Institution: University of the West of England (UWE), Bristol

Unit of Assessment: 16 – Architecture, Built Environment and Planning

Title of case study: Advancing policy and practice for sustainable, climate ready suburbs

1. Summary of the impact

The majority of people in developed countries live in neighbourhoods characterised as 'suburban'. Yet, suburbs in their current form are unsustainable: they contribute to, and are at risk from, climate change. UWE's research on how suburbs can become more sustainable has been used by international agencies, Governments and local authorities to develop policies, and to identify and tackle climate risks. It has informed the OECD's stance on suburbs within urban intensification policies. It has helped shape the National Adaptation Programme for England, and improved UK Government's ministers' and departments' (CLG, DEFRA, DECC) understanding of climate risks. UWE's research has modified the delivery of the Government's flagship energy efficiency Programme: Green Deal, which retrofits dwellings for energy efficiency, to ensure that its implementation does not result in homes overheating. It has also benefitted local authorities, helping them plan effectively for climate change. Overall, it has helped ensure that suburbs contribute to sustainable development patterns, and remain liveable.

2. Underpinning research

The research was undertaken by *Professor Katie Williams* and her team (*Smith, Hambleton, Joynt, Hopkins*) in UWE's Centre for Sustainable Planning and Environments (***SPE***), in collaboration with academic, policy and industrial partners, since *Williams*' move to UWE (from Oxford Brookes University - OBU) in Sept 2007. It has concentrated on how suburbs can contribute to sustainable cities, but also be adapted (climate proofed) in the face of inevitable climate change. The research has been funded by EPSRC under the **Sustainable Urban Environments (SUE)** and **Adaptation and Resilience to a Changing Climate (ARCC)** Programmes.

Compact city policies, often encompassed in 'Smart' or 'Green' Growth strategies, are now central to spatial policies in most developed counties, and are advocated by OECD, World Bank and the EU. However, the theory behind these policies problematises suburbs as resource-rich places lacking in cultural and social value. Hence the policy response is usually either to intensify suburbs, making them more 'urban', or to exclude them.

Williams has built the case that instead of vilifying suburbs, urban policy makers should view them as part of the solution to sustainable cities (R1). In particular, changes in climate mean that we will need suburbs to provide desirable places for people to live sustainably, and space for green and blue (water) infrastructure, with benefits for food growing, autonomous forms of energy production, cooling, and surface water management (R1,2). Importantly, this means that existing suburbs will need development strategies that adapt them to reduce emissions and cope with inevitable climate change, most notably heat stress and flooding. In England, 22 million homes are in neighbourhoods categorised as 'suburban', so this is a major national challenge (R2,3,4).

The **Neighbourhood Design and Sustainable Lifestyles project (funded under SUE)** (*Williams* PI), studied 13 'sustainable' developments in England and showed that new neighbourhoods *can*, if designed well, provide the setting for sustainable lifestyles and land uses. If a range of sustainable design features are included, then people can be supported to make sustainable travel choices and engage in activities that develop social capital (R4,5).

The **Suburban Neighbourhood Adaptation for a Changing Climate (SNACC) project (funded under ARCC)** (*Williams*, PI) provided new evidence on the 'best' ways of adapting the UK's suburbs so they are resilient to climate change, and liveable (R3). The project developed conclusions with policy and practice relevance, namely:

- *Changes to the physical environment of suburbs must encompass adaptation and mitigation together,* not separately, as has been the case in England. We must also consider *all* potential climate risks simultaneously, not retrofit for one threat.
- *Overheating is a much bigger problem in the UK than previously thought***.** Modelling and further analysis of the different types of suburb, undertaken collaboratively by UWE and OBU (*Prof. Gupta*) demonstrated that in many suburbs 100% of homes will overheat by 2050. In England 2,000 people died prematurely in the 2007 heat wave. Projections are for a 3-fold increase in heat deaths by 2050, 14 million lost working days, and increased hospital admissions. Yet SNACC showed that many energy efficiency measures being promoted by Government, NGOs

and industry, such as additional insulation, could increase these risks.

