

<b>Institution: University of Bolton</b>
<b>Unit of Assessment: 16 Architecture, Built Environment and Planning</b>
<p><b>a. Overview</b></p> <p>The Inclusive and Sustainable Environments (IaSE) research group was first returned at the 2008 Research Assessment Exercise with five members of staff and one category C researcher. Of these, only two members of staff are being returned in this assessment, as the group has undergone changes through two major re-structuring exercises and staff turnover, since the last research assessment exercise. IaSE is now part of a new academic group, Engineering, Sports and Sciences, and has been restructured under the following areas: Regeneration and Facilities Management, Construction and Health and Safety Management, and Construction Materials and Structures.</p>
<p><b>b. Research strategy</b></p> <p>Inclusive and Sustainable Environments (IaSE) creates a focus for the development and growth of research in Built Environment disciplines (Building, Construction and Surveying, Civil Engineering, Property and Facilities Management, Regeneration and Sustainable Development) through the three themed research sub-groups of Regeneration and Facilities Management, Construction and Health and Safety Management, and Construction Materials and Structures (<a href="http://www.bolton.ac.uk/Subjects/Civil-Engineering-Construction/Research.aspx">http://www.bolton.ac.uk/Subjects/Civil-Engineering-Construction/Research.aspx</a>). It was borne out of the University's strategic plan (2006-2012) which prioritised the development of a "<i>track record in research, discovery and innovation</i>". This led to the employment of research active staff to boost research activities, and encouraging current staff to become research active through PhD studies, research projects and postgraduate research supervision. This strategy is being continued over the next five years.</p> <p>The 2008 research assessment exercise was the first submission for this research group under the banner of IaSE. The three sub-groups submitted were Construction and Facilities Management, Housing, and Transport Planning. Construction has now been split into a separate group, and Housing brought under the Regeneration and Facilities Management group. This will consolidate the existing research and collaborations, and support the growth and sustainability of research activities within the group.</p> <p>Energy, waste and transport which were prioritised under the previous research strategy have not been developed within this group. The emergence of the Institute for Renewable Energies and Environmental Technologies (IREET) overrode this development within IaSE. Transport has been discontinued because of staff departures, and replaced with Construction Materials and Structures in which we are beginning to develop a core of Civil Engineering staff. The group structure and growth areas have now been refocused based on areas of research on demand from employers, competencies within the group, and priority areas for the government such as sustainability (materials, processes and buildings) and building information modelling (BIM).</p> <p>It is acknowledged that there has been a shift in government from regeneration to localism and the 'Big Society'. At European level, the focus is on smart cities and sustainable development. By focussing on the key theme of sustainability, we are able to align our research to both national and European research agendas. Sustainability is also a common theme which bridges the three sub-groups in IaSE looking at management, consumption and production, and materials. The UK Government theme of the digital economy is also being explored as part of our research in education in this sector, and use of technology to enable improvements and innovation in practice.</p> <p>Collaboration with employers remains core to the research strategy in line with the University's history and vision of supporting 'professionals in practice'; and commitment to implementing the principles of the Research Councils UK (RCUK) concordat for engaging the public with research. It has adopted both community and employer engagement approaches in the development and dissemination of research. The University has developed its own version of the Knowledge Transfer Partnership (KTP) through the Industrial Doctoral Scheme (IDS). These are fully funded by the employers with in-kind contribution from the University.</p> <p>This has led to the development of long term research relationships with organisations such as Bolton at Home and Bolton Council, and funded research projects. Relationships with employers have included sponsored research projects and PhD students, and co-authoring research publications. Success of this strategy will be measured through the number of projects funded by employers, impact of projects on collaborating organisations, and joint publications to disseminate findings from</p>

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collaborative research.

The use of Memorandum of Understanding (MoU) with employers, research organisations and other universities has led to the development of relationships, for example, the Centre for Facilities Management. There are plans currently being developed to sign MoUs with Swiss and Dutch universities in the support of doctoral studies. This strategy has been successfully used by other research groups in the university.

Another strategy for research development is network membership. The university is a member of the European Facility Management (EuroFM) network, International Council for Research and Innovation in Building and Construction (CiB), and British Standards Institute (BSi).

