately 200 words).

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

1. Scoping author for IPCC Special Report on Climate Change & Cities, the only SR planned in 7th Assessment report & likely the sole contribution to the second Global Stocktake
2. 2023 Timothy Oke Award for Original Research in Urban Overheating (highest achievement for early-career urban climatologists)
3. First ECR and PoC Chair of the largest urban climate gathering (Intl Conference on Urban Climate). ICUC11 at UNSW brought together >650 delegates
4. Only ECR Associate Editor of leading Urban Climate journal in 2021. Contributed to peer-review of 110+ scholarly outputs in 3 years
5. Appointed to the National Committee for Earth System Science, developing the ten-year national priorities for urban climate projections in Australia.
6. Elected Chair of the Urban Environment Board at the American Meteorological Society, serving as a focal point for disseminating and supporting urban climate research globally
7. Appointed to GAW Urban Research Meteorology and Environment at the World Meteorological Organization (GURME), helping enhance global capabilities in urban pollution research
8. Appointed as Chief Investigator at the ARC Centre of Excellence for Climate Extremes for continuous contribution to understanding extremes in cities
9. Cohort 8 of Homeward Bound, a ground-breaking, global leadership initiative, set against the backdrop of

Antarctica, empowering women in environmental decision-making
10. UNSW Gender Equity Champion with substantial input on university policies

B11. Research Opportunity and Performance Evidence (ROPE) - Details of participant's career and contributions to the field, including evidence of high-quality outputs, collaboration and excellence in research training and mentoring (where appropriate).

(Provide details of the participant's research impact and contributions. This should not include information provided elsewhere in the application (up to 1,500 characters, approximately 200 words).

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

I am internationally recognised as an emerging leader in my field, evidenced by the Timothy Oke Award for original research in urban heat. Leading UNSW's renowned Climate-Resilient Cities lab, my expertise spans urban physics, numerical modelling, and data science, enabling translational research in urban climate.
I led a global effort to develop the first integrated framework for urban overheating and in 2021, our modelling work directly improved air temperature predictions in regional models. As a pioneer in urban climate informatics, I leveraged wearables for early heat stress detection and quantifying lifestyle impacts for the first time. My expertise is recognised by World Meteorological Organization, co-authoring and reviewing various reports including global guidance on urban heat modeling and monitoring. Nationally, I've contributed scientific reports to government bodies, including the NSW Chief Scientist and Engineer. Further, I hold leadership roles in the American Meteorological Society (Chair of the Urban Board) and the International Association of Urban Climate.
I’ve supervised 6 PhD students at UNSW (3 completions) and 2 internationally, with students earning prestigious awards from intl organizations. Additionally, I've overseen 5 post-docs, 12 research assistants and scholars, including an NHMRC fellow. Lastly, I mentor early-career female academics with notable success (two securing USyd Horizon Fellowship and one Assistant Professor at the Pratt Institute).

B12. Research Opportunity and Performance Evidence (ROPE) - How many PhDs, Masters and Honours students that the participant has supervised have completed their degree?

(Provide total numbers under each category for completions where you have been the principal supervisor.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)
PhD student completions as principal supervisor:

3

Masters student completions as principal supervisor:

4

Honours student completions as principal supervisor:

0

B13. Research Opportunity and Performance Evidence (ROPE) - Research Output Context

(Research context - Provide clear information that explains the relative importance of the participant’s research outputs in disciplinary context. This can include publication and citation metrics and other content relevant to the discipline (up to 1,500 characters, approximately 200 words).

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

My research has been published in acclaimed journals in the fields of meteorology, urban climatology, and built environment, with the vast majority (85%) appearing in Q1 journals including Journal of Advances in Modeling Earth Systems (IF: 8.469), Earth’s Future (IF: 8.2), Geoscientific Model Development (IF: 6.9), Environmental Research Letters (IF: 6.7), and Scientific Reports (IF: 5.0).
I have been particularly successful in maintaining a high number of publications in top journals without jeopardizing the quality and impact of research, demonstrated by the high citation counts and Field-Weighted Citation Index (FWCI) of my publications. Since 2015 (date of first publication) I have published 34 peer-reviewed

articles, two book chapters, 8 scientific reports for international and national government and private agencies, and currently have 4 preprints under review. Among these, 45% are first-author contributions, while another 22% represent the work done by students and postdocs under my supervision. This is highly regarded in the field of urban climatology and built environment, as it provides evidence of critical thinking and leadership in various aspects of project design, implementation, and result interpretation. My average FWCI between 2015-2022 is 3.6, indicating that on average my articles are cited 3.6 times the world average in my field, and article FWCI ranges from 1.2-19. I have 2 articles ranked in the top 1% and 12 articles in the top 10% cited.

B14. Research Opportunity and Performance Evidence (ROPE) – Research Outputs Listing including Ten Career-Best Research Outputs

(Provide up to 10 research outputs and provide clear information regarding the research impact of the researcher's chosen career-best outputs. Mark the research outputs that are most relevant to this project categorised under the following headings: Authored books; Edited books; Book chapters; Refereed Journal articles; Fully refereed conference proceedings; Additional research outputs (including non-traditional research outputs and preprints or comparable resources). CVs and theses should not be included in this list. Each text box allows up to 150 characters, approximately 20 words annotation per output.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Research Outputs Listing

Generated research output document follows on the next page

Ten Career-Best Research Outputs

[1] * N. Nazarian, E. S. Krayenhoff, B. Bechtel, D. M. Hondula & R. Paolini et al. 2022, 'Integrated Assessment of Urban Overheating Impacts on Human Life', *Earth's Future*, vol. 10, no. 8, doi:10.1029/2022ef002682 (Refereed Journal Article)

Research Outputs Annotation Established 1st integrated framework for urban overheating impacts, leading review across 10 subfields through discussions among 17 global experts

[2] Nazarian, N., Acero, J.A. & Norford, L. 2019, 'Outdoor thermal comfort autonomy: Performance metrics for climate-conscious urban design', *Building and Environment*, vol. 155, pp. 145-160 (Refereed Journal Article)

Research Outputs Annotation A novel framework to translate climate model outputs into practical metrics & guideline maps for architects & planners, simplifying design decisions

[3] * Lipson, M.J., Nazarian, N., Hart, M.A., Nice, K.A. & Conroy, B. 2022, 'A Transformation in City-Descriptive Input Data for Urban Climate Models', *Frontiers in Environmental Science*, vol. 10 (Refereed Journal Article)

Research Outputs Annotation An open access building morphology dataset for Australian Cities that enables regional climate models to accurately represent city characteristics

[4] * Middel, A., Nazarian, N., Demuzere, M. & Bechtel, B. 2022, 'Urban Climate Informatics: An Emerging Research Field', *Frontiers in Environmental Science*, vol. 10 (Refereed Journal Article)

Research Outputs Annotation Establishing the field of urban climate informatics, revolutionising urban climate analyses by deploying innovative sensing, datasets, and analytics

[5] Nazarian, N., Liu, S., Kohler, M., Lee, J.K.W. & Miller, C. et al. 2021, 'Project Coolbit: Can your watch predict heat stress and thermal comfort sensation?', *Environmental Research Letters*, vol. 16, no. 3 (Refereed Journal Article)

Research Outputs Annotation Early detection of heat stress achieved through innovative wearables, also presenting the 1st quantification of heat impact on activity and lifestyle

[6] * Julia Potgieter, Negin Nazarian, Mathew J. Lipson, Melissa A. Hart & Giulia Ulpiani et al. 2021, 'Combining High-Resolution Land Use Data With Crowdsourced Air Temperature to Investigate Intra-Urban Microclimate', *Frontiers in Environmental Science*, vol. 9, doi:10.3389/fenvs.2021.720323 (Refereed Journal Article)

Research Outputs Annotation Demonstrating how citizen weather stations can be a major boon to health monitoring and urban planning in Australian Cities

[7] * Nice, K.A., Nazarian, N., Lipson, M.J., Hart, M.A. & Seneviratne, S. et al. 2022, 'Isolating the impacts of urban form and fabric from geography on urban heat and human thermal comfort', *Building and Environment*, vol. 224 (Refereed Journal Article)

Research Outputs Annotation Demonstrating how non-linear changes in urban form and fabric can change urban heat exposure in Australian cities

[8] * Marzie Naserikia, Melissa A. Hart, Negin Nazarian & Benjamin Bechtel 2022, 'Background climate modulates the impact of land cover on urban surface temperature', *Scientific Reports*, vol. 12, no. 1, doi:10.1038/s41598-022-19431-x (Refereed Journal Article)

Research Outputs Annotation Providing a global analysis of land surface temperature and its spatial variability based on urban form and fabric

[9] * Krayenhoff, E.S., Jiang, T., Christen, A., Martilli, A. & Oke, T.R. et al. 2020, 'A multi-layer urban canopy meteorological model with trees (BEP-Tree): Street tree impacts on pedestrian-level climate', *Urban Climate*, vol. 32 (Refereed Journal Article)

Research Outputs Annotation Ranked as "top 1% cited" in the field, it provides one of the most comprehensive representation of street trees to date

[10] * Martilli, A., Krayenhoff, E.S. & Nazarian, N. 2020, 'Is the Urban Heat Island intensity relevant for heat mitigation studies?', *Urban Climate*, vol. 31 (Refereed Journal Article)

Research Outputs Annotation Challenging the most common indicator (mis)used in the field, Urban Heat Island, offering critical assessment of when/how it should be used or avoided

B15. Is the participant applying for Teaching Relief?

(This is a 'Yes' or 'No' question.
(This question must be answered if the participant is a Chief Investigator)
• If you select 'Yes', you will be prompted to request the amount of Teaching Relief up to maximum of $50,000 per Chief Investigator for each requested year.
• Once saved, this information will populate to the budget question D1 where it can then be added to the budget table.

Note - This question was not included in the EOI application and must be answered if the participant is a Chief Investigator. Teaching relief is not available for Partner Investigators.)

No

B17. Partner Investigator – upload a CV in no more than one A4 page

(Provide a CV of up to one A4 page relevant to the project noting that Partner Investigators are not required to complete Research Opportunity and Performance Evidence (ROPE) questions B10 to B14. The PDF should not include qualifications, current and previous appointment(s)/position(s), employment or career interruptions as this will be automatically populated from your profile at questions B2, B8 and B9.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

No PDF file uploaded.

Part B - Participant Details including ROPE (A/Prof Fiona Johnson)

B1. Personal Details

(Note: The answers to Questions B1 - B14 and B16 - B17 are auto-populated from the EOI application and are locked fields. For Question B1 additional fields of information regarding material personal interests were not included in the EOI application form and must be answered. This information will be automatically populated from your RMS profile. To update Personal Details, click the 'Manage Personal Details' link below. Note this will open a new browser tab. When returning to the form ensure you 'Refresh' the page to capture the changes made to your profile.

Note: The date of birth, country of birth, Indigenous status and material personal interests sections will not appear in the PDF version of the form and will not be visible to assessors. Data may be shared with other Commonwealth Entities.

All information contained in Part B is visible to the Administering Organisation on this application.)

Participation Type

Chief Investigator

Title

A/Prof

First Name

Fiona

Middle Name

Family Name

Johnson

B2. Qualifications

(Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Conferral Date	AQF Level	Degree/Award Title	Discipline/Field	Awarding Organisation	Country of Award
14/12/2010	Doctoral Degree	PhD	Civil Engineering	University of New South Wales	Australia
21/05/2002	Bachelor Degree	Bachelor of Engineering (Honours)	Civil Engineering	University of New South Wales	Australia

B3. Research Load (non-ARC Grants and Research)

(Provide details of research funding from non-ARC sources (in Australia and overseas). For research funding from non-ARC sources, list all projects/applications/awards/fellowships awarded or requests submitted involving that participant for funding for the years 2024 to 2030 inclusive.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Uploaded PDF file follows on next page.

B3: Funding from non-ARC sources

Funding from non-ARC sources										
Description (All named investigators on any application or grant/fellowship in which a participant is involved, project title, source of support, scheme and round)	**Same Research Area** (Yes/No)	**Support Status** (Requested/Current/Past)	**Application /Project ID** (for NHMRC applications only)	**2024** $'000	**2025** $'000	**2026** $'000	**2027** $'000	**2028** $'000	**2029** $'000	**2030** $'000
CIs Johnson, Liu, Tamburic, Marshall, Glamore, WaterRA, "Satellite remote sensing for the calibration of the WaterNSW Integrated Water Quality Model"	N	C	n/a	80						
CI Boer, Gallagher, Gill, James, Keith, Price. Sharples, Weir, Johnson et al., NSW Government, "NSW Bushfire and Natural Hazards Research Centre"	Y	C	n/a	1,565	1,698	1,660	1,615			
CI Johnson, Ball, Cinque, Huber, NSSN Grand Challenge, "Flood height predictions for western	Y	C	n/a	120						

NSW catchments”										
CI Johnson, Higgins, NSW DPE “Paleo informed climate scenarios for water management”	N	C	n/a	94						
CI Johnson, Gallant, CIN Sensing for Disasters	Y	R	n/a	36						

B4. What will your time commitment be to research activities related to this project?

