Adapting to Climate Change in the UK: A Water Sensitive Urban Design Approach Applied to NW Cambridge.

Ashley Woods[1 2] *, Celeste Morgan[1], Sarah Bell [2], Andrew Turton[1]

[1] AECOM Ltd, The Johnson Building, 77 Hatton Garden, London, EC1N 8JS, UK
[2] Department of Civil, Environmental and Geomatic Engineering, University College London, University College London, Gower St, London, WC1E 6BT, UK

Keywords: Water Sensitive Urban Design, Urban Planning, Climate Change Adaptation,

* Corresponding author: ashley.m.woods@gmail.com

ABSTRACT

Water Sensitive Urban Design (WSUD)-thinking [1] [2] [3] has the potential to address 4 impacts of climate change in the UK: surface water quality [4], flood risk [5], water availability for supply [6] and urban heat island effects [7]. Through industry-led innovation grants from the Technology Strategy Board (TSB) – the UK's national innovation agency –case-studies projects to assess the performance and viability of a range of strategies to mitigate the impacts of climate change are being trailed [8].

We take the emerging masterplan of the 136Ha development of North West Cambridge; a 3000 home, 100,000m2 commercial and academic space, 2000 student accommodating sustainable mixed-use development [9] [10] as our case study. We develop a WSUD-derived management scenario that utilises interconnected greenspaces throughout the site to manage surface water within the development and the neighbouring agricultural land using TSB funding.

The robustness of the WSUD scenario for NW Cambridge is tested against stochastically generated daily climate change weather files [11] from the UK Climate Project 2009 (UKCP09) [12] for a 2050s planning horizon. Through integrated modelling we assess performance of 5 increasingly "Water Sensitive" approaches to a classic piped-and-drained scenario for 4 management objectives: water quality improvement, flood risk mitigation, reduction in overall water demand and urban heat island impacts.

The results show that WSUD is a key tool for mitigating the impacts of climate change in urban areas, with the evolving NW Cambridge masterplan is being directly driven by the results of this research.

REFERENCES

[1] Wong, T. H. F. (2007). Water sensitive urban design – the journey thus far. *BEDP Environment Design Guide*, 11, 1-11.

[2] van Roon, M. (2007). Water localisation and reclamation: Steps towards low impact urban design and development. *Journal of Environmental Management*, 83, 437-447.

[3] Sharmon, N and Shamir, U. (2010). Water-sensitive planning: integrating water considerations into urban and regional planning. *Water and Environment Journal*, 24, 181-191.

[4] Whitehead, P. G., Wilby, R. L., Battarbee, R. W., Kernan, M and Wade, A. J. (2009). A review of the potential impacts of climate change on surface water quality. *Hydrological Sciences Journal*, 54 (1), 101-123.

[5] Lane, S. N., Tayefi, V., Reid, S. C., Yu, D and hardy, R. J. (2007). Interactions between sediment delivery, channel change, climate change and flood risk in a temperate upland environment. *Earth Surface Processes and Landforms*, 32, 429-446.

[6] Dessai, S and Hulme, M. (2007). Assessing the Robustness of Adaptation Decisions to Climate Change Uncertainties: A Case Study on Water Resources Management in the East of England. *Global Environmental Change*, 17, 59-72.

[7] Gill, S. E., Handley, J. F., Ennos, A. R., and Pauleit, S. (2007). Adapting cities from climate change: The role of the green infrastructure. *Built Environment*, 33 (1), 115-133.

[8] Technology Strategy Board (TSB). (2011). *What We Do*. Available: http://www.innovateuk.org/aboutus/whatwedo.ashx. Last accessed 21st June 2011.

[9] North West Cambridge. (2009). *Stakeholder Workshop and Public Exhibition: June 2010.* Available: http://www.nwcambridge.co.uk/file-uploads/download-file-00000000014.pdf. Last accessed 16th June 2011.

[10] AECOM. (2010). *North West Cambridge Masterplanning and Planning Stage 1 Report*. AECOM PDD, UK.

[11] Jones, P. D., Kilsby, C. G., Harpham, C., Glenis, V., Burton, A. (2009), *UK Climate Projections science report: Projections of future daily climate for the UK from the Weather Generator*. University of Newcastle, UK.

[12] Murphy, J. M., Sexton, D. M. H., Jenkins, G. J., Booth, B. B. B., Brown, C. C., Clark, R. T., Collins, M., Harris, G. R., Kendon, E. J., Betts, R. A., Brown, S. J., Humphrey, K. A., McCarthy, M. P., McDonald, R. E., Stephens, A., Wallace, C., Warren, R., Wilby, R., Wood, R. A. (2009). *UK Climate Projections Science Report: Climate change projections.* Met Office Hadley Centre, UK.