ERASMUS exchanges create further opportunities for the development of research collaborations and new bilateral charters have been signed with Slovenská Technická Univerzita v Bratislave (Slovakia), Zürcher Hochschule für Angewandte Wissenschaften (Switzerland), Technische Universität Wien (Austria), De Haagse Hogeschool (Netherlands) and Vilnius Gediminas Technical University (Lithuania).

Research administration for the subject group lies under the leadership of Prof Myler, supported by the research co-ordinators, including laSE research team leader Dr Nelson, and sub-group coordinators. The subject group research committee reports to the Postgraduate and Research College, and the University Board of Studies for Research Degrees. It also reports to the University Research Ethics Committee on which it is represented by Dr Nelson.

There is 17.2 FTE staff under the Civil Engineering and Construction subject area. Of these, 4.2 FTE are returned for this REF assessment representing 24.42% of staff, one of whom is an early career researcher. This is slightly down on the 26% of staff returned for the 2008 assessment exercise, as a result of staff turnover and overall reduction in staff numbers. Future plans include appointment of more research active members of staff.

**c. People, including:**

The University is committed to supporting the career development of research staff and has implemented the principles of the RCUK concordat for career development.

**i. Staffing strategy and staff development**

Since the achievement of university status in 2005, the University has been committed to recruiting and developing research active members of staff. Staff recruitment focuses on attracting staff with not only industry experience, but research experience as well. With this in place, our profile of staff with PhDs has increased from 25% in 2007 to 42% in 2013 through staff turnovers and PhD completions. Majority of new staff appointed have PhDs, whilst those without are encouraged to start PhD programmes after appointment. The number of staff engaged in PhD supervision has also increased, with more collaboration across subject and research groups.

The university is committed to staff development, and has developed a training programme through a series of research workshops on PhD supervision for staff new to supervision. Existing supervisors are required to undertake CPD and attend a minimum number of training workshops annually.

Staff are encouraged to undertake doctoral studies sponsored by the university for which there is a policy in place, and there are currently 4 members of staff from this research group at various stages of PhD studies. One of the early career research staff, Dr Sherratt, obtained her PhD in 2012. Staff are also supported to disseminate research findings at conferences and workshops. Academic staff have a university wide peer mentoring scheme available to them.

**ii. Research students**

The growth of the postgraduate student population was made a priority in the 2006-12 strategic plan, and this has been followed through in the current strategic plan. The RAE 2008 funding received for our submission resulted in the appointment of four Graduate Teaching Assistants (GTAs) through competitive selection. We have grown PhD student numbers from 8 in 2007 to 16 by July 2013, though completions only grew from 1 in 2007 to 2 in 2013.

A new strategy has therefore been implemented to ensure timely completions of research studies. This includes strict monitoring and control of the postgraduate research process and milestones, training for research degree supervisors where appropriate, more support for research degrees students through weekly research forums at research group and university levels, personal tutoring, and mentoring. Operationally we have implemented fixed dates for progression and assessment panels to ensure student's progress is being timely monitored; reminders to supervisors regarding deadlines and

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progress of students; tailoring laSE weekly research fora to better support students' needs; encouraging student mentoring by peers and staff not involved in their supervision; and the use of 'critique friends' in providing feedback to students. Critique friends are not the students' supervisors, but are involved in providing feedback on students' work through various media.

Postgraduate research training and resources are provided at both University and research group levels in line with the Researcher Development Framework. At university level, research training is provided through the postgraduate research workshops, with online support through Moodle. There is also a Research Student-Supervisor agreement, which sets out the rules of association and captures expectations.

Research students are encouraged and supported to undertake the Postgraduate Certificate in Teaching and Learning in Higher Education (PGCHE). This is mandatory for PhD students on the GTA Scheme. Four of the current students have finished this programme and are Higher Academy Fellows, as have the two PhD completions.

Research students are evaluated at various stages of their MPhil/PhD journey using various monitoring tools. The first is via the postgraduate skills record. This ensures that an audit of students' needs is undertaken at the start of the postgraduate programme and updated annually throughout the period of study; with areas for further development identified and addressed. There is a registration stage (within 6 months for full-time and 9 months for part-time students), and a progress assessment midway through the research study. Further quality assurance is undertaken through annual progress reports and monitoring of students.