(Enter your time commitment to this project as a Full-Time Equivalent (FTE). Note that a FTE of 1.0 represents a full-time commitment (i.e. 5 days per week).

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

0.2

B5. Employment Details as at grant commencement date

(Confirm your employment status at all organisations that you will be associated with as at the grant commencement date. Enter the relevant appointment type and Full-Time Equivalent (FTE) for each organisation.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Org name	Is this an Eligible Organisation?	Please choose your appointment type for this organisation.	Please enter your FTE for this Organisation
The University of New South Wales	Yes	Employee	1

B6. Relevant Organisation for this application as at grant commencement date for this project

(Enter the Organisation that is relevant to your participation on this application, and that you will be associated with as of 1 January 2025. The 'relevant organisation' is the primary organisation that will be supporting your involvement in this project if it is funded. Note that the Organisation must be listed in B5 for this question to validate.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Relevant Organisation

The University of New South Wales

B7. Currently held ARC Projects

(This information is automatically populated from RMS. If you have any concerns with the information recorded here, please contact your Administering Organisation's Research Office.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Identifier	Investigators	Admin Organisation	Project Title	Funding	End Date	Final Report Due Date	Final Report Status
IC190100031	Prof Rutger Vervoort ; Prof Lucy Marshall ; Prof Fabio Ramos ; Prof Glenda Wardle ; Prof Dacheng Tao ; Prof Robert Kohn ; A/Prof Edward Cripps ; Dr Mark Lindsay ; Prof Jody Webster ; A/Prof Tristan Salles ; A/Prof Fiona Johnson ; Dr Rohitash	The University of Sydney	ARC Training Centre in Data Analytics for Resources and Environments (DARE)	$3,973,202	25/08/2025	25/08/2026	Draft

	Chandra ; Dr Aaron Greenville ; Prof Mark Jessell ; Prof Mark Girolami ; Dr Milan Korbel ; Mr Jeffrey Bell ; Dr Karol Czarnota ; Dr Lesley Gibson ; Mr Neil Symington ; A/Prof Minh-Ngoc Tran ; A/Prof Tongliang Liu ; Prof Matthew Cleary ; Dr Clara Grazian ; Prof Judy Kay ; Dr Sahani Pathiraja ; Ms Carolyn Robinson ; Dr Lisa Hamilton ; Prof David Warton ; Prof John Close ; Prof Dr Subhas Mukhopadhyay ; Mr Joel Fossilo ; Dr Bryony Horton						

B8. Research Opportunity and Performance Evidence (ROPE) - Current and previous appointment(s) / position(s) - during the past 10 years

(To update any details in this table, click on the 'Manage Employment Details' link in this question. Note this will open in a new browser tab. 'Refresh' the application page when returning to the form to capture changes made to the participant's profile. This data is automatically populated from the participant's RMS profile.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Description	Department	Contract Type	Employment Type	Start Date	End Date	Organisation
Associate Professor	School of Civil and Environmental Engineering	Permanent	Part Time	03/07/2023		The University of New South Wales
Associate Professor	School of Civil and Environmental Engineering	Permanent	Full Time	31/12/2022	30/06/2023	The University of New South Wales
Associate Professor	School of Civil and Environmental Engineering	Permanent	Part Time	01/01/2020	31/12/2022	The University of New South Wales
Senior Lecturer	School of Civil and Environmental Engineering	Permanent	Full Time	01/01/2019	31/12/2019	The University of New South Wales

Senior Lecturer	School of Civil and Environmental Engineering	Permanent	Part Time	01/07/2016	31/12/2018	The University of New South Wales
Senior Lecturer	School of Civil and Environmental Engineering	Permanent	Full Time	01/07/2015	30/06/2016	The University of New South Wales
Lecturer	School of Civil and Environmental Engineering	Permanent	Full Time	17/09/2012	30/06/2015	The University of New South Wales

B9. Research Opportunity and Performance Evidence (ROPE) - Career Interruptions

(Note - The following fields will not be visible to assessors: From when; To when; FTE of career interruption and Interruption category. RMS will automatically calculate the total career interruption in the field 'Total Period of Career Interruptions which will be visible to assessors.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)
Has the participant experienced a significant interruption that has impacted on research opportunity?

Yes

Total Period of Career Interruptions

Researcher A/Prof Fiona Johnson has reported a career interruption of 3 years and 4 months since 2015.

B10. Research Opportunity and Performance Evidence (ROPE) - Career Highlights

(Include up to 10 career highlights including a short context statement for each highlight, where relevant (up to 1,500 characters, approximately 200 words).

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

1.Elected as a Fellow of Modelling and Simulation Society of Australia (2023) and New Zealand and Fellow of Engineers Australia (2021) for contributions to modelling and water engineering.
2.2023 invited presentations - Global Flood Partnership meeting (Singapore), European Centre for Mid Range Weather forecasting and UK Met Office, demonstrating international expertise relevant to the project.
3.Appointed as an independent hydrological adviser to the Victorian Department of Energy, Environment and Climate (2021-2024) to provide oversight on the second Victorian Water and Climate Initiative
4.Recognised expertise in flood and rainfall extremes through peer review consultancies e.g. InfrastructureNSW, Sunwater.
5.Appointed as a Scientia Associate Professor at UNSW due to research strength and leadership.
6.Editor in Chief for the Journal of Humanitarian Engineering (2020-), Associate Editor for Journal of River Basin Management (2017-2023), International Advisory Board for Journal of Climate Change and Water
7.Director of the UNSW Water Research Centre since 2023, deputy director since 2021.
8.Developed the bias correction approach (206 citations) adopted by the Bureau of Meteorology for Australia wide climate projections of water availability.
9.Led hydrological input to IFD design rainfalls used across Australia in industry through Australian Rainfall and Runoff.
10.Invited to present at Juukan Gorge senate inquiry on best practice environmental assessments.

B11. Research Opportunity and Performance Evidence (ROPE) - Details of participant's career and contributions to the field, including evidence of high-quality outputs, collaboration and excellence in research training and mentoring (where appropriate).

(Provide details of the participant's research impact and contributions. This should not include information provided elsewhere in the application (up to 1,500 characters, approximately 200 words).

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

CI Johnson has internationally recognised expertise in rainfall extremes, flood hazards and humanitarian engineering. She was appointed as the Climate and Weather extremes node co-leader of the NSW government funded Bushfire and Natural Hazard Research Centre (2023-2028), highlighting her expertise in flood hazard research and leading a program of 10 masters projects to provide future workforce capability to the NSW government. She is currently collaborating with the State Emergency Service to provide information on flood wave timing and its uncertainty to allow SES to better manage flood response logistics. CI Johnson ability to deliver practical research project outcomes is demonstrated by the Australian BoM contracting CI Johnson's team in 2019 to collaborate on bias correcting climate projections for Australia at 5 km resolution as part of the Australian Water Outlook product which is now publicly available from the BoM. CI Johnson is best known for her research in designing methods to remove biases to enable impact relevant climate change assessments to be undertaken. CI Johnson has supervised 12 PhD candidates to completion (5 as primary supervisor, 7 as joint or co-supervisor) since commencing as an academic in 2012. CI Johnson is currently supervising 6 research students (5 PhD and 1 MPhil) and is the primary supervisor for 4 of these students. CI Johnson is currently mentoring 4 postdoctoral researchers and has mentored a further 5 during her career.

B12. Research Opportunity and Performance Evidence (ROPE) - How many PhDs, Masters and Honours students that the participant has supervised have completed their degree?

(Provide total numbers under each category for completions where you have been the principal supervisor.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)
PhD student completions as principal supervisor:

5

Masters student completions as principal supervisor:

5

Honours student completions as principal supervisor:

25

B13. Research Opportunity and Performance Evidence (ROPE) - Research Output Context

(Research context - Provide clear information that explains the relative importance of the participant's research outputs in disciplinary context. This can include publication and citation metrics and other content relevant to the discipline (up to 1,500 characters, approximately 200 words).

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

CI Johnson has published 80 journal articles, 5 book chapters and 21 conference papers. Her H-index is 26 (Scopus, 31/1/2024) with more than 3100 citations. Over 90% of her publications are in the top 10% of journals and 10 of her publications are in the top 10% most cited publications.
The convention in her discipline is that the PhD student or Research Associate is the first author and the PhD supervisors are listed after this with no particular difference between the position of the second and third authors. For multi-author review papers, the first author generally has led the work, with substantial input from the second author and all others listed alphabetically.
CI Johnson have a relatively high number of conference presentations which reflects the time she spent working in industry, specifically at the Bureau of Meteorology, where the primary focus of the work was on developing industry relevant rainfall products. Therefore disseminating these outcomes at the Hydrology and Water Resources Symposium, the leading Australian conference for practicing water engineers was vital. The industry relevance of her continued research is demonstrated by her honours students publishing and presenting at this conference as well. CI Johnson has also published several conference papers on Humanitarian Engineering education to help build a network of practitioners and scholars in this young discipline.

B14. Research Opportunity and Performance Evidence (ROPE) – Research Outputs Listing including Ten

Career-Best Research Outputs

(Provide up to 10 research outputs and provide clear information regarding the research impact of the researcher's chosen career-best outputs. Mark the research outputs that are most relevant to this project categorised under the following headings: Authored books; Edited books; Book chapters; Refereed Journal articles; Fully refereed conference proceedings; Additional research outputs (including non-traditional research outputs and preprints or comparable resources). CVs and theses should not be included in this list. Each text box allows up to 150 characters, approximately 20 words annotation per output.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Research Outputs Listing

Generated research output document follows on the next page

Ten Career-Best Research Outputs

[1] Johnson, F. & Sharma, A. 2012, 'A nesting model for bias correction of variability at multiple times scales in general circulation model precipitation simulations', *Water Resources Research*, vol. 48, pp. W01504, doi:10.1029/2011WR010464 (Refereed Journal Article)

Research Outputs Annotation Influential method for bias correction that has been widely adopted internationally in resaerch and practice (FWCI 5.76)

[2] Westra, S., Fowler, H. J., Evans, J. P., Alexander, L. V. & Berg, P. et al. 2014, 'Future changes to the intensity and frequency of short-duration extreme rainfall', *Rev. of Geophysics*, vol. 52, no. 3, pp. 522-555 (Refereed Journal Article)

Research Outputs Annotation First paper to holistically examine changes to sub-daily rainfall extremes which are vital to understand flood hazard in urban areas (FWCI 6.92)

[3] Stephens, C.M., Johnson, F.M. & Marshall, L.A. 2018, 'Implications of future climate change for event-based hydrologic models', *Advances in Water Resources*, vol. 119, pp. 95-110 (Refereed Journal Article)

Research Outputs Annotation This work showed the impact of pre-event moisture and hydrological model structure on flood predictions under climate change (FWCI 2.37)

[4] Wasko, C., Sharma, A. & Johnson, F. 2015, 'Does storm duration modulate the extreme precipitation-temperature scaling relationship?', *Geophysical Research Letters*, vol. 42, no. 20, pp. 8783-8790, DP150100411 (2015-2018) (Refereed Journal Article)

Research Outputs Annotation Highly cited paper examining changes in rainfall extremes related to storm duration which is vital to understand for flood hazard (FWCI 3.22)

[5] Johnson, F., White, C.J., van Dijk, A., Ekstrom, M. & Evans, J.P. et al. 2016, 'Natural hazards in Australia: floods', *Climatic Change*, vol. 139, no. 1, pp. 21-35, DP150100411 (2015-2018) (Refereed Journal Article)

Research Outputs Annotation Highly cited paper on flood risk in Australia and developed a research agenda identifying flood research gaps under climate change (FWCI 2.68)

[6] Kim, S., Liu, Y., Johnson, F.M., Parinussa, R.M. & Sharma, A. 2015, 'A global comparison of alternate AMSR2 soil moisture products: Why do they differ?', *Remote Sensing of Environment*, vol. 161, pp. 43-62, DP140102394 (2014-2017) (Refereed Journal Article)

Research Outputs Annotation First paper to consider the differences in remotely sensed soil moisture algorithms (FWCI 5.34)

[7] Stephens, C.M., McVicar, T.R., Johnson, F.M. & Marshall, L.A. 2018, 'Revisiting Pan Evaporation Trends in Australia a Decade on', *Geophysical Research Letters*, vol. 45, no. 20, pp. 11,164-11,172, LP150100548 (2015-2018) (Refereed Journal Article)

Research Outputs Annotation Important paper revising the pan evaporation paradox and showing that decreasing trends had mainly reversed (FWC 2.38)

[8] Earl, Eleanor, Johnson, Fiona, Marshall, Lucy & Sanderson, David 2023, 'A critical review of Natural Flood Management application and spatial prioritisation approaches in tropical island catchments', *Science of The Total Environment*, vol. 878, pp. 162776, doi:10.1016/j.scitotenv.2023.162776 (Refereed Journal Article)

Research Outputs Annotation First paper to identify gaps in Natural Flood Management in the Pacific particularly around modelling and user acceptance of these flood options

[9] Johnson, F. & Sharma, A. 2009, 'Measurement of GCM skill in predicting variables relevant for hydroclimatological assessments', *Journal of Climate*, vol. 22, no. 16, pp. 4373-4382, doi:10.1175/2009JCLI2681.1 (Refereed Journal Article)

Research Outputs Annotation Highly cited paper showing that rainfall projections from climate models are highly uncertain (FWCI 2.74)

[10] Pham, H.T., Marshall, L., Johnson, F. & Sharma, A. 2018, 'Deriving daily water levels from satellite altimetry and land surface temperature for sparsely gauged catchments: A case study for the Mekong River', *Remote Sensing of Environment*, vol. 212, pp. 31-46, DP140102394 (2014-2017) (Refereed Journal Article)

Research Outputs Annotation Model to improve flood information in sparsely gauged areas using satellite data (FWCI 1.76)

B15. Is the participant applying for Teaching Relief?