- *Many adaptations have multiple benefits, are effective, acceptable and feasible:* e.g. shading and a micro-climate tailored approach (trees, greenery) are effective in neighbourhood cooling; sustainable urban drainage systems are effective in preventing much flooding, but rarely considered in existing suburbs.
- *Promotional campaigns and incentive schemes to encourage householders to make changes to their homes should not focus on climate change or risk:* people are more motivated by saving money, changing the image of their home and essential maintenance. Schemes should also be *targeted at key times:* (e.g. during house moves/improvements), and *by key agents,* like estate agents, providers of DIY products, and builders.
- *Institutional responses (from local authorities, utilities, NGOs) are most effective when they build on existing capacity,* and link to other policy agendas, such as fuel poverty, 'greening', and carbon reduction (R2,3,6).

Key research staff: *Katie Williams*, Professor of Spatial Planning, 01/09/07 – date; *Ian Smith*, RF, 03/08/98 – date; *Robin Hambleton*, Professor of City Leadership, 01/09/07 – date; *Jennifer Joynt*, RF, 28/01/09 – 31/08/12; *Diane Hopkins*, RF, 14/03/11 – 30/11/12.

3. References to the research

R1. Williams K, Joynt, J and Hopkins D (2010) Adapting to climate change in the compact city: the suburban challenge, *Built Environment,* Special Issue: The Compact City Revisited, 36(1), pp.105-115. http://dx.doi.org/10.2148/benv.36.1.105

R2. Williams K, Gupta R, Hopkins D, Gregg, M, Payne C, Joynt J, Smith I, Brkljac-Bates N (2013) Retrofitting England's suburbs to adapt to climate change, *Building Research and Information*, 41(5). http://dx.doi.org/10.1080/09613218.2013.808893

R3. Williams K, Gupta R, Smith I, Joynt J, Hopkins D, Bramley G, Payne C, Gregg M, Hambleton R, Bates-Brkljac N, Musslewhite C (2012) *Suburban Neighbourhood Adaptation for a Changing Climate: Final Report*, UWE Bristol. ISBN:978-1-86043-508-9. **– Available through UWE.**

R4. Williams K, Dair C and Lindsay M (2009) Neighbourhood design and sustainable lifestyles, in *Dimensions of a Sustainable City*, Jones C and Jenks M (eds), pp.183-215, Springer. ISBN: 978-1-4020-8646-5. **– Available through UWE.**

R5. Lindsay M, Williams K and Dair C (2010) Is there room for privacy in the compact city? *Built Environment*, 36(1), pp.28-46. http://dx.doi.org/10.2148/benv.36.1.28

R6. Gupta R, Gregg M, Du H and Williams K (2013) Evaluative Application of UKCP09-based downscaled weather years to simulate overheating risk in typical English homes, *Structural Survey,* 31(4), pp.231-252. http://dx.doi.org/10.1108/ss-01-2013-0005

Key Projects

- **The 'Neighbourhood Design and Sustainable Lifestyles' Project** (*Prof K. Williams* PI) **(£260,047)** (http://www.city-form.com/lifestyles), part of **The Sustainable Urban Form Consortium (CityForm)** (Professor *M. Jenks*, Oxford Brookes, PI, *Prof K. Williams* Co-I, plus 6 further Co-Is), EPSRC, £1,881,989 (http://www.city-form.com) (GR/S20529/01) (01/10/03 - 05/10/07). CityForm was rated 'tending to outstanding' in EPSRC's final review.
- **Suburban Neighbourhood Adaptation for a Changing Climate: identifying effective, practical and acceptable means of suburban re-design** (*Prof K. Williams* PI, UWE*, Prof R. Gupta*, OBU Co-I and *Prof G. Bramley*, Heriot Watt, Co-I) EPSRC-funded, £626,138. (EP/G061289/1) (1/08/2009 – 31/08/2012) in partnership with Oxford, Stockport and Bristol City Councils, 12 industrial partners and five international partners (from USA, Sweden, Australia and Portugal) http://www.snacc-research.org.

4. Details of the impact

The research has had an impact on urban and climate change discourse and policies at international, national and local levels.