At research group level, we have instituted a series of weekly and monthly research fora to support the development of research staff and students. The weekly activities take the form of action learning sets, research workshops and seminars, academic publishing and opportunities for research staff and students to present their work to the group for peer review and critique. This is further supported by the academic groups' monthly research forum and the University's research workshops.

In addition, gaps in researcher skills identified through the postgraduate skills audit are addressed as appropriate. This may be in form of attendance at workshops or undertaking modules in relevant skills area. The university's annual Research and Innovation conference provides a medium for research students to present their research to peers and engage in debate. For most, this will be their first experience of academic dissemination. There is also the opportunity for researchers in the second to third year of study to attend the Vitae residential GradSchool. Four research students from this research group have so far attended the GradSchool.

laSE has also introduced a mentoring scheme for PhD students. This is however not mandatory for students. Mentors are selected by students from senior researchers to guide and support them through their studies. Peer mentoring is also encouraged through action learning sets.

**d. Income, infrastructure and facilities**

The total countable income for laSE during the period 2008 - 2013 was £139,838, up from £33,222 in the RAE2008 submission. This came from four projects funded by UK Local Government and Research Council namely: Community Engagement and Empowerment 2010-13 (£51,679), Sustainable Transport 2010-13 (£56,247), Systematic Urban Cycle 2009-10 (£4112) and Stay at Home 2013-14 (£4838). The second and third projects were led by Prof Parkin, who although left the university in 2011, completed the project as external consultant, and continues from August 2013 as visiting Professor. The first and last projects were led by Dr Margaret Nelson. The latter is on-going and due for completion in July 2014 (total grant income £25,000 plus in-kind contribution from university). Research income was received for other projects by Dr Nelson to the tune of £221,466, and Dr Fred Sherratt for £2000, but the sources of funding are not counted as part of the research excellence framework.

The university's strategy on income generation has shifted since the RAE2008; for example, we can only participate on European projects as co-investigators. It is envisaged that future research income will be primarily sourced from collaborating organisations through the Industrial Doctoral scheme and Knowledge Transfer Partnerships, augmented with some grant funding from UK research councils. A focus on employer engagement and developing short and long term research relationships is set to boost research income in this sector, especially as the sector is beginning to show signs of economic recovery. A strategy for ensuring continued flow of income independent of the economic position of the sector is currently being investigated to ensure sustainability of research.

The laSE research group has been impacted by three structural reorganisations in the last 6 years, as part of the wider university programme. It currently sits within the Engineering, Sports and Sciences academic subject group, which has created new opportunities for shared resources with regards to

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laboratories, IT resources (hardware and software), and technical support. There are dedicated laboratories for hydraulics, materials, soil mechanics and full-scale testing and concrete, and workshops, staffed with technicians who provide assistance to postgraduate research students in the use of equipment. There is also a dedicated design studio and product design studio with access to a wide range of software to aid design students. The Construction materials and structures group also have access to the laboratory facilities for the Institute for Material Research and Innovation (IMRI), with joint supervision of research students with IMRI staff.

The university's library services provide both printed published works and electronic print resources and support for library services. Online reading lists are regularly updated by academic supervisors. Students also have access to other university libraries through the SCONUL scheme. Electronic resource access is open to all staff and students across the university and remotely via OpenAthens. In addition, a dedicated self-service library has been set up within the laSE workspace. Students are encouraged to contribute suggestions for library books or material from their wider reading. The library is funded through book donations and purchase of relevant text from project funds. This flexible space houses a library of books, research papers, conference proceedings, theses, project reports, journals, professional magazines and other relevant literature to the research area. In addition there is a meeting/projects area, where students can work either quietly or in groups. This promotes cross fertilisation of ideas, and provides added support for researchers.

There are two dedicated postgraduate research student rooms with hotdesking facilities for part-time and off-campus students under the laSE research group. The hotdesk computing facilities have installed, specialist software (e.g. NVivo) for use as a shared resource. Postgraduate researchers also have access to printing and reprographic services.