(This is a 'Yes' or 'No' question.
(This question must be answered if the participant is a Chief Investigator)
• If you select 'Yes', you will be prompted to request the amount of Teaching Relief up to maximum of $50,000 per Chief Investigator for each requested year.
• Once saved, this information will populate to the budget question D1 where it can then be added to the budget table.

Note - This question was not included in the EOI application and must be answered if the participant is a Chief Investigator. Teaching relief is not available for Partner Investigators.)

No

B17. Partner Investigator – upload a CV in no more than one A4 page

(Provide a CV of up to one A4 page relevant to the project noting that Partner Investigators are not required to complete Research Opportunity and Performance Evidence (ROPE) questions B10 to B14. The PDF should not include qualifications, current and previous appointment(s)/position(s), employment or career interruptions as this will be automatically populated from your profile at questions B2, B8 and B9.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

No PDF file uploaded.

Part B - Participant Details including ROPE (Prof Jason Byrne)

B1. Personal Details

(Note: The answers to Questions B1 - B14 and B16 - B17 are auto-populated from the EOI application and are locked fields. For Question B1 additional fields of information regarding material personal interests were not included in the EOI application form and must be answered. This information will be automatically populated from your RMS profile. To update Personal Details, click the 'Manage Personal Details' link below. Note this will open a new browser tab. When returning to the form ensure you 'Refresh' the page to capture the changes made to your profile.

Note: The date of birth, country of birth, Indigenous status and material personal interests sections will not appear in the PDF version of the form and will not be visible to assessors. Data may be shared with other Commonwealth Entities.

All information contained in Part B is visible to the Administering Organisation on this application.)

Participation Type

Chief Investigator

Title

Prof

First Name

Jason

Middle Name

Antony

Family Name

Byrne

B2. Qualifications

(Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Conferral Date	AQF Level	Degree/Award Title	Discipline/Field	Awarding Organisation	Country of Award
19/12/2007	Doctoral Degree	PhD	Geography	University of Southern California	United States of America
19/12/2007	Bachelor Honours Degree,Graduate Certificate, Graduate Diploma	Graduate Certificate	Geographic Information Science	University of Southern California	United States of America
15/12/2004	Bachelor Honours Degree,Graduate Certificate, Graduate Diploma	Graduate Certificate	Environmental Science, Policy and Engineering Sustainable Cities	University of Southern California	United States of America
16/12/1998	Bachelor Honours Degree,Graduate Certificate, Graduate Diploma	Bachelor of Arts (Hons.)	Urban and Regional Planning	Curtin University	Australia
07/03/1991	Bachelor Honours Degree,Graduate Certificate, Graduate Diploma	Bachelor of Arts (Hons.)	Anthropology	University of Western Australia	Australia

B3. Research Load (non-ARC Grants and Research)

(Provide details of research funding from non-ARC sources (in Australia and overseas). For research funding from non-ARC sources, list all projects/applications/awards/fellowships awarded or requests submitted involving that participant for funding for the years 2024 to 2030 inclusive.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Uploaded PDF file follows on next page.

B3. Research Load (non-ARC Grants and Research)

Funding from non-ARC sources

Description (All named investigators on any application or grant/fellowship in which the participant is involved, project title, source of support, scheme, and round)	**Same Research Area** (Yes(Y)/No(N))	**Support Status** (Requested (R) /Current (C)/ Past (P))	**Application/Project ID** (for NHMRC applications only)	**2024** $'000	**2025** $'000	**2026** $'000	**2027** $'000	**2028** $'000	**2029** $'000	**2030** $'000
Flies E, Sahajwalla V, Byrne JA, Anders RJ, Williamson G, Kendal DJ, Jones PJ, Johnston F, Marsh P, Vince JZ, Prahalad V	Y	C	n/a	50.5	50.5	50.5	50.5			
Byrne JA, Adams VM	Y	C	n/a	28.7						

B4. What will your time commitment be to research activities related to this project?

(Enter your time commitment to this project as a Full-Time Equivalent (FTE). Note that a FTE of 1.0 represents a full-time commitment (i.e. 5 days per week).

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

0.1

B5. Employment Details as at grant commencement date

(Confirm your employment status at all organisations that you will be associated with as at the grant commencement date. Enter the relevant appointment type and Full-Time Equivalent (FTE) for each organisation.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Org name	Is this an Eligible Organisation?	Please choose your appointment type for this organisation.	Please enter your FTE for this Organisation
University of Tasmania	Yes	Employee	0.8

B6. Relevant Organisation for this application as at grant commencement date for this project

(Enter the Organisation that is relevant to your participation on this application, and that you will be associated with as of 1 January 2025. The 'relevant organisation' is the primary organisation that will be supporting your involvement in this project if it is funded. Note that the Organisation must be listed in B5 for this question to validate.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Relevant Organisation

University of Tasmania

B7. Currently held ARC Projects

(This information is automatically populated from RMS. If you have any concerns with the information recorded here, please contact your Administering Organisation's Research Office.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Identifier	Investigators	Admin Organisation	Project Title	Funding	End Date	Final Report Due Date	Final Report Status
FT220100652	Prof Jason Byrne	University of Tasmania	Urban greening to protect vulnerable people and promote thermal equity	$1,059,390	31/12/2027	31/12/2028	Draft

B8. Research Opportunity and Performance Evidence (ROPE) - Current and previous appointment(s) / position(s) - during the past 10 years

(To update any details in this table, click on the 'Manage Employment Details' link in this question. Note this will open in a new browser tab. 'Refresh' the application page when returning to the form to capture changes made to the participant's profile. This data is automatically populated from the participant's RMS profile.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Description	Department	Contract Type	Employment Type	Start Date	End Date	Organisation
Professor of Human Geography and Planning	Geography and Spatial Sciences	Permanent	Full Time	16/12/2017		University of Tasmania
Associate Professor	Griffith School of Environment	Permanent	Full Time	01/01/2015	15/12/2017	Griffith University
Senior Lecturer	School of Environment, Urban and Environmental Planning	Permanent	Full Time	01/01/2010	31/12/2014	Griffith University

B9. Research Opportunity and Performance Evidence (ROPE) - Career Interruptions

(Note - The following fields will not be visible to assessors: From when; To when; FTE of career interruption and Interruption category. RMS will automatically calculate the total career interruption in the field 'Total Period of Career Interruptions which will be visible to assessors.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)
Has the participant experienced a significant interruption that has impacted on research opportunity?

Yes

Total Period of Career Interruptions

Researcher Prof Jason Byrne has reported a career interruption of 1 year and 7 months since 2006.

B10. Research Opportunity and Performance Evidence (ROPE) - Career Highlights

(Include up to 10 career highlights including a short context statement for each highlight, where relevant (up to 1,500 characters, approximately 200 words).

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

1. ARC Future Fellowship (2022) Urban greening to protect vulnerable people and promote thermal equity - $1,960,887
2. Awarded State Emergency Service grant (2021) for developing a rapid assessment tool and policy framework for improving heatwave resilience in Tasmania
3. Co-recipient National Environmental Research Program 2: Sustainable Communities and Waste Hub - NESP 2 (2021) $20,456,150
4. Recipient of Planning Institute Australia awards for cutting edge research (2014, 2015, 2017 & 2018)
5. Co-edited award-winning book on Australian Environmental Planning (2014) which is used nationally by Australian planning programs
6. Cutting-edge paper in top-ranked journal in field (2014) circa 4,000 citations - shaped international research agenda on environmental equity and greenspace
7. Associate Editor of Q1 field leading journal - Landscape and Urban Planning (2021-2024) - recognition of my standing in field internationally
8. PhD from University of Southern California on greenspace and environmental inequality (2007) working in Center for Sustainable Cities under mentorship of field-leading urban geographer Prof. Jennifer Wolch. Recipient of doctoral research citation.
9. Established NExUS research lab at University of Tasmania, with team of PhD students & a Post-Doc examining climate change, cities, and equity
10. Fellowship at Johns Hopkins University, USA researching environmental justice and greenspace (1999-2000), working with renowned geographer Prof. David Harvey

B11. Research Opportunity and Performance Evidence (ROPE) - Details of participant's career and contributions to the field, including evidence of high-quality outputs, collaboration and excellence in research training and mentoring (where appropriate).

(Provide details of the participant's research impact and contributions. This should not include information provided elsewhere in the application (up to 1,500 characters, approximately 200 words).

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

My top papers are among the most downloaded papers in the field, among the most highly cited in Landscape and Urban Planning and Urban Forestry and Urban Greening. My co-edited, multi-award winning, Australian Environmental Planning book advanced new directions. A co-developer of 'Just Green Enough' theory, I have pioneered paradigmatic urban planning, greenspace and environmental inequality research. Acclaimed environmental justice scholar Prof. Julian Agyeman stated that I am the 'go to scholar' for environmental justice and planning, especially my work on racialised landscapes (Social Science Research Council Insights, 2017). I have been named among the 'who's who' of environmental inequality scholars (Prof Frank Biermann, Copernicus Institute of Sustainable Development, 2020). The Conversation listed me as one of their top thinkers (2018). My research has informed UNICEF and the American Public Health Association, as well as being adopted by state and local government in Australia, guiding Infrastructure Australia, and the Health Department, Victoria.

B12. Research Opportunity and Performance Evidence (ROPE) - How many PhDs, Masters and Honours students that the participant has supervised have completed their degree?

(Provide total numbers under each category for completions where you have been the principal supervisor.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)
PhD student completions as principal supervisor:

8

Masters student completions as principal supervisor:

10

Honours student completions as principal supervisor:

14

B13. Research Opportunity and Performance Evidence (ROPE) - Research Output Context

(Research context - Provide clear information that explains the relative importance of the participant's research outputs in disciplinary context. This can include publication and citation metrics and other content relevant to the discipline (up to 1,500 characters, approximately 200 words).

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

I am an internationally recognised field leader in urban geography and planning. I am 16 years post-PhD and have more than 150 publications including peer-reviewed journal papers, co-edited books, book chapters, encyclopedia entries, and scientific reports and monographs. I am first author on 61 publications and senior author 30 others. My top 3 publications rank in the top 1% in my field; my top 5 in the top 2%. My Field Weighted Citation for T.1410 (Greenspace, green infrastructure & cultural ecosystem services) is 5.86 at 99.9 prominence percentile (2013-22) placing my work at the leading edge (SciVal metrics). I have 24 papers with more than 100 citations (GS 21/02/2024). My Google Scholar H-index is 43 with 14,013 citations; Scopus is H-31, 7,604 citations. Scopus captures fewer social science research outputs. I have published 24 articles in The Conversation with an international readership of 362,992. My research is applied, emphasising co-design with partners. For this reason, it has wide impact, and is adopted into policy and practice. For example, recent research on heat, inequality and urban greening has directly underpinned the City of Launceston's new urban greening strategy. The University of Tasmania provides excellent facilities, high end computing facilities, as part of the Climate Futures Institute of which I am a member, include a full suite of software including NVIVO and Leximancer (text analysis), SPSS statistical analysis software, and ARCGIS.