Impact on OECD (Organisation for Economic Cooperation and Development) policies on suburbs within compact cities

The OECD sees the compact city as a significant plank of its Green Growth agenda. In 2012, it

launched a comprehensive report: **Compact City Policies: A Comparative Assessment** (S1), which is 'the first comprehensive report across the world that redefines the concept of compact city in today's context' (S2). Two of *Williams*' papers (R3,7) are cited, providing evidence on the role of suburban areas in future climate conditions, and cautioning the impacts on social sustainability (p.70,71). She was subsequently invited by the OECD to undertake an independent assessment of the report. The OECD's Senior Policy Analyst for Regional Development Policy states that *Williams'* research 'provided an important insight that compact city policies may not be a universal solution' (S2) and that '…by referring to her paper we pointed out compact cities' risk against extreme weather and natural disaster, which was lacking in previous draft versions' (S2), and that 'compaction may have a negative impact on privacy in the home and on social interaction' (S2).

Impact on the National Adaptation Programme (for England) and on Government's and industry's understanding of risks to suburbs from climate change

The SNACC research was undertaken at a key time for UK climate change policy development. Following the Climate Change Act (2008), the Government published the **National Adaptation Programme (NAP)** (S3) in July 2013. This sets out how government, businesses, communities and civil society should prepare for, and adapt to, climate change. Chapter 2 of the NAP 'Built Environment' reports on future risks of overheating and cites SNACC (p.26) as providing evidence on overheating risks at neighbourhood and individual building levels. The Built Environment chapter of the NAP, and the Government's broader understanding of the problems of adaptation, are also informed by *Williams et al's* research. **DCLG's, Head of Climate Change and Sustainable Buildings** team reported that SNACC's findings have 'strengthened the evidence base underpinning the Built Environment chapter' (S4), and that findings on 'overheating, flood risk and the importance of community resilience were particularly useful in helping **DCLG officials and Ministers** to understand future climate risks' (S4). He also valued findings around motivations for adaptation actions by householders, reporting they offer insights to DCLG into behavioural issues (S4). Similarly, **DEFRA's Head of Buildings and Infrastructure Team** reported that SNACC had improved understanding of how to adapt suburbs, particularly highlighting the risk of overheating, the range of effective solutions, the need for local councils to work with community groups to build capacity, and how adaptation has to be built into other policy interventions (S5). He reports that the research helped develop the approach of the '**Green Infrastructure Partnership'** in considering planting, shading and external microclimate for cooling (S5).

Prior to the NAP's publication, ***SPE's*** research helped inform a growing evidence base on adaptation that is now used across Government and by industry. In response to growing concerns about overheating from SNACC and others, DCLG commissioned an **Investigation into Overheating in Homes** (S6) which cites SNACC as a source of evidence (p 79, 80, 117,119). Concurrently, DEFRA was also keen that practitioners had up-to-date evidence, so commissioned an industry guide: **Overheating in Homes: An Introduction for Planners, Designers and Property Owners** (S15)**.** *Williams* provided evidence for this guide and a paper (R3) and the SNACC Final Report (R5) are cited. The guide is publicly available for practitioners (info@zerocarbonhub.org).

In 2012, SNACC's Final Report (R5) was launched in London by the **Right Honourable Don Foster, Parliamentary Under Secretary of State and Minister for Localism and Climate Change**. In his speech he stated he was: 'surprised to hear such a strong emphasis on overheating as a climate change issue', and concluded that '[t]his is an important report from which government is already learning. Central Government has a role, and I will make sure that the SNACC findings are taken on board as Government develops the National Adaptation Plan' (S8).

Impact on the implementation of 'the Green Deal'

The Green Deal is a scheme launched by DECC to enable householders and businesses to make energy-saving improvements without having to pay all the costs up front. It targets 14 million homes that could benefit from such improvements and will bring large numbers of new players into the energy efficiency market as authorised Green Deal assessors, providers and installers. Between January and September 2013, 71,000 Green Deal assessments had been completed.

