

<p>Institution: UNIVERSITY OF BIRMINGHAM</p>
<p>Unit of Assessment: C17 – Geography, Environmental Studies and Archaeology</p>
<p>a. Context</p> <p>Research and impact activities across the School of Geography, Earth & Environmental Sciences (GEES) are coherent, but presented as 2 submissions (UoA 17 & 7) for REF. GEES is part of the College of Life & Environmental Sciences (LES). UoA17 research is organised primarily around the themes of Society, Economy & Environment (SEE; including the Centre for Urban & Regional Studies, CURS), and Water Sciences (WS), with contributions from Environmental Health Sciences (EHS, including meteorology and climatology) and Geosystems (GS).</p> <p>Themes are aligned with major environmental and societal challenges focusing on: urban resilience, transitions and cultural economies, water and energy security, living with environmental change, sustainable use of natural resources, biodiversity, and data acquisition technologies.</p> <p>Hence, our research impacts on a broad spectrum of non-academic beneficiaries across the public and private sector, as well as wider society, to: shape UK and international policy, enable policy into practice, change governance, and improve cultural understanding and public engagement (as evidenced below by examples of activity between 2008-July 2013).</p>
<p>b. Approach to impact</p> <p>UoA17 staff are proactive in making research relevant and useful beyond academia. Our impact strategy is School wide and founded on developing long-term, reciprocal relationships with a community of stakeholders while extending reach using networks of stakeholders coalesced around specific research projects. The focus is on two-way knowledge transfer; thus, we use stakeholder relationships to yield internationally leading science that maximises impact. To this end, we enable: co-creation of research with stakeholders; put theory into practice via policy; changes to governance and cultural understanding of environmental and societal challenges.</p> <p>Our stakeholders often emphasise the need for interdisciplinary approaches, so we work across traditional academic disciplinary boundaries and with stakeholders with varied backgrounds (examples of interdisciplinarity are evidenced throughout REF5a).</p> <p>Early engagement with stakeholders builds strong networks that we develop further through stakeholder advisory boards, CPD activities with professional associations, educational engagement/ work placements, seminars series and think-tank events with practitioners. We emphasise co-creation of research agendas. For example, the £6.2M EPSRC programme grant (2012-17; Sadler, UoA13 colleagues) involved two grant co-creation workshops with stakeholders ahead of submission, and new governance structures for research management giving stakeholders significantly greater input into the research process. We focus on converting the most fruitful of the partnerships into long-term relationships of mutual benefit (e.g. the decade-long partnership with Birmingham City Council on socio-environmental risk mapping, REF3b). This partnership won a Lord Stafford Award in 2012 for growth and economic prosperity.</p> <p>Working in interdisciplinary teams, UoA17 staff make major UK, EU and international public policy impacts. The House of Lords Innovation in EU Agriculture report (Clark), led to debate in the House of Commons; it was responded to in the government's Policy Direction Report and shaped the EU Horizon 2020 agenda. UN commissioned research altered international policies for sustainable energy in housing (Golubchikov). The NERC-funded KTN Hyporheic Network (Hannah, Krause) led to an Environment Agency published handbook for environmental practitioners and policy generation/ advice in Defra on the management of surface-groundwater interactions. Projections of extreme weather events were presented to Members of the German Parliament and inform Public Safety & Security policy (Leckebusch). A number of our research projects have moved regional planning policy into practice. For example, the NERC-funded KTP BUCCANEER (Chapman, Thornes, REF3b) has determined forward planning policy <i>via</i> Birmingham City Council's planning process Core Strategy Document, Climate Change Adaptation Action Plan, and Green Living Spaces SPD. Housing research has contributed directly to the West</p>

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Midlands spatial planning policy (Lee). Urban environment and transport analysis based on data from mobile phone operators (Tranos) has been used by the Dutch Ministry of the Environment & Infrastructure in transport management.

UoA17 staff provide **advice to regulatory and policy stakeholders** in national and local government. We have advised and influenced decisions by government and national environmental bodies including Defra (e.g. Climate Change Risk Assessment - Chapman; LWEC Climate Change Report Card for the Water Sector - Hannah; Aichi biodiversity UK CBD targets - Sadler), the Environment Agency and Natural England (e.g. EA Ecoforesight - Hannah; UK Biodiversity Action Plan - Sadler). Carceral Geographies research has influenced national policy via the UK Ministry of Justice's national prison policy (Moran). We provide scientific guidance to the UK Technical Advisory Group for the EU Water Framework Directive to aid implementation (Hannah); and we were invited by NERC to join the Water Security KEP to prioritise research needs and strengthen knowledge exchange between the UK research base, industry, civil society and government (Bradley, Hannah, Krause). International policy impacts arise from work with UNESCO on global water resources (Hannah), Norway's National Corrections Dept. and the Danish Institute for Human Rights (Moran), and World Bank on informal economies (Round).

Impacts on creativity, culture and society and economic, commercial, and organisations are generated via engagement to re-imagine governance structures. Ongoing collaborations with Arts Council England, Visiting Arts, Birmingham Museums Trust, and the Jewellery Quarter Neighbourhood Forum (Jones) integrate stakeholders directly into the research programme. Our research has shaped the governance of the Greater Birmingham and Solihull Local Enterprise Partnership (Bryson, REF3b). New environmental monitoring techniques for urban climate and infrastructure (Chapman, REF3b) have led to wealth generation and entrepreneurship. MunichRe use analysis of extreme weather events over Europe (Leckebusch) to tailor risk solutions. A new TSB-NERC-EPSRC-funded-KTP with industry (RS-Hydro) will deliver a new water quality sensor system to market and increase UK business competitiveness and reach (Bradley, Hannah).