**e. Collaboration and contribution to the discipline or research base**

Long term collaborations are being developed with organisations such as Bolton at Home and Bolton Council, The collaboration with Bolton at home for example, has led to our joint nomination as finalists at the HCA Skills for Better Places awards in 2009; development of an Industrial Doctoral Scheme (2010-2013); and the Bolton Regeneration Conference 2011, which was co-funded by the four neighbourhood management groups at Bolton at Home, and Dr Nelson's funded research project on Regeneration and Sustainable Communities. This conference enabled the University and its project collaborators to showcase on-going research; and led to the development of the MoU with Groundworks UK, research collaboration with Phoenix Community Housing, London and student projects with the University's Community Studies team

<http://www.bolton.ac.uk/MediaCentre/Articles/2013/May2013-14.aspx>

laSE members have been involved in various networks such as the CiB (part of our RAE2008 strategy), European Facility Management (EuroFM), and British Standards Institute (BSi). As part of our activities with the BSi, the team of Dr Nelson, Neil Davies (left 2013), David Walker and Mohammad Tammo (Graduate Teaching Assistant) were involved in the review of the BS8210 standard – Guide on Facilities Maintenance Management. Dr Nelson coordinated the second phase of the project.

Dr Nelson is research team leader of laSE. In addition to being lead investigator on five projects during this assessment period, and developing the area of regeneration and sustainable communities from 2007; she was also an investigator on the £375k JISC-funded ECCILES project (<http://www.bolton.ac.uk/Projects/JISC/ECCILES/Home.aspx>). Dr Nelson supervised 1 PhD student to completion, is currently supervising 10 PhD students, has externally examined 3 PhD students, and 1 Docent appointment for Tampere University of Technology, Finland. She is external examiner for the Facilities Management BA and MBA degree programmes at Sheffield Hallam University, UK. Her profile in Facilities Management research led to her election as Chair of the EuroFM Research Network group and member of the EuroFM board (2009-2010), and editorial board EuroFM Insight (2009-2010) <http://www.eurofm.org/groups/practice/eurofm-market-data/>. She was Chair of the Scientific Committee of the EFMC Research Symposia 2010 in Madrid and 2011 in Vienna, and editor of the proceedings of both symposia in the International Journal of Facilities Management. She was/is a member of the Scientific Committees for the EFMC conferences in Amsterdam 2009, Prague, 2013 and Berlin, 2014. She was a member of the organising committees for the EFMC research symposia 2007-2009, and academic lead of the Organising Committee for the Bolton Regeneration Conference 2011. She has been invited to deliver presentations at various international conferences including Slovak Facility Management Association FM conference 2012 in Bratislava. She was interviewed for Czech TV on 'FM in the European market' in 2010 (<http://www.ceskatelevize.cz/ivysilani/10249971631->

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[ekonomika/210411058390628/](http://ekonomika/210411058390628/)); and represented the UK and Ireland on the EuroFM European market data project 2010-2011. She is a member of the editorial advisory board for the International Journal of Facility Management (an IFMA publication) and on the editorial board of Urban Design International journal. She is a reviewer for the following journals: Facilities, Journal of Facilities Management, International Journal of Strategic Property Management, Intelligent Buildings International, Structural Survey, Journal of Financial Management of Property and Construction, Engineering, Construction and Architectural Management Journal, International Journal of Construction Management, Construction Innovation: Information, Process, Management, and member of the Emerald Literati network. She was a member of the Homes and Communities Agency (HCA) Placemaking Practice Review Panel, the BIFM NW Committee 2007-2010, and is currently a member of the EU smart cities and communities stakeholder platform. She was appointed a reviewer for the Joint Information Systems Committee Project Grants in 2009. She has been invited as a guest editor for the Spring 2014 edition of the International Journal of Facility Management on distributed and networked workspaces.