B14. Research Opportunity and Performance Evidence (ROPE) – Research Outputs Listing including Ten Career-Best Research Outputs

(Provide up to 10 research outputs and provide clear information regarding the research impact of the researcher's chosen career-best outputs. Mark the research outputs that are most relevant to this project categorised under the following headings: Authored books; Edited books; Book chapters; Refereed Journal articles; Fully refereed conference proceedings; Additional research outputs (including non-traditional research outputs and preprints or comparable resources). CVs and theses should not be included in this list. Each text box allows up to 150 characters, approximately 20 words annotation per output.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Research Outputs Listing

Generated research output document follows on the next page

Ten Career-Best Research Outputs

[1] * Steele, W, Hillier, J, MacCallum, D, Byrne, J & Houston, D 2021, 'Quiet Activism: Climate Action at the Local Scale', Palgrave Macmillan, Cham, Switzerland, DP150100299 (2015-2019) (Authored Book)

Research Outputs Annotation Co-authored book reporting findings from ARC DP research on environmental inequality, climate change and citizen responses in Australia's cities

[2] * Wolch, J, Byrne, J & Newell, J 2014, 'Urban green space, public health, and environmental justice: the challenge of making cities 'just green enough'', *Landscape and Urban Planning*, vol. 125, pp. 234-244, doi:10.1016/j.landurbplan.2014.01.017 (Refereed Journal Article)

Research Outputs Annotation Paradigm-changing paper charting new agenda for environmental justice research and theoretical framing for the greenspace paradox & social inequality

[3] * Baldwin, C, Matthews, T & Byrne, J 2020, 'Planning for older people in a rapidly warming and ageing world: The role of urban greening', *Urban Policy and Research*, vol. 38, no. 3, pp. 199-212, doi:10.1080/08111146.2020.1780424 (Refereed Journal Article)

Research Outputs Annotation One of the first papers reporting on challenges of heat for marginalised and disadvantaged communities in Australian cities, pointing to key issues

[4] * Ambrey, C, Byrne, J, Matthews, T, Davison, A & Portanger, C et al. 2017, 'Cultivating climate justice: green infrastructure and suburban disadvantage in Australia', *Applied Geography*, vol. 89, pp. 52-60, doi:10.1016/j.apgeog.2017.10.002 (Refereed Journal Article)

Research Outputs Annotation The first international study to identify suburban thermal inequity arising from city planning decisions

[5] * Byrne, J, Ambrey, C, Portanger, C, Matthews, T & Baker, D et al. 2016, 'Could urban greening mitigate suburban thermal inequity?: The role of residents' dispositions and household practices', *Environmental Research Letters*, vol. 11, no. 9, doi:10.1088/1748-9326/11/9/095014/meta (Refereed Journal Article)

Research Outputs Annotation A cutting edge study that identified how heat can impact suburbanites, not just city dwellers, and magnify social inequalities

[6] * Byrne, J & Houston, D 2014, 'Environmental justice in Australian cities' in Byrne, J, Sipe, N & Dodson, J (eds.), *Australian Environmental Planning: Challenges and Future Prospects*, Routledge, United Kingdom, pp. 206-218 (Book Chapter)

Research Outputs Annotation Chapter in my multi-award-winning book that identified the dimensions of environmental inequality in Australian cities and their causes

[7] * Byrne, J, Lo, A & Yang, J 2015, 'Residents' understanding of the role of green infrastructure for climate change adaptation in Hangzhou, China', *Landscape and Urban Planning*, vol. 138, pp. 132-143, doi:10.1016/j.landurbplan.2015.02.013 (Refereed Journal Article)

Research Outputs Annotation High impact paper in field-leading journal showing the dimensions of heat-equity planning and greening responses in China. Identified greening limits

[8] * Byrne, J & Wolch, J 2009, 'Nature, race, and parks: past research and future directions for geographic research', *Progress in Human Geography*, vol. 33, no. 6, pp. 743-765, doi:10.1177/0309132509103156 (Refereed Journal Article)

Research Outputs Annotation Highly cited paper in top-ranked journal, showing how environmental costs and benefits are produced though social, cultural and governance processes

[9] * Steele, W, MacCallum, D, Byrne, J & Houston, D 2012, 'Planning the Climate-just city', *International Planning Studies*, vol. 17, no. 1, pp. 67-83, doi:10.1080/13563475.2011.638188 (Refereed Journal Article)

Research Outputs Annotation Highly cited paper that laid the conceptual foundation for understanding environmental inequalities in Australian cities

[10] * Byrne, J 2021, 'Urbanisation: Towns and cities as sites of environmental (in)justice' in Coolsaet, B (ed.), *Environmental Justice: Key Issues*, Routledge, New York, pp. 193-206 (Book Chapter)

Research Outputs Annotation Invited chapter in acclaimed book - shows how processes of urbanisation lead to spatial and social distribution of environmental harms and benefits

B15. Is the participant applying for Teaching Relief?

(This is a 'Yes' or 'No' question.
(This question must be answered if the participant is a Chief Investigator)
• If you select 'Yes', you will be prompted to request the amount of Teaching Relief up to maximum of $50,000 per Chief Investigator for each requested year.
• Once saved, this information will populate to the budget question D1 where it can then be added to the budget table.

Note - This question was not included in the EOI application and must be answered if the participant is a Chief Investigator. Teaching relief is not available for Partner Investigators.)

No

B17. Partner Investigator – upload a CV in no more than one A4 page

(Provide a CV of up to one A4 page relevant to the project noting that Partner Investigators are not required to complete Research Opportunity and Performance Evidence (ROPE) questions B10 to B14. The PDF should not include qualifications, current and previous appointment(s)/position(s), employment or career interruptions as this will be automatically populated from your profile at questions B2, B8 and B9.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

No PDF file uploaded.

Part C - Project Description (DP250100794)

C1. Project Description

(Upload a Project Description as detailed in the Instructions to Applicants and in the required format. (Up to 7 A4 pages including references).

Note - This question was not included in the EOI application and must be answered.)

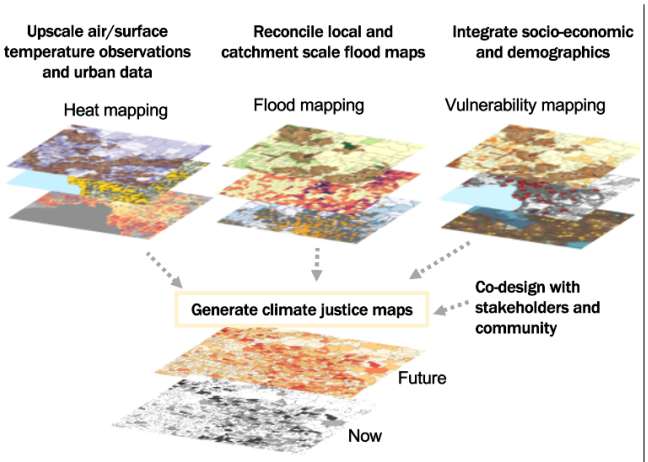
Uploaded PDF file follows on next page.

PROJECT TITLE

Mapping climate (in)justice in Australian cities: Compounding Risks of Heat and Flooding

PROJECT QUALITY AND INNOVATION

Climate hazards threaten people and livelihoods. Cities, where most Australians live, are especially vulnerable and exacerbate two hazards: urban heat and flooding. Heat is a silent killer, harming more Australians than any other natural disaster[1], while flooding accounts for the majority of disaster claims and costs the Australian economy $5 billion annually[2]. Both hazards are closely linked to how urban areas are developed and grow[1, 3], and they disproportionately impact the most vulnerable communities in Australian cities[4]. Despite the severity of these impacts, there remains a significant gap in understanding combined heat and flood risk (**multi-hazard assessment**) and linking them with the spatial variability of exposed populations, their vulnerability, and adaptive capacity (**climate risk assessment**).



These gaps are a major factor in assessing **urban climate injustice in Australian cities**, where the most vulnerable populations not only face greater exposure to climate hazards but also have less power and capacity to respond to these impacts. Quantifying and addressing this injustice is the core motivation behind the proposed project.
The project aims to provide the first high-resolution, multi-hazard mapping as a new approach to quantifying climate hazards in Australian cities, considering exposure to **both current and future heat and flooding** alongside urban characteristics and community profiles. To ensure high-impact outputs, the project will translate empirical results into practical interventions through policy co-design workshops with key stakeholders and the community.
This project asks **four important questions** about the current and future distribution of flood and heat hazards in Australian cities; the disproportionate impacts of these hazards on vulnerable populations now and into the future; and translating this knowledge into policy and decision-making. By integrating trans-disciplinary modelling and machine learning with co-design approaches, the project will equip decision-makers with a deeper understanding of where and how these climate injustices occur in urban areas, identifying necessary interventions to rectify them.

Motivation and background

Heat and flooding hazards in cities: now and future

As our cities grow, so does the amount of heat they trap. Changing natural surfaces to built materials directly alters local climates, creating a highly variable distribution of heat in urban areas. The location of the hot and cool spots across the city is then determined by urban form and fabric, such as density and vegetation cover, as well as geographic factors like distance from the coast and elevation. With over 90% of Australians living in towns and cities, urban heat is both deadly and costly, particularly for the 10 million people already residing in areas with high heat risks[5].

Urban structures, materials, and infrastructures also directly contribute to urban flooding by exacerbating surface runoff, accelerating river discharge rates, and triggering flash floods. These hazards come with high costs. The Insurance Council of Australia reported[6] $12.3 billion in claims during 2020-23 from storms and flooding, with 1 in 25 adult Australians making damage claims. The 2022 QLD/NSW flooding alone accounted for $4.3 billion in claims, the 4th most costly disaster in Australian history. In addition to health and economic impacts, flooding exposure is associated with increased long-term mortality risks (e.g., from mould, structural damage, and personal stress and hardship)[7].

Both of these hazards are expected to worsen due to climate change and future urban expansion. Australia's climate has warmed by over 1.2°C since 1910, and the number of heatwave days each year has increased in all major cities since 1950[8]. The higher frequency, intensity, and duration of heat events[9], compounded by urban heat islands[10], will be detrimental for Australian cities. Future healthcare costs due to heat in Sydney alone are projected to rise to over $390 and $500 million in 2030 and 2050, respectively[11]. Similarly, there is clear evidence of increasing short-duration rainfall extremes[12]. A high emissions scenario could result in a 30% increase in the costs of coastal flooding and storms. In cities, this will increase the frequency and severity of flooding[13], leaving urban populations in Australia

grappling with multiple, compounding hazards now and into the future[4].

What about people? From climate data to climate justice

Climate hazards in cities are triggers for negative impacts, but other factors determine the ultimate *risks* for people and infrastructure. Understanding the risks posed by these climate hazards requires knowledge of **who** is exposed, **how sensitive** they are to the impacts, and **what adaptive capacity** they have to respond. For example, in the context of urban heat, vulnerability arises when sensitive individuals[14] (such as the elderly and children) and infrastructure (such as poorly insulated buildings) are exposed to extreme heat[15]. Negative impacts follow when there is a lack of capacity to respond and adapt (e.g., inability to afford air conditioning or relocate[16]). **Placing people at the centre of climate risk assessments, and understanding their current and future exposure and vulnerability**, is key to achieving climate justice.

Climate justice refers to efforts to reduce the burden of climate change impacts on communities experiencing marginality and disadvantage. In Australia, this notion holds particular relevance as many climate extremes (e.g., flooding, heatwaves, storms), disproportionately affect communities with fewer resources to cope[17]. For example, heatwaves disproportionately harm older people, children, people with existing medical conditions and lower-income families who are less able to afford air-conditioning, cannot afford the cost of building retrofits (e.g., roof insulation, double-glazing) or may be renters and are thus unable to modify their homes. Floods and bushfires have a worse and longer-lasting impact on people without insurance. Flood impacts may be spread across more diverse populations, but people experiencing economic hardship and social exclusion will bear disproportionate costs. These impacts are acutely felt in towns and cities, where more than 90% of Australians live.

While understanding climate hazards in Australia is important, we need to move away from merely emphasising climate data and instead focus on climate justice. This involves recognising the simultaneous exposure to **multiple hazards compounded by the vulnerabilities of communities**, as well as considering the **projected changes** based on climate change and future population dynamics. This holistic approach is crucial in addressing the urgent need to mitigate the disproportionate impact of climate change on marginalised and disadvantaged populations in Australia.

Climate Justice in policy and planning

Advocates of climate justice seek to redress four aspects of inequity in exposure to environmental harm and access to environmental benefits: (i) distributive justice via actions to reduce the spatial distribution of harm; (ii) procedural justice via initiatives to make government policies and actions more transparent, accountable and inclusive; (iii) recognition justice, where environmental harms and the structural circumstances that created them (e.g., power imbalances, poverty) are recognised by government and decision-makers; and (iv) capabilities – acknowledging communities are not passive victims; they hold important knowledge about responding to impacts.

Scholarly work on the climate-just city is nascent and policy responses are relatively new. Operationalising the conceptions of justice has been challenging, but recently is in documents such as the UN Sustainable Development Goals, and national and local strategies and plans such as Australia's Strategy for Nature [18], the National Climate Resilience and Adaptation Strategy[19], and local government urban greening strategies. Justice is expressed in these documents as minimising exposure to harm and maximising access to benefits (distribution), enabling participation in governance and decision-making (procedural), explicitly recognising vulnerable communities and the processes that create them (recognition), and restoring life-sustaining ecosystem services (restoration). Together, these governance instruments are critical to reducing climate-change related harm, setting the underlying principles of the proposed project.

Mapping urban climate justice: limitations and future directions

Mapping flood and heat risk in cities is complex. First, there is a need for high-resolution and accurate datasets that account for the compounding effects of both hazards. Second, this information needs to be integrated with urban characteristics that influence exposure to heat and flooding, alongside community attributes that determine vulnerability. Third, comprehensive risk assessments are essential for addressing current challenges and anticipating future changes. Finally, this new information must be translated into policy, planning and decision-making to effect meaningful change[20, 21]. **Significant gaps** persist across all three areas, demanding immediate attention:

- Accurately mapping heat and flooding hazards remains a challenge, primarily due to the limitations of existing datasets and inadequate spatial coverage for informing high-resolution mappings. In the case of heat, spatial maps often come from satellite-sensed land surface temperatures (LST) which are of limited relevance to heat exposure of people[22, 23]. Similarly, fine-grained data representing flood hazards are consistently lacking across cities, as flood mapping is typically prepared on a catchment scale. This leads to variability in resolution and coverage due to misalignment with local government boundaries. In addition estimating high-resolution flood hazards for large river systems, such as the Hawkesbury-Nepean River, poses substantial computational challenges.