We **engage with the public** to change opinions and perceptions, using various mechanisms. All research is disseminated through our School website as well as other accessible media to reach different audiences (e.g. radio and TV broadcasts; Bryson, Chapman, Sadler), email updates, social media (e.g. Twitter and Facebook feeds on Carceral Geography, Birmingham Urban Climate Laboratory and Water Sciences). A Birmingham-led EPSRC-ESRC network grant led to the creation of the Energy Vulnerability Network, which provides public advice on energy provision, inequity and vulnerability across European and North America. A bespoke public engagement project (OPALWM, funded by the BIG Lottery) uses citizen science to mainstream research on ecological and societal importance of green space in cities (Sadler, REF3b).

Institutional facilitation of impact is provided at **University-level** via a range of initiatives (e.g. Impact Acceleration Fund to support flexible secondments, Medici entrepreneurship training, Enterprising Birmingham Fund, School Outreach, formation of the Public Engagement Group under the RCUK Concordant). Licensing, spin-outs IP and consultancy services are handled by the University's dedicated technology transfer company: ALTA Innovations Ltd. To enhance dissemination of our research and public understanding, we make full use of the University's Marketing and Press Offices, which translate research outputs into accessible formats for a range of non-academic audiences, and also the Ideas Lab, which creates documentaries based on our research. For example, UoA17 staff have presented several "Research in 60 Seconds" movies/podcasts and written "Birmingham Briefs" that explain the research evidence-base for timely news stories (e.g. climate change adaptation in cities - Chapman; energy efficiency in the home - Day; the alleged crisis in British manufacturing - Bryson; hydrological drought - Krause).

At the **College-level**, support is provided by the Director of Research & Knowledge Transfer aided by a Business Engagement Directorate and a College Business Engagement Partner, which provide public engagement and project management support. This ensures that planned research projects integrate and access pathways to impact. At the **School level**, we encourage staff to consider stakeholders in research by recognising impact activities in our workload model, and

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rewarding engagement by assessing it explicitly in our promotion criteria. We share best practice in impact planning through staff mentoring (e.g. guidance from those sitting on RCUK, EU and other committees) and national conferences (e.g. "Impact, Exchange and Making a Difference" hosted by the School in 2012). We involve stakeholders in teaching on all our MSc programmes, with the dual purpose of ensuring accreditation compliance (MSc Urban & Regional Planning; MSc Applied Met. & Climate) and learning about emerging end-user priorities. We train PGRs and PDRAs in public engagement using Unravelling Science: a private-sector company specialising in outreach.

c. Strategy and plans

Our **School strategy** for achieving impact will continue to be based on enhancing research power through **delivering interdisciplinary research that addresses directly stakeholder challenges** and **interfaces between public policy, civic society and academic enquiry**. Our fundamental aim is to **maximise impact by growing the amount of co-created research**, feeding priorities and concerns of practitioners and policy makers to academics as research is designed and undertaken jointly. The School Research Committee leads this strategic focus. Specifically, we strive to produce research of the highest calibre and bring research into practice with the highest degree of rigour to yield impacts in the near-, medium-, and long-term.

Moving forward, we will strengthen further ties to our stakeholders through research theme (listed in Section a) based User Fora that comprise a limited number of senior collaborators from our user community and meet annually to exchange knowledge and ensure translation of impact. Additionally, industry-academic events will continue to be an important mechanism for delivering impact (e.g. those held currently under the auspices of the Midlands Energy Consortium).

Notably, at College-level, we have won very recently an European Regional Development Fund project: **Accelerating Business-Knowledge Base Innovation Activity** (ABIA). We are in the process of recruiting two ABIA business engagement managers to identify SMEs in the West Midlands region requiring access to academic expertise. This activity will match SMEs with the most appropriate academics, broker the contact and engagement, and identify the best route for collaboration for both parties. The ABIA project will provide further support for engagement-linked travel and subsistence, consumables and events in 2014 and beyond.

We appreciate that impact activities require resources. Therefore, it is critical that we continue to: support staff to develop necessary skills, provide them with funding, and recognise that time they spend on impact activities will reduce capacity in other areas of work. Our annual Staff Development Reviews include discussion of impact activities; and we will provide enhanced, more focused mentoring for researchers that wish to improve the impact potential of their work. Staff will continue to be encouraged to apply for institutional support as well as external knowledge exchange and network grants. The School obtained 7 Knowledge Transfer Partnerships over this REF cycle; and we will use these new links as springboard for high impact as we move forward.

We will seek to improve on our current high levels of impact, drawing on the strengths of our present approach, while seeking to learn the lessons from successful and more challenging impact activities. Some of the key lessons learnt from the REF exercise regarding impact are: (1) the importance of recording stakeholder engagement as it happens, and (2) tracking evidence of impact throughout the whole chain from primary research to tangible impact. The first of these issues is being addressed by the implementation of the PURE information system, in which staff can record stakeholder engagement as living documents. Tracking impact has improved markedly since the initiation of the College Business Engagement Team in 2013.

d. Relationship to case studies

Our chosen case studies exemplify the diversity of impact delivery mechanisms and strategies (above). **Regional economies** (Bryson) and **urban heat island** (Chapman, Thornes) led to policy creation, development and review by putting **theory into practice**. **Biodiversity in cities** (Sadler) has transformed people's views of their local nature spaces through **cultural engagement**. **Route-based forecasting for winter road maintenance** (Chapman) has led to business innovation and wealth generation as well as impacts on local to national decision making and benefits for the general public via **co-creation of research**. Thus, **case studies map our impacts on economy/commerce, society, the environment, welfare, organisations, practitioners and policy**.