Dr Fred Sherratt is an early career researcher; and a member of: ARCOM Committee and workshop convenor, CIB W99 Health and Safety in Construction Group, and University of Westminster Centre for the Study of the Production of the Built Environment (ProBE) advisory group. She is a reviewer for Construction Management and Economics and the Journal of Safety Health and Environmental Research. She was invited to take part in the ARCOM 2012 David Langford memorial lecture for up and coming researchers, and a member of the panel for the ARCOM 2012 equality and diversity debate. She has been invited for guest presentations at the Centre for the Study of the Built Environment (ProBE), University of Westminster, 11<sup>th</sup> December 2012 on 'Well Being and Safety on Sites', and the Chartered Institute of Architectural Technologists (CIAT), University of Bolton, 7<sup>th</sup> February 2013 on 'BIM and Safety'. She won the Presidential Commendation and CIQ prize for paper most relevant to industry at ARCOM Nottingham Trent University 2009, and Emerald Publishing Best Paper Prize, 26th Annual ARCOM Conference, Leeds, 2010. Both were joint papers with Dr Farrell. Dr Sherratt was awarded £2,000 for the 2013 ASET Research Bursary for student led research into placement or work based learning. She has secured a contract with Routledge to write a textbook on construction management with Dr Farrell, and is in discussions with Wiley-Blackwell to publish an edited version of her PhD thesis as a textbook.

Dr Farrell is a referee for Construction Management and Economics and Proceedings of ICE - Management, Procurement and Law; and book reviewer for the Association of Building Engineers. His text book 'Writing your dissertation; Practical guidance for Students of the Built Environment' (2011), has sold over 1400 copies. He is external examiner for the BSc (Hons) Construction Management, Leeds Metropolitan University / Bradford College from 2009 to date, University of Cumbria and Edinburgh Napier University from 2013. He was external examiner at Sheffield Hallam University 2004-08, and University of Northumbria 2006/13. He has presented several international and European keynote addresses including Christian values in construction to the Salvation Army Bolton Citadel, 9 July 2011, and the University's Learning and Teaching Conference, Ras Al Khaimah, April 2011. He has 2 PhD completions and currently supervising 4 PhD students. He has also supervised circa 40 MSc dissertations; and examined one internal PhD student. He has won several awards jointly with his students including the CIOB prize best paper in project management at the 9<sup>th</sup> International Postgraduate Research Conference in the Built and Human Environment, The University of Salford, 2009 with J. Taylor. He has also collaborated on a joint conference publication with A Al Khalaf for the 2012 CiB world council conference in South Africa, and was the external in a PhD mid-term assessment at the Central University of Technology, Bloemfontein, South Africa. He contributes to the validation of undergraduate and postgraduate programmes in the University, and has had extensive involvement in the work of professional bodies, particularly the Chartered Institute of Building, for whom he was prior Chair of the Greater Manchester Branch for three years.

Dr Paul McMahon's research interests lie in ground investigation, contaminated land and geotechnics. He is a member of the editorial board Journal of Earth Sciences and Geotechnical Engineering (2011-date). He has been external examiner for the MSc/PgD in Sustainable Development, Energy and Management and MSc/PgD in Water, Energy and Waste at the University of Salford, between 2010 and 2012. He has also been involved in validations as an external panel member. In 2012 he was elected as academic staff representative to the University of Bolton Senate.

Dr Yassin Osman's background is in water and environmental engineering, and industrial engineering. His main research area is in urban pollution managements through integrated catchment modelling. Dr Osman is a reviewer with the Open Journal of Modern Hydrology (OJMH); Journal of Environmental Technology; and Journal of Water and Environment. He is a Chartered Engineer (UK Engineering Council); Chartered Water and Environmental Manager (CIWEM); and Chartered Environmentalist (The Society for Environment, UK).

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Other staff not submitted for this exercise but actively involved in research include:

Dr Gareth Whittleston, an early career researcher who presented at the EE2012 Conference in September 2012 and the IBEE2013 Conference Workshop in May 2013. He is currently supervising two PhD students and undertaken one internal PhD examination.

Dr Mostapha Boulbibane a recent appointee, is currently supervising 2 PhD students at Nottingham University and Singapore Polytechnic in the areas of geotechnical structures and soil mechanics, and has previously supervised 1 PhD and 5 MEng students to completion. He has held four post-doctoral positions in the United Kingdom, New Zealand and France. He has four book chapters and over 18 refereed publications.