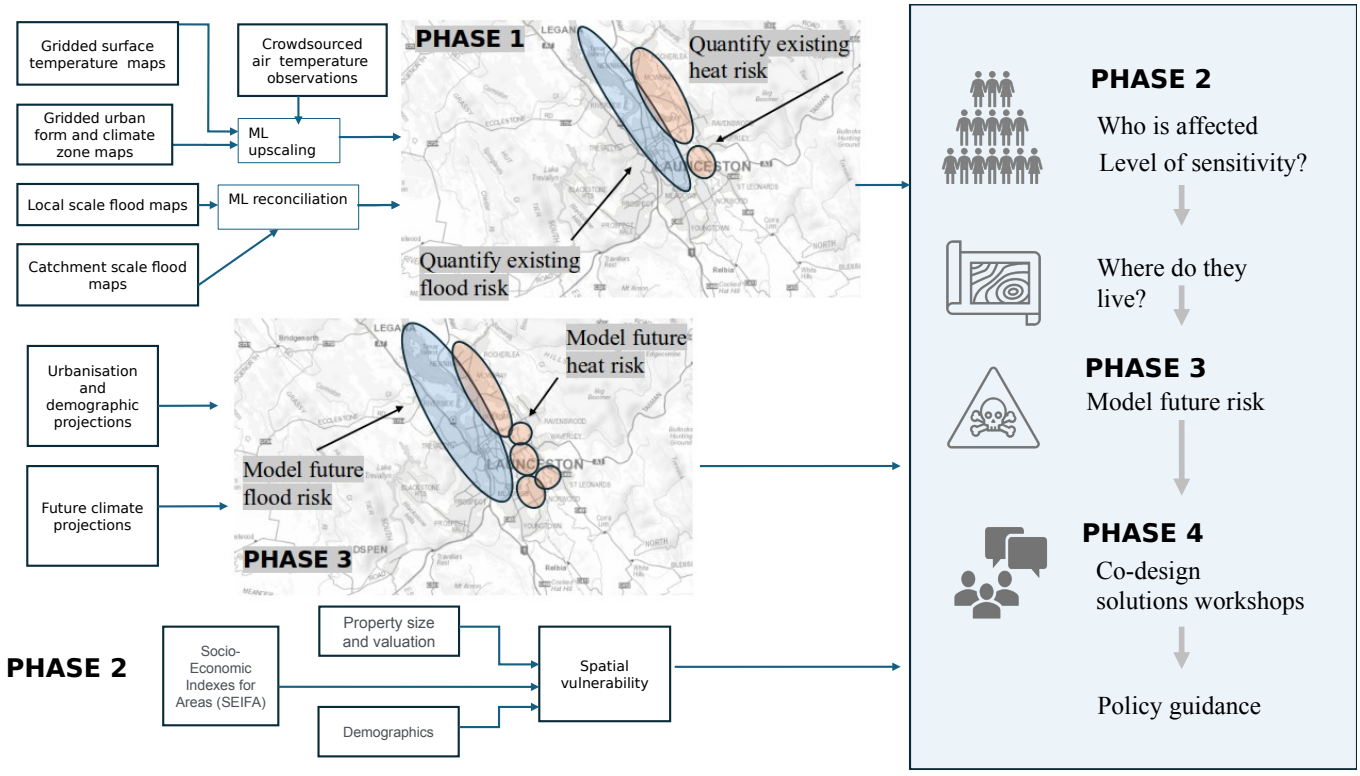


Figure 1: Schematic of the project framework, detailing proposed phases and their key elements.

• There are significant gaps in research focusing on the social science aspects of climate mitigation and adaptation[24]. This encompasses not only mapping hazards but also accurately overlaying these maps with population vulnerability. Achieving this requires integrating varying degrees of population sensitivity to hazards along with adaptive capacities. Factors like socioeconomic status, built environment infrastructure integrity, and population sensitivities contribute to the complex human response to climate hazards[25, 26]. However, planning policies and strategies in Australia often rely on census data which has limited information on exposure and vulnerabilities.

• The final gap is a lack of accurate data and spatial projections based on both climate change and future urban growth and population change. While downscaled climate models aim to provide estimates of future flood and heat risk, they often lack critical urban effects, operate at low resolutions, and have substantial biases. Additionally, predicting future risk based on future populations remains challenging. Planning instruments attempt to consider population change from census data and national projections based on current trends in natural increase and immigration. Few consider the spatial expression of social vulnerability to natural hazards over time, particularly based on dynamic models. Consequently, identifying neighbourhoods and communities that might experience both future vulnerability and exposure to heat and flood risk remains unknown.

This project aims to leverage innovative urban climate informatics methods, including ground-level citizen weather observations[27, 10] upscaled by machine learning (ML) algorithms to overcome the identified gaps in high-resolution heat mappings and reconciling previously incompatible flood mappings, to capture and develop spatial data on urban climate justice. Specifically, it proposes to address the following **research questions**:

1. Can the spatial variability of heat and flooding hazards in Australian cities be accurately mapped using emerging innovative sensing and ML methods?
2. Can spatial disadvantage and climate injustice in response to heat and flooding be effectively mapped by integrating population vulnerability (integrating demographic sensitivity and adaptive capacity) into hazard maps?
3. How are the spatial patterns of climate injustice in Australian cities expected to evolve in response to future urbanisation growth and projected climates and extremes?
4. How can new information about compounding risk be translated into policy, plans, and guidelines, with end users?

Project Design and Implementation Plan

Four research questions set out in this proposal will be addressed in four phases (Figures 1 and 2):

Phase 1 will address the first research question by generating present-day heat and flooding hazard maps for Australian

urban areas. This phase requires extensive dataset integration as well as the development of novel methodologies for climate hazard mapping in cities, therefore is supported by three team members: A research associate (RA Heat) focused on heat datasets (1 year 0.6 FTE), a PhD student (PhD Flood) focused on flood hazard mapping, and a post-doctoral research associate (PD Climate Justice) focused on Climate Justice mapping. Their contributions aligned with the proposed methodology are detailed here. A fourth team member (PhD Policy Co-design) will draw from the data generated during the first three phases to use in Phase 4.

Heat maps will be developed based on the datasets and methodology developed by CI Nazarian[10, 23, 28], leveraging quality-controlled, crowd-sourced citizen weather observations from cities across Australia. CI Nice has been collecting hourly observations (approximately 500 locations across the greater Sydney area, for example) from all the Australian capital cities since 2019. The upscaling of these data, along with other relevant sources, will employ machine learning (ML) algorithms, following the approach of CI Nice[29, 30] and will transform coarse mappings to a finer scale suitable for an SA2 scale impact analysis of the vulnerability. The integration, quality control, and accessibility of the urban heat datasets (including Land Surface Temperature and crowdsourced air temperature) will be supported by a research associate (RA Heat) at UNSW supervised by CI Nice and Nazarian.

For flooding risks, ML techniques will be employed to reconcile the differing scales between existing local and catchment flood hazard mapping (typically at 5-20 metres resolution based on hydrodynamic modelling) with the coarser resolution extreme rainfall data. The aim here is to develop a model that estimates flood impacts at the spatial scale of the heat impacts. This will allow the multi-hazard impacts to be combined in Phase 2. The integration of the rainfall data with the existing flood mapping is required to provide a homogeneous city-wide flood hazard assessment and as part of Phase 3 to translate the high resolution climate model rainfall simulations into flood hazards.

The rainfall data in the form of Intensity, Frequency, Duration (IFD) data, at a resolution of 2.5 kilometres, which was optimised to provide comprehensive information on extreme rainfalls at the national level rather than the scale of any particular catchment or city[31]. CI Johnson's earlier work on spatial disaggregation of climate model simulations suggests that factors representing loss of variance between spatial scales can be used to inform the relationships between the IFD data with the flood mapping[32]. Other inputs to the ML modelling will be high-resolution Digital Elevation Models, satellite-derived land cover which controls hydraulic roughness and Mean High Water Spring tide levels which control tailwater levels and hence backwater flood hazard. Random Forest models will be investigated based on their previous good performance in flood susceptibility mapping[33]. The flood hazard from the 1% Annual Exceedance Probability event will be assessed, focusing primarily on flood depth but also flood extents and velocities which together create the overall flood hazard. The focus of this phase will be limited to pluvial (i.e. rainfall driven) and fluvial (i.e. river driven) flood hazards as coastal flood hazard from erosion and storm surge is assessed differently from hydrological hazards. One of the key research questions to be answered in this phase is how to resolve temporal scaling questions with the flood mapping. For example the peak flood in small urban catchments can result from very short duration rainfall events. But such events can be embedded in larger flood-producing systems e.g. the so-called Pasha Bulker storm in 2007 led to major flash flooding in Newcastle CBD from thunderstorms that occurred within a wider extra-tropical cyclone system that led to main river flooding of the Hunter River over multiple days[34]. This temporal scale duality will be important to resolve in the mapping because it will need to be considered in Phase 3 when extracting and bias correcting the precipitation projections. This work has an extensive focus on novel methodologies for flood mapping and will be supported by a PhD student (PhD Flood) supervised by CI Johnson at UNSW.

Phase 2 will generate spatial vulnerability mapping through a combination of demographic and socio-economic statistics from Australian Bureau of Statistics census data[35] and other urban spatial datasets available through the Australian Urban Research Infrastructure Network (AURIN)[36]. Important factors contributing to population response and adaptation to heat and flooding[25, 26] include age, gender, language, literacy, income and economic status, assets, social support, housing status, education, community composition (including access to green or blue space, built conditions, pollution levels), access to social services (childcare, education, primary health), transportation infrastructure, and community health indicators. The intersection of hazards generated in Phase 1 with spatial vulnerability will be quantified to address the second research question. This work will be supported by a post-doctoral research associate (PD Climate Justice, 3 year 1.0FTE) at UNSW, who will also coordinate the overall synthesis of all the data collection and data generated in the previous and subsequent phases. They will be supervised by CI Nice and Nazarian.

Phase 3 will quantify future patterns of climate injustice that integrate climate projections together with anticipated changes in urbanisation and demographic profiles. Future climate projections will be generated through Coupled Model Intercomparison Project Phase 6[37, 38] (CMIP6) data. A future climate change signal is superimposed onto present-day time series and generated future heat hazard mapping via a 'morphing' process, shifting (in mean) and stretching (in minimum and maximum) the observed time series, changing both the mean and the variance[39, 40]. Future flood hazard maps will be generated by bias correcting the newly developed 4km resolution NARCliM 2.0

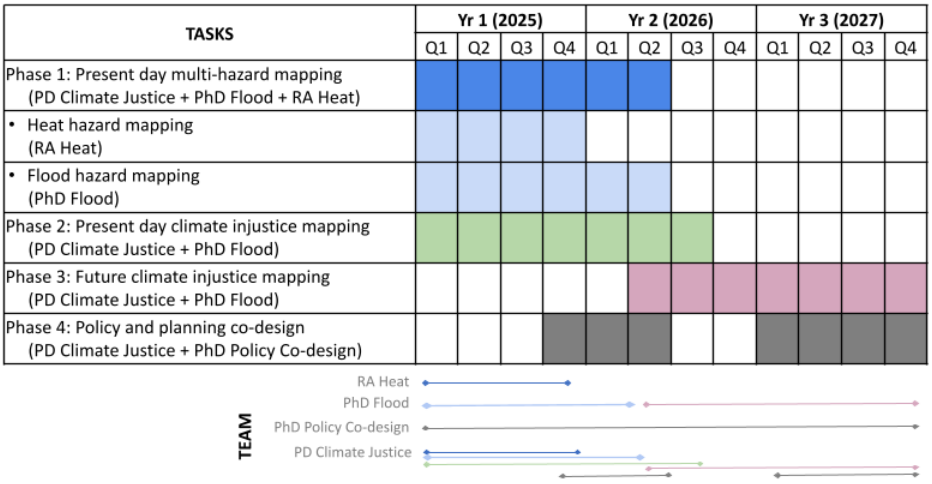


Figure 2: Project phases and allocation of team resources across the project.

rainfall simulations[41] for Brisbane and Tasmanian Climate Futures simulations at 10km resolution for Launceston to provide estimates of future IFDs combined with sea level rise projections and then using ML methods from Phase 1 to map the changes in IFDs into future flood hazards. ML methods are vital for this mapping due to non linearity in the catchment response to flooding. ML methods have been used to emulate high-resolution flood hazard assessments based on low-resolution models under historical climate conditions, but have not yet been used to estimate future flood risk where changes in both rainfall extremes and tailwater conditions will combine to add additional complexity to the problem[42].

Future urbanisation trends and demographic shifts will transform Phase 2 mappings of spatial vulnerability into future 2050 and 2080 projections that can be applied to analyse future hazard risks for the last research question. Existing population trends, derived from analysis of the last four census datasets (2006, 2011, 2016, 2021) will be used to forecast future locations of concentrated socio-economic disadvantage. ML will be used to predict the future spatial location of marginality and disadvantage, by using a suite of variables that currently shape vulnerability and disadvantage in Australian cities and suburbs. These include low-income, low-educational attainment, age, home-ownership/social housing tenancy, Indigeneity, poor health status, disability, unemployment, sole-parent household, and migrant with non-English speaking background. These variables will be combined with an analysis of 30-year strategic plans to identify future areas of greenfield and infill urban growth. Because historical processes can concentrate disadvantage in specific locations (e.g., cheaper housing in outer suburbs) we will use forecasting based on current trends coupled with collaborative back-casting from stakeholder/community workshops to quantify future vulnerability and risk. This work will be supported by PD Climate Justice and PhD Flood.