SNACC, along with other ARCC projects (CREW, LUCID, see www.arcc-cn.org.uk) produced research findings that indicated that some Green Deal measures could create problems with overheating. *Williams* (and *Gupta*) worked closely with ARCC-CN and DCLG, DECC and DEFRA to provide accurate guidance, summarised in **Synthesised Advice on Identifying and**

Preventing Overheating in Homes under the Green Deal (S9). This resulted in DECC issuing guidance to Green Deal suppliers to ensure energy efficiency measures are installed correctly so that overheating is not a common problem. In addition, DECC is now working to ensure that energy efficiency supply chains, including those working within Green Deal, are aware of overheating risk, and that guidance is provided on homes which are most likely to be vulnerable, and the measures that could be taken to minimise risk. These changes mean that Green Deal should result in effectively adapted, comfortable homes, avoiding significant overheating problems.

The research on overheating and Green Deal from the ARCC projects received media attention during the warm summer of 2013. BBC News reported: 'Green Deal could lead to deadly summer overheating', which was followed by a similar article in The Daily Mail (both citing the ARCC-CN advice) (S9). Coverage led to commentaries on numerous housing, environmental and climate websites, as well as from professional institutions (e.g. RICS), raising public and practitioner awareness about the UK's preparedness for climate change.

Impact on local responses to climate change adaptation in suburbs

SPE's research has assisted local level strategies for suburban adaptation. As an example, the SNACC team has worked closely with Bristol City Council to develop jointly our understanding of local risks and strategies. The research has informed the Council's Sustainability Advisor and her team who have used SNACC's findings to provide the evidence base for assessing some climate risks in the city, but also to feed into strategic planning policy, community resilience, neighbourhood planning, asset management, protection of vulnerable people, and the City's own retrofitting programme (S10). SNACC has also provided case studies of 'successful adaptation' which are now used by local authorities (via London Climate Partnership), Sustainability West Midlands, and across Europe (via CIRCLE-2, a database of climate adaptation projects).

Overall, ***SPE's*** research has had a significant impact on international, national and local policy and practice responses to the very pressing issue of how best to adapt and plan neighbourhoods and suburbs in response to future climatic conditions.

5. Sources to corroborate the impact

-All available through UWE-

S1. OECD (2012) Green Growth Studies: Compact City Policies: A Comparative Assessment, OECD Green Growth Studies, OECD Publishing. http://dx.doi.org/10.1787/9789264167865-en, citations pp.4, 70, 71.

S2. OECD Senior Policy Analyst, Regional Development Policy, Public Governance and Territorial Development Directorate, Testimonial. **[1 on REF Portal]**

S3. H M Government (2013) The National Adaptation Programme: Making the Country Resilient to a Changing Climate, The Stationery Office, London, ISBN: 978-0-10-851238-4, citation, p.26.

S4. DCLG (Department for Communities and Local Government) Head of Climate Change and Sustainable Buildings, Testimonial. **[2]**

S5. DEFRA (Department for the Environment, Food and Rural Affairs), Head of Buildings and Infrastructure, Adapting to Climate Change Team, Testimonial. **[3]**

S6. AECOM (2012) Investigation into Overheating in Homes: Literature Review, DCLG, London, ISBN: 978-1-4098-3592-9, citations pp. 79, 80, 117,119.

S7. Zero Carbon Hub (2012) Overheating in Homes: An Introduction for Planners, Designers and Property Owners, for DEFRA and First Wessex HA, http://www.zerocarbonhub.org/overheatinginhomes8pp-2013_8March.pdf, citations pp. 6,8.

S8. Right Honourable Don Foster, Parliamentary Under Secretary of State and Minister for Localism and Climate Change, transcript of speech given at SNACC Final Report launch, 23rd October, 2012, Royal Institution of Chartered Surveyors, Parliament Square, London. [4]

S9. Adaptation and Resilience to a Changing Climate Coordination Network (ARCC-CN) (2013) Synthesised Advice on Identifying and Preventing Overheating in Homes under the Green Deal, synthesis of SNACC findings on all pages. http://www.arcc-cn.org.uk/wp-content/pdfs/ACN-overheating-and-green-deal.pdf

S10. Vilarkin L (2013) A Stakeholder View on the SNACC (Suburban Neighbourhood Adaptation for a Changing Climate) Research Project, Bristol City Council, http://www.arcc-cn.org.uk/wp-content/pdfs/SNACC-Evaluation-Jan2013.pdf