Phase 4 will synthesise the mappings of climate hazards and vulnerability from the previous three phases via multi-city co-design workshops with stakeholders and communities - covering the spectrum of built environments and vulnerabilities from a rapidly growing state capital (Sydney) to a smaller regional city (Launceston). From existing locales of concentrated disadvantage (identified via census data) a sample of community representatives will be drawn, and combined with representatives of peak bodies (e.g., planning, housing, development, community services) and decision-making agencies (e.g., state and local government) to participate in city workshops (60 participants). All CIs will leverage their extensive networks in these cities to recruit participants. These 1-day, 3 part workshops will begin by providing data on the physical risk analysis for heat and flooding, and how that changes over time, presenting this to participants in plain language. Using a guided scenario approach, in part 2 participants will then be asked to start from the future state of the cities in 2050, and work back to the present, identifying key steps that will need to be taken to minimise future risk of heat and flooding (backcasting). This will inform policy recommendations developed in part 3, where community, stakeholders, and decision-makers will formulate options to overcome inequities. Co-design approaches can overcome path dependence in planning systems through stakeholder buy-in, integrating local knowledge, and generating novel solutions. An ethics approval will be obtained and participants will sign informed consent documents. Workshops will be recorded using digital recorders, transcribed by a third party, and transcripts anonymised. Transcripts will be checked by attendees. Thematic content analysis will be undertaken using NVIVO and Leximancer software, drawing on published methods used by CI Byrne. This work will be supported by PD Climate Justice and a PhD student (PhD Policy Co-design) at UTAS supervised by CI Byrne to assist with translating key findings into policy. That PhD will undertake a systematic review of the international literature on backcasting in natural hazards policy development. They

will assist in developing visioning scenarios for the co-design workshops and with running the workshops. The student will help analyse workshop participants' feedback and recommendations. And they will play a role in communicating outcomes, such as preparing draft infographics.

Use Cases: The four phases outlined will be applied to three urban areas in Australia, each representing distinct use cases characterised by varying gradients of heat and flooding due to their climate background, urban characteristics, and experienced climate hazards. One of the objectives is to encompass not only major cities in Australia that have been the focus of many climate risk studies (such as Sydney and Melbourne) but also to conduct vulnerability assessments in smaller urban areas (such as Launceston). Furthermore, different urban areas experience varying levels of heat and flooding, with different emphasis given to each hazard, and these impacts are spatially non-uniform. Comparing different use cases is key to developing more comprehensive methodologies for climate justice mapping. The selection of the use cases will be finalised in the first quarter of year 1, taking these considerations into account and detailing how the findings can be scaled to all Australian urban areas in the future.

BENEFIT

Australia faces many challenges from climate hazards. Heat is the most dangerous natural hazard[43] whilst the 2022 floods in Queensland and NSW led to damages of almost $6 billion. For both heat and flooding, these impacts are disproportionately experienced by vulnerable populations[44]. Future climate change will only intensify those impacts[45]. Mitigation and adaptation to these changes require both knowledge about the hazards and the ability to locate people who will be most impacted by these hazards[46]. In addition, as a problem that spans multiple disciplines - climate, hydrology, demographics, population health, and urban planning, a trans-disciplinary approach is needed. The methodologies developed in this project not only develop data specific to the main research questions for this project, mapping heat and flooding climate hazards along with maps of spatial disadvantage, but provide a general framework to link climate hazards to the inequitable impacts under shifts in urbanisation growth and future climate conditions.

The research directly addresses the **Australian Government's Science Research Priority** in Environmental Change. Priority 4 from the draft National Science and Research Priorities (September 2023) is to build a stronger, more resilient nation. Specifically, this priority aims for research to develop and apply new methods for cities and towns to prepare for and adapt to the impact of climate change. The proposed project is clearly aligned with this priority through its integrated multi-hazard mapping of climate impacts. The project directly addresses the **Australian Government's draft National Urban Policy** (May, 2024) goals to make cities more liveable, equitable, productive, sustainable and resilient, recognising heat as a national urban problem, and the critical need for evidence-based, collaborative policy.

The result of this project will enable high-resolution mapping of urban-induced climate hazards across all Australian urban areas. Integration of population-level vulnerabilities will identify patterns of spatial disadvantage and communities subjected to climate injustice and provide guidance to how best mitigate impacts of climate hazards and quantify the contribution of urban-induced climate hazards to climate injustice. Additionally, projections of shifting spatial patterns will account for changes in demographics, future urbanisation, and a changing climate.

The **participating institutions** in this project are exceptionally well equipped to support the work. UNSW hosts both the ARC Centre for Excellence in Climate Extremes and the ARC Training Centre for Data Analytics for Resources and Environments, has world class high performance computing facilities, and a large pool of suitable HDR candidates and research assistants to recruit for the heat and flood mapping phases of this project. The School of Geography, Planning, and Spatial Sciences at the University of Tasmania specialises in complex human-environment interactions and is uniquely placed to support the vulnerability mapping and climate justice phases. As a result, the cost-effectiveness of this project ensures excellent value for money. Extra costs are very minimal and the funding will largely be applied to support the personnel costs and student stipends to generate and deliver the research.

Increasingly governments are looking to alleviate climate change impacts by using better predictive models that allow first responders to prioritise efforts during disasters and planners and urban managers to identify areas that are at higher risk, and to take steps to mitigate that risk to reduce the impact of natural hazards. For example, improving flood mapping can increase awareness among residents that their neighbourhoods are flood prone. Water sensitive urban design interventions such as swales, detention basins and permeable paving seek to reduce stormwater runoff. In rarer cases managed retreat by moving at-risk populations away from highly flood prone areas, such as the town of Grantham in the Lockyer Valley, Queensland have also occurred. So too has buy-back of houses in highly flood-prone areas such as Lismore, NSW. But governments still struggle to identify the co-location of populations experiencing socio-economic marginality and disadvantage and climate change related extreme events. A particularly vexing question is how to predict future risk based on future populations, a task taken up by this project.

COMMUNICATION OF RESULTS

Research outputs will target scholarly, public and stakeholder/policy audiences.

Scholarly outputs: As a multi-disciplinary project, the outputs will be published in a range of top ranked peer-reviewed journals across urban climates and modelling (e.g. Science of the Total Environment, Urban Climate, Geoscientific Model Development), hydrology (e.g. Journal of Hydrology), human geography (e.g. Dialogues in Human Geography, Environmental Research Letters), urban planning (e.g. Environment and Planning B), and data publishing (e.g. Earth Systems Science Data, Scientific Data). Topics covered will include methodologies for urban heat mapping (present-day and future predictions) and methodologies for mapping flooding risks. The use of each of these methods and their application to spatial vulnerabilities will result in additional academic outputs. Implications to urban planning and climate injustice will follow from those. Finally, datasets generated by this project will be published as open datasets.

Public outputs: A dedicated project website will collect and host the data and articles and reports to make all of these project outputs publicly and freely available. Publication of scientific summaries and opinion pieces in venues such as the Conversation will help provide access to the project insights to a lay audience.

Stakeholder outputs: The data and the methods generated by this project will help inform adaptation of urban planning policies to guide future development away from high risk areas and to retrofit cities to reduce risk and bolster resilience through workshops and consultations to engage practitioners. Other outputs will include stakeholder presentations, policy briefing notes, public reports in plain English, infographics, and guidelines. Finally, the overall methodologies created in this project will be generic enough to be applied across multiple locations and utilising the project team's international collaborative networks, will seek other international locations to provide climate justice assessments.

REFERENCES

[1] **Nazarian, N**. et al. **Integrated Assessment of Urban Overheating Impacts on Human Life**. *Earth's Future*, 2022. [2] Department of Veteran's Affairs. Eastern Australian floods generated a whopping $4.7 billion in industry loss. 2022. [3] B. Feng et al. Urbanization impacts on flood risks based on urban growth data and coupled flood models. *Natural Hazards*, 2021. [4] Australian Government Bureau of Meteorology. State of the Climate 2022, 2022. [5] KPMG. 38% of Australians face high risk from extreme heat. 2024. [6] Insurance Council of Australia. Three-year weather bill reaches $12.3 billion, 2021. [7] Y. Wu et al. Floods and cause-specific mortality in the UK. *BMC Medicine*, 2024. [8] R. Trancoso et al. Heatwaves intensification in australia. *Sci Total Environ*, 2020. [9] S. E. Perkins et al. Increasing frequency, intensity and duration of observed global heatwaves and warm spells. *Geophys. Res. Lett.*, 2012. [10] J. Potgieter, **Nazarian, N.**, et al. **Combining High-Resolution Land Use Data With Crowdsourced Air Temperature to Investigate Intra-Urban Microclimate**. *Front Environ Sci*, 2021. [11] M. Tong et al. Heat-attributable hospitalisation costs in Sydney. *Urban Clim*, 2021. [12] L. Jayaweera, **Johnson, F.**, et al. **Non-stationarity in extreme rainfalls across Australia**. *J Hydrology*, 10.1016/j.jhydrol.2023.129872:129872, 2023. [13] K. Alexander et al. Can integrated green spaces and storage facilities absorb the increased risk of flooding. *J Hydrology*, 2019. [14] C. Baldwin, T. Matthews, and **Byrne, Jason**. **Planning for Older People in a Rapidly Warming and Ageing World**. *Urban Policy and Research*, 2020. [15] **Byrne, JA.** et al. **Could urban greening mitigate suburban thermal inequity?** *Environ. Res. Lett.*, 2016. [16] C. Ambrey, **Byrne, JA.**, et al. **Cultivating climate justice: Green infrastructure and suburban disadvantage in Australia**. *Applied Geography*, 2017. [17] J. Hillier, **Byrne, JA.**, et al. **Climate justice in the Australian City**. In *State of Australian Cities*, 2013. [18] Australia's Nature Hub. Australia's Strategy for Nature 2019-2030, 2019. [19] Australian Department of Climate Change, Environment, Energy, and Water. National Climate Resilience and Adaptation Strategy, 2024. [20] W. Steele, **Byrne, JA.**, et al. **Planning the Climate-just City**. *Interl Plan Studies*, 2012. [21] N.J.L. Rogers, **Byrne, JA.**, et al. **Factors affecting the mainstreaming of climate change adaptation in municipal policy and practice**. *Climate Policy*, 2023. [22] A. Martilli, ES. Krayenhoff, and **Nazarian, N. Is the Urban Heat Island intensity relevant for heat mitigation studies?** *Urban Clim*, 2020. [23] M. Naserikia, **Nazarian, N.**, **Nice, KA.**, et al. **Land surface and air temperature dynamics**. *Sci Total Environ*, 2023. [24] I. Overland et al. The misallocation of climate research funding. *Energy Research & Social Science*, 2020. [25] D. Johnson et al. Measuring Social Vulnerability to Climate Change at the Coast. *Water*, 2023. [26] A. Li et al. Mapping social vulnerability indicators to understand the health impacts of climate change. *Lancet Planet Health*, 2023. [27] D. Fenner. *Heatwaves and urban thermal climates in Berlin, Germany*. Phd, 2020. [28] MJ. Lipson, **Nazarian, N.**, **Nice, KA.**, et al. **A Transformation in City-Descriptive Input Data for Urban Climate Models**. *Front Environ Sci*, 2022. [29] JS. Wijnands, **Nice, KA.**, et al. **The impact of the COVID-19 pandemic on air pollution**. *Atmos Pollut Res*, 2022. [30] O. Brousse et al. Spatially-explicit correction of simulated urban air temperatures using crowd-sourced data. *J Appl Meteorol Clim*, 2023. [31] **Johnson, F.** et al. **Topographic relationships for design rainfalls over Australia**. *J Hydrology*, 2016. [32] J. Nahar, **Johnson, F.**, et al. **A rank-based approach for correcting systematic biases in spatial disaggregation of coarse-scale climate simulations**. *J Hydrology*, 2017. [33] N. Gharakhanlou et al. Flood susceptible prediction through the use of geospatial variables and machine learning methods. *J Hydrology*, 2023. [34] **Johnson, F.** et al. **Natural hazards in Australia: floods**. *Climatic Change*, 2016. [35] Australian Bureau of Statistics. 2021 Census Community Profiles, 2021. [36] CJ. Pettit et al. The Online What if? Planning Support System. *Applied Spatial Analysis and Policy*, 10.1007/s12061-015-9133-7, 2015. [37] V. Eyring et al. Overview of the Coupled Model Intercomparison Project Phase 6 (CMIP6). *Geosci Model Dev*, 2016. [38] **Nice, K. A.** et al. **Present day and future urban cooling enabled by integrated water management**. *Front Sustain Cities*, 2024. [39] S. E. Belcher et al. Constructing design weather data for future climates. *Building Serv Eng Res Technol*, 2005. [40] J. Pulkkinen et al. Near- and medium-term hourly morphed mean and extreme future temperature datasets. *Data in Brief*, 2021. [41] J. Li, **Johnson, F.**, et al. **Addressing the mischaracterization of extreme rainfall in regional climate model simulations**. *J Hydrology*, 2018. [42] N. Fraehr et al. Supercharging hydrodynamic inundation models for instant flood insight. *Nature Water*, 2023. [43] ED. Coffel et al. Temperature and humidity based projections of a rapid rise in global heat stress exposure during the 21st century. *Environ Res Lett*, 2018. [44] N. Nicholls et al. A simple heat alert system for Melbourne, Australia. *Intl J of Biometeol*, 2008. [45] IPCC. *Climate Change 2022: Impacts, Adaptation, and Vulnerability*. Cambridge University Press, 2022. [46] Productivity Commission. Natural Disaster Funding Arrangements, Canberra. Technical report, 2014.

C2. Capability Statement

(Describe the investigator or team's capability in up to 3,000 characters, approximately 400 words, to deliver the project described in this application. Consider the alignment between skills and project design, capacity to deliver outcomes, and composition of the team (if relevant).

Note - This question was not included in the EOI application and must be answered.)

The investigator team assembled for this project is exceptionally qualified to execute the proposed research requiring interdisciplinary datasets and methodologies. Our collective expertise spans climate science, flood hazards, urban geography, and urban planning, and most crucially the use of novel data sources and machine learning.

Heat mapping will be led by CIs Nice and Nazarian, established urban climate scientists with extensive experience in urban heat assessments and urban climate informatics, including machine learning, data analysis, and innovative data sources like quality-controlled weather stations with active collaborations and co-publications, including contributions to the Western Sydney Region of Councils Cool Suburbs rating and assessment tool for building heat resilience in urban development.

CI Nice has published research utilising ML in career-best outputs #7 (air pollution prediction), #8 (sky detection in imagery), and #9 (neural network clustering of urban design typologies). CI Nazarian, one of the four experts who established the field of urban climate informatics (UCI), has notable ML contributions in career-best outputs #4 (review of ML in UCI) and #8 (land cover analysis). CIs Nazarian and Nice will supervise the RA Heat, focused on urban heat data integration and quality control.

CI Johnson, internationally recognised for her leading research in rainfall extremes, flood hazards, and humanitarian engineering, is best known for designing methods to remove biases, enabling impact-relevant climate change assessments directly relevant to this project and a CI in the ARC Training Centre for Data Analytics for Resources and Environments as the water domain lead working with industry partners on integrating data science methods into their operations. She will lead the reconciliation of scales in existing flood hazard mapping and develop new methodologies to project these mappings into the future and will supervise a PhD student (PhD Flood) at UNSW to assist with this research.

CI Byrne, a Future Fellow, has extensive research record in population vulnerability and inequity, as well as public policy and environmental planning. He will lead the phase to map climate hazards to spatial population demographic vulnerabilities and urban planning policies constraining potential adaptation and mitigation. CI Byrne has demonstrated policy expertise (e.g., stakeholder engagement for the City of Launceston urban greening strategy) and research outputs in environmental justice (#2), environmental planning (#9) and natural hazards (#4). He will supervise a PhD student (PhD Policy Co-design) at UTAS.

A 1.0FTE 3-year post-doctoral researcher (PD Climate Justice) will coordinate the synthesis of mappings involving UCI and ML and assessment of the present and future climate hazards across Australia's urban and rural populations and climate typologies under the direction of the project CIs.

Part D - Project Cost (DP250100794)

D1. What is the proposed budget for your project?

(There are rules around what funds can be requested from the ARC. You must adhere to the scheme specific requirements listed in the Grant Guidelines. Refer to the Instructions to Applicants for detailed instructions on how to fill out the budget section.

Note: This question was not included in the EOI application and must be answered.)

Total requested budget: $810,675

Year 1

Description	ARC	Admin Org		Other Eligible Org	
	Cash	Cash	In-kind	Cash	In-kind
Total	309,274		59,551		131,613
Personnel	286,432		59,551		127,537
CI Nice, 0.3FTE, Level C1-C3			59,551		
CI Nazarian, 0.2FTE, Level C4-6					42,487
CI Johnson, 0.2FTE, Level D4					51,301
CI Byrne, 0.1 FTE, Level E					26,687
Research Associate, Level A1, 0.6FTE (UNSW)	68,068				
Research Associate, Level A8-B2, 1.0FTE (UNSW)	153,940				
HDR (Higher Degree by Research stipend)	32,212				5,472
HDR (Higher Degree by Research stipend)	32,212				1,590
Travel	14,842				
Total Travel Costs	14,842				
Equipment					750
Total Equipment Costs					750
Other	8,000				3,326
Total Other Costs	8,000				3,326

Year 2

Description	ARC	Admin Org		Other Eligible Org	
	Cash	Cash	In-kind	Cash	In-kind
Total	248,341		61,378		136,560
Personnel	226,477		61,378		130,234
CI Nice, 0.3FTE, Level C1-C3			61,378		
CI Nazarian, 0.2FTE, Level C4-6					43,636
CI Johnson, 0.2FTE, Level D4					51,301
CI Byrne, 0.1 FTE, Level E					27,221
Research Associate, Level A8-B2, 1.0FTE (UNSW)	162,053				
HDR (Higher Degree by Research stipend)	32,212				5,472
HDR (Higher Degree by Research stipend)	32,212				2,604

Travel	10,326				3,000
Total Travel Costs	10,326				3,000
Field Research	3,538				
Total Field Research Costs	3,538				
Other	8,000				3,326
Total Other Costs	8,000				3,326

Year 3

Description	ARC	Admin Org		Other Eligible Org	
	Cash	Cash	In-kind	Cash	In-kind
Total	253,060		63,198		173,065
Personnel	232,549		63,198		169,739
CI Nice, 0.3FTE, Level C1-C3			63,198		
CI Nazarian, 0.2FTE, Level C4-6					44,787
CI Johnson, 0.2FTE, Level D4					51,301
CI Byrne, 0.1 FTE, Level E					27,221
Research Associate, Level A8-B2, 1.0FTE (UNSW)	168,125				
HDR (Higher Degree by Research stipend)	32,212				24,314
HDR (Higher Degree by Research stipend)	32,212				22,116
Travel	10,173				
Total Travel Costs	10,173				
Field Research	2,338				
Total Field Research Costs	2,338				
Other	8,000				3,326
Total Other Costs	8,000				3,326

Other Eligible Organisation

Organisation	Year 1		Year 2		Year 3	
	Cash	In-kind	Cash	In-kind	Cash	In-kind
The University of New South Wales		99,260		103,409		120,402
University of Tasmania		32,353		33,151		52,663
Total		131,613		136,560		173,065
Committed Total		131,613		136,560		173,065

D2. Justification of funding requested from the ARC

(Fully justify, in terms of need and cost, each budget item requested from the ARC. Use the same headings as in the Description column in the above Budget Table in this application (upload a PDF of up to 3 A4 pages and within the required format).

Note - This question was not included in the EOI application and must be answered.)

Budget Justification

Uploaded PDF file follows on next page.

D2. Justification of funding requested from the ARC

Personnel, $292,720 (yr1) | $233,865 (yr2) | $241,137 (yr3)

PhD Flood: HDR PhD (Higher Degree by Research Stipend): $32,212 (yr1) | $32,212 (yr2) | $32,212 (yr3).
A PhD student will be funded for 3 years at UNSW in order to complete the flood hazard mapping tasks set out in Phase 1 and will be primarily supervised by CI Johnson. The final 1/2 year will be funded by UNSW (details in D3).
RA Heat: Research Associate Fixed term A.1, 0.6 FTE: $68,068 (yr1) | $0 (yr2) | $0 (yr3). A research assistant will be funded for 1 year at UNSW (0.6 FTE A.1) in order to complete the heat hazard mapping and will be primarily supervised by CI Nice and CI Nazarian.
PD Climate Justice: Research Associate Fixed term A.8-B.2, 1.0 FTE: $153,940 (yr1) | $162,053 (yr2) | $168,125 (yr3). A postdoctoral research associate will be funded for 3 years to coordinate the synthesis of the climate hazard mapping with spatial vulnerabilities. They will work with the 2 PhD students and the RA, as they will be responsible for the overall coordination of the project's overall analysis and results. They will need to be proficient in machine learning and spatial analysis. They will also be responsible for literature reviews, publications, and other project outputs. They will be primarily supervised by CI Nice and CI Nazarian.
PhD Policy Co-design: HDR PhD (Higher Degree by Research Stipend): $32,212 (yr1) | $32,212 (yr1) | $32,212 (yr3). A PhD student will be funded for 3 years at UTAS to complete the spatial vulnerability mapping and will be primarily supervised by CI Byrne. The final 1/2 year will be funded by UTAS (details in D3).

Travel, $14,842 (yr1) | $10,326 (yr2) | $10,173 (yr3)

Year 1 expenses include travel to an international conference for CI Nice and CI Nazarian. Itemised expenses include:
International conference, registration fee: $3,500. CI Nice and CI Nazarian will attend an international climate conference to present heat hazard mapping findings. Registration fee ($1,750 each) required to attend and present.
International conference, accommodation, 7 nights @ $250/night: $3,500. CI Nice and CI Nazarian will attend an international climate conference to present heat hazard mapping findings.
International conference, per diem, 7 days @ 70% of $290/day: $2,842. Per diem rates are requested at the standard 'Category 5' ATO rate for CI Nice and CI Nazarian to cover meals and incidentals.
International conference, return economy airfare: $5,000. For CI Nice and CI Nazarian. Airfare estimates are based on the University's Price Guide for international flights.

Year 2 expenses include travel to an international conference for CI Johnson and expenses for a hybrid stakeholder / community workshop in Sydney. Itemised expenses include:
International conference, registration fee: $1,750. CI Johnson will attend an international climate conference to present flood hazard mapping findings. Registration fee required to attend and present.
International conference, accommodation, 7 nights @ $250/night: $1,750. CI Johnson will attend an international climate conference to present heat hazard mapping findings.
International conference, per diem, 7 days @ 70% of $290/day: $1,421. Per diem rates are requested at the standard 'Category 5' ATO rate for CI Johnson to cover meals and incidentals.
International conference, return economy airfare: $2,500. For CI Johnson. Airfare estimates are based on the University's Price Guide for international flights.
Hybrid workshop, return economy airfare: $2,000. For CI Byrne. Airfare estimates are based on the University's Price Guide for domestic flights.
Workshop accommodation (2 nights, Sydney rates) 2 nights @ $257/night: $514. CI Byrne will conduct hybrid workshop.
Workshop per diem (3 days @70% $186/day Sydney rates): $390. CI Byrne will conduct hybrid workshop.

Year 3 expenses include travel to an international conference for CI Byrne and expenses for a hybrid stakeholder / community workshop in a regional city. Itemised expenses include:
International conference, registration fee: $1,750. CI Byrne will attend an international climate conference to present climate inequity findings. Registration fee required to attend and present.
International conference, accommodation, 7 nights @ $250/night: $1,750. CI Byrne will attend an international climate conference to present climate inequity findings.
International conference, per diem, 7 days @ 70% of $290/day: $1,421. Per diem rates are requested at the standard

'Category 5' ATO rate for CI Byrne to cover meals and incidentals.
International conference, return economy airfare: $2,500. For CI Byrne. Airfare estimates are based on the University's Price Guide for international flights.
Hybrid workshop, return economy airfare: $2,000. For CI Byrne. Airfare estimates are based on the University's Price Guide for domestic flights.
Workshop accommodation (2 nights, regional city rates) 2 nights @ $207/night: $414. CI Byrne will conduct hybrid workshop.
Workshop per diem (3 days @70% $161/day regional city rates): $338. CI Byrne will conduct hybrid workshop.

Field Research: $0 (yr1) | $3,538 (yr2) | $2,338 (yr3)
Year 2 expenses for include costs for a workshop in Sydney conducted by CI Byrne. Itemised expenses include:
Stakeholder workshop: $2,800. CI Byrne will hold a research and stakeholder hybrid workshop in Sydney for 60 participants. Funding for venue hire and catering ($1000 and 1800).
Workshop transcription: $738. Funds are requested for transcription of workshops. Costs are based on Transcript Divas standard rate (transcriptdivas.com.au), an allowance for background noise, multiple speakers, and English as a second language. $2.90 p/m + .50 (multi-speaker) + .30 (noise) + .40 ESL = $4.10 p/m x 180 mins

Year 3 expenses for include costs for a workshop in a regional city conducted by CI Byrne. Itemised expenses include:
Stakeholder workshop: $1,600. CI Byrne will hold a research and stakeholder hybrid workshop in a regional city for 60 participants. Funding for venue hire and catering ($400 and 1200).
Workshop transcription: $738. Funds are requested for transcription of workshops. Costs are based on Transcript Divas standard rate (transcriptdivas.com.au), an allowance for background noise, multiple speakers, and English as a second language. $2.90 p/m + .50 (multi-speaker) + .30 (noise) + .40 ESL = $4.10 p/m x 180 mins

---

Other, $8,000 (yr1) | $8,000 (yr2) | $8,000 (yr3)
Open access publication fees: $24,000. Fees ($4000 each) related to two publications per year in a highly reputable academic journal. Fees vary across different journals, but some example fees for potential publication venues include Geoscientific Model Development (Copernicus Publishing) 2,900 USD (4,300 AUD), Science of the Total Environment (Elsevier) 3,990 USD (5,800 AUD), or Landscape and Urban Planning (Elsevier) 3,120 USD (4,600 AUD). Six total publications are planned for the three years.

D3. Details of non-ARC contributions

(Provide an explanation of how non-ARC contributions will support the proposed project. Use the same headings as in the Description column in the Budget Table of this application (upload a PDF of up to 2 A4 pages and within the required format).

Note - This question was not included in the EOI application and must be answered.)

Details of Non-ARC Contributions

Uploaded PDF file follows on next page.

D3. Details of non-ARC contributions

The total in-kind contribution from participating organisations is **$625,365**: $184,127 from the **University of Melbourne**, $323,071 from **UNSW**, and $118,167 from the **University of Tasmania**.

The **University of Melbourne**'s in-kind contribution breakdown is as follows:
Personnel:
CI Nice (0.3FTE, Level C1-3): $59,551 (yr1) | $61,378 (yr2) | $63,198 (yr3).
CI Nice will commit 0.3FTE to this project. The University of Melbourne will fund the salary contribution including on-costs for the three years of the project. CI Nice is an urban climate scientist at the University of Melbourne and specialises in modelling urban heat, urban heat mitigation with vegetation and water, and the use of machine learning and computer vision in urban system modelling. He will lead and coordinate the overall project and provide expertise in urban heat hazards and spatial analysis. He will also co-supervise the research associate (RA Heat) at UNSW and the post-doctoral research associate (PD Climate Justice) at UNSW along with CI Nazarian.

The **UNSW**'s in-kind contribution breakdown is as follows:
Personnel:
CI Nazarian (0.2FTE, Level C4-6): $42,487 (yr1) | $43,63 (yr2) | $44,787 (yr3).
CI Nazarian will commit 0.2FTE to this project. UNSW will fund the salary contribution including on-costs for the three years of the project. CI Nazarian is an urban climate scientist at UNSW and specialised in climate and built environment interactions and climate impacts of urban populations. She will lead the work on urban heat hazard mapping. She will also co-supervise the research associate (RA Heat) at UNSW and the post-doctoral research associate (PD Climate Justice) at UNSW.
CI Johnson (0.2FTE, Level D4): $51,301 (yr1) | $51,301 (yr2) | $51,301 (yr3).
CI Johnson will commit 0.2FTE to this project. UNSW will fund the salary contribution including on-costs for the three years of the project. CI Johnson is the director of the Water Research Centre at UNSW in the School of Civil and Environmental Engineering and specialises in statistical hydrology, especially around flooding and extreme events. She will lead the work on flood hazard mapping. She will also supervise the PhD student (PhD Flood) at UNSW.
PhD Flood: HDR PhD (Higher Degree by Research Stipend): $5,472 (yr1) | $5,472 (yr2) | $24,314 (yr3).
A PhD student will be funded for 3 1/2 years at UNSW in order to complete the flood hazard mapping tasks set out in Phase 1 and will be primarily supervised by CI Johnson. UNSW will provide stipend top-up for the three years above the yearly ARC $32,212 funding and cover the stipend of the final 1/2 year of the 3 1/2 year PhD ($18,842 included in the year 3 total).
Travel:
PhD conference travel grant: $3000 (yr2).
UNSW will contribute a $3000 Development and Research Training Grant through the School of Civil and Environmental Engineering to support conference travel and conference fees for the HDR PhD (Higher Degree by Research Stipend) (PhD Flood) PhD student in year 2.

The **University of Tasmania**'s in-kind contribution breakdown is as follows:
Personnel:
CI Byrne, (0.1 FTE, Level E): $26,687 (yr1) | $27,221 (yr2) | $27,221 (yr3).
CI Byrne will commit 0.1FTE to this project. University of Tasmania will fund the salary contribution including on-costs for the three years of the project. Note, CI Byrne is currently appointed as 0.8FTE funded through a ARC Future Fellowship at UTAS. CI Byrne is a Professor of Human Geography and Planning at the University of Tasmania. His research includes urban political ecologies of green space, climate change adaptation, and environmental justice. He will lead the work on impacts of the climate hazards and spatial inequity in climate justice. He will supervise the Policy Co-design PhD student (PhD Policy Co-design) at the University of Tasmania.
PhD Policy Co-design: HDR PhD (Higher Degree by Research Stipend): $1,590 (yr1) | $2,604 (yr2) | $22,116 (yr3).
A PhD student will be funded for 3 years at UTAS by ARC funding to develop the policy co-design approach and will be primarily supervised by CI Byrne. UTAS will provide stipend top-up for the three years above the yearly ARC $32,212 funding and cover the stipend of the final 1/2 year of the 3 1/2 year PhD ($18,468 included in the year 3 total).

Equipment: $750 (yr1) | $0 (yr2) | $0 (yr3) |
5 Digital audio recorders (@$150):
University of Tasmania will purchase 5 digital audio recorders to support transcriptions of stakeholder / community workshops.

Other: $3,326 (yr1) | $3,326 (yr2) | $3,326 (yr3)
NVIVO Software Subscription (@$1426/year):
University of Tasmania will purchase NVIVO software subscription for each year of the three year project. $1426
Leximancer software subscription (@$1900/year):
University of Tasmania will purchase Leximancer software subscription for each year of the three year project. $1900

Part E - Classifications and Other Statistical Information (DP250100794)

E1. Australian Government priority areas

(Does this application align with an announced Australian Government policy? For reporting purposes, the ARC is capturing relevant Australian Government policies for your application. If your application does not align with an announced Australian Government policy, please select 'No'.

Note - This question was not included in the EOI application and must be answered.)

Yes

Full name of current Australian Government Policy and, if known, year of announcement.

Australia's Science and Research Priorities 2015 - Environmental change: resilient urban, rural and regional infrastructure

E2. To what extent does your application align with each of the following types of research activity?

(Indicate which type(s) of research activity the project best aligns with by selecting a percentage weighting for each research type. You may proportion the research across one or more categories, but the percentages must total 100.

Note - This question was not included in the EOI application and must be answered.)
Categories

Applied research	40%
Pure basic research	30%
Strategic basic research	30%

E3. Field of Research

(Select up to 3 (6-digit) classification codes that relate to the application. Note that the percentages must total 100.

Note - The answer to this question is auto-populated from the EOI application and is a locked field.)

Code	Percentage
330410 - Urban analysis and development	20
410103 - Human impacts of climate change and human adaptation	60
420602 - Health equity	20

E4. Socio-Economic Objective (SEO-2020)

(Select up to 3 SEO classification codes that relate to the application. Note that the percentages must total 100.

Note - This question was not included in the EOI application and must be answered.)

Code	Percentage
200406 - Health protection and disaster response	50
280111 - Expanding knowledge in the environmental sciences	30
190101 - Climate change adaptation measures (excl. ecosystem)	20

E5. Interdisciplinary Research

(This is a 'Yes' or 'No' question. If you select 'Yes' 2 additional questions will be enabled:
1. Specify the ways in which the research is interdisciplinary by selecting one or more of the options below and click 'Add'.
2. Indicate the nature of the interdisciplinary research involved (up to 375 characters, approximately 50 words).

Note - This question was not included in the EOI application and must be answered.)

Does this application involve interdisciplinary research?

Yes

Specify the ways in which the research is interdisciplinary by selecting one or more of the options below.

Investigatory Team
Methodology

Indicate the nature of the interdisciplinary research involved (up to 375 characters, approximately 50 words).

The research areas of the investigation team incorporates climate science, data science and machine learning, flood hazards, urban geography, and urban planning. The proposed methodology generates new science knowledge and data generation of risk mapping and applies those findings to policy formulation and population risk impacts.

E6. Does the proposed research involve international collaboration?

(This is a 'Yes' or 'No' question. If you select 'Yes' you will need to answer: If the proposed research involves international collaboration, specify the country/ies involved.

Note - This question was not included in the EOI application and must be answered.)

No

E7. If the proposed research involves international collaboration, please specify the country/ies involved.

(Commence typing in the search box and select from the drop-down list the name of the country/ies of collaborators who will be involved in the proposed project. Note that Australia is not to be listed and is not available to be selected from the drop-down list.

Note - This question was not included in the EOI application and must be answered.)

E8. How many PhDs, Masters and Honours that will be filled as a result of this project?

(For reporting purposes, the ARC is capturing the number of Research Students that would be involved if the application is funded. Enter the number of all student places (full-time equivalent - FTE) that will be filled as a result of this project, not just those requested in the budget for funding in the application form.

Note - This question was not included in the EOI application and must be answered.)
Number of Research Student Places (FTE) - PhD

2

Number of Research Student Places (FTE) - Masters

0

Number of Research Student Places (FTE) - Honours

0

Part F - Project Eligibility (DP250100794)

F1. Medical Research

(This is a 'Yes' or 'No' question. Does this application contain content which requires a statement to demonstrate that it complies with the eligible research requirements set out in the ARC Medical Research Policy located on the ARC website?

Note - This question was not included in the EOI application and must be answered.)

No

F2. Medical Research Statement

(Justify why this application complies with the eligible research requirements set out in the ARC Medical Research Policy located on the ARC website. Eligibility will be based solely on the information contained in this application. This is the only chance to provide justification, the ARC will not seek further clarification (up to 750 characters, approximately 100 words).

Note - This question was not included in the EOI application and must be answered.)

Certification

Certification by the Deputy/Pro Vice-Chancellor (Research) or their delegate or equivalent in the Administering Organisation

I certify that—

- I have read, understood, and complied with the *Discovery Program Grant Guidelines - (2023 edition)*, (Grant Guidelines) and, to the best of my knowledge all details provided in this application form and in any supporting documentation are true and complete in accordance with the Grant Guidelines.
- Proper enquiries have been made and I am satisfied that the participants and the organisations listed in this application meet the requirements specified in the Grant Guidelines.
- In certifying the National Interest Test statement, I have considered the requirements detailed in the Instructions to Applicants, including whether the National Interest Test statement is written in plain English and for the audience – the general public.
- The ARC reserves the right to audit any evidence on which an application is based.
- I have received confirmation that the Chief Investigator(s) will not be undertaking any Higher Degree by Research during the project activity.
- I will notify the ARC if there are changes to any named participant or organisation after the submission of this application.
- The listed participants are responsible for the authorship and intellectual content of this application, and have appropriately cited sources and acknowledged significant contributions to this application.
- To the best of my knowledge, all material personal and financial interests and Conflicts of Interest relating to parties involved in or associated with this application are disclosed to the Administering Organisation, and, if the application is successful, I agree to manage all Conflicts of Interest relating to this application in accordance with the *Australian Code for the Responsible Conduct of Research (2018), the ARC Conflict of Interest and Confidentiality Policy* located on the ARC website and any relevant successor documents.
- I have obtained the agreement, attested to by written evidence, of all the relevant persons and organisations necessary to allow the project to proceed. This written evidence is retained and will be provided to the ARC if requested.
- I have obtained the certification of all organisations contributing to the project (CEO or their delegate) that they support the project, will contribute to the resources outlined in the application, have complied with the Grant Guidelines and will abide by the relevant Commonwealth Grant Agreement, including the requirement to enter arrangements for intellectual property.
- The application, including all parties involved in or associated with this application, has undergone due diligence to assess risks from foreign interference in line with the *Guidelines to Counter Foreign Interference in the Australian University Sector (2019)* developed by the University Foreign Interference Taskforce.
- This application complies with the eligible research requirements set out in the *ARC Medical Research Policy*, located on the ARC website.
- This application does not request funding for the same research activities, infrastructure or project previously funded or currently being funded through any other Commonwealth funding.
- This application complies with the requirements to manage other similar or linked research applications by the participants and management is in place to avoid duplication of Australian Government funding if all applications are funded.
- If this application is successful, I am prepared to have the project carried out as set out in this application and agree to abide by the terms and conditions of the Grant Guidelines and the relevant Commonwealth Grant Agreement.
- The project can be accommodated within the general facilities of this organisation and if applicable, within the facilities of other relevant organisations specified in this application and sufficient working and office space is available for any proposed additional staff.
- All funds for this project will only be spent for the purpose for which they are provided.

- The project will not be permitted to commence until there is an ethics plan in place. The ARC reserves the right to audit any evidence on which an application is based.
- I consent, or where necessary, I have obtained the necessary consent(s) concerning all the parties, to this application being referred to third parties, including to overseas parties, who will remain anonymous, for assessment purposes.
- I consent, or where necessary, I have obtained the necessary consent(s) concerning all the parties, to the ARC copying, modifying and otherwise dealing with information contained in this application.
- I acknowledge, or where necessary have informed all the parties, that information from this application may be provided to other Commonwealth agencies to seek advice on national security or other matters.
- I confirm that potential risks, are factored into the proposed project and if awarded a risk management plan will be in place before the project can commence.
- To the best of my knowledge, the Privacy Notice appearing at the top of this form has been drawn to the attention of all the participants whose personal details have been provided in the Participant section of the application.